

## **CAPTCHA Interface Feature: Security and Usability in the Distinction Between Human and Machine**

José Guilherme Santa Rosa <sup>1</sup>, Joana Rafaela Gomes Vieira Liberato <sup>2</sup>

Av. Salgado Filho, 3000 – Sala 37c (LEXUS) – Department of Arts - Federal University of Rio Grande do Norte — Lagoa Nova, Capim Macio – Natal – RN – Brazil – 59072-970

<sup>1</sup>jguilhermesantarosa@gmail 1, <sup>2</sup>joygvl@gmail.com

**Keywords:** design, captcha, usability.

### **1 CAPTCHA**

In order to prevent computers sending automated messages posing as real users, developers have used the interface CAPTCHA feature to distinguish the data and submissions made by humans and machines. This paper presents the main types of CAPTCHAs, and discusses the implications for usability.

However, while the CAPTCHA interface feature provides greater safety during entry of information systems, can it complicate and compromise the usability and may even contribute to the abandonment of the users, when they can not identify with characters clearly. This problem tends to be exacerbated when users are visually impaired.

Although the use of CAPTCHA interface has been developed to ensure the security and integrity of systems during filling out and submission of information (the differentiation of humans and machines) they are another barrier to be overcome by requiring users to perform tasks on the computer.

### **2 Method**

To perform the research, we selected three systems on the Internet that require interaction with CAPTCHA. Among the three systems, one is text-based (and selected based on their popularity and difficulty attested by experts), the second is based on images and third in their descriptions and images associated with concepts and classifications - both developed by the project CAPTCHA Project of Carnegie Mellon University (AHN, BLUM and LANGFORD, 2010; HOLMAN et. Al. 2007; KULKARNI, 2008).

The subjects of the study, were 10 users of computers. Each participant underwent interaction with the three different types of CAPTCHA, according to the valuation technique: Usability Testing (TULLIS, T. e ALBERT, 2008; SANTA ROSA & MORAES, 2010). Tests conducted had as controlled variables, hardware, physical environment and Internet connection.

In the statistical analyzes we found a significant negative correlation ( $r = -0.7032108$ ) between levels of English language proficiency and levels of dissatisfaction with CAPTCHAs. Thus, it appears that there is a significant correlation between the user satisfaction when interacting with the CAPTCHA feature and user proficiency in the language used in messages and instructions.

There was also a significant correlation ( $r = 0.73029674$ ) between users' proficiency in the English language and a sense of usefulness that users attach to the element CAPTCHA. Therefore, it is suggested that designers and planners, in addition to seeking solutions that are independent of language or language that identifies the user, present primarily in the native language of the instructions and information about the purpose of this interface feature.

### 3 Results

It was found by means of usability testing, 100% of users ( $n = 10$ ) were able to overcome the barrier of text-based CAPTCHA, while 80% ( $n = 8$ ) to overcome the image-based CAPTCHA and only 50 % ( $n = 5$ ) to the associative CAPTCHA. It is clear, too, that the duration of the filling association CAPTCHA was greater in tests with seven of the ten participants.

It was found also that although five of the ten participants had made more of an attempt to fill the image-based CAPTCHA, none of them triggered the refresh button to submit new CAPTCHA code, while nine of ten participants made more than one attempt in five participants associative CAPTCHA and triggered the refresh button.

It should be emphasized that during the interaction with the associative CAPTCHA three participants clicked the "?" (Help). It was noted that none of the participants triggered the buttons for running audio CAPTCHA present in two forms of CAPTCHA tested. Even participants who make mistakes in typing, the selection had to repeat or not opted for audio, even during testing have been told that the speakers were working. This demonstrates that, despite some developers to design solutions that can be used by normal users and users with disabilities, usage tends to be segmented.

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## 4 Conclusions

It was concluded that although the interface element CAPTCHA is perceived by users as a tool that adds security and reliability systems, causes dissatisfaction and hampers the use and may even contribute to giving the user to accomplish his task.

It is noteworthy that the other interface features and technologies, such as biometrics, identification in federated networks, among others, should be investigated in order to allow the systems to distinguish between humans and machines without having to spend time and cognitive efforts to prove that humans really are.

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## 6 Acknowledgments

Acknowledgments to Federal University of Rio Grande do Norte and LEXUS (Ergodesign and Usability Lab | UFRN).