

Intercultural Aspects: Color Usability Perception

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ABSTRACT

This article presents an exploratory study involving the perception of color within a computer task in two different contexts, Brazil and Germany. In this study, we propose a comparison between possible elements of usability in typing task and color. A total of 62 individuals (31 Brazilian and 31 German) participated in the study. We developed a questionnaire in the language of each country. The questionnaire was sent, via email, to persons who had previously agreed to participate in the survey. Alongside each question, we provided a palette of 48 colors to correlate colors with usability elements. Participants were requested to correlate past experiences of a typing task. We found significant differences for color perception in positive and negative emotions (success and failures in accomplishing the task). We observe that the color ratings obtained from the German group are more homogeneous than those of the Brazilian group. And in the Brazilian group, we found more preference for many colors for that same task, and we suggest further studies.

Keywords: Usability Perception, Intercultural, Color Perception

INTRODUCTION

The importance of cultural usability is growing along with the increasing numbers of different national and ethnic groups that have access to digital technology equipment on a daily basis. Accordingly, global or localization products should accommodate users' cultural differences in order to be successfully marketed. But analyzing the needs, preferences, expectations and desires of different cultures is a challenging task (Olaverri Monreal et al, 2014). For good results in usability studies through multi-cultural approaches, it is necessary to investigate aspects of use perception. From a review of the literature, we conclude that different cultural variables such as color, sound, semantics, signs, reading direction, etc. can affect product uses (Okimoto et al., 2013). These elements can often form true popular stereotypes, but they are not explicit elements. Previous culture and usability studies have shown that through understanding the processes of cognition and perception, we can recognize cultural elements (Barber & Badre, 1998); (Marcus & Baumgartner, 2003) and (Nisbett & Masuda, 2003). In product design methods, color is understood within a universal meaning (Davies & Corbett, 1997). Even today, this vision is still a part of industrial design training in many countries. Contrasting with this theory, colors bring unique meanings to different cultures (Barber & Badre, 1998). According to these authors, the color red can represent happiness in China, anger and

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danger in Japan, death in Egypt, aristocracy in France, and danger and “stop” in the USA. For the authors, color is viewed as a cultural stereotype, but this is a global perception. It is also a representation of the user’s memory associated with the color, but not necessarily a representation that can be applied to all interfacing elements. The question that arises in this issue concerns the global stereotype. Is color one of the components of the usability of a product? To extend this discussion of the meaning of color, we proposed an exploratory study involving the perception of color within a computer task in two different contexts, Brazil and Germany. In this study, we propose a comparison between possible elements of usability in task and color. The survey included elements such as effectiveness, efficiency, satisfaction, and dissatisfaction, which were associated with a color palette. Our challenge was to understand how these elements were perceived and interpreted within the two cultures we looked at. This paper intends to present and discuss some results of this survey.

DESCRIPTION OF THE SURVEY

A total of 62 individuals (31 Brazilian and 31 German) participated in the study. Their ages varied from 21 to 61 years. The mean age and the standard deviation for the Brazilian group was 38.13 (10.35), and for the German participants, 28.9 (10.01); sixteen of the Brazilian and fifteen of the German participants were female. The Brazilian participants were postgraduate students or researchers in Industrial Design or Mechanical Engineering. The German participants were postgraduate students or researchers in Ergonomics. We developed a questionnaire in the language of each country. The questionnaire was sent, via email, to persons who had previously agreed to participate in the survey. The survey was conducted between the months of October and November 2012 in both countries. Alongside each question, we provided a palette of 48 colors to correlate colors with usability elements. Participants were requested to correlate past experiences of a typing task in the following situations: when the task is completed correctly; when the task can't be completed; when the task is performed in less time than expected; when the task takes a long time, much more time than expected; when the task is easy to do; when the task is very laborious; when you are satisfied with the use of computers, notebooks, netbooks, tablets, etc.; and when you become dissatisfied with the use of computers, notebooks, netbooks, tablets, etc. The survey was divided into four positive questions and four negative questions regarding usability perceptions of the computer task. The positive perceptions were: task completed correctly; performed in less time, easy task, and user satisfaction. The negative perceptions were: task not completed correctly; the task requires much time; difficult task, and dissatisfied. Neutral perceptions were not investigated in this study.

ANALYSIS RESULTS

Respondents in both cultural groups used the computer daily. Computer use time per day was almost the same for Brazilians and Germans, 6.5 and 7 hours, respectively. Preferred types of equipment for the Brazilians were: notebooks (90.3%), desktops (74.2%), and tablets (22.6%). Germans’ preferred equipment was: notebooks (93.5%), desktops (74.2%), and tablets (25.8%). Preferred equipment indicated for data entry by all subjects in Brazil was: keyboard (96.8%), mouse (93.5%), and touchpad (74.2%). In Germany, the preferred equipment for data entry was: mouse (96.8%), keyboard (90.3%), and touchpad (42%). The comparative usability perceptions of positive elements resulting from computer tasks are presented in Figures 1, 2, 3 and 4. Figures 1a and 1b show the results of perception when the task is completed correctly. The colors associated with a correct task for German subjects presented the following proportions: green 75%, blue 10%, light blue 6%, yellow 6%, and orange 3%. For Brazilian subjects, a correct task was associated as follows: blue 39%, green 29%, red 10%, orange 10%, pink 6%, yellow 3%, and white 3%.

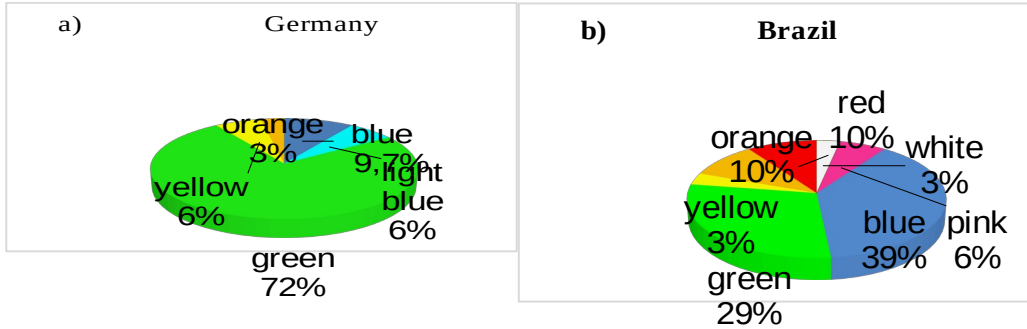


Figure 1. (a and b). Colors associated with a correct task. Figure 1a Germany, and Figure 1b Brazil.

Figures 2a and 2b present the results for tasks performed in less time than expected. For German subjects, the associated colors were: green 50%, aqua 16%, yellow 16%, blue 9%, orange 6%, and white 3%. And for Brazilian subjects, the colors associated with this result were: green 24%, blue 20%, dark pink 20%, yellow 17%, chocolate brown 13%, red 3%, and white 3%.

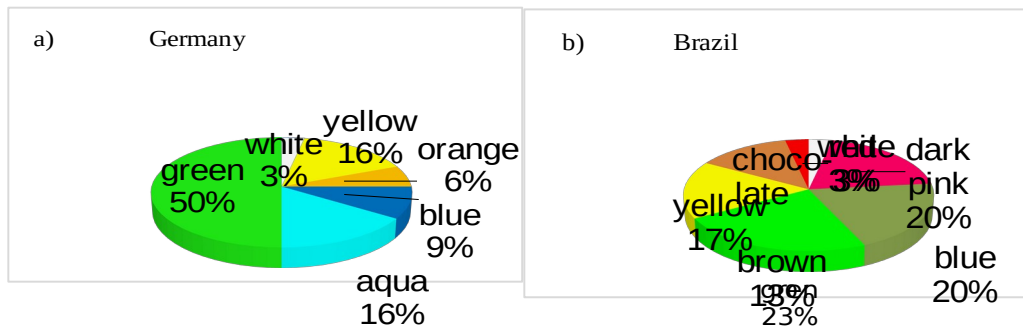


Figure 2 (a and b). Color associated with task completed in little/less time. Figure 2a Germany, and Figure 2b Brazil.

Green was selected by 50% of German subjects in relation to an easy task, and for the remaining German subjects, preferences were distributed among the following colors, as shown in Figure 3a: aqua 19%, blue 19%, pink 6%, orange 3%, and yellow 3%. For 38% of Brazilian subjects, the easy task was more commonly correlated with blue, as shown in Figure 3b.

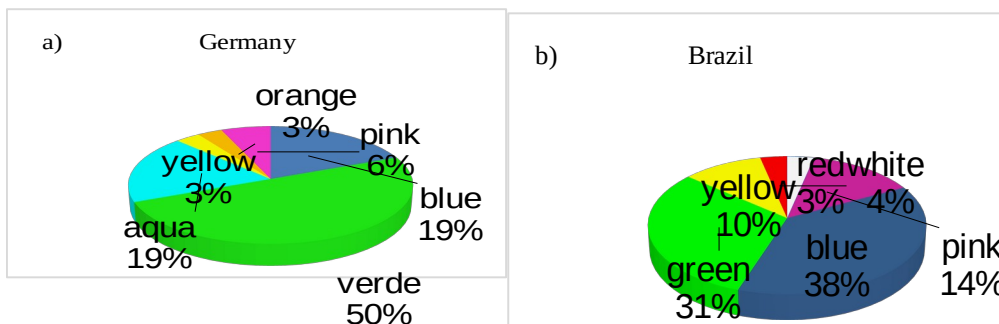


Figure 3 (a and b). Color associated with an easy task. Figure 3a Germany, and Figure 3b Brazil.

Figure 4 shows the results for the question about satisfaction with the use of computers, notebooks, netbooks, tablets, etc. German subjects selected the following colors related to use satisfaction: green 35%, blue 34%, yellow 16%, red 6%, pink 6%, and white 3%, while Brazilian subjects expressed the following choices: blue 40%, yellow 23%, orange 7%, white 7%, and red 3%.

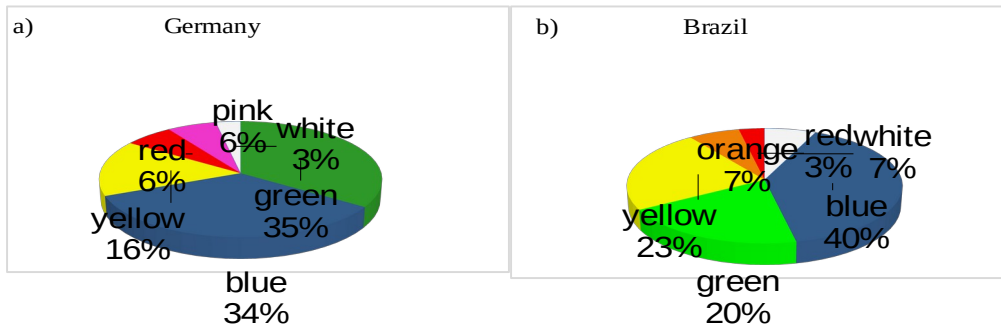


Figure 4 (a and b). Color associated with a pleasurable computer task. Figure 4a Germany, and Figure 4b Brazil.

Perceptions of negative results related to a computer task are presented in Figures 5, 6, 7, and 8. The first negative question addresses feelings of inefficiency due to the perception of task incompleteness. A task that cannot be completed correctly is shown in Figure 5a and Figure 5b, and the predominant color was red, for both groups. But German group agreement reached 78%, a high value compared with that of the Brazilian group, which was 26%. The following colors were also associated by the German group, though to a lesser degree: black 13%, orange 6%, and dark blue 3%. For the Brazilian group, there was a significant association with dark magenta, 23%.

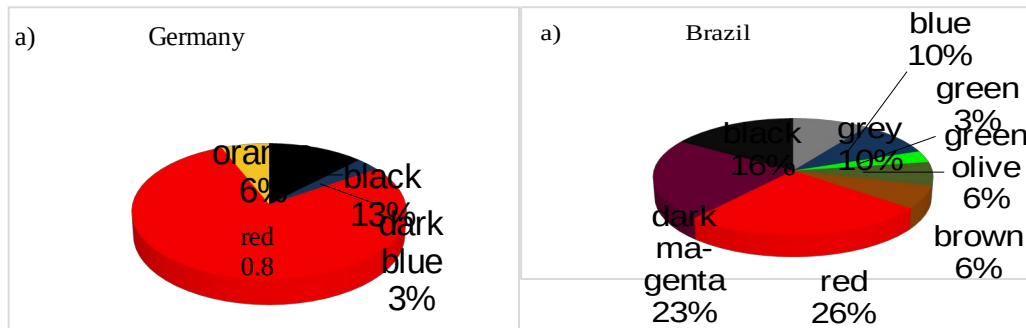


Figure 5 (a and b). Color associated with a task that cannot be completed correctly. Figure 5a Germany, and Figure 5b Brazil

The indicators of efficiency include task completion time and learning time. In this survey, lower efficiency is related to greater consumption of time, and is presented in Figure 6a and Figure 6b. Consequently, the negative result for efficiency is understood here to be a completed task taking more time than initially expected. Lower efficiency is expressed through the following colors by German subjects: dark orange 31%, dark red 27%, violet 15%, magenta 12%, dark purple 11%, and olive green 4%. Brazilian subjects selected shades of the following colors: dark olive green 32%, indigo 29%, dark purple 13%, grey 13%, red 10%, and light pink 3%.

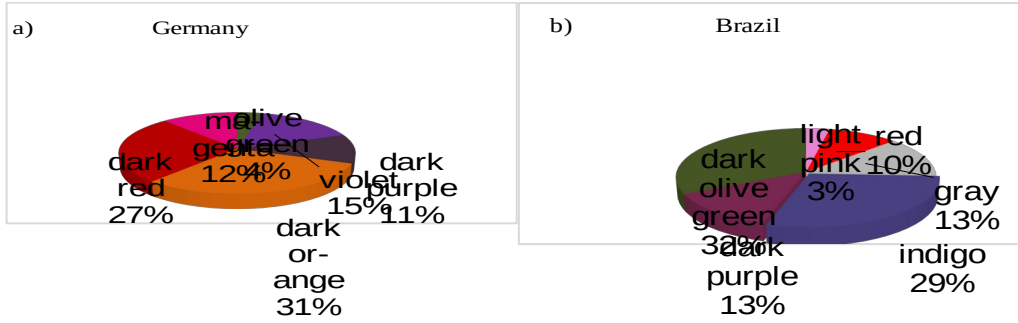


Figure 6 (a and b). Color associated with completed task requiring more time. Fig. 6a Germany, and Fig 6b Brazil.

The task's degree of difficulty could be evaluated in this study through perceptual level. The results of the positive level, the easy task, were initially presented in Figure 3, with similar colors for both cultures (Germany and Brazil). In contrast, the color perceived for the negative difficulty level of the task presented a significant difference between the two cultures. The difficult task was associated with the following colors by German subjects: dark red 40%, black 23%, yellow 19%, magenta 17%, brown 14%, and orange 6%. The Brazilian subjects selected mostly light tones: light grey 23%, yellow 19%, blue violet 15%, saddle brown 12%, black 12%, green 11%, and red 8%.

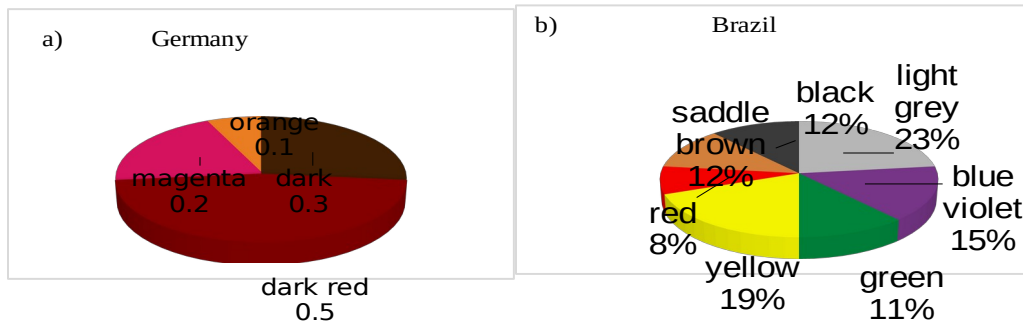


Figure 7 (a and b). Color associated with a difficult task. Figure 7a Germany, and Figure 7b Brazil.

An unpleasant task is perceived with similar colors by both Germans and Brazilians, but the predominant colors are different for each group, as we can see in Figures 8a and 8b. For the German group, red is significant, with 49%, and other colors associated were: dark brown 21%, dark grey 18%, olive green 6%, and purple 6%. For the Brazilian group, the associated color was dark brown with 31%, followed by black 28%, indigo 24%, red 10%, and olive green 7%.

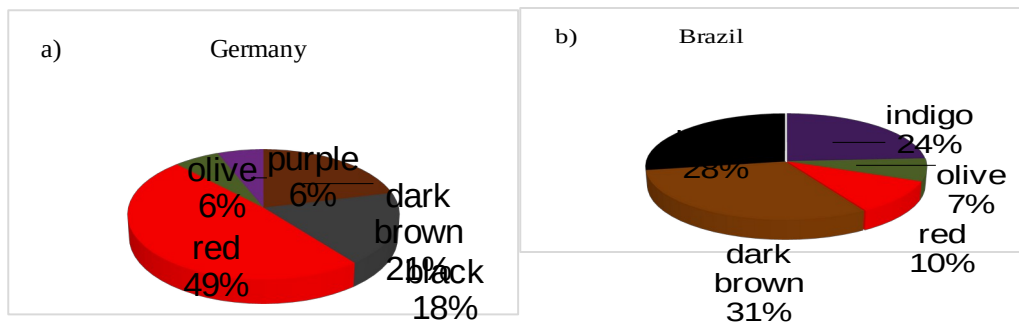


Figure 8 (a and b) Color associated with a dissatisfying task. Figure 8a Germany, and Figure 8b Brazil.

CONCLUSIONS

The results presented in this study show us the variation in perception in two cultural groups which use the computer daily. The most significant difference in input choice was related to the touchpad, which was preferred by 74.2% of the Brazilian group, higher than the German group's 42%. Comparative usability was perceived as consisting of positive and negative elements resulting from the computer tasks, according to the qualities of emotions elicited. We found significant differences for color perception in positive and negative emotions (success and failures in accomplishing the task). Subsequently, we sought to associate the emotions elicited by the task with the possible levels of usability generated by the typing task. In this study, we found a color variation differing from conventional stereotypes. We observe that the color ratings obtained from the German group are more homogeneous than those of the Brazilian group. Regarding the results for the positive level, the easy task was marked with similar colors by both cultures. In contrast, color perception of the negative emotion for a difficult task presented a significant difference between the two cultures. And in the Brazilian group, we found more preference for many colors for that same task. This fact was also reported by Davies (1997) in a multicultural study. This author reported that Brazil has many sites that are particularly colorful, with no color being overly dominant. This is indicative of a cultural preference for many colors. In this study, the outsourcing of color as a component of usability shows us that the emotions elicited by the task reflect aspects of stereotypes developed by the culture to which a subject belongs. The topic of usability and culture is a relevant topic, and we suggest further studies to include color as an element that can change the usability of a product.

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