Next generation of tools for industry to evaluate the user emotional perception: the biometric-based multimethod tools

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Abstract: More and more companies are adding emotional features into the development process of their financial offer, developing new products and services based on the emotional motivations of users. However, the subjectivity of the experience and the complexity of its variables has become one of the biggest challenges for businesses today. In recent years many tools have been created in order to explore the user's emotional perception, but there are still shortcomings. Experience design professionals have pointed out the need for further assessment work and in this paper the biometric-based multimethod tools are reviewed. Within this type, one of the most focused experience evaluation tool is analyzed: the Eyeface. A tool that consists of two devices, the Eye-tracking and Facereader. The research work concludes that the biometric-based multimethod tools will be the key element to face the ultimate integration of the emotional approach into the business world in the near future.

Keywords: Eyeface, evaluation, tool, emotion

1. Introduction

During the last decade, more and more companies are adding emotional features into the development process of their financial offer, developing new products and services based on the emotional motivations of users. However, the subjectivity of the experience and the complexity of its variables has become one of the biggest challenges for businesses today (Hassenzahl, 2005, Pucillo y Cascini, 2013).

The bibliographic review allows to identify that there is a great variety of tools currently destined to the evaluation of the user experience. But, the complexity of emotional perception and inadequate approximation makes many of the tools inadequate.

In this sense, multimethod tools are presented as one of the most interesting alternatives in the field of evaluating user experiences. Thus, and based on these keys, a new multimethod tool has recently been developed. It evaluates the ideas of experiences within the conceptual design phase, and it is

called Eyeface tool (Lasa, Justel & Retegi, 2015). A tool that evaluates by combining two independent biometric devices: Eye-tracking and Facereader. The Eyeface is featured by collecting the user's perception in an objective and intrusive way. In addition, thanks to the development and definition of a specific work model for the Eyeface, the tool meets the requirements for proper integration in the design processes of the companies.

Biometric based measurements are not still widely applied in the evaluation of the user experiences (Maia and Furtado, 2016). But multimethod tools like the Eyeface, are presented as a powerful alternative to the complex evaluation of this new design approach, where emotions are one of the most fundamental pillars when creating new products or services. This communication makes a review of the main multi-method tools and reflects on their role in the near future.

2. Objetive

As an alternative to the more traditional ones, multi-method tools based on biometric evaluations tools are presented in this paper. Within this typology, one of the most focused tool for evaluating experiences is the Eyeface: tool consisting of two devices Eye-tracking and Facereader.

The communication emphasizes that multi-method tools, based on biometric measurements, will be a fundamental pillar of the future for the definitive integration of the design of experiences in business activity.

3. Multimethod tools review

The greatest challenge in the design of experiences is to guarantee that the user comes to feel the experience in the way that the designer wants it to be perceived, since the valuation is totally subjective (Hassenzahl, 2005; Pucillo and Cascini, 2013).

For this reason, to ensure the level of approximation that exists between the proposed experience and the perceived is necessary. In this sense, the contribution of evaluation systems and tools is vital, in order to achieve the maximum degree of success with each proposal of experience that is made.

Although many different evaluation tools have been created so far, experience design professionals have pointed out the need to deepen the evaluation task and propose new and more specific tools. Arnold et al. (2010), for example, value positively the exploration and creation of multi-method tools, such as those that have been created from the combination of two or more tools. They also emphasize the need to improve the effectiveness of the evaluation. On the same line, Roto, Obrist and Väänänen-Vainio-Mattila (2009) point out that when using a multi-method tool, with two or more sources of information, the data obtained is more significant and relevant. In addition, Roto et al. (2011) after having observed that most of the tools used today come from the field of usability and interaction, criticize that they are not very practical for experience design projects.

At present, there is no great variety of multi-method tools for the design of experiences. A sample of this is the classification of 123 evaluation tools of experiences proposed by Vermeeren et al. (2010), where a just single multi-method tool, called Emoscopio (Bustillo, 2007), is identified.

Emoscopio is a patented tool (Ribes i Bonet et al., 2008) that evaluates emotional usability and suggests an intervention protocol. The system raises, on the one hand, the incorporation of a usetherapist. This figure aims to provide the point of view of the user throughout the design process. In short, an expert in the area of interaction, functional design, usability and interfaces, which is present throughout the process, but does not lead the team. On the other hand, it proposes a toolkit

called Emotools. The package contains different modules, such as Emotron, Emotracking and Pulsetron, proposing an agile and useful solution to carry out the evaluation.

Emotron is the software that allows to record the data related to the emotions while the user is immersed in the process of the task. This software generates diagrams detailing the intensity of the emotions, which are then linked to the other modules.

The Emotracking, collects the data of the tool called Eye-tracking. This device collects the user's eye tracking while performing the task, showing points of interest and thermal maps highlighting the most interesting areas.

Finally, the Pulsetron is the module that collects polygraphic data with the aim of having a better understanding of the psychological and emotional reality of the user.

The Emoscope enable to combine the data coming from the three platforms and to evaluate the experience of the usability of the user. To do this, it links the formal properties and emotional state of the user during the interaction process, analyzing, among other aspects, data related to pupilometry.

The tool is created to evaluate functional prototypes or finished products, to perform the test, and will lead to product improvements from the conclusions obtained. raise product improvements. The features of the tool limit its application to web platforms, mobile applications or digital software evaluation.

There is a recent commercial version similar to the Emoscope, called iMotions Attention (Imotions, 2015), developed by iMotions Biometric Research Platform.

In addition, another multimethod tool called Emotracker (Hupont et al., 2013) has been identified, combining Eye-tracking technology and emotion analysis based on facial recognition. The tool, among other settings, has been applied to study the emotional behavior and the perception of works of art (Hupont et al., 2014). Thus, within the multi-method tools, no one is specifically identified to evaluate concepts of experiences associated with products and services.

There are also some other new technologies such us, Visage Technologies (2016) which combines the face and gaze tracking analysis of users. And can include speech and lip motion analysis. This software enables to explore a great variety of application fields, such us, games and entertainment, marketing research, automotive safety, industrial safety or health.

And finally, it is identified a device called Emotiv Epoc (Carofiglio, Ricci and Abbattista, 2015), where the user experience evaluation is measured using a brain-driven evaluation. The Emotiv Epoc is a headset that detects the EEG signals of users and pre-processes them, enabling to detect the emotional user experience recognition based on brain activity. This tool has been used to analyse educational virtual environments.

4. New multimethod tools

As mentioned in the review, several authors have indicated the need to create new and more effective evaluation tools for industrial activity (Roto, Obrist and Väänänen-Vainio-Mattila, 2009; Arnold et al., 2010; Roto, Vermeeren, Väänänen-Vainio-Mattila and Law, 2011), and as a more interesting way of development they visualize the creation of new multimethod tools, combining more than one tool.

In this sense, and focusing on conceptual evaluation analysis, it is observed that there is a significant gap. Justel et al. (2007), perform a study of the different methods that exist for the evaluation of conceptual ideas for product development, but still, no method has been identified that helps to choose from the perspective of experience. This makes it highly interesting to go deeper in this direction. In this line, Pugh (1991) points out that selecting the concept to design in detail is one of the most critical and difficult decisions. Thus, the definition of selection criteria in the early stages of design has direct consequences on the evolution and success of the final result. Buxton (2010) explains how the progression in time of the project demands greater investment by the team. And, in turn, it stresses the importance of establishing criteria for design assessment in the earliest stages of the project. Through the interpretation of this approach it is concluded that it is much more important to realize the evaluation of the product at the conceptual level.

However, based on the analysis made in the review of the design of experiences, it is concluded that the application of these tools for the evaluation of experiences would have to be accompanied by a methodology that encompasses the entire development process, providing a whole vision of the design. Likewise, the importance of using specific tools for the design of experiences within the process contemplates the definition of the objectives from the beginning of the design.

2.1 Eyeface

In order to reduce the lack of specific experience design evaluation tools, a new multi-method tool Eyeface (Lasa, Justel & Retegi, 2015) has been created to facilitate the understanding of user's perceptions in the conceptual phase.

Eyeface is a tool created to evaluate products and services based on the user experience approach. This multi-method tool is composed of two different devices: the Eye-tracking and the Facereader (Figure 1). The Eye-tracking, allows to identify the trajectory of the user's gaze while visualizing an experience in presentation mode. The tool consists of two cameras, two infrared flashes and two software: Smart Eye Pro 5.5 (2009) and Gaze Tracker 8.0 (2008). The first, called Smart Eye Pro 5.5, is responsible for recording the user's gaze and transforming this data into mathematical parameters. The second software, Gaze Tracker 8.0, collects and processes the data that is obtained from Smart Eye Pro and facilitates the data interpretation. Both software, enable to know where the user is looking by analyzing the trajectories and points or areas of interest.

The Facereader, on the other hand, analyzes the emotional reactions by means of facial stimuli in a determined period of time, classifying the emotions in the following way: happiness, sadness, anger, surprised, scareness, displeasure and neutrality. The tool has a webcam and a software which identifies and classifies emotions transmitted by the user while performing an activity or visualizing a specific content. The software is called Facereader 2.0 (2008).

The Facereader 2.0 allows to analyze the emotional reactions of a user during a specific period of time. To do this, it collects the graphical information through a camera and decodes it into a specific emotion. This classification of emotions is based on mathematical calculations and virtual meshes that represent user's facial features.

As a result, the Eyeface enable to get an overall analysis of user emotional evaluation. On the one hand, the device highlighted the points that have been interesting for the user during the experience visualization. And on the other hand, is gathered the emotional reaction that has caused the experience and how is reflected into the different emotional moods. Thus, with the combination of these two devices, it is possible to identify the areas that have the greatest visual attraction during the exhibition and the emotional reaction generated by the visualized experience.
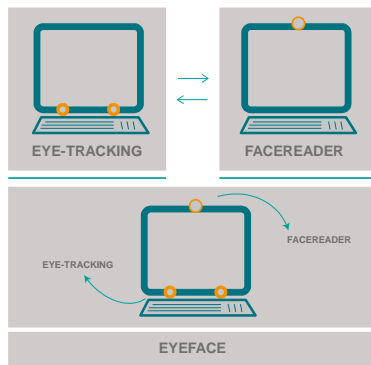
Figure 1: Eyeface multimethod tool

5. Conclusions and future work

The assimilation by the industry of the design of experiences is being progressive, but there are still shortcomings between the academic activity linked to the design of experiences and the business area. This situation arises from the subjective character of the evaluation of the experience that is based on emotional stimuli and feelings. Therefore, the evaluation of the user experience assumes an important role in the evolution of the design of experiences as a development area and its implementation in the business world.

The evaluation of experiences has become one of the greatest challenges for companies, and despite the fact that the design of experiences has spread in recent years, the tools for evaluation that are known today do not have a proper integration in the design process. In addition, it has been seen that the current tools do not collect all the information required from the field of industry and the vast majority of the tools focus on the final stages of development, leaving aside the evaluation of conceptual phase.

One of the key pieces to ensure the proper integration of this new design approach are multimethod tools. We need tools that allow us to know the user's perception in an objective way, using biometric measurements and analyzing the hedonic and pragmatic objectives of the experience. In addition, application models, such as the one proposed for the Eyeface are required (Lasa & Justel, 2016). These models allow the use of tools, guarantee successful results and provide a global vision of the design and its process.

Lastly, visualizing the future, it is understood that in a relatively short period of time the basis of the evaluation of the experience will be based on the biometric devices and technologies. Devices that definitely allow to know the objective perception of the users. Multimethod tools such as the Eyeface, which today are based on two non-intrusive biometric devices, will have to consider exploring the integration of non-intrusive methods that enable to understand the complex emotional response of users.

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