Cultural models in HCI: Hofstede, affordance and technology acceptance.

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Cultural Models in HCI: Hofstede, Affordance and Technology Acceptance

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Thesis Summary

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Summary:

There are many models of culture available to Human-Computer Interaction (HCI) researchers and industry sector practitioners that could potentially help in tackling the challenge of designing across cultures. Models by Hall and Hofstede (investigated in this thesis) among others, are used by the HCI community to shape research, frame research findings and inform design. However, very limited information is available that proves the applicability of these models to the field. There is currently no large scale, multi-country study that addresses the suitability and applicability of cultural models to the topical areas covered by HCI. The consequence of this lack of validated applicability is that the community, due to a lack of tools or knowledge, have to rely on guesswork or rules of thumb when tackling cross-cultural research and design. The research described here sets out to investigate when cultural models can be applied and to which HCI topics.

This thesis explores the relationship and applicability of Hofstede's cultural model to two HCI topics which span Ito and Nakakoji's (1996) model of cultural impact on interaction. These two topics are cross-cultural affordance and cross-cultural technology acceptance. The thesis contingently also looks at the viability of doing cross-cultural research by using standardised tools and measures.

The first study described here was a research project exploring the differences in affordances between two cultures and how or if Hofstede's cultural model could be applied to explain the findings of this study. The results from the affordance study showed that cultural differences do exist at the affordance level of interaction. However, Hofstede's cultural model could not help explain HCI at the lower end of Ito and Nakakoji's cultural influence model, at the level of affordance. The affordance study also provided useful insight into the questionnaire method used for gathering data in the second, larger scale project on technology acceptance.

The second study which focused on cross-cultural technology acceptance, at the high end of Ito and Nakakoji's model, was a large scale, multinational, exploratory study. It investigated how Hofstede's cultural model could assist in understanding cross-cultural differences in technology acceptance as expressed when using websites. The research sought to understand how and if Hofstede's cultural model as measured by the Value Survey Module (VSM) would correlate with website acceptance as measured by the Unified Theory Acceptance and Use of Technology (UTAUT). Both models were measured using questionnaires in 11 countries and 6 different languages. Results of this second study showed that Hofstede's model was not helpful at the higher end of Ito and Nakakoji's cultural influence model. Indeed the results cast doubt as to the validity of Hofstede's model as measured by the VSM while validating the use of the UTAUT cross-culturally.

Declaration

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree

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This thesis in the result of my own investigation, except where otherwise stated, Were correction services have been used the extent and nature of the correction is clearly marked in a footnote. Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

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Related publications and research activities

The research described in this thesis led directly to three peer refereed publications:

Oshlyansky, L., Cairns, P. and Thimbleby, H. (2004). Breaking Affordance: Culture as Context. *Proceedings of NordiChi 2004*. Tampere, Finland, October 23-27, 2004.

Oshlyansky, L Cairns, P. and Thimbleby, H. (2006). A cautionary tale: Hofstede's VSM revisited. *Proceedings of British Human Computer Interaction Conference 2006*. London, September 11 - 15 2006.

Oshlyansky, L Cairns, P. and Thimbleby, H. (2007). Validating the Unified Theory of Acceptance and Use of Technology (UTAUT) tool cross-culturally. *Proceedings of British Human Computer Interaction Conference 2006*. Lancaster, September 3 - 7 2007.

Other publication and research in which the author of this thesis was involved during the course of the PhD research include:

Cha, H., Oshlyansky, L. and Cairns, P (2005). Mobile phone preferences and values: the UK vs. Korea. *Proceedings of the International Workshop on Internationalisation of Products and Systems*. Amsterdam, July 7-9 2005.

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Oshlyansky, L., Cairns, P. and Foy, K. (2004). User Centred Design and the Japanese User. *Proceedings of the International Workshop on Internationalisation of Products and Systems*. Vancouver, July 7-9 2004.

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1. Introduction to the research

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1.1. Introduction

Human-Computer Interaction (HCI) practitioners face the challenges of designing across cultures daily but have little in the way of proven tools or guidelines to rely on. Offering products globally enables companies to grow and expand beyond their home markets (Yunker, 2003) and companies may now sell more than 50 percent of their product outside their own borders (Del Galdo & Nielsen, 1996). Building systems for an increasingly global and diverse audience poses challenges that if not met result in culturally insensitive design with potentially harsh and costly consequences (Aykin, 2005; Yunker, 2003). For example, a mistake on a time zone map in Windows 95 which showed the disputed Jammu-Kashmir region as not belonging to India, caused upset in the Indian government resulting in a ban of the product (Brown, 2004).

In order to design culturally appropriate and sensitive products it is necessary to understand the audience in the target culture. Yet, the goal of cross-cultural HCI is not to study culture but to understand how culture influences the use of products and systems. HCI, like many other fields, needs an operational model of culture which it can apply in its own research domain (Hall, 1990). In order to gain understanding of culturally sensitive issues researchers in the field use existing models of culture to assist them in design and help their understanding of the end user.

The anthropologist Edward T. Hall (1990) first called for an operational model of culture which could be used outside the field of anthropology in 1959. Hall felt that a model of culture should help those who are not specialist in the field of anthropology do their jobs with an understanding of the extent to which culture affects everything in life. There are many such operational models now used by fields outside of anthropology, including the field of HCI. By far the most popular is that of Hofstede which has been applied in fields ranging from accounting to psychology to economics (1991; 2001; Hofstede & Hofstede, 2005; Søndergaard, 1994; Baskerville, 2003).

HCI research on cross-cultural user interface design has focused mostly on analysing existing designs and trying to understand their apparent differences in terms of cultural models. For example, this approach has been taken in comparing websites of different countries (Gould, Zakaria and Yusof, 2000; Callahan, 2005) and explaining the acceptance and adoption of technologies in different countries (De Angeli, Athavankar,

Joshi, Coventry & Johnson, 2004; Barnett & Sung, 2005; Maitland & Bauer, 2001). Although this approach has most certainly led to a greater understanding of culture and interface design, there is still much work to be done.

There are numerous questions to address the relationship between culture and HCI. What can be learned about cultures that will help in the design of better products and interfaces? How do cultural models help us design cross-culturally? How can cultural models help us understand what goes on in the field of HCI when we find cross-cultural design differences? Can cultural models be used to explain differences in design, use, and acceptance? No one piece of research can possibly answer all these questions, but HCI researchers have been expanding their knowledge of cross-cultural differences and developing designs and methodologies to address these differences. However, limited research has been done to understand when and to what topics the operational cultural models, such as Hofstede's (1991; 2001; Hofstede & Hofstede, 2005), can be validly applied in the field.

The literature review chapter of this thesis demonstrates that several models of culture are currently being used in HCI. The model most often used is Hofstede's (1991; 2001; Hofstede & Hofstede, 2005). However, there are inconclusive findings about the applicability of the model to HCI (Ford & Gelderblom, 2003). Indeed, the general validity of the model has been questioned (Kruger & Roodt, 2003; Spector, Cooper, & Sparks, 2001).

This thesis adds to the knowledge in cross-cultural HCI and begins to fill in missing empirical information about the applicability of Hofstede's cross-cultural model. It aims to add to the understanding of how and when cultural models can be usefully and validly applied. There is currently little literature that addresses these questions directly. And it is vital to begin answering them as cultural models are so often applied in the field. As the question is vast the approach taken here is to consider what might be deemed two extreme ends of HCI as seen in the Ito and Nakakoji's (1996) cultural influence model. These two are affordance and technology acceptance. The thesis considers whether cultural models can inform these aspects of HCI in a cross-cultural setting. The next section discusses the selection of these two topics in greater detail.

1.1.1. Approaching topic selection

Selecting the topics to study and the methods with which to study them is a challenge in a multidisciplinary field of research such as HCI. The field can be safely said to include, at the very least, elements of Computer Science, Cognitive Psychology and Ergonomics. Each of these fields has influenced HCI with its own theories and methods, giving HCI a number of different research approaches to choose from, and a large scope of topics to study. The challenge becomes selecting which questions to ask and then choosing the most appropriate research method or theory through which to explore it. A workshop at the 2005 British HCI conference focused on the question of theory and methods in HCI. The workshop's conclusions, presented in a panel at the same conference, were that different methods and theories provide different maps with which to navigate or approach a set of research questions (Thimbleby, Gulliksen, Oshlyansky, Bannon & Boivie, 2005). It is not that there is one correct approach, but that each approach will provide a slightly different view of the terrain (Decortis, Noirfalise & Saudelli, 2000; Kaplan & Duchon, 1988; Gulliksen, Boivie, Bannon, Oshlyansky & Thimbleby, 2005).

The Activity Theory approach to HCI and the interaction model described by Ito and Nakakoji (1996) had the most notable influence on the thesis work described here. A key inspiration was Activity Theory's (AT) overall focus on the context of use and its acknowledgement of the influence that culture plays on the use of technology. However, the overall approach used in the thesis was not entirely modelled on AT. As suggested by Nardi (1998) AT can be adopted as a framework where certain of its elements are used and others not. AT informed certain decisions that were made for this research; aspects of the methodology, for instance, were informed by concepts in AT. AT provides means by which to take into account the social and cultural context in which people use technology. The level to which a tool fits the target cultural or user group is an important factor to that tool's overall acceptance (Gobbin, 1998). This overall focus on culture as context greatly informed the way the research described in this thesis was approached.

The other major influence on this work was Ito and Nakakoji's model which plots out the influence culture plays at every stage of interaction (Figure 1.1). When selecting the topics to study it was valuable to select topics at opposite ends of the cultural influence spectrum (low and high), so the work would be able to more fully explore when cultural

models can be applied. If a given cultural model can explain findings at both extremes of the spectrum then it will most likely also be applicable to any finding falling in the middle. If the cultural model proves functional at the lower, simpler end of the spectrum then it should be applicable to other topics at this level. However, if the model cannot explain topics at the lower, simpler end of the spectrum then it may not be helpful at the more complex higher levels either. Alternatively, if the model is only helpful at the higher end of the cultural influence spectrum then it should not be applied without empirical validation to any topics at the lower end and only with caution to topics falling in the middle. In this way a fuller spectrum is explored making the findings more generally applicable.

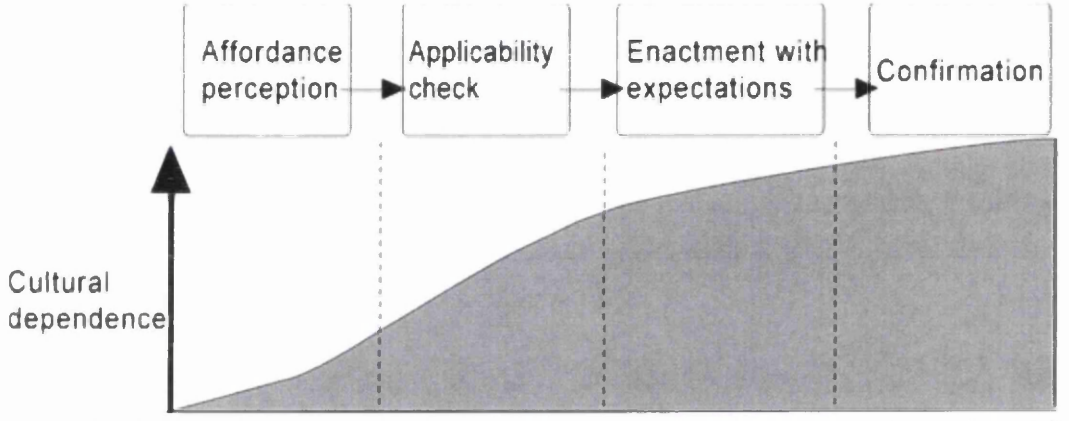

Figure 1.1: Levels of cultural dependence in interaction (based on Ito & Nakakoji, 1996)

Ito and Nakakoji (1996) propose a "two mode" model for the interaction of users with computers. The first mode is Listening Mode, where information is presented from the computer to the user. In this initial mode the user receives perceptual information, becomes aware of what is happening on the screen, then associates the perceived information with semantic meanings and finally reasons about the presented information. In the second mode, Speaking Mode, users provide information back to the computer. The first stage of Speaking Mode is the affordance perception phase, which is actually all of the Listening Mode. Once users have understood the information being presented they enter the phases of: Applicability check, Enactment with expectations and Confirmation. Ito and Nakakoji (1996) propose that culture affects all phases of Listening and Speaking modes, but has the least influence in

listening mode (affordance perception) of interaction (see Figure 1.1 for details - based directly on those provided by Ito and Nakakoji, 1996). The affordance phase is therefore proposed to be the one least influenced by culture, whereas the phases of Applicability check, Enactment with expectations and Confirmation are increasingly more influenced by culture. Affordance is then at one end of a spectrum, while more complex issues, such as attitudes and expectations, are at the other end.

As can be seen from Figure 1.1, affordance is at the simple, lower end of the cultural influence spectrum. Affordance, as an HCI concept, explores how objects can be used by a subject / user, or if a user can understand how something should be used (Norman, 1988; Draper & Barton, 1993). Several authors acknowledge the influence of culture on affordance (Norman, 1998; Hartson, 2003; Turner & Turner, 2002). Activity Theory's approach to affordance especially stresses the important role culture plays in the perception of what can be done with objects (Turner &Turner, 2002). Therefore affordance, at the low end of Ito and Nakakoji's (1996) spectrum of cultural influence and acknowledged by HCI researchers to be influenced by culture, was one of the topics selected for this research.

At the high end of the spectrum (Figure 1.1) are expectations and confirmation which are most influenced by culture. Ito and Nakakoji (1996) give several examples of interaction topics that fall within these categories. For example, expectation about a product's performance and perceptions of timeliness fall at this end of the spectrum. Many HCI topics can be said to exist at this high more complex end of the cultural influence spectrum. Of the possible choices, technology acceptance seemed most appropriate as it measures so many aspects of users' interaction with technology. Users' attitudes about, expectations of and preferences for technology and the impact of social influence are all covered in various technology acceptance models (Venkatesh, Morris, Davis & Davis, 2003). Aspects measured by technology acceptance models are to be found in all the phases of Ito and Nakakoji's (1996) interaction model. Also, Activity Theory demonstrates that the cultural fit of a technology can be a key determinant to its acceptance and use (Gobbin, 1998). This underscores the need to understand how cultural models can account for differences in cross-cultural technology acceptance. Technology acceptance was therefore chosen from among all other possibilities as the topic to address at the higher, more complex end of the spectrum.

In summary, two topics that span Ito and Nakakoji's (1996) interaction model were chosen to represent a wide spectrum of the HCI field. Affordance in the listening mode of the model is said to be least influenced by culture and falls at the lower end of the spectrum. Technology acceptance, which measures many aspects within the speaking mode of the model is at the higher end of the spectrum and most influenced by culture. Therefore, it was these two topics that were explored within the scope of this thesis.

1.2. Research questions and findings

Having selected the two spanning HCI topics it was necessary to further define the scope of the research. This thesis questions when Hofstede's (1991; 2001; Hofstede & Hofstede, 2005) cultural model can be validly applied in the field of HCI. It specifically looks at the applicability of Hofstede's cultural model to affordance and technology acceptance, the two topics selected to cover a broader range of HCI. It does not aim to establish a new theory or model of cultural differences but rather to understand the applicability of existing cultural models.

1.2.1. Contents

This thesis is made up of two distinct studies, one for each of the selected topics. First it addresses the cultural differences in affordance in two cultures, the United States and the United Kingdom. Then the thesis explores how and if Hofstede's cultural model can help explain the affordance findings (Chapter 3). The second part of this work, detailed in Chapters 4, 5 and 6, explores the connection between technology acceptance and culture. The research applies Hofstede's model to technology acceptance as measured by the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, et al., 2003). To answer the question of cultural influences on technology acceptance, 11 countries were sampled: Czech Republic, France, Greece, India, Malaysia, New Zealand, the Netherlands, Saudi Arabia, South Africa, the United Kingdom and the United States.

1.2.2. Findings

The findings of the thesis show that Hofstede's model does not help explain cultural differences in affordance nor does it seem to apply to technology acceptance. The work also casts further doubt as to the general validity of Hofstede's model, adding support to previous such findings of other researchers (Kruger & Roodt, 2003; Spector, Cooper, & Sparks, 2001). This thesis did not originally set out to confirm or question the validity

of Hofstede's model; however, the results from the technology acceptance study cannot be ignored.

A further outcome of the research described here is a validation of the technology acceptance model used in the work in nine national cultures. Previous research has found that care must be taken when employing standard measurement tools cross-culturally or potential cultural differences can be missed (Shimaneni & Dunckley, 2005). As the UTAUT, the technology acceptance model used here, had not previously been tested in these countries, its validation was a useful finding.

2. Review of Literature

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2.1. Introduction

Before describing the research completed for this thesis it is useful to first explore how the HCI community has approached culture. This chapter covers some of the cultural models used in HCI research and the ways that these models have been applied. Often HCI research into culture and cultural differences has focused on explanatory or hypothetical applications of cultural models. These analyses are a part of the post-hoc approach of taking research findings or existing designs and explaining their differences in terms of a cultural model.

Of the several cultural models referenced in HCI literature, those of Hall, Hofstede, Nisbett and Trompenaars are outlined here. Subsequently, the use and application of these models in HCI is examined. Finally the chapter considers what remains to be done in the field of cross-cultural HCI and how this work proposes to address some of these issues.

2.2. Models of Culture

There are many models and definitions of culture. As will be discussed, many models operationalise culture and systematically divide it into measurable, comparable parts. It is widely accepted that cultures are different, but because of the complexity of the concept of culture it is difficult to pinpoint a precise definition. Indeed, there is disagreement between various academic disciplines as to how best to define culture (Hall, 1990). Some definitions see culture as expressed through symbols, heroes, rituals and values. For others, culture can influence learning style, attitudes to change, memory, aesthetic tastes, information encoding and overall acceptance of technology (McLoughlin, 1999). Another definition sees culture as a set of learned and shared knowledge that makes one society different from another (Altarriba, 1993). These various definitions reflect some of the many attempts that have been made to understand how cultures differ and to organize these differences into concrete measurable elements.

This thesis considers national cultures as a context and a source of differences in how people relate to, work with and come to understand and accept technology. In this way national culture (society) is used as a context or frame of reference with which to understand the differences emerging between countries in the use and perception of technology. For instance, Norman (1988) points out cultural conventions can often

determine or constrain how objects behave and how they are perceived. National culture is also the unit of analysis used by two of the cultural models described below. In many ways, culture affects our context of use and our perceptions. It infuses our everyday lives. For example, psychologists have found that culture influences memory, judgement, perception and decision making (Middleton, 2002; Oishi, Diener, Lucas & Eunkook, 1999; Mann, Radford & Kanagawa, 1985; Nisbette, 2003).

HCI research has often taken existing models of culture from other disciplines and applied these in its own research realm. By far the most popular of these models is Hofstede's. Other models, appearing less often, but also applied, are those of Hall, Nisbett, and Trompenaars and Hampden-Turner. Each of these theories proposes a different way of understanding or qualifying the differences in culture. But, as Hall acknowledges, it is likely that there is no single correct way to explain culture (Hall, 1990) and that each of these theories provides a "different way of cutting the same pie" (Hofstede & Hofstede, 2005 p. 33). The sections below outline each of these models in some detail particularly that of Hofstede as it is used in this research.

2.2.1. Hall

Hall, an anthropologist, called for a more replicable, more non-specialist accessible approach to the study and definition of culture. Hall's research attempted to establish "elemental units of culture" so that the results of different research projects could be compared and contrasted. Other researchers have answered Hall's call and also attempted to find universal measures of culture, as will be seen in the following discussion. Hall believed that there was a need for a method that could identify the building blocks of culture, thereby allowing the impartial comparison of one culture to another. His quest for this method and these building blocks was driven out of the need to create a methodology as well as a set of data that was "teachable" (especially to non-specialists) and replicable. His need arose from trying to teach about culture to people outside the field of anthropology, such as Foreign Service employees and those working abroad. Any successful theory of culture would therefore need to be applicable to all cultures and useful and understandable to non-specialists, outside the field of anthropology as well as specialists.

For Hall, culture is a set of learned and shared behaviours as well as a way that a people communicate understand and relate to each other and to the world. Culture controls the

way that people organise life, think, their attitudes, their underlying understanding of family, government, society and even human kind. According to Hall, culture as a whole is a form of communication that is so deep that it is often beyond the conscious awareness of its participants (Hall, 1990; Hall, 1989). Hall's research into the "elemental units of culture" was motivated by a need for researchers to have a way to compare and contrast their results and to communicate them outside their own field. His quest for a theory of culture led to his identification of what he called the Primary Message Systems (PMS). These systems make up human activity; they are non-lingual forms of communication and are biologically based. To understand a particular culture one must understand how the culture relates to these systems. There are 10 PMS and each one refers to a different aspect of human activity and how it structures culture (Hall, 1990):

1. Interaction – everything people do involves interaction; to interact is to live and everything grows from it.
2. Association – interactions between people and groups; the way that societies are organized and structured.
3. Subsistence - from food to economics, from diet to characteristics of the economy and the values placed on work and work status.
4. Bisexuality – concepts of masculinity and femininity and what is considered appropriate or acceptable male / female behaviour.
5. Territoriality – the relationship to possessions as well as the use and defence of territory.
6. Temporality - the cycles and rhythms of life; the importance placed on time.
7. Learning – an adaptive device which varies from culture to culture; we learn to learn and we learn differently.
8. Play – humour and jokes and a strong link to learning.
9. Defence – religion, war, medicine and law are all devices of defence.
10. Exploitation – use of the environment and our extension of self into the environment (tools, clothes, shelters).

Interestingly, it is not these non-linguistic systems of human activity that Hall is most often cited for in HCI literature. Rather, within his larger theory Hall also defined the concept of high-low context cultures and it is this concept which is most often used in HCI literature. The concept refers to how information (a message) is stored and how it

flows. In high context (HC) cultures, the information contained in a message is mostly implicit; most of the information is internalised in the physical context or in the person themselves. The messages in a HC culture are simple with deep meaning. By contrast, in a low context (LC) culture the message's information is explicit; the meaning is given in the code of the message and little is hidden or internalised. For example, cultures such as the United States, Germany and Switzerland are considered LC whereas cultures such as China and Japan would be HC. Communication in the United States tends to be very specific; things need to be spelled out. In Japan communication is based more on what one already knows about an individual, and the emphasis is on remaining polite and retaining control rather than on spelling out what one wants and needs. HC cultures tend to be rooted in the past and slow to change, valuing tradition. LC cultures tend to be faster paced and more amenable to change and less concerned with the past and tradition (Hall, 1989). High-low context has been applied in HCI to explain design variation and to suggest reasons for differences in communication patterns.

2.2.2. Nisbett

Nisbett's model of culture does not provide measurable units, as Hall suggested, but aims to give greater insight into how East Asian and Western cultures differ. It has not been applied as widely in HCI as the other models discussed here. Nisbett's focus of study is not on national cultures but on the differences that exist generally between Western and Eastern cultures. As a social psychologist Nisbett's research explores the differences between Easterners and Westerners in the processes of thought, perception, attention, organisation of knowledge, understanding and various other mental processes. Although, he does not give his own definition of culture he broadly distinguishes those of Northern European descent from those of East Asian descent (Nisbett, 2003).

Nisbett differentiates Westerners and Asians as having either "holistic" or "analytic" thought patterns / mental processes. The concepts of holistic and analytic become Nisbett's points of comparison and analysis. Holistic thought involves perceiving the context and relationship between objects, looking at the "whole" rather than individual elements. Analytic thought focuses more on objects or their attributes outside of context. The holistic approach is more tolerant of a middle ground where contradiction and multiple views can be accommodated. The analytic approach, on the other hand, depends on rules that help explain and predict, and avoids contradiction. Nisbett assigns

Westerners to the analytic side of the spectrum and Asians to the holistic side and holds that these approaches underlie reasoning, thought, perception and understanding. The Eastern, holistic, sense of self is linked into a network of relationships and social obligations. The Western, analytic, sense of self attends more to people without constraints to relationships (Nisbett, 2003; Nisbett, Peng, Choi & Norenzayan, 2001).

These patterns of thought are based in thousands of years of history and philosophy and influence the culture's entire relationship with the outside world. For Asians (holistic view), there is a continuity and a relationship among objects and events that can not be broken down into constituent parts, for it is meaningless to do so. For Westerners (analytic view) it is important to categorise and find rules that govern the world so that predictions and control can be established. Westerners seek the rightness of one way whereas Easterners seek the middle way. These differences are self perpetuating as people develop different understandings, social practices and attend to different aspects of the world which will in turn reinforce a different world view (Nisbett, 2003).

2.2.3. Trompenaars and Hampden-Turner

One response to Hall's call for an operational model of culture is that of Trompenaars and Hampden-Turner (1997) who in their book, Riding the Waves of Culture, defined seven dimensions of culture. These seven dimensions form the operational units of comparison for Trompenaars and Hampden-Turner. They write for the management and business market and approach cultural differences with the intention of improving business communication and collaboration. Their research and data set is also based on the management market, formed mostly of participants in their management workshops. Trompenaars approaches culture as a common way to communicate between people. Culture is a system of shared meaning, shared beliefs and a shared, meaningful context. It is also a way in which "a group of people solves problems and reconciles dilemmas." Culture has three levels or layers:

1. Explicit culture, which is observable reality, such as food, language, architecture, art etc.
2. Norms and values, a shared sense of what is "good" and "bad" and "right" and "wrong."
3. Assumptions about existence that are biologically based, deeply ingrained ideas about how to organise life and people in order to solve the problems of survival.

These layers influence all actions and behaviour, yet all but the explicit layer are hidden from awareness.

Based on the large data set collected from their workshops and research (30,000 + participants), Trompenaars and Hampden-Turner defined their seven fundamental dimensions on which cultures vary. The first five dimensions identify how people relate to others, the sixth dimension identifies the relationship to time and the final dimension identifies the attitude to the environment. Some commonality with Halls PMS elements are evident. For example Hall's "exploitation" seems to relate closely to Internal – external attitudes to nature and his "temporality" relates closely to sequential – synchronic relation to time. The universalism – particularism and sequential – synchronic dimensions also relate to Nisbett's concepts of holistic and analytic.

1. **Universalism – particularism**: Universalism is a view that holds that there is a right way to do things and that this way will always apply. Particularism, on the other hand, holds that circumstances and relationships will influence what needs to be done and how.

2. **Individualism – communitarianism**: Is it the individual or the group that takes precedence and are individual goals more important than the community?

3. Neutral – emotional: The neutral approach to relationships is detached and about reaching an objective. The emotional approach is more focused on human relationships and emotional expression is not inappropriate.

4. **Specific – diffuse**: Specific relationships are defined and limited by contracts and strictly agreed business relationships. The diffuse relationships are defined by personal contact and getting to know the people involved in the relationship.

5. **Achievement – ascription**: Achievement based cultures are those in which status is built on accomplishments and experience. Ascription based cultures are those in which status is assigned and based on your connections or birth right.

6. **Sequential – synchronic relation to time**: Cultures vary on whether they value the now and the future or the historic and the past. Cultures also vary in their sense of time as linear or as circular.

7. **Internal – external attitude towards nature**: Cultures also vary on how they perceive the outside world. Motivations and influence comes either from inside the individual or from the outside environment. Is nature to be controlled and imposed upon or is it to be valued and synchronised with?

Trompenaars' dimensions have been applied in the field of HCI to discuss patterns of design across cultures. Given its dependence on management and business workshops for data the theory may be limited in its applicability outside its milieu. However, although this theory is not as popular as Hofstede's with HCI researchers, both have several dimensions in common.

2.2.4. Hofstede

Hofstede's answer to Hall's call for an operational cultural model that was useable to non-anthropologists has become very popular and is frequently cited. Hofstede defines culture as "collective programming of the mind" that makes one group unique from another. Patterns of thinking, feeling and potential activity all go into this programming. Culture is a collective phenomenon, consisting of unwritten rules of social interaction. It indicates what reactions are likely to occur in any given situation.

Culture exists in between human nature, which is shared by all people regardless of their ethnic or national origin and individual personality. Culture is learned throughout life. First, it is taught by parents in the form of examples and corrections, then by teachers and interactions with peers. The young in any one culture will vary in their "programming" from the old in the same culture. But the young in culture X will vary as much from the young in culture Y as will the old from culture X to culture Y. So the differences between cultures will manifest themselves beyond age differences and similarities.

Culture can be subdivided into layers, with values at the core followed by rituals, then heroes and at the very outer layer symbols. The layers of ritual, heroes and symbols are expressed through daily practices. Values are at the deepest layer of culture, the most difficult to change and therefore most persistent. Values are the stable elements of culture. Symbols which exist at the outermost level are more easily changeable and also most obviously observable. Likewise the layers acquired later in life are quicker and easier to change then those acquired early in life. Values are the elements of culture that

Hofstede's theory attempts to measure and classify with his Value Survey Module (VSM) questionnaire.

Hofstede readily acknowledges that cultures change and that today's multi-ethnic, modern national cultures are not as stable and homogenous as the cultures of the isolated, non-literate societies of the past. Of the levels of culture (national, regional / ethnic / religious, gender, generation, social class and organizational / corporate) those at the national level are the easiest, most expedient to study. Although nations may not be completely homogenous, they are the source of much of the collective "programming" of the people who live in them. And, while the scores of nations on Hofstede's cultural dimensions may vary, the relative position of one culture as compared to another will be fairly stable.

Hofstede's cultural dimensions are based on a large sample of employees from the large, multinational IBM, whom he studied over many years from the 1960's , 70's and 80's. Other sources were added to the large set of IBM data over the years and confirmed the dimensions originally formulated with the IBM studies. These dimensions are: Power-distance, Collectivism vs. Individualism, Femininity vs. Masculinity, Uncertainty Avoidance, and Long vs. Short-term Time Orientation. His fifth dimension, Long-term vs. Short-term time orientation is especially notable because Hofstede had not originally included it in his model. This dimension was added later with the help of Michael Bond who had lived and worked in Asia. It is a dimension particularly important to cultures influenced by Confucian religion.

1. **Power Distance**: The extent to which the people pf a particular culture are willing to accept unequal power distribution.

High Power Distance:

- Centralized decision making.
- Management and superiors are highly respected and have the last say in decisions.

Low Power Distance:

- Everyone expects to share in decision making.
- Management hierarchies are flatter and more open to questioning.

2. **Uncertainty Avoidance**: The extent to which a society fears and avoids uncertainty and uncertain outcomes.

High Uncertainty Avoidance:

- Strictly defined rules of behaviour and formality
- Things that are different or unexplained can be viewed as dangerous

Low Uncertainty Avoidance:

- Willingness to take risks
- More experimentation and / or innovative behaviour

3. **Individualism vs. Collectivism**: The extent to which people in the society define themselves as part of larger groups.

High Individualism:

- Social ties are loose
- Individuals expected to look after themselves

High Collectivism:

- Individuals are strongly incorporated into groups of family, clan, school
- Government policies often favour the group over individual rights

4. **Masculinity vs. Femininity**: The extent to which a society favours certain gender traits.

High Masculinity:

- Favours assertiveness
- Emphasis on competition

High Femininity:

- Focused on quality of life
- Importance placed on the well-being of relationships

5. **Long vs. Short-term Time Orientation**: The extent to which society is focused on the future as opposed to the past and present.

Long-term time orientation:

- Promotes virtue and persistence.
- Focus towards future rewards.

Short-term time orientation

- Emphasize the past and present.
- Fosters a respect for tradition.

Through many replications and international collaborations which provided additional data, VSM scores for more than 70 countries / regions are available (Hofstede, 1991; Hofstede, 2001; Hofstede and Hofstede, 2005).

A review of citation of Hofstede's work, published in 1994, reports: 274 citations in research using Hofstede's dimensions as a framework, 61 replications and over 1000 general citations of the work. Disciplines which draw upon Hofstede's theory range from Marketing to Business to Social Psychology and Accounting (Søndergaard, 1994). Another cross-disciplinary review found more than 1700 citation of Hofstede's "Cultures and Consequences." Academic disciplines in this review ranged from Education to Health / Medical to Economics and Law (Baskerville, 2003). Obviously his model has found an extensive and wide-ranging audience, including HCI researchers. Part of this popularity may be due to the simplicity of the five dimensional model that Hofstede uses. Also his, model is based on a short and easily administered questionnaire which provides the scores for each of the dimensions.

The model is not however without its critics. Hofstede's work has been criticised for its lack of insight into the richness and depth of culture. It has been suggested that a more qualitative or activity theory based approach would be more appropriate (Ratner & Hui, 2003; Baskerville, 2003). Further, the reliance on a sample of IBM employees in the 1960s and 1970s to draw conclusions about the wider cultures they live in is heavily critiqued. Hofstede's heavy reliance on the homogeneity of culture is in itself a problem. His further reliance on a very selective population set within each culture (IBM employees) to inform its key assumptions additionally confounds the issues with the work (McSweeny, 2002).

Baskerville (2003) cites anthropological and ethnographic studies that have fundamentally disproved the link between culture and nation, on which Hofstede's model relies heavily. This is also one of the main criticisms levelled at Hofstede's work by McSweeny (2002). Furthermore, Hofstede's indices are a measure of central tendency in a population (nation). These central tendencies ignore the large divergence in individual answers within a culture and ignore the deeper, richer meaning of social factors (McSweeny, 2002; Ratner & Hui, 2003). McSweeny's (2002) most significant censure of Hofstede's work is that using culture as a basis of analysis for the IBM studies was arbitrary. Hofstede could have just as easily stratified the data based on gender, religion, education, etc and found differences in the sample. "...what Hofstede 'identified' is not national culture, but an averaging of situationally specific opinions

from which dimensions or aspects, of national culture are unjustifiably inferred" (McSweeny, 2002 p.22).

Despite all these criticisms and the possible shortcomings of his research Hofstede's work continues to be cited and used. For example, sampling a single HCI conference, British HCI 2005, shows that four of the six papers discussing culture cited Hofstede. Again, it is possible that the attraction of this particular model is the way it operationalises culture into just five "elemental units." - the units that Hall (1990) noted were missing for cultural models to be useful to those outside of anthropology. Also Hofstede's VSM tool is simple to use and administer and has a proven track record outside of its original field. It is because of the popularity of Hofstede's model that it was used in this thesis, so as to begin to understand its utility and applicability.

2.3. Culture in HCI

HCI has applied cultural models in many different ways. Hoft (1996) suggests that cultural models can be used to:

1. Identify information that is cross-culturally appropriate.
2. Identify cross-cultural bias by applying the models to designer's own culture.
3. Identify effective metaphors.
4. Assess the degree of localisation that will be necessary.
5. Avoid cross-cultural mistakes which can cause offence.
6. Evaluate how suitable an international interface is.

Cultural models are sometimes used in a generative fashion, to build frameworks or suggest design guidelines. More often the cultural models are used to asses and evaluate the differences between cultures in existing designs. And finally the models are applied, more empirically, as tools to test designs or guidelines and more broadly to test the cultural model's applicability. In the following sections, HCI research that has used cultural models in one of the above mentioned applications will be summarised. This is followed by a short discussion of HCI research that has found cultural differences but without the citation or use of the cultural models reviewed previously in this chapter.

2.3.1. Cultural Models to generate guidelines or design frameworks

The first application of culture mentioned, as a generative tool to construct guidelines and design frameworks, has been attempted by several researchers. For example, Yeo (1996) proposed a strategy for making local, culturally appropriate (localising) user interfaces. Referring to these interfaces as "Cultural User Interfaces" (CUI), he suggests that first step is to localise the easily visible elements such as date, time, units of measure and currency formats, character sets and writing direction. Then the interface design would also address the less obvious needs of using appropriate visuals, functionality, metaphors and mental models. Developers and designers would work together with experts from the target culture as a team throughout the software development lifecycle. These teams would make decisions on what parts of the software required localisation, on how best to build the interface, on the system itself and on how to test it with the target population (Yeo, 1996). Since Yeo's call for more culturally appropriate designs, other HCI researchers have developed culturally targeted guidelines and design frameworks for both the front end interface and the back end software.

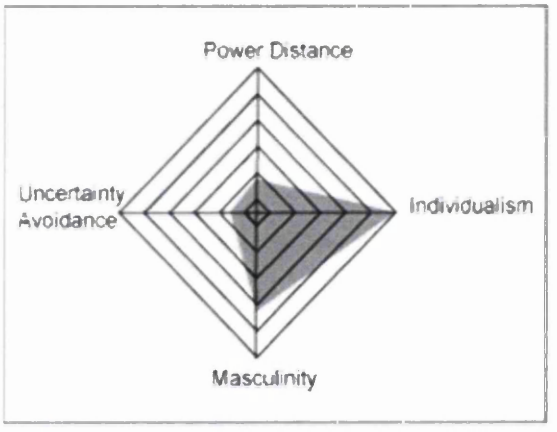

Figure 2.1 Culture's fingerprint

One interpretation of Hofstede's cultural model for HCI is Marcus and Gould's (2000) proposed design guidelines. For example, the design recommendations for high Power Distance cultures include: access to information should be highly structured, tall hierarchies, a strong emphasis on social and moral order and the use of business and social roles to organise and restrict information. For cultures scoring high on Individualism, Marcus and Gould's guidelines suggest designs that: cater to motivation based on personal achievement, contain images of

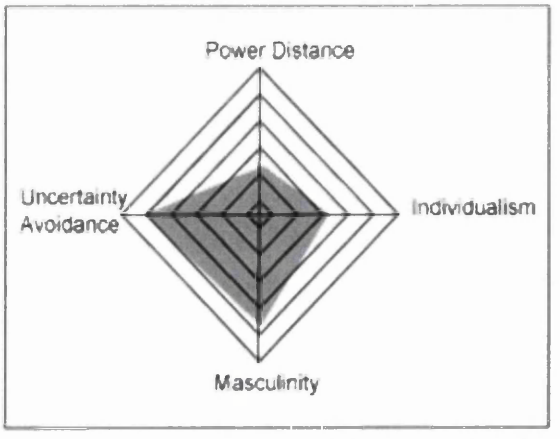

Figure 2.2 Website's cultural

success that stress materialism and consumerism, have written language that is rhetorical and tolerates extreme claims, gives prominence to youthful ideas and images, emphasises change and places the individual before the group. Marcus and Gould originally used existing website designs as examples from which to draw their guidelines. These guidelines were therefore created by drawing on existing designs analysed through the lens of Hofstede's cultural model. They are then meant to inform future designs so that they are more culturally appropriate. However, as with the critique levelled at Hofstede's work (McSweeny, 2002), it can be argued that the differences that Marcus and Gould observed were not necessarily cultural differences and that theirs is but one interpretation of the visible difference on the sites they studied. Others, such as Ford and Gelderblom (2003), have tested their recommendations and found mixed results. Nonetheless, these guidelines offer a concrete set of cultural design specifications on which web site designers can build.

Another approach to providing a cultural design framework is proposed by Smith, Dunckley, French, Minocha and Chang (2004). They explore how cultural differences, which affect website usability and acceptability, can be communicated to designers and developers. The authors acknowledge that "there is a lack in explicit demonstration that such theories of culture are actually applicable to and significant within website usability" (Smith et al., 2004 p. 67). The work described in this thesis begins to address this lack of demonstrated applicability.

Drawing on semiotics the authors endeavour to produce a model that will enable a better fit for the target audience and the industry / sector the site is designed for. One of their suggested design approaches is to first conduct a review of existing sites in each culture to gather design elements which are important to and appropriate for the audience, similar to the approach taken by Marcus and Gould (2000). This review produces a "meta-level taxonomy that includes factors such as:

- Use of colour and colour combinations;
- Use of culturally specific symbols;
- Linguistic cues (mixed, dual language and assimilation of one language into another);
- Culturally specific iconography (religious and charity giving, cartoon, geographical);
- Trust aspects as instantiated in site branding and signification." (Smith et al., 2004 p. 73).

Another design approach is to take a "cultural fingerprint" of a culture and a website (see Figures 2.1 and 2.2 for an example – figures based directly on those provided by Smith et al. 2006). This approach is presented by the authors as a way of balancing their suggested site review. The fingerprint is a way of using Hofstede's VSM scores for each country to map out where a particular country sits in the four dimensional space of Individualism, Masculinity, Power Distance and Uncertainty Avoidance. This fingerprint can then be compared to the "cultural fingerprint" of existing sites or proposed site designs for this culture. The site's "cultural fingerprint" would be calculated by a team of expert evaluators. By comparing the two fingerprints a design team can tell where the misfit between the target culture and the site design lies, quite easily (Figures 2.1 and 2.2). The authors continue to work on determining just how important or influential each of Hofstede's dimensions is for a given culture so that the calculation of fingerprints for each country can be improved and made more insightful (Smith, et al., 2004). Data collected for this thesis could contribute information to the cultural fingerprints of those countries it studied.

Another team of researcher working to understand how culture influences usability are Ford and Kotzé. They propose a more general framework within which to study the effects of culture on usability and interaction. Having found inconclusive results (Ford & Gelderblom, 2003) when testing the effects of Hofstede's cultural dimensions on user experience, Ford and Kotzé (2005) sought a better way to understand culture's influence. Their model identifies five general categories of variables that can influence usability and could have confounded their 2003 results. These five categories are:

1. subjective culture;
2. the interface;
3. user acceptance;
4. speed of performance;
5. objective culture.

To account for and encompass these possible confounds, the conceptual model the authors propose for testing usability cross culturally is broken up into three contexts: user characteristics, task characteristics and the environment (Table 2.1). The user characteristics context is further broken up into 3 classes: cultural, physical

characteristics and psychological characteristics. The psychological characteristics class includes several sub-classes which are investigated using the Unified Theory of Acceptance and Use of Technology (UTAUT) in this work. They include: perceived enjoyment, professional status, self-efficacy, ease of use and ease of understanding, computer anxiety, and computer self- efficacy. Task characteristics is further broken up into: job category, risk, demands, linkages and task execution. The environment category consists of: organizational environment, technical environment and physical environment. Each one of the classes under each category is further broken down into specific variable that would need to be controlled, isolated or accounted for in some way when doing cross-cultural usability research.

Use characteristics	
Culture	
	Objective and subjective
Physical	
	Age, gender, capabilities and limitations
Psychological	
	Cognitive ability, Motivation and Attitude
Task Characteristics	
Job Category	
	Task goal, tasks duration, task criticality and discretion
Risk	
	Errors, side effects
Demands	
	Physical, Mental, task technology fit
Linkages	
	Linked tasks
	Autonomy
Environmental Characteristics	
Organizational Environment	
	Management, communication
Organizational Culture	
	Performance monitoring, performance feedback, work autonomy, interruptions, hours of work, single / multi user environment
Technical Environment	
	Functionality, Specifications
Physical Environment	
	Workplace, conditions, workplace safety

Table 2.1: Contexts influencing usability (based on model in Ford & Kotzé, 2005).

Ford and Kotzé (2005) provide useful guidance about controlling for each of the variables they identify. This work explores several of the variables identified by them using the UTAUT as the tool of measure. Ford and Kotzé advice also includes a caution regarding using Hofstede's model with student participants. As Hofstede's questionnaire was originally intended for a more mature audience in a work context the questions may need re-wording or to be tested for appropriateness with the intended subject group. The work done in this thesis pilots Hofstede's questionnaire and does make small adjustments to clarify wording and instructions for the intended audience (see Chapter 4).

While Marcus and Gould's guidelines address the front end design and Ford and Kotzé model provides an empirical model for cross-cultural usability evaluation, Kersten, Kersten & Rakowski (2002) offer a conceptual framework for designing the back end systems to be more culturally appropriate. Kersten et al. draw on the models of Hall and Hofstede (among others) to assert that it is not just the interface that is affected by culture, but also the software sitting behind the interface. They argue that culture influences our core beliefs and behaviours and influences the way we approach business practice, an argument that all the authors of the cultural models reviewed here (Hall, Nisbett, Trompenaars, Hofstede) would agree with. Applications which appear as "e-business" such as online customer services, online banking etc are extensions of the social interactions that take place in the real world and are influenced and shaped by the culture of their participants. The authors suggest taking a more culturally aware approach to software development. This can be achieved first by determining which aspects of the software are culturally dependent and then designing these separately to be appropriate for each culture while maintaining a core set of "libraries" that are used by all instances of the software (Kersten et al., 2002).

All the research discussed in this section attempts to provide guidance to developers and designers. Whether for front end or back end, the guidance attempts to incorporate culture into design. As will be seen in the following section researchers have more often used cultural models as explanations.

2.3.2. Cultural models as explanations and frameworks

The field of HCI has frequently applied Hofstede's and to a lesser extent other cultural models to explain, describe or frame the cultural differences found in design. Many

studies have looked at two or more cultures, trying to compare them and understand how they vary in interface design and technology use or acceptance. Some of the efforts to apply cultural models to HCI are limited in their scope, either because of sample size, lack of comprehensive testing or verification and some have yield conflicting results. However, there is a large body of work in the area of cross-cultural HCI which falls into the category of using cultural models as explanatory frameworks.

One such study by Gould, Zakaria and Yusof (2000) involved a comparison of representative sites in Malaysia and the US in three domains: rail transport, education, and retail book sales. The two cultures have different ways of interacting and different priorities in their interactions. The researchers focused on two of Hofstede's dimensions (Power Distance and Individualism - Collectevism), and one Trompenaars' dimension (Specific Relationship) in order to frame the differences they found between the two cultures. These particular dimensions were chosen either because of the variability of the countries or their particular influence on one of the two cultures. The survey of sites found that Malaysian sites reflected the high Power Distance and low Individualism of the culture. Malaysian sites were focused on building relationships, establishing credibility and reinforcing how the user would be a part of the group. US sites, in contrast, were much more focused on individual user goals and task completion (Gould, Zakaria and Yusof, 2000). The sites, therefore, were reflections of social interactions as they occurred in each culture. Unfortunately the findings of this research cannot be generalised and some of the differences that the researchers noted six years ago may no longer exist on the updated sites. Likewise the results are open to interpretation; a different set of researchers could have found different results or choosing different dimensions or different cultural models may have yielded a totally different set of results. While giving HCI practitioners some interesting perspective on culture, these results may not help them understand how to design a site or technology product for either culture in the future. There is no reason to assume that the differences in design are there because of cultural differences – they could be caused by other factors not being considered by the researchers. This is similar to the criticism levelled at Hofstede's work in general by McSweeny (2002). Likewise there is no reason to assume that Hofstede's and Trompenaar's models are applicable as valid explanations for the findings.

In a similar study to Gould et al.'s, Callahan (2005) used Hofstede's model to frame an analysis of university websites in eight different countries. The home pages of 20 universities from each country were studied to evaluate the layout design, type and frequency of images and number of links per page. Callahan hypothesizes many correlations between Hofstede's country scores and these page elements. Most of the correlations found were weak but in the hypothesised direction. The best correlations were found in the use of logo images (correlated to high Power Distance) and the use of figurative images (correlated with more masculine countries). Another, similar study applied the Masculinity dimension to look at the different emotions and values expressed on university home pages in three countries (Dormann, 2005). Dormann (2005) concludes pages coming from more feminine countries more strongly expressed the feminine values as described in Hofstede's theory. Other researchers have also found connections between the interpretation of graphic elements and culture. Evers (2001) used the models of Hofstede and Trompenaars (among others) to explain the disparate interpretations of graphical elements on an interface by participants from different cultures. Evers (2001) acknowledges that although the participants, drawn from four cultures, did show differences in their understanding of the graphics presented these differences were not necessarily caused by culture. As all these findings show, it is effective to relate design differences to cultural models but none of the studies provide insight as to the validity of this relation.

It is not just interpretation and design differences that have been framed by HCI researchers in terms of cultural models. An explanatory approach has been used to analyse the adoption and acceptance of technology across cultures. A study of Automated Teller Machine (ATM) adoption and use in Mumbai, India found that class and culture influenced people's response to adopting and using a technology such as ATMs (De Angeli, Athavankar, Joshi, Coventry & Johnson, 2004). The researchers used Hofstede's model and Marcus and Gould's (2000) design guidelines to inform their research. The data gathered during the study is interpreted by the researchers in the light of Hofstede's model. Specifically, the dimensions of Power Distance, Individualism – Collectivism and Time Orientation were thought to be influencing adoption and acceptance. For example, the researchers felt that India's relatively high Collectivism explains the large influence family and friends (social links) have on adoption: "word of mouth and encouragement from friends and family were major

drivers to adoption..." (De Angeli et al., 2004 p. 38). The researchers conclude that Hofstede's model is good for post-hoc analysis of cultural differences in adoption and acceptance, but they did not feel that the model or Marcus's design guidelines were helpful in informing design. De Angeli et al. (2004) take a post-hoc approach to understanding adoption and acceptance, whereas the second study completed for this thesis tests the validity of applying Hofstede's model to acceptance.

Given De Angeli et al. (2004) findings, design guidelines may not be the answer for designing across cultures. Evaluating Chinese and American university students, Faiola and Matei (2005) found that users are better off using web sites designed by members of their own culture. The researchers report that users perform better and complete tasks faster on sites designed by and within their own cultures. This effect is attributed to the way that culture influences the design and organization of information. The authors suggest, citing Vygotsky and Nisbett, that culture shapes cognitive processes of both the users and designers of web sites and that in turn influences the use of the sites. This is an interesting insight into the future of web design as it suggests that the best way forward is not to depend on guidelines, however culturally sensitive, but to employ local designers building sites for their own market. This does not however negate the need to better understand how cultural models can help in other areas of HCI.

Similarly, a study of Korean and British mobile phone users found that the two groups have distinct preferences for the mobile phone designs, different frustrations and different favourite features which may account for different patterns of use and acceptance. However these preferences did not express themselves in the favoured choice of interface (Cha, Oshlyansky & Cairns, 2005). Cha et al (2005) created interface prototypes based on Nisbett's idea of holistic versus analytic mental frameworks and seemingly backed up by the self reported preferences of users. The finding suggested that users, regardless of culture, preferred the holistic framework which gave more contextual information up front. Cha et al.'s study seems to suggest informing design with cultural models may not lead to a better cultural fit of the interface. This again underscores the need to better understand when cultural models can be effectively and appropriately applied in HCI.

The perceived impact of Information Technology (IT) may also be influenced by culture. Researchers in the United States and Korea used the models of Hofstede,

Trompenaars and Hall to structure their arguments about the possible difference that existing between managers from these two countries in using Information Technology in decision making (Calhoun, Teng & Cheon, 2002). The two countries are very dissimilar in all of the cultural models; Korea is highly collectivistic and high context where as the United States is highly individualistic and low context. In this exploratory study, the researchers found limited differences in each group's perceptions of the impact that IT had for decision making. Items in the survey showing the most cultural impact were those that dealt with communication and human interaction. The researchers felt that the cultural values described by Hall, Hofstede and Trompenaars were possibly "flexible" when dealing with the use of IT in decision making. This seems to show that the cultural models are not suited to being applied in every HCI domain. Using Hofstede's, Hall's and Trompenaars' models, the researchers were not able to predict or adequately explain managers' perceptions IT's impact on decision making. Again these types of findings stress the need to better understand how and when cultural models can be applied in HCI, which is what this thesis aims to explore.

Culture has also been researched as to its influence on the diffusion, acceptance and centrality of the Internet as a whole. Hofstede's model in particular has been used to analyse the diffusion and acceptance of the Internet. Barnett and Sung (2005) found that Hofstede's Individualism and Uncertainty Avoidance are significantly related to the centrality of the hyperlink network (Internet) in a given country. The higher the nation scores on Individualism the more central that nation is likely to be in the Internet network. Maitland and Bauer (2001) found that country's relative Masculinity and Uncertainty Avoidance scores could help explain the rate of adoption of the Internet. In an earlier paper Maitland (1998) proposes several ways in which culture can impact diffusion of interactive networks, again using Hofstede's dimensions to suggest ways in which diffusion and adoption will be influenced. For example, the Power Distance dimension is proposed to affect the diffusion of networks that have a status value. Diffusion of interactive networks in general is proposed to be affected by Uncertainty Avoidance; "... in cultures with low Uncertainty Avoidance, all innovations, not just interactive networks, will be looked upon more favourably than in cultures with high Uncertainty Avoidance." (Maitland, 1998, p. 280). Hofstede's model, in the examples given, is again used in an explanatory fashion to account for what the researchers perceive to be differences caused by culture. But as yet there is nothing that shows that

Hofstede's model is valid for explaining the research findings of Barnett and Sung, (2005) and Maitland and Bauer (2001).

In a study very similar to the one undertaken in this work, Straub, Keil and Brenner (1997) review the Technology Acceptance Model (TAM) across three cultures. The researchers were able to validate the TAM in the three countries they sampled, Japan, Switzerland and the United States, although the predictive power of the TAM was not found to be strong in Japan. Hofstede's model was used by Straub et al. to construct ideas about how technology acceptance may be affected by culture. For example, the researchers surmise that low Individualism cultures will be less likely to communicate via computer mediated tools. This is because computer mediated communication, such as email, lacks the social cues of face to face contact and diminishes the group effect. The researchers use Hofstede's four original indices (Time Orientation is not used) to predict the likelihood of a computer mediated communication tool (email) to be accepted in the three countries. They do not go on to specifically test if their surmised cultural effects for each of Hofstede's indices actually influence acceptance as predicted, rather they combine the indices into one index to express the overall effects of all four indices on acceptance of email. Finally, the researchers find that there are significant differences between the three cultures' acceptance of email as a communication tool (Straub et al., 1997).

Hermeking (2005) provides an excellent synthesis of research in the field of marketing as it relates to culture and internet consumption. Here again the link between Hofstede's Individualism and Uncertainty Avoidance dimensions and Internet usage is brought forward. Hermeking cites several studies in the area of marketing which demonstrate that cultures with low Uncertainty Avoidance are more likely to adopt new technologies like the Internet. Internet consumption rates were also reportedly found to be highly correlated with Hofstede's Individualism dimension (based on the scores reported by Hofstede in 1991). The work does not acknowledge that there could be something unrealated to culture, such as work environment or age of the subject, that causes this correlation. Hermeking's (2005) final analysis accepts the limitations of models such as Hofstede's and Hall's, but maintains that they are important in explaining cultural influences on Internet use.

The models of Hofstede, Trompenaars and Turner and Hall himself, attempt to realise Hall's goal of a highly operational and easily applicable cultural model. Hofstede's model, especially, with its five easily calculated and applied dimensions has been poplar in many research fields, despite its limitations. This thesis takes a more exploratory and more sceptical approach to cultural models. It aims to understand if Hofstede's model can be validly applied and does not simply accept its applicability as self evident.

2.3.3. Testing cultural models in HCI

As can be seen from the studies reviewed here, much of HCI research has used cultural models as tools with which to frame and explain cross-cultural research. There are, however, far fewer examples in HCI literature of empirical tests of the cultural models as they apply to HCI.

One of these, undertaken by Ford and Gelderblom (2003), used Hofstede's cultural dimensions and Marcus and Gould's (2000) recommendations for interface design to test users' speed, accuracy and satisfaction levels with interfaces. The users were "matched" based on their cultural profiles to web sites with similar profiles. The researchers first took the cultural profile of the test participants (based on Hofstede's dimensions) and then took the cultural profile of the websites (based on Marcus and Gould) much like the "cultural fingerprint" recommended by Smith et al. (2004). Users were then asked to use sites with which they were either purposefully matched by cultural profile or purposefully mismatched. Ford and Gelderblom (2003) theorised that users would perform better (increased accuracy, speed and satisfaction) on sites that matched their cultural profile. For example a high Power Distance user would do better using a high Power Distance site. Their results suggest, surprisingly, that matching users' cultural dimensions to website interfaces judged to have those same dimensions (or similar profiles based on Marcus's design guidelines) did not positively impact speed, accuracy and satisfaction. The study did find that sites judged to have high Power Distance, high Uncertainty Avoidance, more Masculine and Collectivist profiles were thought by all participants to be better sites. The researchers also found that some cultural dimensions or combination of dimensions seem to override others, impacting usability more (Ford & Gelderblom, 2003). The conclusions drawn by the researchers lead to the primary researcher (Ford) developing a new approach to study cross-cultural usability (Ford & Kotzé, 2005). Since sites with a certain cultural profile were most

liked, these findings show that there maybe something going on at the cultural level but that it is not being adequately explained by the current cultural models. Furthermore, a need to understand how and when cultural models can be used to assist in design is crucial as matching cultural profiles did not seem to be helpful.

Vöhringer-Kuhnt (1998) attempted to find correlations between Hofstede's VSM and the Computer System Usability Questionnaire (CSUQ). Participants were asked to evaluate the IBM web site using the CSUQ and their responses were then correlated to the subject's scores on the VSM. The CSUQ measures effectiveness, efficiency, satisfaction and overall usability. Vöhringer-Kuhnt hypothesised that culture would effect the measures of effectiveness, efficiency, and satisfaction when using the IBM website. Of these factors, only one significant correlation was found, between Individualism and the total attitude towards the products' (the IBM website) usability. This study has some limitations; of the 30 countries sampled, several were represented by only one or two participants; indeed most of the participants came from Germany or the United States. As his sample was solicited online from volunteers for the HCI mailing lists and IBM employees it is somewhat limited in scope and accounts for the small sample sizes (poor response rate) for some of the countries he sampled. However, the results do not seem to indicate that Hofstede's cultural variables would be helpful to designers in cross-cultural design.

Another study which draws on the cultural models of Hall, Hofstede and Trompenaars to measure culture's impact on technology acceptance was done by Evers and Day (1997). The researchers use several cultural variables drawn from Hofstede, Trompenaars and Hall, to judge cultural impact on interface acceptance. The study uses a technology acceptance model extended by Day (1996) to include culture. Their study tested 206 international Asian students studying in Australia and 38 Australian students. Five aspects of design preferences and attitudes towards technology systems were measured. The five aspects examined how cultural design preferences influenced perceived usefulness and perceived ease of use and how these in turn affect the attitudes towards satisfaction with and anticipated use of a system. Evers and Day (1997) found significant differences between cultural groups and based on these results were able to compile a set of design preferences for Asian users. The culturally extended technology acceptance model also showed that the Chinese participants, among the international

students sampled, had different acceptance processes than the Indonesian participants. The Chinese students seemingly placed more value on preference, usefulness and satisfaction, while the Indonesians students sampled place more value on ease of use. The subject sample used, although large, was somewhat problematic as it was drawn from international students studying in Australia not participants located in their home country – but none-the-less the sample showed significant cultural variation. Other studies have also found cultural affects on acceptance and use. Sarker and Wells (2003), for example, discovered many factors affecting the acceptance of mobile devices, including cultural origin. The study found that the user's cultural origin affected the patterns of use and the acceptance and adoption of different modes of mobile communication (SMS- Short Message Service for example) at different rates (Sarker & Wells, 2003). Evers and Day (1997) call for more research of this kind to both verify and extend their results. To some extent this work does build on that of Evers and Day (1997), but uses a different technology acceptance model (UTAUT) and specifically tries to identify how the cultural dimensions defined in Hofstede's model relate to technology acceptance.

2.3.4. Other cross-cultural findings in HCI

As it is evident from the discussion thus far, HCI has applied cultural models often and with varied success. However, HCI studies have also found interesting cultural differences without using cultural models to frame their research findings. These include findings about how participants in different cultures respond to standard user testing techniques which provide important insight into cross-cultural testing. Cleary (2000) noted that during user testing her Japanese participants were more hesitant and more concerned about making mistakes than their western counterparts. Moreover, when they did make mistakes they took responsibility for those errors onto themselves (Cleary, 2000). Evers (2002) also found that cultures varied on what types of testing techniques worked best. Her sample included Dutch, Japanese, U.S. and U.K. users. Of these cultural groups the U.S. and Japanese users had problems with the questionnaires, although for different reasons. The UK and the Dutch users had problems with the think aloud method, although, again for different reasons (Evers, 2002). Given these findings, the research completed in this thesis ensures that any materials used are appropriate and acceptable in all cultures sampled by piloting with a multi-cultural pilot group and taking advice from local collaborators.

An earlier study by Evers, Kukulska-Hulme and Jones (1999) evaluated an online university site and found that culture affected what metaphors and icons were acceptable to users. Words like "campus" were found to be problematic as the concept (and/or the word) is very American in origin (Evers, Kukulska-Hulme & Jones, 1999). Other research has shown that shown users perform best on a fully translated and localised interface (Tractinsky, 2000; Cleary, 2000). Researchers have previously noted that cultural influence on design, technology use and acceptance goes beyond the need to translate an interface from one language to another. There are subtleties in the meaning that affect users reaction to and understanding of things like sounds, sorting order, images and icons and calendars used among other things (Belge, 1995; Russo & Boor, 1993). Translation has also been shown to be unhelpful in certain circumstances. A study in Botswana, a multi-ethnic, multi-lingual country, found that users preferred English be used in interfaces rather than one of the local languages (Onibere, Morgan, Busang & Mpoeleng, 2001). It seems that while users expressed a desire for a "localised" interface they preferred English as the interface language as all learn it and often used it in the work environment – English was a neutral choice. As these researchers have shown language can be a difficult hurdle to cross. The materials used in this research will need to be carefully worded and checked for appropriateness by local collaborators in all countries sampled. Language choice will also need to be informed by local collaborators especially in countries where multiple languages are the norm.

2.4. Choosing the questions to study.

Technology tools are artefacts of the cultures and context in which they are created and their suitability to a given group is a key component in their acceptance and successful use (Kuutti, 1996; Gobbin, 1998). The review of literature presented earlier gives a good indication of the numerous possible topics covered in cross-cultural HCI. Given that there has been little systematic analysis of how cultural theories can help the field of HCI to explain and predict, the list of possibilities was vast. Previous research has applied Hofstede's theory to explain existing differences in design and to attempt to create tools and guidelines by which designs can be made more culturally appropriate. But little has been done to empirically understand how cultural theories can be applied in HCI and indeed to what aspects. This is an enormous area to cover; the cultural theories have to be tested with a wide range of concepts and ideas in the field of HCI

across as many cultures as possible. The scope of such research is much too large for one PhD and one, quite literally, needs to start somewhere.

To narrow the scope of topics to study Ito and Nakakoji's (1996) model of cultural influence on users' interactions with computers proved most helpful. Their model suggests that all interaction is influenced by culture but some more than others, forming an escalating spectrum of influence from lower to higher. By taking topics at the extreme ends of the spectrum a wider range of subjects and a greater scope of HCI could be covered. The topics chosen were affordance at the lower end of cultural influence and technology acceptance at the higher end of cultural influence. Therefore this thesis aims to understand if Hofstede's cultural theory can be applied to understanding and explaining the HCI concepts of affordance and one model of technology acceptance.

This research is exploratory in nature and makes no assumptions about what correlations will be found between Hofstede's model and the two aspects of HCI it explores. However, previous research at least in the area of acceptance, adoption and diffusion (Maitland, 1998; Barnett & Sung, 2005; Maitland & Bauer, 2001; Hermeking, 2005; DeAngeli, Athavankar, Joshi, Coventry & Johnson, 2004; Evers & Day, 1997), has suggested that Hofstede's model would provide insight into cultural differences in this area. While previous research has also suggested that cultural differences exist in affordances (see Chapter 3 on affordance for a detailed discussion) there has been no attempt to explain these within the framework of a cultural model. Trillo (1999) suggests that culture influences usability and interaction at all phases of interaction. Affordance occurs at the time when "users become aware of what actions are available to them..." (Trillo, 1999). The awareness of the available actions can be influenced by the culture of the user; however, it is not thought that Hofstede's model will help explain affordance differences between cultures. With these caveats, and again emphasising the exploratory nature of the work as a whole, this work will endeavour to answer the following thematic question:

Q: Can cultural models be validly applied in HCI? Specifically can Hofstede's model be used to help explain and frame cultural difference in affordance and technology acceptance?

2.4.1. Selecting tools

Having selected two topics to explore within the context of culture it was necessary to select the tools with which to study them. As mentioned earlier Hofstede's cultural model is by far the most popular and most often applied in HCI research. As such it was used for this research and necessitated using his VSM94 (Values Survey Module 1994) as the questionnaire with which to measure cultural differences. Researchers have attempted to apply the VSM in correlational research before without success (Kruger & Roodt, 2003) and replications of Hofstede's research have not succeeded (Spector, Cooper & Sparks, 2001).

There was no questionnaire available for measuring affordance so one was developed by expanding on work previously reported in Bailey (1982 & 1996) and adding some new measures. Chapter 3 gives details of the affordance questionnaires. Selecting a technology acceptance questionnaire took some consideration as several are available and this is discussed below as is the decision to add a "visual aesthetics" measure.

2.4.2. Selecting a technology acceptance questionnaire

Previous research had used the technology acceptance model (TAM) developed by Davis (1989) to study acceptance across cultures (Evers & Day, 1997). The TAM had previously been extended by Day (1996) to incorporate the influence of culture. The TAM tool however does not encompass measures such as fun (Bruner II & Kumar, 2003), task fit (Wu, Chen & Lin, 2007), social factors and anxiety factors (McFarland & Hamilton, 2006), and attitude toward using technology (Venkatesh, Morris, Davis & Davis, 2003). Technology acceptance models, other than the TAM, incorporate these measures and one in particular synthesises the measures of several previous models into one cohesive whole.

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a unification of eight prominent models of technology acceptance. It is an integration of elements of the following acceptance models and theories: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behaviour (TPB), Combined TAM and TPB, Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognition Theory (SCT). Having synthesised these models into one, the UTAUT proves to be a better predictor of technology acceptance than any of the individual models it draws upon used separately

(Venkatesh et al., 2003). These models often share measures in common so that their synthesis leaves the UTAUT with eight constructs: performance expectancy, effort expectancy, attitude towards using technology, social influence, facilitating conditions, self-efficacy, anxiety and behavioural intention to use the system (Venkatesh et al., 2003). Each of these constructs is measured by four questions (with the exception of behavioural intention, which is measured by 3).

For the proposed research some slight re-wording will be necessary to make the questionnaire appropriate for the topic being studied and the subject sample being used. UTAUT is most often used to test the acceptance of actual systems being introduced in the work place whereas this work will test with university students and their use of websites. Other researchers have made small changes and adapted the questionnaire (Schaper & Pervan, 2004; Anderson & Schwager, 2004). The questionnaire is designed to withstand minor changes since the systems and settings in which it can be applied change, these should not harm its effectiveness or reliability (Venkatesh et al., 2003).

2.4.3. Adding an aesthetic measure to the UTAUT

Based on the findings of previous researchers it is evident that aesthetics play a key role in peoples' acceptance, adoption and use of technology. The role of aesthetics in technology acceptance and use is not accounted for in the UTAUT as there is no aesthetics measure. Several studies have noted the importance of aesthetics in the perception of usability and acceptance of products and technology (Bloch, Brunel, & Arnold, 2003; Brady & Phillips, 2003; Chawda, Craft, Cairns, Rüger & Heesch, 2005; Karvonen, 2000; Springston & Champion, 2004; Tractinsky, 1997; Tractinsky, Adi, & Ikar, 2000). Tractinsky (1997) has also found cultural differences in the link between perceived aesthetics and perceived ease of use. Given these previous findings it was important to add an aesthetics measure to the UTAUT.

There is however, no standard questionnaire available in the field of HCI to measure the importance of aesthetics to interface acceptance (Chawda et al., 2005; Lavie & Tractinsky, 2004; Liu, 2000;). Lavie and Tractinsky (2004) have begun to address this lack by developing a measure of perceived website aesthetic. This tool allows designers to measure user's reactions to the aesthetic quality of a site, but it does not measure the importance of aesthetics to acceptance and use. A review of literature uncovered a measurement tool in the field of Marketing developed to asses the importance of

aesthetics to individuals' relationship to products. The tool is called the "Centrality of Visual Product Aesthetics" (CVPA) (Bloch et al., 2003).

The CVPA consists of three dimensions, which measure the importance of aesthetics to people's perceptions of products. Two of the measures deal directly with how perceived aesthetics influence the decision to buy or own a product. There are 11 questions that measure Value, Acumen and Response of or for visual aesthetics (Bloch et al., 2003). Value measures the extent to which the subject feels that beautiful objects enhance the quality of life. Acumen measures the ability to evaluate and categorise different designs. Response measures the subject's response levels to perceived beauty. Not all the questions in the CVPA are appropriate for this research but on the whole the tool is. The CVPA was intended to measure response to physical product aesthetics. If product cost is not an issue, and in the case of websites cost is rarely an issue as most sites are free to use, then the CVPA can be used to measures how important aesthetics are in the decision to use sites. Indeed the authors recommend several expansion of the tool, one of which is web page layouts. It will also require some rewording to ensure an appropriate fit for the research question. As with the UTAUT, the changes will be as minor as possible and should not affect the overall reliability of the questionnaire.

2.5. Summary

This chapter has reviewed a sampling of the literature in HCI which address the many questions of culture and its affects on interaction and usability. It has also outlined the selection of research questions addressed in this work and the tools with which these will be answered.

The current literature in HCI, while providing insight into how cultures vary, has not yet supplied a definitive answer to how, when and with what accuracy cultural models can be applied in HCI. Much of the literature deals with applying cultural models post hoc and using them to frame explanations of observed differences. What is missing is a clear insight into how cultural models can be applied in HCI and when it is appropriate to do so. Given the large scope of this topic it is not feasible for one research project or PhD to cover all the possibilities. Therefore, this thesis is a beginning, covering two of the possible topics: affordance and technology acceptance.

3. Applying cultural models to affordance

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3.1. Introduction

The work in this chapter explores the lower end of Ito and Nakakoji's (1996) cultural influence spectrum, namely affordance. It also looks at the links between culture and affordance through a straightforward experiment using a questionnaire designed for this purpose. Specifically, the study described here asks if the difference(s) in mapping in two cultures which are very similar in Hofstede's cultural model, the United States and the United Kingdom, are enough to breakdown the affordance of certain everyday object such as light switches, dials, burners / cooker hobs. Work previously reported in Bailey (1982; 1996) is expanded upon using two new populations, university students in the United States and the United Kingdom. Finally the capacity of Hofstede's cultural model to explain these findings is discussed. The sections that follow begin with a quick description of culture and affordance and then go on to describe in detail the questionnaire experiment carried out to better understand the link between culture and affordance. Finally the findings are discussed in the light of Hofstede's cultural model and its inability to account for them.

3.1.1. Culture's influence

Cultural conventions and expectations can determine and constrain how people use and perceive objects (Norman 1988). Culture, in the case of this study national culture, can provide the context in which people learn to use and perceive devices and interfaces. Artefacts are created and used in particular activities which in turn are situated in a cultural and historic context (Kuutti, 1996). Hofstede's cultural model, which also relies on national culture as its basis, has been used to explain many things in HCI. From the work of numerous authors, it is known, that culture affects many aspects of human behaviour and human interaction with systems and interfaces (see literature review chapter). Hofstede's five cultural dimensions are frequently cited in the HCI literature to explain differences in design and communication style. For example, HCI researchers have found that culture influences interface design and user design preferences (Evers, Kukulska & Jones, 1999; Gould, Zakaria & Yusof, 2000; Marcus & Gould, 2000). But the applicability of Hofstede's model to these concepts is not yet clear. Researchers have called for more work to be done to better understand if the many links made to Hofstede's model by HCI are indeed valid (Smith, Dunckley, French, Minocha & Chang 2004). The process of evaluating Hofstede's model and its applicability is begun in this chapter by looking at affordance and culture.

3.1.2. Affordance and Culture

Gibson's original term 'affordance' referred to things in an environment which provide possible actions to an animal in such a way that the animal and environment are complementary (Bærentsen & Trettvik, 2002; Norman, 1988; Torenvliet, 2003; James, 1994). The term has been applied to many user interface design issues. Cooper (1995) referred to the concept on a more practical level for interface design, where affordance is applied more to what subjects think a thing should do. Norman used the term "perceived affordance" in the domain of interface design to mean the actual properties of an object that can be perceived. His definition focuses on how the object can be used by a user (Norman, 1988). Norman also included cultural and social constraints, describing affordance as a phenomenon shaped by a person's previous knowledge and experience. However, somewhere in its use or overuse "affordance" has lost some of its original meaning and intention (Torenvliet, 2003).

Researchers have attempted to better define and clarify the term "affordance." For example Cairns and Thimbleby (2006) have drawn parallels to symmetry. Other researchers have including in their definition some acknowledgement of culture. The term is widely used in HCI and has a wide range of interpretations. Several definitions of affordance attempt to consider culture as a context. Gaver (1991) provides a definition that tries to be useful for design. For Gaver (1991) affordance becomes perceptible properties of the environment that tell us what actions can be taken on a given object or interface. His definition includes a nod at the importance of culture: "...my culture and experience may determine the choice of examples I use here, but not the existence of the examples themselves." Draper & Barton (1993) have a similar view of affordance, saying that it is also about "whether a person can perceive how to operate something..." Turner (2005) reviews several interpretations of affordance and suggests that the term be classified as ether "simple" or "complex" affordance. Simple affordance is in line with Gibson's definition, whereas complex affordances "embody such things as history and practice" (Turner, 2005). Hartson (2003) suggests four kinds of affordance: cognitive, physical, sensory and functional. Like Gaver, Hartson (2003) acknowledges that there must be a shared cultural convention for there to be affordance.

Possibly the term affordance has become overused in the HCI community, being applied to a wide range of meanings (Torenvliet, 2003). Interface and product designs

are often based on some notion of affordance. Yet there is little empirical data to support the concept of affordance as a dependable one on which to base interface design especially in a cross-cultural context. There is no evidence to suggest that affordance is universal or that any cultural models currently used, Hofstede's for example, can explain the differences found in affordance. The term, as it is often used, ignores the context in which things are used and the background of the people using them. A notable exception to this is Activity Theory, which approaches affordance from a context of use perspective; seeing all activity and action as being situated in the context of use (Kuutti, 1996). This context is in turn influenced by the socio-cultural environment of the subjects (Bærentsen & Trettvik 2002; Kaptelini, Nardi & Macaulay 1999). Turner and Turner (2002) suggest a three level approach to affordance where the third level is a "Cultural Affordance."

> *"A cultural affordance (CA) is a feature or set of features which arises from the making, using or modifying of the artifact and in doing so endowing it with the values of culture from which it arises. Unlike simple affordances or those which arise from embodiment, CAs can only be recognized (in an extreme sense) by a member of the culture which created it."*

Turner and Turner (2002) build their classification of affordance based partially on the work of one of the founders of Activity Theory, Ilyenkov. Turner (2005) interprets Ilyenkov to mean that "affordances/significances are the visible manifestations of our culture." Ito and Nakakoji's (1996) definition sees affordance as the stage at which a user identifies what can be done with the information or interface in front of them and this is, of course, influenced by culture . It is this manifestation of affordances, one that is grounded in culture, which this work explores and hopes to clarify by testing the applicability Hofstede's cultural model to cultural differences in affordance.

There is little evidence available for when affordances work and when they do not, even for simple things like domestic light switches. In Ito and Nakakoji's (1996) cultural influence model, affordance is at the low end of cultural influence, but affected all the same. This study begins to fill in the missing data which exists when speaking about affordance cross-culturally. Empirical data is presented that shows the importance of culture's influence on perceived affordance, even in cultures that would be very similar

in Hofstede's cultural model, such as the United Kingdom and the United States. It also explored how or if Hofstede's cultural model can help us understand these differences.

The data gathered for this research is also compared to data gathered from other cultures provided by Bailey (1982; 1996) to construct an even wider picture of culture's influence on affordance. Bailey's influential "Human Performance Engineering: A Guide for Systems Designers" (Bailey, 1982; Bailey, 1996) lists recommendations for the best way of designing everyday objects. Among his recommendations is a list for directions of movement to accomplish the "ON" and "OFF" state. Up, right, forward and pull should be used for "ON," and down, left, push for "OFF" (Bailey, 1982). This is seemingly straightforward until one notices that most light switches in (for example) Britain map down to "ON" and up to "OFF," which is the exact opposite to the mapping in the US. The work reported here expands upon this observation through a simple experiment. Bailey (1982) also suggests that there are cultural differences in the way that humans respond to controls. An experiment with dials (pictured in Figure 3.1) suggested by Bailey (1996) will further explore the link between culture and affordance as it may provide interesting cultural differences as well. Finally the study looks at hobs, whose mappings do not differ in the two countries sampled here.

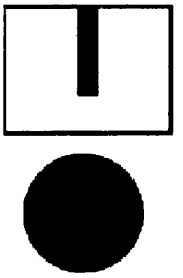

Figure 3.1 Dial

3.1.3. The Context of Use

The definition of affordance used for the study described here is Turner's complex affordance, which includes the influence of practice, history and culture. This definition is used in this work particularly because it includes the idea that affordances are created in and influenced by culture. We learn the names, properties and uses of objects within a context, culture for example. The mappings of objects and the way in which their design becomes standardised are often culturally constrained (Norman, 1988). Objects have affordance only when one plans to or is able to use them in intended (or unintended) activity (Bærentsen & Trettvik, 2002). If a glass of water is perceived to be usable as a paperweight then it has afforded this use, although it may not have been designed for it. Affordance ties in with Heidegger's notion of ready-to-hand, as discussed by Lucy Suchman (1987), and to Winograd and Flores (1986)

phenomenological perspectives on HCI. If the glass is never knocked over, spilling its contents, it will not lose its affordance (unready-to-hand or breakdown), say, as a paperweight. What happens when the objects used do lose their affordance because the context of use changes? What happens when people of one culture are presented with an object they know but one that works in ways that are different from their expectations? What happens when these everyday objects are then abstracted to be used in a computerised interface? There is a surprising lack of data available to answer these questions so they are now consider in this work with two student populations, one from the UK and one from the US.

Figure 3.2 US style switch.

Figure 3.3 UK style switch.

3.2. Hypothesis

The main aim of this study was to examine how Hofstede's cultural model could help explain cultural difference in affordance. First it was necessary to find these differences. To this end several hypothesise were generated about cross-cultural affordance and tested. It is hypothesised that objects with strong culturally specific cues, such as light switches (Figures 3. 2 and 3.3), will show strong cultural affordance bias even when abstracted onto paper questionnaires. On the other hand, objects that do not have a culturally standard design will show no such cultural bias in the two cultures sampled here, the UK and the US. The hypotheses for this work look at three sets of abstracted objects: light switches (Figures 3.2 and 3.3), dials (Figures 3.1, 3.4, 3.6 and 3.7) and stove tops / hobs (Figure 3.5).

> H1.1. The light switches will show strong cultural affordance bias with US and UK participants mapping ON and OFF to different positions.

To explore the first hypothesis two sets of images and questions were created. These are the light switches in Figures 3.2 and 3.3. As stated earlier light switches have exactly opposite mappings in the UK and the US so should provide an excellent exemplar of how culturally learned cues can bias affordance. Light switches were selected specifically because they have such a strong cultural predisposition.

H1.2. The dials will show no cultural difference between the UK and the US.

H1.3. The dials will show cultural differences between the US, UK sample and the samples provided by Bailey (1996).

Figure 3.4 Dial example

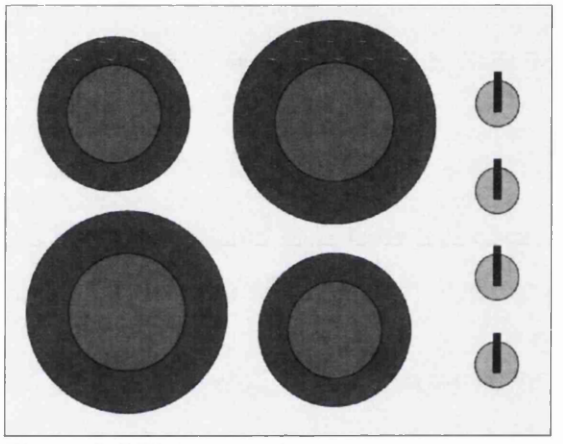

Figure 3.5 Hob example

In the US and the UK there are no differences in the way that the dials pictured in Figures 3.1, 3.4, 3.6 and 3.7 would work and so there would be no cultural differences expected, as expressed in hypothesis 1.2. However, Bailey (1996), from whom the dials experiment is taken, provides data for other cultures, Flemish, Algerian and Moroccan, and suggests a comparison study, which is being carried out here. Based on Bailey's suggestion the data gathered here will yield differences when compared to the data he provides. Should the null of hypothesis 1.3 be rejected it will provide evidence for the position of this work, that culture does affect affordance perception.

H1.4. There will be no cultural difference between the UK and US mappings of the oven hobs.

The final hypothesis is a neutral measure inspired by Bailey's suggestion of a "best" solution to the mapping of cookers with control knobs below the hobs (1982 & 1996). No differences are expected but it has been included to ascertain the overall agreement between US and UK participants on objects that have no culturally specific cues available. Cooker hobs or stove tops (Figures 3.5, 3.8 and 3.9) while called by different names in the two countries, are designed in very similar ways. The data collected here will be compared to Bailey's solution to see if it is suitable to both the US and UK users.

3.3. Methodology

The study took place in two universities, DePaul University in Chicago, USA and University College London in London, United Kingdom. Students were recruited from among the Computer Science and Human Computer Interaction courses at both universities. Participants completed a questionnaire addressing the above hypotheses during regularly scheduled lecture time at their given universities.

3.3.1. Participants

As this study looks at the influence of culture on affordance, it was important to recruit students who were native to the cultures being studied. To this end only those students who had reported the same country for nationality, country of primary and secondary education were used. International students, those students who were living in the country to study, were not used in the final analysis. In all 85 participants were used: 40 UK and 45 US. The samples were about evenly split by gender in both countries. The UK sample consisted of 17 women and 20 men (3 participants did not give their gender) with an average age of 22.9. The US sample contained 20 women and 18 men (7 participants did not give gender) with an average age of 27.4.

3.3.2. Materials

The questionnaire developed for this research (Appendix A) consisted of computer-rendered drawings of light switches, dials and stove burners / hobs and a demographic section asking questions regarding age, gender and national origin and affiliation. The images created for the questionnaire, with the exception of the dials which were adapted from Bailey (1996), were based on everyday objects found in both countries. Each question and image was chosen to address the above hypotheses. The light switches were particularly chosen because it was hoped they would yield a strong cultural

difference. The dials were included because they extended reported findings in Bailey (1996). Finally the Hobs were included because there appeared to be no cultural differences between the UK and the US for how these were mapped. The demographic questions were included to ascertain the cultural background of the participants and to match the UK and US data sets by age, gender and education.

In each image the participants were asked to make a decision about the state of the object presented or about the appropriate mapping for its use. In the case of the light switches the respondents were asked to state whether the image shown would mean that the light was "on" or "off" (Figures 3.2 and 3.3). The light switches looked like those typically found in the United States (Figure 3.2) or like switches typically found in the United Kingdom (Figure 3.3). For the dials the respondents were asked which direction to move the dial to achieve a certain effect, clockwise or counter-clockwise (see Figures 3.4, 3.6 and 3.7 for example directions). These dials examples are taken directly from Bailey's suggested experiment (1996). Finally two images of a stove burners / hobs were presented and participants were asked to map which knob would control which burner (Figure 3.5). In one image the knobs are to the right of the hobs / burners and in the second image the knobs are below the burners / hobs. The hobs were also those that would typically be found in either country, having controls either below the burners or to the right of them (Figure 3.5). These examples were also inspired by Bailey (1982, 1996), who provides a "solution" for cooker hobs with controls at the bottom.

The questionnaires were reviewed by both British and American collaborators to ensure that they were suitable and understandable to both audiences. Although both countries are English speaking, terms and word usage often vary. In the case of this study two major changes were necessary in the directions for the affordance questions and in the demographic section to ensure that both the US and UK participants would find them understandable. The changes included:

1. Using both the terms "cooker hobs" and "stove top" in the direction for Hob control mappings.

2. The question "Level of education complete" in the demographic questionnaire gave the choice "Secondary / high school" to accommodate the academic systems in both countries.

Once the wording changes had been completed the questionnaires were ready for distribution to collaborators in the United States and the United Kingdom.

3.3.3. Procedure

The questionnaires were given to participants in both countries during lecture time. In the US this was done by collaborating researchers. The participants were asked to fill in the questionnaires to the best of their ability and to answer all questions. The images were presented in random order to account for order effect. The completed questionnaires were collected from participants and in the case of the US mailed back to the researcher.

3.4. Results

Each set of results is considered separately beginning with the results for switches. The two styles of switches (US- Figure 3.2 and UK- Figure 3.3) are considered separately. Then the discussion continues on to examine the results of the dials data gathered here along with the data provided by Bailey (1996) for Moroccan, Algerian and Flemish participants. Finally the UK and US hobs results are presented. An example of the data collected for the study can be seen in Appendix B.

3.4.1. Light Switches

Table 3.1 for the US style light switch shows a clearly significant result; UK participants perceive the switches differently from US participants ($\chi 2$ = 39.85, $p < 0.000$, df = 1). As is clearly visible in the table UK participants thought the down position of the switch indicated it was "ON" whereas the US participants thought it was "OFF."

	ON	OFF	Participants per country
UK	28	12	40
US	2	43	45
Total	30	55	85

Table 3.1. US switch in down position

The findings in Table 3.2 for the UK style light switch are equally as strong ($\chi 2$ = 34.85, $p < 0.000$, df = 1). Again participants from the UK labelled the switch in the down position as "ON" and participants in the US labelled it as "OFF."

	ON	OFF	Participants per country
UK	36	4	40
US	12	33	45
Total	48	37	85

Table 3.2. UK switch in down position

3.4.2. Dials

As predicted, there was no significant difference between the US and the UK for any of the four images of dials presented. There was overall agreement among all participants in all case with the highest accord coming in the scenario pictured in Figure 3.6, where participants were asked to move the dial to the right. In this instance all but two respondents, both from the US, said the dial should be moved clockwise to accomplish the requested position. The dial image causing the most confusion for participants was the dial pictured in Figure 3.7, requesting that respondents move the dial down. Nine out of 45 of the US respondents and nine out of 39 of the UK respondents thought the movement required was counter-clockwise. The remaining respondents chose to move in a clockwise direction. The Tables 3.3 – 3.6 show the data gathered for each one of the dial scenarios.

	Clockwise	Counter clockwise	Participants per country
US	43	2	45
UK	39	0	39

Table 3.3: Move dial Right

	Clockwise	Counter clockwise	Participants per country
US	4	40	44
UK	2	37	39

Table 3.4: Move dial left

	Clockwise	Counter clockwise	Participants per country
US	36	9	45
UK	30	9	39

Table 3.5: Move dial down

	Clockwise	Counter clockwise	Participants per country
US	7	38	45
UK	8	31	39

Table 3.6: Move dial up

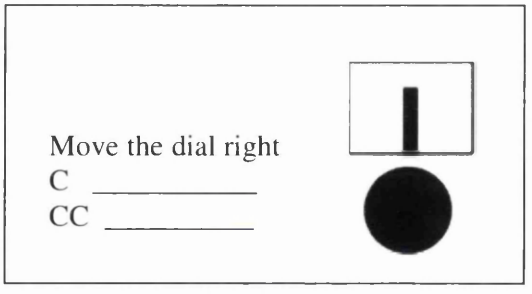

Figure 3.6: Dial, Move right

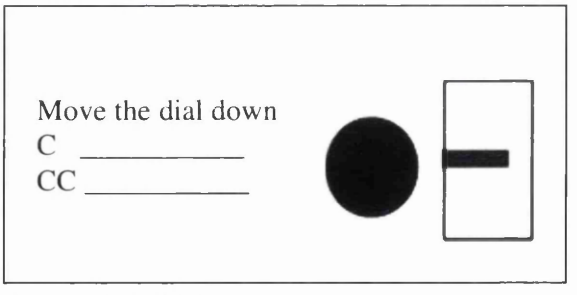

Figure 3.7: Dial, Move down

Bailey (1996) provides data for the dial experiment from three other cultures: Algerian, Flemish and Moroccan. Using this data and analysing it along with the US and UK

offers another insight into the way culture affects perceived affordance. All four dial scenarios were explored using the three samples provided by Bailey (1996) and the US, UK samples merged together into one group. A Chi-Square test was used to examine this data in detail and the results can be seen in Table 3.8. Tables 3.9 - 3.12 summarise the data for each country and each scenario. Obviously there is a cultural effect in the dial experiment; with all but the "Move Up" scenario yielding $\chi 2$ differences (see Table 3.8) with significances thresholds of $p < 0.001$.

	$\chi 2$	P	Df
Move Down	33.990429	0.00	1.00
Move Up	8.018369	0.05	1.00
Move Right	20.125835	0.00	1.00
Move Left	20.027419	0.00	1.00

Table 3.8: Chi Squared Values for dial scenarios

	Clockwise	Counter clockwise	Subjects per country
Flemish	9	21	30
Algerian	5	14	19
Moroccan	11	14	25
US+UK	66	18	84

Table 3.9: Move dial down

	Clockwise	Counter clockwise	Subjects per country
Flemish	11	19	30
Algerian	7	12	19
Moroccan	10	15	25
US+UK	15	69	84

Table 3.10: Move dial up

	Clockwise	Counter clockwise	Subjects per country
Flemish	25	5	30
Algerian	14	5	19
Moroccan	17	8	25
US+UK	82	2	84

Table 3.11: Move dial right

	Clockwise	Counter clockwise	Subjects per country
Flemish	3	27	30
Algerian	8	11	19
Moroccan	8	17	25
US+UK	6	77	83

Table 3.12: Move dial left

3.4.3. Hobs

The data collected for the Hobs experiment came back as expected, showing no difference between the UK and US respondents (bottom: ($\chi 2 = 5.064941$, $p < 0.3$, $df = 3$, right: ($\chi 2 = 4.4469$, $p < 0.3$, $df = 3$). There are no strong cultural cues and no strict difference in how each hob is mapped to control knobs in each country. Tables 3.13

and 3.14 summarise the data from the hobs. Figures 3.8 and 3.9 show the most popular mapping patterns for both the Right and Bottom configurations and give the number of respondents that selected these patterns. As can be seen in Tables 3.13 and 3.14 the easiest choice for participants to make was when the control knobs were at the bottom of the cooker hobs.

	Pattern: 1	2	3	4	Other	Sample size
UK	8	9	6	10	7	40
US	7	13	14	7	4	45

Table 3.13: Patterns chosen when control knobs are at the bottom

	Pattern: 1	2	3	4	Other	Sample size
UK	15	9	8	4	4	40
US	25	11	4	4	1	45

Table 3.14 : Patterns chosen when control knobs are at the right

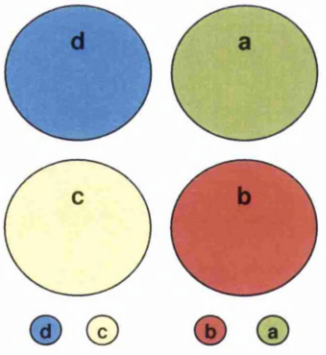

Figure 3.8 Most popular mapping for controls at the bottom, pattern 2, US: 13, UK: 9

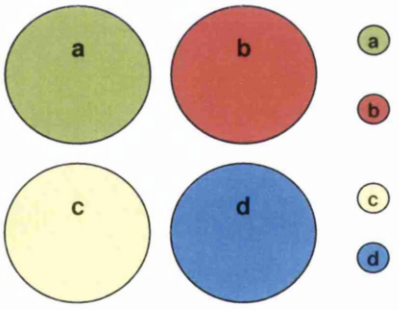

Figure 3.9 Most popular mapping for controls at the right, patter 1, US: 25, UK: 15

3.5. Results Discussion

Although culture is difficult to define, the definition used here, namely national culture, has yielded interesting results. The results discussed above confirm all four hypotheses. They show that perceived affordance and mapping will vary when there are strong culturally based cues for an object. In this section the results for each set of objects

(light switches, dials and hobs) will be discussed in detail as will any connection between these findings and Hofstede's cultural model.

3.5.1. Light Switches

As predicted the results for the light switches was shown to have a strong cultural bias. Light switches are mapped in exactly opposite ways in the two countries and so provided the strongest cultural bias of all the examples given to the participants. The Chi-square result for the two switch types showed unarguably that the two subject groups perceive the switches differently. It is also interesting to note that only 2 US participants incorrectly designated the US style switch, presumably the one most familiar to them. Whereas 4 UK participants incorrectly designated the UK style switch. Furthermore there were 12 US participants who correctly designated the UK style switch and 12 UK participants who correctly designated the US style switch (Oshlyansky, Cairns & Thimbleby 2004).

Taking into consideration the very strong similarities that the two countries share according to Hofstede's (Hofstede & Hofstede, 2005) cultural scales it is difficult to see how Hofstede's model could help explain these findings. Table 3.15 gives scores for Hofstede's Value Survey Module (VSM) for all the countries used in this work except Algeria, for which scores are not available (Hofstede & Hofstede, 2005). The noteworthy difference between the US and the UK is on Uncertainty Avoidance, none of the other measures show any great variation.

Uncertainty Avoidance measures the degree to which a culture tolerates ambiguity and unpredictability. Both the UK and the US fall somewhere in the middle of the spectrum of Uncertainty Avoidance, being neither too averse to nor too tolerant of uncertainty. Given this, it is not surprising that both sets of participants referred to what they knew previously of light switches to decide the state of an abstracted switch on the questionnaire. However, this VSM measure does not help explain why the two cultures map the switches in exactly opposite ways.

The affordance of the switch has been learned in a cultural context; so the design of the switch itself provides no actual affordance for its correct use. The shape of the switch seemingly made no difference to the perceived affordance. Although the switches have a somewhat different shape, they were treated the same by both sets of participants. The

result conclusively shows that the simple household light switch provides no universally understood information as to how it changes a system's state. Instead it has a strong culturally learned cue for how it is supposed to behave. Hofstede's model simply does not address these aspects of culture or account for these cultural differences.

	Power Distance	Individualism	Masculinity	Uncertainty Avoidance	Long-term Orientation
US	40	91	62	46	29
UK	35	89	66	35	25
Belgium - Flemish*	61	78	43	97	38*
Morocco	70	46	53	68	Not available

Table 3.15: Hofstede's VSM scores

3.5.2. Dials

There were no cultural differences found in the dials experiment for the UK and US subject groups used here, as hypothesised. There are no strong culturally specific cues for these types of dials in either culture so no cultural difference was expected. There was however a strong difference revealed when the US, UK data was compared with the Algerian, Flemish and Moroccan samples provided by Bailey (1996). Lending further evidence to the main position of this work that culture can influence perceived affordance. Although Bailey's data is cited from 1975 and was not gathered specifically for this study it was well worth examining along with the data gathered here as it has provided interesting cultural insights. The Algerian, Flemish, and Moroccan respondents, as the Chi-Squared analysis showed, (Table 3.8), have different perceptions of how each dial is to be moved.

The dials experiment suggested by Bailey again proves that culture plays a role in how participants interpret the behaviour of objects and how they perceive those objects should be used. It is another strong example of why users' culture can not be ignored when designs are implemented. Although the dials would work identically for the US and the UK market they wouldn't work as well in (Flemish) Belgium, Morocco or Algeria. As the data provide by Bailey is now more than thirty years old it would warrant some re-investigation to see if these difference still emerge. The samples from

* Hofstede provides the Long-term Orientation score for all of Belgium not separating out the Flemish population as done the rest of the scores.

the countries being studied would need to be matched and the data would need to be gathered in the same way, which was not the case here. However, as the analysis above shows, it is likely that there are some cultural cues in the Algerian, Moroccan and Flemish populations which are causing the difference in mapping when compared to the US and the UK. Again this shows that culture, as a framework or context, is playing a role in affordance.

This data is difficult to interpret using Hofstede's model and the model does not provide good explanatory power. There is no VSM data available data for Algeria so it is not possible to include it in the following discussion. The VSM scores for the US, UK, Belgium (Flemish) and Morocco show that the populations vary on several of Hofstede's indices. As stated previously the UK and the US populations are very similar on Hofstede's indices. The Belgian Flemish and Moroccan scores vary significantly on the Individualism and Uncertainty Avoidance scales. Flemish Belgium differs from the US and the UK on all Hofstede's measures. Morocco differs greatly from the US, UK sample on Power Distance, Individualism and Uncertainty Avoidance. Because these cultures vary on almost all the indices it is difficult to understand how Hofstede's model can help explain what is being seen in these results other than to say that the cultures are different and will therefore have different interpretations of affordances. It is not possible to argue for which, if any, of Hofstede's measures influences the results obtained here.

3.5.3. Hobs

The hob example was inspired by one given in Bailey (1996; 1982) and it was used to measure the agreement the US and UK would have in a more or less neutral example. Also this data was used to see if the mapping obtained in the UK and the US would be consistent with the findings reported in Bailey (1982) for both cultures. The data collected here matches with that of Bailey's (1982, p.553), re-affirming that the best mapping for a configuration where the control knobs are below the hobs is the one shown in Figure 8 for both cultures. Bailey does not provide any data for a configuration which has the control knobs to the right of the hobs but from this data it can be said that either pattern 1 or pattern 2 would cause the least error.

As expected there was no difference found between the US and UK. The mapping of controls knobs on cookers varies greatly by brand and model in each country and the

wide array of variations are available in both countries. This can easily be seen when looking at consumer sites selling cookers in each of the countries (www.comet.co.uk and www.bestbuy.com for example). A survey of US and UK websites selling cookers (stoves or ranges in the US) shows a wide array of free standing or built in units with different control to hob mappings. Hofstede's model could be said to help explain these results because the two cultures are so similar on his scales. However, if this argument is to hold then countries with widely varying scores, on the Hofstede's cultural dimensions, should have very different patterns of mapping controls on cookers. This would need to be looked at further; taking each cultural index separately to test which if any had an effect on the design or mapping of controls.

This research shows that perceptions of affordance will vary between cultures, therefore, future researchers may also wish to consider how this might impact design. Previous research by Honold (2000) found significant difference in how Indian households preferred to use washing machines as compared to European users. Indian participants' interpretations of washing programs and even directions for the programs were completely different from the expectations formed by the German designers of the appliance. Honold advises that mental models formed on previous experience will influence user's perceptions and behaviour. Affordances form expectations and mental models and are based, as this work showed, on previous experiences with devices, interfaces and objects. Given Honold's (2000) findings and those of this thesis, would differences be found in user's expectations in countries that vary greatly as to life style and culture, like China and the United Kingdom for instance, on devices such as cooker hobs?

3.6. Conclusion

The research here begins to show that affordance and mapping can be affected by culture as context. There appear to be differences in the understanding of even seemingly simple objects; like the affordance of a switch. Other objects studied here, such as the dials had better cultural agreement in the UK and US populations that were sampled. However, when comparing the dials to populations previously sampled cultural differences again emerged. There are several reasons that this may be, but possibly the strongest of these is that people learn the purpose of things, how they map and how they should work in the context of culture.

If even simple design decisions can be questioned what else must designers look at before making design conclusions (e.g., for the web)? In his explanation of affordance, Norman says that, "when simple things need pictures, labels, or instructions, the design has failed" (Norman, 1988). When designs ignore the context of use, or the culture of the target users and force users to think about which way a switch operates for "ON" the design is flawed as well. If the goal of user friendly design is to have objects, interfaces and tools "afford" their use, then design must be done with a strong understanding of the users and their context. This includes previous knowledge, expertise, experience and most definitely culture. Without these considerations users are forced to make adjustments and face frustrations which may lead them to abandon the use of a system or product.

Hofstede's cultural model does not help explain the affordance differences found here; those at the low end of the Ito and Nakakoji (1996) model of cultural influence and may therefore not be applicable to other aspects of interaction. Cultural models such as Hofstede's do not appear to aid design in these simplified cases. It can not be used to predict how a given cultural group will map objects or what affordance an object will have. Hofstede's model can not therefore be used to explain culturally specific affordances and how they will impact on design.

3.6.1. User Interface Design

It is seemingly easy to dismiss "simple" results such as these. In most situations users know if a light controlled by the switch is on or off because it can be seen or which way to turn a dial because they can hear or see the result. Problem solving and activity usually include knowledge of the initial state, a goal or task, a participants' knowledge of the environment and a set of operations to change the initial state (James, 1994). But these results have to be seen in a greater context of usability; if designers and users can't agree which direction turns a light on, then what else needs to be considered in a multicultural context? Further work is needed to understand what influence culture has on the way that users come to use, understand and accept the technology around them. A better understanding of what cultural models such as Hofstede's can be used to predict or explain is needed to ensure that the HCI community makes appropriate design decisions. Therefore this research will continue on to explore the higher end of Ito and

Nakakoji (1996) model of cultural influence and look at the applicability of Hofstede's model to technology acceptance.

Often cultural models are used to help designers make culturally specific interface designs, but as the data here shows this may not always be the best route to understanding the needs of the users. For example Smith et al. (2004) suggest turning the VSM scores for a particular audience into cultural "fingerprints" and matching these fingerprints to the cultural fingerprint of an interface. However, it is difficult to see how cultural fingerprints can be created for simple interfaces like those tested here. It is therefore unclear how helpful Hofstede's model can be in explaining acceptance or suitability of interfaces which are more complex issues and at the higher end of the cultural influence spectrum (Ito & Nakakoji, 1996).

A clearer understanding of what cultural factors influence design and how this influence is experienced is called for. It is often said that an icon on a screen 'has' an affordance to legitimise its placement there: users (and designers) have learnt that an abstracted button on a screen will do certain things. Users have learned to accept certain design conventions. Different users will bring different experience to the table (or computer screen as the case may be) and they will not all understand the design in the same way. Culture is an important factor in how people understand the icons and images used in interface design (Evers et al., 1999) and given this fact interface design should endeavour to match the expectations of the user.

Users will learn from exploration and can adjust to designs, but there is no guarantee that the learning will "stick" (Draper & Barton, 1993). The chances are that after many wrong attempts at using a light switch, re-learning will occur and a person will know which way is on (or that the light has failed). This scenario may be acceptable for many situations, it is after all just a light switch and one only has to look at the light to know if it is indeed on. However, a switch which is controlling a device, even a light, in a failure state, where for example the bulb has died will become all the more frustrating to users. When an object is in a failed state users may be depending on the control, be it a switch or a dial, in order to understand if the device is indeed off or not working. When the control is mapped in a way that the user cannot understand, such as in the case of the cultural difference in the light switches tested here, there is nothing for users to depend on for feedback when the device has failed.

In safety critical the switch or dial which controls the device is not so forgiving. For example, a switch or dial in a plane cockpit, for a heart monitor, a nuclear power plant, or other safety critical system can not be flipped or turned several times to decide if the device is working, is on or off. In a safety situation it becomes even more important for devices and controls to take into consideration cultural expectations as these situations are often unforgiving.

Not all systems are as forgiving as a light switch and not all systems present the initial and goal states as obviously as a light. For such systems it is especially important to understand cultural context of our users. An actual switch on a wall may prove to have a greater affordance (since the state it controls is visible) the same claim cannot be made when common objects are abstracted onto a screen as they become divorced from this very visible context. Likewise, not all switches control things with obvious states. Without this understanding users are being asked to re-learn or even un-learn.

3.7. Discussion of Future Work in this Thesis

The study described here was an examination of how culture can influence the perceived use of everyday objects and how cultural models can help explain this. It looked at the low end of Ito and Nakaoji's (1996) cultural influence spectrum. There are many assumptions made in user interface design that need to be explored in the greater context of culture. Further work on the possible impact culture has on perceived affordance will need to be done on a wide variety of interfaces and user populations, not just the ones studied here. More broadly, culture must have a multitude of other possible effects on acceptance of products and systems, on design, the evaluation process and use of products. The entire design process is often approached in the same way regardless of the target audience's culture; this in itself may prove to be problematic under closer inspection. The use of cultural models, such as Hofstede's without a clear understanding of what user behaviour, use and acceptance phenomenon they help explain is also problematic. It is to gain greater understanding of how and to what cultural models can be applied that this thesis goes on to explore technology acceptance. Technology acceptance is at the higher end of cultural influence (Ito & Nakakoji, 1996) spectrum and will give the research broader scope of understanding about the applicability of Hofstede's model in HCI. Lessons learned from the

affordance study, discussed below will be taken forward and applied to a larger scale survey of technology acceptance and culture.

3.7.1. Experiences Taken Forward

Research yields new and interesting knowledge but also frequently gives insight into how future research can be better handled or approached. The work described in this chapter proved no different as several broad methodological lessons were learned from the undertaking. These include what seemed to be a very suitable way to conduct a large scale questionnaire survey, enlisting assistance in other countries and more generally overcoming the difficulties of doing research cross-culturally. This affordance study was, in many ways, a pilot of the methodology used in the larger scale study to follow. The affordance study helped inform the process of creating, and stream-lining the compilation, distribution and collection of the questionnaires used in the technology acceptance study.

First, in order to ensure that the questionnaires are understandable they should be reviewed by local collaborators. This is especially true of issues around wording and language usage as was the case with words such as "cooker" versus "stove". Secondly, in order to ensure the accuracy and the integrity of the questionnaire material the questionnaires should be assembled by the primary researcher and then supplied to any collaborators whenever possible. This avoided any errors in copying or collation and lessened the burden placed on collaborators. Finally, the approach found to be most effective for distribution was through colleagues or acquaintances teaching large or medium sized lectures. There the questionnaires were best given out at the beginning or towards the end of lecture and the students were given some time to complete them in class. This guaranteed the best return rate and attention of the students. This approach was then adopted whenever possible in the subsequent work.

Garnering assistance and recruiting collaborators proved to be a challenging undertaking. The affordance study demonstrated that an effective route to recruitment was through personal acquaintance or through introductions with only one degree of separation. The best responses to requests for assistance were always received from people who had personal connections to the researcher or who were being approached through an introduction by a mutual acquaintance. This would prove to be more

difficult in future research as the number of countries was expanded but the approach was followed where possible.

Finally the general difficulties of time scales, distance and correspondence were vetted in this work. The most significant lesson was that time scales would need to be flexible and adjustable to the time of the collaborators. Collaborators are helping in most instances out of kindness and interest but their work will understandably take precedence. Ostensibly, the most suitable approached was to give flexible deadlines and provide as much assistance as possible to make the process easy for them. Providing, pre-assembled questionnaires, clear directions, return envelopes, occasional reminders and quick responses to any questions all proved very helpful.

4. Technology acceptance study methodology

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4.1. Introduction

This thesis aims to understand how Hofstede's cultural model can help explain and understand cultural differences in two aspects of HCI. Another way of phrasing this goal is to say that the work looks to find associations between Hofstede's cultural model and certain concepts studied in HCI. The previous chapter explored whether Hofstede's cultural model could help explain differences in affordance at the lower end of Ito and Nakakoji's (1996) cultural influence scale. The following chapters analyse how or if Hofstede's model can help explain technology acceptance, at the higher end of the cultural influence spectrum. The second, technology acceptance, study hoped to uncover associations between Hofstede's cultural dimensions and the technology acceptance variables measured by the Unified Theory of Acceptance and Use of Technology (UTAUT).

In order to understand the relationship between technology acceptance and culture this thesis completed a study sampling 11 countries. University students in: Czech Republic, France, Greece, India, Malaysia, the Netherlands, New Zealand, South Africa, Saudi Arabia, the United Kingdom and the United States were sampled. Website use was the topic queried on the UTAUT as websites were readily available to all participants. Likewise, by focusing on website use the issues of cost, access and cultural preference could be accounted for as participants would report on their own most often used sites. As a study in 11 countries, using questionnaires that would require at the least translation was a large undertaking significant preparation was needed. This chapter outlines the process taken to prepare for the study. Chapter 5 presents the initial analysis completed to assess how Hofstede's cultural model related to technology acceptance and a deeper analysis of the cultural model on its own. Chapter 6 presents a more detailed analysis of the UTAUT tool and the aesthetic questions which were added to it. While no specific hypothesis about the relationships between culture, as measured by Hofstede's VSM, and technology acceptance, as measured by the UTAUT were generated there was an expectation that relationships would be found. As will be seen in the following chapters no such relationships were uncovered and the validity of the VSM tool was brought under question while the cross-cultural validity of the UTAUT tool was confirmed.

In this chapter the method used to prepare for and complete the technology acceptance study is covered. This includes:

1. Making changes to the original questionnaires to make them appropriate for use in this study.
2. Piloting the questionnaires and making further adjustments.
3. Recruiting collaborators and translators from each country.
4. Translating the finalised English versions of the questionnaires.
5. Distribution and collection of questionnaires.
6. Data cleaning and summarisation.
7. Selecting an appropriate data analysis method.

The following sections discuss each of these steps in detail. First, however, a summary of the questionnaire selection and the practicality of using questionnaires in a study such as this is discussed.

4.2. Questionnaires

Several questionnaires are used to gather data for the topic selected at the higher, more complex end of Ito and Nakakoji's (1996) cultural influence spectrum: technology acceptance. The questionnaire selected to measure technology acceptance was the UTAUT which measures: effort expectancy, attitude towards using technology, social influence, facilitating conditions, self-efficacy, anxiety and behavioural intention to use the system (Venkatesh, Morris, Davis & Davis, 2003). An Aesthetics measure borrowed from the Centrality of Visual Product Aesthetics (CVPA) (Bloch, Brunel, & Arnold, 2003) is added to the UTAUT to account for findings which show the strong role aesthetics play in use, perceptions of usability and acceptance of products and technology (Bloch, Brunel, & Arnold, 2003; Brady & Phillips, 2003; Chawda, Craft, Cairns, Rüger & Heesch, 2005; Karvonen, 2000; Springston & Champion, 2004; Tractinsky, 1997; Tractinsky, Adi, & Ikar, 2000). Hofstede's Value Survey Module (VSM) questionnaire was used as the measure of culture since it is the basis of Hofstede's cultural model, being investigated here.

4.2.1. Questionnaire use

Questionnaires were the most practical method with which to approach the technology acceptance research described here for several reasons. Regarding questionnaires, Neilsen (1993) states that no other method gives the coverage or is as feasible for collecting large amounts of data from around the world. Also, the method used to

investigate any research question must be appropriate on the grounds of "situational responsiveness" rather than based on habit or some routine (Patton, 1990). Further the questions asked by this research fall into the categories considered appropriate for questionnaire research. These include: beliefs, attitudes, opinions, expectations, behaviours and knowledge (Neuman, 2000). Finally, translating a set of questionnaires is more easily and economically accomplished then hiring translators for interviews.

Apart from the practical considerations mentioned one of the goals of this research was to gather data for Hofstede's cultural model (as measured by his VSM) and the UTAUT technology acceptance model. Both of these are questionnaire based and it was therefore logical to keep to the original format. It would have been necessary to convert the questionnaire based UTAUT and VSM into some other format (interviews for example) to employ research methods such as Grounded theory, for example. This would have run the risk of losing the original context of the models.

The pilot, however, would require more detailed information from participants as to the questionnaires' understandably, appropriateness and suitability, than just the successful completion of the paper questionnaire would provide. Therefore, the intended English version of the questionnaire would be used for the pilot and the participants would be required to provide further feedback on comprehension and questionnaire fit during the post test interview. The pilot and its outcomes are described in the following sections.

4.3. Preparing questionnaires for piloting

In order to make the questionnaires more suited to answer the main question of this research and to test general trends in acceptance and use of websites several changes were made before the pilot. The changes made to the UTAUT and CVPA questionnaires were in the form of rewording or the exclusion of certain measures. Measures were excluded to adjust the questionnaires for this research as certain measures on the UTAUT and CVPA did not suit or apply to the website use being queried here. The UTUAT is intended to be reworded and changed to some degree to suit the technology which it will test (Venkatesh et al., 2003). Other researchers have made adjustments to the UTAUT with no negative consequences to its overall validity (Anderson & Schwager, 2004; Schaper & Prevan, 2004). However, careful attention was paid to the behaviour of those questions which required most rewording during analysis to ensure that they had not been compromised. No changes were made to the

VSM before piloting as it is a measure of culture and should not be affected by the technology being queried on the UTAUT and CVPA.

4.3.1. Changes to the UTAUT

Several changes were made to the UTAUT before the pilot (see original questionnaire in Appendix C and reworded questionnaires in Appendix D). The UTAUT's "Behavioural Intention to Use" is meant as a predictor of use. As this research was not trying to predict use, and indeed was asking about decisions already made and websites already used the measure was excluded. The questions in this measure were:

1. I intend to use the system in the next <n> months.

2. I predict I would use the system in the next <n> months.

3. I plan to use the system in the next <n> months.

The other UTAUT measure not used in this research was "Facilitating Conditions." Its questions deal with how well the technology in question will integrate into the users' current environment:

1. I have the resources necessary to use the system.

2. I have the knowledge necessary to use the system.

3. The system is not compatible with other systems I use.

4. A specific person (or group) is available for assistance with system difficulties.

These questions were not used because the participant sample was already using the internet and websites. They also had the necessary hardware and software to facilitate this use. This research was not measuring a new type of website or website application that would need to integrate with other programs or sites used by the participants. Likewise the websites used by the participant are not necessarily integrating into any other systems, they are often stand-alone entities so compatibility is not an issue. The "Self-efficacy" measure explores the importance of access to help or assistance for the technology in question so dropping question 4 of Facilitating conditions was not problematic. However, some of these questions could and should be added back if it is appropriate for the populations and technology being sampled. There are many parts of the developing world where technology, such as the internet and web, are in use but the population as a whole does not necessarily have the access to resources needed to use

them. People also live in areas where infrastructure doesn't offer the easy and quick access that so many website require. None of these considerations was an issue for this research as it sampled students at universities with internet and computer facilities.

One final question was taken off the UTAUT because of its unsuitability to the current research. This question came from the "Attitude towards technology" measure:

Using the system is a bad/good idea.

This question is useful when it is posed in regards to the use of a specific system or application. This research questions the respondents about the factors that influenced their decisions to use the websites they are already using, not a single site or product. Because it was not possible to effectively re-word this question in a way where it would apply to this research it was also dropped. This left the "Attitude" measure with only three questions whereas all other UTAUT measures have four.

All other questions underwent some rewording to make them appropriate and were used in the pilot (see Appendix D). The most significant rewording was the replacement of word "system" with the word "website." Likewise, where the word "job" or "work" appeared they were supplemented with the word(s) "university," "university studies" or "studies" as appropriate. Several sentences were changed from future tense to present tense or vice versa to make their meaning more easily understood as applied to website use. These types of changes are expected on the UTAUT, as it was designed to test different systems and applications in different environments, so tense and some wording changes are to be expected (Venkatesh et al., 2003).

There were two instances on the UTAUT where directions were changed. On the original UTAUT a set of directions precedes the "Self-efficacy" questions which reads: "I could complete a job or task using the system ...." Each question in this section begins with "if." Many sites used are not being used for a specific task or job so these directions were omitted. The questions in the "Self-efficacy" section were then reworded as follows:

Original wording		**Re-worded**
If there was no one around to tell me what to do as I go.	→	I can use the website even when there is no one around to tell me what to do as I go.

If I could call someone for help if I got stuck.	→	There is someone to call for help if I got stuck.
If I had a lot of time to complete the job for which the software was provided.	→	There is no time pressure to do the task for which the website was provided.
If I had a built-in help facility for assistance.	→	I have a built in help facility for assistance if I need it.

The questions in the "Anxiety" section of the UTAUT were given a set of directions which were not in the original UTAUT. This was done so that users would think about their feelings when they first used new websites as sites they have become accustomed to would not cause anxiety. The directions read: "Given a completely new website that you have not used previously which of the following are true for you ..." By providing users with this prompt it was hoped they would consider their feelings when faced with the use of new websites.

Original wording		**Re-worded**
I feel apprehensive about using the system.	→	I feel apprehensive about using new websites.
It scares me to think that I could lose a lot of information using the system by hitting the wrong key.	→	When entering data on a new website it concerns me to think that I could lose a lot of information by hitting the wrong key.
I hesitate to use the system for fear of making mistakes I cannot correct.	→	I hesitate to use a new website for fear of making mistakes I cannot correct.
The system is somewhat intimidating to me.	→	New websites are somewhat intimidating to me.

4.3.2. Changes to the CVPA

A measure of aesthetic influence on acceptance and use is not included on the UTAUT, but has been proven to be an important factor in people's perception and use of websites and interfaces (Brady & Phillips, 2003; Chawda et al., 2005; Karvonen, 2000; Tractinsky, 1997; Tractinsky, Adi, & Ikar, 2000). Two measures from the Centrality of Visual Product Aesthetic (CVPA) were adapted for use in this research to complement the UTAUT. As with the UTAUT, the changes made to the CVPA involved either rewording or dropping of certain questions.

The CVPA was chosen because there are few standardised measures of the importance of aesthetics in the field of HCI. A recent paper in British HCI (Chawda et al., 2005) cited this exact difficulty and the researchers developed their own questionnaires. The CVPA is particularly suitable because its questions deal with the importance people place on aesthetics in their decision to purchase a product. In many ways websites are products and although users do not "buy" them they do make commitments to using them.

The CVPA has three measures: Value, Acumen and Response. Of these "Acumen" was dropped. Its questions deal with a person's ability to judge the differences in designs of products:

1. Being able to see subtle differences in product design is one skill that I have developed over time.

2. I see things in a product's design that other people tend to pass over.

3. I have the ability to imagine how a product will fit in with designs of other things I already own.

4. I have a pretty good idea of what makes one product look better than its competitors.

While these questions would make for interesting research in themselves they were not suited to understanding the importance given to visual design in choosing to use a website. Rather they measure how attuned a person is to aesthetic difference. This work is interested in how aesthetics influence acceptance and how this varies by culture. Therefore questions dealing with a person's aesthetic judgement and the importance they place on their aesthetic expertise were not included.

The remaining questions on the CVPA were reworded and used in the pilot (see pilot questionnaire Appendix D). Substituting "website" for the word "product" was the most common change made to the CVPA. The word "buying" was changed to "using / exploring" and the word "owning" was changed to "using." These changes were enough to make the CVPA questions read sensibly and appropriately for the topic being queried, website use. These changes, as will be seen in the analysis chapter that follow, did not seemingly influence the CVPA's effectiveness as its questions continued to work together.

4.4. Piloting the Questionnaire

Once the initial changes making the questionnaires appropriate to the topic being examined were completed they were ready for piloting. Before the questionnaires were translated and dispersed to collaborators around the world they were piloted with a multi-cultural participant group to ensure their suitability. The intention of the pilot was to uncover any issues with wording or other ambiguities. As was learned in the affordance study, wording can be difficult cross-culturally even in cultures that use the same language. The pilot would also uncover any confusion that may arise with understanding the context of the questionnaires. As the questionnaires were destined to be translated into several other languages (those native to the countries being sampled), it was vital that the English questionnaire version would be as clear and understandable as possible. Also, the UTAUT and CVPA were to be administered to a multi-national audience possibly for the first time. The suitability of wording and indeed the perception of users from various cultural groups when taking the questionnaires would need to be considered before translation began. The VSM was not originally designed for a student audience, the target population of this work and needed to be piloted to ensure understanding and fit (Ford and Kotzé, 2005).

4.4.1. Procedure for pilot

The pilot participants were recruited from people living and working in the United Kingdom with diverse cultural backgrounds. The pilot participants came from various countries that were being considered for use in the overall study. This multi-national participant group was needed to evaluate the suitability and appropriateness of the questionnaires across cultures. The participants were also in a unique position to assess the suitability of wording and context of the questions for their respective cultures as they were English speakers but native to another culture and language. They could also provide insight into how best to re-word or translate questions into their native languages.

The participants were asked to go through the pilot questionnaire (see Appendix D) and answer the questions to the best of their ability. They were invited to ask for clarification while they were completing the questions and these requests were discussed with them at the end of their session. After completing the questionnaires participants were put through a structured interview (see Appendix D) designed to solicit feedback that could be used to better design the questionnaire. Any points of

clarification that the participants had brought up were also discussed in the post-questionnaire interviews. A summary of the interviews and the data from the pilot can be found in Appendix E and a detailed discussion of the pilot's outcomes along with the changes made to the questionnaires follows.

4.4.2. Pilot Participants

A total of eleven participants piloted the questionnaire, five men and six women with an average age of 31.6. These participants were recruited partially for their knowledge and expertise in the area of technology design and implementation. Four participants were PhD students in HCI, two of these had significant professional experience in various technology fields prior to enrolling for a PhD. Two participants were masters students in the filed of HCI, one of these had more than fifteen years of work experience in various senior roles in technology implementation for the financial sector in India. One participant was a lecturer in HCI. The remaining participants were professionals drawn from several roles in IT including design, support and programming. As HCI and technology professionals these participants were able to provide extra insight into the content, context and language used on the questionnaires. The countries / regions represented by the participants were: France, the United Kingdom, the United States, Malaysia, China, Hong King, Saudi Arabia, India, Greece and New Zealand. One participant had spent equal parts of their life in the UK and Oman and was a citizen of both countries.

4.4.3. Structured Interview

The structured interviews took place after each pilot participant had completed the questionnaires. The interview was designed to elicit information about the general content of the questionnaires, the wording, any factors or ideas that may be missing and the appropriateness of the questionnaires' content. Since many of the pilot participants used were bilingual, the subject of translation was also broached on several occasions, along with the original English language content. The following section separates the pilot's outcomes for each of the questionnaires and explains any changes that were made to the questionnaires based on these outcomes.

4.4.4. VSM pilot outcomes

Two problems of understanding were uncovered within the VSM during the pilot. The first was with the wording of the each section's directions and the transition from one

section to another. The second problem was with some of the words used in the actual questions.

The most troublesome area was caused by a lack of directions before a transition in the questionnaire that was not clearly addressed. Following the section beginning with the directions "In your private life, how important is each ..." there are 2 questions which ask about the current situation of the participant. But there is no direction given for these two questions and several participants were confused by this transition. Participant 7 while pointing at this section of the questionnaire suggested: "... maybe you can put something here that says 'in our work life'." To clarify and prevent confusion a set of directions reading "In your current situation" was added before the questions: "How often do you feel tense at work?" and "How frequently, in your experience, are subordinates afraid to express disagreement with their superiors?"

The directions given in the original VSM (Appendix B) for the final section of questions caused some confusion for several participants; they were uncertain if they were expected to think of a specific situation to answer the questions or if they were being asked about general opinions. For example participant 8 stated "I didn't know what the context is but then you said just in general and so that was ok." To alleviate confusion, the directions for this section were changed from "How much do you agree or disagree with each of the following statements? (please select one answer for each question)" to "In general how much do you agree or disagree with each of the following statements? (please select one answer for each question)." By adding the statement "in general" the ambiguity was avoided.

The final problem with the VSM was one of word meaning and nuance (please see final version of the questionnaire in Appendix F). Several participants expressed uncertainty about the meaning of certain words but stated that translation into their native language would clarify meanings. The question regarding "Thrift" however was found to be difficult even for primary English speakers. Several participants did not understand the nuance of the word and asked for clarification. Participant 6: "Thrift ... I wasn't 100% sure what it meant." It may simply be that the word has gone out of common use in the last 20 or so years since the VSM was compiled. Several dictionary and thesaurus entries were referenced to find the best possible explanation that could be added to the questionnaire to explain this question. The following entries are some examples of the

definitions and synonyms found (Merriam-Webster Dictionary online, 2006; Collins English Dictionary, 1990; Oxford English Dictionary online, 2006; Webster's Thesaurus, 1999; www.thesaurus.com, 2006):

- Wise economy in the management of money and other resources; frugality.
- Careful management especially of money.
- Economical management, economy; sparing use or careful expenditure of means.
- Wisdom and caution in the management of money
- Economy
- Frugality
- Carefulness

Based on the definitions and synonyms found the question was changed from "Thrift" to "Thrift (careful management of money)." The use of an explanation in parentheses was not problematic as similarly formatted explanations are used in other VSM questions and so this one would not seem out of place. The explanation given to the pilot participants to explain the word "thrift" was very similar to the definition finally placed on the questionnaire and it helped understanding.

4.4.5. UTAUT pilot outcomes

The pilot results lead to some additional minor changes to the UTAUT. The most important of these was the overall direction given at the beginning of the UTAUT questionnaire. The directions given on the pilot read "Please rate how important each of the following is to you when deciding whether or not to use a particular website to support your work or studies..." Several participants were unhappy with these directions. One participant felt that it made certain questions asked seem "redundant." The wording for the directions was changed to read "Please rate each of the following statements. Consider how important each statement is when you are deciding which websites to use. You may find it useful to think of the websites you currently use." The new directions were shown to four of the pilot participants and were found to be adequate and were therefore used on the final version of the questionnaire.

Some of the wording from the pilot UTAUT was found to be a little problematic. One of these was the use of the word "scares" in one of the Anxiety questions; participants found it too extreme. Participant 11: "Websites are not in themselves scary...it's more

wary ...it's more annoying rather than scary." The word was changed to a milder "concerns." The question asking about having a built in help facility was pointed out to be confusing because any computer would have its own help menu, the browser would have its own as well and the website may have another. Changing the wording from "I have a built in help facility" to "There is a built in help facility" seemed to make it clear to the users that the help facility was on the website.

The final version of the UTAUT can be found in Appendix F.

4.4.6. CVPA pilot outcomes

Several adjustments needed to be made to the CVPA after the pilot. One further question was dropped because it was found to be too excessive sounding when applied to websites. Several users laughed or stated that the question, "Beautifully designed websites make our world a better place to live." sounded too extreme to be taken seriously. Participant 6 had a fairly standard reaction, after laughing she stated: " I guess it's a question that asks about how strongly you feel about good design... but it seems kind of, well, you know, the world existed without websites." This question was therefore excluded from the final version of the questionnaire.

One question was adjusted to make the wording sound a more moderate tone. In the question "Websites that have superior designs make me feel good about myself" the problem was found to be the statement "about myself." Pilot participants stated that while a nicely designed site might make them feel good it wouldn't make them feel good about themselves. To address this problem the statement "about myself" was dropped from the question and the final version reads: "Websites that have superior designs make me feel good."

The final change to the CVPA was to remove somewhat colloquial wording from the questions: "If a website's design really speaks to me, I feel that I must explore and use it." Participants did not always understand what was meant by "speaks to me." Participant 4; "Really, it's attracts my attention, is what you meant, yes?" Although some of the confusion would have been cleared up for bilingual participants once the questionnaire was translated into their native language the wording was also problematic for primary English speakers. In clarifying this question during pilot testing the word "appeals" was found to be most useful. The question was therefore

changed to read: "If a website's design really appeals to me, I feel that I must explore and use it." All other questions on the CVPA were left as they appeared on the pilot questionnaire (see final version of the CVPA in Appendix F).

4.4.7. Demographic pilot outcomes

The largest issue with the demographic section of the questionnaire proved to be the wording of the question asking about education level. It seems that the differences in terminology in the English speaking world are such that one term can not adequately explain education level. "Secondary School" is roughly equivalent to "High School" and "Graduate" has different meanings in British English than in American English. To clarify this wording for the English speaking questionnaire the following labels were applied: High School / Secondary School, Bachelors / Undergraduate, Post-Graduate / Masters, PhD.

The pilot questionnaire did not include a question about what field, subject or majors the person was studying. This question was added to the final version because it would help in ensuring that the sample was diverse at least in terms of the academic fields that were being represented. The question would also help in understanding the educational backgrounds of the samples. The final version of the questionnaire consequently contains the question "Subject / Major you currently study at university?"

4.5. Recruiting collaborators

After completing the pilot and finalising the English language questionnaire the next steps were to scope out and prepare for the main technology acceptance study. The details of collaborator and participant recruitment are covered in the following sections. The process of recruitment was informed by experiences gained while conducting the affordance study.

To broaden the scope of the study, the recruitment of collaborators and translators occurred in 11 countries. First, countries were targeted to give the widest range of national cultures from around the world. Secondly, these countries were approached because contacts or introductions to researchers working locally were readily available. As was learned from the affordance study, the best results for collaborator recruitment are reached when recruiting from ones own acquaintance base and this was proven true in the technology acceptance study. The countries successfully recruited were: Czech

Republic, France, Greece, India, Malaysia, Netherlands, New Zealand, Saudi Arabia, South Africa, United Kingdom and the United States. Collaborators in all countries were affiliated with universities in their home country and fluent English speakers. Often collaborators were asked to act as translators or proof readers of the questionnaire for their country.

4.6. Translation

The translation process involved the recruitment and oversight of at least two translators for each target language. At least one translator from each country was also recruited because they were knowledgeable in the fields of HCI and Computer Science. Recruiting subject experts as translators ensured that terminology dealing with websites and interfaces was appropriately translated. Translators who were knowledgeable with HCI terms mitigated concerns about reaching lexicon equivalence for words or concepts that may not exist in languages other than English (Neuman, 2000). Translators and collaborators were also trusted to inform the researcher of the language needs of the participants. As is the case in many countries, more than one language or dialect is spoken (Aykin, 2005). In India and South Africa collaborators were instrumental in informing the decision to use the English version questionnaires and proofing this version for comprehensibility.

The method of "back translation" was used to maintain the best possible match of meaning and nuance between language versions (Neuman, 2000; Michener, DeLamater & Myers, 2004). The need to maintain the same or equivalent meaning from one language to another is important in ensuring that the measurement tool does not fall into error or misunderstanding in a particular culture (Cavusgil & Das, 1997). In the back translation approach two or more bilingual or native speaking translators work on the text consecutively. One translator works from the original language version, in this case English, and translates to the target language. The second translator takes the now translated questionnaire and translates back from the target language into English. The two English versions are compared to each other, any mistakes or inconsistencies are then addressed through a repetition of the back translation process. This process is vital as language appropriateness is essential to correct understanding (Patton, 1990).

Several iterations of translation were often necessary. Translators often recruited other bilinguals to assist when nuance or subtleties were difficult to transmit. In several

instances, translators asked the researcher for assistance with subtle differences in meaning or to explain colloquial usage to guarantee the best fit in their own language. One such example came from a question adapted from the CVPA which caused concern for the Greek, Czech and Dutch translators. The question was: "Sometimes the way a website looks seems to reach out and grab me." The colloquial "reach out and grab" caused difficulty and the translators asked for guidance as to the real meaning of the expression.

Once the questionnaires were translated and proofed for all the countries being surveyed they were ready for distribution. There were six finalised language versions of the questionnaire (please refer to Appendix F for examples of the translated questionnaires): Arabic (Saudi), Czech, Dutch, English, French, Greek and Malay. The English version of the questionnaire went to: India, South Africa, New Zealand, the United Kingdom and the United States. Due to its broad distribution, the English version of the questionnaire was carefully scrutinised by collaborators in all countries to which it was distributed. This careful review assured that the questionnaire's suitability and clarity for all participants before distribution.

4.7. Questionnaire distribution and collection

The translated questionnaires were most often assembled and posted by the researcher to the collaborators' countries. In several instances this was not the best or most feasible approach due to time constraints. As a result a portion of questionnaires in Saudi Arabia, New Zealand, Malaysia, France and Czech Republic were printed and assembled by the collaborators in those countries. When the questionnaires were assembled by the researcher the order of presentation was (see Appendix F): Instructions, VSM, UTAUT, CVPA, demographic section.

In all countries the paper questionnaires were distributed to the student participants by the collaborators within a classroom setting. As was learned in the affordance study, the ideal situation for questionnaire completion was to allocate some class time in which participant could work on the questionnaire. Due to rules at the Universities of collaborators and / or classroom time constraints, this was not always possible for collaborators. Whenever possible students were given the questionnaires and completed them during lecture time. In all other cases, students were given the questionnaire in

class and would then complete them at their leisure, bringing them back to collaborators at a later date. Questionnaires took no more than 10 minutes to complete on average.

Once all completed questionnaires were returned to collaborators they were posted back to the researcher in the United Kingdom. In one instance, that of India, some 40 questionnaires were lost in the post. In all other instances the postal method worked well for getting questionnaires to and from collaborators.

4.8. Data sample

As questionnaires arrived back from collaborators their data was entered into Excel spreadsheets (an example can be seen in Appendix G). The total number of questionnaires received from each country is summarised in Table 4.1. The data samples received from France (N = 38) and the Netherlands (N = 43) proved too small for further analysis (Kline, 2002; Tabachnick & Fidell, 1989) and unfortunately had to be disregarded in the analysis discussed in the following chapters. This left nine countries for further analysis: Czech Republic, Greece, India, Malaysia, New Zealand, Saudi Arabia, South Africa, United Kingdom and the United States.

	Number respondents	Incomplete / Suspect	Non-native respondents	Remaining sample
Czech Republic	157	2	3	152
France	38	-	-	Not used
Greece	152	17	19	116
India	129	24	12	93
Malaysia	187	8	11	168
Netherlands	43	-	-	Not used
New Zealand	199	14	78	107
Saudi Arabia	125	12	22	91
South Africa	144	19	15	110
United Kingdom	242	16	109	117
United States	156	13	17	126
Totals	1572	125	286	1080

Table 4.1 Samples collected per country

4.8.1. Participants

The participant sample was made up of undergraduate and post-graduate (Master's and PhD level) students. To some extent it was a convenience sample based on the availability and accessibility of this population to the researcher. The sample also

ensured that the participants matched from one country to the next on key demographic measures. The countries used in the research vary greatly as to their economic and social prosperity. Although university students are a specific sub-set of the greater population in any country, it is especially true in those countries where university education is still limited to the privileged. However, sampling from universities provided a means to match populations by age, education and most importantly, access to technology. At the very least the samples guaranteed that in the less affluent countries, students would have access to computers and the internet at their universities. This last point, access to the internet, was vitally important as the study asks questions about website use. The respondents were therefore recruited from universities in all countries being sampled. Undergraduates were the largest portion of the sample but Masters and PhD students were also included on occasion. The demographic data for the participants remaining after data cleaning is presented in Table 4.2.

4.8.2. Data Cleaning and Summarisation

Data from the original questionnaires went through several stages of cleaning and summation. First, all questionnaires returned by respondents who were non- native country residents, either having been educated or residing elsewhere for most of their lives and those that did not provide cultural background information were put aside. These non-native respondents made up large portions of several samples as can be seen in Table 4.1. Respondents were considered to be native when they had been wholly educated in the country of their current residence, including primary, secondary and any university education. Next, all questionnaires with more than 10% (5+) questions left blank were also set aside as incomplete. The remaining questionnaires were examined to make sure that answers were not given in any discernable pattern (all answers the same or 1234512345 patterns etc) any questionnaires with suspicious answer patterns were also set aside (Table 4.1 shows the proportions of the incomplete and non-native respondents). The remaining data was then considered to be ready for examination and to consisting of participants native to the country being sampled. This data set, of individual respondent's answers, before any calculation or averaging was performed, will be referred to as "raw" data.

	Number respondents	Male	Female	Unknown gender	Mean age	Mean Education	Internet Use
Czech Republic	152	98	44	10	23.30	1.30	1.36
Greece	116	39	61	16	23.75	2.10	2.66
India	93	68	21	4	23.44	2.15	1.32
Malaysia	168	49	102	17	21.99	1.64	2.01
New Zealand	107	58	48	1	21.70	1.25	1.28
Saudi Arabia	91	36	46	9	24.19	1.50	2.26
South Africa	110	75	27	8	20.94	1.60	1.25
United Kingdom	117	53	61	3	25.68	1.79	1.26
United States	126	43	79	4	24.28	1.31	1.17
Totals	1080	519	489	72	23.25	1.63	1.62

Table 4.2 Demographic Summary

4.8.3. Participants Demographic Summary

The demographic data was summarised from the raw data to give descriptions of each country (Table 4.2). The demographics summary allowed for an easier comparison and matching on key demographic indicators such as age, gender and education level between countries. As can be seen in Table 4.2, 1080 responses remained after data cleaning had been performed, with the highest number of questionnaires coming from Malaysia (168) and the lowest number coming from Saudi Arabia (91). 286 questionnaires were set aside as the respondents were not of the same nationality as the country being sampled. Of these 286 questionnaires, made up of international students or immigrants living in the sampled countries, 109 were collected in the UK, 78 in New Zealand and the remaining 99 came from all other countries sampled.

The total sample was almost equally divided by gender with 519 men and 489 women (72 respondents did not give their gender). Every effort was made to balance each country's sample by gender, but this was not always achieved. The sample from India is the most gender skewed, with just over 73% of the respondents being male. The average age for participants was 23.25 years with the lowest average age occurring in the sample from South Africa (average age of 20.94). Respondent's self report of the highest education level completed shows that most were undergraduates or had just completed undergraduate study. The rankings for this question are as follows:

1 completed secondary / high school education

2 completed undergraduate

3 completed post graduate.

Respondents were also asked how often they used the internet:

1 Every day

2 More than once a week

3 Once a week,

4 Less than once a week

5 Several times a month

6 less than once a month.

Most respondents used the internet at least once a week. Respondents from Greece were at the lowest end of internet usage and the respondents from the United States represented the high.

The samples were also collected with every effort made to ensure the diversity of respondents. As the respondents were recruited from University campuses it was not possible to get a broad range of ages or work backgrounds. Instead respondents were recruited to obtain a wide range of university majors / fields of study. This ensured that the samples would not be skewed with regard to any one intellectual interest or subject and that a wider range of backgrounds and knowledge be represented. A mix of Humanities and Science students were usual for each country sample. Table 4.3 shows the breakdown of respondents by general fields of study / discipline area in each sampled country. With one exception this information also came from the demographic section of the questionnaire and is based on respondents self reported fields of study. The exception is Saudi Arabia, where due to an error in the Arabic questionnaires, the question "Subject / Major you currently study at university?" was left out. In this instance the information comes from the collaborators in Saudi Arabia who collected the data and recruited the respondents and is therefore not as complete as in the other countries. Table 4.3 shows that a wide range of subject interests was covered in each country and there is a broad match across countries as to the academic disciplines studied by participants.

	Czech Republic	Greece	India	Malaysia	New Zealand	Saudi Arabia	South Africa	United Kingdom	United States
Arts	1	2	2	10	5			2	2
Business / Accounting / Economics	1	14	6	30	3		46	6	10
Engineering / Computer Science	106	47	54	63	34	X	47	45	29
Humanities		37		10	4	X	3	10	18
Medical Science	16	6	9	3	3	X		47	49
Physical Science		1	5	26	7		11	2	2
Social Science	21		1	15	41				
Other	7	9	16	11	10		3	5	16

Table 4.3 summary of disciplines studied by participants in each country

Finally the demographic section asked one question regarding finding new websites and one question about the sites currently used. The question regarding finding new sites was adapted from the GVU's 6th WWW User Survey (GVU Center, College of Computing, Georgia Institute of Technology, 1996). The questioned asked participants to choose the three ways they most often found new sites and the summary of their responses can be seen in Table 4.4. As can be seen, regardless of country, most participants depend on the same sources to find new sites. The most often cited sources are friends, internet directories and links from other sites. The second question, about sites currently used and what they are used for provided a rich source of qualitative data on which to generally match respondent website use. Future work can analyse this data in greater detail, here it was simply used to understand the general categories of sites the respondents would have been referencing when answering the questionnaire. Broadly speaking each country's participants wrote down the sites they used to find news, used for email, entertainment and their university studies. These included globally popular sites such as Yahoo! and Google as well as more local versions of email and portal sites.

	Czech Republic	Greece	India	Malaysia	New Zealand	Saudi Arabia	South Africa	United Kingdom	United States
Books	5	12	27	24	13	18	8	13	14
Friends / Colleagues	100	78	48	100	69	56	70	86	93
Signatures at end of email messages	2	5	9	2	9	15	6	5	2
Usenet newsgroups	8	4	6	9	3	12	3	3	1
Television advertisements	1	13	4	16	15	8	8	13	14
Hyperlinks from other Web pages	114	62	49	68	69	30	72	81	74
Internet search engines (e.g., Google, Alta Vista, Lycos, etc.)	5	12	27	24	13	18	8	13	14
Magazines/newspapers	23	33	24	50	13	15	10	9	12
Internet directories (e.g., Yahoo, MSN, etc.)	50	26	13	73	15	23	22	20	38
Other Sources	2	3	4	4	1	1	3	4	6

Table 4.4 Summary of sources for new sites per country

4.9. Data analysis approach

In order to understand how Hofstede's Value Survey Module (VSM) relates to or associates to technology acceptance (as measured by the UTAUT) in the large data set collected a method of data analysis had to be selected. An analysis method which could reduce the number of variables and explain patterns within this large data was needed. . A more detailed discussion of using Factor Analysis can be found in Chapter 5. Specific attention is paid to Principal Component Analysis (PCA) which will be the method used in the analyses conducted in the following chapters.

4.9.1. Sample Sizes

In factor analysis the larger the sample sizes the better. However, a sample size of 100 per group is usually more than sufficient, producing reliable correlations (Kline, 2002; Tabachnick & Fidell, 1989). The main reason for dropping countries that fell well below the 100 sample size was the need to obtain clear, dependable correlations between the variables of culture and technology acceptance for each country. India and Saudi Arabia did not reach the needed 100 after data cleaning but were retained as their samples were not far below. Unfortunately France (N=38) and the Netherlands (N=43)

fell so far below the needed number of participants that they were not considered in further analysis.

4.9.2. Further analysis

The subsequent two chapters present an analysis of data collected for all the countries which met the needed sample size. These countries are: Czech Republic, Greece, India, Malaysia, New Zealand, Saudi Arabia, South Africa, United Kingdom and the United States. The data for these countries was first analysed to find patterns that would answer the main question of: "Can Hofstede's cultural model be applied to technology acceptance?" The next two chapters describe in detail the analysis undertaken to investigate the link between Hofstede's cultural model and technology acceptance as measured by the UTAUT. The first chapter looks at the VSM and UTAUT data together and at VSM data, gathered here, in much greater detail. The second chapter explores the UTAUT and CVPA data in greater detail without the VSM.

5. Culture and technology acceptance – an analysis of data

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5.1. Introduction

Once all the data had been collected and cleaned of any suspicious records several analyses of the samples were conducted. The primary goal was to investigate how Hofstede's VSM would relate to and help explain cultural difference in technology acceptance (as measured by the UTAUT) at the higher end of the cultural influence spectrum (Ito & Nakakoji 1996.) This chapter outlines the steps taken to investigate this question from calculating the VSM scores to applying them in a Principal Component Analysis along with the UTAUT scores and finally to a detailed investigation of the VSM as a tool. As will be seen, Hofstede's VSM did not factor as would be expected from a long established and validated questionnaire and so much of this chapter is dedicated to a thorough analysis of the VSM data.

5.1.1. Calculating VSM scores

Calculations were performed on the raw data to obtain the VSM scores for each country in the sample (appendix G shows an example of the raw data). VSM scores were calculated with the equations provided by Hofstede (1991) in his book "Culture and Organizations: Software of the Mind." The equations are:

Power Distance (PD): -35 (mean for question 3) + 35 (mean for question 6) + 25m (mean for question 14) - 20 (mean question 17) -20

Uncertainty Avoidance (UA): 25 (mean for question 13) + 20 (mean for question 16) - 50 (mean for question 18) - 15 (mean for question 19) + 120

Individualism (IDV): -50 (mean for question 1) + 30 (mean for question 2) + 20 (mean for question 4) - 25 (mean for question 8) + 130

Masculinity (MAS): 60 (mean for question 5) – 20 (mean for question 7) + 20 (mean for question15) – 70 (mean for question 20) + 100

Time Orientation (TO): -20 (mean for question 10) + 20 (mean for question 12) + 40

The scores are calculated using the overall country mean for each question on the VSM and inserting the means into Hofstede's equations. Individual respondent's VSM scores were also calculated by taking each subject's VSM answer values, instead of the mean score for the country, and inserting these individual values into Hofstede's equations. These individual VSM scores were then used in the factor analysis investigation along with the UTAUT data. The scores obtained for this data sample and their relative rankings as compared to the data published by Hofstede (2005) will be discussed in

more detail later in this chapter. Table 5.1 shows the scores obtained in this research with the abbreviations for Hofstede's indices in the left hand column and the countries across the top of the table.

	Czech Rep	Greece	India	Malaysia	New Zealand	Saudi Arabia	South Africa	United Kingdom	United States
PD	35.02	50.43	31.35	23.47	20.85	29.08	23.27	30.23	20.83
UA	83.26	113.48	97.01	97.38	81.26	93.60	89.29	83.67	83.85
IDV	85.14	93.97	78.03	80.39	96.42	88.21	87.29	103.33	97.32
MAS	17.00	45.18	49.30	32.95	11.24	49.92	34.73	7.34	31.83
TO	53.95	56.17	42.20	54.25	51.59	42.42	48.26	54.36	46.19

Table 5.1 VSM scores for each of the sampled countries

The scores obtained in this research did not match those given by Hofstede. It is expected that the actual scores for a particular measure may change as time passes. Some of the scores obtained here, however, varied greatly from those given by Hofstede (2005). A good example of this is Malaysia's score on Power Distance. Here the score is 23.47 whereas the score given by Hofstede (2005) is 104. Large differences in the scores obtained were not always the case, other scores match more closely, for example the score for Uncertainty Avoidance in Greece, 113.48 here, is very close to the one given by Hofstede, 112. Table 5.6 later in this chapter outlines these differences in scores in more detail.

5.1.2. Calculating UTAUT and CVPA means

Mean scores were also calculated per individual for the UTAUT and CVPA (see Table 5.2). This was done primarily to balance the difference in cases where there was missing data or where there was a difference in the number of questions contributing to a factor (there are only 3 questions for Attitude, 4 for all other UTAUT factors and 6 questions for the CVPA). The means also more clearly summarise the differences in technology acceptance across the sampled countries. The questions on the UTAUT and CVPA were measured with Likert scales where 1 was Most Important and 5 was Least Important (see questionnaire appendix F for details). Respondents from the Czech Republic were most likely to rate questions to towards the "Least Important", the 5 end of the scale. The United States had most responses towards the Most Important, the 1 end of the scale, being overtaken by Saudi Arabia on Attitude and CVPA and by

Malaysia for Anxiety. The mean scores calculated for the UTAUT and CVPA were then used in factor analysis along with the individual VSM scores.

	Czech Rep	Greece	India	Malaysia	New Zealand	Saudi Arabia	South Africa	United Kingdom	United States
Performance	2.02	2.22	1.91	1.92	1.80	1.76	1.76	1.83	1.68
Effort	2.42	2.35	2.02	2.08	1.86	1.74	1.82	1.87	1.56
Attitude	2.95	2.43	2.16	2.27	2.20	1.74	1.97	2.42	1.87
Social	3.25	2.80	2.52	2.47	2.30	2.28	2.52	2.70	2.16
Self-efficacy	2.93	2.52	2.29	2.05	2.11	1.93	2.21	2.29	1.82
Anxiety	4.05	3.40	2.83	2.82	3.68	2.86	3.68	3.54	3.28
CVPA	2.50	2.06	2.00	2.17	2.30	1.833	2.06	2.47	2.32

Table 5.2 means for UTUAT measures and CVPA

5.2. Data Analysis

The main aim of this research was to see if differences in technology acceptance could be explained in the light of Hofstede's cultural model. To this end exploratory factor analysis was determined to be the best method with which to analyse the data. Exploratory factor analysis, Principal Component analysis in this case, would show if any association existed between the VSM and the UTAUT. Factor Analysis was very suited for this type of investigation, where the intersections between two or more questionnaires are being sought (Kline, 2002).

5.2.1. Using Factor Analysis

Large sets of data can be difficult to understand without tools that assist in simplifying and summarising them. Kline (2002) presents the example that given five variables there will be 25 possible correlations. Factor analysis simplifies a matrix of correlations into more easily comprehensible factors. Factors in turn represent a summary of the relationship between sets of variables (Kline, 2002; Tabachnick & Fidell, 1989; Dunteman, 1994).

Exploratory factor analysis, such as Principal Component Analysis (PCA), is used to explore the nature and dimensions of a given field of study (Kline, 2002; Tabachnick & Fidell, 1989; Dunteman, 1994). PCA, unlike confirmatory factor analysis, does not test a specific hypothesis but instead explores relationships within a large dataset. PCA is well suited to reducing a large number of variables to a smaller, more easily manageable

set of components (also referred to as factors) which can then be used with other statistical methods as dependent variables (Tabachnick & Fidell, 1989). This is a useful feature of PCA, as any components that emerged from Hofstede's VSM and the UTAUT could then be further analysed to search for any significant cross-cultural differences using other statistical methods. The PCA method also produces components based on the actual variables that load the component, as opposed to estimates as some other factor analysis methods. This provides a clearer picture of how variables relate to one another. This makes PCA ideal for exploring a broad question about the relationship between variables (Kline, 2002), such as culture and technology acceptance. PCA was the methods used because it is conceptually simpler than other factor analysis methods, suits the exploratory nature of the work described in the subsequent chapters and it does not rely on any assumptions about the validity of the instruments being used to gather the data.

In contrast to PCA, confirmatory factory analysis is used to test hypotheses formed in previous research (Kline, 2002). Confirmatory factor analysis must also rely on the previous validation of the tools being used to collect data. This was not the case in this work as the UTAUT had not been validated cross-culturally. Also, there is not a great deal of previous research systematically exploring the applicability of Hofstede's cultural model to technology acceptance. As such no particular hypotheses were formed for this research. Rather this research is a first step in generating an understanding of how Hofstede's cultural model relates to cultural difference in technology acceptance and therefore confirmatory factor analysis would not have been an appropriate analysis tool. Confirmatory factor analysis was, however, used on the Hofstede's data as will be seen later in this chapter. It provided very similar results to those obtained with PCA.

5.2.2. Analysis Particulars

The data was evaluated starting from the specific and moving to the more general. Each country was first examined with Principal Component Analysis separately in order to discover what patterns of association existed in each country. Once patterns were established per country the entire data set would be run to establish an overall pattern of associations between the VSM and the UTAUT. Although no specific hypothesis was formed about which VSM measures would correlate with which UTAUT measures it was thought that some concrete patterns would emerge. For example, some researchers

have postulated that high Uncertainty Avoidance correlates with lower rates of adoption and consumption of new technologies (Hermeking, 2005; Strom, 2005). It is therefore possible that high Uncertainty Avoidance on the VSM would correlate with high Anxiety on the UTAUT. Also, since the questionnaires used in the research had been well established in their own right it was expected that each questionnaire would emerge as its own factor. As will be discussed in detail below these expectations were not met. The data provided no associations between the UTAUT and the VSM and the VSM never emerged as a factor on its own. These initial findings lead to ever more detailed and specific analysis of the data in order to understand what was actually happening in the sample and to account for the unexpected results.

In this chapter the results of the initial analysis of VSM and UTAUT are presented. The VSM results are then analysed separately and these results are explored in detail. The chapter that follows explores the UTAUT and CVPA in greater detail.

As discussed previously, PCA was used to investigate the data in all cases. SPSS release 11.5.0 was used to conduct all statistical and factor analysis described in this work unless otherwise stated. When needed to clarify the patterns emerging from the data, Direct Oblimin rotation was used to rotate the matrices. Rotation is used only in those instances when separate analyses are not being compared to one another and where the interpretation of the data could be helped by rotation (Dunteman, 1994). Kline (2002) explains that a general factor will emerge as an artefact of the factor analysis method without rotation and that the other factors of an un-rotated solution are therefore difficult to interpret. However, rotation makes it difficult to compare and contrast components emerging from different analyses and in many instances in this research the appearance of a general factor is sought as an indication that the tools used (VSM and UTAUT) are working as cohesive wholes. Rotation is therefore only used when directly seeking the simplification and interpretation of associations that emerge in the data. All component matrices presented in the following discussion are the un-rotated solutions. All rotated solutions are given in the pattern matrices and are specifically noted.

In the analysis that follows, unless otherwise specified, any variables (questions) loading a factor above .30 or below -.30 were considered significant. This is the standard recommended by Kline (2002) and was used for all but the smaller data sets.

To offset some of the smaller sample sizes in countries like Saudi Arabia and India a slightly stricter cut off of .35 (-.35) was used. These two samples, Saudi Arabia and India, fell just short of 100 respondents and Kline's recommendation of taking loadings of .30 or higher is particularly for large samples. A variable loading a factor / component at .30 will explain 9% of the variance accounted for by that component. In large samples 9% is relevant to the meaning of a component (Kline, 2002). Each component / factor in turn explains some percentage of total variance for the whole sample. Factor 1 accounts for the most variance, factor 2 for a little less and so on. The percentage of variance each component / factor accounts for is found in "( )" to the right of the factor in all the factor analysis tables that follow. Only those factors with eigenvalues of 1 or greater were considered in the analysis. In all cases both the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity were conducted on the data to ensure that factor analysis was appropriate. The KMO value is given in the table captions in the component (un-rotated solutions) matrices.

5.2.3. Emergent Components

The expectation for the factor analysis of the VSM and UTAUT data was that each of the questionnaires would emerge as separate components / factor in the un-rotated solutions (component matrices). These are well established questionnaires, in the case of the VSM one that has been used and re-used for over 20 years. It was assumed that the UTAUT and VSM would emerge as factors because each is meant to measure a specific aspect of the respondent. The VSM measures cultural differences so a "culture" factor would emerge. The UTAUT measures technology acceptance so an "acceptance" factor would emerge. The CVPA was expected to be a complement to the UTAUT and emerge as a "visual" or "aesthetic" variable loading with the UTAUT. Tables 5.3 – 5.5 present the VSM and UTAUT data analysed together. Table 5.3a is the component matrix (un-rotated solution) for the entire data set (all countries) and table 5.3b presents the rotated solution, or pattern matrix for the data set. Tables 5.4 and 5.5 are given here as examples of the component matrices completed for each of the countries, the remainder of the matrices can be found in Appendix H. As can be seen from the data below (Tables 5.3 – 5.5) the first component to emerge was the UTAUT, the "technology acceptance" factor. The CVPA did in some instances load with the UTAUT as expected. The VSM, however, never emerged as its own factor. This lack

of a VSM factor will be discussed in greater detail later in this chapter as will the several attempts made at better understanding why "culture", the factor, did not emerge.

In the case of the UTAUT, it emerged either as a whole, with the CVPA or in some instances missing one of its measures for each of the countries in the sample. Kline (2002) cautions, that without rotation, this first component is often "an artefact of the method" (Kline, 2002, p. 39). However, in the case of this data this first factor is a strong indication that the UTAUT is working across the countries sampled. It may also show that translating the UTAUT into other languages did not hurt its validity and this will be explored further in the following chapter. This was a good finding in terms of cross-cultural tool validation and is further explored in the next chapter. As many tools and techniques used in HCI and in related fields have been developed and tested in the Western world it is important to test them in different cultures. Recent HCI literature has shown that testing well established tools outside of their original Western context can yield interesting results as well providing evidence that the tool works (Shimaneni & Dunckley, 2005).

Although the UTAUT loaded the first factor in all cases it never loaded completely on its own. In all the country instances the UTAUT loaded with the CVPA. The CVPA in these instances seems to act as a complementary variable or measure to those on the UTAUT. The full (all countries) composite data set also shows the UTAUT loading with the CVPA on factor 1. In the cases of Malaysia, New Zealand, Saudi Arabia and the USA the Anxiety variable loaded separately from the rest of the UTAUT (please refer to Appendix H for these tables). Anxiety loaded on factor 2 with the CVPA in several cases with the exception of Czech Republic, India, South Africa, the United Kingdom and the United States. This frequent loading of CVPA with UTAUT could be taken as an indication that the UTAUT tool would benefit from a "visual aesthetic measure" and this suggestion will be further developed in the following chapter. The only other UTAUT measure not loading factor 1 was the Performance measure which was missing from factor 1 in the Czech Republic. However, in this case, Performance loaded factors 4 and 5 very strongly possibly indicating that it has a particularly strong influence on the Czech sample.

There was some variation in which VSM variables, if any, loaded on factor 1 with the UTAUT. However, as can be seen in Tables 5.3a, 5.4 and 5.5, all of which show the

un-rotated component matrices, the VSM never loads a factor on its own. In the samples from India (please refer to Appendix H) and Malaysia (Table 5.4) the Individualism variable loaded the first factor with the UTAUT variables. In Czech Republic the variables Uncertainty Avoidance, Masculinity, and Time Orientation all loaded on the first factor with most of the UTAUT variables, except Performance. Time Orientation loaded with UTAUT on factor 1 in the samples from Greece, Malaysia, South Africa and United Kingdom and again when all the countries were put together. Because no consistent VSM variable loaded on factor 1 along with UTAUT it is difficult to draw any conclusions regarding how Hofstede's dimensions (VSM) could be used to explain the influence of culture on the UTAUT measures.

In an attempt to see if any pattern of correlations would emerge between the VSM and UTAUT an analysis with Direct Oblimin rotation was also completed. As rotation would make it difficult to compare and contrast the factors that emerged between countries it was only done on the all country data set. The rotated solution, pattern matrix can be seen in table 5.3b. It does not however provide any further insight into the correlations between the UTAUT and the VSM. As with the un-rotated component matrix the rotated pattern matrix loads factor 1 as the UTAUT factor. Factors 2 - 4 emerge with various UTAUT and VSM measures but the VSM never emerges as a whole. The rotated pattern matrix closely resembles many factors of the un-rotated component matrix. For example both solutions load Power distance and Uncertainty Avoidance on factor 3. Therefore, the rotation of the entire data set does not help in interpreting the data.

All Countries Component Matrix				
	1 (25.41)	2 (10.92)	3 (9.15)	4 (8.60)
Power Distance	0.09	0.25	**0.76**	0.21
Uncertainty Avoid	-0.16	**0.43**	**0.57**	-0.27
Individualism	-0.05	-0.50	0.14	0.08
Masculinity	0.14	0.12	-0.07	**0.80**
Time Orientation	**0.56**	**-0.39**	0.14	0.03
UTAUT Performance	**0.46**	**0.38**	-0.14	0.08
UTAUT Effort	**0.68**	**0.30**	-0.16	-0.02
UTAUT Attitude	**0.71**	0.18	-0.06	-0.08
UTAUT Social	**0.75**	-0.04	0.10	0.01
UTAUT Self Efficacy	**0.80**	0.00	0.01	0.01
UTAUT Anxiety	**0.37**	**-0.61**	**0.30**	0.04
CVPA Visual	**0.38**	-0.06	-0.05	**-0.50**

Table 5.3a All Countries VSM and UTAUT results (N = 1080; KMO = .797)

All countries Pattern Matrix				
	1	2	3	4
Power Distance	0.07	-0.17	**0.80**	0.21
Uncertainty Avoid	-0.08	0.21	**0.69**	-0.24
Individualism	-0.24	**-0.49**	-0.06	0.02
Masculinity	0.20	-0.01	-0.03	**0.81**
Time Orientation	**0.36**	**-0.56**	-0.02	-0.03
UTAUT Performance	**0.59**	0.25	0.00	0.12
UTAUT Effort	**0.76**	0.14	-0.04	0.01
UTAUT Attitude	**0.73**	-0.01	0.01	-0.07
UTAUT Social	**0.67**	-0.29	0.07	-0.02
UTAUT Self Efficacy	**0.75**	-0.23	0.00	0.00
UTAUT Anxiety	0.09	**-0.76**	0.05	-0.04
CVPA Visual	**0.34**	-0.06	-0.06	**-0.51**

Table 5.3b All Countries VSM and UTAUT results – rotated solution

As rotation (Table 5.3b) of the entire sample did not help to interpret the correlations between the VSM and UTAUT, it was most useful to explore all other emerged factors in the loadings they have in common using the un-rotated component matrices to make comparison possible. Likewise as the VSM did not load as expected and the UTAUT did this approach could have uncovered a pattern or commonalities between samples of VSM and UTAUT measures loading together in each country. No such pattern between the VSM and the UTAUT became apparent however; no measures loaded consistently together across all the countries sampled. Factor 1, the UTAUT factor, was the only factor to load similarly across all countries. Any other frequent or common recurrence of measures loading together in this first iteration of data analysis is explored in detail below. The remainder of this chapter then focuses on further investigation of the VSM specifically to try to discover why it did not emerge as a factor in the first iteration of analysis, as this brings into question its construct validity. The following chapter then explores the UTAUT and CVPA in greater detail.

Malay Component Matrix					
	1 (27.59)	2 (11.12)	3 (9.33)	4 (8.68)	5 (8.36)
Power Distance	-0.02	**0.54**	**-0.34**	0.17	**-0.44**
Uncertainty Avoid	-0.10	0.27	-0.17	**0.84**	0.09
Individualism	**-0.41**	0.19	-0.14	-0.11	**0.63**
Masculinity	0.19	-0.08	**0.61**	**0.40**	**0.37**
Time Orientation	**0.55**	0.12	**0.35**	-0.10	-0.25
UTAUT Performance	**0.70**	-0.19	0.19	0.01	-0.05
UTAUT Effort	**0.77**	-0.16	-0.27	0.03	0.12
UTAUT Attitude	**0.73**	-0.10	-0.29	0.05	0.11
UTAUT Social	**0.64**	**0.34**	0.06	-0.02	0.01
UTAUT Self Efficacy	**0.82**	0.04	-0.09	0.08	0.05
UTAUT Anxiety	-0.04	**0.69**	**0.46**	-0.12	-0.06
CVPA Visual	**0.33**	**0.50**	-0.19	**-0.31**	**0.41**

Table 5.4 Malaysia VSM and UTAUT results (N = 168; KMO = .782)

South Africa Component Matrix				
	1 (23.55)	2 (11.31)	3 (10.93)	4 (9.25)
Power Distance	-0.02	0.00	**0.63**	**0.56**
Uncertainty Avoid	**-0.49**	-0.27	0.16	**0.41**
Individualism	0.13	**0.53**	**-0.46**	**0.38**
Masculinity	0.19	**0.65**	**0.42**	-0.10
Time Orientation	**0.35**	**0.50**	**-0.34**	0.02
UTAUT Performance	**0.35**	-0.07	-0.21	**0.66**
UTAUT Effort	**0.65**	**-0.32**	-0.25	0.01
UTAUT Attitude	**0.68**	-0.04	0.14	0.10
UTAUT Social	**0.71**	-0.02	0.12	0.01
UTAUT Self Efficacy	**0.76**	**-0.35**	-0.03	-0.06
UTAUT Anxiety	**0.38**	0.29	**0.43**	-0.08
CVPA Visual	**0.43**	-0.15	0.24	-0.14

Table 5.5 South Africa VSM and UTAUT results (N = 110; KMO = .695)

5.2.4. Common Factor Loadings

In the first iteration of analysis the focus was on discovering how the VSM's cultural measures could be used to explain differences in technology acceptance as measured by the UTAUT. No definitive correlations between UTAUT and VSM could be drawn from this data set. Some common factor loadings did occur however and these are examined here. Factor 1 is not considered in this discussion as it is the general UTAUT that most often emerges on the first factor. Again only those factors with eigenvalues of 1 or greater are considered for the analysis. Significant loadings are those over .30 (below -.30) with the exception of the India and Saudi Arabia samples where the stricter .35 is used to compensate for the smaller sample size.

One such common loading was not between the UTAUT and the VSM but in the combination of UTAUT's Anxiety and CVPA which occurred in factor 2 for (please refer to Appendix H for the following examples, Tables 5.4 and 5.5 show two of the country specific component matrices, Malaysia and South Africa):

- Greece (Individualism, Time Orientation and UTUAT's Performance, Effort and Attitude also loaded this factor)

- Malaysia (Power Distance and UTAUT's Social also loaded on this factor)

- New Zealand (Uncertainty Avoidance and Time Orientation also loaded this factor)

- Saudi Arabia (Power Distance, Uncertainty Avoidance, Time Orientation and UTAUT's Social all loaded on this factor)

New Zealand had Anxiety and CVPA load again on factor 3 (negative loadings in this instance). The United States had factor 5 loading Anxiety and CVPA. However even this common loading did not occur for all countries and did not always occur in the same direction. For example, for Malaysia, New Zealand and the USA the two variables both loaded positive on the factor. In Greece, Anxiety had a negative loading where as CVPA had a positive loading on the factor. This was reversed in Saudi Arabia with Anxiety taking the positive load and CVPA the negative. This loading is particularly interesting in the New Zealand sample because there is a positive loading on factor 2 and a negative loading on factor 3. In both factors the two variables load with several other variables making it difficult to clearly interpret their relationship. Overall it is difficult to draw any conclusions about the relationship of these two variables as it seems that the relation varies by country. Also, this iteration of data analysis included the VSM variables and these could have distracted from a clearer relationship emerging between the CVPA and UTAUT's Anxiety measure. This relationship is explored further in the following chapter.

Several VSM variables loaded with CVPA fairly regularly: Time Orientation, Uncertainty Avoidance and Individualism. In all the instances these combination of variables did not occur in isolated pairings but with larger groupings of variables which loaded factors. There was also no pattern or consistency shown in which other variables would load into these larger groupings or indeed which factor they would occur in. For example, in the New Zealand sample Individualism and CVPA loaded with Masculinity and Time Orientation on factor 3 whereas in the Malaysia sample the CVPA loaded

with Uncertainty Avoidance and Masculinity on factor 4. Time Orientation loaded with CVPA in: India, Greece (twice, once on factor 2 and again on 4), New Zealand (on factors 2 and 3), Saudi Arabia and the USA. Uncertainty Avoidance loaded with CVPA in: Czech Republic, Greece, Malaysia, New Zealand (factors 2 and 3), Saudi Arabia, and the USA. Individualism loaded with CVPA in: Czech Republic, India, Greece, Malaysia, New Zealand and the USA. Because of the variability of these results no concrete conclusions can be drawn about any of these pairings as they vary from country to country.

The last pairing of variables worth noting is the frequent loading of Time Orientation and Anxiety. These two variables loaded together most often on factor 2 (factor 3 for Malaysia and South Africa) in all sampled countries except Czech Republic. The loadings in almost all cases were strong, well over the .30 cut off (.35 for India and Saudi Arabia). This pairing does seem to say something interesting about the relationship between Hofstede's Time Orientation dimension and the Anxiety measure on the UTAUT. Unfortunately this is still not a grouping that shows consistency across different countries. In Saudi Arabia it loaded with Power Distance, Uncertainty Avoidance, Social, and CVPA, in India it loaded with Attitude and in Malaysia with Masculinity. In the South Africa sample the two variables loaded in different directions, positive for Anxiety and negative for Time Orientation.

It seems accurate to say that, with the exception of Time Orientation and Anxiety, there was no uniformity in how VSM and UTAUT related to each other. The conclusion must be made that Hofstede's dimension can not be used to explain difference in Technology Acceptance as measured by the UTAUT, at least for the data sample collected here. This was an unexpected finding as Hofstede's model is so often used in the field of HCI to explain difference in interface design, interface preference and use. Previous research has also used Hofstede's model to frame differences in technology diffusion and acceptance (Barnett & Sung, 2005; Maitland & Bauer, 2001). An even more striking and unexpected finding was that the VSM did not itself make up a factor. Since the VSM is a standard measurement tool the expectation was that it would load one factor on its own, like the UTAUT did for factor 1. This was not found to be the case however. Because this discovery was surprising it lead to more detailed analysis of

the raw data collected for the VSM and is discussed in detail in the remainder of this chapter.

5.3. Re-examining the VSM Data

As mentioned previously, it was assumed that the VSM would load a factor on its own like the UTAUT. This did not prove to be the case and so the VSM's raw data was examined further. Several steps were taken in order to better understand what was happening with the VSM and to confirm its overall validity. The first step was to compare the VSM scores obtained from this data to those given by Hofstede (Hofstede & Hofstede, 2005) (Table 5.6). Then more specific analysis of the data was undertaken. The first of these analyses was done using just the VSM raw data for the entire sample (all countries) using factor analysis to see which of its dimensions were loading together and how strongly. The data from this full analysis can be seen in Tables 5.7a and 5.7b. The data was then explored in ever smaller, more specific sets to attempt to determine what was causing the VSM not to factor as expected. To rule out translation of the VSM as a problem an analysis of only English speaking countries was done (Table 5.8). Another analysis of countries where English was the only language, excluding those countries where English is often a second language, was done to ensure that interpretation was not an issue (Table 5.9). The countries that used translated (non-English) VSM questionnaires were then also examined separately to see if the factor loadings would change significantly from those of the English speaking countries – again to rule out language as an issue (Table 5.11). When none of these analyses gave any further insight into why the VSM was not loading as expected or indeed what the VSM was measuring the data for each country was factored separately (examples can be found in Tables 5.12 and 5.13).

Finally, an attempt was made to understand what was happening in the VSM data that used an analysis technique other then PCA. This effort used Cluster analysis to examine the data. The cluster analysis did not show the expected behaviour as countries did not group or cluster together as would be expected. The cluster analysis and all further PCA attempts to understand the VSM data are discussed in detail in the sections that follow.

	Czech Republic	Greece	India	Malaysia	New Zealand	South Africa	UK	USA	Saudi Arabia	Kendall rank correlation
PD	35.0 / 57 (2/4)	50.4 / 60 (1/3)	31.4 / 77 (3/2)	23.4 / 104 (5/1)	20.9 / 22 (7/8)	23.2 / 49 (6/5)	30.2 / 35 (4/7)	20.8 / 40) (8/6)	29.1	0.38
UA	83.2 / 74 (7/2)	113.4 / 112 (1/1)	97 / 40 (3/6)	97.4 / 36 (2/7)	81.3 /49 (8/3)	89.3 / 49 (4/3)	83.7 / 35 (6/8)	83.9 / 46 (5/5)	93.6	-0.36
IDV	85.1 / 58 (6/5)	94 / 35 (4/7)	78 / 48 (8/6)	80.4 / 26 (7/8)	96.4 / 79 (3/3)	87.3 / 65 (5/4)	103.3 / 89 (1/2)	97.3 / 91 (2/1)	88.2	0.64
MAS	17 / 57 (6/5)	45.2/ 57 (2/5)	49 / 56 (1/7)	33 / 50 (4/8)	11.2 58 (7/4)	34.7 / 63 (3/2)	7.3/ 66 (8/1)	31.8 / 62 (5/3)	49.9	-0.4
TO	54 / 13 (4/5)	56.2 (1/)	42.2 / 61 (8/1)	54.3 (3/1)	51.6 / 30 (5/2)	48.3 (6/)	54.4 / 25 (2/4)	46.2 / 29 (7/3)	42.4	-0.6

Table 5.6 VSM score obtained here / Hofstede VSM score followed below by Rank obtained here / Rank based on Hofstede scores 2005 and Kendall correlations

5.3.1. Analysing the VSM in detail

The first step in analysing the VSM data gathered for this research was to compare it to that given by Hofstede (Hofstede & Hofstede, 2005). The scores for each country used in this research were compared as were their relative ranks and these did not match with Hofstede's data. The correlation between this research's data and that of Hofstede were weak. Table 5.6 gives the country scores obtained for this research followed by the Hofstede's country scores (Hofstede & Hofstede, 2005) and below these can be found the ranking obtained in this research and the rankings based on Hofstede's scores (VSM score obtained here / Hofstede VSM score followed below by Rank obtained here / Rank based on Hofstede scores 2005). The abbreviations for the row headings should be read as follows: PD – Power Distance, UA – Uncertainty Avoidance, IDV – Individualism, MAS – Masculinity, TO – Time Orientation. The final column in the table gives the Kendal rank correlation for the rankings obtained here and those based on Hofstede's 2005 scores. The scores for each country were not anticipated to match perfectly as Hofstede himself states that these raw scores will change over time. However, the rankings of the countries in relation to each other should remain fairly stable over time (Hofstede & Hofstede, 2005). As can be seen in Table 5.6 the rankings obtained in this data did not correspond (Kendal rank correlations shown in last column are weak) to those derived from the original Hofstede scores. Three of the correlations, those for Uncertainty Avoidance, Masculinity and Tim Orientations are negative. The only correlation to come out strongly was for the Individualism measure (Oshlyansky, Cairns Thimbleby, 2006). It was not possible to get the rankings and Kendal correlations for Saudi Arabia as no Hofstede data is available for this country.

As the rankings for the scores obtained here differed so greatly from those provided by Hofstede and a general VSM factor did not emerge in the overall analysis the raw VSM data was put through several more sets of factor analysis. The data presented below outlines the step by step process taken to understand why the VSM was not factoring as expected when analysed with other data, not ranking as expected and what the VSM data was actually measuring. Each analysis is presented with corresponding output to illustrate the findings. The abbreviations in the left hand column are read as follows: IDV – Individualism, TO – Time Orientation, MAS – Masculinity, PD – Power Distance and UA – Uncertainty Avoidance. The "q" number after each abbreviation is the number of the question as it appears on the VSM questionnaire (Appendix F).

VSM Component Matrix for all countries					
	1 (18.27)	2 (8.77)	3 (8.09)	4 (6.52)	5 (6.07)
IDV – q1	0.42	-0.02	-0.11	-0.06	-0.53
IDV – q2	0.6	0.08	-0.04	-0.11	-0.19
IDV – q4	0.67	-0.17	0.12	0	-0.07
IDV – q8	0.51	0.33	-0.32	-0.12	0.12
TO – q10	0.53	-0.24	0.44	-0.13	-0.05
TO – q12	0.5	-0.11	0.49	-0.03	-0.22
MAS – q15	-0.02	0.62	0.13	0.12	-0.18
MAS – q20	-0.01	0.15	0.37	-0.13	0.66
MAS – q5	0.6	0.15	-0.15	0.14	0.15
MAS – q7	0.57	0.07	-0.22	-0.17	0.16
PD – q14	0.03	0.5	0.28	-0.33	-0.13
PD – q17	0.24	0.02	0.35	0.43	0.21
PD – q3	0.55	0.02	-0.28	0.24	0.16
PD – q6	0.65	0.17	-0.14	0.05	0.21
UA – q13	-0.12	0.62	0.23	-0.29	-0.08
UA – q16	-0.2	0.47	-0.07	0.34	0.02
UA – q18	0.02	0.18	0.11	0.68	-0.22
UA – q19	0.11	-0.1	0.54	0.13	0.05

Table 5.7a VSM results for all countries (N = 1080; KMO = .781)

Once again Principal Component Analysis was run on the data using the Direct Oblimin rotation method when rotation is employed (Kline, 2002). As the samples below were large the cut off originally suggested by Kline (2002) of .3 was used. All those variables that loaded above .3 are in green and all those that loaded below -.3 are in red. The sample size for the entire sample is 1080, well over the suggested 100.

The first PCA was done using only the raw data for the VSM to eliminate any possible inference from other data, such as the UTAUT and CVPA in previous analysis. The data showed (Table 5.7a) that Hofstede's dimensions do not group as anticipated even when analysed on their own. The first factor, in the un-rotated component matrix (Table 5.7a), should have been a general VSM factor showing that the questionnaire works as one unit of measure, measuring culture in this case. The first factor was a more general VSM factor but one of its dimensions, Uncertainty Avoidance, does not load on the factor 1 at all. Two questions from the Masculinity dimension and the Power Distance dimension do not load on factor 1 either. The missing Uncertainty Avoidance in itself would not be a concern if this dimension loaded entirely on another factor, but it does

not. Since the VSM is a well established measurement tool this lack of a general factor for all its questions was surprising (Oshlyansky et al., 2006).

It was further expected that each dimension's questions would load as groups on a factor. What would emerge would be an "Uncertainty Avoidance" factor, an "Individualism" factor and so on. This, in fact, did not happen and factors 2 through 6 show this (Table 5.7a); the loadings are combinations of questions that are not meant to measure the same dimension. For example, factor 2 loaded with questions on Individualism (q 8), Masculinity (q15), Power Distance (q14) and Uncertainty Avoidance (q13 and q16). Only Individualism (factor 1) and Time Orientation (factors 1 and 3) had all their questions load together (Oshlyansky et al., 2006).

VSM Pattern Matrix for all countries					
	1	2	3	4	5
IDV – q1	0.14	0.08	0.19	0	**-0.61**
IDV – q2	**0.42**	0.12	0.24	-0.06	-0.28
IDV – q4	**0.63**	-0.23	-0.05	0.16	-0.01
IDV – q8	**0.37**	-0.11	**0.46**	-0.05	-0.15
TO – q10	**0.65**	-0.04	0.05	0.12	0.02
TO – q12	**0.71**	0	0.07	0.04	0.08
MAS – q15	**0.62**	0.01	0	-0.2	0.01
MAS – q20	**0.69**	0.18	-0.18	-0.07	-0.02
MAS – q5	0.1	-0.01	**0.69**	-0.16	-0.03
MAS – q7	0.03	0.11	**0.71**	0.01	-0.15
PD – q14	-0.05	**0.72**	-0.02	-0.02	0.08
PD – q17	-0.01	**0.67**	0.13	-0.09	0.01
PD – q3	0.05	**0.54**	-0.05	**0.36**	-0.06
PD – q6	0.05	0.22	-0.3	**0.46**	0.07
UA – q13	0.13	-0.11	**0.36**	**0.41**	0.27
UA – q16	-0.05	-0.05	0.08	**0.74**	-0.17
UA – q18	-0.17	0.03	**0.53**	0.14	0.18
UA – q19	0.15	0.15	0.14	-0.14	**0.76**

Table 5.7b VSM results for all countries - rotated solution (N = 1080)

In order to evaluate if the individual measures, Hofstede's cultural dimensions would emerge at all another PCA analysis was run with rotation (Table 5.7b). The rotation could have helped uncover the individual dimensions as it would look for the simplest solution to the matrix and no longer load an omnibus factor 1. As table 5.7b shows the

individual measures / dimensions still do not emerge. Factor 1 no longer loads all of the questions for Individualism, but continues to load both questions for Time Orientation. Power Distance comes closer to emerging as a single factor (factor 3) but is still missing one question. Rotating the solution did not in effect clarify or simplify the patterns emerging from the data.

It was thought possible that this lack of expected loadings was taking place due to some error in the way the VSM was administered. The VSM questionnaire, like all the others, had been translated into several other languages: Arabic, Czech, Greek and Malay. It was possible that the translated versions were not working as they should so two more factor analyses were conducted using data from just those countries sampled with the English version of the questionnaire. The first analysis included all the countries sampled in English: India, New Zealand, South Africa, UK and the USA. To rule out interference from interpretation of English, the second analysis excluded India and South Africa. These two countries both use English in teaching and business but it is not always used in the home and can often be a "second" language for many.

Component Matrix for India, New Zealand, South Africa, United Kingdom, United States							
	1 (15.79)	2 (9.31)	3 (8.39)	4 (7.18)	5 (6.25)	6 (5.89)	7 (5.60)
IDV - q1	**0.31**	**-0.35**	0.04	-0.13	**-0.45**	0.20	0.27
IDV - q2	**0.50**	0.12	0.18	-0.08	-0.27	-0.17	0.18
IDV - q4	**0.65**	0.04	-0.10	-0.18	0.02	0.19	0.12
IDV - q8	**0.38**	-0.24	**0.49**	-0.10	0.13	**-0.31**	0.20
TO - q10	**0.46**	**0.39**	**-0.33**	-0.20	0.03	0.22	-0.01
TO - q12	**0.45**	**0.39**	-0.19	0.04	-0.26	-0.05	0.27
MAS - q15	-0.07	0.23	**0.56**	0.16	-0.01	**0.42**	0.12
MAS - q20	-0.10	**0.42**	0.00	**-0.38**	**0.47**	-0.26	-0.08
MAS - q5	**0.60**	-0.03	0.16	0.17	0.09	0.13	**-0.43**
MAS - q7	**0.60**	-0.16	0.10	**-0.33**	0.23	-0.11	0.24
PD - q14	0.04	**0.34**	**0.33**	-0.06	**-0.42**	-0.29	**-0.40**
PD - q17	0.06	**0.43**	-0.02	**0.31**	0.25	-0.33	**0.35**
PD - q3	**0.55**	-0.21	0.05	**0.31**	0.21	0.07	-0.21
PD - q6	**0.62**	-0.07	0.09	0.24	0.16	-0.09	-0.29
UA - q13	-0.09	**0.36**	**0.49**	**-0.36**	-0.20	0.01	-0.13
UA - q16	-0.19	0.13	**0.49**	0.06	**0.33**	**0.44**	0.20
UA - q18	0.04	0.25	0.06	0.71	-0.15	-0.13	0.17
UA - q19	0.21	**0.48**	-0.29	-0.01	0.00	**0.35**	-0.11

Table 5.8 VSM results for all English speaking countries (N = 553, KMO = .718).

Component Matrix New Zealand, United Kingdom, United States						
	1 (16.23)	2 (9.31)	3 (8.39)	4 (7.18)	5 (6.76)	6 (5.67)
IDV – q1	**0.41**	0.03	-0.28	-0.14	**-0.49**	0.11
IDV – q2	**0.49**	0.23	0.07	-0.18	-0.12	0.19
IDV – q4	**0.65**	-0.18	0.03	-0.1	0.04	0.13
IDV – q8	**0.43**	**0.5**	-0.2	-0.17	**0.31**	0.18
TO - q10	**0.43**	**-0.49**	**0.36**	-0.01	-0.01	0.05
TO - q12	**0.45**	-0.22	**0.34**	0.03	-0.17	**0.45**
MAS – q15	0.05	**0.54**	0.21	0.17	-0.23	0.09
MAS – q20	-0.12	0	**0.52**	-0.22	**0.45**	0.09
MAS – q5	**0.63**	0.06	0.07	0.19	-0.08	**-0.47**
MAS – q7	**0.59**	0.13	-0.12	**-0.31**	**0.37**	0.1
PD – q14	0.03	**0.31**	**0.46**	-0.14	**-0.44**	0.03
PD – q17	-0.01	0.1	**0.38**	**0.37**	**0.39**	0.18
PD – q3	**0.55**	0.04	-0.11	**0.44**	0.04	-0.27
PD – q6	**0.63**	0.07	-0.12	0.21	0.16	-0.12
UA – q13	0.05	**0.44**	**0.44**	**-0.34**	-0.13	**-0.32**
UA – q16	-0.16	**0.42**	0.18	0.16	0.17	-0.21
UA – q18	-0.03	0.12	0.16	**0.67**	-0.14	0.3
UA – q19	0.15	**-0.49**	**0.41**	-0.04	-0.04	**-0.34**

Table 5.9 VSM results for primary English speaking countries (N = 350, KMO = .694).

The results, as can be seen in Tables 5.8 and 5.9, did not show any improved loadings for any of the dimensions. Rotation was again attempted but did not provide any further insight. In the un-rotated solutions, even the sample with only those countries where English is the first and primary language (New Zealand, USA and UK – Table 5.9) the VSM dimensions did not load as expected. Interestingly there is also a lack of consistency between the analyses regarding which questions loaded each factor. The results for each of these analyses can be seen below in Tables 5.8 and 5.9 (un-rotated component matrix is presented in both cases). In all the analyses the only measure / indices to load as expected were Individualism (IDV) and Time Orientation (TO). IDV loaded on factor 1 and TO loaded factors 1 and then again on either factor 2 or 3 as was true in the complete (all countries) sample. It must be noted, however, that IDV only loads on factor 1 along with various other questions from the VSM, never on its own or clearly paired with another measure / index. TO only has two questions, unlike the other measures, but still never loads cleanly on its own. TO's questions 10 and 12 loaded similarly in the English speaking samples (Tables 5.8 and 5.9) (Oshlyansky et a., 2006).

	Factor 1			Factor 2			Factor 3		
	All English	New Zealand, UK, USA	All Countries	All English	New Zealand, UK, USA	All Countries	All English	New Zealand, UK, USA	All Countries
IDV - q1	0.31	0.41	0.42	-0.35	0.03	-0.02	0.04	-0.28	-0.11
IDV - q2	0.50	0.49	0.60	0.12	0.23	0.08	0.18	0.07	-0.04
IDV - q4	0.65	0.65	0.67	0.04	-0.18	-0.17	-0.10	0.03	0.12
IDV - q8	0.38	0.43	0.51	-0.24	0.50	0.33	0.49	-0.20	-0.32
TO - q10	0.46	0.43	0.53	0.39	-0.49	-0.24	-0.33	0.36	0.44
TO - q12	0.45	0.45	0.50	0.39	-0.22	-0.11	-0.19	0.34	0.49
MAS – q15	-0.07	0.05	-0.02	0.23	0.54	0.62	0.56	0.21	0.13
MAS – q20	-0.10	-0.12	-0.01	0.42	0.00	0.15	0.00	0.52	0.37
MAS – q5	0.60	0.63	0.60	-0.03	0.06	0.15	0.16	0.07	-0.15
MAS – q7	0.60	0.59	0.57	-0.16	0.13	0.07	0.10	-0.12	-0.22
PD - q14	0.04	0.03	0.03	0.34	0.31	0.50	0.33	0.46	0.28
PD - q17	0.06	-0.01	0.24	0.43	0.10	0.02	-0.02	0.38	0.35
PD - q3	0.55	0.55	0.55	-0.21	0.04	0.02	0.05	-0.11	-0.28
PD - q6	0.62	0.63	0.65	-0.07	0.07	0.17	0.09	-0.12	-0.14
UA - q13	-0.09	0.05	-0.12	0.36	0.44	0.62	0.49	0.44	0.23
UA - q16	-0.19	-0.16	-0.20	0.13	0.42	0.47	0.49	0.18	-0.07
UA - q18	0.04	-0.03	0.02	0.25	0.12	0.18	0.06	0.16	0.11
UA - q19	0.21	0.15	0.11	0.48	-0.49	-0.10	-0.29	0.41	0.54

Table 5.10 Factors 1, 2, 3 for VSM comparison between analyses.

For easier comparison factors 1, 2 and 3 from the un-rotated component matrices are put side by side in the Table 5.10. As can be seen factor one loads with the same questions consistently across all the samples but Uncertainty Avoidance is missing from all of them. Factors 2 and 3 load differently on each sample and again do not load those questions that measure one dimension together. For example IDV-q1 loaded on factor 2 when all English speakers were included but did not load factor two for the all countries sample or when only New Zealand, UK and USA were included in the sample. This seems to eliminate translation in itself as a problem, as neither of the English speaking samples loaded as expected.

Component Matrix non-English speaking countries (Czech Republic, Greece, Malaysia, Saudi Arabia)					
	1 (21.25)	2 (8.96)	3 (8.13)	4 (6.65)	5 (5.80)
IDV - q1	**0.51**	0.01	0.09	0.20	**-0.47**
IDV - q2	**0.66**	0.01	-0.10	-0.08	-0.27
IDV - q4	**0.69**	-0.16	0.18	0.10	-0.06
IDV - q8	**0.59**	0.21	**-0.33**	-0.12	0.09
TO - q10	**0.60**	-0.17	**0.46**	-0.15	-0.09
TO - q12	**0.54**	-0.11	**0.56**	-0.02	-0.05
MAS – q15	-0.01	**0.57**	0.14	0.13	-0.09
MAS – q20	0.07	**0.36**	0.21	-0.10	**0.60**
MAS – q5	**0.60**	0.21	-0.26	0.06	0.03
MAS – q7	**0.55**	-0.06	-0.27	-0.06	0.25
PD - q14	0.00	**0.55**	0.26	**-0.44**	-0.18
PD - q17	**0.38**	0.02	0.27	**0.41**	0.27
PD - q3	**0.54**	0.05	**-0.34**	0.07	0.12
PD - q6	**0.68**	0.25	-0.22	-0.11	0.12
UA - q13	-0.17	**0.66**	0.13	-0.18	-0.16
UA - q16	-0.23	**0.35**	-0.20	**0.44**	-0.01
UA - q18	0.00	0.25	-0.01	**0.63**	-0.20
UA - q19	0.05	0.06	**0.47**	0.26	**0.31**

Table 5.11 VSM results for non-English speaking countries (N = 527; KMO = .802).

The non-English countries were also examined as a last test to rule out translation and interpretation as a problem. All those countries that had used a translated questionnaire (Czech Republic, Greece, Malaysia and Saudi Arabia) were examined using PCA. If this analysis yielded the same inconsistent results as the English speaking samples, then translation could be ruled out completely. The results (Table 5.11) for the non-English speaking sample showed only more inconsistencies. The first factor still does not load as a general VSM factor but as before loaded with IDV and TO. As before, TO also loaded the 3rd factor but none

of the other measures / indices load all their questions on one factor. Given this final result it can be concluded that translation and interpretation were not what caused the unexpected behaviour of the VSM for this sample.

Component Matrix Malaysia						
	1 (25.83)	2 (8.9)	3 (7.85)	4 (6.96)	5 (6.12)	6 (6.03)
IDV - q1	**0.62**	0.00	-0.12	-0.02	**-0.31**	-0.21
IDV - q2	**0.75**	-0.01	0.04	-0.14	-0.26	-0.20
IDV - q4	**0.64**	-0.04	0.19	**-0.41**	-0.09	-0.03
IDV - q8	**0.69**	0.01	**-0.31**	0.17	-0.02	-0.02
TO – q10	**0.78**	0.05	0.00	-0.16	0.03	-0.06
TO – q12	**0.64**	0.13	0.23	**-0.40**	0.15	0.02
MAS - q15	**0.63**	-0.03	-0.15	-0.01	**0.40**	**0.36**
MAS - q20	**0.69**	-0.04	0.02	0.04	0.22	**0.31**
MAS - q5	**0.69**	-0.21	-0.07	**0.39**	-0.08	0.06
MAS - q7	**0.53**	0.09	0.20	**0.49**	-0.01	0.21
PD - q14	-0.06	0.06	**0.56**	0.02	0.25	**-0.36**
PD - q17	0.07	0.08	**0.58**	**0.40**	0.27	-0.11
PD - q3	-0.04	**0.47**	**-0.42**	**0.37**	0.22	-0.16
PD - q6	**-0.31**	0.28	-0.15	-0.26	0.24	**0.49**
UA - q13	0.23	**0.69**	-0.22	0.07	0.03	**-0.32**
UA - q16	-0.02	**0.65**	-0.03	-0.17	-0.23	0.06
UA - q18	-0.09	0.24	**0.33**	0.23	**-0.62**	**0.45**
UA - q19	0.05	**0.51**	**0.38**	-0.09	0.10	0.13

Table 5.12 Malaysia VSM results (N = 168; KMO =.779)

A final test using Principal Components Analysis was done with the VSM data to see if the dimensions would emerge as expected. Each country's data was taken separately and factored. This was done to rule out the possibility that creating a heterogeneous data set of mixed countries was causing the VSM dimensions to load in unexpected ways. Below are examples of the UK and Malaysia VSM data analysis (Tables 5.12 and 5.13). Again the VSM questions did not load as expected. The loadings for factor 1 are similar but not exactly the same as those in the previous examples. The Malaysia sample loaded an Uncertainty Avoidance question on factor 1 which had not been seen up to this point. The UK sample has an 8th factor which had not appeared earlier. The other factors are again dissimilar, but this was not entirely unexpected as different countries would have different VSM measures as more or less important. What was unexpected was that none of the VSM measures (Hofstede's dimensions) loaded all their questions together, nor did the entire VSM come out as one factor. Further, this

type of analysis, country by country, should not be necessary for a cross-culturally validated tool, one that measure culture especially. The tool should be usable and valid on a multi-cultural, homogenous sample. This precipitates doubt as to the construct validity of the VSM as a tool for measuring cultural differences.

Component Matrix UK only							
	1 (17.8)	2 (8.9)	3 10.08)	4 (7.68)	5 (7.01)	6 5.08)	7 (5.9)
IDV - q1	**0.47**	0.01	-0.12	**-0.56**	**-0.32**	0.14	0.09
IDV - q2	**0.38**	0.29	**0.37**	-0.10	-0.05	**-0.42**	-0.01
IDV - q4	**0.74**	-0.09	-0.08	0.19	-0.07	0.15	-0.30
IDV - q8	**0.73**	-0.01	-0.04	-0.04	0.09	-0.27	-0.11
TO – q10	**0.70**	-0.26	0.22	0.08	-0.17	-0.05	-0.21
TO – q12	**0.64**	0.04	-0.20	**0.32**	-0.10	-0.09	**0.32**
MAS - q15	**0.51**	**0.35**	**-0.31**	0.11	**0.35**	0.16	0.09
MAS - q20	**0.51**	**0.56**	-0.08	0.01	0.07	0.00	0.21
MAS - q5	**0.33**	**-0.56**	0.27	0.14	0.27	-0.25	-0.02
MAS - q7	**0.30**	-0.27	0.15	-0.22	0.28	**0.33**	**0.64**
PD - q14	0.22	0.25	**0.44**	**-0.40**	0.18	0.12	-0.28
PD - q17	-0.01	0.17	**0.55**	**-0.35**	-0.23	-0.23	0.22
PD - q3	0.17	0.12	**0.31**	-0.03	-0.08	**0.75**	-0.23
PD - q6	-0.04	**0.52**	0.14	**0.31**	**0.34**	-0.02	-0.24
UA - q13	0.06	-0.21	**0.43**	**0.56**	-0.11	0.18	0.24
UA - q16	-0.05	0.24	**0.43**	**0.34**	**-0.58**	0.04	0.06
UA - q18	0.13	**-0.62**	0.20	-0.10	0.17	0.03	-0.20
UA - q19	-0.22	0.16	**0.58**	0.05	**0.49**	-0.03	0.10

Table 5.13 UK VSM results (N = 117; KMO = .582)

5.3.2. Factors emerging in the VSM data

Thus far the VSM data was examined with the intention of finding the 5 dimensions of Hofstede's cultural model emerging on the components. These dimensions did not emerge, as was seen. However, before moving on to discuss the analysis completed beyond Principal Components Analysis it is pertinent to attempt to understand the factors that did emerge. The PCA component matrices tables presented thus far have shown the VSM questions in their dimensional groups. This was done to facilitate interpretation of the factors as it was expected that each dimension would load together. Therefore the questions were not presented in the order in which they appear on the questionnaire but all the questions representing the Individualism dimension are shown together, all those that represent Power Distance together and so on. If the data is resorted and presented in VSM question order (Table 5.14) a slightly different picture of the data becomes apparent. It should be noted that questions 9 and 11 which are not

used in the calculation of any of the dimensions are left in for this discussion as they help understand the data pattern that manifests.

Component Matrix for the VSM - all countries					
	1 (18.27)	2 (8.77)	3 (8.09)	4 (6.52)	5 (6.07)
IDV - q1	**0.40**	0.06	-0.15	0.06	**-0.56**
IDV - q2	**0.57**	0.16	-0.06	-0.04	-0.22
PD - q3	**0.50**	0.18	**-0.31**	0.21	0.19
IDV - q4	**0.66**	-0.12	0.01	0.05	-0.08
MAS - q5	**0.57**	0.24	-0.13	0.12	0.15
PD - q6	**0.62**	0.27	-0.13	0.02	0.20
MAS - q7	**0.54**	0.19	-0.21	-0.22	0.15
IDV - q8	**0.47**	**0.45**	-0.22	-0.16	0.10
Not used - q9	**0.58**	-0.26	0.13	0.05	-0.15
TO - q10	**0.59**	**-0.33**	**0.33**	-0.11	-0.05
Not used - q11	**0.55**	-0.15	0.16	-0.20	0.17
TO - q12	**0.52**	-0.19	**0.40**	0.03	-0.18
UA - q13	-0.14	**0.51**	**0.43**	-0.26	-0.14
PD - q14	0.02	**0.38**	**0.43**	-0.28	-0.22
MAS - q15	-0.05	**0.55**	**0.31**	0.14	-0.15
UA – q16	-0.21	**0.42**	0.10	0.27	0.12
PD - q17	0.25	-0.05	0.30	**0.43**	0.27
UA – q18	0.01	0.16	0.14	**0.71**	-0.09
UA – q19	0.13	-0.21	**0.45**	0.15	0.08
MAS - q20	0.01	0.04	**0.39**	-0.20	**0.58**

Table 5.14 VSM data presented in question order (N = 1080)

What emerges is a possible order effect on the VSM. Questions 1 - 12 load on factor 1, questions 13 – 16 load factor 2, questions 12 – 15, 19 and 20 load on factor 3 and questions 17 and 18 on factor 4. Rotating the solution (refer to Table 5.7b) does lessen the pattern of order that emerges in the un-rotated solution. However, as stated earlier, rotation does not facilitate the individual measures emerging. Further research will need to evaluate if an order effect is truly present on the VSM, but the analysis completed here does seem to point to some such effect. Questions 1 – 12 loading on factor 1 could have been caused by the extra line of instruction inserted before question 13, which read "In your current situation." But this seems unlikely as question 12 and 13 load with two different groups on factors 1, 2 and 3. As the research done here was not specifically designed to test order effect on the VSM it is not possible to conclude that this is indeed an issue. The remaining sections of this chapter describe further analysis of the VSM which goes beyond PCA and attempts to understand why the expected loadings where not achieved.

As the VSM is an often used tool and its cultural dimensions are considered to be well established confirmatory factor analysis (Principal Axis Factoring) was also attempted (Table 5.15). This technique is used as a way to validate pre established hypothesis or tools. As such it could have yielded slightly different results to that of Principal Components Analysis (PCA) which is used predominantly to explore and not confirm. Again the data used is the entire sample (all countries) raw data for the VSM questions. Questions 9 and 11 again left in the analysis as they help explain the pattern emerging from the data even though they are not used in the calculation of any of the VSM dimensions. The questions are left in the order in which they appear on the VSM and not grouped by dimension. The pattern that emerges is very similar to that found with PCA (Table 5.14) in that the first 12 questions make up factor 1, questions 13, 14, and 15 emerge on factor 3 and none of the VSM measures (cultural indices) emerge as factors after factor 1. Nor does the VSM load as one complete factor as an indication that it is measuring one idea – culture.

Confirmatory factor analysis factor matrix for all VSM data						
	1	2	3	4	5	6
IDV – q1	**0.37**	0.06	-0.08	0.08	**0.48**	-0.02
IDV – q2	**0.51**	0.11	0.01	0.03	0.16	-0.08
PD - q3	**0.45**	0.18	-0.19	0.18	-0.12	0.00
IDV – q4	**0.60**	-0.10	-0.03	0.05	0.08	0.02
MAS - q5	**0.54**	0.23	-0.06	0.28	-0.17	-0.18
PD - q6	**0.57**	0.24	-0.04	0.07	-0.15	-0.02
MAS - q7	**0.51**	0.23	-0.14	**-0.40**	-0.03	0.18
IDV – q8	**0.43**	**0.39**	-0.05	-0.18	0.00	0.05
Not used - q9	**0.52**	-0.23	0.04	0.06	0.07	-0.03
TO – q10	**0.56**	**-0.39**	0.22	-0.07	-0.05	-0.07
Not used - q11	**0.50**	-0.15	0.08	-0.13	-0.15	-0.05
TO – q12	**0.48**	-0.24	0.27	-0.04	0.07	0.15
UA – q13	-0.12	**0.30**	**0.47**	-0.07	0.06	-0.17
PD - q14	0.02	0.17	**0.36**	-0.02	0.02	-0.16
MAS - q15	-0.04	0.30	**0.32**	0.06	0.07	0.15
UA – q16	-0.18	0.23	0.13	0.06	-0.03	0.17
PD - q17	0.21	-0.08	0.13	0.13	-0.08	0.23
UA – q18	0.00	0.07	0.09	0.29	0.01	0.21
UA – q19	0.11	-0.18	0.19	0.05	-0.07	0.07
MAS - q20	0.01	-0.02	0.20	-0.05	-0.18	-0.02

Table 5.15 Principal Axis Factoring solution for entire VSM sample (N = 1080)

5.3.3. Beyond PCA Analysis

To further understand why the VSM's questions did not load as expected and gain a better understand of was happening in the VSM data further analysis was conducted. Cluster Analysis was completed to see if each country or country groups would cluster logically together, thereby showing that some aspect of national culture or cultural difference was being measured by the VSM. If country clusters did not emerge then another possibility was for regional clusters to form such as "Western" versus "Eastern" countries or developed countries versus developing.

The Hierarchical Cluster Analysis (done using SPSS 11.5.0) did not show the VSM raw data clustering into country groups. The analysis was done specifying nine clusters be formed, one for each country, but the clusters that emerged were not country clusters. The clusters or groups that were formed did not follow a pattern of "eastern" versus "western" either. From the results of the Cluster Analysis, it would appear that the data gathered for this research can not show that the VSM is measuring national culture. These finding and some further analysis were reported in Oshlyansky, Cairns and Thimbleby (2006) and should be further investigated in the future with larger samples of the VSM data as they bring into question the construct validity of the VSM.

5.4. Conclusions for the VSM data

The initial analysis using the VSM, was done to see how Hofstede's cultural model would help understand cross-cultural technology acceptance. When the VSM did not perform as expected further analysis was done in an attempt to gain insight into the reasons for the unusual behaviour. Principal Component Analysis (PCA) was used to see what, if any, factors which related back to the VSM or any of its dimensions would emerge. The VSM data was isolated from the technology acceptance data and analysed on its own but still did not perform as expected, it did not emerge as a comprehensive whole nor did any of its indices emerge as components. What did emerge from the completed VSM factor analysis was a possible order effect in the questionnaire. When the VSM was additionally analysed using cluster analysis it still did not produce the groupings that were expected. Nine clusters were searched for in the cluster analysis, one for each country, but they did not emerge.

Several conclusions can be drawn for the analysis carried out here with the VSM data. Firstly, it seems safe to rule out translation as a problem since the English-language

only samples did not show any better factor loadings than the mixed language set. When only English speaking countries were used in the analysis to eliminate any concerns caused by translation the VSM data performed no better. Limiting the data used in the PCA to just New Zealand, the US and the UK (only those countries where English is the only official language) did not improve the outcome of the analysis. Rotating the solution did not achieve better results for the individual VSM measures. If the VSM was not meant to calculate just one concept (such as culture) and is an inherently a multidimensional measure, rotation of the factor solution should have uncovered each of its dimensions (indices). The only VSM dimensions that did emerge with some consistency consistently were those of Individualism and Time Orientation. Time Orientation is composed of only two questions that appear in sequence so it is difficult to say if it is a valid measure. If Individualism is the only dimension which can be relied upon in the VSM than the model and questionnaire cannot be said to measure culture, but only Individualism.

It may be possible that this is due to some other aspect of the data set, such as age or education level. Age is seen to influence some VSM dimensions, UAI and MAS for example (Hofstede & Hofstede, 2005). However, it seems unlikely that age, (the average age of the entire sample was just over 23) would cause the questions measuring each dimension not to group together. Education level could also be contributing to some of the data peculiarity. Hofstede (2001) cites work done to correct for education level for the various dimension scores, but does not mention this as a problem for factoring the raw data. Neither of these issues can be completely ruled out. The work done by Hofstede, and most of those who have duplicated his studies, seem to have been done with older samples and possibly therefore with people who have an overall higher level of education then the sample described here (Hofstede & Hofstede, 2005).

This research used students in nine countries with the VSM, a major difference to the research of Hofstede, who had originally used middle management professionals. However, a well composed questionnaire that measures culture should still work with a population that is of a somewhat younger age. Likewise, studies undertaken by Kruger and Roodt (2003) and Spector, Cooper and Sparks (2001) sampled older, professional populations, with no better results. In the case of Kruger and Roodt (2003) their population was all female and their aim, similar to the one undertaken in this research,

was to find the association between Hofstede's cultural model and another measure (leadership behaviour). It can therefore be said that Hofstede's model did not work for Kruger and Roodt because the population was all female, and did not work in this research because the sample was all younger non-professionals. This critic can not be levelled at the population sample used by Spector et al. (2001) which included over 6000 professionals from 23 countries. A sample, whose demographics closely matched those first used by Hofstede. Like this research and that of Kruger and Roodt, Spector et al. could not produce the five measures (indices) that Hofstede's VSM and his cultural model are said to measure.

It may be that the data set itself may not have been large enough. Every effort was made to collect samples of at least 100 respondents from each country. This was not always possible, as in the case of India and Saudi Arabia. Larger sets of data for each country may yield better results but this does not seem to be the case as even larger data sets, like those collected for Czech Republic and Malaysia did not improve the VSM's performance. Much more scrutiny is required of the VSM if the research community is to continue to rely on it as a framework of culture.

Finally and possibly most significantly, there may have been nothing wrong with the samples used here. A questionnaire intended to measure culture should be usable with a multi-cultural participant sample, across differing age, educational and professional groups. Although in some instances the Individualism and Time Orientation dimensions do emerge, as in the case of the all country sample before rotation (Table 5.7a) this is not enough to validate the entire VSM. Especially as Individualism never loads outside factor 1 and does not even load factor 1 in its entirety when the solution is rotated (Table 5.7b) and Time Orientation is represented by only two questions. The analysis completed here may simply add to concerns already expressed by previous researchers, like Kruger and Roodt (2003) and Spector et al. (2001), about the validity and usefulness of the VSM and Hofstede's model.

6. UTAUT and CVPA analysis

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6.1. Introductuion

Given the unexpected results for the VSM data detailed in the previous chapter, it was not meaningful to draw any correlations between culture, as measured by the VSM, and technology acceptance, as measured by the UTAUT. The UTAUT questionnaire did seem to show itself to be a robust and reliable measurement tool across the countries sampled for this research in the previous analysis. Because of the UTAUT's strong showing in the overall analysis, this chapter will review the results of the UTAUT with and without the additional CVPA questions. The cultural differences that emerged on the UTAUT between the countries sampled will be highlighted but their meaning will not be discussed in scope of Hofstede's cultural model. The discussion here will look at the data starting with the entire sample and progress to look at the individual countries and the differences that emerged between them.

6.2. Extending the UTAUT beyond its original

Before beginning a detailed discussion of the analysis completed here on the UTAUT, it is worthwhile to note the difference between this research and the original research carried out by Venkatesh, Morris, Davis and Davis (2003) to produce and validate the UTAUT. The work presented here is foremost an extension of the original UTAUT research as it does not seek to use it as a predictive tool, but rather as a measure of technology acceptance. Secondly the original research by Venkatesh et al. (2003) used a different factor analysis method (Partial least squares), one more suited to the elimination of unneeded questions from their original set to achieve the resulting set of UTAUT questions and to test the reliability and validity of the selected questions. Along with the minor re-wording which was covered in detail in Chapter 4 the response scale used here was five point unlike the original seven point scale used by Venkatesh et al. (2003). The five point scale was used here so that the UTAUT, CVPA and the VSM questionnaires would all have the same scale measures. Providing similar scales for each of the questionnaires ensured that the participants would not have to switch between a seven point scale on one questionnaire and a five point on another. This standardisation made it easier for participants. Finally this work's biggest extension and difference from the original UTAUT research is the translation of the UTAUT into several languages other than English. As will be seen throughout this chapter, the extension of the UTAUT in these ways did not hurt its validity or its performance as a tool.

6.2.1. Approach for detailed analysis of UTAUT and CVPA

UTAUT data, as mentioned in the previous chapter, loaded together on factor 1 in the main analysis (Table 6.1 shows the component matrix for the VSM, UTAUT and CVPA data all together for all countries as an example). This indicated that the UTAUT was working as a cohesive measurement tool across the entire sample. As this analysis also included the VSM data which could have confounded the results, the UTAUT was then analysed separately to get a clearer picture of its behaviour. The following discussion will also included the interaction between the UTAUT and the questions taken from the CVPA. In previous analyses (Chapter 5) the CVPA questions loaded together with the UTAUT in 5 cases / countries: Greece, India, Saudi Arabia, South Africa and United Kingdom. To refine the understanding of how the UTAUT was working across the national cultures sampled here, the raw data was examined. And, also, to better understand the relationship between the CVPA questions and the UTUAT, the raw data for these two questionnaires was examined. As before Principal Component Analysis was used, when it would help interpret the data Direct Oblimin rotation was used. All factors with eigenvalues over 1 were considered. The cut off point of for any variable to be considered as significantly affecting a particular factor was .3, if the sample being analysed was greater than 100. In cases where the sample falls short of 100 the stricter cut off used is .35. As in the previous chapter the component matrices show the un-rotated solution and where helpful for the interpretation of data the pattern matrix is also given.

All Countries Component Matrix				
	1 (25.41)	2 (10.92)	3 (9.15)	4 (8.60)
Power Distance	0.09	0.25	**0.76**	0.21
Uncertainty Avoid	-0.16	**0.43**	**0.57**	-0.27
Individualism	-0.05	**-0.50**	0.14	0.08
Masculinity	0.14	0.12	-0.07	**0.80**
Time Orientation	**0.56**	**-0.39**	0.14	0.03
UTAUT Performance	**0.46**	**0.38**	-0.14	0.08
UTAUT Effort	**0.68**	0.30	-0.16	-0.02
UTAUT Attitude	**0.71**	0.18	-0.06	-0.08
UTAUT Social	**0.75**	-0.04	0.10	0.01
UTAUT Self Efficacy	**0.80**	0.00	0.01	0.01
UTAUT Anxiety	**0.37**	**-0.61**	0.30	0.04
CVPA Visual	**0.38**	-0.06	-0.05	**-0.50**

Table 6.1 All Countries VSM and UTAUT results (N = 1080; KMO = .797)

6.2.2. Re-affirming the validity of the UTAUT tool

Before analysing the entire all countries data set only those countries that were English only speaking were examined. This was done to ensure that the tool was working as a cohesive whole without the noise of the VSM data as in the analysis described in the previous chapter. It was also done with just the English speaking population to ensure that the rewording and other changes to the tool had not affected its validity. Previously the tool had been validated by checking that the first factor was an omnibus factor with all the UTAUT's measures loading it (Venkatesh, Morris, Davis & Davis, 2003). In this thesis this was done with a sample containing the countries of New Zealand, the United Kingdom and the United States. India and South Africa were not included as they are not English-only speaking and are significantly different in their socio-economic situations to the other English language countries in the sample. The UTAUT tool had only previously been used and tested in the western, developed world. As this initial analysis was done to re-affirm that the changes made to the tool had not affected its validity, a sample that closely resembled the original used by Venkatesh et al. (2003) was needed. Therefore, India and South Africa were not included.

As can be seen in Table 6.2a the first factor to emerge is an omnibus UTAUT factor with the exception of Anxiety. The left hand column in each of the tables below gives the name of the measure / construct and the number of the question as it appears on the questionnaire. The top row gives the factor number and the amount of variance accounted for in the sample by that factor follows in "( )." Overall the tool is working and it would seem that the rewording of questions did not affects its performance as questions measuring the same construct load together in groups. The Anxiety measure loads very strongly on factor two along with most of the Performance measure. This is similar to what is seen in the all countries analysis. It appears that Anxiety is a strong measure that stands independently from the rest of the measures on the UTAUT. This can be caused by several factors, including the way the questionnaire was altered for this research, or indeed the technology (i.e. websites) being queried. Never the less, the emergence of all other measures on factor one is a strong indication that the tool is working and can be analysed further to ascertain its overall validity across all the countries sampled.

Component Matrix UTAUT New Zealand, UK, USA (English only)						
	1 (27.13)	2 (13.59)	3 (9.15)	4 (6.78)	5 (6.3)	6 (4.87)
Performance – q1	**0.40**	-0.25	**0.60**	0.14	0.17	0.08
Performance – q2	**0.43**	**-0.32**	**0.51**	0.27	0.14	0.10
Performance – q3	**0.53**	**-0.30**	**0.62**	0.22	0.08	0.13
Performance – q4	**0.46**	**-0.30**	**0.49**	0.16	-0.13	-0.02
Effort – q5	**0.54**	-0.23	-0.27	0.24	0.12	-0.21
Effort – q6	**0.65**	-0.04	**-0.42**	0.27	0.16	-0.17
Effort – q7	**0.66**	-0.15	**-0.40**	0.24	0.21	-0.13
Effort – q8	**0.65**	-0.16	**-0.40**	0.25	**0.33**	-0.13
Attitude – q9	**0.58**	-0.06	-0.02	0.24	**-0.45**	0.09
Attitude – q10	**0.58**	0.00	-0.19	0.13	**-0.62**	0.21
Attitude – q11	**0.60**	-0.10	-0.26	0.11	**-0.55**	0.17
Social – q12	**0.53**	0.09	0.23	-0.30	-0.14	**-0.42**
Social – q 13	**0.50**	0.17	0.13	**-0.35**	**-0.30**	**-0.36**
Social – q14	**0.67**	0.12	0.12	**-0.35**	0.08	-0.23
Social – q15	**0.68**	0.15	0.10	**-0.44**	0.02	-0.19
Self-efficacy – q16	**0.64**	-0.14	-0.11	-0.06	**0.31**	0.08
Self-efficacy – q17	**0.60**	**0.31**	-0.03	-0.25	0.16	**0.31**
Self-efficacy – q18	**0.47**	0.07	-0.09	**-0.36**	0.17	**0.46**
Self-efficacy – q19	**0.53**	0.15	-0.14	**-0.31**	0.12	**0.43**
Anxiety – q20	0.26	**0.72**	0.18	0.19	0.06	-0.06
Anxiety – q21	0.02	**0.75**	0.07	**0.30**	0.01	0.04
Anxiety – q22	0.13	**0.81**	0.08	0.28	0.02	-0.03
Anxiety – q23	0.17	**0.83**	0.14	0.18	0.06	0.02

Table 6.2a UTAUT results for English only countries: New Zealand, UK, USA (N = 350; KMO = .841)

Rotating the matrix in Table 6.2b provides an even cleared picture for the UTAUT. Rotation loses the omnibus first factor and instead provides a factor for each of the 6 UTAUT measures used here. The first factor emerges as the Effort measure. Factor 2 is Anxiety, 3 Performance and so forth. In the rotated solution the Effort, Social and Self-efficacy measures do not lose any of their questions to other factors but load all their questions on one factor. The structure matrix is not given here as it does not provide any further clarification of the data as its loadings are very similar to the pattern matrix. Again this shows that the UTAUT was not affected by any of the wording changes made.

Pattern Matrix UTAUT New Zealand, UK, USA (English only)						
	1	2	3	4	5	6
Performance – q1	-0.04	0.02	**0.80**	-0.02	0.10	0.05
Performance – q2	0.08	0.00	**0.81**	0.09	0.01	-0.01
Performance – q3	-0.02	0.02	**0.90**	0.02	-0.05	0.05
Performance – q4	-0.04	-0.06	**0.67**	-0.14	-0.19	-0.11
Effort – q5	**0.71**	-0.07	0.04	-0.05	-0.07	-0.13
Effort – q6	**0.83**	0.10	-0.08	-0.02	-0.10	-0.03
Effort – q7	**0.84**	0.00	-0.02	0.01	-0.06	0.02
Effort – q8	**0.89**	0.00	0.01	0.05	0.05	0.05
Attitude – q9	0.10	0.07	0.19	-0.03	**-0.67**	-0.03
Attitude – q10	-0.01	0.02	-0.02	-0.02	**-0.88**	0.11
Attitude – q11	0.11	-0.08	-0.05	-0.03	**-0.81**	0.11
Social – q12	0.02	0.01	0.08	**-0.79**	0.01	-0.11
Social – q 13	-0.08	0.01	-0.08	**-0.80**	-0.17	-0.06
Social – q14	0.15	0.02	0.06	**-0.66**	0.10	0.20
Social – q15	0.07	0.00	0.01	**-0.70**	0.05	0.27
Self-efficacy – q16	**0.46**	-0.09	0.17	-0.08	0.09	**0.36**
Self-efficacy – q17	0.05	0.22	0.04	-0.12	-0.04	**0.65**
Self-efficacy – q18	-0.04	-0.07	0.02	0.01	-0.05	**0.79**
Self-efficacy – q19	0.01	0.02	-0.03	-0.01	-0.12	**0.76**
Anxiety – q20	0.03	**0.79**	0.07	-0.12	0.04	0.01
Anxiety – q21	-0.03	**0.82**	-0.03	0.12	-0.04	-0.03
Anxiety – q22	0.04	**0.88**	-0.04	0.01	-0.02	-0.04
Anxiety – q23	-0.04	**0.86**	0.00	-0.04	0.02	0.07

Table 6.2b UTAUT, English only: New Zealand, UK, USA - rotated solution

6.2.3. Complete Sample analysis, UTAUT and CVPA

The UTAUT was found to be working as a whole in the heterogeneous (all countries) data sample as it had been in the English only sample. This is a strong finding for the cross-cultural validity of the UTAUT which had not been previously translated and tested in this many countries simultaneously. This analysis shows that the UTAUT is a valid reliable measurement tool in at least the countries sampled here. Table 6.3 shows the Principal Component analysis (un-rotated) for the UTAUT data only. Table 6.4 shows the un-rotated results for the UTAUT and CVPA data analysed together. As before, the left hand column is the construct being measured and the number of the question as it appears on the questionnaire. The top row is the factor and in "( )" the amount of variance explained by that factor in the sample.

The first factor is the general UTAUT factor with the exception of Anxiety which loads factor 2 in both cases – UTAUT (Tables 6.3a and 6.3b) and UTAUT + CVPA (Tables 6.4a and 6.4b). In the combined UTAUT and CVPA data set factor 2 loads Anxiety with

the CVPA questions, this pairing will be seen again in the analysis of individual countries. Questions that measure the UTAUT constructs (Performance, Effort Expectancy, Attitude, Social, Self-efficacy, and Anxiety) load, for the most part, in their sets. Again this is a sign that rewording of the questions did not affect the questionnaire overall. As can be seen in Table 6.3a in factors 2 through 6 (UTAUT only analysis) and in Table 6.4a in factors 2 through 7 (UTAUT + CVPA analysis) constructs load in their groups. For example, in the UTAUT only analysis (Table 6.3a) Performance and Anxiety load on factor 2, Performance also loads with Effort on factor 3. In the UTAUT + CVPA (Table 6.4a) analysis a strong pairing occurs between the Anxiety construct on the UTAUT and the CVPA questions (factors 2 and 3).

Component matrix UTAUT all countries						
	1 (29.04)	2 (12.87)	3 (8.30)	4 (6.27)	5 (5.74)	6 (4.37)
Performance – q1	0.32	-0.31	0.57	0.07	0.15	0.02
Performance – q2	0.37	-0.42	0.54	0.11	0.22	0.05
Performance – q3	0.43	-0.38	0.57	0.15	0.15	0.04
Performance – q4	0.49	-0.32	0.43	0.16	-0.01	0.04
Effort – q5	0.53	-0.38	-0.17	0.05	0.22	-0.05
Effort – q6	0.65	-0.18	-0.37	0.05	0.32	-0.19
Effort – q7	0.65	-0.23	-0.39	0.07	0.34	-0.21
Effort – q8	0.65	-0.18	-0.36	0.07	0.32	-0.22
Attitude – q9	0.54	-0.17	0.02	0.43	-0.32	0.09
Attitude – q10	0.59	-0.07	-0.22	0.44	-0.44	0.13
Attitude – q11	0.62	-0.10	-0.25	0.37	-0.39	0.09
Social – q12	0.62	0.14	0.15	-0.22	-0.31	-0.37
Social – q 13	0.61	0.17	0.14	-0.14	-0.36	-0.33
Social – q14	0.65	0.14	0.17	-0.40	-0.18	-0.15
Social – q15	0.63	0.14	0.15	-0.49	-0.08	-0.08
Self-efficacy – q16	0.63	-0.10	-0.20	-0.18	0.08	0.08
Self-efficacy – q17	0.66	0.22	-0.08	-0.17	0.01	0.30
Self-efficacy – q18	0.58	0.04	-0.06	-0.29	0.06	0.46
Self-efficacy – q19	0.60	0.12	-0.11	-0.23	0.03	0.48
Anxiety – q20	0.40	0.62	0.12	0.21	0.10	-0.07
Anxiety – q21	0.19	0.68	0.14	0.20	0.26	0.02
Anxiety – q22	0.27	0.77	0.12	0.24	0.16	0.04
Anxiety – q23	0.29	0.74	0.13	0.22	0.17	-0.07

Table 6.3a UTAUT results for all countries. (N = 1080; KMO = .886)

Rotating the solutions for the UTAUT only (Table 6.3b) analysis and the UTAUT + CVPA analysis (Table 6.4b) provides cleaner loadings for each measure. Each UTUAT measure emerges as its own factor in the rotated solution providing 6 clean factors. In the UTAUT and CVPA analysis there are 7 factors emerging the extra factor accounting for all the CVPA questions. These clean loadings in the rotated solutions demonstrate

further that the UTAUT and CVPA questionnaires are working well cross-culturally. Also the wording changes necessitated by this research have not affected the questionnaires' overall validity.

Pattern matrix UTAUT all countries						
	1	2	3	4	5	6
Performance – q1	-0.03	0.03	**0.76**	-0.07	-0.04	-0.01
Performance – q2	0.07	-0.02	**0.82**	-0.05	0.06	0.01
Performance – q3	0.02	0.02	**0.83**	0.02	0.00	0.00
Performance – q4	-0.01	-0.01	**0.65**	0.19	-0.09	0.02
Effort – q5	**0.59**	-0.13	0.18	0.06	0.05	0.07
Effort – q6	**0.86**	0.05	-0.03	0.00	-0.02	0.00
Effort – q7	**0.91**	0.02	-0.02	0.00	0.01	-0.03
Effort – q8	**0.87**	0.07	-0.03	0.01	-0.03	-0.04
Attitude – q9	-0.01	0.02	0.21	**0.71**	0.00	0.01
Attitude – q10	0.02	0.01	-0.06	**0.86**	-0.02	0.08
Attitude – q11	0.10	-0.03	-0.08	**0.79**	-0.06	0.09
Social – q12	0.05	0.02	0.01	0.08	**-0.83**	-0.12
Social – q 13	-0.01	0.06	0.00	0.18	**-0.78**	-0.11
Social – q14	0.00	0.00	0.06	-0.08	**-0.73**	0.20
Social – q15	0.04	-0.01	0.06	-0.20	**-0.66**	**0.32**
Self-efficacy – q16	**0.37**	-0.08	-0.01	0.04	-0.15	**0.36**
Self-efficacy – q17	0.07	0.17	-0.02	0.10	-0.11	**0.60**
Self-efficacy – q18	0.00	-0.02	0.05	0.02	0.00	**0.79**
Self-efficacy – q19	0.00	0.05	-0.01	0.09	0.03	**0.80**
Anxiety – q20	0.05	**0.73**	0.03	0.08	-0.11	-0.01
Anxiety – q21	0.01	**0.80**	0.03	-0.08	0.08	0.04
Anxiety – q22	-0.05	**0.86**	-0.02	0.03	0.03	0.06
Anxiety – q23	0.02	**0.85**	-0.01	-0.01	-0.05	-0.03

Table 6.3b UTAUT results for all countries - rotated solution

The Social and Self Efficacy constructs had the poorest loadings in the un-rotated solutions but this was not the case once rotation was used. Both loaded factor 1 in the un-rotated solution but then neither emerged again with all its questions on any other factor. The Social construct, for example had two of its question loading on one factor and two on another in both the un-rotated UTAUT and UTAUT + CVPA analyses. The Social and Self Efficacy constructs are both noted by Venkatesh (2003) as being slightly awkward. The Social construct is strongly influenced by gender, age and experience while the affect of the Self-efficacy construct is partially captured by the Effort Expectancy construct (Venkatesh et al., 2003) and this could be the reason for their less clear division here. But they load well in the rotated solution so their poor showing in the un-rotated component matrix could be an artefact of the PCA method without rotation.

Component matrix UTAUT and CVPA all countries							
	1 (24.94)	2 (10.66)	3 (9.79)	4 (6.59)	5 (4.86)	6 (4.57)	7 (3.46)
Performance – q1	0.30	-0.31	0.13	0.57	0.10	0.12	-0.04
Performance – q2	0.34	-0.42	0.18	0.54	0.16	0.16	-0.07
Performance – q3	0.41	-0.36	0.18	0.57	0.17	0.10	-0.07
Performance – q4	0.47	-0.33	0.12	0.43	0.14	-0.08	-0.08
Effort – q5	0.50	-0.40	0.12	-0.17	0.13	0.20	0.05
Effort – q6	0.63	-0.25	-0.01	-0.36	0.16	0.29	0.16
Effort – q7	0.62	-0.32	0.00	-0.38	0.19	0.30	0.18
Effort – q8	0.64	-0.22	0.02	-0.35	0.17	0.29	0.18
Attitude – q9	0.54	-0.13	0.13	0.03	0.32	-0.40	-0.04
Attitude – q10	0.60	-0.04	0.08	-0.21	0.30	-0.52	-0.05
Attitude – q11	0.63	-0.07	0.09	-0.24	0.24	-0.46	-0.03
Social – q12	0.61	0.00	-0.20	0.15	-0.28	-0.22	0.38
Social – q 13	0.59	0.03	-0.22	0.14	-0.21	-0.29	0.35
Social – q14	0.63	-0.03	-0.25	0.17	-0.42	-0.07	0.16
Social – q15	0.60	-0.04	-0.26	0.14	-0.47	0.06	0.09
Self-efficacy – q16	0.61	-0.20	-0.07	-0.20	-0.13	0.10	-0.09
Self-efficacy – q17	0.64	0.05	-0.26	-0.09	-0.14	0.06	-0.24
Self-efficacy – q18	0.57	-0.07	-0.15	-0.07	-0.25	0.13	-0.41
Self-efficacy – q19	0.58	-0.03	-0.22	-0.12	-0.20	0.07	-0.44
Anxiety – q20	0.42	0.48	-0.36	0.14	0.23	0.06	0.08
Anxiety – q21	0.20	0.51	-0.43	0.15	0.27	0.20	0.00
Anxiety – q22	0.28	0.57	-0.50	0.14	0.28	0.09	-0.05
Anxiety – q23	0.30	0.56	-0.47	0.15	0.27	0.12	0.05
CVPA value - q1	0.17	0.37	0.53	0.06	-0.03	0.23	0.22
CVPA value - q2	0.26	0.31	0.64	0.08	-0.05	0.18	0.16
CVPA value - q3	0.38	0.45	0.55	-0.01	-0.04	0.02	0.02
CVPA response – q4	0.42	0.37	0.44	0.00	-0.06	-0.01	-0.04
CVPA response – q5	0.50	0.45	0.43	-0.05	-0.11	-0.05	-0.16
CVPA response – q6	0.45	0.48	0.44	0.00	-0.10	-0.03	-0.19

Table 6.4a UTAUT and CVPA results for all countries (N = 1080; KMO = .877)

The CVPA questions were originally added to the UTAUT to help further the understanding of what influences users' decisions to use websites. As mentioned earlier, research in HCI has shown that aesthetics play an important role in the perceived usability and use of interfaces. Because the UTAUT had no aesthetics measures / construct this research incorporated six questions adapted from the CVPA which measure the importance of aesthetics to use and acceptance. In the analysis shown in Tables 6.4a and 6.4b the questions borrowed from the CVPA are treated as just another measure / construct like all those on the UTAUT. In the analyses described in the previous chapter the CVPA questions grouped strongly with the UTAUT in several cases (please refer to discussion in Chapter 5). Also, the CVPA does not significantly affect the total sample variance explained by the factors emerging with

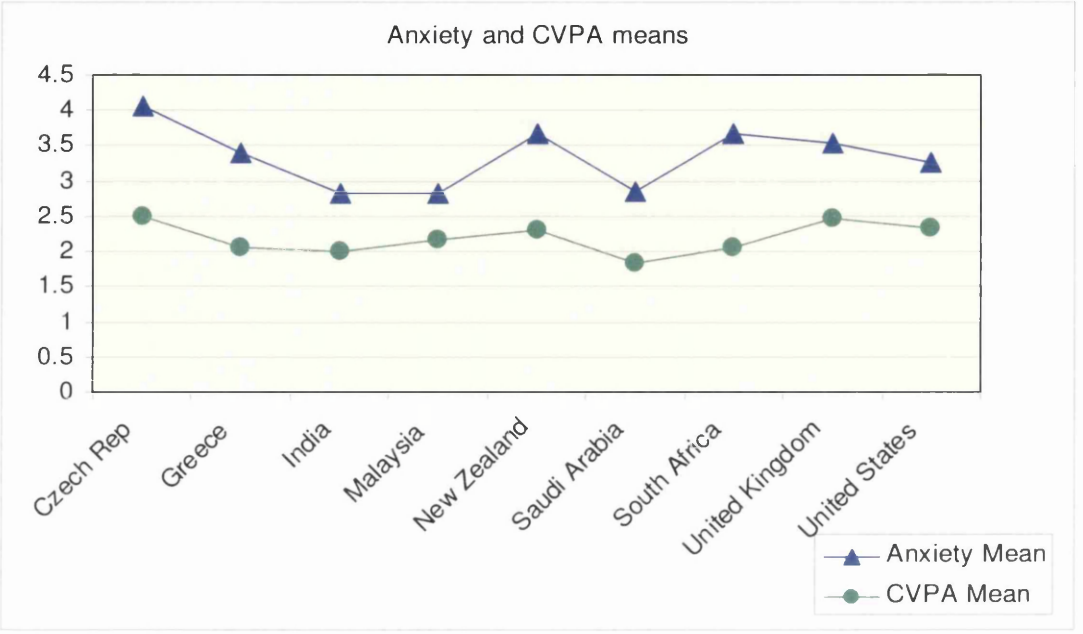
eigenvalues over 1. Those factors with eigenvalues over 1 in the UTAUT only analysis explained 66.6% of the variance in the total sample and adding the CVPA lowered this slightly to 64.87%. The addition of the CVPA does however change some of the loadings on factors in the un-rotated solution, as would be expected. One such change is the frequent pairing that will be seen between the UTAUT's Anxiety measure /construct and the CVPA questions.

Pattern Matrix UTAUT and CVPA all countries							
	1	2	3	4	5	6	7
Performance – q1	-0.04	0.03	0.01	**0.75**	-0.04	0.07	0.01
Performance – q2	0.06	-0.02	-0.02	**0.82**	0.05	0.04	-0.01
Performance – q3	0.01	0.02	0.03	**0.83**	0.00	-0.02	0.00
Performance – q4	-0.02	-0.02	-0.01	**0.65**	-0.08	-0.20	-0.05
Effort – q5	**0.60**	-0.12	-0.01	0.18	0.04	-0.06	-0.07
Effort – q6	**0.83**	0.05	0.01	-0.04	-0.01	-0.04	-0.04
Effort – q7	**0.88**	0.03	-0.03	-0.02	0.01	-0.05	-0.01
Effort – q8	**0.83**	0.06	0.05	-0.04	-0.02	-0.04	0.00
Attitude – q9	0.05	0.03	0.03	0.23	-0.02	**-0.67**	0.04
Attitude – q10	0.10	0.01	0.04	-0.03	-0.04	**-0.82**	-0.01
Attitude – q11	0.16	-0.03	0.06	-0.05	-0.09	**-0.75**	-0.04
Social – q12	0.02	0.02	0.01	0.00	**-0.84**	-0.09	0.12
Social – q 13	-0.02	0.06	-0.01	0.00	**-0.78**	-0.19	0.13
Social – q14	0.00	0.00	0.01	0.06	**-0.75**	0.08	-0.19
Social – q15	0.05	-0.01	0.02	0.06	**-0.68**	0.21	-0.29
Self-efficacy – q16	**0.39**	-0.07	0.01	0.00	-0.17	-0.04	**-0.35**
Self-efficacy – q17	0.15	0.19	0.01	0.00	-0.17	-0.06	**-0.52**
Self-efficacy – q18	0.10	0.00	0.04	0.09	-0.05	0.03	**-0.70**
Self-efficacy – q19	0.10	0.07	0.00	0.02	-0.03	-0.05	**-0.72**
Anxiety – q20	0.04	**0.72**	0.06	0.02	-0.12	-0.06	0.03
Anxiety – q21	0.03	**0.81**	-0.01	0.02	0.08	0.09	-0.01
Anxiety – q22	-0.05	**0.87**	-0.03	-0.01	0.04	-0.03	-0.06
Anxiety – q23	0.00	**0.85**	-0.01	-0.01	-0.04	0.01	0.02
CVPA value - q1	0.12	0.02	**0.71**	0.02	-0.02	0.20	0.23
CVPA value - q2	0.10	-0.08	**0.78**	0.09	0.00	0.12	0.17
CVPA value - q3	-0.01	0.02	**0.79**	-0.02	0.00	-0.08	0.01
CVPA response - q4	-0.02	0.02	**0.66**	0.01	-0.02	-0.11	-0.09
CVPA response - q5	-0.08	0.03	**0.72**	-0.05	-0.01	-0.16	-0.24
CVPA response - q6	-0.13	0.05	**0.74**	-0.02	0.03	-0.13	-0.25

Table 6.4b UTAUT and CVPA results for all countries - rotated solution

Looking at the all countries un-rotated analysis (Tables 6.3a and 6.4a) it can be seen that the UTAUT's Performance and Anxiety constructs emerge as a strong pairing (along with the CVPA in the UTAUT + CVPA data set on factor 2 (Table 6.4a). Performance loads again this time with most of Effort Expectancy on factor 3 in the UTAUT only analysis and on factor 4 in the UTAUT + CVPA. Overall, whether or not the addition

of CVPA questions is a useful would need to be explored further with more focused studies on the affects of aesthetic judgements on technology acceptance. This analysis shows that the CVPA questions do not influence the performance of the UTAUT or interfere with UTAUT's measures / constructs loading factors as expected.

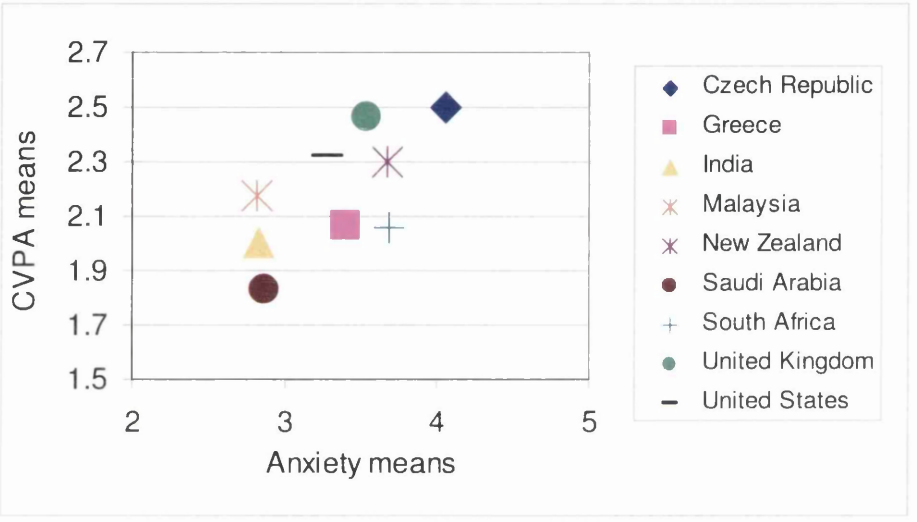


Graph 6.1 Anxiety and CVPA means for each country

The relationship between UTAUT's Anxiety construct and the CVPA questions was noted in the factor analysis in Chapter 5. This relationship may be an interesting insight into how lower anxiety with new technologies leads to lower visual expectations. Graph 6.1 shows the means for the Anxiety score and CVPA scores for each country and demonstrates this point. This pairing also had strong explanatory power (see Table 6.6) in the factor analysis for four countries, appearing in factor 2 or 3. The Anxiety questions (see appendix F) asked if respondents felt nervous about using new websites with the scale measuring from 1, "Always true" to 5, "Never True." Countries with scores closer to 5 are therefore less anxious using new websites. On the CVPA, 1 on the Likert scale measured the strongest agreement with the importance of aesthetics and 5 the lowest agreement, so that respondents at the 1 end of the scale are most influenced by aesthetics and those closer to the 5 end of the scale least influenced. Generally, as can be seen on Graph 6.1, as Anxiety towards new websites decreases so does the importance placed on visual aesthetic. The one country to break this trend is South

Africa which falls at the lower end of Anxiety but at the higher end of visual aesthetic importance.

A correlation analysis of the means reveals a weak, but significant, relationship between the CVPA and the Anxiety measure ($r = .672$, $p < .05$). The scatter plot (Graph 6.2) of the means further demonstrates this relationship. This is obviously an interesting finding that would benefit from more and deeper exploration in future research. It would appear that as respondents become less anxious about using new and unfamiliar websites they place less importance on the visual aesthetics of the sites they use.



Graph 6.2 Scatter plot of Anxiety and CVPA means for each

Anxiety is also interesting as it the only UTAUT measure that does not load factor 1 with the other UTAUT measures in the un-rotated solution. This general or omnibus factor expresses the UTAUT tool is working together. While Anxiety seems to work strongly with performance, loading as a pair on factor 2 (see Table 6.3a) it does not load the omnibus factor. There could be several reasons for this, including the possibility of an order effect as the anxiety questions come last on the UTAUT. This is unlikely however, as the CVPA questions were put directly after the Anxiety questions in the questionnaire used here. The way Anxiety loads could also be a remnant of what was questioned in the study. It may be that when analysing their own behaviour and decisions in hindsight participants put more emphasis on their own feelings of anxiousness. It could also be that websites as a subject of query is somehow different from other technologies which were measured with the UTAUT previously. Finally the

rewording done to make the questions fit the research and the topic being queried could have caused the observed behaviour. All these possibilities could be examined in the future to gain a better understanding of what is different in the Anxiety measure.

The analysis of the entire, heterogeneous data set proves once again that the UTAUT tool works cross-culturally. The individual country analyses discussed later will show that the UTAUT can also be used to understand the differences in cross-cultural website acceptance. The discussion that follows will look at each country's UTAUT and UTAUT + CVPA results comparing which factors emerged in each country. As will be shown, the factors that emerge are different country by country, showing that there are cultural differences emerging on the UTAUT.

6.2.4. UTAUT country by country analysis

The discussion that follows will look at the factors that emerged in each country for the UTAUT (with and without the CVPA). In this way it was possible to see what influence variables have on each cultural sampled and to see if certain variables influence one culture more than another. The un-rotated component matrices found in Appendix H are used in all the following cases so as to enable comparison from one sample to another. In all cases except India and Saudi Arabia the significant loadings were those over .30 or below -.30. In the case of India and Saudi Arabia, whose samples fell below 100, the slightly stricter cut off of .35 / -.35 was used.

In order to simplify and clarify the following discussion the summary of all the countries together will be presented first so that the differences between the countries can be examined. Then particular cases of interest will be approached one country at a time. Often rotating the solution would mean that the UTAUT constructs emerge more cleanly but the rotation makes it difficult to compare and contrast factors emerging from country to country.

In all cases, except India (considered later), factor 1 (un-rotated component matrix solutions) is not examined as it is the omnibus UTAUT factor which has already been discussed. It is important to point out that in three un-rotated solutions the Anxiety measure does load the first factor but in most countries it does not. In the Czech Republic, Greece and the United Kingdom Anxiety emerges with all other measures on the omnibus factor in the UTAUT only analysis (see Appendix H). This may indicate

that Anxiety has a lower influence in some countries than in others or it may be that the tool performs better in certain countries. This is discussed further in the following chapter, while the discussion here will focus on factors 2 - 5 which emerge in the un-rotate component matrices in all countries. In many of the countries analysed 6 or more factors emerged, but it is the first 5 factors that give the most interesting insight. Likewise, the variance accounted for in each sample by later emerging factors is small so they do not provide further clarity or add to the understanding of what is happening in the data. Tables 6.5 and 6.6 summarise the UTAUT and CVPA constructs / variables loading each factor. These tables actually summarise which of the UTAUT and CVPA measures emerged on each factor. Each measure is simply listed by name in the column for that factor as it appeared in a country's component matrix. The actual component matrices from which this data is summarised can be found in Appendix H. What these tables clearly demonstrate, and what will be discussed in detail, country by country, later in this chapter, is that different UTAUT and CVPA measures emerged in different countries and on different factors in each country.

Table 6.5 presents un-rotated component matrix solutions for the UTAUT only analysis and Table 6.6 the un-rotated component matrix solutions for the UTAUT plus CVPA. In both tables the measures loading each factor are listed in alphabetical order. Those measures that loaded with negative values are denoted with a (-). The top row of the table gives the number of the factor and the left column gives the country for which the measures loaded that factor. Only those measures that completely load a factor are considered; those that have all their questions load a single factor with .3 or higher (.35 in the case of India and Saudi Arabia) are discussed. Some latitude is given when a measure loads three out of four questions very strongly and the fourth question approaches the .3 cut off. An example of this can be seen in the UTAUT only analysis for Malaysia (Appendix H) where the Social measure loads strongly on factor 2 except one question which falls just short of the .30 cut off.

Possibly the most important change to note in the UTAUT versus the UTAUT + CVPA analysis is how the addition of the CVPA questions to the UTAUT changes the pattern emerging from the data. South Africa is a good example of this. When the CVPA is included in the analysis all the UTAUT's Social construct questions emerged strongly on factor 5. The Social construct however plays no role in explaining the clustering of

the variables in the UTUAT only analysis. The CVPA in the case of this work gives further understanding into what influences people's decisions to use websites. Whether having an aesthetic measure would help the UTUAT's predictive accuracy is outside the scope of this research but should be examined in the future.

UTAUT only factors				
	factor 2	Factor 3	factor 4	factor 5
Czech Republic	(-)Attitude Effort	(-)Attitude Performance Social	Attitude	Anxiety
Greece	(-)Anxiety Performance	Performance	Attitude	(-)Social
India	Anxiety	---	Attitude	---
Malaysia	Anxiety Social	Performance	---	Self-efficacy
New Zealand	Anxiety	Effort	Attitude	(-)Self-efficacy Attitude
Saudi Arabia	---	---	---	---
South Africa	(-)Anxiety	Performance	(-)Attitude	---
United Kingdom	(-)Anxiety Effort	Performance	---	---
United States	Anxiety	Performance	Attitude (-)Social	---

Table 6.5: UTUAT measures emerging in each factor listed by country

UTAUT + CVPA factors				
	factor 2	factor 3	factor 4	factor 5
Czech Republic	CVPA	(-)Attitude Effort Performance	Performance	---
Greece	(-)Anxiety	(-)Performance	(-)Effort Performance	---
India	(-)Anxiety	CVPA	---	Attitude
Malaysia	Anxiety CVPA	Anxiety (-)CVPA	---	---
New Zealand	Anxiety CVPA	Anxiety	Effort	(-) Attitude Performance
Saudi Arabia	Social	---	---	---
South Africa	(-)Anxiety	(-)Anxiety CVPA	Performance	(-)Attitude Social
United Kingdom	CVPA	Anxiety (-)Effort	Performance	---
United States	CVPA	Anxiety	Performance	Attitude (-)Social

Table 6.6 UTAUT and CVPA measures emerging in each factor listed by country

There are several commonalities to be noted for all the countries in the UTAUT only analysis (Table 6.5). The Anxiety measure / construct emerges for seven countries on factor 2 but does not load until factor 5 for Czech Republic and not at all for Saudi Arabia (discussed later). The Performance measure loads for six countries on factor 3. The Attitude measure loads in six cases on factor 4. These commonalities seem to indicate that some of the UTUAT measures have similar influence over many of the countries sampled. The measure's relative importance to the decision to use a particular website in each of these countries can then be inferred from the mean score on the measure (Table 6.7 gives the means for all measures followed by their rank and standard deviation in brackets). When the CVPA questions are included they load on factor 2 or 3 in all countries with the exception of Greece which loads all the CVPA questions but one on factor 3. This is a strong indicator that when aesthetic questions are included they influence the data heavily.

There are also several notable differences that emerge in the UTAUT measures between countries; not just in the relative positions of measures in the component matrix but more importantly which measures emerge at all, which have the dominant effect. In the UTAUT only analysis the Self-efficacy measure emerges only for Malaysia and New Zealand; the remaining countries never fully load this measure at all. The Social measure is another example of a UTAUT measure that seems to vary greatly by country. It loads for Malaysia and Saudi Arabia on factor 2, but other countries never have it emerge at all. With the inclusion of the CVPA questions the Social measure shifts about, it no longer loads at all for Malaysia but does appear for South Africa. Similarly, Self-efficacy doesn't load in the UTAUT + CVPA analysis for any country, coming closest in the New Zealand sample, on factor 6 (not shown in the summary Tables 6.4 and 6.5 but can be seen in Appendix H). These results seem to indicate that constructs like UTAUT's Social and Self-efficacy, allowing for their weakness (discussed earlier), are more important for some cultures than for others. Likewise the analysis of the UTAUT+CVPA shows how an additional aesthetic measure outweighs measures such as UTAUT's Social and Self-efficacy in explaining the structure of the data.

Czech Republic

The Czech Republic varied from the other countries on two of the UTAUT measures: Attitude and Anxiety. The Czech Republic was the only country along with Saudi Arabia not to load Anxiety on factor 2 in the UTAUT only analysis. Anxiety also did not emerge in the UTUAT+CVPA analysis along with CVPA, three of its questions do load but the one is missing. It would appear that the Anxiety measure is not as influential in the Czech Republic data as it is in the other countries. Attitude, however, appears several times. It emerged very strongly in the UTAUT only analysis, on factors 2, 3 and 4 and emerged once in the UTAUT + CVPA analysis on factor 3 and 6 (not in the summary table). Table 6.7 shows that the Czech Republic had the highest mean for Anxiety, meaning that as a group the Czech participants were the least worried about using new websites. The Attitude mean is also the highest in the sample but falls in the middle of the Likert scale, meaning that the participants neither felt it to be important or unimportant.

UTAUT and CVPA means per country							
	Anxiety	**Attitude**	**Effort**	**Performance**	**Self-Efficacy**	**Social**	**CVPA**
Czech Republic	4.05 (1 / .82)	2.95 (1 / .93)	2.43 (1 / 1.03)	2.02 (2 / 1.15)	2.93 (1 / 1.25)	3.25 (1 / 1.16)	2.50 (1 / 1.13)
Greece	3.40 (5 / .97)	2.43 (2 / 1.06)	2.35 (2 / .93)	2.22 (1 / 1.08)	2.52 (2 / 1.15)	2.81 (2 / 1.36)	2.06 (6 / .88)
India	2.83 (8 / 1.03)	2.16 (6 / 1.05)	2.02 (4 / 1.10)	1.91 (4 / 1.29)	2.29 (4 / 1.30)	2.52 (4 / 1.42)	2.00 (8 / .90)
Malaysia	2.82 (9 / .85)	2.27 (4 / .77)	2.08 (3 / .85)	1.92 (3 / 89)	2.05 (7 / .83)	2.47 (6 / 1.15)	2.17 (5 / .86)
New Zealand	3.68 (3 / .87)	2.20 (5 / .76)	1.86 (6 / .85)	1.80 (6 / .90)	2.11 (6 / .89)	2.30 (7 / 1.21)	2.30 (4 / .91)
Saudi Arabia	2.86 (7 / 1.02)	1.74 (9 / .87)	1.74 (8 / .90)	1.76 (8 / 1.20)	1.93 (8 / 1.10)	2.28 (8 / 1.48)	1.83 (9 / .93)
South Africa	3.68 (2 / .80)	1.97 (7 / .89)	1.82 (7 / .88)	1.76 (7 / 1.04)	2.21 (5 / 1.13)	2.52 (5 / 1.28)	2.06 (7 / .96)
United Kingdom	3.54 (4 / .85)	2.42 (3 / .85)	1.87 (5 / .94)	1.83 (5 / 1.00)	2.29 (3 / 1.06)	2.70 (3 / 1.27)	2.47 (2 / .88)
United States	3.28 (6 / .87)	1.87 (8 / .68)	1.58 (9 / .82)	1.68 (9 / .97)	1.82 (9 / .89)	2.16 (9 / 1.26)	2.32 (3 / .93)

Table 6.7 UTAUT and CVPA means per country followed by the rank and standard deviation

Greece

The data set from Greece appeared to be strongly influenced by the Performance measure. It emerged in both analyses more than once. As mentioned earlier, Performance is one of the measures emerging in most countries. Greece was the only

country to have Performance load two factors in both the UTUAT and UTAUT + CVPA analysis. Because the Performance construct loaded twice in the analyses it would seem to indicate that this construct is very important in the Greek sample, possibly more so than in the other countries.

India

India's sample was the weakest of all the countries, having a smaller sample size (N=93) and poor gender balance (more than 70% of the sample was male). This may account for some of the sample's poor showing in the analyses. Rotating the solution does provide slightly clearer loadings for India but still not as strong or as clear as would be expected. The more stringent .35 loading cut off was used for India to attempt to compensate for the small sample size. Several UTAUT measures would have faired better in the analysis if the more liberal .30 cut off were used. Overall the India sample had the worst showing on the UTUAT. In the UTUAT+CVPA analysis, even factor 1 does not load as in the other countries, missing questions from several constructs. Anxiety is the only measure which loads in both analyses. The CVPA questions also load as expected in the UTAUT+CVPA analysis. The strong Anxiety and CVPA loadings are not unique to this sample alone. Because of the poor loadings on the UTAUT factors it is difficult to say what is most influential in the India sample.

India's most unique showing is its lack of the Performance construct on either the UTUAT only or UTAUT+CVPA analyses which it shares with Saudi Arabia, another small sample. The Performance factor never loads all its questions in any of the factors emerging for India, this includes factor 1, and makes India the only country to be wholly missing this measure. Although the mean for Performance (Table 6.) for the India data set is fairly high, showing that participants rated it as important, it seems to be influencing the data very little.

Malaysia

The Malaysia sample is most defined by Anxiety and the CVPA in the UTAUT + CVPA analysis. The Anxiety measure also loads in the UTAUT only analysis along with the Social measure. In the UTAUT+CVPA analysis the Anxiety and CVPA pairing appears twice, once on factor 2 and then on factor 3. Likewise, Malaysia is one of the countries that loads the Social construct in the UTUAT only analysis and one of only two to load the Self-efficacy measure. As mentioned earlier, the inclusion of the

CVPA supersedes other measures in this sample and the Social and Self-efficacy constructs do not load in the UTAUT+CVPA analysis as they did in the UTAUT only analysis. This seems to imply that the CVPA is having a strong affect on the Malaysian sample, possibly more so than in the other countries.

Malaysia, along with the United States, India and Saudi Arabia, never loads the Effort measure outside of factor 1, in both analyses. It also never loads the Performance measure outside factor 1. This makes Malaysia unique as all other countries (with the exception of the small samples on India and Saudi Arabia) load at least one of these two measures if not both. This may show that these two measures are not as influential for Malaysia.

New Zealand

The New Zealand sample was most notable as one of only two countries to have the Self-efficacy measure outside of factor 1, along with Malaysia. The Anxiety measure also seems to have some strong influence on this sample, appearing on factor 2 in both analyses. Anxiety is paired with CVPA (as in other countries) on factor 2 and then again on factor 3 in the UTAUT+CVPA analysis. It is on its own with some very strong loadings on factor 2 in the UTAUT only analysis. However, Anxiety makes a strong showing in several other countries as well, so this is not unique to New Zealand alone. The Attitude measure appears twice in the UTAUT only analysis and also appears in the UTAUT + CVPA analysis which may show that it influences this sample more than others, although Attitude appears in most of the samples.

Saudi Arabia

Saudi Arabia's sample was also small (N=91) and the more stringent cut off for factor loadings (.35) was used. This meant that several measures were close to loading completely but fell short of having all their questions reach the .35 cut off. This included the Social measure in the UTAUT only analysis. However Social does emerge in the UTAUT + CVPA analysis with all its question loading well above the .35 cut off. This would seem to indicate that the Social construct has a very strong impact on the Saudi data sample.

The other UTAUT measures do not fair well in this sample, but this could be an artefact of the sample size as it may have been in the Indian sample. The CVPA comes close to loading on factor 3 in the UTAUT + CVPA analysis, with just one question falling short

of the .35 cut off short. Rotating the Saudi Arabian solution makes for better loadings on several of the UTAUT measures but again this would make it impossible to compare the factors emerging with those in other country samples. However, the omnibus UTAUT factor does emerge for Saudi Arabia, unlike in the India sample, even without rotation, so overall the UTAUT does seem to work in the sample.

South Africa

The South African sample is most defined by the Performance and Anxiety measures. This is not unique to the South Africa sample alone as several other countries are strongly influenced by these constructs as well. The South Africa sample is one of the few, however, to load the Social measure in the UTAUT+CVPA analysis. It is the only country to load the Social construct on the UTAUT+CVPA analysis but not on the UTUAT only. While the addition of the aesthetic measure seems to obscure or displace the Social measure in samples like Malaysia in the South Africa sample it brings this measure forward.

United Kingdom

The United Kingdom shares with several other countries the strong influence of Anxiety, Effort and Performance. The United Kingdom never loads the Social or Self-efficacy measures as do several other countries. The addition of the CVPA does not displace the Anxiety, Effort or Performance measure in the UK sample, only moving them to different factors. The most interesting aspect of the UK data is that it is one of the few countries not to load the Attitude measure at all in either analysis. It may be interesting to understand why the Attitude constructs seemingly does not influence the data from the UK as it does in other countries.

United States

Like the several other countries the United States' data is strongly influenced by Anxiety, Attitude and Performance. The United States is also one of the few countries to load the Social measures in both the UTUAT+CVPA and UTAUT only analyses. This may show that the Social construct is influencing the sample more than in other countries.

The United States share the absences of the Effort construct, outside of its initial loading on factor 1, with several other counties. This seems unusual for the United States especially as Effort poses questions of "ease of use" - an often toted western usability

principal and one that was rated important by the participants (mean score in Table 6.7). Despite this, the construct seems not to help explain the structure of the data for this sample.

Country Summary

When analysing the data country by country at least one interesting country grouping appears, that of the Social construct. The seemingly strong showing of the Social construct in Malaysia and Saudi Arabia in the UTUAT only analysis seems to indicate that this construct is highly influential in these two samples. These countries would not normally be grouped together in a cultural model, such as Hofstede's for example, although both are predominantly Muslim countries. Likewise the appearance of this construct in samples like the Czech Republic, Greece and United States, countries that would be thought highly individualistic, is also interesting. As the Social construct asks about the influence that opinions and support of others (family, teachers, other staff) would have on the participants decisions to use a website it would seem logical that highly individualistic countries would not be overly influenced by this construct. As a group those countries influenced by the Social construct seem to defy the usually cultural assemblage as they include: Czech Republic, Greece, Malaysia, Saudi Arabia and the United States.

The appearance of Self-efficacy in the New Zealand and Malay samples also seems to cross the usually drawn cultural circles. It would seems logical for the New Zealand and United Kingdom samples to share common factors and be influenced by the same constructs, as they are so often grouped together as similar in cultural models. But instead the only two countries to load this measure do not seem to fit easily. This group again appears incongruous in most cultural models.

6.3. Taking the analysis further

Several UTAUT measures and the CVPA seem to influence all the countries sampled here. The Anxiety measure is the only one to load for every country with the exception of Saudi Arabia, in both analyses (UTAUT only and UTAUT+CVPA). However, Anxiety frequently does not load the omnibus factor 1, only doing so in Czech Republic, Greece and the United Kingdom. Performance also influence most of the countries sampled with the exception of India. Attitude appears frequently as well. The Effort, Self-efficacy and Social constructs provide the greatest differences between

countries, loading factors for some but not for others. These results seem to indicate that while the UTAUT is definitely working across cultures and several of its constructs are generally influential in all countries at least three of its constructs are subject to cultural variance. The fact that constructs like Anxiety, Attitude and Performance are only missing from one or two countries also points to some cultural variation in what particular aspects of acceptance have the most impact on decisions in different cultures.

To understand if the emerging factors do in fact show a cultural difference that is significant the means of each UTAUT measure were compared across the nine countries. Both the ANOVA and Kruskal-Wallis analysis of variance tests were run on the data to see if the differences in means were significant. The Kruskal-Wallis test, unlike the ANOVA, does not rely on the assumption that the data collected is parametric making it a more appropriate measure for the sample collected here (Kirk, 1990; Gibbons, 1993). The results of the UTAUT Kruskal-Wallis are provided in Table 6.8 and those for the CVPA are in Table 6.9. The ANOVA results for the UTAUT are provided in table 6.10. The differences in means for all the UTAUT's measures and the CVPA questions were significant in the nine countries sampled. Both the ANOVA and the more conservative Kruskal-Wallis show that the differences between countries are highly significant. However, the results should be viewed conservatively, as with sample sizes this large it is not unusual to find that differences are significant. To more clearly understand where the differences occur and what countries group together on each measure a follow-up homogeneity of variance was run based on the results of the Kruskal-Wallis.

Kruskal-Wallis results for UTAUT measures						
	Performance	**Effort**	**Attitude**	**Social**	**Self-efficacy**	**Anxiety**
Chi-Square	76.25	144.21	189.27	145.22	158.59	174.43
Df	8	8	8	8	8	8
Asymp. Sig.	0.000	0.000	0.000	0.000	0.000	0.000

Table 6.8: Kruskal-Wallis significance tests for all UTAUT measures across all 9 countries

Kruskal-Wallis results for CVPA	
Chi-Square	96.63
Df	8
Asymp. Sig.	0.000

Table 6.9: Significance tests for CVAP

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Performance	401.45	8	50.18	7.26	0.000
Effort	1289.72	8	161.22	20.42	0.000
Attitude	1225.00	8	153.12	29.74	0.000
Social	1816.30	8	227.04	21.44	0.000
Self-efficacy	1904.66	8	238.08	25.36	0.000
Anxiety	3140.60	8	392.58	25.63	0.000
CVPA	1621.37	8	202.67	12.33	0.000

Table 6.10 ANOVA significance tests for all UTAUT measures across all 9 countries

The homogeneity of variance results presented in Tables 6.11 -6.17 (an "x" in the table column denotes that a country belongs to that grouping) show that there is no clear grouping for any of the measures. None of the homogeneity tests provide a clear picture of which countries group together for each of the UTAUT measures or for the CVPA. Countries often overlap and appear in two or three groups. However, the sample of nine countries used here may simply be too limited to gain a clear insight into how countries group together on the UTAUT measures. Within the nine country sample some interesting insights do emerge. For example, Czech Republic often stands on its own, as in the groupings for Attitude, Social and Self-efficacy.

More research will need to be done to understand exactly how or if countries group on the UTAUT. Especially as the Kruskal-Wallis groupings do not necessarily reflect the groupings of countries based on emerged factors. For example the group of Malaysia and New Zealand which were the only two countries to load Self-efficacy do emerge in the homogeneity tests as a grouping but with many other countries. More countries and a wider selection of countries from a single region of the world should be examined. It is possible that samples of more countries would yield clearer groupings.

Performance			
	group 1	Group 2	group 3
Czech Republic		x	
Greece		x	
India	x	x	
Malaysia	x	x	x
New Zealand	x		x
Saudi Arabia	x		x
South Africa	x		x
United Kingdom	x	x	
United States	x		

Table 6.11 Homogeneity groups for Performance

Effort				
	group 1	group 2	group 3	group 4
Czech Republic				x
Greece			x	x
India		x	x	
Malaysia		x	x	
New Zealand	x	x		
Saudi Arabia	x	x		
South Africa	x	x		
United Kingdom	x	x		
United States	x			

Table 6.12 Homogeneity groups for Effort

Attitude					
	group 1	Group 2	group 3	group 4	group 5
Czech Republic					x
Greece		x		x	
India	x	x	x		
Malaysia		x	x	x	
New Zealand	x	x	x	x	
Saudi Arabia	x		x		
South Africa	x		x	x	
United Kingdom		x		x	
United States	x				

Table 6.13 Homogeneity groups for Attitude

Social				
	group 1	group 2	group 3	group 4
Czech Republic				x
Greece		x	x	
India	x	x	x	
Malaysia		x	x	
New Zealand	x	x		
Saudi Arabia	x	x		
South Africa		x	x	
United Kingdom			x	
United States	x			

Table 6.14 Homogeneity groups for Social

Self-efficacy				
	group 1	group 2	group 3	group 4
Czech Republic				x
Greece			x	
India		x	x	
Malaysia	x		x	
New Zealand	x	x	x	
Saudi Arabia	x	x	x	
South Africa	x	x	x	
United Kingdom		x		
United States	x			

Table 6.15 Homogeneity groups for Self-efficacy

Anxiety			
	group 1	group 2	group 3
Czech Republic		x	
Greece		x	x
India	x		x
Malaysia	x		
New Zealand		x	x
Saudi Arabia	x		x
South Africa		x	x
United Kingdom			x
United States			x

Table 6.16 Homogeneity groups for Anxiety

CVPA			
	group 1	group 2	group 3
Czech Republic	x		x
Greece	x	x	x
India	x	x	
Malaysia	x	x	x
New Zealand	x	x	x
Saudi Arabia		x	
South Africa		x	
United Kingdom			x
United States			x

Table 6.17 Homogeneity groups for CVPA

6.4. Conclusions

The research here clearly showed that the UTAUT is a cross-culturally valid tool and that cultural differences do emerge when comparing the data from one country to another. The UTAUT behaved as would be expected from a well validated tool and it did so within a culturally diverse participant sample. The over all UTAUT emerges in factor analysis almost completely (with the exception of Anxiety – discussed later) on factor 1 indicating that it is working as a whole. Its individual measures then appear in pairs on subsequent factors, grouping each measure's questions together. For example, in the un-rotated solution, factor 2 emerges with the pairing of all the Anxiety questions and those for Performance. Certain of UTAUT's measures did not perform as well as others when the factor solution is un-rotated, for example in the all countries analysis, the Social measure does not emerge with all its questions on one factor but broken up between factors 4, 5 and 6. As discussed in Chapter 6 this is not always the case. The Social measure does emerge as a whole for countries like Czech Republic, Greece, Malaysia, Saudi Arabia and the US (Appendix H) which appeared to indicate some cultural variance as to which UTAUT measures most influences the country samples. The rotated solution of the UTAUT also shows that the Social measure emerges as a factor / component and that its questions are working together. The rotated solution provides six clear factors, one for each of the UTAUT measures used in this research. This is a strong indication that the UTAUT is working on the overall heterogeneous sample and that rewording, translation and its application to understanding website use were not detrimental to its validity.

The UTAUT data was then also analysed to understand if the different factor compositions for each country found in the PCA analysis pointed at significant cultural differences. The ANOVA and Kruskal-Wallis analysis of variance showed that the difference between countries on each of the UTAUT measures were indeed significant. However, the large sample sizes gathered for this research mean that these findings should be interpreted cautiously. Further, the homogeneity tests performed as post analysis for the Kruskal-Wallis results did not provide clear groupings of countries. Indeed the findings suggest that much more research is needed to interpret what cultural difference will be found using the UTAUT.

7. Discussion and future work

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7.1. Introduction

The research completed for this thesis tested the applicability of Hofstede's cultural model to two aspects of HCI: affordance and technology acceptance. As both studies completed here showed that Hofstede's model did not help explain the cultural difference in either topic, this thesis opens many avenues for further investigation. The thesis also showed that the UTAUT tool works well across the countries sampled here and does point to culture difference in technology acceptance. Future work may include more detailed studies designed to explore some of the specific findings presented here on affordance and technology acceptance. Exploring the broader questions of the applicability and validity of other cultural models to other HCI topics may be another interesting route. Yet another way of extending this research directly would be to conduct similar studies in a broader or different range of countries and with other population groups. However, the need for additional research specifically on the use of cultural models in HCI is necessary. This chapter discusses the findings presented in previous chapters and suggest ways in which these could be expanded upon.

7.2. Specific findings and suggestions for future research

The results of both the affordance and technology acceptance studies confirmed that cultural differences do exist in these two HCI areas and that Hofstede's cultural model did not help account for them. The model's ineffectiveness and the cross-cultural differences found cannot be ignored and should be further investigated. Thus, the following sections consider the results of each study in terms of possible future work that could be undertaken to develop them further.

7.2.1. Affordance

The findings of the affordance study, presented in Chapter 3, showed that cultural differences exist in people's perceptions of how things should work. The study looked at two cultures, the United Kingdom and the United States, and how they perceived three objects: light switches, dials and cooker hobs. Significant cultural differences were found between the United Kingdom and the United States in the perception of light switches. The two populations had differing views on which state represented ON and which represented OFF. The US and UK populations differed significantly from three other cultures (Algerian, Flemish and Moroccan) provided by Bailey (1996;1982) in the perception of whether a knob should be turned clockwise or counter-clockwise to

accomplish a certain position for a dial. The final affordance question dealt with cooker hobs and found no differences in the way that US and UK populations perceived the controls should be mapped to the hobs. The overall results are particularly interesting because they illustrate in a simple study how affordance perceptions could vary from culture to culture.

The study, however, tested a limited set of objects (only three) and within a limited country sample (the United Kingdom and the United States). While the analysis also considered previous data reported by Bailey (1996; 1982) for three additional countries, this is still a narrow sample. The work presented here could be easily extended to encompass a larger country sample and include different age groups than the university student population used here.

Investigations expanding on cultural difference in affordance could ask how the differences found here affect interface design, use and acceptance. For example, Chapter 3 included a discussion on what affordance difference might be found if countries with wide variation on Hofstede's dimensions were used in the cooker hob experiment. No difference in mappings or affordances was found between the UK and US populations used here on the Hob and dial experiment but that is not to say that such difference don't exist among other populations. This is especially true as differences were found in these two populations in the mappings of light switches. Adding more countries to such a study is one of the many possible continuations of the affordance research presented here but any investigation that broadened the number of countries and the devices tested would add to the knowledge gained in this thesis.

If affordance differences strongly influence the way in which different cultures understand and use interfaces, as the findings presented here suggest, then future work can consider the best ways to deal with this in the design process. If cultural models such as Hofstede's cannot aid in the understanding of these difference then can other cultural models? Finding and providing tools and methods by which cultural difference in affordance could be taken into account during design would provide benefits to designers and be a practical way of moving affordance research forward. Exploring ways with which to ensure that designs built in one cultural setting were acceptable and usable to other cultures and took into consideration affordance differences would likewise make for interesting research. Honold (2000) suggests that Activity Theory

may provide a good framework for such studies especially those that investigate cultural variance. Future research could then use an Activity Theory methodology to approach studying cross-cultural affordance and expand upon the work done here.

Aside from affordance, other aspects of HCI on the lower end of cultural influence (Ito & Nakakoji, 1996) should also be considered cross-culturally. This includes analysing those aspects of interaction at the listening mode level of Ito and Nakakoji's cultural influence model. It may be the case that Hofstede's cultural model can help explain other aspects of interaction at the listening mode level. It is also possible that other models of culture, such as those of Hall or Trompenaars, would be better at explaining the cross-cultural differences found at this level of HCI. These avenues of research could each be pursued at some length in their own right. Findings in this area would increase the knowledge and understanding of what differences exist at the low end of cultural influence and how existing cultural models can help HCI researchers and practitioners understand and account for them.

Finding that cultural differences at the low end of Ito and Nakakoji's (1996) were not explained by Hofstede's cultural model this work moved on to explore the higher end of cultural influence, in the form of technology acceptance. The resulting analysis of Hofstede's Value Survey Module (VSM) along with data from a technology acceptance model showed concerning and unexpected results. These results lead to further and more in depth analysis of the VSM.

7.2.2. Further examination of the VSM

The results reported here for Hofstede's VSM call for more and deeper investigation of its validity and its applicability. While the model may provide the HCI community with a language by which to discuss culture it should not be depended on to explain cultural difference in terms of actual measurements on the scales provided by Hofstede. A more significant understanding of Hofstede's cultural model, as measured by the VSM, is merited based solely on its popularity and wide application to understanding cultural differences in a broad range of fields (Baskerville, 2003; Søndergaard, 1994). Firstly the results previously reported by Kruger and Roodt (2003) and Spector, Cooper, and Sparks (2001) had likewise cast some concern on the validity of Hofstede's model. Despite these findings the model was and is still frequently applied in many fields, including HCI. Secondly, the overall use of Hofstede's model in HCI has never fully

been investigated. Two topics (affordance and technology acceptance) were covered here, leaving large areas open to further research.

The results of the VSM analysis completed in this research were not promising overall, casting doubt as to its usefulness to the field and its overall validity. The possibility of an order effect (detailed in chapter 5) which was found in the VSM data collected for this research is concerning. The studies conducted here did not set out to validate or confirm the VSM and so cannot rule out that the order effect seen was an artefact of the way the questionnaire was presented to participants. This is an important research topic to examine in greater detail. Hofstede's model and his country rankings are so often applied it is vital to determine if his model is indeed measuring aspects of culture and if so what these aspects are. Using the original data gathered by Hofstede, if possible, and any more recently collected data sets to allay any concerns of order effect would provide researchers in many fields some assurance that the model was working. It would also allow for deeper examination of what benefit the VSM does provide and whether it measures aspects of culture.

In addition to the order effect, the unexpected and disappointing lack of validity, on the VSM may have been caused by the participant sample itself as suggested in Chapter 5 or some other aspect of the studies conducted. Other researchers should examine the VSM questionnaire with other types of participants. It is possible that the VSM's poor performance was caused by the relative youth and lack of professional experience of the university student population used here. It is also possible that the order effect noted was caused by the insertion of the extra line of direction before question 13 in the VSM questionnaire. It would be beneficial to many fields, including HCI, to examine the Hofstede model with different participants in different countries and at different age groups. Another possibility is to use a non-altered VSM and compare its results to those gathered here for validity and order affect. Any data that could assure the research community that this highly utilised model is valid and dependable would be valuable.

A model, such as Hofstede's, which aims to measure and explain culture should be applicable to wide range of ages, educations and other populations within a country. The model should be strong enough to be used with a diverse and heterogeneous sample, which Hofstede's model may not be. It must be said, however, that his cultural model has provided researchers outside the field of Anthropology a means by which to

describe and speak about culture. His model has been widely used and often cited answer to Hall's (1989, 1990) call for an operational explanation of culture which could be used by non-specialists. Because of the broad and continued application of Hofstede's model and his country scores (Søndergaard, 1994; Baskerville, 2003) the lack of validity has meaningful repercussions and must be examined more thoroughly.

7.2.3. Further research with the UTAUT

The research here validated the UTAUT tool cross-culturally and showed that cultural differences do emerge between countries. The homogeneity tests performed as post analysis for the Kruskal-Wallis results were not conclusive and did not provide clear groupings of countries. These findings suggest that much more research is needed to interpret what cultural difference will be found using the UTAUT. Also beyond the scope of this work to explore if cultural differences do indeed affect how particular technologies are accepted and used in different countries. This research also did not explore the predictive nature of the UTUAT and cannot say if it would be as effective in other countries as it is in the United States where it was originally validated (Venkatesh et al., 2003). It would be interesting to follow-up the research conducted here with a deeper investigation of the UTAUT's measures as they influence the acceptance of a particular technology product from one culture to another and to evaluate its predictive power. The research would need to assure that samples be balanced in terms of access to the technology in question and issues of price, infrastructure and availability must be accounted for. Research like this can provide further insight into how and if culture influences the uptake of technology. It can in turn inform the presentation as well as the design of technologies for different audiences.

Work of this kind was done for final year projects of students at the Czech Technical University in Prague under the supervision of the author (Kravjanský & Šuráb, 2006). The students conducted a small scale study using the Czech language version of the UTAUT questionnaire. They found that the tool was useful in understanding why Czech users chose a particular portal or search site over others, such as Google, but also that some of the questions were confusing to users who did not have a technical background. The findings are a good preliminary indicator that the UTAUT tool will prove useful in gaining some insight into patterns of use for specific sites and specific technologies but may need to be more carefully worded for non-technical users.

Likewise it seems to indicate that the UTAUT should be useful in its intended predictive capacity in other cultures.

Further research with the tool should be conducted in different countries to those used here including countries that are just developing their internet and web presence. As discussed in Chapter 4 the "Facilitating conditions" measure was taken off the UTAUT because its questions were not appropriate for the populations being sampled and topic being queried in this research. However, in the developing world such questions may be of paramount importance. A trip to Kenya in 2006, taken by the researcher, brought the importance of the "Facilitating Conditions" question into sharp clarity. The University of Nairobi is well wired and internet cafes exist even in small villages. However, the infrastructure does not allow for the high speed connections necessary for so many websites to be used easily or effectively. For example, loading a page from Yahoo email can take several minutes. Trying to complete a fairly common task such as online flight check-in can become completely impossible as pages time out before they have a chance to load. While the populations used for this research did not have these issues, as all the participants attended well equipped universities and were regular internet users, this cannot be said of the rest of the population in some of the countries sampled.

"Facilitating Conditions" may indeed be one of the key factors in the decision to use certain sites in areas where users must depend on slow connections. The organisation Aptivate (http://www.aptivate.org) helps create websites suited for low bandwidth access. In doing volunteer work with this organisation the researcher has been privileged to observe first hand the difficulties inherent in designing sites that are appropriate for use around the world. Much of the developing world does not have the bandwidth and the infrastructure in place to easily view websites that we take for granted. On the other hand users in the developed world expect a certain amount of visual and graphic design and the inclusion of certain features in the websites they use. Adding visuals and graphic design elements increases the bandwidth necessary to view the site. So while "Facilitating Conditions" such as resources, knowledge and system compatibility may not be a factor for the developed world using websites they may be for the developing world. Future research into the issues inherent in designing websites that are suitable for the low bandwidth reality of the developing world could consider the "Facilitating Conditions" measure of the UTAUT in detail.

7.2.4. Investigating the link between aesthetics and anxiety

The link between the aesthetic measure and the UTAUT Anxiety measure was first noted in the analysis of all the data described in Chapter 5. The aesthetic measure was taken from the Centrality of Visual Product Aesthetics (CVPA) questionnaire (Bloch, Brunel, & Arnold, 2003). The questions used from the CVPA and those of the Anxiety measure loaded together in the factor analysis completed for all the data collected (all countries together) and for the India, Malaysia, New Zealand and South Africa individually. The relationship was described in Chapter 6. As the reported anxiety towards using new websites decreases so does the reported importance placed on the visual aesthetics of a website. This trend repeats in every country except South Africa where the importance placed on aesthetic does not decrease along with anxiety.

This is an interesting pattern to explore in more detail. Is it that as users become more accustomed to using websites and therefore less anxious about using new sites they are less concerned with the visual aesthetics of the site? It is also interesting to further investigate why South Africa was an exception to this pattern and to test other countries to see if this exception occurs elsewhere. The trend can be explored in greater depth in several ways. Outside of investigating more and different countries it may be possible to find this same trend between novice and expert users in one country. For example, are novice users focusing on the aesthetic appeal of a website to give them more confidence? Or, is it that countries like South Africa, which are still at relatively low levels of internet use, are sensitised to website design and therefore more particular about aesthetics? If this pattern of lower anxiety and lower importance placed on aesthetics proves to be an artifact of people's comfort with website use its effects on acceptance and use would need to be investigated in much greater detail. There is also a possibility that the relationship hinted at here between anxiety towards new websites and visual aesthetics doesn't exist. Future research would need to investigate the true nature of the relationship between the importance placed on aesthetics and the levels of anxiety towards using novel websites. It may be that the pattern found here was somehow an artefact of the participants or countries sampled or even of the UTAUT and CVPA tools being used together.

As the Anxiety measure also emerges on its own in the un-rotated factor analysis solution when the UTAUT data is considered without the CVPA questions, more

detailed research is needed on any relationship that emerges between Anxiety and other factors. Likewise the reasons that Anxiety emerges on its own, often not loading the omnibus first factor in the un-rotated factor solutions, as in the case for the entire data set , would need to be more closely scrutinised. In three countries, the Czech Republic, Greece and the United Kingdom (see appendix I) Anxiety emerges on factor 1 with all other UTAUT measures. In all other countries it does not. Anxiety does emerge a strong factor on its own in the rotated solution for the whole sample, as do all the other UTAUT measures. In taking this research further more countries would need to be examined and more detail would need to be gathered about why Anxiety behaves as it does in the un-rotated solution. It could be that in post-hoc analysis of their decisions and behaviours participants in certain countries overestimate their anxiety towards the use of new websites. Anxiety may simply be a stronger variable than others on the UTAUT and so emerges outside the omnibus factor 1 because it has greater influence over the sample. It may also emerge on the omnibus factors in some countries instead of others because it has a weaker influence or because the tool as a whole works better in some countries than in others.

7.2.5. Extending the UTAUT

It is not just the behaviour of the Anxiety measure but the overall performance of the UTAUT cross-culturally which needs further examination. While this work is a strong indication that the UTAUT is indeed working cross-culturally there is no reason to believe that its measures and question are the only ones to ask. Likewise, the UTAUT was modified here to ask about past decisions and past behaviour. This was an extension of its original scope and could arguably have influenced its behaviour in unforeseen ways. The UTAUT was not intended to examine general use patterns, or necessarily to be given just post-hoc. The tool is intended as a predictor of acceptance and is given at the beginning stages of use of a new technology. However, as shown here it does still perform when being applied post-hoc and does seem to measure general trends in acceptance even across cultures. This novel application of the UTAUT could be researched in much greater depth and indeed may reveal why the Anxiety measure stands out from the other measures. The overall tool is indeed working across the cultures sampled here. Appendix I provides the UTAUT component matrices for each individual country and also shows that the tool is working. Significantly more work in this area is possible and indeed more recent research has looked at the influence

culture has on particular aspects of acceptance (Bandyopadhyay & Fraccastoro, 2007). Researchers have also sought for ways to extend the UTAUT and technology acceptance models in general to include weights for cultural differences (Fife & Pereira, 2005).

7.2.6. Further analysis of the data

A large amount of data was collected for this thesis. In all 1572 questionnaires were collected, 123 of these were either incomplete or contained suspect data and were discarded. A further 286 were put aside and not used in this thesis because they were from non-native respondents. This included students on exchange or simply studying abroad and students who had been partially educated outside the country where they were residing. The 286 questionnaires could be used for other analysis or even to extend the analysis already completed here. Many of these non-native questionnaires came from Asian countries such as China, Taiwan, Vietnam, India and Pakistan. One possibility is to use these questionnaires as a control group and compare them to similar aged populations still residing in their native countries. For example, it may be possible to compare Chinese students studying abroad to Chinese students studying in universities in China and explore if any differences emerge between the two groups on the UTAUT.

Another set of data that was scarcely used in this thesis, the answers to the more qualitative questions about the websites participants used and what they used them for, is available for further analysis. This data could offer a rich insight into website usage patterns across cultures. For example, if a similar set of data were to be collected with several years gap in between the two sets, they could be compared for changes in the patterns of use. A time series or longitudinal analysis of this sort could provide interesting insight into the growth and decline of website use in different countries.

7.3. General avenues for expanding this work

The nine countries that were used in the final analysis are a tiny proportion of countries in the world. Likewise the two studies conducted for this thesis represent a small subset of all the possible topics to cover in HCI. Different participant groups, different educational levels and different ages could provide different insights. Hofstede's cultural model is only one of many available to HCI practitioners and other cultural models should be explored.

7.3.1. Expanding this work and beyond

The most straight forward way to expand on this research is to simply add more countries to the existing analysis. The sample used here attempted to get the widest representation possible but was limited in scope to those countries where contacts and collaborators could be found. Unfortunately it was not possible to obtain collaboration from countries representing Central or South America so they were not included. The French and Dutch samples were too small to use in the analysis conducted here so Western and Northern Europe were also missing from the analysis. Only South Africa represented the entire, diverse continent of Africa. No Confucian influenced Asian country was represented. The list of possible additions is therefore vast and any addition would enhance the understanding of cross-cultural HCI. For example, exploring affordance in a non-western, or possibly a developing country, may prove extremely insightful. Gaining a further understanding of where the UTAUT can be used, validating it in more countries, would also help the HCI community.

The completed research explored only two topics, affordance and technology acceptance; two extremes of Ito and Nakakoji's (1996) cultural influence spectrum. Future work could also explore those topics that would be located more towards the middle of the spectrum. For example a single measure of the UTAUT, such as Anxiety, could be explored across cultures. This could be done with reference to Hofstede's cultural model and may provide different insight into how or indeed if Hofstede's model can at all be applied in HCI.

Studies similar to those completed here could also be carried not just with different HCI topics but also different participant samples. The range of HCI topics to choose from is vast and many standard measurement tools used in the field have yet to be validated in non-western and non-English speaking cultures. Validating any of these tools cross-culturally would make a contribution to the field. Using a different participant demographic or a broader one would make the findings more generalisable. As only students were used in this research the results obtained here cannot be blithely generalised to the wider society.

7.3.2. Cultural Models in HCI

Hofstede's model is only one of several models used in HCI. Others, those of Hall, Trompenaars and Nisbett have also been applied. While Nisbett does not, in effect,

provide an operational model the others do. There is no reason to presuppose that the models of Hall and Trompenaars are not valid or applicable to HCI. An investigation into the validity and applicability of other cultural models may provide the community with a definitive answer as to which models work.

A much broader question that may need to be posed is whether Hall's call for an operational model is at all feasible. It is possible that operational models of culture will simply not work in all situations and in all fields of study where they are wanted. Is it always best to do localised testing and localised designs and not depend on cultural models to help design outside a particular cultural milieu? It may prove that the HCI community has to build a core knowledge of culture instead of attempting to rely on models of culture. If other models of culture prove inapplicable to the field of HCI then the design and research community will need to consider other options for cross-cultural work.

7.4. Conclusion

The work detailed in this thesis has contributed to the field of HCI in several ways. It has shown that cultural differences do exist and can be documented in the area of affordance. However, the results did not support the effectiveness of the Hofstede's cultural model in explaining the differences found in affordance. The thesis has also show that the UTAUT model works well cross-culturally. In addition, it has demonstrated that while it is not possible to use Hofstede's model to account for cross-cultural difference in technology acceptance it may be possible to use the UTAUT model to explore these differences. Moreover, the applicability and, indeed, the overall validity of the Hofstede's model in the HCI field has been cast into further doubt by the reported results.

The value of this research is that it broadens and deepens the understanding of the issues facing the HCI community, especially those members who undertake work in cultures other than their own. This thesis is not an exhaustive consideration of cultural models in HCI and, as detailed in this chapter, future research can build on the work presented here in many ways.

8. Appendix A: Affordance questionnaire

Informed Consent Information for the Perceived Affordance Project

The study in which you are being asked to take part is on the topic of perceived affordance. It is being conducted by Lidia Oshlyansky of University College London Interaction Center. The general purpose of this study is to gain a better understanding of some of the factor contributing to perceived affordance. This study is both anonymous and confidential, you will not be asked to return a signed informed consent form along with your questionnaire, as is normally required in studies of this type. Instead, return of your completed questionnaire will be taken as indication of your consent to participate. This consent form is for your records, it includes contact information should you wish to communicate with the researcher(s) at a later time. Please also note that:

1. Your participation in the study is fully voluntary. You have the right not to participate, and you will not be penalized for this in any way.

2. All information you provide in this study is anonymous, and will be kept strictly confidential. Any report of the study will not identify you personally in any way.

3. There is no real benefit or risk to participating in this study. The time needed for this study is minimal and the user may at any time choose to end the test if they feel time is a factor.

4. At the completion of the study, you will be given an explanation of the research and scientific impact of the study. If you wish further information on the outcomes of the study you may contact the researcher(s) via the email provided below.

5. Although the length of time it takes different people to fill out the questionnaire will vary depending on the different experiences, most people should be able to complete it in 10-20 minutes.

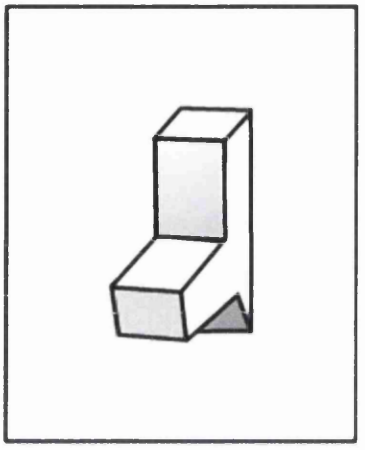
6. By returning your questionnaire, you certify that you are 18 years of age or older and that you have given consent for it to be used by the researcher(s) in the current study.

If you have any questions, please feel free to ask them. If you desire more information in the future regarding your participation in the study, feel free to contact the researcher(s) at the following email address: lidiaosh@yahoo.com.

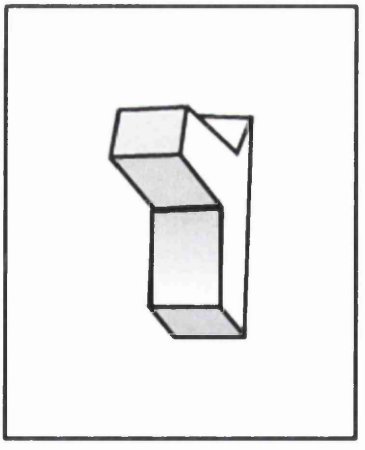
My signature below affirms that I have read and agree with the above prior to participation and that you agree to participate in this study. This document is for your records, please detach it before handing in the rest of the questionnaire.

Name _____ Date _____

For the light switch pictured below, which is in the "ON" position and which is in the "OFF" position? Please mark each picture with either "ON" or "OFF".

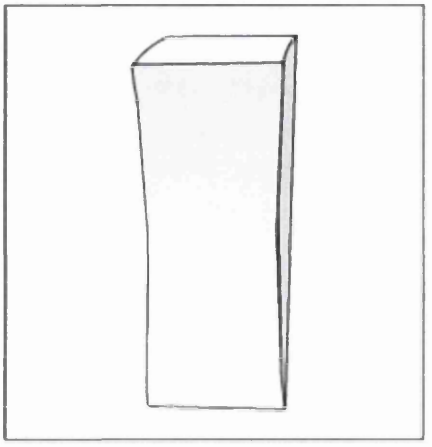


_____

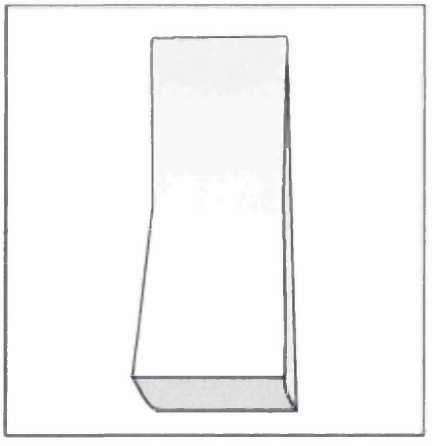


_____

For the light switch pictured below, which is in the "ON" position and which is in the "OFF" position? Please mark each picture with either "ON" or "OFF".

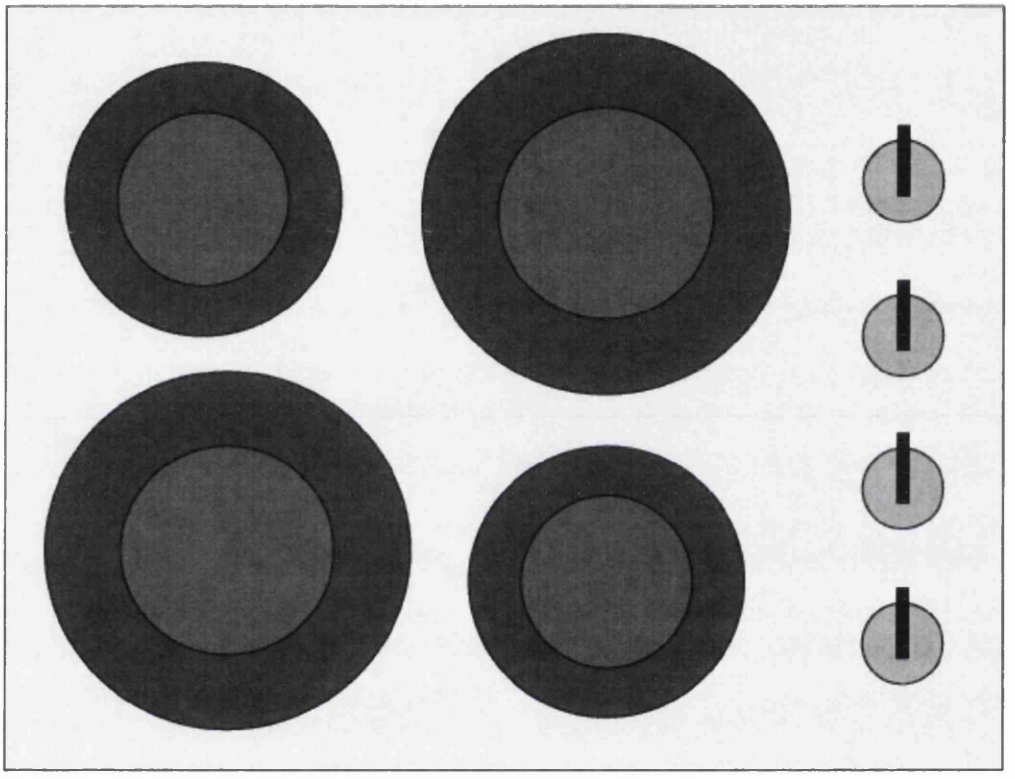


_____

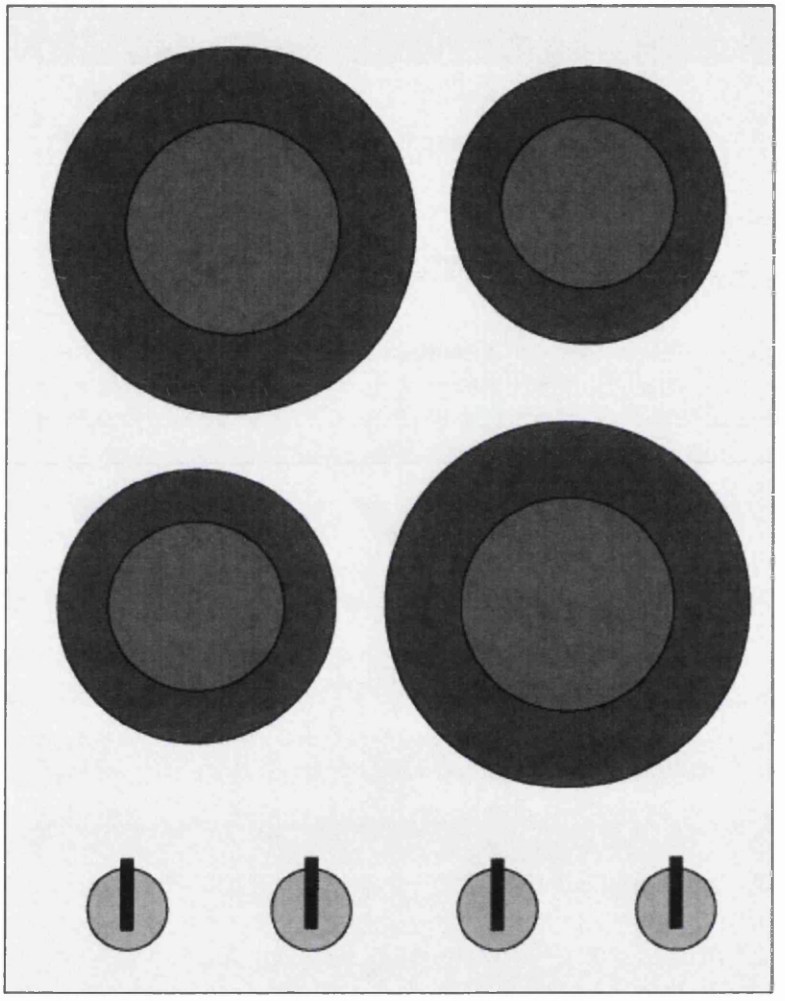


_____

On this cooker / stove top you decide which knob controls which hob ring. Either by labelling or drawing arrows please decide which knob you would have control which hob ring.



On this cooker / stove top you decide which knob controls which hob ring. Either by labelling or drawing arrows please decide which knob you would have control which hob ring.

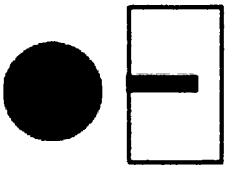


The black circle is a knob which controls the dial next to it. Please indicate which way you would turn the knob, clockwise (C) or counter-clockwise (CC) to move the dial in the direction stated.

Move the dial down

C _____

CC _____

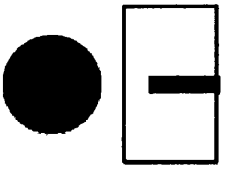


The black circle is a knob which controls the dial next to it. Please indicate which way you would turn the knob, clockwise (C) or counter-clockwise (CC) to move the dial in the direction stated.

Move the dial up

C _____

CC _____

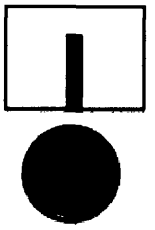


The black circle is a knob which controls the dial next to it. Please indicate which way you would turn the knob, clockwise (C) or counter-clockwise (CC) to move the dial in the direction stated.

Move the dial right

C _____

CC _____

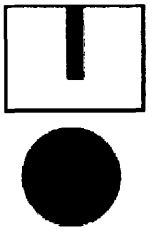


The black circle is a knob which controls the dial next to it. Please indicate which way you would turn the knob, clockwise (C) or counter-clockwise (CC) to move the dial in the direction stated.

Move the dial left

C _____

CC _____



The study you just completed is a precursory look at how people conceptualize the way that things should work and the affordance of everyday Western objects.

Affordance is a concept most notably adapted by Donald Norman from Psychology. It can be summed up as: those properties of an object that can be perceived and give an idea of how the object can be used by the user. For a more detailed explanation please see Donald Norman's article on affordance found at:
http://www.jnd.org/dn.mss/affordances-interactions.html.

This research specifically looks at the possible affects of culture and exposure to other cultures on how we think things should work. The following questions will ask you about your own cultural history and your knowledge of the principle of affordance.

Post-study Questionnaire

Date:

Gender:

Age:

1. Highest Level of education? □ Secondary / High School □ B.S. □ Graduate

2. Country of residence? _____

3. How many years have you lived in the above country? _____

4. Country of Citizenship if different from country in question 2? _____
_____

5. Do you speak any language other than English in your home? Yes / No
6. If you answered "Yes" to question 5 please list the languages. _____
_____

7. How often do you travel out of the country where you live? _____

8. How familiar are you with the concept of "affordance?"

Very Familiar	Somewhat Familiar	Familiar with the term but not the concept	No familiarity at all.

9. Have you ever read Donald Norman's book "The Design of Everyday Things" or any other books which talk about Affordance? Yes / No

10. Please share any other thoughts or comments you may have regarding this study.

9. Appendix B: Affordance data sample

Subject	Gender	Age	Edu	UK?	Other Countries	Other Langs	Afford?	Light US top	Light US bottom	Light UK top	Light UK bottom	Hob - right	Hob - bottom	Dial move down	Dial move up	Dial move right	Dial move left
13	M	25?	3	y	y	Y	2	off	on	on	Off	a1 b2 c3 d4	a1 b2 c3 d4	c	Cc	c	cc
20	M	22	3	n	y	Y	1	off	on	on	Off	a1 b2 c3 d4	a1 b2 c3 d4	c	Cc	c	cc
27	F	20	2	y	n	Y		off	on	on	Off	a1 b2 c3 d4	a1 b2 c3 d4	c	Cc	c	cc
12	M	20	2	y	n	Y	1	on	off	on	Off	a1 b2 c4 d3	a1 b2 c3 d4	cc	C	c	cc
7	M	29	2	y	n	N	5	on	off	on	Off	a1 b2 c4 d3	a1 b2 c3 d4	cc	Cc	c	cc
4	F	21	3	y	n	Y	5	on	off	on	Off	a1 b3 c2 d4	a1 b2 c3 d4	c	Cc	c	cc
4	M	21	2	y	y	Y	1	off	on	off	On	a2 b1 c4 d3	a1 b2 c3 d4	c	Cc	c	cc
23	F	21	2	y	n	N	1	on	off	on	Off	a2 b1 c4 d3	a1 b2 c3 d4	cc	C	c	cc
29	F	20	1	y	n	N	3	on	off	off	On	a1 b2 c3 d4	a1 b2 c4 d3	cc	Cc	c	cc
22	F	20	2	y	n	N	3	off	on	off	On	a1 b2 c4 d3	a1 b2 c4 d3	c	Cc	c	cc
25	F	21	2	y	n	N	2	off	on	on	Off	a1 b2 c4 d3	a1 b2 c4 d3	cc	Cc	c	cc
17		26	2	y	y	N	5	on	off	on	Off	a1 b2 c4 d3	a1 b2 c4 d3	c	Cc	c	cc
27	F	19	1	y	n	Y	1	on	off	on	Off	a1 b2 c4 d3	a1 b2 c4 d3	c	Cc	c	cc
9	M	24	2	y	n	N	5	off	on	on	Off	a2 b1 c3 d4	a1 b2 c4 d3	c	Cc	c	cc
21	F	33	3	y	n	N	5	on	off	on	Off	a2 b1 c4 d3	a1 b2 c4 d3	c	Cc	c	cc
12	M	25	3	y	y	Y	4	off	on	on	Off	a2 b3 c4 d3	a1 b2 c4 d3	c	C	c	c
13	M	21	3	y	n	Y	5	on	off	on	Off	a3 b1	a1 b2 c4	cc	Cc	c	cc

												c2 d4	d3		
11	M	22	2	y	n	N	5	on	off	on	Off	a2 b1 c4 d3	a1 b3 c2 d4	c	C

10. Appendix C: Original VSM, UTAUT and CVPA questionnaires.

VSM - Original version

Please think of an ideal job – disregarding your present job, if you have one. In choosing an ideal job, how important would it be to you to ... (please circle one answer for each question):

1. Have sufficient time left for your personal or family life?

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

2. Have good physical working conditions (good ventilation and lighting, adequate work space etc)?

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

3. Have a good working relationship with your direct supervisor?

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

4. Have security of employment?

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

5. Work with people who cooperate well with one another?

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

6. Be consulted by your director supervisor in his/her decisions?

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

7. Have an opportunity for advancement to higher level jobs?

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

8. Have an element of variety and adventure in the job?

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

In your private life, how important is each of the following to you (please circle one answer for each question):

9. Personal steadiness and stability

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

10. Thrift

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

11. Persistence (perseverance)

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

12. Respect for tradition

1. Of Utmost Importance	2. Very Important	3. Of Moderate Importance	4. Of Little Importance	5. Of Very Little or No Importance

13. How Often do you feel tense at work?

1. Never	2. Seldom	3. Sometimes	4. Usually	5. Always

14. How frequently, in your experience, are subordinates afraid to express disagreement with their superiors?

1. Very Seldom	2. Seldom	3. Sometimes	4. Frequently	5. Very Frequently

How much do you agree or disagree with each of the following statements? (please circle one answer for each question)

15. Most people can be trusted.

1. Strongly Agree	2. Agree	3. Undecided	4. Disagree	5. Strongly Disagree

16. One can be a good manager without having precise answers to most questions that subordinates may raise about their work.

1. Strongly Agree	2. Agree	3. Undecided	4. Disagree	5. Strongly Disagree

17. An organizational structure in which certain subordinates have two bosses should be avoided at all costs

1. Strongly Agree	2. Agree	3. Undecided	4. Disagree	5. Strongly Disagree

18. Competition between employees usually does more harm than good

1. Strongly Agree	2. Agree	3. Undecided	4. Disagree	5. Strongly Disagree

19. A company's or organization's rules should not be broken – not even when the employee thinks it is in the company's best interest

1. Strongly Agree	2. Agree	3. Undecided	4. Disagree	5. Strongly Disagree

20. When people have failed in life it is often their own fault

1. Strongly Agree	2. Agree	3. Undecided	4. Disagree	5. Strongly Disagree

UTAUT – Original Version

1. I would find the system useful in my job.
2. Using the system enables me to accomplish tasks more quickly
3. Using the system increases my productivity.
4. If I use the system, I will increase my chances of getting a raise.

5. My interaction with the system would be clear and understandable.
6. It would be easy for me to become skilful at using the system.
7. I would find the system easy to use.
8. Learning to operate the system is easy for me.

9. Using the system is a bad/good idea.
10. The system makes work more interesting.
11. Working with the system is fun.
12. I like working with the system.

13. People who influence my behaviour think I should use the system.
14. People who are important to me think that I should use the system.
15. The senior management of this business has been helpful in the use of the system.
16. In general, the organization has supported the use of the system.

17. I have the resources necessary to use the system.
18. I have the knowledge necessary to use the system.
19. The system is not compatible with other systems I use.
20. A specific person (or group) is available for assistance with system difficulties.

21. I have the resources necessary to use the system.
22. I have the knowledge necessary to use the system.
23. The system is not compatible with other systems I use.
24. A specific person (or group) is available for assistance with system difficulties.

I could complete a job or task using the system .....
25. If there was no one around to tell me what to do as I go
26. If I could call someone for help if I got stuck.
27. If I had a lot of time to complete the job for which the software was provided.
28. If I had just the built in help facility for assistance.

29. I feel apprehensive about using the system.
30. It scares me to think that I could lose a lot of information using the system by hitting the wrong key.
31. I hesitate to use the system for fear of making mistakes I cannot correct.
32. The system is somewhat intimidating to me.

33. I intend to use the system in the next <n> months.
34. I predict I would use the system in the next <n> months.
35. I plan to use the system in the next <n> months.

CVPA – Original Version

1. Owning products that have superior designs makes me feel good about myself.
2. I enjoy seeing displays of products that have superior designs.
3. A product's design is a source of pleasure for me.
4. Beautiful product designs our make world a better place to live.

5. Being able to see subtle differences in product design is one skill that I have developed over time.
6. I see things in a product's design that other people tend to pass over.
7. I have the ability to imagine how a product will fit in with designs of other things I already own.
8. I have a pretty good idea of what makes one product look better than its competitors.

9. Sometimes the way a product looks seems to reach out and grab me.
10. If a product's design really "speaks" to me, I feel that I must buy it.

11. Appendix D: Technology acceptance pilot questionnaires and interview questions

VSM

Please think of an ideal job – disregarding your present job, if you have one. In choosing an ideal job, how important would it be to you … (please select one answer for each question):

	Of Utmost Importance	Very Important	Of Moderate Importance	Of Little Importance	Of Very Little or No Importance
Have sufficient time left for your personal or family life?					
Have good physical working conditions (good ventilation and lighting, adequate work space etc)?					
Have a good working relationship with your direct supervisor?					
Have security of employment?					
Work with people who cooperate well with one another?					
Be consulted by your director supervisor in his/her decisions?					
Have an opportunity for advancement to higher level jobs?					
Have an element of variety and adventure in the job?					

In your private life, how important is each of the following to you (please select one answer for each question):

	Of Utmost Importance	Very Important	Of Moderate Importance	Of Little Importance	Of Very Little or No Importance
Personal steadiness and stability					
Thrift					
Persistence (perseverance)					
Respect for tradition					

	Never	Seldom	Sometimes	Usually	Always
How often do you feel tense at work?					

	Very Seldom	Seldom	Sometimes	Frequently	Very Frequently
How frequently, in your experience, are subordinates afraid to express disagreement with their superiors?					

How much do you agree or disagree with each of the following statements? (please select one answer for each question)

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Most people can be trusted.					
One can be a good manager without having precise answers to most questions that subordinates may raise about their work.					
An organizational structure in which certain subordinates have two bosses should be avoided at all costs					
Competition between employees usually does more harm than good					
A company's or organization's rules should not be broken – not even when the employee thinks it is in the company's best interest					
When people have failed in life it is often their own fault					

Acceptance Questionnaire

Please rate how important each of the following is to you when deciding whether or not to use a particular website to support your work or studies...

	Extremely important	Slightly important	Neither important or unimportant	Somewhat unimportant	Totally unimportant
The website is useful in my job / university studies					
Using the website would enable me to accomplish specific tasks more quickly.					
Using the website would increase my productivity at university / work.					
The website would increase my chances of getting a raise / good grades (marks).					
Interacting with the website is clear and understandable.					
Becoming skilful at using the website is easy.					
I would find the website easy to use.					
Learning to operate the website would be easy for me.					
The website would make work / studying more interesting.					
Working with the website would be fun /entertaining.					
I would enjoy working with the website.					
People who influence my behavior such as teachers or supervisors think I should use the website.					
People who are important to me such as friends and family think that I should use the website.					
The university staff will be helpful in supporting students using the website.					
In general, the university would be supportive of the use of the website.					

	Extremely important	Slightly important	Neither important or unimportant	Not very important	Totally unimportant
I can use the website even when there is no one around to tell me what to do as I go.					
There is someone to call for help if I got stuck.					
There is no time pressure to do the task for which the website was provided.					
I have a built in help facility for assistance if I need it.					

Given a completely new website that you have not used previously which of the following are true for you...

	Always true	Sometimes true	Neither true nor untrue	Rarely true	Never true
I feel apprehensive about using new websites.					
When entering data on a new website it scares me to think that I could lose a lot of information by hitting the wrong key.					
I hesitate to use a new website for fear of making mistakes I cannot correct.					
New websites are somewhat intimidating to me.					

Please rate how much you agree with the following statements about website design…

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Using websites that have superior designs makes me feel good about myself.					
I enjoy seeing / using websites that have superior designs.					
A website's design is a source of pleasure for me.					
Beautifully designed websites make our world a better place to live.					
Sometimes the way a website looks seems to reach out and grab me.					
If a website's design really "speaks" to me, I feel that I must explore and use it.					
When I see a website that has a really great design, I feel a strong urge to explore it.					

Demographics

Gender: M / F
Age: _____
Highest Level of education you have completed? ☐ Secondary / High School ☐ B.S. ☐ Graduate
How often do you use the internet?

- O Every day
- O More than once a week
- O Once a week
- O Less than once a week
- O Several times a month
- O Less than once a month

How do you find out about new web pages/sites? (Please select 3 that most apply.)

- O Books
- O Friends / Colleagues
- O Signatures at end of email messages
- O Usenet newsgroups
- O Television advertisements
- O Follow hyperlinks from other Web pages
- O Internet search engines (e.g., Google, Alta Vista, Lycos, etc.)
- O Magazines/newspapers
- O Internet directories (e.g., Yahoo, MSN, etc.)
- O Other Sources _____

Please tell us about the website you use:

Websites you use regularly		what do you use them for?
_____	used for	_____
_____	used for	_____
_____	used for	_____
_____	used for	_____
_____	used for	_____
_____	used for	_____

The questions below ask about your cultural background. These questions are asked because this research seeks to identify cultural differences and patterns in website acceptance and use. This information will be used only to place your responses on previous questions within a cultural context.
Country where you received Primary / Elementary education? _____
Country where you received Secondary / High School education? _____
Country you currently live in? _____

How many years have you lived in the above country? _____
Country of Citizenship? _____
The above questions are asked in order to determine your cultural background, if they do not accurately represent your cultural background please tell us what it is: _____

Interview

I. You've just completed a questionnaire that will be used to measure the factors that influence people's acceptance of websites. Can you think of anything that these questionnaires do not cover which may influence how people come to accept websites?

II. In regards to the questionnaire you have just completed:

1. Are there any questions on the questionnaire that seemed inappropriate to you or out of place?

2. If there were can you tell me why they seemed out of place?

3. Are there questions on the questionnaire that seemed as though they were difficult to understand or need to be re-worded?

4. If there are questions that you feel need to be re-worded can you point them out and suggest rewordings?

III. I'd like to ask you a few general questions about how you come to use websites ....

1. Often there are many websites that do the same or similar things, what makes you use one site as opposed to another?

2. How do you decide what website to use for a given purpose?

3. Are there specific things that you look for in a website before you decide to use it

12. Appendix E: Summary of pilot data

Demographic Data									
Subject	**gender**	**age**	**ed**	**country ed1**	**country ed2**	**live**	**years lived**	**citizen**	**natnlty**
1	m	35	3	USA	USA	UK	1.5	USA	USA
2	f	32	3	UK	UK	UK	32	UK	UK
3	f	28	3	Saudi Arabia	Saudi Arabia	UK	0.33	Saudi Arabia	Saudi Arabia
4	f	39	3	Malaysia	Malaysia	UK	2	Malaysia	Malaysia
5	m	30	2	France	France	UK	1	France	France
6	f	24	3	England	Oman	England	15	UK	British / Oman
7	f	49	3	India	India	UK	1	India	Indian
8	m	28	3	Hong Kong	Hong Kong and UK	UK	11.5	UK	Hong Kong and UK
9	m	29	2	USA	Greece	UK	1	USA, Greece	Greek
10	m	26	3	China	China	UK	4	China	China
11	f	28	3	New Zealand	New Zealand	UK	2	New Zealand, British	New Zealand, British

	VSM																			
Subject	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	2	3	2	3	2	3	2	2	2	3	4	5	2	2	1	4	4	3	4	3
2	1	2	1	1	2	3	1	1	1	2	2	2	4	4	1	1	2	4	2	2
3	2	2	1	3	2	2	2	1	1	2	1	2	3	2	3	2	2	4	3	4
4	1	1	1	1	1	3	3	2	2	2	2	3	3	3	2	2	1	4	4	4
5	3	2	2	2	1	1	2	1	3	5	2	3	3	1	3	1	1	2	5	1
6	2	1	2	2	2	3	2	2	2	3	2	4	3	2	4	4	3	3	4	4
7	2	2	2	3	2	3	2	3	1	3	1	4	3	4	2	2	2	3	3	2
8	1	2	2	1	2	3	2	2	1	2	2	1	4	3	3	2	3	3	4	4
9	2	3	2	3	3	3	1	1	2	1	1	4	3	3	4	3	2	4	4	1
10	2	2	1	2	2	2	2	1	3	3	3	3	4	4	2	3	1	4	3	3
11	2	2	3	3	3	3	2	2	3	3	4	4	2	3	2	2	4	2	5	4

	UTAUT																							
Subj	**perf1**	**perf2**	**Perf3**	**perf4**	**eff1**	**eff2**	**eff3**	**eff4**	**att2**	**att3**	**att4**	**soc1**	**soc2**	**soc3**	**soc4**	**self1**	**self2**	**self3**	**self4**	**anx1**	**anx2**	**anx3**	**anx4**
1	1	1	1	1	1	2	2	2	3	4	3	5	4	2	2	1	2	2	3	5	2	5	5
2	1	3	2	3	1	1	1	1	2	3	2	2	2	2	3	2	5	3	3	5	5	5	5
3	1	2	1	3	1	2	3	3	3	3	3	2	4	5	4	3	3	4	4	3	3	5	5
4	1	1	1	2	3	2	2	1	2	1	1	1	1	1	2	1	1	1	2	2	2	4	4
5	1	1	1	1	1	1	2	2	3	3	2	3	4	2	1	1	4	1	2	2	4	5	4
6	1	4	3	2	2	2	2	2	2	3	3	2	2	3	3	1	4	2	3	4	4	4	5
7	1	1	1	1	2	2	3	2	1	2	3	2	5	5	5	1	2	3	5	5	5	5	2
8	1	1	1	1	2	2	2	2	3	4	4	3	4	3	3	4	3	2	3	2	2	2	3
9	1	1	1	3	2	2	2	2	2	2	2	5	4	5	4	1	4	2	2	4	4	5	5
10	1	1	1	1	2	3	2	3	2	2	2	3	3	2	2	1	1	2	2	2	2	2	2
11	1	1	1	2	2	3	3	2	2	3	3	1	2	3	3	5	5	2	2	5	5	5	5

CVPA							
Subject	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	3	1	1	4	2	1	1
2	5	5	5	3	5	5	5
3	3	2	3	2	3	2	2
4	1	1	2	2	2	2	2
5	2	1	1	3	2	4	4
6	3	2	2	4	2	2	2
7	2	2	2	3	3	2	3
8	4	3	5	5	5	5	3
9	3	1	1	1	2	2	2
10	2	2	1	1	1	1	1
11	3	2	2	3	4	3	2

Website Use																
Subject	**Internet use**	**new sites**	**new sites**	**new sites**	**sites used**	**used for**	**sites used**	**Used for**	**sites used**	**used for**	**sites used**	**used for**	**sites used**	**used for**	**sites used**	**used for**
1	1	2	6	7	google	search	bank website	money mangmnt	email / yahoo	email / yahoo	amazon	book searches	ebay	pricing/ looking for items		
2	1	2	6	7	google	info and image seeking	iglu.com	holiday search	expedi a	travel booking	amazon	shopping	interflora	shopping		
3	1	1	6	7	yahoo	search / email	google	search	java.su n.com	API document ation	amazon	books	elpha	arabic news	cnn	news
4	2	2	6	7	yahoo	email	google	search	bc	news, tv, weather, tickets	UCL sites	courses offered, staff info, research updates	guardian	news	utusan malaysia	malaysian news
5	1	2	6	7	famek ult.com	work	liberatio n.fe	news	allocin e.fr	movie news	oui.fr	live radio				
6	1	2	6	7	hotmail	email	google	search	kiok	design info / links	bbc	news	gamasht ra	game design / news	comics online	amuseme nt
7	1	2	6	7	google	search	ucl	academic	google	mail	cnn	news				
8	1	2	6	7	myfast mail.co m	email	bc	news, weather	yahoo HK	news in Hong Kong	London net	seraching for entertain ment eg films etc				
9	1	2	7	9	new.bb c.co.uk	news	expedia. com	travel	suppor t.docu mentu m.com	work	google	search	finance. yahoo.c om	investmen t info	kitco.co,	investmen t info

10	1	2	6	7	google	searching	ebay	buying and selling	hsbc	banking	paypal	online transactions	bbc	news	bozou.com	personal website and blog
11	1	2	6	7	guardian.co.uk	news, features	westpac.com.au	banking	tube site	travel planning	beerintheevening.co.uk	finding and choosing pubs				

Post test interview summary

Subject	Interview summary
subject 1	**VSM** Unclear if I am still thinking about an ideal job or a current job. Because its not clear that there is a transition, are the questions regarding my work now or my imagined work. **Acceptance** "It scares me to think...." it might bother me, distress or annoy me. Scares is too strong maybe concerns, of annoys or frustrates etc **CVPA** *You were laughing at the "Beautifully designed websites make the world a better place", do you think that question is just silly?* Well I think anyone who would hold that opinion must just be mad. Its just really funny, it's a hyperbole, food aide makes the world a better place, medical advances make the world a better place..... etc etc **Websites chosen because of ...** depends on context but simplicity, accuracy of the results, and attractive too. Value wins over attractiveness, cost over attractiveness, confusing design hinders my acceptance. **Specific features you look for before using a website** not really I just have to get what I want out of it. Does it do what I need it to do, I'm utilitarian about it.
subject 2	**VSM** on the front page (VSM in your private life...) what does it mean personal steadiness and stability - how important is personal steadiness and stability. Its difficult to give an answer without context. But thinking in general I guess... There is no context they are to abstracted so its difficult to answer. By saying "in your personal life" it makes it hard to answer because its like it gives you a context but then doesn't. If it just said in general it would almost be easier. **Acceptance** "I have a built in help facility" seems a strange way to say it. Shouldn't it say the "website has" or "there is" **CVPA** seemed to be a jumble of questionnaires. You could have something at the beginning to tell people to expect two different questionnaires because otherwise its confusing. You could make them look different so that people knew to expect two questionnaires **Websites chosen because of ...** habit, fit for purpose, if the first choice couldn't complete my goal I would go to the next searched for something and the site came up on top **Specific features you look for before using a website** sometimes I'm restricted by what I can use, for example I can only use my bank's site for banking. if I don't know where to find something then I search on that item and then go to the website that lists it

subject 3 **VSM**

"thrift" was difficult to understand
"persistence" the context is not understandable

Acceptance

some of the questions on the acceptance questionnaire weren't all stated the same way so it was hard sometimes to understand

I used the websites I use as a model to answer the questions. The websites I put on the first page, so the answers were dependent on the websites I use
"the website would increase my chances of getting a raise" wasn't very clear to me
"using the site would increase my productivity..." I wasn't sure if you would understand what I meant with my answers. Of course its important that it increases my productivity, I am using it because it should help me. *So you put "extremely important there because you wouldn't use it unless it made you more productive.* Exactly, that's it.

As apposed to the question "university staff would be helpful in supporting the use of ...." where you put "totally unimportant" because it doesn't matter to you if they are supportive or not as long as the site is useful to you?" yes that is exactly it. I just want it to be useful and help me. *So actually you have answered the questions the way they were meant to be*

CVPA

Websites chosen because of ...

as long as it works, does it do what I want and give me the info I need, serves its purpose
habit, search for new ones

Specific features you look for before using a website

doesn't matter if its pretty but if its clear or not
depends on the what I am doing at the time. I will look to make sure it is helpful now, I may not use the sites again in 3 years but it provides for some purpose now

subject 4 **VSM**

I've never seen the questions before so I thought they weren't related to the other questionnaires. Need better directions to tell you that there are 2 different questionnaires because there is a change of theme that isn't clear.
these questions were unfamiliar to me so they took more time I had to think about them
some words are difficult to interpret but hopefully translation would help

Acceptance

in order to answer these I would visualise particular websites and answer the questions. Is that good I wasn't sure if that was what you wanted. Sometimes I would picture something very formal where for the rest I may think of pages like the ones I used when I was travelling for questions like "Beautifully designed websites make the world a better place." so sometimes I would use formal websites and sometimes I would think of sites that I use for less formal things

CVPA

"Speaks" to me what does that mean. Does that mean "interests me" does it mean "attracts my attention" "is it meaning that... interest me?" Real its attracts my attention is what you meant, yes?"

Websites chosen because of ...

I want something that fits into one screen and prints, so it's the design. I prefer

sites designed which lets you get what you see
not too many graphics they slow down page download, its ok to be simple, I want the information

Specific features you look for before using a website
information is very important
colour and all those other things are important but they would be secondary

subject 5 **VSM**
Problem with some wording. May be solved by translation
"Thrift" basically was difficult

Acceptance
This section was difficult, I imagined websites I use every day for work. I was not sure if I should imagine if I should think of sites I use for work or not, so I thought of sites I use for work. And I am not a student so I tried to image this as well because I don't have the experience of a student.

CVPA
"can it change the world" the design of a website can change the world - well there seems no point

Websites chosen because of ...
clarity of the information I'm looking for. For example I use one really good French website I use for video game news, the clarity of the website means I can automatically see the latest news. And it allows people to make comments on the news so I can read those as well. I use other websites as well for example American website and there is a big difference because they are usually kind of a mess.

Specific features you look for before using a website
Must be easy to find information that is the first criteria, even if its pretty ugly I don't care.
I always select 2 - 3 of the same kind because maybe one wont have the info I am looking for but my favourite will be the more clear website
The one with options I appreciate, like user comments section, or content like trailers for movies
also who are the people who write or do the website, I want to feel a connection, for example there is a news site that has journalists comments on it, like a blog and I really like that.

subject 6 **VSM**
"thrift" wasn't a 100% sure what the definition was. *Would it be helpful to put "personal economy" in parenthesise after thrift?* Yes I think that would help - "Thrift I wasn't 100% sure what it meant."
"perseverance" was a bit hard to understand but then I read the statement above (in your personal life) and then it made more sense

Acceptance
yeah I guess there are 2 or 3 types of website you go to some just for enjoyment, some for just information .... Some have immediate impact on work, some just to see where you just float around to see what happens.... So some of the answers you could answer differently depending on if you use things every day or if its just something I use then I wouldn't expect things like support depends on context of use

CVPA
"beautifully designed website make the world a better ...." I guess it's a question that asks about how strongly you feel about good design... but it seems kind of well you know the world existed without websites. I guess it's a good way to find out how strongly you feel."

Websites chosen because of ...
Respect, and like BBC I use it because I have respect for it I've always used it and there is radio and tv etc.
reliable like Google
for website that give you information its good when they change so you know there will be something new when you go back to them
quality of information, well written etc
connection to other sites, so if I know if it's a good resource to find other sites

Specific features you look for before using a website
I think it takes more than once. If I see one I like I'll go back to it to see if I can repeat the rewarding or interesting experience

subject 7 **VSM**
the transition between the private life and the "how often do you feel tense at work" is unclear. Maybe you could put a sentence in there that says "in your work life" or something "maybe you can put something here that says 'in our work life'." pointing at section of vsm

Acceptance
the directions were difficult maybe you can say "when you try to decide whether or not to use a website how important each of these things will be...."
you see I thought all of this was about finding out if I would use sites just for fun or if I wouldn't and I wouldn't touch them with a 10 foot pole and that is what comes out on the questionnaire. Because my attitude is "no you can't have fun you should be working"
It may matter to the person whether you need to tick or cross or circle. If you tell them up front it would decrees the psychological load. The person may feel that they are doing it wrong otherwise.

CVPA
aesthetics is important but only for sites that already give me what I need. If the site I use is aesthetically pleasing than of course that is nice
what does it mean "make the world a better place" that seems like it would reflect an immaturity or frivolous. It may be good to have that but still.
the order of ratings changes in one place and that is the only place. Everywhere else it is the same. I don't think its problematic. I do feel that it confuses the person when the order of ratings is always switched around. And it seems to say that you think little of the persons seriousness who is taking the survey. And it diverts attention from the questionnaire

Websites chosen because of ...
depends on context of use
I don't really surf it may be an individual choice, I've always focused on getting the most out of time so I just go to the sites that I know of or I have been told about.
It has to fulfil a task and it has to do it quickly

Specific features you look for before using a website
sometimes I find a jewel and I save it in favourites but then I never go back to it again

really I don't look at different sites and then think I need to look at others, I just use it and that is all.
I'm not really bothered by the usability even now when I have studied it..

Demographic
graduate and undergraduate is a problematic wording. Needs to be better worded, maybe look at different demographic forms to bring out what you really mean

subject 8 **VSM**
thrift didn't know what it meant - "I didn't know what thrift meant."
the transition on the vsm right before "how much do you agree or disagree..." was problematic "I didn't know what the context is but then you said just in general and so that was ok."

Acceptance
didn't know what apprehensive meant
at first I thought that the questionnaire was odd. Because the directions seemed to make a lot of the questions redundant, because if I sue the website for work or studies then of course it is useful

CVPA

Websites chosen because of ...
Well its easier for me to use examples I use fastmail because I have an account with them, I use bbc and yahoo for news because I watch bbc news
Familiarity
good coverage, variety so I get to choose what to look at (regarding yahoo), exhaustive source

Specific features you look for before using a website
goal directed
depends on what I'm looking for, context. I don't really surf the web for nothing, I don't use the internet outside of work so there are always specific reasons for me to use the web

subject 9 **VSM**
"Once can be a good manager without having precise ..." actually I don't think the questions is wrong but I guess it depends on the type of work. McDonalds is different then IT management, you don't need to tell your employees how to write a jdbc driver etc.

Acceptance
The first questions seemed redundant. Because the directions said "for work and study..." *so if it was reworded to say "Please let me about the website you use and why you use them that would have made more sense to you?"* Yes
"there is no time pressure..." not clear where the pressure is coming from, and that was confusing, where is the pressure coming from, from the site or from someone else

CVPA

Websites chosen because of ...
I'll use all the commonly used site and use them as a comparison for each other, so like expedia, orbitz, lasminute.com. Then I choose the site that has the best

deal, even though I prefer expedia but the best deal will win out.

Practicality wins out, the site with the best services or options. I do get annoyed when sites suck but practicality drives my decisions

Specific features you look for before using a website
it all depends on how useful the site proves to be

subject 10

VSM
Persistence, perseverance were difficult to understand
thrift did not really understand it

Acceptance
Its nicely organised, I can barely check the last column because all the questions were quite appropriate

CVPA

Websites chosen because of ...
performance
match my needs
secondly I think about usability ease of use
familiarity comes third, so if I am familiar with the site then I will keep using it so long as it meets my needs

Specific features you look for before using a website
It is the functionality and performance. I'm looking for a website that can really match my needs.

subject 11

VSM
persistence what does that mean in terms of your private life. I interpreted it to mean that you persisted with a difficult relationship
"competition between employees does more...." I guess it really depends, in my background I think its good but I can see where it may not be good for sales people say, so I did it based on my background
Thrift I interpreted that to be when you are in a relationship and the other person has completely economic ideas to you..." totally different money values than you do...

Acceptance
"the university staff will be supportive ..." I interpreted that to mean company staff supporting me
"I can use a website...." I had to think about that one for a little while, but its ok "Apprehension" questions seemed out of place. There are points where I can get apprehensive, like entering personal details or I double check c to make sure that they wont spam me with marketing info. Websites are not in themselves scary, Its not scared its more wary, "its more annoying rather than scary". *concerns maybe?* Yes concerns me that I may loose "wariness more"

CVPA
"Makes the world a better place.." *laughs* "I do agree that some website are very well designed and I am more compelled to look at them... but a "better world" is a bit too strong"

"speaks to me" I had to interpret. Would attracts be better? Yeah appeals to me would be better
"Websites that have superior designs make me feel good about myself" I would never get an ego hit of a website. If it isn't frustrating than I don't feel anything negative. *Maybe it should say "feel good" instead of good about myself?* Yeah because it is a pleasurable experience

Websites chosen because of ...
In terms of ticket booking, for example, I've compared a lot of sites. I like flexibility, to change details for example, clear ranking of results, content
I hate compulsory registration, I wont use those sites. I want to see information before I register
I don't like it when they don't give you information up front, like the trainline.co.uk which makes you drill down and work too much

Specific features you look for before using a website
completeness of information, clarity of information, flexibility
you do make judgements about website when you first see a site, if the site is flashing and crawling and there are a ton of adds then the trust level goes down. The site needs to look professional, there needs to be a level of professionalism.

13. Appendix F: Final questionnaires for the technology acceptance study.

English Version

Information on this study:

The survey in which you are being asked to complete is on the topic of culture and website acceptance. It consists of three distinct questionnaires. One will ask you about the importance of certain work and life values. The second will ask you about factors that influence your decisions to use website. Lastly you will be asked some demographic and background information about yourself.

This study is being conducted by Lidia Oshlyansky from University College London Interaction Centre. The general purpose of this study is to examine whether any correlations exist between cultural variance and website acceptance. Please be assured that the study is anonymous and your name will not appear with any information we collect from you. The return of your completed questionnaire will be taken as indication of your informed consent to participate in this survey.

1. Your participation in the study is fully voluntary. You have the right not to participate, and you will not be penalized for this in any way.

2. All information you provide in this study is anonymous, and will be kept strictly confidential. Any report of the study will not identify you personally in any way.

3. There is no real benefit or risk of doing this study. The allotted time needed for this study is minimal and you may, at any time choose to end this survey, if time is a factor.

If you desire more information in the future regarding your participation in the study, feel free to contact me at the following email addresses: l.oshlyansky@cs.ucl.ac.uk

Values Questionnaire

Please think of an ideal job – disregarding your present job, if you have one. In choosing an ideal job, how important would it be to you to ... (please select one answer for each question):

	Of Utmost Importance	Very Important	Of Moderate Importance	Of Little Importance	Of Very Little or No Importance
Have sufficient time left for your personal or family life?					
Have good physical working conditions (good ventilation and lighting, adequate work space etc)?					
Have a good working relationship with your direct supervisor?					
Have security of employment?					
Work with people who cooperate well with one another?					
Be consulted by your director supervisor in his/her decisions?					
Have an opportunity for advancement to higher level jobs?					
Have an element of variety and adventure in the job?					

In your private life, how important is each of the following to you (please select one answer for each question):

	Of Utmost Importance	Very Important	Of Moderate Importance	Of Little Importance	Of Very Little or No Importance
Personal steadiness and stability					
Thrift (careful management of money)					
Persistence (perseverance)					
Respect for tradition					

In your current situation:

	Never	Seldom	Sometimes	Usually	Always
How often do you feel tense at work?					

	Very Seldom	Seldom	Sometimes	Frequently	Very Frequently
How frequently, in your experience, are subordinates afraid to express disagreement with their superiors?					

In general how much do you agree or disagree with each of the following statements? (please select one answer for each question)

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Most people can be trusted.					
One can be a good manager without having precise answers to most questions that subordinates may raise about their work.					
An organizational structure in which certain subordinates have two bosses should be avoided at all costs					
Competition between employees usually does more harm than good					
A company's or organization's rules should not be broken – not even when the employee thinks it is in the company's best interest					
When people have failed in life it is often their own fault					

Acceptance Questionnaire

Please rate each of the following statements. Consider how important each statement is when you are deciding which websites to use. You may find it useful to think of the websites you currently use.

	Extremely important	Slightly important	Neither important or unimportant	Not very important	Totally unimportant
The website is useful in my job / university studies.					
Using the website would enable me to accomplish specific tasks more quickly.					
Using the website would increase my productivity at university / work.					
The website would increase my chances of getting a raise / good grades (marks).					
Interacting with the website is clear and understandable.					
Becoming skilful at using the website is easy.					
I would find the website easy to use.					
Learning to operate the website would be easy for me.					
The website would make work / studying more interesting.					
Working with the website would be fun /entertaining.					
I would enjoy working with the website.					
People who influence my behaviour such as teachers or supervisors think I should use the website.					
People who are important to me such as friends and family think that I should use the website.					
The university /company staff will be helpful in supporting students using the website.					
In general, the university would be supportive of the use of the website.					
I can use the website even when there is no one around to tell me what to do as I go.					
There is someone to call for help if I got stuck.					
There is no time pressure to do the task for which the website was provided.					
There is a built in help facility for assistance if I need it.					

Given a completely new website that you have not used previously which of the following are true for you...

	Always true	Sometimes true	Neither true nor untrue	Rarely true	Never true
I feel apprehensive about using new websites.					
When entering data on a new website it concerns me to think that I could lose a lot of information by hitting the wrong key.					
I hesitate to use a new website for fear of making mistakes I cannot correct.					
New websites are somewhat intimidating to me.					

Please rate how much you agree with the following statements about website design...

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Using websites that have superior designs makes me feel good.					
I enjoy seeing / using websites that have superior designs.					
A website's design is a source of pleasure for me.					
Sometimes the way a website looks seems to reach out and grab me.					
If a website's design really appeals to me, I feel that I must explore and use it.					
When I see a website that has a really great design, I feel a strong urge to explore it.					

Demographics

Gender: M / F

Age: _____

Highest Level of education you have completed?

- O High School / Secondary School
- O Bachelors / Undergraduate
- O Post-Graduate / Masters, PhD

Subject / Major you currently study at university? _____

How often do you use the Internet?

- O Every day
- O More than once a week
- O Once a week
- O Less than once a week
- O Several times a month
- O Less than once a month

How do you find out about new web pages/sites? (Please select 3 that most apply.)

- O Books
- O Friends / Colleagues
- O Signatures at end of email messages
- O Usenet newsgroups
- O Television advertisements
- O Follow hyperlinks from other Web pages
- O Internet search engines (e.g., Google, Alta Vista, Lycos, etc.)
- O Magazines/newspapers
- O Internet directories (e.g., Yahoo, MSN, etc.)
- O Other Sources _____

Please tell us about the websites you use:

Websites you use regularly — what do you use them for?

_____ used for _____
_____ used for _____
_____ used for _____
_____ used for _____
_____ used for _____
_____ used for _____

The questions below ask about your cultural background. These questions are asked because this research seeks to identify cultural differences and patterns in website acceptance and use. This information will be used only to place your responses on previous questions within a cultural context.

Country where you received Primary / Elementary education? _____

Country where you received Secondary / High School education? _____

Country you currently live in? _____

How many years have you lived in the above country?

_____

Country of Citizenship? _____

The above questions are asked in order to determine your cultural background, if they do not accurately represent your cultural background please tell us what it is:

_____

Czech version

Informace o této studii:

Dotazník, o jehož vyplnění jste byli požádání, se týká tématu rozdílu mezi kulturami a přijatelností různých webových stránek. Obsahuje tři části. První je o důležitosti určitých hodnot týkajících se vašeho života a vaší práce. Druhá je o faktorech, které ovlivňují vaše rozhodování zda a jakou webovou stránku použít. Poslední část je demografická, která má za cíl získat informace o vaší osobě.

Tento výzkum je veden Lidií Ošlyanskou z Interaction Centre Univerzitní koleje (University College) v Londýně. Hlavním účelem této studie je prozkoumat, zda existuje korelace mezi kulturní rozdílností a přijatelností webových stránek napříč celým světem.

Tato studie je zcela anonymní a vaše jméno nikterak nefiguruje na žádném formuláři tohoto dotazníku. Odevzdání dotazníku však budeme chápat jako váš souhlas s účastí na tomto výzkumu.

1. Vaše účast v této studii je zcela dobrovolná. Je vaším právem se nezúčastnit a nijak nebudete penalizováni.

2. Veškeré informace, které uvedete, jsou anonymní a budou shromážděny a zpracovány jako důvěrné. V žádné zprávě, která o tomto výzkumu bude uveřejněna, se nevyskytne vaše jméno ani žádná informace, podle které by vás mohl kdokoliv identifikovat.

3. Účast ve studii nepředstavuje žádné riziko, ale ani z ní neplynou žádné výhody. Vyplnění formuláře si však vyžádá minimální množství času a dotazník můžete odevzdat byť i neúplně vyplněný, dostanete-li se do časové tísně.

Chcete-li více informací o vaší účasti v této studii, prosím kontaktujte mě prostřednictvím této e-mailové adresy: l.oshlyansky@cs.ucl.ac.uk

Dotazník o životních hodnotách

Zapřemýšlejte o ideálním povolání (vaše současné zaměstnání neuvažujte). Jakou důležitost přisuzujete následujícím faktorům při výběru ideálního zaměstnání? (Prosíme zaškrtněte vždy jen jednu odpověď):

	Zásadní	Velmi důležité	Středně důležité	Málo důležité	Nedůležité a nebo zcela nepodstatné
Mít dostatek volného času pro svůj osobní a rodinný život.					
Mít dobré fyzické pracovní podmínky (dobrá ventilace, osvětlení, odpovídající pracovní prostor, atd.)					
Mít dobrý pracovní vztah se svým přímým nadřízeným.					
Mít jistotu zaměstnání.					
Pracovat s lidmi, kteří vzájemně dobře spolupracují.					
Váš nadřízený s vámi konzultuje jeho rozhodnutí.					
Mít příležitost k postupu do vyšších mist.					
Prvky pestrosti a dobrodružství ve vašem zaměstnání.					

Jak důležité je pro vás ve vašem soukromém životě následující? (Prosíme zaškrtněte vždy jen jednu odpověď):

	Zásadní	Velmi důležité	Středně důležité	Málo důležité	Nedůležité a nebo zcela nepodstatné
Osobní vytrvalost (pravidelnost) a stabilita					
Opatrné hospodaření s penězi					
Vytrvalost a houževnatost					
Úcta k tradicím					

Ve vaší současné situaci:

	Nikdy	Zřídka	Někdy	Obvykle	Vždy
Jak často pociťujete v práci stres?					

	Velmi zřídka	Zřídka	Někdy	Často	Velmi často
Jak často – podle vaší zkušenosti – se podřízení obávají vyjádřit					

nesouhlas se svými nadřízenými?					

Souhlasíte či nesouhlasíte s následujícími obecnými výroky? Prosíme zaškrtněte jednu odpověď pro každou otázku.

	Zcela souhlasím	Souhlasím	Nevím	Nesouhlasím	Naprosto nesouhlasím
Většině lidí se dá věřit.					
Člověk může být dobrým vedoucím, aniž by měl přesné odpvědi na většinu otázek, které mu jeho podřízení mohou klást o jejich práci.					
Organizační struktuře, kde někteří podřízení mají dva šéfy, je důležité vyhýbat se za každou cenu.					
Soutěžení mezi zaměstnanci většinou nadělá víc škody než užitku.					
Pravidla společnosti nebo organizace by neměla být porušena, ani když si zaměstnanec myslí, že je to v jejím nejlepším zájmu.					
Selhání jednotlivce je často jeho vlastní chyba.					

Dotazník o přijatelnosti

Prosíme ohodnoťte každý z následujících výroků: Jakou důležitost přisuzujete následujícím faktorům při výběru webových stránek, které používate? Může vám pomoci uvažovat o stránkách, které v současné době používáte.

	Zásadní	Velmi důležité	Ani tak, ani onak	Málo důležité	Zcela nepodstatné
Vybrané webové stránky jsou užitečné pro moje zaměstnání / studia na vysoké škole					
Použití webových stránek urychlí splnění určitých úkolů, na kterých pracuji					
Použití webových stránek zvětší mojí produktivitu ve škole a nebo v práci					
Tyto webové stránky zvýší moje šance na zlepšení známek nebo povýšení					
Práce (interakce) s vybranými stránkami je jasná a srozumitelná					
Stát se zběhlým v používání stránky je snadné					
Stánky se snadno používají					
Naučit se pracovat se stránkami je pro mě jednoduché					
Stránky učiní moji práci nebo studium zajímavější					
Práce se stránkami je zábavná					
Práci se stránkami si dobře užiju					
Lidé, kteří ovlivňují moje chování (učitelé / nadřízení) si myslí, že bych měl(a) stránky používat					
Lidé, kteří jsou pro mě důležití (rodina a přátelé) si myslí, že bych měl(a) stránky používat					
Vysoká škola nebo zaměstnavatel pomáhají studenty / zaměstnance při používání těchto stránek.					
Vysoká škola poskytuje infrastrukturu a technologii potřebnou k zobrazení stránek.					
Stránky mohu použít, I když není poblíž nikdo, kdo by mi uměl poradit, jak pokračovat					
Existuje někdo, koho / komu můžu zavolat, když nevím, jak dál					
Úkol, kvůli němuž jsou stránky vytvořeny, není plněn v časové tísni					
Stránky mají nápovědu, která je schopna mi pomoci v případě, že to potřebuji					

Sednete-li si ke zcela novým stránkám, které jste před tím ještě nikdy nepoužili, co je pro vás důležité:

	Pravda	Někdy pravda	Ani pravda, ani nepravda	Velmi zřídka	Zcela nepravda
Mám obavy z použití zcela nových stránek					
Když vyplním data do nových stránek, vždy musím uvažovat o tom, že bych mohl(a) přijít o mnoho vyplněných informací, kdybych stiskl(a) nesprávnou klávesu.					
Zdráhám se používat nové stránky, protože se bojím, že nadělám nenapravitelné chyby.					
Nové stráky mi tak trochu nahání strach.					

Prosím ohodnoťte, jak moc souhlasíte s následujícími výroky o struktuře a vzhledu webových stránek

	Zcela souhlasím	Souhlasím	Nevím	Nesouhlasím	Naprosto nesouhlasím
Používání stránek, které mají dokonalou strukturu a vzhled, mi dělá dobře.					
Rád si prohlížím / používám webové stránky, které mají dokonalou strukturu a vzhled.					
Struktura a vzhled stránek jsou pro mě zdrojem potěšení.					
Někdy jsem zcela uchvácen(a) tím, jak stránky vypadají.					
Když se mi u stránek líbí jejich struktura a vzhled, mám pocit, že je musím prozkoumat a začít používat.					
Zahlédnu-li stránky, které mají skvělou strukturu a vzhled, mám silnou touhu je prozkoumat.					

Demografická data

Pohlaví: M / Ž
Věk: _____
Nejvyšší dosažený stupeň vzdělání?

- O Střední škola
- O VŠ – bakalář
- O VŠ – magistr
- O Vysokoškolské postgraduální studium (PhD)

Obor vašeho studia na univerzitě: _____
Jak často používáte internet?

- O Každý den
- O Více jak jednou týdně
- O Jednou týdně
- O Méně než jednou týdně
- O Několikrát za měsíc
- O Méně než jednou měsíčně

Jak se dozvídáte o nových internetových stránkách? (Vyberte 3, které nejvíce vyhovují.)

- O Z knížek
- O Od přátel a kolegů
- O Z podpisů na konci e-mailových zpráv
- O "Usenet newsgroups"
- O Z televizních reklam
- O Z odkazů na stránkách
- O Z internetových vyhledavačů (Google, Alta Vista, atd.)
- O Z časopisů a novin
- O Z internetových adresářů (Seznam, Yahoo, MSN, etc.)
- O Z jiných zdrojů: _____

Prosíme, napište, jaké stránky praidelně navštěvujete a k čemu je využíváte

_____ pro _____
_____ pro _____
_____ pro _____
_____ pro _____
_____ pro _____
_____ pro _____

Tento výzkum si klade za cíl identifikovat rozdíly mezi kulturami a souvisejícími způsoby využívání webu. Získané informace budou využity k umístění vašich odpovědí do správného kulturního kontextu.
Země, kde jste získali základní vzdělání: _____
Země, kde jste vystudovali střední školu: _____
Země, kde nyní žijete: _____
Kolik let již žijete v této zemi? _____
Občanství: _____
Předchozí otázky jsme uvedli, abychom určili váš kulturní kontext. Pokud jimi není váš kulturní context dostatečně vyjádřen, prosíme uveďte jej zde:

_____

Arabic version

الإستطلاع الذي طلب منك إنجازه يتمحور حول موضوع الثقافات وتقبّل موقع الإنترنت. يتضمّن هذا الإستطلاع ثلاثة يتضمّن الإستبيان الأول أسئلة عن أهمية عمل معين وقيم الحياة . بينما يتضمّن الإستبيان الثاني أسئلة حول .إستبيانات العوامل التي تؤثر على قراراتك لإستخدام موقع الإنترنت. وأخيراً سوف تُسأل عن بعض المعلومات الديموغرافية وعن سيرتك وخلفيتك.

لقد تم إجراء هذه الدراسة من قبل ليديا أوشليانسكي من مركز التفاعل بكلية لندن الجامعية . وتهدف هذه الدراسة إلى معرفة إن كانت هناك أي علاقة قائمة ما بين المتغير الثقافي وتقبّل موقع الإنترنت. تأكد أن هذه الدراسة سرية وأن إسمك لن يظهر مع أي معلومات قد نحصل عليها منك. كما تعتبر تعبئة الإستبيان كاملاً وإعادته إلينا دليلاً على موافقتك على المشاركة في هذا الإستطلاع.

أ. مشاركتك في هذا الدراسة مسألة تطوعية محضة ويحق لك عدم المشاركة ولن تتم معاقبتك على ذلك بأي حال من الأحوال.

ب. ستعامل جميع المعلومات التي توفرها لنا بسرية تامة وكأنها مجهولة المصدر وسيتم المحافظة على سريتها بشكل تام. وأي تقرير حول هذه الدراسة لن يحدد شخصيتك بأي حال من الأحوال.

ج. لا توجد أية فائدة مادية أو مخاطرة عند القيام بهذه الدراسة، حيث أن الوقت المخصص لهذه الدراسة محدود. كما يمكنك إنهاء هذا الإستطلاع في أي وقت إن كان وقتك ضيقاً.

لمزيد من المعلومات مستقبلاً في حالة رغبتك المشاركة في هذه الدراسة، يرجى الإتصال بي عن طريق البريد الإلكتروني التالي l.oshlyansky@cs.ucl.ac.uk

إســـتبيان عن القيم الـــمهنية

يرجى التفكير بوظيفة مثالية- بغض النظر عن وظيفتك الحالية إن كانت لديك وظيفة. في حال إختيار وظيفة مثالية، ما مدى أهميتها بالنسبة لك... (يرجى إختيار إجابة واحدة من بين الأجوبة لكل سؤال):

	هام إلى أبعد حد	هام جداً	هام نوعاً ما	قليل الأهمية	أهمية قليلة جداً أو ليس له أهمية
هل يبقي لديك وقت كاف لحياتك الشخصـــية أو الأسرية؟					
هل أحوال العمل الجسماني جيدة (تهوية وإضاءة جيدة , مســـاحه مناســـبة ... الخ)؟					
هل لديك علاقة عمل جيدة مع مديرك المباشر؟					
هل تتوفر العوامل الضامنة لحقوقك الوظيفية؟					
هل تعمل مع أشخاص يتعاونون جيداً مع بعضهم البعض؟					
هل تتم إستشارتك من قبل المدير/المشرف فـــي القرارات المتخذة؟					
هل لديك فرصة للترقية إلى وظيفة أعلى؟					
هل يتوفرعنصر التنويع والتشويق في عملك؟					

في حياتك الشخصية، ما مدى أهمية كل من الآتي بالنسبة لك (يرجى إختيار إجابة واحدة لكل سؤال)

	هام إلى أبعد حد	هام جداً	هام نوعاً ما	قليل الأهمية	أهمية قليلة جداً أو ليس له أهمية
إستقرار وثبات الأحوال الشخصية					
الإقتصاد (إدارة الأموال بحرص)					
المثابرة (الإصرار)					
إحترام العادات والتقاليد					

أثناء وضعك الحالي:

	لم أشعر أبداً	نادراً	أحياناً	عادة	دائماً
ما مدى شعورك بتوتر أثناء العمل؟					

	نادر جداً	نادر	أحياناً	بين فترة وأخرى	تتكرر كثيراً
من واقع مشـــاهدتك اليومية في عملـــك, هـــل يخشى زملائك الموظفين مـــن الإخـــتلاف مـــع رؤسائهم؟					

ما مدى موافقتك أو عدم موافقتك لكل من العبارات التالية؟ (يرجى اختيار إجابة واحدة لكل سؤال)

	أوافق بقوة	أوافق	لم أتخذ قراراً	لا أوافق	لا أوافق بقوة
يمكن الثقة بمعظم الناس.					
يمكن لشخص ما أن يكون مديراً جيداً دون أن تكون لديه أجوبة دقيقة لمعظم الأسئلة التي قد يوجهها المرؤوسين حول عملهم.					
يجب تجنّب وجود رئيسين ضمن هيكل تنظيمي واحد به عدد معين من المرؤوسين.					
التنافس ما بين الموظفين يضر أكثر مما يفيد.					
يجب عدم مخالفة قوانين الشركة أو المؤسسة حتى لو إعتقد الموظف أنها لا تخدم المصلحة العامة للعمل.					
عندما يفشل الأشخاص في حياتهم غالباً ما يكون ذلك بسبب أخطائهم.					

إستبيان للتعرف على مدى قبولك للموقع:

يرجى تقييم كل من العبارات التالية. حدد ما مدى أهمية كل عبارة عندما تقرر إستخدام موقع ما. قد تجد التفكير بموقع معين تستخدمه حاليا مفيداً.

	مهم جداً	مهم	محايد	غير مهم	غير مهم علي الإطلاق
موقع الإنترنت مفيد لي في وظيفتي /دراستي الجامعية.					
إستخدام موقع الإنترنت يساعدني على إنجاز مهامي بسرعة أكثر.					
إستخدام موقع الانترنت سيزيد من إنتاجيتي في الجامعة /العمل.					
موقع الإنترنت سيزيد من فرصي للحصول علي علاوة /علامات جيدة (درجات).					
التفاعل مع موقع الإنترنت واضح ومفهوم.					
من السهل أن تصبح ماهراً في إستخدام موقع الإنترنت.					
أجد سهولة في إستخدام موقع الإنترنت.					
تعلم تشغيل موقع الإنترنت سهل بالنسبة لي.					
موقع الإنترنت يجعل العمل /الدراسة أكثر متعة.					
العمل مع موقع الإنترنت فيه نوع من التسلية والترفيه.					
أستمتع بالعمل على موقع الإنترنت.					
الأشخاص المؤثرون في عملي كالأساتذة أو المشرفون يعتقدون أنه يجب عليّ إستخدام موقع الإنترنت.					
الأشخاص المهمون بالنسبة لي كالأصدقاء والأسرة يعتقدون بأنه يجب عليّ إستخدام موقع الإنترنت.					
موظفو الجامعة أو الشركة يدعمون و يحثون الطلبة على إستخدام موقع الإنترنت.					
بصورة عامة، إن الجامعة هي الجهة المشجعة لإستخدام موقع الإنترنت.					
يمكنني إستخدام موقع الإنترنت حتى لو لم يكن هناك شخص يوجهني.					
يوجد شخص يستطيع مساعدتي عندما تواجهني عقبات أو مشاكل.					
لا يوجد هناك زمن محدد للقيام بالمهمة التي من أجلها تم تصميم موقع الإنترنت.					
هناك وسيلة مساعدة داخلية في الموقع في حالة حاجتي لذلك.					

بإعطائك موقع إنترنت جديد لم يسبق لك إستخدامه أي من العبارات التالية صحيحة لك:

	دائماً صحيح	أحياناً صحيح	محايد	نادراً ما يكون صحيحاً	غير صحيح أبداً
أشعر بأنني سريع الفهم عند إستخدام مواقع إنترنت جديدة .					
عند إدخال بيانات في موقع إنترنت جديد فأكثر ما أخشاه هو أن أضيع هذه البيانات بالنقر على المفتاح الخاطئ.					
أتردد في إستخدام موقع إنترنت جديد خوفاً من إرتكاب أخطاء لا أستطيع تصحيحها.					
مواقع الإنترنت الجديدة تربكني نوعاً ما.					

يرجى تقييم مدى موافقتك على العبارات التالية حول تصميم موقع الإنترنت.

	أوافق بقوة	أوافق	محايد	لا أوافق	لا أوافق مطلقاً
إستخدام مواقع إنترنت تتميز بتصاميم متطوّرة تجعلني أشعر بإرتياح .					
أستمتع بمشاهدة/إستخدام مواقع الإنترنت التي تتميز بتصاميم متطوّرة.					
شكل و تصميم موقع الإنترنت يعد مصدر سرور بالنسبة لي.					
من خلال المظهر الذي يبدو فيه موقع الإنترنت أشعر بأنه يجذبني.					
إذا كان تصميم موقع الإنترنت يروق لي حقاً ، أشعر بأنه يتعيّن علي إستكشافه وإستخدامه.					
عندما أرى موقعاً للإنترنت يملك تصميماً مميزاً، أشعر أنه يتعيّن عليّ إستكشافه.					

الديموغرافيا (الدراسة الإحصائية)

الجنس : ذكر /أنثى
العمر : _____

دراسات علياO بكالوريوس O ثانوي/متوسط Oأعلى مستوى تعليمي حصلت عليه؟

ما مدى إستخدامك للإنترنت؟

يومياO	أقل من مرة في الأسبوعO
أكثر من مرة في الأسبوعO	عدة مرات في الشهرO
مرة واحدة في الأسبوعO	أقل من مرة في الشهرO

كيف تتعرف على صفحات/مواقع إنترنت جديدة (يرجى إختيار 3 إجابات)

كتبO	متابعة الوصلات من صفحات إنترنت أخرىO
أصدقاء/زملاءO	محركات البحث (O Google, Alta Visa, Lycos,...
تواقيع في نهاية رسائل البريد الإلكترونيO	مجلات/صحفO
إستخدم مجموعات أخبار الانترنتO	أدلة الإنترنت (O Yahoo, MSN,...
الإعلانات التلفزيونيةO	مصادر أخرى _____O

يرجى إخبارنا عن موقع الإنترنت الذي تستخدمه:

لأي غرض تستخدمها		المواقع التي تستخدمها بإنتظام
_____	أستخدمه لغرض	_____
_____	أستخدمه لغرض	_____
_____	أستخدمه لغرض	_____
_____	أستخدمه لغرض	_____
_____	أستخدمه لغرض	_____

لقد تم توجيه هذه الأسئلة لأن هذا البحث يسعى إلى تحديد وُضعت الأسئلة التالية للإستفسار عن خلفيتك الثقافية. الإختلافات الثقافية وأنماط تقبّل وإستخدام موقع الإنترنت. هذه المعلومات سوف تستخدم فقط لوضع إجاباتك السابقة في إطار ثقافتك الإجتماعية.

في أي بلد تلقيت تعليمك الابتدائي ؟ _____
في أي بلد تلقيت تعليمك الإعدادي/الثانوي ؟ _____
في أي بلد تقيم الآن ؟ _____
كم عدد السنوات التي عشتها في البلد المذكورة أعلاه؟ _____
البلد التي تحمل جنسيتها؟ _____

يتم توجيه هذه الأسئلة لكي نحدد خلفيتك الثقافية. إذا لم تعكس هذه الأسئلة خلفيتك الثقافية بكل دقة نرجو منك ذكر ما هي خلفيتك الثقافية:_

_____

14. Appendix G: Raw data sample (US subjects)

subject	VSM idv1	idv2	pdi3	idv4	mas5	pdi6	mas7	idv8	x9	lto10	x11	lto12	uai13	pdi14	mas15	uai16	pdi17	uai18	uai19	mas20
1	1	1	3	1	3	3	1	2	1	1	1	1	3	4	4	4	4	3	1	2
2	3	3	3	3	3	2	1	3	3	3	2	3	3	4	2	2	2	4	3	2
3	1	1	1	1	1	1	1	2	2	3	3	2		4	2	2	2	4	4	2
4	3	2	3	1	1	2	1	3	1	1	2	2	3	3	3	2	3	3	3	4
5	2	2	3	2	3	3	2	3	2	3	3	2	4	3	4	4	2	4	2	2
6	2	1	1	1	1	3	2	1	3	2	1	2	2	3	3	2	2	2	3	3
7	2	1	2	1	2	3	2	2	2	2	2	2	3	3	3	4	4	4	3	2
8	3	2	2	2	3	3	2	1	2	3	2	2	3	4	4	5	2	3	4	2
9	1	1	3	2	1	2	2	1	3	4	3	3	2	2	2	4	1	4	4	2
10	2	2	2	1	1	2	1	2	2	1	2	2	2	3	3	3	4	4	4	3
11	1	2	1	2	1	1	1	1	2	3	3	4	3	3	2	2	3	2	2	4
13	3	2	2	1	1	2	1	2	1	1	1	1	3	2	4	2	2	3	2	1
14	2	1	2	2	2	2	2	2	1	2	2	3	1	4	4	2	3	4	5	2
15	2	1	1	1	1	2	1	2	2	2	2	2	3	3	2	2	3	4	3	3
16	2	2	4	2	2	4	2	2	2	2	1	3	3	4	2	2	3	3	4	5
17	2	2	2	2	3	3	2	2	2	2	2	2	3	4	3	2	2	2	1	3
18	1	2	1	1	2	3	1	2	1	1	1	1	4	4	5	2	2	4	3	4
21	2	2	2	1	2	3	2	3	2	2	3	3	4	3	3	2	2	3	4	2
22	2	1	2	1	2	3	1	1	1	2	3	3	2	2	4	2	1	5	1	1
23	2	2	2	1	1	3	1	2	2	1	1	2	3	3	3	2	2	4	4	2

	UTAUT																						
subject	perf	perf	perf	perf	eff	eff	eff	eff	att	att	att	soc	soc	soc	soc	self	self	self	self	anx	anx	anx	anx
	1	2	3	4	1	2	3	4	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	1	1	3	2	2	1	2	3	3	2	2	2	2	2	1	2	3	2	3	1	2	2
2	1	1	1	2	1	2	2	3	2	3	2	4	4	2	2	3	4	2	4	4	2	5	5
3	1	1	1	1	2	2	2	2	2	2	2	1	3	2	2	1	3	4	3	5	4	5	5
4	2	2	2	3	2	2	2	2	2	2	2	4	2	2	3	3	3	2	2	2	2	2	3
5	1	1	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	5	5	5	5
6	3	3	3	2	2	2	2	2	2	2	2	3	4	3	3	2	3	2	2	2	2	2	3
7	2	1	2	2	3	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	3	3	4
8	4	4	3	3	2	2	2	2	2	2	2	3	3	3	3	2	2	2	2	2	1	2	2
9	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	5	5	5	5
10	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	3	3	1	3	3	5	5
11	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	4	4	4	4
13	1	1	1	2	2	1	1	1	1	1	1	2	2	1	1	1	1	2	2	2	2	2	3
14	5	5	5	3	1	1	1	1	3	3	3	2	2	2	3	2	3	2	3	5	3	4	5
15	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	3	2	2	3
16	1	2	2	1		2	2	3	2	2	3	4	4	2	3	2	2	3	2	3	2	4	4
17	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	3	4	4
18	1	1	1	1	1	2	2	2	1	1	1	3	3	2	2	1	1	1	1	5	4	4	5
21	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	1	3	1	3	4	4	5	4
22	1	2	1	1	1	2	1	1	2	1	1	1	2	2	1	1	1	3	3	1	3	3	4
23	1	1	1	1	2	2	1	2	2	2	1	2	1	1	1	2	3	3	1	5	3	4	5

	CVPA					
subject	val1	val2	val3	rsp1	rsp2	rsp3
1	3	3	3	3	3	3
2	3	2	4	3	3	2
3	2	2	3	4	3	2
4	3	3	3	3	3	1
5	1	1	1	1	1	1
6	3	2	2	2	2	2
7	2	2	2	3	2	2
8	3	3	2	2	2	3
9	2	1	1	4	3	2
10	3	2	3	2	2	2
11	3	2	3	3	2	2
13	2	2	3	2	2	2
14	1	1	1	1	1	1
15	2	2	3	2	3	3
16	3	1	2	3	2	2
17	3	3	3	3	3	3
18	3	3	3	2	2	2
21	3	2	2	2	1	1
22	2	1	2	1	1	1
23	2	1	3	2	1	2

Demographics

subject	gender	age	ed	study	cntryed1	cntryed2	live	yrslvd	citizen	natnlty
1	m	23	1	ect	usa	usa	usa	23	usa	usa
2	m	38	1	bus mang	usa	usa	usa	38	usa	usa
3	m	26	1	tech mang	usa	usa	usa	26	usa	usa
4	f	27	2	telecom	usa	usa	usa	27	usa	usa
5	f	26	1	nsa	usa	usa	usa	26	usa	usa
6	m	22	2	edu elem	usa	usa	usa	22	usa	usa
7	f	24	1	mang	usa	usa	usa	24	usa	usa
8	f	22	1	psych	usa	usa	usa	22	usa	usa
9	f	28	2	bus mang	usa	usa	usa	28	usa	usa
10	f	22	2	org com	usa	usa	usa	22	usa	usa
11	f	21	1	psych	usa	usa	usa	21	usa	usa
13	m	26	1	net com	usa	usa	usa	26	usa	usa / arabic
14	m	19	1	net engn	usa	usa	usa	19	usa	usa
15	m	19	1	comp netw	usa	usa	usa	19	usa	usa
16	m	18	1	netwrk	usa	usa	usa	18	usa	usa
17	m	26	1	telecom	usa	usa	usa	26	usa	usa
18	m	27	1	net com	usa	usa	usa	27	usa	usa
21	m	27	1	net com	usa	usa	usa	27	usa	usa / hispanic
22	m	27	1	net com	usa	usa	usa	27	usa	usa
23	m	35	2	tech mang	usa	usa	usa	35	usa	usa

Internet

subject	intrnt use	new sts1	new sts2	new sts3	site1	used4_1	site2	used4_2	site3	used4_3	site4	used4_4	site5	used4_5	site6	used4_6
1	1	1	2	6												
2	1	2	4	6	camcast	news, email	about.com	learn, resolve issues	monster.com	job serach	carerbuilder	job search	jobhunter	job search	jobsniper	job search
3	1	2	6	7												
4	1	2	6	7	google	search	dogpile	search	career	jobs	mosnter	jobs				
5	1	2	7													
6	1	2	6	7												
7	1	1	6	7	yahoo	email	northcentral	school								
8	3	2	6	7	yahoo	email	northcnetral	school								
9	1	6	7	9	travelocity	travel	expedia	travel	noctrl.edu	school	bank	online banking				
10	1	2	3	5												
11	1	2			noctrl.edu	school / email										
13	1	2	6	7	askjeeves	school / email	realestate	work	devry.edu.com	school						
14	1	2	5	6	google	search	ebay	bidding	comcast	email	money	stocks	woot.com	shopping		
15	1	7			google	search										
16	1	1	2	5	ebay	selling / shopping	google	search	hotmail	email						
17	1	7			google	search										
18	1	6	7	9	google	search	yahoo	homepage / email	mapquest	driving directions	devry.edu	school	ebay	auctions	amazon	books / media sales
21	1	2	5	7	tigerdir	shoppin	neweg	shoppi	dslrep	cable	googl	search	hotmai	email	yahoo	email

					ect	g	g	ng	orts	speed testing	e	l
22	1	2	8	9	google	search	cubs.com	scores	ebay	buying		
23	1	2	7	9	thinplanet.com	citrix trouble shooting	microsoft	server trouble shooting	espn.com			

15. Appendix H: VSM and UTAUT component matrices for each country

VSM component matrices for all countries.

Czech Component Matrix				
	1 (20.76)	2 (10.94)	3 (9.92)	4 (9.55)
Power Distance	-0.04	0.04	**-0.48**	**0.72**
Uncertainty Avoid	**-0.41**	**0.56**	0.16	0.27
Individualism	0.27	**-0.31**	**0.38**	0.24
Masculinity	**0.40**	**0.32**	**-0.33**	0.22
Time Orientation	**0.52**	-0.14	-0.18	-0.13
UTAUT Performance	0.04	-0.11	0.58	**0.53**
UTAUT Effort	**0.49**	-0.09	0.17	-0.17
UTAUT Attitude	**0.48**	**0.55**	-0.12	-0.15
UTAUT Social	**0.64**	0.00	-0.01	0.27
UTAUT Self Efficacy	**0.75**	-0.04	-0.14	0.04
UTAUT Anxiety	**0.51**	-0.26	0.16	0.05
CVPA Visual	**0.32**	**0.63**	**0.48**	-0.09

Czech Republic VSM and UTAUT results

Greece Component Matrix					
	1 (24.05)	2 (12.71)	3 (11.41)	4 (10.30)	5 (8.42)
Power Distance	-0.08	0.28	0.63	0.23	**0.50**
Uncertainty Avoid	-0.08	0.13	0.23	**0.79**	0.08
Individualism	0.19	**-0.47**	**-0.43**	**0.50**	-0.17
Masculinity	0.12	0.01	**-0.51**	-0.15	**0.73**
Time Orientation	**0.38**	**-0.44**	0.28	**-0.31**	0.27
UTAUT Performance	**0.45**	**0.31**	**-0.52**	0.14	0.18
UTAUT Effort	**0.66**	**0.34**	0.18	0.05	-0.05
UTAUT Attitude	**0.61**	**0.36**	-0.05	0.09	-0.15
UTAUT Social	**0.79**	-0.23	0.06	0.14	0.04
UTAUT Self Efficacy	**0.82**	-0.08	0.08	0.06	0.02
UTAUT Anxiety	**0.40**	**-0.63**	0.27	-0.07	-0.03
CVPA Visual	**0.45**	**0.46**	0.06	**-0.36**	-0.24

Greece VSM and UTAUT results

India Component Matrix					
	1 (24.09)	2 (13.14)	3 (11.23)	4 (9.58)	5 (8.49)
Power Distance	0.23	0.31	-0.05	**0.72**	0.32
Uncertainty Avoid	-0.26	0.04	**0.70**	0.11	-0.17
Individualism	**0.52**	**-0.33**	-0.04	0.29	**-0.40**
Masculinity	-0.15	0.15	**-0.78**	-0.06	0.19
Time Orientation	0.29	**-0.61**	0.16	-0.17	0.51
UTAUT Performance	**0.49**	0.34	**0.37**	0.07	0.20
UTAUT Effort	**0.58**	0.21	-0.04	**-0.54**	-0.20
UTAUT Attitude	**0.39**	**0.68**	0.02	-0.10	0.20
UTAUT Social	**0.81**	0.07	-0.06	0.20	-0.01
UTAUT Self Efficacy	**0.74**	0.11	-0.06	-0.12	**-0.35**
UTAUT Anxiety	**0.46**	**-0.52**	-0.21	0.28	-0.10
CVPA Visual	**0.50**	-0.28	0.14	-0.26	**0.43**

India VSM and UTAUT results

Malay Component Matrix					
	1 (27.59)	2 (11.12)	3 (9.33)	4 (8.68)	5 (8.36)
Power Distance	-0.02	**0.54**	**-0.34**	0.17	**-0.44**
Uncertainty Avoid	-0.10	0.27	-0.17	**0.84**	0.09
Individualism	**-0.41**	0.19	-0.14	-0.11	**0.63**
Masculinity	0.19	-0.08	**0.61**	**0.40**	**0.37**
Time Orientation	**0.55**	0.12	**0.35**	-0.10	-0.25
UTAUT Performance	**0.70**	-0.19	0.19	0.01	-0.05
UTAUT Effort	**0.77**	-0.16	-0.27	0.03	0.12
UTAUT Attitude	**0.73**	-0.10	-0.29	0.05	0.11
UTAUT Social	**0.64**	**0.34**	0.06	-0.02	0.01
UTAUT Self Efficacy	**0.82**	0.04	-0.09	0.08	0.05
UTAUT Anxiety	-0.04	**0.69**	**0.46**	-0.12	-0.06
CVPA Visual	**0.33**	**0.50**	-0.19	**-0.31**	**0.41**

Malaysia VSM and UTAUT results

New Zealand Component Matrix					
	1 (18.47)	2 (11.57)	3 (10.56)	4 (9.78)	5 (9.31)
Power Distance	-0.23	-0.09	0.13	**0.53**	**0.47**
Uncertainty Avoid	0.10	**-0.69**	**-0.31**	0.07	**0.40**
Individualism	0.02	0.22	**0.38**	-0.29	**0.62**
Masculinity	0.04	0.08	**0.37**	**0.63**	-0.21
Time Orientation	0.15	**0.35**	**0.48**	-0.24	0.04
UTAUT Performance	**0.61**	0.03	0.28	-0.02	-0.16
UTAUT Effort	**0.62**	-0.15	0.17	0.09	-0.26
UTAUT Attitude	**0.52**	0.20	0.07	**0.47**	**0.32**
UTAUT Social	**0.73**	0.05	-0.17	-0.26	0.24
UTAUT Self Efficacy	**0.67**	-0.28	-0.04	-0.07	0.03
UTAUT Anxiety	0.00	**0.67**	**-0.41**	0.04	0.20
CVPA Visual	**0.33**	**0.36**	**-0.58**	0.22	-0.13

New Zealand VSM and UTAUT results

Saudi Arabia Component Matrix				
	1 (25.81)	2 (14.03)	3 (11.69)	4 (9.97)
Power Distance	0.14	**0.44**	**-0.55**	0.10
Uncertainty Avoid	0.09	**-0.59**	0.18	-0.03
Individualism	-0.32	-0.28	**0.43**	**0.50**
Masculinity	0.21	-0.22	0.10	**-0.86**
Time Orientation	0.11	**0.47**	**0.59**	-0.26
UTAUT Performance	**0.72**	0.04	-0.34	0.15
UTAUT Effort	**0.76**	-0.28	-0.05	0.13
UTAUT Attitude	**0.74**	-0.22	-0.04	0.14
UTAUT Social	**0.65**	**0.35**	-0.03	-0.04
UTAUT Self Efficacy	**0.72**	0.08	0.22	-0.06
UTAUT Anxiety	0.23	**0.62**	**0.51**	0.23
CVPA Visual	**0.51**	**-0.38**	0.33	0.13

Saudi Arabia VSM and UTAUT results

South Africa Component Matrix				
	1 (23.55)	2 (11.31)	3 (10.93)	4 (9.25)
Power Distance	-0.02	0.00	**0.63**	**0.56**
Uncertainty Avoid	**-0.49**	-0.27	0.16	**0.41**
Individualism	0.13	**0.53**	**-0.46**	**0.38**
Masculinity	0.19	**0.65**	**0.42**	-0.10
Time Orientation	**0.35**	**0.50**	**-0.34**	0.02
UTAUT Performance	**0.35**	-0.07	-0.21	**0.66**
UTAUT Effort	**0.65**	**-0.32**	-0.25	0.01
UTAUT Attitude	**0.68**	-0.04	0.14	0.10
UTAUT Social	**0.71**	-0.02	0.12	0.01
UTAUT Self Efficacy	**0.76**	**-0.35**	-0.03	-0.06
UTAUT Anxiety	**0.38**	0.29	**0.43**	-0.08
CVPA Visual	**0.43**	-0.15	0.24	-0.14

South Africa VSM and UTAUT results

UK Component Matrix				
	1 (24.40)	2 (11.59)	3 (10.38)	4 (9.48)
Power Distance	-0.11	**0.48**	0.26	**-0.40**
Uncertainty Avoid	-0.27	0.19	**0.56**	0.21
Individualism	-0.11	**0.55**	**-0.51**	0.30
Masculinity	**0.33**	**-0.40**	0.13	0.16
Time Orientation	**0.56**	**0.40**	0.15	-0.06
UTAUT Performance	**0.32**	0.00	**0.63**	**0.33**
UTAUT Effort	**0.65**	**-0.38**	-0.22	-0.10
UTAUT Attitude	**0.68**	-0.23	-0.09	-0.13
UTAUT Social	**0.69**	0.27	0.12	0.28
UTAUT Self Efficacy	**0.74**	0.05	-0.08	0.30
UTAUT Anxiety	**0.53**	**0.47**	-0.20	-0.17
CVPA Visual	**0.36**	0.01	0.22	**-0.70**

VSM and UTAUT results

USA Component Matrix					
	1 (24.60)	2 (11.92)	3 (10.14)	4 (9.45)	5 (8.38)
Power Distance	0.17	0.15	-0.17	**0.74**	-0.29
Uncertainty Avoid	-0.09	**-0.55**	-0.23	**0.39**	-0.03
Individualism	-0.26	**0.30**	**0.63**	0.15	-0.17
Masculinity	0.19	**0.43**	**-0.61**	0.18	-0.24
Time Orientation	0.24	**0.58**	**0.39**	0.09	-0.29
UTAUT Performance	**0.61**	-0.23	0.09	0.04	-0.01
UTAUT Effort	**0.78**	-0.15	0.00	-0.17	-0.12
UTAUT Attitude	**0.77**	-0.11	0.00	0.00	-0.09
UTAUT Social	**0.73**	0.08	0.09	-0.01	0.13
UTAUT Self Efficacy	**0.75**	0.24	-0.08	-0.19	0.16
UTAUT Anxiety	-0.09	**0.54**	-0.21	0.14	**0.70**
CVPA Visual	**0.30**	-0.23	**0.39**	**0.53**	**0.44**

USA VSM and UTAUT results

16. Appendix I: UTAUT and UTAUT + CVPA component matrices for each country

UTAUT component matrices for all countries.

Czech Republic UTAUT						
	1 (20.20)	2 (10.07)	3 (9.51)	4 (8.43)	5 (7.76)	6 (4.88)
Performance 1	-0.08	0.27	0.39	0.19	0.09	-0.04
Performance 2	0.09	0.33	0.35	0.47	0.08	0.29
Performance 3	0.12	0.42	0.32	0.55	0.24	0.02
Performance 4	0.01	0.24	0.37	0.53	0.02	0.19
Effort 1	0.32	0.52	-0.09	0.03	-0.11	0.11
Effort 2	0.57	0.48	-0.31	-0.06	0.18	-0.22
Effort 3	0.54	0.60	-0.36	-0.08	0.13	-0.14
Effort 4	0.46	0.48	-0.46	0.00	0.10	-0.15
Attitude 1	0.27	-0.41	-0.30	0.49	0.15	-0.12
Attitude 2	0.50	-0.46	-0.36	0.40	0.15	0.03
Attitude 3	0.48	-0.36	-0.42	0.45	0.13	0.10
Social 1	0.55	-0.25	0.34	0.08	-0.21	-0.36
Social 2	0.53	-0.19	0.38	0.16	-0.08	-0.35
Social 3	0.46	-0.15	0.43	0.13	-0.28	-0.24
Social 4	0.46	0.14	0.24	-0.19	-0.47	-0.22
Self-efficacy 1	0.60	0.05	-0.08	-0.17	-0.28	0.00
Self-efficacy 2	0.65	-0.13	-0.13	-0.05	-0.29	0.24
Self-efficacy 3	0.46	0.02	0.03	0.06	-0.40	0.45
Self-efficacy 4	0.43	-0.02	-0.04	-0.14	-0.38	0.42
Anxiety 1	0.59	-0.21	0.14	-0.22	0.40	0.17
Anxiety 2	0.36	0.12	0.36	-0.29	0.28	0.14
Anxiety 3	0.42	-0.26	0.27	-0.40	0.44	0.17
Anxiety 4	0.53	-0.08	0.26	-0.23	0.57	0.01

Greece UTAUT						
	1 (30.57)	2 (16.27)	3 (9.23)	4 (7.18)	5 (6.23)	6 (5.06)
Performance 1	0.00	0.56	0.50	-0.21	0.13	0.11
Performance 2	0.21	0.54	0.46	-0.17	0.34	0.02
Performance 3	0.30	0.45	0.62	0.01	0.00	0.09
Performance 4	0.50	0.36	0.44	0.12	0.14	-0.17
Effort 1	0.46	0.57	-0.26	-0.16	0.14	0.00
Effort 2	0.64	0.30	-0.42	-0.22	0.17	0.21
Effort 3	0.68	0.30	-0.43	-0.25	0.20	0.14
Effort 4	0.69	0.24	-0.42	-0.23	0.14	0.26
Attitude 1	0.39	0.41	0.32	0.39	0.26	0.04
Attitude 2	0.46	0.06	-0.21	0.68	0.12	-0.28
Attitude 3	0.49	0.24	-0.25	0.66	0.09	-0.18
Social 1	0.60	-0.08	0.13	0.22	-0.39	0.50
Social 2	0.61	-0.10	0.10	0.23	-0.43	0.30
Social 3	0.74	-0.11	0.21	-0.04	-0.39	0.08
Social 4	0.71	-0.17	0.19	-0.12	-0.33	-0.09
Self-efficacy 1	0.66	0.32	-0.28	0.10	-0.05	0.04
Self-efficacy 2	0.70	-0.14	0.03	-0.28	-0.17	-0.30
Self-efficacy 3	0.73	-0.02	0.03	-0.23	-0.16	-0.45
Self-efficacy 4	0.67	-0.22	0.05	-0.23	-0.04	-0.42
Anxiety 1	0.40	-0.69	0.18	0.09	0.31	0.16
Anxiety 2	0.44	-0.63	0.10	-0.04	0.27	0.05
Anxiety 3	0.45	-0.71	0.14	-0.04	0.32	0.06
Anxiety 4	0.48	-0.64	0.11	0.03	0.39	0.13

India UTAUT (no CVPA)								
	1 (22.33)	2 (12.54)	3 (6.99)	4 (6.57)	5 (5.88)	6 (5.47)	7 (4.61)	8 (4.37)
Performance 1	0.19	-0.23	-0.13	0.18	0.51	0.15	0.42	-0.11
Performance 2	0.41	-0.27	-0.30	-0.04	0.40	0.30	0.02	0.17
Performance 3	0.33	-0.33	0.36	-0.53	0.07	0.04	-0.05	0.18
Performance 4	0.51	-0.13	0.22	-0.29	0.25	0.30	0.12	0.38
Effort 1	0.44	-0.40	0.36	-0.07	-0.17	-0.26	-0.11	0.00
Effort 2	0.60	-0.34	-0.25	-0.18	-0.34	0.07	0.02	0.24
Effort 3	0.48	-0.28	-0.36	0.16	-0.37	0.25	-0.13	-0.21
Effort 4	0.43	0.07	-0.42	0.03	-0.38	0.44	-0.11	0.10
Attitude 1	0.35	-0.42	0.36	0.28	0.02	0.28	0.21	-0.20
Attitude 2	0.32	-0.46	0.23	0.40	-0.23	-0.04	0.14	0.10
Attitude 3	0.43	-0.21	0.23	0.66	0.12	-0.05	-0.08	0.05
Social 1	0.68	0.07	0.07	0.13	0.00	-0.15	-0.36	-0.17
Social 2	0.57	0.09	0.24	0.01	0.21	0.02	-0.38	0.20
Social 3	0.62	0.33	-0.11	0.03	0.30	-0.01	-0.17	-0.30
Social 4	0.67	0.18	-0.26	-0.33	0.18	-0.23	-0.03	-0.12
Self-efficacy 1	0.31	-0.18	-0.44	0.14	0.09	-0.49	0.40	0.18
Self-efficacy 2	0.66	0.14	-0.14	0.11	-0.15	-0.37	0.07	0.24
Self-efficacy 3	0.64	0.16	0.01	-0.16	0.00	0.24	0.18	-0.43
Self-efficacy 4	0.52	-0.15	0.13	-0.33	-0.15	-0.33	0.21	-0.31
Anxiety 1	0.34	0.66	-0.02	0.26	0.10	-0.04	-0.11	0.20
Anxiety 2	0.32	0.54	0.35	0.06	-0.02	0.02	0.12	-0.04
Anxiety 3	0.21	0.57	0.31	-0.04	-0.37	0.16	0.38	0.08
Anxiety 4	0.28	0.72	-0.01	0.07	-0.05	0.09	0.20	0.14

Malaysia UTAUT					
	1 (29.77)	2 (13.86)	3 (8.08)	4 (7.14)	5 (4.87)
Performance 1	0.50	0.03	0.56	-0.13	-0.07
Performance 2	0.61	-0.01	0.58	-0.02	-0.12
Performance 3	0.55	0.03	0.53	0.13	-0.17
Performance 4	0.59	-0.01	0.34	0.08	-0.41
Effort 1	0.68	-0.28	-0.04	0.22	-0.05
Effort 2	0.55	-0.28	-0.24	0.26	0.17
Effort 3	0.66	-0.20	-0.25	0.36	0.04
Effort 4	0.66	-0.03	-0.26	0.16	0.02
Attitude 1	0.65	0.00	0.01	0.07	-0.23
Attitude 2	0.60	-0.03	-0.30	0.40	-0.24
Attitude 3	0.52	-0.15	-0.30	0.28	-0.12
Social 1	0.52	0.41	-0.36	-0.32	-0.27
Social 2	0.49	0.41	-0.41	-0.27	-0.13
Social 3	0.58	0.29	-0.20	-0.56	-0.11
Social 4	0.60	0.34	-0.03	-0.49	0.05
Self-efficacy 1	0.56	0.00	-0.08	-0.09	0.53
Self-efficacy 2	0.58	0.06	0.11	-0.13	0.29
Self-efficacy 3	0.68	-0.08	0.13	-0.09	0.38
Self-efficacy 4	0.72	-0.02	0.18	0.07	0.33
Anxiety 1	-0.02	0.76	0.10	0.16	0.12
Anxiety 2	-0.08	0.77	-0.04	0.36	0.12
Anxiety 3	-0.06	0.83	0.09	0.34	0.05
Anxiety 4	-0.07	0.74	0.08	0.23	-0.01

New Zealand UTAUT						
	1 (22.69)	2 (13.22)	3 (8.91)	4 (8.48)	5 (7.66)	6 (5.57)
Performance 1	0.59	-0.14	-0.27	0.42	0.09	0.28
Performance 2	0.49	-0.27	-0.30	0.42	0.15	0.10
Performance 3	0.65	-0.10	-0.31	0.31	0.13	0.32
Performance 4	0.51	0.12	-0.51	0.21	0.09	0.17
Effort 1	0.52	-0.18	0.34	-0.03	0.28	-0.30
Effort 2	0.61	0.05	0.51	0.08	0.19	-0.14
Effort 3	0.65	-0.14	0.49	0.11	0.21	-0.06
Effort 4	0.63	-0.20	0.57	0.17	0.20	-0.04
Attitude 1	0.38	0.23	-0.21	-0.40	0.47	0.27
Attitude 2	0.31	0.31	-0.23	-0.68	0.29	0.12
Attitude 3	0.47	0.20	0.04	-0.64	0.33	0.06
Social 1	0.56	0.33	-0.11	0.13	-0.25	-0.31
Social 2	0.23	0.30	-0.28	-0.16	-0.10	-0.43
Social 3	0.59	0.22	-0.30	0.08	-0.11	-0.30
Social 4	0.57	0.33	-0.19	-0.01	-0.23	-0.36
Self-efficacy 1	0.66	-0.09	0.06	-0.06	-0.28	0.04
Self-efficacy 2	0.38	0.21	0.14	-0.11	-0.53	0.32
Self-efficacy 3	0.48	-0.12	0.06	-0.30	-0.60	0.10
Self-efficacy 4	0.31	0.00	0.35	-0.20	-0.44	0.42
Anxiety 1	0.03	0.75	0.11	0.20	-0.06	0.05
Anxiety 2	-0.18	0.64	0.23	0.24	0.15	0.19
Anxiety 3	-0.14	0.78	0.22	0.21	0.09	0.13
Anxiety 4	-0.15	0.79	0.10	0.20	0.01	0.01

Saudi Arabia UTAUT					
	1 (29.75)	2 (13.40)	3 (10.45)	4 (7.35)	5 (5.58)
Performance 1	0.64	-0.11	-0.45	0.08	0.01
Performance 2	0.59	-0.18	-0.58	0.25	0.05
Performance 3	0.60	-0.12	-0.46	0.31	0.20
Performance 4	0.59	-0.02	-0.23	0.55	0.01
Effort 1	0.74	-0.21	0.14	-0.03	0.18
Effort 2	0.57	-0.26	0.38	-0.03	0.24
Effort 3	0.51	-0.30	0.45	0.03	0.28
Effort 4	0.62	-0.35	0.37	0.07	0.30
Attitude 1	0.72	-0.22	0.14	0.28	-0.25
Attitude 2	0.53	-0.28	0.25	0.11	-0.60
Attitude 3	0.63	-0.33	0.22	0.03	-0.29
Social 1	0.64	0.44	-0.29	-0.03	0.13
Social 2	0.65	0.31	-0.16	0.00	-0.12
Social 3	0.40	0.43	-0.45	-0.28	-0.10
Social 4	0.51	0.50	-0.35	-0.26	0.01
Self-efficacy 1	0.59	0.08	0.22	-0.17	-0.32
Self-efficacy 2	0.45	0.28	0.24	-0.13	0.54
Self-efficacy 3	0.58	0.36	0.20	-0.32	-0.15
Self-efficacy 4	0.48	0.29	0.17	-0.53	0.04
Anxiety 1	0.55	-0.02	0.17	-0.28	-0.08
Anxiety 2	0.01	0.67	0.34	0.29	-0.11
Anxiety 3	0.02	0.73	0.33	0.40	-0.05
Anxiety 4	0.01	0.68	0.33	0.47	0.08

South Africa UTAUT							
	1 (24.96)	2 (11.83)	3 (9.96)	4 (7.55)	5 (6.91)	6 (5.48)	7 (4.66)
Performance 1	0.29	0.24	0.61	0.18	0.17	-0.18	-0.19
Performance 2	0.29	0.57	0.52	0.06	0.26	-0.16	-0.06
Performance 3	0.26	0.68	0.45	0.00	0.17	-0.01	-0.13
Performance 4	0.23	0.57	0.49	-0.13	-0.18	0.22	0.26
Effort 1	0.27	0.47	-0.20	0.11	0.30	0.12	0.49
Effort 2	0.69	0.15	-0.39	0.16	0.16	-0.23	0.11
Effort 3	0.70	0.06	-0.34	0.04	0.19	-0.29	0.11
Effort 4	0.68	0.08	-0.39	0.00	0.26	-0.35	-0.04
Attitude 1	0.60	-0.04	0.10	-0.62	-0.18	-0.08	0.01
Attitude 2	0.52	0.05	0.04	-0.72	-0.14	-0.11	-0.15
Attitude 3	0.51	-0.09	-0.12	-0.51	0.11	-0.04	-0.02
Social 1	0.48	-0.08	0.08	0.24	-0.56	-0.24	0.27
Social 2	0.42	-0.04	0.18	0.21	-0.56	-0.22	0.39
Social 3	0.65	-0.09	0.07	0.42	-0.26	0.12	-0.31
Social 4	0.69	-0.19	0.07	0.27	-0.23	0.04	-0.33
Self-efficacy 1	0.57	0.11	-0.33	0.26	0.15	0.13	-0.09
Self-efficacy 2	0.68	-0.12	0.06	-0.06	-0.14	0.28	-0.13
Self-efficacy 3	0.44	0.17	-0.27	0.04	0.11	0.57	0.16
Self-efficacy 4	0.67	-0.06	-0.09	-0.06	-0.04	0.48	-0.09
Anxiety 1	0.31	-0.45	0.30	0.23	0.42	-0.06	-0.03
Anxiety 2	0.33	-0.54	0.44	0.02	0.25	0.12	0.13
Anxiety 3	0.20	-0.55	0.37	-0.07	0.20	0.17	0.37
Anxiety 4	0.27	-0.63	0.24	-0.05	0.23	-0.18	0.09

United Kingdom UTAUT						
	1 (25.10)	2 (12.52)	3 (11.73)	4 (7.44)	5 (5.84)	6 (5.18)
Performance 1	0.20	0.14	0.76	-0.01	0.07	-0.07
Performance 2	0.25	0.33	0.48	-0.35	0.26	0.20
Performance 3	0.31	0.28	0.79	-0.13	0.18	0.06
Performance 4	0.31	0.38	0.54	-0.02	0.26	0.09
Effort 1	0.44	0.37	-0.25	-0.26	0.08	-0.04
Effort 2	0.55	0.30	-0.51	-0.17	0.08	-0.06
Effort 3	0.65	0.38	-0.34	-0.12	0.02	-0.02
Effort 4	0.60	0.33	-0.42	-0.33	-0.07	-0.04
Attitude 1	0.54	0.27	-0.04	0.18	0.29	-0.27
Attitude 2	0.49	0.30	-0.24	0.49	0.26	0.16
Attitude 3	0.43	0.41	-0.24	0.53	0.18	0.13
Social 1	0.45	0.03	0.32	0.40	-0.13	-0.32
Social 2	0.47	-0.07	0.13	0.54	-0.16	-0.06
Social 3	0.65	-0.26	0.15	-0.12	-0.29	-0.40
Social 4	0.67	-0.24	0.14	0.09	-0.28	-0.33
Self-efficacy 1	0.53	0.23	-0.05	-0.50	-0.22	0.05
Self-efficacy 2	0.70	-0.18	0.12	-0.11	-0.31	0.03
Self-efficacy 3	0.41	-0.13	0.17	0.08	-0.38	0.63
Self-efficacy 4	0.56	0.03	-0.01	0.15	-0.33	0.41
Anxiety 1	0.52	-0.54	0.02	-0.15	0.33	-0.07
Anxiety 2	0.37	-0.62	-0.11	0.03	0.31	0.21
Anxiety 3	0.50	-0.62	-0.12	-0.05	0.31	0.05
Anxiety 4	0.53	-0.65	0.00	-0.09	0.23	0.11

United States UTAUT						
	1 (30.71)	2 (14.25)	3 (9.22)	4 (7.0)	5 (5.24)	6 (4.68)
Performance 1	0.41	-0.09	0.56	-0.12	-0.36	0.17
Performance 2	0.55	-0.05	0.64	-0.07	-0.15	0.02
Performance 3	0.61	-0.06	0.65	-0.04	-0.15	0.14
Performance 4	0.51	-0.26	0.51	-0.03	0.12	0.03
Effort 1	0.60	-0.18	-0.03	0.25	0.12	0.23
Effort 2	0.71	0.05	-0.21	0.27	0.21	0.28
Effort 3	0.69	-0.09	-0.31	0.27	0.07	0.26
Effort 4	0.72	-0.08	-0.20	0.18	0.13	0.36
Attitude 1	0.61	-0.06	0.20	0.30	0.03	-0.32
Attitude 2	0.64	0.04	0.05	0.44	0.13	-0.43
Attitude 3	0.67	-0.03	0.01	0.33	0.08	-0.47
Social 1	0.49	0.23	0.06	-0.46	0.55	-0.06
Social 2	0.54	0.28	0.00	-0.46	0.43	-0.18
Social 3	0.69	0.14	-0.21	-0.42	-0.13	-0.02
Social 4	0.70	0.20	-0.21	-0.46	-0.18	0.01
Self-efficacy 1	0.72	-0.05	-0.14	-0.02	-0.01	0.21
Self-efficacy 2	0.46	0.46	-0.24	0.02	-0.38	-0.17
Self-efficacy 3	0.44	0.21	-0.32	0.12	-0.25	0.11
Self-efficacy 4	0.55	0.36	-0.27	-0.12	-0.39	-0.20
Anxiety 1	-0.03	0.77	0.20	0.08	0.09	0.15
Anxiety 2	-0.30	0.73	0.17	0.26	0.04	0.08
Anxiety 3	-0.16	0.82	0.16	0.18	0.08	0.10
Anxiety 4	-0.15	0.87	0.15	0.07	0.03	0.05

UTAUT and CVPA component matrices for all countries.

Czech Republic UTAUT and CVPA								
	1 (17.89)	2 (10.66)	3 (8.12)	4 (7.52)	5 (6.60)	6 (5.93)	7 (4.21)	8 (3.49)
Performance 1	-0.06	0.04	0.29	0.40	-0.01	0.00	-0.11	0.64
Performance 2	0.05	-0.03	0.41	0.41	0.00	0.40	0.30	-0.03
Performance 3	0.14	0.13	0.52	0.45	-0.17	0.36	0.02	-0.18
Performance 4	0.06	0.21	0.33	0.49	0.06	0.28	0.05	0.05
Effort 1	0.26	-0.21	0.51	-0.15	0.10	0.08	0.08	0.23
Effort 2	0.53	-0.23	0.45	-0.32	-0.24	0.03	-0.21	0.03
Effort 3	0.50	-0.20	0.56	-0.39	-0.20	-0.01	-0.13	-0.01
Effort 4	0.46	-0.07	0.47	-0.44	-0.16	0.06	-0.06	-0.17
Attitude 1	0.33	0.21	-0.36	-0.10	-0.14	0.54	-0.08	0.07
Attitude 2	0.57	0.18	-0.39	-0.17	-0.13	0.45	0.11	0.00
Attitude 3	0.53	0.16	-0.30	-0.24	-0.12	0.53	0.12	0.10
Social 1	0.52	-0.22	-0.23	0.35	0.24	0.03	-0.26	-0.08
Social 2	0.48	-0.23	-0.15	0.43	0.12	0.14	-0.14	-0.24
Social 3	0.43	-0.18	-0.12	0.44	0.28	0.05	-0.29	-0.02
Social 4	0.36	-0.37	0.12	0.11	0.46	-0.16	-0.19	-0.25
Self-efficacy 1	0.54	-0.28	0.02	-0.17	0.25	-0.09	-0.10	-0.12
Self-efficacy 2	0.59	-0.27	-0.16	-0.19	0.28	0.08	0.03	0.18
Self-efficacy 3	0.44	-0.10	0.04	0.00	0.42	0.02	0.28	0.29
Self-efficacy 4	0.37	-0.24	-0.03	-0.13	0.39	-0.07	0.38	0.02
Anxiety 1	0.56	-0.23	-0.22	0.14	-0.40	-0.19	0.22	-0.01
Anxiety 2	0.26	-0.35	0.09	0.27	-0.24	-0.30	0.08	0.17
Anxiety 3	0.32	-0.39	-0.30	0.20	-0.41	-0.29	0.22	0.11
Anxiety 4	0.45	-0.35	-0.10	0.25	-0.55	-0.16	0.12	-0.08
CVPA 1	0.36	0.42	0.08	-0.02	0.32	-0.24	0.39	-0.01
CVPA 2	0.31	0.59	0.18	0.06	0.15	-0.20	0.34	-0.26
CVPA 3	0.49	0.62	0.05	0.09	-0.18	-0.21	0.08	-0.11
CVPA 4	0.37	0.58	0.11	0.19	-0.15	-0.14	-0.17	-0.07
CVPA 5	0.58	0.47	-0.11	-0.02	0.02	-0.24	-0.23	0.16
CVPA 6	0.47	0.61	-0.06	-0.03	0.02	-0.23	-0.31	0.22

Greece UTAUT and CVPA							
	1 (25.89)	2 (14.72)	3 (9.08)	4 (7.26)	5 (5.78)	6 (5.08)	7 (4.04)
Performance 1	0.01	0.50	-0.41	0.42	0.22	0.02	0.10
Performance 2	0.26	0.49	-0.32	0.43	0.26	0.16	-0.04
Performance 3	0.30	0.33	-0.43	0.53	-0.10	0.03	0.08
Performance 4	0.50	0.23	-0.31	0.39	-0.16	0.17	-0.19
Effort 1	0.48	0.49	-0.24	-0.32	0.12	0.09	0.00
Effort 2	0.66	0.23	-0.13	-0.44	0.17	0.07	0.18
Effort 3	0.70	0.19	-0.23	-0.48	0.15	0.11	0.10
Effort 4	0.70	0.14	-0.17	-0.46	0.13	0.05	0.23
Attitude 1	0.42	0.35	-0.12	0.38	-0.17	0.37	0.02
Attitude 2	0.49	0.05	0.32	-0.10	-0.47	0.44	-0.23
Attitude 3	0.53	0.22	0.27	-0.11	-0.48	0.38	-0.16
Social 1	0.58	-0.17	-0.04	0.13	-0.35	-0.21	0.53
Social 2	0.58	-0.20	-0.03	0.11	-0.37	-0.24	0.32
Social 3	0.71	-0.22	-0.14	0.16	-0.15	-0.33	0.10
Social 4	0.68	-0.27	-0.10	0.15	-0.05	-0.33	-0.08
Self-efficacy 1	0.70	0.25	-0.02	-0.25	-0.15	-0.01	0.03
Self-efficacy 2	0.66	-0.25	-0.17	-0.04	0.15	-0.27	-0.30
Self-efficacy 3	0.71	-0.14	-0.19	-0.05	0.06	-0.23	-0.45
Self-efficacy 4	0.61	-0.34	-0.23	-0.07	0.13	-0.04	-0.40
Anxiety 1	0.34	-0.71	0.10	0.20	0.14	0.33	0.16
Anxiety 2	0.38	-0.64	0.10	0.09	0.27	0.20	0.06
Anxiety 3	0.40	-0.69	0.14	0.16	0.32	0.22	0.06
Anxiety 4	0.44	-0.62	0.16	0.15	0.27	0.34	0.13
CVPA 1	0.32	0.53	0.23	0.05	0.45	0.08	0.13
CVPA 2	0.24	0.60	0.40	0.06	0.36	-0.04	0.02
CVPA 3	0.32	0.32	0.62	0.00	-0.03	-0.02	0.04
CVPA 4	0.37	0.11	0.58	0.26	0.00	-0.06	-0.12
CVPA 5	0.42	0.24	0.55	0.10	0.06	-0.22	0.01
CVPA 6	0.38	0.22	0.54	0.26	0.13	-0.32	-0.05

India UTAUT									
	1 (20.04)	2 (10.94)	3 (8.65)	4 (5.81)	5 (5.46)	6 (4.87)	7 (4.69)	8 (4.35)	9 (3.84)
Performance 1	0.11	0.35	-0.08	-0.18	0.08	0.07	0.50	0.18	0.39
Performance 2	0.31	0.43	-0.10	-0.25	-0.15	0.07	0.35	-0.06	-0.01
Performance 3	0.28	0.33	0.20	0.44	-0.29	0.41	0.03	0.04	-0.14
Performance 4	0.50	0.20	0.04	0.12	-0.11	0.42	0.40	-0.10	-0.05
Effort 1	0.40	0.38	0.24	0.36	0.11	0.06	-0.26	0.15	-0.17
Effort 2	0.55	0.39	0.16	-0.32	-0.12	0.34	-0.31	0.01	-0.08
Effort 3	0.40	0.41	-0.01	-0.35	0.03	-0.14	-0.32	-0.42	0.08
Effort 4	0.45	-0.03	-0.05	-0.51	-0.05	0.11	-0.21	-0.40	0.01
Attitude 1	0.32	0.36	0.26	0.23	0.37	-0.04	0.16	-0.21	0.37
Attitude 2	0.27	0.43	0.23	0.07	0.47	-0.08	-0.13	-0.02	0.10
Attitude 3	0.38	0.27	0.01	-0.03	0.68	-0.15	0.16	0.15	-0.09
Social 1	0.60	0.22	-0.32	0.12	0.09	-0.18	-0.11	-0.07	-0.25
Social 2	0.53	0.12	-0.25	0.25	0.09	-0.02	0.19	-0.11	-0.43
Social 3	0.60	-0.07	-0.39	-0.03	-0.09	-0.17	0.22	0.03	-0.06
Social 4	0.68	0.03	-0.20	-0.02	-0.46	-0.15	0.07	0.13	-0.08
Self-efficacy 1	0.27	0.27	0.02	-0.28	-0.14	-0.35	-0.07	0.52	0.24
Self-efficacy 2	0.65	0.05	-0.17	-0.15	0.07	-0.02	-0.26	0.39	-0.07
Self-efficacy 3	0.62	0.02	-0.20	0.01	-0.11	0.19	0.02	-0.16	0.29
Self-efficacy 4	0.50	0.20	0.11	0.36	-0.33	-0.16	-0.25	0.11	0.25
Anxiety 1	0.35	-0.39	-0.56	-0.04	0.19	-0.04	-0.01	0.15	-0.11
Anxiety 2	0.36	-0.35	-0.35	0.32	0.18	0.10	0.01	0.00	0.17
Anxiety 3	0.26	-0.42	-0.30	0.26	0.14	0.30	-0.30	-0.13	0.36
Anxiety 4	0.35	-0.53	-0.43	-0.03	0.08	0.05	-0.04	-0.01	0.14
CVPA 1	0.38	-0.43	0.35	-0.30	0.13	0.38	-0.02	0.28	-0.02
CVPA 2	0.37	-0.42	0.50	-0.20	0.13	0.34	0.07	0.25	-0.04
CVPA 3	0.48	-0.44	0.36	-0.11	0.18	-0.19	0.12	-0.22	-0.25
CVPA 4	0.38	-0.32	0.58	0.22	-0.04	-0.23	-0.13	-0.02	0.01
CVPA 5	0.50	-0.30	0.35	-0.12	-0.14	-0.23	0.22	-0.23	0.07
CVPA 6	0.54	-0.43	0.37	0.17	-0.20	-0.31	0.15	-0.03	0.12

Malaysia UTAUT and CVPA							
	1 (24.63)	2912.61)	3 (9.71)	4 (6.41)	5 (5.65)	6 (3.73)	7 (3.59)
Performance 1	0.47	-0.12	0.18	0.53	-0.19	-0.04	0.26
Performance 2	0.56	-0.24	0.24	0.52	-0.07	0.09	0.11
Performance 3	0.52	-0.12	0.21	0.52	0.12	0.12	0.24
Performance 4	0.54	-0.27	0.27	0.26	0.05	0.41	-0.11
Effort 1	0.65	-0.33	-0.13	-0.04	0.22	0.00	0.05
Effort 2	0.54	-0.22	-0.22	-0.17	0.28	-0.25	0.25
Effort 3	0.66	-0.19	-0.17	-0.18	0.38	-0.13	0.21
Effort 4	0.66	-0.04	-0.05	-0.21	0.20	-0.08	0.28
Attitude 1	0.63	-0.11	0.09	-0.01	0.07	0.37	-0.18
Attitude 2	0.59	-0.11	0.03	-0.27	0.44	0.24	-0.01
Attitude 3	0.51	-0.18	-0.08	-0.30	0.28	0.13	-0.28
Social 1	0.51	0.19	0.37	-0.45	-0.25	0.16	0.13
Social 2	0.50	0.26	0.32	-0.47	-0.19	0.02	0.10
Social 3	0.58	0.12	0.28	-0.28	-0.52	0.02	0.18
Social 4	0.60	0.19	0.28	-0.09	-0.48	-0.06	0.05
Self-efficacy 1	0.57	-0.03	0.00	-0.06	-0.06	-0.47	-0.32
Self-efficacy 2	0.58	0.02	0.04	0.11	-0.15	-0.12	-0.39
Self-efficacy 3	0.70	-0.04	-0.07	0.18	-0.11	-0.30	-0.10
Self-efficacy 4	0.70	-0.13	0.08	0.18	0.04	-0.26	-0.32
Anxiety 1	0.00	0.56	0.51	0.09	0.16	-0.13	-0.08
Anxiety 2	-0.05	0.61	0.46	-0.01	0.39	-0.10	0.02
Anxiety 3	-0.02	0.68	0.47	0.12	0.32	0.02	-0.09
Anxiety 4	-0.04	0.59	0.44	0.09	0.22	0.01	-0.02
CVPA 1	0.13	0.64	-0.30	0.07	-0.01	-0.12	0.24
CVPA 2	0.31	0.53	-0.52	0.19	0.05	0.03	0.16
CVPA 3	0.37	0.49	-0.39	0.12	-0.09	0.15	-0.12
CVPA 4	0.31	0.40	-0.42	-0.03	-0.10	0.26	-0.20
CVPA 5	0.36	0.53	-0.49	0.01	-0.09	0.19	-0.09
CVPA 6	0.33	0.47	-0.51	0.12	0.00	-0.06	0.08

New Zealand UTAUT and CVPA								
	1 (18.64)	2 (14.02)	3 (8.88)	4 (7.08)	5 (6.66)	6 (6.11)	7 (4.36)	8 (3.51)
Performance 1	0.53	-0.30	0.02	-0.17	0.47	-0.04	0.27	-0.05
Performance 2	0.43	-0.34	-0.10	-0.21	0.50	-0.09	0.11	-0.26
Performance 3	0.65	-0.16	-0.08	-0.26	0.42	-0.06	0.26	0.06
Performance 4	0.48	-0.14	0.24	-0.44	0.29	-0.07	0.17	0.26
Effort 1	0.48	-0.24	-0.15	0.31	-0.07	-0.31	-0.30	0.10
Effort 2	0.59	-0.14	0.05	0.52	-0.04	-0.23	-0.08	-0.05
Effort 3	0.62	-0.22	-0.14	0.48	0.03	-0.21	-0.06	0.14
Effort 4	0.57	-0.31	-0.16	0.59	0.07	-0.21	-0.02	-0.08
Attitude 1	0.41	0.10	0.10	-0.30	-0.30	-0.49	0.28	0.15
Attitude 2	0.36	0.19	0.13	-0.37	-0.59	-0.33	0.18	-0.19
Attitude 3	0.51	0.12	-0.02	-0.11	-0.59	-0.37	0.10	-0.11
Social 1	0.53	-0.07	0.47	-0.03	0.04	0.20	-0.27	0.01
Social 2	0.27	0.15	0.23	-0.28	-0.12	0.08	-0.48	-0.18
Social 3	0.55	-0.13	0.36	-0.24	0.06	0.06	-0.26	0.04
Social 4	0.59	0.05	0.33	-0.16	-0.03	0.20	-0.39	0.05
Self-efficacy 1	0.63	-0.21	-0.05	0.04	-0.09	0.28	0.00	0.02
Self-efficacy 2	0.37	-0.05	0.27	0.15	-0.22	0.49	0.35	-0.07
Self-efficacy 3	0.44	-0.23	-0.04	0.01	-0.36	0.56	0.09	-0.01
Self-efficacy 4	0.34	0.06	-0.16	0.27	-0.26	0.46	0.34	0.21
Anxiety 1	0.13	0.47	0.57	0.19	0.12	0.04	0.09	-0.16
Anxiety 2	-0.05	0.57	0.35	0.28	0.19	-0.14	0.16	0.11
Anxiety 3	-0.03	0.55	0.55	0.29	0.12	-0.11	0.15	0.06
Anxiety 4	-0.02	0.57	0.56	0.18	0.12	-0.02	0.04	-0.10
CVPA 1	0.25	0.70	-0.18	-0.02	0.03	-0.04	-0.11	0.41
CVPA 2	0.24	0.58	-0.38	-0.11	0.08	0.06	-0.15	0.40
CVPA 3	0.30	0.55	-0.29	-0.14	0.00	0.09	0.03	0.14
CVPA 4	0.35	0.55	-0.28	-0.02	0.12	0.21	-0.03	-0.16
CVPA 5	0.30	0.65	-0.44	-0.04	0.10	0.00	-0.03	-0.33
CVPA 6	0.37	0.60	-0.43	0.04	0.12	0.05	0.00	-0.38

	Saudi UTAUT						
	1 (27.35)	2 (11.34)	3 (9.28)	4 (8.22)	5 (5.97)	6 (4.70)	7 (3.72)
Performance 1	0.63	-0.01	-0.29	-0.38	0.08	0.04	-0.08
Performance 2	0.56	-0.03	-0.43	-0.45	0.28	0.05	-0.15
Performance 3	0.58	0.01	-0.31	-0.36	0.33	0.16	-0.26
Performance 4	0.60	0.03	-0.06	-0.23	0.52	0.09	0.07
Effort 1	0.73	-0.07	-0.18	0.22	-0.01	0.12	-0.20
Effort 2	0.55	-0.13	-0.10	0.44	0.01	0.12	-0.39
Effort 3	0.51	-0.22	-0.04	0.49	0.01	0.29	0.08
Effort 4	0.63	-0.26	-0.06	0.40	0.04	0.30	0.01
Attitude 1	0.74	-0.14	-0.05	0.16	0.29	-0.13	0.29
Attitude 2	0.50	-0.12	-0.20	0.36	0.22	-0.54	0.20
Attitude 3	0.63	-0.21	-0.15	0.29	0.08	-0.28	-0.02
Social 1	0.58	0.52	-0.10	-0.26	-0.04	0.15	0.09
Social 2	0.56	0.46	-0.21	-0.05	0.03	0.04	0.26
Social 3	0.36	0.45	-0.10	-0.44	-0.29	-0.09	0.22
Social 4	0.42	0.61	-0.18	-0.28	-0.22	-0.02	0.00
Self-efficacy 1	0.54	0.19	-0.10	0.29	-0.12	-0.20	0.31
Self-efficacy 2	0.45	0.26	0.18	0.19	-0.23	0.52	-0.16
Self-efficacy 3	0.54	0.41	0.09	0.17	-0.31	-0.23	-0.14
Self-efficacy 4	0.46	0.31	0.08	0.14	-0.54	-0.13	-0.19
Anxiety 1	0.51	0.10	-0.15	0.25	-0.26	-0.06	-0.02
Anxiety 2	-0.02	0.59	0.44	0.21	0.26	-0.06	-0.05
Anxiety 3	0.01	0.61	0.55	0.15	0.35	-0.05	-0.08
Anxiety 4	0.01	0.55	0.56	0.14	0.39	0.14	0.05
CVPA 1	0.41	-0.20	0.42	-0.04	-0.08	0.38	0.40
CVPA 2	0.55	-0.48	0.31	-0.20	-0.19	0.18	0.32
CVPA 3	0.54	-0.31	0.41	-0.30	-0.15	-0.11	-0.17
CVPA 4	0.33	-0.35	0.49	-0.34	-0.22	-0.10	-0.02
CVPA 5	0.65	-0.27	0.52	-0.16	0.04	-0.20	-0.15
CVPA 6	0.57	-0.22	0.53	-0.20	0.14	-0.23	-0.16

South Africa UTAUT									
	1 (21.19)	2 (10.36)	3 (9.52)	4 (8.02)	5 (5.96)	6 (5.60)	7 (4.45)	8 (3.91)	9 (3.56)
Performance 1	0.28	-0.20	-0.34	0.55	0.07	0.22	0.14	-0.07	-0.16
Performance 2	0.27	-0.51	-0.15	0.57	-0.04	0.28	0.07	-0.13	-0.03
Performance 3	0.24	-0.59	-0.05	0.55	-0.04	0.17	-0.09	-0.17	-0.09
Performance 4	0.22	-0.45	0.00	0.61	-0.03	-0.15	-0.21	0.28	0.13
Effort 1	0.25	-0.50	0.10	-0.09	0.04	0.30	-0.21	0.12	0.47
Effort 2	0.67	-0.29	-0.02	-0.39	0.08	0.15	0.21	-0.10	0.16
Effort 3	0.67	-0.22	-0.13	-0.37	-0.08	0.10	0.22	-0.10	0.16
Effort 4	0.67	-0.21	-0.05	-0.39	-0.12	0.18	0.23	-0.24	0.08
Attitude 1	0.60	0.05	0.03	0.14	-0.53	-0.34	0.08	0.04	0.02
Attitude 2	0.52	-0.04	0.07	0.12	-0.64	-0.34	0.03	-0.10	-0.11
Attitude 3	0.51	0.05	0.02	-0.12	-0.52	-0.08	-0.03	-0.05	-0.02
Social 1	0.48	0.06	-0.02	0.11	0.41	-0.41	0.32	0.10	0.23
Social 2	0.40	-0.01	-0.14	0.19	0.36	-0.44	0.24	0.21	0.31
Social 3	0.62	0.04	-0.25	0.00	0.46	-0.16	-0.10	-0.08	-0.32
Social 4	0.68	0.14	-0.22	-0.01	0.31	-0.18	-0.05	-0.15	-0.30
Self-efficacy 1	0.54	-0.23	-0.12	-0.36	0.17	0.14	-0.20	0.02	-0.10
Self-efficacy 2	0.68	0.12	-0.09	0.01	0.00	-0.17	-0.13	0.05	-0.09
Self-efficacy 3	0.45	-0.18	0.12	-0.26	0.05	0.15	-0.46	0.35	0.03
Self-efficacy 4	0.67	0.04	-0.12	-0.16	-0.05	-0.11	-0.37	0.18	-0.11
Anxiety 1	0.28	0.39	-0.41	0.08	0.07	0.43	0.15	-0.18	0.09
Anxiety 2	0.33	0.54	-0.29	0.24	-0.05	0.31	0.00	0.21	-0.01
Anxiety 3	0.18	0.50	-0.34	0.16	-0.14	0.19	0.03	0.42	0.21
Anxiety 4	0.26	0.57	-0.38	0.07	-0.18	0.26	0.13	0.08	0.00
CVPA 1	0.27	0.10	0.63	0.03	-0.01	0.13	0.29	0.33	-0.17
CVPA 2	0.24	-0.15	0.54	0.01	0.07	0.12	0.38	0.24	-0.32
CVPA 3	0.38	0.00	0.72	0.15	0.05	0.23	0.17	0.03	0.06
CVPA 4	0.36	0.26	0.45	0.05	0.11	0.29	-0.19	0.04	-0.20
CVPA 5	0.36	0.46	0.49	0.24	0.10	-0.04	-0.27	-0.33	0.26
CVPA 6	0.36	0.52	0.50	0.27	0.10	-0.03	-0.16	-0.35	0.18

United Kingdom UTAUT and CVPA								
	1 (20.91)	2 (11.47)	3 (9.90)	4 (9.53)	5 (6.20)	6 (4.77)	7 (4.34)	8 (3.70)
Performance 1	0.19	-0.03	-0.14	0.76	-0.04	0.02	0.10	-0.10
Performance 2	0.25	0.06	-0.32	0.48	-0.34	0.06	0.19	0.34
Performance 3	0.31	0.05	-0.27	0.78	-0.19	0.14	0.14	0.02
Performance 4	0.31	0.06	-0.37	0.53	-0.07	0.22	0.21	-0.02
Effort 1	0.43	-0.07	-0.40	-0.26	-0.25	-0.03	0.18	-0.27
Effort 2	0.56	0.01	-0.30	-0.50	-0.13	-0.11	0.11	0.00
Effort 3	0.64	-0.06	-0.40	-0.33	-0.07	-0.09	0.08	-0.05
Effort 4	0.60	-0.04	-0.35	-0.41	-0.27	-0.14	-0.06	0.04
Attitude 1	0.53	-0.03	-0.27	-0.02	0.20	-0.13	0.33	0.05
Attitude 2	0.52	0.16	-0.25	-0.21	0.50	0.17	0.18	0.19
Attitude 3	0.44	0.13	-0.37	-0.20	0.56	0.11	0.13	0.22
Social 1	0.41	-0.22	-0.07	0.34	0.39	-0.15	0.01	-0.38
Social 2	0.46	-0.11	0.06	0.14	0.50	0.14	-0.13	-0.39
Social 3	0.62	-0.25	0.21	0.17	-0.07	-0.40	-0.20	-0.19
Social 4	0.64	-0.20	0.22	0.18	0.14	-0.36	-0.24	-0.03
Self-efficacy 1	0.53	-0.02	-0.24	-0.07	-0.49	-0.07	-0.28	0.06
Self-efficacy 2	0.66	-0.31	0.12	0.12	-0.07	-0.10	-0.28	0.14
Self-efficacy 3	0.38	-0.28	0.06	0.12	0.00	0.57	-0.47	0.12
Self-efficacy 4	0.51	-0.28	-0.09	-0.02	0.17	0.19	-0.33	0.29
Anxiety 1	0.52	-0.15	0.53	0.03	-0.15	-0.05	0.32	0.06
Anxiety 2	0.37	-0.14	0.61	-0.12	-0.04	0.26	0.26	0.00
Anxiety 3	0.50	-0.16	0.61	-0.12	-0.08	0.11	0.29	-0.02
Anxiety 4	0.51	-0.24	0.62	0.00	-0.08	0.05	0.20	0.20
CVPA 1	0.19	0.58	0.19	0.17	0.10	-0.40	-0.07	0.27
CVPA 2	0.07	0.68	0.14	0.25	0.12	-0.37	-0.02	0.15
CVPA 3	0.28	0.69	0.18	-0.04	0.10	0.13	-0.20	0.19
CVPA 4	0.35	0.70	0.18	0.00	0.10	0.08	-0.01	-0.15
CVPA 5	0.43	0.70	0.04	-0.06	-0.22	0.19	-0.09	-0.26
CVPA 6	0.36	0.67	0.17	-0.11	-0.24	0.26	-0.07	-0.25

United States UTAUT and CVPA							
	1 (25.75)	2 (12.91)	3 (11.56)	4 (7.16)	5 (5.70)	6 (4.25)	7 (3.75)
Performance 1	0.40	-0.09	-0.08	0.57	-0.22	0.34	0.13
Performance 2	0.55	0.02	-0.08	0.63	-0.13	0.12	-0.02
Performance 3	0.61	-0.03	-0.07	0.64	-0.12	0.17	0.10
Performance 4	0.56	0.15	-0.31	0.41	-0.08	-0.03	0.04
Effort 1	0.59	-0.15	-0.17	0.00	0.26	-0.11	0.27
Effort 2	0.69	-0.20	0.08	-0.16	0.29	-0.13	0.30
Effort 3	0.65	-0.32	-0.04	-0.21	0.32	-0.09	0.23
Effort 4	0.70	-0.20	-0.05	-0.16	0.20	-0.05	0.36
Attitude 1	0.62	-0.03	-0.06	0.19	0.28	0.01	-0.32
Attitude 2	0.65	-0.03	0.03	0.06	0.43	-0.04	-0.40
Attitude 3	0.66	-0.14	-0.01	0.03	0.33	-0.06	-0.45
Social 1	0.52	0.15	0.19	-0.03	-0.41	-0.51	0.00
Social 2	0.53	-0.01	0.28	-0.02	-0.40	-0.50	-0.15
Social 3	0.65	-0.24	0.20	-0.18	-0.39	-0.03	-0.04
Social 4	0.66	-0.25	0.26	-0.18	-0.43	0.02	-0.01
Self-efficacy 1	0.68	-0.27	0.00	-0.08	0.00	-0.01	0.19
Self-efficacy 2	0.43	-0.16	0.51	-0.17	0.03	0.28	-0.20
Self-efficacy 3	0.42	-0.13	0.24	-0.31	0.12	0.28	0.13
Self-efficacy 4	0.53	-0.15	0.42	-0.26	-0.15	0.36	-0.22
Anxiety 1	0.02	0.37	0.70	0.18	0.08	-0.02	0.17
Anxiety 2	-0.27	0.31	0.68	0.18	0.26	-0.02	0.10
Anxiety 3	-0.16	0.16	0.79	0.23	0.17	-0.06	0.10
Anxiety 4	-0.15	0.20	0.84	0.21	0.09	-0.08	0.03
CVPA 1	0.38	0.74	-0.17	0.00	0.11	-0.13	0.04
CVPA 2	0.39	0.67	-0.34	0.07	0.13	-0.15	0.02
CVPA 3	0.27	0.76	-0.14	-0.18	0.05	-0.09	-0.13
CVPA 4	0.35	0.70	0.10	-0.10	-0.01	0.10	-0.03
CVPA 5	0.32	0.67	-0.03	-0.30	-0.20	0.28	0.08
CVPA 6	0.35	0.64	-0.13	-0.27	-0.12	0.31	0.11

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