The Use and Usefulness of Cultural Dimensions in Product Development

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Abstract

Insights from cultural dimensions can be translated into UI guidelines to make technology products locally relevant. Such design suggestions originate from academia but little insight exists in how this knowledge is being applied and tested with global industry products, indicating a gap between research and practice. We contribute two case studies, developed based on work experience and interviews with Product Owners for e-commerce localization in Booking.com and Managing Editors involved in the development for the AI Cortana, Microsoft's intelligent assistant, that provide insight into the efforts to develop or optimize a locally relevant product. These case studies contribute to the academic discussion of the use and usefulness of cultural dimensions by examining the value of existing academic research when applied in specific circumstances. We found that cultural dimensions are used for idea generation, to inform design interventions at a global scale, and to justify personal experiences and intuitions. We also found that designers in industry rely more on personal experiences and knowledge than on the use of cultural dimensions. We discuss the complexities of optimizing for local markets and how insights from the case studies can help to further close the gap between industry and research.

Hofstede's five cultural dimensions:

- Power distance: the extent to which the less powerful persons in a society accept inequality in power and consider it normal.
- Individualism vs. Collectivism: the extent to which people are integrated into tight social networks.
- Masculinity vs. Femininity: the relative desirability of material success versus quality of life and of assertive versus modest behavior.
- Uncertainty avoidance: the extent to which people tolerate ambiguity and risk or feel threatened by change.
- Long Term/Short term orientation: the fostering of virtues oriented towards future rewards (long term) or the fostering of virtues related to the past and present

Introduction

Localization often seeks to go beyond translation to local target languages and additionally improve technology products by designing for people's local needs and behaviors (Reinecke et al., 2011, Okazaki, 2004). The use of cultural dimensions is one approach to achieve this. Cultural dimensions are based on cultural theory and describe similarities in people's behaviors and values, often based on country comparisons. The advantage of using cultural dimensions to inform the design of user interfaces is that they can provide guidelines as to how a country's national culture might compare to another. This can reduce the need for a localization team to conduct time-consuming and expensive studies in each society for which a localized version of the product is needed, thus avoid delays in time-to market (Price, Walton, Petersen, 2014).

Researchers in the field of Human-Computer Interaction have translated insights from cultural dimensions into culture-related user interface (UI) guidelines (Marcus & Gould, 2000, Reinecke and Bernstein, 2013). They have also analyzed analyzed websites across the globe to understand design differences that can be applied in other settings (Hermeking, 2005). Such design suggestions have been verified in small scale testing in academia (Reinecke and Bernstein, 2013) but it is unclear whether this research has reached industry and if it has, how industry makes use of it.

This paper explores whether and in what ways cultural dimensions are used in two different companies to make products more locally relevant and competitive.

Background

The most cited and utilized cultural model, consisting of several cultural dimensions, was developed by Geert Hofstede who conducted research within IBM collecting data on work-related values related to universal aspects of social relationships. His survey included IBM employees from 72 countries, with a comparable level of income and education. From this research, Hofstede initially derived five cultural dimensions (Hofstede et al., 1991), briefly explained in the sidebar.

Hofstede himself suggests that his cultural dimensions are determined by fundamental values which subconsciously control our collective behavior. Therefore, he claims, the factors are universal and highly resistant to change because people learned them as children. He argues that while adults might be exposed to opposing values and superficially adapt, they can never erase this 'software' of the mind (Gould, 2005).

Method

We present two case studies that show how cultural dimensions informed decision making and conclusions drawn from experiments, as well as changes made to companies' products. Insights were gained from the first author's experience of working with the localization teams of two important players in the technology industry: one of the largest e-commerce providers worldwide, Booking.com, as well as Microsoft and one of its products, the intelligent assistant Cortana. The first author was involved in the ideation for and execution of the A/B tests presented in these case studies. In addition, the first author also conducted interviews with employees at Booking.com and Microsoft with the goal of supplementing knowledge

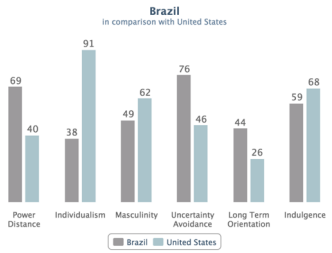

Figure 1: Hofstede's index scores showing the difference between an individualistic society (US) and a collectivities society (Brazil)

acquired during the time in the team. Product Owners at Booking.com responsible for localizing products to markets in Brazil, Japan and China were able to give insights into efforts made to localize for their markets. Semi-structured interviews with the Principal Content Publishing Manager, the Content Developer for Germany, Austria and Switzerland, and the former International Editing Manager of the Cortana global team, provided most of the Cortana case study.

Case study 1: Product optimization at Booking.com

Booking.com is an international e-commerce company that allows travelers to search for and book temporary accommodation worldwide. Booking.com has a culture of experimentation and uses A/B testing for product development. Such A/B tests or controlled experiments allow over 100 product teams to evaluate the value of changes or new product features introduced to the e-commerce experience and to make data-driven decisions. To give insight into the scale, at Booking.com approximately 1000 experiments are running concurrently across all channels, which allows the company to get a good understanding of customer preferences. All experiments described in this section had more than 1 million page views and were statistically significant at the 95% confidence level.

Use of cultural dimensions for idea generation

Hofstede's model of cultural dimensions was first introduced in a Booking.com team meeting by the first author, which led to a discussion on the Individualism score. The team was particularly interested in the Brazilian market. With an individualism score of 36 (Figure 1), Brazil is considered a collectivistic society, which manifests itself in close long-term commitment to the member 'group', be that a family, extended family, or extended relationships (https://geert-hofstede.com/brazil.html). A team member from Brazil confirmed this finding, giving context to everyone in the team on how this is shown in daily life.

This discussion led to considerations which of the information on Booking.com could be used to increase trust of Brazilian travelers. The team found that Booking.com has a high amount of our account holders in Brazil and exposing the number of fellow Brazilians that have created an account seemed important information for individuals that seek to be member of a group. The hypothesis therefore was that exposing this number dynamically on Booking.com's main landing page would increase trust in the website and hence, increase the finalized bookings made by travelers from this country. The copy team introduced a text change that exposed the number of account holders from Brazil as a unique selling point on the main landing page and showed this condition to 50% of all visitors from Brazil for a pre-calculated time period. The result of this experiment showed that the hypothesis was confirmed - bookings made by Brazilian site visitors who were shown the number of account holders had significantly increased compared to the control group that did not see the number of account holders.

Retroactively tying findings to cultural dimensions

While many employees in localization at Booking.com are familiar with cultural dimensions, not all are familiar with research on culturally-related UI guidelines. Instead, employees often rely on their own experiences to identify potential changes. For example, the idea to

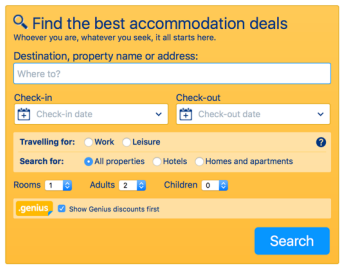

Figure 2: Search box - Global color scheme.

Figure 3: Search box - Color scheme used in CJK.

Figure 4: Clickable search box as alternative to standard search.

change the background color of the Booking.com search box from dark yellow (Figure 2) to a lighter pastel tone (Figure 3) stemmed originally from local knowledge of team members who noticed that websites in Asian markets often use pastel colors. They decided to test whether altering the background could positively impact the conversion rate by conducting a controlled experiment with users whose language choice is Chinese (traditional and simplified), Japanese and Korean. The result showed indeed a positive impact on search fields filled when using pastel tones, which ultimately led to a higher conversion rate for customers exposed to the change. To further expand this test, the change was introduced to all languages. The team found that the change still increased the number of people that filled in the information; contrary to what was seen for Chinese, Korean and Japanese languages, there was also an increase in people abandoning search and no significant increase in conversion rates was detected.

To find out why changing the background color was impactful for users whose language choice was Chinese, Japanese, and Korean, but not for other languages, the team then turned to the literature. Research has indeed found similar results, such as presented in (Callahan, 2005) who found that Japanese university websites use predominantly pastel colors. In addition, the team tried to explain the results with the help of cultural dimensions. This proved to be challenging as pastel colors are attributed to a low masculinity index. With an index score of 95, Japan is one of the most Masculine societies in the world which contradicts the success of this experiment. However, moving to a lighter color has also improved the contrast and shows overall a lighter color, which is a recommended design decision for a society high on the masculinity index and could therefore explain the increase in conversion. Altogether, the team found it difficult to reconcile the sometimes contradictory links between cultural dimensions and UI design.

Similarly, based on local knowledge, the Booking.com team also hypothesized that users with language choices of Chinese, Japanese and Korean are used to a more complex navigation interfaces and text density and that therefore introducing an alternative option to the search box would allow this user group to more easily complete a booking. To prove this, the team introduced a ‘clickable search’ (Figure 4) in addition to the regular search box (Figure 3) and introduced this change as a controlled experiment for users with language choices of Chinese, Japanese and Korean for a pre-defined time frame. The results showed that allowing alternative ways to search for a destination indeed led to an increase in conversion.

To explain this result, the team again turned to cultural dimensions and associated UI design aspects. Navigational preferences have previously been related to the dimensions Uncertainty Avoidance and Power Distance (see, e.g., (Marcus and Gould, 2000)). However, China and Japan both score very differently on these dimensions, with scores of 30 (China) and 92 (Japan) for Uncertainty Avoidance and 80 (China) and 54 (Japan) for Power Distance. Japan should therefore be less comfortable with complex interfaces, which this change introduced. Similarly, China is rather high on Power Distance and therefore should be more comfortable with less navigation options according to prior work.

Case study 2: Cortana, Microsoft's Intelligent Personal Assistant

Cortana is an intelligent personal assistant integrated into the Windows 10 operating system and uses Microsoft's artificial intelligence platform. Cortana takes care of a wide variety of tasks for the user, from setting alarms and reminders, making lists and scheduling meetings to tracking packages, opening apps or identifying and managing travel plans from a user's calendar.

The Cortana product team realized early on that for Cortana to succeed it was important to build trust with the user; the more information the user shares with Cortana the more she can assist. As a result, the team made a bet on giving Cortana a personality to make her feel more like a "real" person and therefore more trustworthy. When developing Cortana's personality, the team built on Nass and Yen (2010), who suggested that people have emotional responses to inanimate objects. They also suggest that if an AI personality is not carefully developed, people will imbue it with the personality they think it should have. Instead of allowing the user to imbue their own personality, the team worked on creating a believable personality that served the product and the user in the most optimal way while at the same time conveying that Cortana was not actually human to avoid the uncanny valley effect (an area of repulsive response aroused by a robot with appearance and motion between a "barely human" and "fully human") (Seyama & Nagayama, 2007).

In advance of the launch of Cortana, the US-based product team defined Cortana's US personality in deep detail and ensured that her responses in any context conformed to that personality. The Cortana Personality Design Team focused on creating a digital assistant that can be perceived as professional and helpful, friendly, kind and sensitive, trustworthy and other positive, relatable attributes, all aimed at the goal of making the user feel good about their interaction with Cortana.

When the team started thinking about international expansion, they knew from prior experiences that they would need to adjust Cortana's personality to different markets. It was clear that, while the core US tenets might be globally relevant, personality was an area where "traditional" localization would not be enough. They therefore build an international team that was tasked with developing Cortana's unique personalities in each market. They started by researching cultural theories and decided that Hofstede's cultural dimensions were the most relevant and approachable for the team. The dimensions were used to help guide the team's thinking, and in some cases, validate their intuition, about Cortana's personality in different markets. Two of Hofstede's cultural dimensions were especially relevant, due to the nature of the product: Power Distance (Cortana is an assistant, a subordinate) and Masculinity vs. Femininity (Cortana is female).

Verifying intuitions with cultural dimensions

Of all the European team members, the French were the only ones who felt that Cortana should address the user with the formal pronoun ("vous"). The team verified this insight by referring to Hofstede's high Power Distance index in France (68) compared to Germany (35), Italy (50) or Spain (57). The Japanese team members recognized that Cortana's relationship to the user would be predominantly affected by the fact that she was female in a high masculinity culture, rather than by her subordinate position per se. Japan's

power distance index is 54, but it has the highest masculinity index (95) of any of the countries in Hofstede's study.

Individualism vs. Collectivism was also used as a lens, with the "default" (US) personality being individualistic in subtle but definite ways. For example, a lot of "chit-chat" content, meant to entertain and build trust in Cortana in the US (Individualism index 91), was focused on Cortana (her history, family, interests, tastes in music, events, food etc.). In more collectivist markets some of that content did not hit the right tone. In India, for example (Individualism index 48), the team decided to provide Cortana with a more community-focused repertoire, with a very robust set of responses around regional food and regional celebrations including different rituals of Diwali.

The category of Uncertainty Avoidance was used to determine how Cortana differs in responding to user questions. Germany (65) is among the countries with a high Uncertainty Avoidance compared to the US (46). Where the German Cortana answers questions directly, the answers of the US Cortana include more ambiguity. For example, when a user asks Cortana for a date, the German Cortana responds with a clear 'Yes, I would love to go out with you, but you pay' while the US Cortana is more ambiguous and does not answer with a clear yes or no. The team was hesitant to just replicate the crisp style of German communication for the German Cortana: *"Because they were interacting with a computer instead of a person, [visual] cues were missing... they had to inject more humor, warmth and politeness to maintain correct balance with blunt German efficiency".*

Discussion

This paper explored whether and in what ways cultural models are used in two different companies to make products more locally relevant and competitive. The case studies of Booking.com and Microsoft showed that cultural dimensions are used in a variety of ways to inform the product team's decision-making:

1) The localization teams at Booking.com used theories of culture, and in particular, Hofstede's cultural dimensions, to inform possible design interventions that might increase various success metrics. In the case study, we showed how cultural dimensions have helped to shape experiment hypotheses and how this process was able to to significantly and measurably improve several success metrics. However, while Hofstede's cultural dimensions are being used as a tool for ideation and hypotheses generation, we also learned that only a small fraction of all experiments are informed by cultural theory. Instead, the majority of localization experimentation is based on first-hand research, data analysis, and the personal experiences of team members from the target culture they are designing for. In some cases, findings were retroactively aligned with cultural dimensions, so as to verify their accuracy or to explain contradictory results.

2) The product development for Cortana mainly used cultural theory for generating ideas about how the intelligent assistant should behave differently in the various target markets. Given that Cortana was a new product, Hofstede's cultural dimensions provided an essential lens to guide ideation in this early phase of development. However, similar to

Booking.com, the Cortana team only used cultural theory for a small part of the development and instead most often referred to team member's experiences and intuitions.

While the usage of cultural dimensions within these two large, international companies is encouraging, both case studies indicate that cultural dimensions alone are insufficient:

a) Product teams rely on local knowledge and first-hand insights

Teams at Microsoft and Booking.com either started with knowledge on cultural dimensions but supplemented or verified these with local insights, or used cultural dimensions to understand research insights or local knowledge.

Such mixed approach is not as scalable as relying on cultural dimensions alone. The process still depends on having access to people from the target country or conducting first-hand research, which is often cost-prohibitive and infeasible for smaller teams and companies. In addition, it bears the risk that insights are biased if decisions are based on co-workers from a specific target country whose demographics and experiences might be different from the actual target population.

Interestingly, cultural dimensions were also used to explain and justify personal experiences and intuitions. This retrospective use of cultural dimensions is interesting as it suggests the need for justifying whether personal suggestions are generalizable.

b) Cultural models and their implications are often unknown

The case studies indicate that there is only limited use of cultural theory and UI guidelines provided by researchers in industry. The majority of experiments are informed by data analysis, first-hand research, and the personal experience of team members from the target culture. Interestingly, the two case studies show that companies are often aware of differences between countries and cultures, but they often lack the knowledge of cultural dimensions or the tools to explain these differences or act upon them. Our case studies suggest that one of the main problems is that cultural dimensions suggest theoretical variations between countries that are difficult to translate into actionable design changes for a specific product.

We propose that insights generated through these case studies can help to further close the gap between industry and practice in a variety of ways:

1) Research needs to investigate a larger variety of use cases for applying cultural models and provide more applicable design guidelines of cultural dimensions. Practitioners, in turn, need to highlight the challenges that they experience when applying this research to their own work, which will often require collaborations with researchers (internally or externally.
2) Individual successes and failures of applying cultural models to products should be published to grow the body of knowledge that links cultural dimensions to specific product changes.
3) Cultural models and how they can be applied in industry should be part of the curriculum of any computer science and human-centered

design program so that a new generation of employees has the tools to understand the potential and limitations of these models.

Conclusion

The localization industry is seeking to go beyond translation and improve technology products by designing for people's preferences based on their local needs and behaviors. In two case studies, we showed how two large international corporations, Booking.com and Microsoft and their Cortana product team, use academic insights on cultural differences in their product development and optimization. We found that cultural dimensions are often unknown, but if they are known, they can be successfully used for idea generation and to justify personal experiences and intuitions. We pointed out the complexities of optimizing for local markets and how companies use both cultural dimensions as well as research and local insights to improve their offerings.

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