

A Study of Search User Interface Design based on Hofstede's Six Cultural Dimensions

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Abstract: An information seeker's cultural background could influence their preference for search user interface (UI) design. To study cultural influences Geert Hofstede's cultural dimensions have been applied to website design for a number of years. In this paper, we examine if Hofstede's six cultural dimension can be applied to inform the design of search engine user interfaces. The culturally designed search user interfaces have been evaluated in a study with 148 participants of different cultural backgrounds. The results have been analysed to determine if Hofstede's cultural dimensions are appropriate for understanding users' preferences on search user interface design. Whilst the key findings from the study suggest Hofstede cross-cultural dimensions can be used to model users' preferences on search interface design, further work is still needed for particular cultural dimensions to reinforce the conclusions.

1 INTRODUCTION


A user's cultural orientation could influence their preferences on user interface (UI) design, as noted by (Reinecke et al., 2010). Contemporary search engines such as Google, Bing, and Yahoo!, do not differentiate between different user types or the cultural backgrounds of their users. Research conducted by Slone (2002, p 1166) states, "Both motivation and experience, elements of goals and mental models, played equally strong roles in this result. In fact, goals and mental models work in tandem to determine overall searching behaviour". A user's cultural background influences their mental model formation.


One means of defining culture is mental programming. Mental programming can be thought of as patterns of thinking, feeling and actions, based upon what we have learned throughout our lifetime. Hofstede (1991, p 4) writes, "Much of it has been acquired in early childhood". Thinking patterns, feelings and actions which have been learned over


one's lifetime, once learned have to be unlearned before new patterns can be absorbed. Hofstede, (1991, p 5) also noted, "Culture is learned not inherited". Culture is different from human nature on one hand and from personality on the other hand. Culture as described by Hofstede (1991, p 5) is "the collective programming of the mind which distinguishes the members of one group or category of people from another".

In our work, we examine cross-cultural aspects in search UI design. The overall aim of our research is to study the potential differences and different preferences between cultures when it comes to search UI. Due to the reported importance of Hofstede's work in international communication, (Wardrobe, 2005) international management, (Bing, 2004) international marketing, (Mooij and Hofstede, 2010) and use in website design, (Marcus and Gould, 2000: Liu, 2021), we base our considerations on Hofstede's model.

Our contribution is as follows: firstly, we discuss how we have used Hofstede's six cultural dimensions

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to inform our prototype search UI design. Secondly, in our study we use the prototype UIs we designed based on Hofstede's dimensions to determine if Hofstede's cultural dimensions and index scores for different countries match the user preference of the search UI design. For example, if Hofstede's cultural dimensions Index scores indicate a country's culture is towards the high end of the Masculinity dimension, do users from this cultural background actually prefer a search UI designed with high Masculinity in mind?

To accomplish our aims, the remainder of the paper is structured as follows: to justify our choice of applying Hofstede's dimensions, we briefly review different cultural models in the next section. Subsequently, we discuss by example how Hofstede's dimensions informed the design of our prototype UIs. Next, we present our study and its results to answer the question of whether Hofstede's index scores can be used to indicate the search UI preferences of users from different cultural backgrounds. Finally, we offer our conclusion.

2 CULTURAL MODELS

Several cultural models have been critically reviewed for the suitability of this research, which is to effectively model different cultures and be able to inform the design of cross-cultural search UIs. Below are the details on what they are and why we decide to continue our investigation with Hofstede's model.

2.1 Hall

Edward Hall, an anthropologist, was a pioneer in cross-cultural business communication. Hall (1976) defined culture as using 'high context' (HC) and 'low context' (LC). A high context communication, as noted by Smith et al., (2004) is where, "little has to be said or written because most of the information is either in the physical environment or within the person, while very little is in the coded, explicit part of the message". Liu (2021) notes 'people from high-context cultures prefer face-to-face communication' and continues by saying high-context cultures 'look for both less-direct verbal and subtler nonverbal cues during the communication'.

This high-low context for cultures refers to how information is stored and flows. Whereas in a 'low context' culture the information contained in the message is explicit, little is hidden.

Hall identified the Primary Message Systems (PMS). These systems are non-lingual ways in which humans communicate with one another. Hall

identified 10 PMS each relating to a facet of human activity, (Hall, 1990). However, it is Hall's 'high-context' and 'low-context' work that is most cited within a Human-Computer Interaction (HCI) perspective.

2.2 Trompenaars & Hampden-Turner

Trompenaars and Hampden-Turner also looked at culture from a dimension level and defined seven cultural dimensions. They took Parson's five relational orientations, Parsons (1951) as a starting point.

These dimensions are units that can be used to make comparisons and are as follows: Universalism vs Particularism, Individualism vs Communitarianism, Specific vs Diffuse, Neutral vs Emotional, Achievement vs Ascription, Sequential time vs Synchronous time and Internal direction vs Outer direction.

2.3 Nisbett

Nisbett, a social psychologist, examines the differences between Eastern and Western cultures. As noted by Oshlyansky (2007), Nisbett looks at the "processes of thought, perception, attention, organisation of knowledge, understanding" and other mental processes. He uses 'holistic' and 'analytic' thought patterns or mental processes to distinguish between Eastern and Western cultures, with the West on the analytics side and East/Asian on the holistic side. Nisbett and Miyamoto, (2005) says, "the evidence indicates that people in Western cultures focus on salient objects and use rules and categorization for purposes of organizing the environment. By contrast, people in East Asian cultures focus more holistically on relationships and similarities among objects when organizing the environment."

2.4 Hofstede

Geert Hofstede, a Dutch anthropologist, carried out in-depth interviews with hundreds of IBM employees in 53 countries. He identified four cultural dimensions and published his research at the end of the 1970s. The fifth dimension Long-term Time Orientation (LTO) was added in 1991 from work carried out by Michael Harris Bond, supported by Hofstede. An additional sixth dimension, Indulgence versus Restraint (IND) added in 2010 is described in Hofstede et al., (2010) following the analysis of the World Values Survey data (from the World Values

Survey Organisation) from 93 countries by Michael Minkov. Hofstede et al., (2010) contains details of all six dimensions.

2.5 Why Hofstede?

Geert Hofstede's cultural research is probably one of the most well-known cultural models and as noted by Ghemawat and Reiche, (2011) the most widely used. Hofstede created six dimensions by which cultures can be compared, (Reid, 2015). Hofstede's work has been used in a number of disciplines, examples of which are global branding and advertising', (Mooij and Hofstede, 2010), consumer behaviour, (Milner et al., 1993), management control systems, (Chatterjee, 2014), cross-cultural psychology, (Hofstede, 2011) and cross-cultural HCI research (Smith et al., 2004). As noted by Oshlyansky (2007) when discussing cultural models used in HCI states, "By far the most popular of these models is Hofstede's". Smith et al., (2004) also state, "Hofstede's (1991) dimensions of culture that are the most often quoted theories in relation to cross-cultural usability". Mooij and Hofstede (2010) assert "People perform information-seeking tasks faster when using web content created by designers from their own culture". Mooij and Hofstede (2010) go on to say, culturally adapted websites are more usable, and users are more likely to have a more positive outlook toward them.

3 HOFSTEDE'S CROSS CULTURAL THEORY

Examples of how Hofstede's work has been used in HCI, are shown by Marcus and Gould (2000), who used Hofstede's five-dimensional model to develop a set of website design guidelines and Smith et al., (2004) who incorporated Hofstede's dimensions in their process model. Research undertaken by Chessum et al., (2014) looked at Hofstede's five dimensions to group users for cross-cultural information retrieval. However, since then, Hofstede has added a sixth dimension, called 'Indulgence v Restraint' (IND), to his cultural model.

This work examines whether Hofstede's dimensions can be used in the design of search UIs. The attributes of Hofstede's six dimensions have been researched extensively in relation to HCI by the authors of this paper. We considered the following interpretations of the six dimensions (user interface

designs UI 1 to UI 12¹) applicable to Human-Computer Interaction (HCI) design.

There has been generally less research conducted regarding Hofstede's most recent, sixth dimension, Indulgence v Restraint (IND). Many works conducted did not include this last dimension. Examples are (Marcus and Gould, 2000), (Smith et al., 2004), (Chessum et al., 2014) and (Karreman et al., 2016). Hofstede's additional sixth dimension is included in this research and the descriptions and references given below (Sections 3.1 to 3.6).

3.1 Power Distance (PD)

Power Distance is the amount of unequal power within a culture that members of that culture are prepared to accept or expect. User interface designs for UI 1 and UI 2 are given below:

3.1.1 UI 1 High (PD)

- Images of Experts, official buildings, official logos, prominence given to security and restrictions (Marcus and Gould 2000).
- Structured website design (Burgmann et al. 2006).
- "Older people are both respected and feared" use images of older people for wisdom and credibility (Hofstede 2011).

3.1.2 UI 2 Low (PD)

- Status is displayed to leaders rather than the population, staff or consumers. Information hierarchy is shallow (Marcus and Gould, 2000).
- Use a looser structure to allow users to explore your site for themselves (Nahai, 2013), (Marcus and Gould, 2000).
- Use earned evaluations e.g. ratings, testimonials, likes, to promote your goods or services (Nahai, 2013).
- "Older people are neither respected nor feared" Show images of younger or youthful people (Hofstede, 2011).

3.2 Individualism (IDV)

Individualism within a culture is where the individual is expected only to take care of themselves and their immediate family. There is no expectation for them to take care of anyone else, as opposed to a collectivist society, where members take care of extended

¹ Examples of UI 1 to UI 12 can be seen at <https://github.com/ifromm/cross-cultural-ui-designs/>

families and other group members. User interface designs for UI 3 and UI 4 are given below:

3.2.1 UI 3 High (IDV)

- “High text-to-image ratio”. Avoid cluttered graphics. Show positive images of goal achievement (Gould et al., 2000).
- “Create competitions and challenges to engage your customers”. “Give visitors a sense of personal achievement to motivate actions”. Have content that has ‘novelty’ and ‘difference’ in order to ‘attract attention’ (Nahai, 2013).
- Have their own personal goals. Follow their likes and dislikes (Sinha, 2014).
- “Speaking one's mind is healthy” (Hofstede 2011).

3.2.2 UI 4 Low (IDV)

- “High image-to-text ratio” (Gould et al., 2000).
- Transparency, give users full disclosure, for example how their data would be used. “Show that you respect privacy and security of personal info”. “Engage the community – ‘we’ not ‘me’” (Nahai, 2013).
- Emphasis on social and organisational goals.
- An individual’s goals are less important (Gould et al., 2000).
- Members of a collective society, aspire to achieve their in-groups’ goals (Sinha, 2014).
- “Harmony should always be maintained” (Hofstede, 2011).

3.3 Masculinity (MAS)

With this dimension, Hofstede refers to gender roles rather than to physical gender. Masculine roles consist of assertiveness, toughness and competition. Masculine work objectives incorporate “earnings, recognition, advancements and challenge”, as noted by Marcus (2002). While feminine roles are traditionally ones with an emphasis on caring for the home, family/children, people and tenderness are considered prevalent. User interface designs for UI 5 and UI 6 are given below:

3.3.1 UI 5 High (MAS)

- User attention obtained by games and competitions. Work tasks, roles, and skills, quick results obtained for limited actions. Navigation focused on exploring but also on control (Marcus and Gould, 2000).

- Masculine societies are competitive. Motivated by achievement, heroism, assertiveness, and materialism (Idler, 2013).
- “Admiration for the strong” (Hofstede 2011).
- Bright contrasting colours (Voehringer-Kuhnt, 2002), (Dormann and Chisalita, 2002).

3.3.2 UI 6 Low (MAS)

- User attention is obtained by the use of poetry, aesthetics, and appealing to uniting values (Marcus and Gould, 2000).
- Provide contact information and be prepared for feedback and questions. “This group is very cooperative and if they want to give feedback, they don’t hesitate to get in contact with you”.
- “Feminine societies are consensus-oriented”. With a preference for values, corresponding to cooperation, modesty, care for the weak, and quality of life (Idler, 2013).
- “Sympathy for the weak” (Hofstede, 2011).
- Pastel colours, low saturation (Voehringer-Kuhnt, 2002, (Dormann and Chisalita, 2002).

3.4 Uncertainty Avoidance (UA)

Uncertainty avoidance relates to the extent a culture is either comfortable or uncomfortable with uncertainty or unknown situations. User interface designs for UI 7 and UI 8 are given below:

3.4.1 UI 7 High (UA)

- Tries to show/predict the results or effects of actions before the user acts. Navigation structures are designed to help prevent users from becoming lost. Any ambiguity can be decreased by the use of “Redundant cues”, e.g. design, sound visual aids (Burgmann et al., 2006).
- Simplicity, with clear metaphors, restricted options, and limited volume of data (Marcus and Gould, 2000).
- “The uncertainty inherent in life is felt as a continuous threat that must be fought”. “Need for clarity and structure” (Hofstede, 2011).

3.4.2 UI 8 Low (UA)

- Information is maximised by the use of colour coding, typeface, font, and sound. Use multiple links but not redundant cueing. Limited control over navigation e.g. Links could open content in new windows that lead away from the original webpage(s). Complexity with maximum content

and options. Acceptance of exploring and risk (can even be encouraged), with a stigma on "over-protection." (Marcus and Gould, 2000).

- "The uncertainty inherent in life is accepted and each day is taken as it comes", "Comfortable with ambiguity and chaos" (Hofstede, 2011).

3.5 Long-term Time Orientation (LTO)

Also known as, Long-term Orientation versus Short-term Normative Orientation (LTO). This dimension was identified later by Hofstede and Bond (1984), where Bond had a questionnaire re-designed, with a Chinese culture bias. This he called the Chinese value survey, (CVS). LTO is a Confucian philosophy, where members value long-term gain over short-term gain. User interface designs for UI 9 and UI 10 are given below:

3.5.1 UI 9 High (LTO)

- Offer ways for the user to save browsing history, e.g., wish lists. Together with means of sharing on social media. Persons with long-term orientation decisions are comprehensive and grounded "for the future" (Idler, 2013).
- Patience shown in attaining results and reaching goals. "Relationships as a source of information and credibility" (Marcus and Gould, 2000).
- "Perseverance in achieving results" (Makkonen, 2012).
- "Thrift and perseverance are important goals". "Large savings quota, funds available for Investment" (Hofstede, 2011).

3.5.2 UI 10 Low (LTO)

- Users require quick results that are consistent with known values and traditions. Persons with a short-term orientation would appear "to live more in the past and in the present than in the future" (Idler, 2013).
- Persons from a very short-term oriented culture e.g. Spain have a tendency "to live in the moment" (Nahai, 2013).
- A wish for instant results and achieving goals. "Rules as a source of information and credibility" (Marcus and Gould, 2000).
- "Focus on achieving quick results" (Makkonen, 2012).
- "Service to others is an important goal". "Social spending and consumption" (Hofstede, 2011).

3.6 Indulgence vs Restraint (IND)

The additional sixth dimension, relates to happiness, freedom of expression and feeling in control of your own life, (Hofstede, 2011). User interface designs for UI 11 and UI 12 are given below:

3.6.1 UI 11 High (IND)

- Use and encourage user-generated content. "Make interactions fun". "Reflect loose gender roles by using a range of models" (Nahai, 2013).
- People from an Indulgent culture have a tendency to put an emphasis on individual happiness and wellbeing. Their leisure time is more significant and people experience more freedom and "personal control" (MacLachlan, 2013).
- Maintaining order in the nation is not given a high priority. A perception of personal life control. Freedom of speech is seen as important (Hofstede, 2011).

3.6.2 UI 12 Low (IND)

- Frugal, show how they can save money. "Emphasise how you serve the community". "Strict, cultured gender roles" (Nahai, 2013).
- People from a restrained culture do not display positive emotions as easily, with freedom, happiness and leisure time not assigned the same significance (MacLachlan, 2013).
- Higher number of police officers per 100,000 population. A perception of helplessness: what happens to me is not my own doing. Freedom of speech is not a primary concern (Hofstede, 2011).

4 SEARCH INTERFACE DESIGN

As discussed above, the characteristics of Hofstede's six cultural dimensions have been used to create twelve prototype UIs. These consist of two UIs created for each dimension, with one interface set for the lower end and one for the higher end of each dimension. (e.g., "high masculinity", "low masculinity").

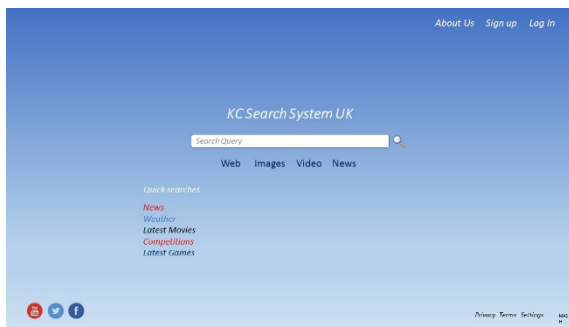


Figure 1: Prototype High Masculinity (MAS) UI 5.

Here we offer two examples of how Hofstede’s Masculinity dimension, both, high MAS shown in Figure 1 and low MAS shown in Figure 2, have been applied to the search user UI design². The prototype UI design was constructed using the design features described in 3.3 above. How the design features are implemented are shown below in tables 1 and 2 respectively.

Table 1: High Masculinity.

| High (MAS) HCI Design Feature | HCI Design Feature Implementation UI 5 |
|---|---|
| User attention obtained by games and competitions. (Marcus and Gould, 2000) | This has been achieved by, showing text links for ‘Competitions’ and ‘Latest Games’ |
| Work tasks, roles, and skills, quick results obtained for limited actions. (Marcus and Gould, 2000) | ‘Quick’ search textual links are provided, offering quick results for popular searches. |
| Navigation focused on exploring but also control. (Marcus and Gould, 2000) | ‘Quick’ searches and search links to ‘Web’, ‘Images’, ‘Video’ and ‘News’ |
| Masculine societies are competitive. Motivated by achievement, heroism, assertiveness, and materialism. (Idler, 2013) | A non-cluttered interface with textual links to News, Weather and Latest movies. Also, textual links for ‘Competitions’ and ‘Latest Games’. Only graphical image icons are for ‘YouTube’, ‘Twitter’ and ‘Facebook’, allowing faster access to these social media organisations. |
| Admiration for the strong” (Hofstede, 2011) | A general masculine ‘look and feel’. |
| Bright contrasting colours. (Voehringer-Kuhnt, 2002), | Bold colours such as red, blue, dark blue and black |

| | |
|-------------------------------|---|
| (Dormann and Chisalita, 2002) | have been used for ‘Quick’ search textual links. With a contrasting white for ‘About Us’, ‘Sign up’ and ‘Log In’. With black textual links for ‘Privacy’, ‘Terms’ and ‘Settings’. |
|-------------------------------|---|

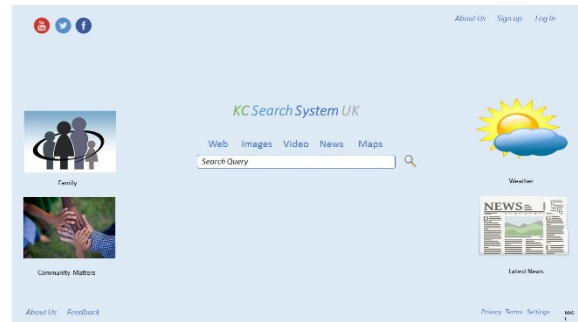


Figure 2: Prototype Low Masculinity (MAS) UI 6.

Table 2: Low Masculinity.

| Low (MAS) HCI Design Feature | HCI Design Feature Implementation UI 6 |
|--|---|
| User attention is obtained by the use of poetry, aesthetics, and appealing to uniting values. (Marcus and Gould, 2000) | A general ‘softer’ appearance with more and larger images and icons. |
| Provide contact information and be prepared for feedback and questions. (Idler, 2013) | Two ‘About Us’ links and a ‘Feedback’ link. |
| “Feminine societies are consensus-oriented”. With a preference for values, corresponding to cooperation, modesty, care of the weak, and quality of life. (Idler, 2013) | A ‘Community Matters’ link and imagery showing multicultural inclusion. ‘Family’ link and imagery. |
| “Sympathy for the weak” (Hofstede, 2011) | A general softer, less masculine aesthetic ‘look and feel’ |
| Pastel colours, low saturation. (Voehringer-Kuhnt, 2002), (Dormann and Chisalita, 2002) | The use of pastel colours for background, ‘Weather’ icon, ‘News’ icon, Logo, and textual system links, such as ‘About Us’, ‘Sign up’, ‘Log in’, ‘Feedback’, ‘Privacy’, ‘Terms’ and ‘Settings’ |

² Examples of UI 1 to UI 12 can be seen at <https://github.com/ifromm/cross-cultural-ui-designs/>

This paper examines the data obtained from the research of the twelve prototype search UIs, designed using Hofstede's six cultural dimensions.

5 USER EVALUATION

Participants of this survey have been taken mostly from the staff, the current student base and the alumni of the University of Bedfordshire, England. However, this survey was also promoted internationally via social media by a number of University staff. The survey was completely anonymous. The data for this study was collected via an online survey. Our survey was constructed using the following two sections.

5.1 Survey Section One

This section consists of potentially seven questions depending upon the user's responses. This collected general background information about the participant and consisted of closed questions relating to gender, age, occupation, and culture most identified with. In addition, there were several questions relating to languages spoken and place of residence.

5.2 Survey Section Two

In this section of the survey, the participant/user is exposed to the twelve prototype UIs, these consisting of two for each of the six dimensions and are sequentially numbered User Interface (UI) 1 to User Interface (UI) 12.

The users were asked to pick their preferences from the twelve UIs designed using the above design features (Sections 3.1 to 3.6). The search UI'S were paired for each of the six dimensions, with one UI being the low-end design and the other UI being the high-end design for all six dimensions, i.e. two UIs per dimension making twelve in total. The user could only pick one for each pair, as the responses are mutually exclusive. This paper is based upon the findings from this section together with the participant's nationality and the index scores for Hofstede's six dimensions.

5.3 Hypothesis

Our six hypotheses have been developed from both the low and high aspects of Hofstede dimensions and are detailed below:

H1: Higher PD Countries will show a preference for UI 1 and Lower PD Countries for UI 2.

H2: Higher IDV Countries will show a preference for UI 3 and Lower IDV Countries for UI 4.

H3: Higher MAS Countries will show a preference for UI 5 and Lower MAS Countries for UI 6.

H4: Higher UA Countries will show a preference for UI 7 and Lower UA Countries for UI 8.

H5: Higher LTO Countries will show a preference for UI 9 and Lower LTO Countries for UI 10.

H6: Higher IND Countries will show a preference for UI 11 and Lower IND Countries UI 12.

5.4 Data Analysis

The data was collected via our survey as described in 5.2 where the user was asked to select a preference for one of the UI pairs. The participant's nationality is collected in section one of the survey as described in 5.1 above. Hofstede's country index scores have been applied to participants who identify with the matching nationality. These index scores are applied for each nationality for all six dimensions.

Once the data had been collected, a quantitative data analysis tool has been to analyse the data.

6 EVALUATION RESULTS

We had 148 participants who completed our survey, made up of 101 participants who at present are residing in the UK and 47 who are residing overseas. We had 97 male and 51 female participants.

The 148 participants are from 33 countries. Unfortunately, many of the countries only had 1 to 2 respondents and as such we have not included their results. Likewise, several countries not having an Index score calculated by Hofstede, have also been excluded. The countries and cultures results analysed are as follows, the number of participants given in brackets. U.K. (Great Britain) (51) Germany (21), Poland (3), Pakistan (10), Nigeria (5), Bangladesh (3), Ethiopia (3), China (6), Nepal (5), Sri Lanka (3) and India (7), with 117 participants in total.

6.1 Analysis of Preferences for Each User's Culture

6.1.1 Hypothesis 1 Power Distance

Both Germany and the UK are considered to be low PD countries (both Hofstede's country's Index scores 35), which means a culture that supports the concept that inequalities in their society be kept to a minimum. Therefore, the expectation for H1 (Section 5.3) would be that such countries prefer search UI 2.

This was not found in our data, with only 12% (UK) resp. 14% (Germany) prefer UI 2.

Pakistan would be considered close to the central point for a PD country with an Index score of 55. Here, H1 (Section 5.3) has been partially supported with 80% of users showing a preference for UI 1 and 20% for UI 2.

From the countries with a high PD according to their Index score, our data confirmed the expected preference for UI 1 for Poland, Nigeria, Ethiopia, China, Nepal, Sri Lanka and India.

Against their expected preference, participants from Bangladesh seem to not prefer UI 1. However, we have to note that we only had a few participants from these countries.

6.1.2 Hypothesis 2 Individualism

UK, Germany, and Poland are considered countries with a high IDV score, which, according to our hypothesis H2 in 5.3, means UI 3 would be preferred.

While this is supported in the case of Poland, we observe this is not the case for the UK and Germany.

India would be considered close to the central point for an IDV country with an index score of 48. H2 has not been supported with 86% of users showing a preference for UI 4 and 14% for UI 3.

Pakistan, Nigeria, Bangladesh, Ethiopia, China, Nepal, and Sri Lanka are low IDV countries according to Hofstede's Index scores, accordingly we would expect a preference for UI 4. This is confirmed, except for Bangladesh and Ethiopia.

6.1.3 Hypothesis 3 Masculinity

Hypothesis H3 (Section 5.3), suggests that higher MAS Countries will show a preference for UI 5 and lower MAS Countries will show a preference for UI 6.

According to Hofstede's Index score, the UK, Germany, Poland, Nigeria, Ethiopia and China are considered high masculine countries – we would expect a preference for search UI 5 for these countries. This is confirmed for the UK, Germany and Ethiopia, whereas preferences are mixed for China and India and not confirmed for Nigeria.

Pakistan, Bangladesh and India are considered close to the central point for a MAS country. Indeed, no clear preference for either of the two search UIs could be determined by our data as would be expected.

Nepal and Sri Lanka are countries with a low MAS index score. While the data does not allow for determining a clear preference, there is a slight tendency towards the (expected) search UI 6.

6.1.4 Hypothesis 4 Uncertainty Avoidance

Hypothesis H4 in 5.3, says that higher UA Countries will show a preference for UI 7 while lower UA Countries will show a preference for UI 8.

Poland, Pakistan, Germany and Bangladesh are considered countries with high uncertainty avoidance. Participants from these countries indeed exhibited a preference for UI 7, as expected.

Sri Lanka, Nigeria and Ethiopia are countries considered to be in the middle range when it comes to the UA score. We would not expect any clear preference for any of the two UIs. However, this has not been confirmed in the case of Nigeria whose participants exhibit a preference for UI 8. However, Ethiopia with an index score of 55, did show a preference for UI 7.

The UK, China, Nepal and India are countries with a low UA score. Except in the case of Nepal, our data disagrees with the expected preference for UI 8.

6.1.5 Hypothesis 5 Long-term Time Orientation

Long-term time orientation cultures value virtuous behaviour, perseverance and patience for achieving goals and results. Hypothesis H5 suggests that higher LTO Countries will show a preference for UI 9 and lower LTO countries will exhibit a preference for UI design 10.

Germany and China are considered countries with a high long-term orientation, according to Hofstede's Index score. However, our data do not confirm the expected preference for search UI 9.

Countries in the middle range when it comes to LTO are the UK, Pakistan, Bangladesh, India and Sri Lanka. We can argue the expectation of no clear preference for either UIs is confirmed (though Pakistan shows a slight tendency for UI 9).

Countries with a low LTO score are Poland and Nigeria, both exhibiting the expected preference for UI 10.

There is no LTO index score reported by Hofstede for Ethiopia and Nepal.

6.1.6 Hypothesis 6 Indulgence

For the Indulgence (IND) dimension, our hypothesis H6 states that higher IND countries will show a preference for UI 11 while lower IND countries will show a preference for search UI 12.

Nigeria and the UK are both considered high indulgence countries. Based on our data, we regard H6 to be confirmed due to the preference for UI 11.

Germany, Bangladesh, India and China have a low IND score according to Hofstede's Index. Preferences for these countries are rather mixed, so H6 is not confirmed in these cases. However, it has been confirmed for Poland, also considered a low IND country. There is no IND index score reported by Hofstede for Ethiopia, Nepal and Sri Lanka.

7 DISCUSSION AND CONCLUSION

Overall, we have found 33 out of the possible 61 results that support Hofstede's Index scores. A further 12 results were difficult to fully categorise but partially support the hypothesis. 16 results do not support the respective hypothesis.

Firstly, Hofstede's Index scores do not address search UIs but had a different focus originally. One of our contributions is exactly to verify to what degree these scores can be applied to search UIs. It seems, from our data, that Hofstede's Index scores show the potential to inform search UIs, but they also show further research needs to be carried out to shed some light on the reasons why we get at times inconclusive results and how we can better inform culturally aware search UI design. We consider our study as an important contribution to triggering this discussion.

Secondly, we had a limited number of participants from some countries, although our study attracted many participants in particular from the UK (51), Germany (21) and Pakistan (10). However, looking at the data, it would seem the most supported dimension across the countries reported in this study is Long-term Time Orientation, with 7 from 9 countries (2 countries did not have Hofstede Index scores for this dimension) being confirmed. With Power Distance having 6 confirmations and 2 partially confirmed and Masculinity having 5 confirmations with 4 partially confirmed. It indicates there is a stronger link between specific cultural dimensions and search UI design. This aspect requires further research, possibly using the 3 most popular dimensions and more participants.

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