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The Impact of Culture on Visual Design Perception

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Abstract. This paper questions the concept of universal users, taking a first step in looking at design perception differences between cultures, opening a discussion about culture in the context of HCI and more specifically interface interaction. This is done through a short study assessing participants from 3 cultures and their perception of interface by looking at 3 mobile payment applications with the help of remote eye-tracking technology (iMotions), and AI predictive analysis software (EyeQuant). Results show considerable differences between the two software solutions as well as between cultures, diverging in preference over text vs icons, with little consistent patterns as ground for speculation further than what the data shows.

Keywords: Culture, Eye Tracking, HCI, Interface Design

1 Introduction

In a continuous race to have an edge in the sales and marketing sectors, several companies have emerged promising a shortcut to interaction analysis, allowing companies to assess their websites or applications faster and with impressive numbers as promises. This shortcut has been pushed even further given the current state of the world under the current pandemic and thus the need of remote analysis. We can see similar reasons evoked when justifying the need of these tools “associated costs, running user studies might become extremely challenging due to health, travel, and financial constraints”, etc [1]. While some tools approach interaction analysis through methods such as cursor patterns or go as far as to have their users interact with a website or page while describing the process out loud, other companies have taken it a step further and offer an analysis based on previously collected data and a set of algorithms bound to create an analysis of a universal experience [2].

This of course raises the question of the existence of a universal user. While more and more companies go global with their products and content, it is important to understand whether there are objective design approaches that will be accepted internationally, or whether accommodating and catering to a regional culture is a worthy investment. Papers show cultural differences can have an impact as deep as usefulness perception [3], and while a call for the creation of cultural personas exists in the current literature [4], is there really a segregation in market needs regarding visual design and functionality, or is the seemingly utopian universal user a reality?

2 Methods

The concept of a universal user is being questioned throughout this study by comparing the heatmap of a software providing the perspective of a universal user [2], with heatmaps from a software analyzing the eye movement of participants from 3 distinct countries and cultures – the Chinese, the Danish, and the Kenyan one, in order to see any potential discrepancies between them.

The participants were split in 3 studies, based on nationality, and were asked to look at the interfaces of their local application, as well as the other two foreign applications, while their eye movements were tracked with the help of the iMotions software mentioned in the Software section.

2.1 Participants

In the Kenyan study, out of 16 participants, 11 were considered valid. In the Chinese study, out of the 11, 8 were considered valid. In the Danish study, out of 11, 9 were considered valid. Some data was considered invalid due to a variety of factors, including: poor light conditions, the inability of the software to identify the eye, study participants being engaged in other activities (for example looking away from the computer during the time their eye motion was analyzed), etc.

The ages of the participants vary from 20 to 55 year old, all participants are familiar with the concept of mobile payment applications, and have previously used their local application. The participants had not previously interacted with the other two applications. The local application are considered to be: WeChat Pay for China, MobilePay for Denmark, and M-Pesa for Kenya.

2.2 Software

The software used in this project is by Eyequant and iMotions. Eyequant provides a software using AI to predict what users focus on regarding visual designs. The software makes use of predictive algorithms and provides feedback on the design of a chosen page, allowing companies to optimize their websites, ads, or other promotional material.

iMotions provides a software meant for remote eye tracking, among other services. The software is currently limited to eye tracking and uses the remote access hardware such as computer / laptop cameras. The software version used during this study was in its initial stages, and since this study, iMotions has debugged and optimized its software for a more inclusive and overall improved performance.

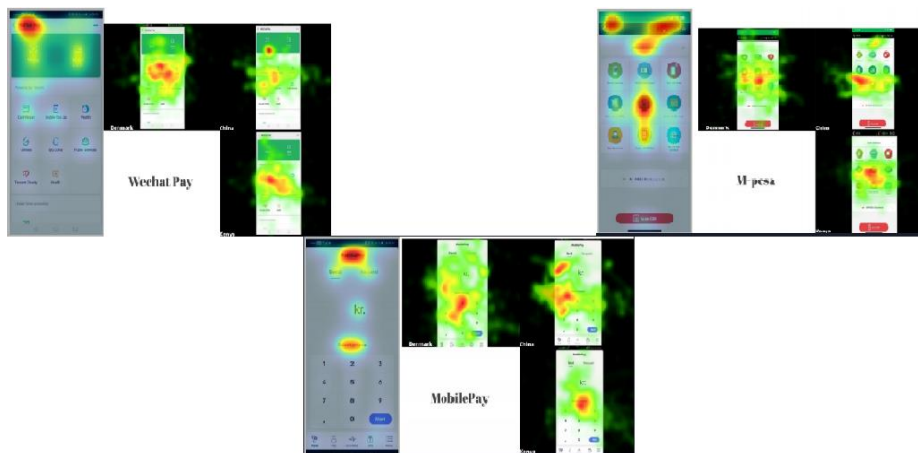
2.3 Procedure

The Eyequant study has been performed through their main service, providing a fast solution in the form of heatmapping predicted attention spots.

The iMotions study was performed remotely, accessing the laptop/PC's camera, and it included several steps of calibration. The test has a duration of less than 5 minutes including the calibration, includes 92 slides, out of which 9 are direct stimuli for the study, and out of which 3 have been analyzed directly in this project. The stimuli are kept on the screen for a duration of 6 seconds, which was considered similar to other studies of this kind [5], and the calibration slides were on the screen for 5 seconds each. The participants are presented with the interface slides in a random order. The approximated distance of the participants from the screen is of 60 to 90 cm. The resulting heatmaps were compared by software and culture of provenience.

3 Results and Discussion

Below are presented the side-by-side heatmaps from both software companies, Eyequant on the left of each of the 3 sets of images, and iMotions above and to the right of the application name in each set. WeChat Pay, the Chinese local payment application is the first interface shown on the left side, followed by the one of MobilePay – the local Danish application on the bottom, and finally by the M-pesa one on the right – the local Kenyan application.



The Eyequant heatmap (on the left of each image batch) seems to show a preference for text and general titles over icons, which can seem contra intuitive for image/icon heavy designs such as the Wechat and M-pesa interfaces. The iMotions analysis (above and to the right of the text of each image batch) seems to overlap the Eyequant one when reduced to the center focal point, but does not show a strict user preference of the text/titles. The Eyequant and iMotions analyses diverge the most in the case of Wechat, where Eyequant shows little to no interest to icons, while the iMotions study shows the users' eyes are generally attracted to icons and more visually telling, or crowded parts of the interface. The two platforms diverge as well in their MobilePay heatmaps, but as the general interface of this application is rather plain

and the numbers are occupying a fair share of the screen, it is surprising to see such little interest on the bottom part of the screen, where the icons are placed. This might be due to the muted colours and what can be considered a weaker call to action.

The pattern is kept consistent with the M-pesa heatmaps too, showing a focus on the middle third of the screen, and little to no interest for the text over the icons, with the inconsistent occurrence of the Chinese users.

As Eyequant has no clearly defined data gathering and processing patterns and processes, it is rather difficult to assess the accuracy of the software, and none of the nationalities mentioned in the iMotions analysis above seem to replicate the Eyequant one, their overlapping consistently leaving out the preference Eyequant as a software shows for text.

The data gathered throughout this project can show meaningful differences dictated by culture and context, and that it is important to understand and acknowledge the existence and importance of cultural spectrums in user perception of interfaces and their usability.

4 Conclusion

The main concern of the study – the existence of a universal user, was approached through comparison and data analysis techniques and according to the findings presented in this project, a definite effect of cultural nature can be seen on visual perception. From gender norms to cultural differences, the concluding aspect of this project is that the universal user is far from being a current reality.

However, while the literature sometimes emphasizes a clear and defined gap in between cultures, the reality seems, however, to be more nuanced. While cultural differences exist and cannot and should not be denied, the truth is that this information should be approached rather as a spectrum than as a defined block.

With more and more technologies emerging promising a shortcut to user studies, we must not forget that software, as well as products in their general sense, should be approached through a cultural lens too, and companies have nothing but to gain from adapting their products to local markets.

Finally, the discrepancy in understanding of user needs and cultural values and general cultural impact shows the need for an increased funding in research as well as in general product and software development. While universal users may well become a norm in future years, the current global situation seems to be far from homogenous, and companies and research centers should act accordingly. This first attempt at defining distinctive interface perceptions in visual design is to be followed by more extensive studies, both in the number of participants, as well as in the nature of separation. Future works should take into account age groups focus, as well as gender, and can be extended to include more cultures for a better understanding of where the lines of interaction blur, and where they become more defined patterns.

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