

Quantifying Cultural Attributes for Understanding Human Behavior on the Internet

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Abstract. Understanding human behavior on the Internet is a complex problem. One important part of the problem is measuring cultural attributes and their effect on human behavior. A clear understanding and comprehensive description of the link between human behavior and cultural attributes is essential for quantifying behavioral change. The objective of this paper is to introduce the result of a survey in which ($n = 152$) university participants participated in quantifying cultural attributes. The study results suggest that human behavior on the Internet can be linked to various cultural attributes. Notably the qualitative feedback and quantitative statistical results found following the cultural attributes to be important: safety, privacy, self, intuition and networking.

Keywords: Internet, human behavior, Internet anxiety, cultural attributes, HCI.

1 Introduction

“The only problem with Microsoft is they just have no taste. They have absolutely no taste. And I don’t mean that in a small way, I mean that in a big way, in the sense that they don’t think of original ideas, and they don’t bring much culture into their products.” - Steve Jobs (Triumph of the Nerds, 1996)

As boldly and beautifully stated by the late Steve Jobs, introducing *culture into products*, systems and design is vital for a product’s success. Culture is presumed to be based on indicators such as race or ethnicity or sex. However, culture is a complex weave, a collection of not one cultural factor/attribute but a combination of various factors interwoven to set and affect our beliefs, values and behaviors. Academic research in computer science (CS) that investigates culture or its attributes is thus far limited in scope (Kamppuri, 2011). Therefore, the research question that we investigate in this paper is: *How can we quantify cultural attributes for understanding human behavior on the Internet?*

There is a vast amount of literature study on cultural theory, and this paper is narrowly focused on the issue of quantifying cultural attributes for understanding human behavior on the Internet. From measuring and developing cultural characteristics at individual level (Lee et al., 2010) to reconciling differences, improving physical environment and infrastructure, culture and its attributes plays an important role in society. Furthermore, there is a difference in how culture is perceived on the Internet (Marcus, A. & Gould, E., 2000).

2 Literature Study

In software and application development, as well as an understanding of system requirements, data collection and effective implementation and testing, the cultural aspect is an important factor to study (Evers, 2001). In cultural psychology, culture comprises many variables such as age, ethnicity, occupation, and gender. The contributions of cultural psychology (Cole, 1998; McCrae, 2005) and cognitive sciences (Hutchins, 1995) to conceptualizing culture and cultural attributes are important as much experimental HCI research is based on the tradition of cultural psychological research. According to (Vatrapu, 2011), there are two types of cultural models; one that mainly deals with typologies and one that mainly deals with dimensions. The one that deals with typologies is easy to conceptualize. However, dealing with dimensions requires empirical validation. In their work a summary of empirical evidence regarding differences between East Asian and Western learner culture has been presented (Vatrapu, 2011; Nisbett, 2002). Thus, based on these existing literature sources we can derive cultural differences between East Asians and Western learners as shown in Table 1.

Table 1. Cultural differences between East Asians and Western learner

<i>Westerns</i>	<i>East-Asians</i>	<i>Empirical evidence</i>
Analytical in reasoning	Holistic in reasoning	(Vatrapu, 2011; Nisbett, 2002)
Individualism	Collectivism	(Hofstede, G. 1980; 1997)
Lower power distance index	Higher power distance index	(Hofstede, G. 1980; 1997)
Lesser difficulty in separating objects (more object-oriented)	Encountered difficulty in separating objects from surroundings (relation-oriented)	(Nisbett, 2002)
Application focused and analytical in logical grounds	Conceptual focused and willing on holistic grounds	(Vatrapu, 2011; Nisbett, 2002) (Hofstede, G. 1997)

Literature studies, e.g., (Hofstede, G., 1980; McCrae, R. R., 1992; Ebon, B., 1998), and (Terry Sullivan and Rebecca Matson. 2000; Kalwar, 2011) suggest that it is difficult to determine the self-reinforcing relationship between human behavior and cultural attributes. However, understanding culture and its attributes is important a) to overcome differences in understanding experiences of systems and products, especially in HCI, where the aim is mapping between human needs and technologies, and b) to overcome lack of consensus in understanding of cultural constructs. An interesting research paper (Tedre et al., 2006) highlights the importance of culture and its attributes for interface designs and describes CS and engineering majors' perception of culture as a neutral approach. Additionally, culture is important in the computing field not only because of globalization. Many studies (Vatrapu, 2011) (Kamppuri et

al., 2006) show a growing interest for race and ethnicity factors as they pertain to digital life. In a doctoral thesis entitled, “Cultural Models in HCI: Hofstede, Affordance and Technology Acceptance,” Lidia Oshlyansky points out cultural differences “do exist,” and the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003) works cross-culturally (Oshlyansky 2007). On a similar note, user anxiety and phobia has been studied by (King and McNeese, 1998), whose paper outlines cognitive and clinical pitfalls by providing examples of affective computing for complex systems. Contributions from HCI (Cockton, 2006; Hvannberg and Cockton, 2008) especially in User experiences (McCarthy et al., 2006) have added importance to the value of cultural theory. In the study of culture and its attributes (Kalwar 2011; Alaoutinen, et al., 2012) the following cultural attributes in the given context require further investigation; intuition, privacy, security, networking and safety.

From the culture literature, we can conclude that there are wide-ranging views on cultural models, dimensions, factors/attributes, definitions, and usability issues that all should be considered in regard to a user’s culture. This work aims to quantify these cultural attributes within the context of digital life, i.e., the Internet, for improved understanding of online human behavior. Based on the literature findings, the cultural attributes/dimensions of intuition, privacy, networking, safety and self are defined in Table 2.

Table 2. Cultural attributes within the context of digital life

<i>Cultural attributes</i>	<i>Definitions</i>	<i>Empirical evidence</i>	<i>Initial assumptions with Hofstede's dimensions</i>	<i>Initial assumptions with McCrae's "Big Five" dimensions</i>
Intuition	An act of knowing or sensing something based on personal, social and cultural experiences	(Brown, et al., 1989).	Long term vs. short term orientation	Openness to experience
Privacy	General concern on the Internet, where personal freedom should be cared, respected and taken seriously.	(Moore, 1984)	Power distance (PDI)	Neuroticism
Networking	An act by which users want/desire to collaborate with others on the Internet	(Castells, 2011)	Individualism vs. collectivism	Agreeableness
Safety	The method or technique to avoid uncertainties, security of data, and other cyber concerns	(Reason, 1990)	Uncertainty avoidance index (UAI)	Extraversion
Self	A self-less desires to perform better, learn and live	(Maslow, 1943)	Masculinity vs. Femininity	Conscientiousness

3 Methodology and Observations

The research methodology employed was to conduct a survey in which ($n = 152$) university participants participated in linking cultural attributes and human behavior on the Internet. Pre-testing with a small number (i.e. twelve users) was first carried out. Testing was carried out with 140 university participants. The testing was carried out in two phases because it was considered important that the respondents should understand the questions in a similar way as the researcher posited. In the test, the participants were asked to verify the importance of identified cultural attributes. Understanding cultural attributes has been carried out by classification of behavioral observations and by use of mixed research methodologies (i.e. both qualitative and quantitative) to enhance empirical results. Figure 1 below shows how the questions were organized. Open-ended questions were: 1) in your opinion, what is culture? 2) In your opinion, what is culture on the Internet? , and 3) what cultural issues affect your feelings on the Internet? Five-point Likert scale (5= of utmost importance, 1= very little or no importance) measures were used.

In your digital life, how important is each of the following?

	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance
Intuition (An act of knowing or sensing something)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Privacy (A general concern on the Internet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Networking (The act by which users want/desire to collaborate)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety (A method or technique developed by a user to avoid uncertainties, security of data)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self (A desire to perform better, learn, and live)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fig. 1. Diagram illustrating measurement sheet/questions

4 Quantitative Results

The comparison data of the responses of the participants of Asian and Western ethnicity showed the results given in Figure 2 for the five cultural attributes considered. The survey gave quite surprising results in that Westerners ascribed “utmost importance” to “safety,” and “privacy” (on the Internet). The results made us pause for reflection for two reasons. Firstly, on the present Internet, the safety cultural attribute is a critical issue and presents a key challenging requirement for building the future Internet. Secondly, the privacy cultural attribute is often assumed to be part of law or legal rights but here the study participants had a different opinion, conceiving it as a personal freedom, or cultural rights. Interestingly, Asians and others ethnicity gave utmost importance to “self” and “intuitions”. For Africans and Asians, “networking” was of very greater importance than for other participants.

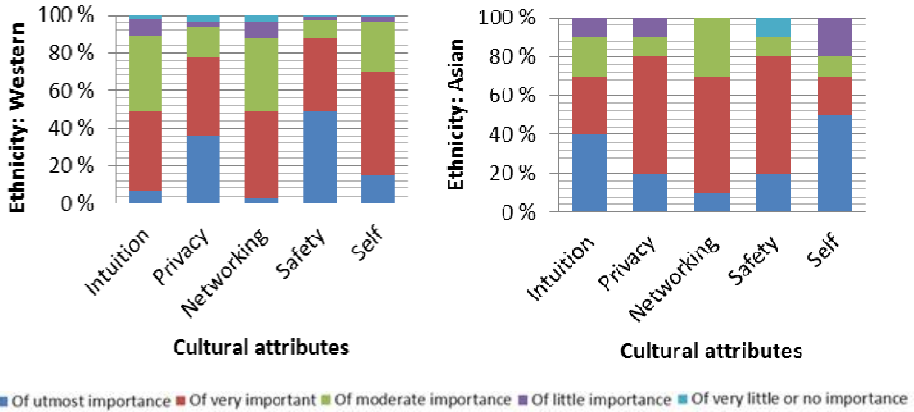


Fig. 2. Western and Asian ethnicity vs. cultural attributes

5 Qualitative Coding

As per the qualitative research methodology, the open-ended questions were coded based on qualitative feedback and criticism from the users. When asked the first question, “In your opinion, what is culture?” the following responses were received. For example, a user (1) had difficulty grasping the concept of “culture” and simply responded:

1. *“Topic for discussion mainly, too abstract for me to really ponder...”*

Whereas, other users (2-5) came up with some serious answers:

2. *“Culture is outcome of social needs and values.”*
3. *“Culture is manifested in all human actions, both immaterial and material, and dictates how we react to various situations and how we behave in interaction with other members of the community.”*
4. *“Culture is how we perceive the surrounding world and how we act in it according to the specific norms, traditions, and customs defined by the community.”*
5. *“Culture also guides our behavior towards people from other cultures.”*

On a similar note, some users also reported that culture is “how we perceive,” “manifested in all human,” “way of doing,” “guides our behavior,” “beliefs,” “group,” “habit,” and “people”.

When asked for the second question, “In your opinion, what is culture on the Internet? Some users reported (6-8) that there is no culture on the Internet with the following responses; e.g.

6. *“There isn't one. There are many, as there are in the world. The Internet is not (just one) 'thing'.”*
7. *“I haven't realized any identifiable culture on internet. I think behavior on internet is wild because of huge amount of users. Everybody follow her or him own approved rules.”*

8. *“Internet represents only a part of the human culture; What is NOT on the Internet may be even more important than what is there.”*

Similarly, other users (9-11) defined culture on the Internet as

9. *“Culture is something affecting how you use the Internet, how your idea about it, how you communicate with others through Internet.”*
10. *“Culture on the Internet: don't touch and don't break down that not yours”*
11. *“ It can be its contents; i.e., music, videos and pictures or on a larger perspective it's the defining characters of the internet that separates it from other medias, like you can't trust the contents of the internet on the same way you trust printed media or that anyone”*

However, other users also reported that culture on the Internet is “way one behaves,” “how person uses, and act in internet,” or even “same as normal culture,” and “connections and reaction in online environment”.

The questions were designed with the level of difficulty (i.e. easier, difficult, and very difficult) format. It was found that most users had experienced difficulty with the final question, “what cultural issues affect your feelings on the Internet?” In response, the users (12–14) responded:

12. *“Haven't thought about this.”*
13. *“Good skills and attitude towards technology”*
14. *“I interact on internet only on very common level.”*

The most frequent responses referred to “privacy”, “security,” and personal usage. For example, users (15-17) responded:

15. *“I am very careful with privacy on internet so, I do not reveal any private issues of my own or of my family on internet (in Facebook etc.)”*
16. *“Privacy, religion, language barriers, visual aspects of international sites.”*
17. *“I think safety is really important to me and it comes from the culture that I live in, in our culture privacy is appreciated. Also, something that is always to be remembered is that in our culture people and things in general can be trusted, and in Internet that can't be done.”*

For another user, the “excessive use of social networking sites” was among the cultural issue affecting her feelings on the Internet. For users (18, 19), personal feelings and symptoms (emphasis on “my,” “impatient” in their responses) were important on the Internet.

18. *“My age and gender, definitely, which shape my attitudes and cultural interests; My education, job, and background; My family status (own kids and the Internet), my nationality, my hobbies; My beliefs and values...”*
19. *“ Impatient (that is more personal than cultural issue), western individuality”*

Another user (20) indubitably believes that the Internet is “*spoiled*” by the accumulation of the number of users.

20. “*Internet has already been spoiled by the great mass of dumb and non-technical users. Self-aggrandizement and self-importance have flooded the internet making everything subjective, postmodern, and deconstructible. That is why I carefully choose what I view on the internet and choose not to comment anything...*”

As the observations from the data showed, most users felt on very little cultural issues and reported on more general level simply stating, “*same as in real world. Internet is just a tool,*” “*ways of communication... things I am ready to reveal about myself e.g. in Facebook etc.*” In short, both quantitative and qualitative data suggested users being concerned on various cultural attributes as shown in Table 3.

Table 3. Some common observations based on qualitative and quantitative data

<i>Westerns</i>	<i>East-Asians</i>
The qualitative data supports empirical evidence that Westerns learners are individualistic, analytical and application focused.	The qualitative data supports empirical evidence that East-Asians learners are holistic, collectivist and conceptual focused.
According to Hofstede’s dimensions and with regards to digital life, higher power distance, uncertainty avoidance index and lower long-term orientation vs. short-term and masculinity vs. femininity was visible.	According to Hofstede’s dimensions and with regards to digital life, lower power distance, uncertainty avoidance index and higher long-term vs. short-term orientation and masculinity vs. femininity was visible.
According to McCrae’s “Big Five” dimensions and with regards to digital life, lower conscientiousness and openness to experience was observed.	According to McCrae’s “Big Five” dimensions and with regards to digital life, higher conscientiousness, and openness to experience was observed.
Safety and Privacy is utmost important	<i>Self and Intuition</i> is utmost important
Networking lesser important	<i>Networking</i> very important
Dreadful and anxious digital life	Interesting digital life
Symptoms of “self-aggrandizement,” “narcissism,” impatience,” and “frustration,” seems more likely.	Symptoms of “self-aggrandizement,” “narcissism,” impatience,” and “frustration,” seems less likely.

6 Discussion and Limitations

Previous study has shown that the significance of cultural attributes is important in understanding human behavior on the Internet (Clarke, R. 1999; Castells, 2011).

A recent paper (Proctor et al., 2011) discusses the effects of culture on user uptake of digital media and technology by building understanding of cultural differences that shape decision-making in the use and design of digital media (Apple-Computer, 1992). In addition, studies of (e.g., Davis, F., 1993; Evers, 2001; Shi, Q., 2010), show a close link between human behavior and cultural attributes. There was a difference between the initial assumption of *Hofstede's* and *McCrae's* dimensions and final outcome among various ethnicity and cultural attributes. *Hofstede's* dimensions are not useful in terms of quantifying cultural attributes with regards to digital life. Studies (Vatrapu, 2011; Shi, Q., 2010) indicate that cultural attributes are of utmost importance also for understanding human behavior (King and McNeese, 1998; Proctor et al., 2011); an insight which is confirmed here with quantifiable cultural attributes. The cultural models can be used to bridge the gaps between various cultures that affect not only user experience but also computer supportive collaborative work (CSCW) in learning environment. The result based on the literature, qualitative and quantitative statistics quantified importance to following cultural attributes: Safety-Privacy-Self-Intuition-Networking.

Overall, the study results suggest that understanding of human behavior on the Internet can be linked with various cultural attributes. The western ethnicity was relatively larger in the sample than other ethnicities, which means that no reliable forecast can be drawn from this result. Although the university participants consisted of students, researchers, teachers and other staff, the sample considered in this pool might have biased the findings of the study. Consequently, a limitation is that the present study does not consider a much larger and diverse sample representation. In addition, the imbalance in the number of participants from different ethnic backgrounds might have also affected on the validity of the results.

7 Conclusions and Lesson Learned

The present study suggests that analyzing and conceptualizing human behavior and cultural attributes may need some contextual linking. A possible alternative is to link cultural attributes with behavior on the Internet. In short, using this mixed research methodologies, we can claim that cultural attributes are significant in enhancing our understanding of human behavior on the Internet.

The beauty of the present inquiry is that by asking simple questions like: 1) In your opinion, what is culture? 2) In your opinion, what is culture on the Internet? , and 3) What cultural issues affect your feelings on the Internet? We can conclude that these cultural attributes can be measured. Interestingly, the quantitative findings stressed on the five-point Likert scale (5= of utmost importance, 1= very little or no importance) the following cultural attributes: Safety-Privacy-Self-Intuition-Networking. By placing emphasis on cultural attributes and self-assessing user behavior online, we can quantify cultural attributes effectively for understanding human behavior on the Internet. The lessons learned about studying user cultural attributes and human behavior on the Internet are as follows:

1. From the five cultural attributes given, most users highlight the importance of “*safety*” and “*privacy*” as the utmost important cultural attributes.
2. Although most of the participants’ belonged to a western ethnic background, the cultural attribute, “*intuition*” is very important among the study participants.
3. Feelings and symptoms on the Internet are difficult to determine. However, some users did report general symptoms like “*impatient,*” and personal symptoms like “*self-aggrandizement*” and “*narcissism*”.
4. We can conceptualize human behavior on the Internet if we can link various cultural attributes and fulfill the user requirements by improving *safety*, *privacy*, and *self*.
5. The take-away message is that one should have an *intuitive* feeling to read, write, and learn stuff on the Internet for gaining broader cultural experiences.

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