Gestures of Appropriation in the Pictorial Universe of Painting Through the Use of a Tangible Surface

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Abstract

It is in the crossroads between art museum and technology where this project here presented is born. We are referring to a prototype designed to provide involvement of museum visitors through experiences of enjoyment, creation and sharing. The prototype is an interactive application that combines an enjoyment area with a creative exploration area. In the creative exploration area the visitors may, individually or in collaboration, create visual compositions and share them in social networks. This presentation contemplates the description as regards the investigation scenario and the analysis of the first tests results.

1   Introduction

The project here presented starts from the development of a multimedia solution prototype that aims to create a new communication model to be used in art museums. It should be noted that

museums have demonstrated, in the last two decades, a greater opening to the participation of its public [Simo10] through direct actions such as workshops and also through the introduction of new technologies such as: "Rain Table" [Pras08], "World That Was" seen at the Los Angeles Museum of the Holocaust [Youn10], or "Louvre Audio Guide" App [Louv13]. As benefits of using the model here presented comes the impact generated by the construction of significant learning relative to reading and the consolidation of knowledge about the artwork. This construction is generated in the relation between the public and the artwork in its digital version. This process of getting closer and connecting with the artwork allows for a greater involvement of the public and suggests the development of individual experiences and/or of collaborative experiences that can be continued in time and virtual space, namely on Facebook, as in the past it was continued in the rooms of the academies and studios on sheets of paper or canvas. In this manner, from this model it is hoped to be the making of a kind of creative lab, where people can adopt a critical, creative and above all an experimental stance.

2   Motivation

It is in the domain of action that we hope the public that, before seen as mere spectator, might live in the museum a unique experience. In which they might create their own work and afterwards share it in the net. In this context one of the applications resulting from the model is like the anchor of a great ship anchored in the museum, which through the Internet allows countless voyages around its art to be realized. The application allows appropriating the artwork and is configured according to an assemblage and collage logic so well known and explored by communities linked to the visual arts, arts, photography, new media and even literature. From sound to image the exploration of these techniques allows an alert eye over what has already been produced, the work, the project, the object, and over this to construct a subjective vision. In museums as in the universe of institutions the subjects that constitute the public are invited to look, that is, there is a distance between the matter, that which is seen, and those that will see/enjoy/learn. It is within this scenario of change that we inspired our project, a model of an application for exploring content that we intend to be intuitive, to be used in a specific context, an art museum, by a greater number of people. For that and because computing literacy is still a reality, we used existing technology, tangible surfaces, and chose two current platforms, multi-touch table and the *Android Tablet*, as platforms to execute the application.

2.1 Object of study

The study object of this project is the fruition of the painting from its *appropriation* in a tangible surface. With this model we intend to investigate new ways to approach the work of art. In our study we seek to understand the kind of engagement that is set by the visitors when they manipulate, interpret and reconfigure the artwork through the use of the prototype presented. With this project we seek to design a platform that enhances the reflection and learning about the artwork and promote the development of creative activities by those who visit the museums.

2.2 Issue/contribution

We seek to know what contribution achieved through interaction conducted in developed platform. We intend to find out whether the involvement achieved in the interaction may or may not constitute a new approach to building knowledge around the artwork from visitors of museums. Our research hypothesis part of the consideration that the possibility of manipulation of the works through an interactive surface, a scenario that combines a space of enjoyment with a space for creative exploration, promotes knowledge about the work presented.

3 Development

For the development of this project we selected the work of painter Hieronymus Bosch. It is a set of works that points to the medieval imaginary, a pictorial universe filled by multiple characters that at times place the observer before men and women, through images of extreme realism, and at other times places the observer before grotesque and fantastic figures. The narrative component of the work of this painter inspires the creation of plots and stories that get lost and cross paths in different scenarios. The modernity of the fantastic imaginary that pervades his work is by itself an element of bonding/connection with individuals of our time and that is why it is used for the first trials of this prototype that is developed using the *Processing* and *Unity* languages. In the application the subjects may interact with the work, manipulating and transforming it in something else, starting from individual or collaborative compositions. Finally, the object created may be shared in social networks and increase the discursive framework and knowledge building around the original work as well as of the new image. The contribution of a project of this nature is the participation of the museum public in activities that were reserved to specific audiences, such as teachers and art students, and has

characteristics that go beyond the information paradigm from multimedia kiosks and available in mobile devices. The project has a similarity to applications developed and implemented in other tangible devices such as tablets and in smartphones that allow for movements that amplify, reduce, move the image and stands out for the participative introduction in the public's relation to artwork, that is, giving them the possibility of having an active role in taking in the artwork scenario, far away from the passive subject in front of the artwork. In this manner besides enjoyment, there is also the possibility of participation.

3.1   Technical background – tangible surfaces

Tangible surfaces are included in what is designated as tangible interfaces. According to [Xu05] the Tangible Interfaces give physical form to digital and computational information, easing in this manner the direct manipulation of bits, in other words, in this technology the users can interact directly with the information, without the 6 use of peripherals like the mouse, keyboard or joystick. For [Righ08] this technology finds exploration at the level of human sensations and is made concrete in a relation between physical and digital means. The use of this technology can be found in multiple applications like, for example, the experience in art restoration, carried out by a research group of the Tangible Media Group in the MIT Media Lab [Bona10]. The group presented the development of an interface usable in a multidisciplinary context, where there were users from those carrying out the restoration to the students and other users [Bona10]. Beyond the prospect of crossing different areas, the use of tangible surfaces offers the use by more than one user simultaneously. Hornecker studies refer that interaction in multi-touch tables outside of the context of a laboratory are rare. [Horn08]. According to the author the contribution of the field studies may reveal factors that influence the interaction, highlighting the role of the context used. The study, as regards interface usage on a multi-touch table, happened in the context of the Berlin Natural History Museum. Another study [Logt09] involving multi-touch tables was dedicated to the visualization of molecules, with the objective to provide a more interactive and direct form of visualizing information. Logtenberg emphasizes that a great surface - the multi-touch table - allows a collaborative action of more than one user, leaving therefore behind, the traditional approach in which only one user controlled the information such as in controlling the mouse or keyboard, while the other participants watch. This practical manner of learning is explored, in different museums, like the Science and Industry Museum of Chicago [Grei13]. The museum initiatives offer their visitors

the possibility of interactive experiences at exhibit and artifacts level. Still within this research domain, O'Malley and Fraser indicate that studies carried out within the scope "of psychology and of education" point to the existence of "real benefits" in learning resulting from the use of tangibles [O'Mal04]. Therefore in an area that has had advances, there are studies regarding the benefits of learning, dedicating their attention to the younger recipients.

3.2   Work in progress

As it was referred this research work aims to explore the relations of museum visitors with the possibility of *appropriation* of the artwork on tangible surfaces. Thus seeking to know if the fact of the subjects interacting with the digital images of the artwork helps them to construct new narratives, new interpretations from their manipulation. The aim is to know if this possibility of use approaches and contributes to a new understanding of the work. The first initiative is to prepare and build a theoretical analysis framework. The design of the interface included in its conceptual origin the realization of a scenario narrative. To this narrative principle be possible, in practice, it was necessary to extraction and categorization of the elements that are painted on the original artwork. To the development of this project we selected the work of Hieronymus Bosch. At the present, we conceive and develop a prototype, using two distinctive platforms: A commercial multi-touch table as the tangible interface (Figure 1a). In this scenario the development and implementation of the interface systems is based on Processing programming language [Reas13]. The other platform is based on a Tablet Android (Figure 1b) and the development is based on the unity - game engine [Unit13].
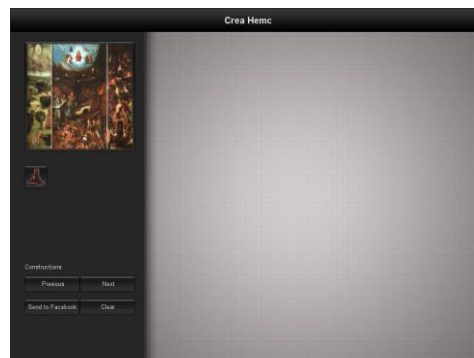
a)   b)

Fig. 1: System platforms: a) commercial multitouch table; b) Tablet android unity.

The works "The Last Judgment", "The Hay Wain" and "The Temptation of St. Anthony" were first divided in several categories each one with specific context identity, meaning, type of actors, symbols and backgrounds. At this stage seven categories were defined: constructions figures; animals figures; animal like figures; celestial figures; human figures; objects of everyday life and grotesque characters. We select the essence of the narrative as a method to be used in this context of exploration and construction of meaning around the paint because narratives allow the reading and the description of the artwork. In this picture by the same time that visitors describe a story around the elements of the artwork the whole scenario became more evident. In this particularly scenario we also consider that narrative is a framework that allows the construction of new narratives and visual compositions. Therefore, to the realization of this work we conducted a detailed study of all the works considered. A work of fragmentation and extraction of different elements was subsequently conducted. We intend to create an extraction-based category to make the realization of visual compositions possible. For that reason we manually cropped the pictorial works. In figure 2 we present some of those elements divided in three categories: human elements (a); animal elements (b) and celestial elements (c).

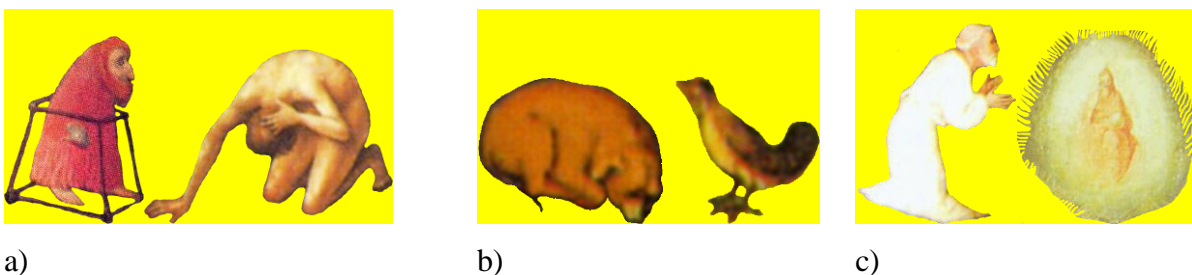a)   b)   c)

Fig. 2: Some examples of elements for three categories: a) human elements; b) animal elements; c) celestial elements.

The interaction is based on the selection of different elements of one or more categories and manipulating these elements digitally through the use of the tangible surface. At the present the prototype has the interface shown in figure 3. In the "categories selection area" we can select a specific element of the artwork. That element will then be manipulated in the working area to create our own pictorial work. Using the virtual keyboard, we can create a short description of our work in the narrative area (figure 3a). Through the command line interface (CLI) for Facebook – fbcmd [Tomp12] we develop an interface for *Processing* language (button of figure 3b) in order to post images directly on *Facebook* project's page [Hemc13].

At the moment, the visitor can already implement simple manipulation like translation, rotation and scaling (figure 4), and therefore (re) create new pictorial works (Figure 5). At this stage we have created a total number of 154 elements that can be used by the visitor to give life to new pictorial works.
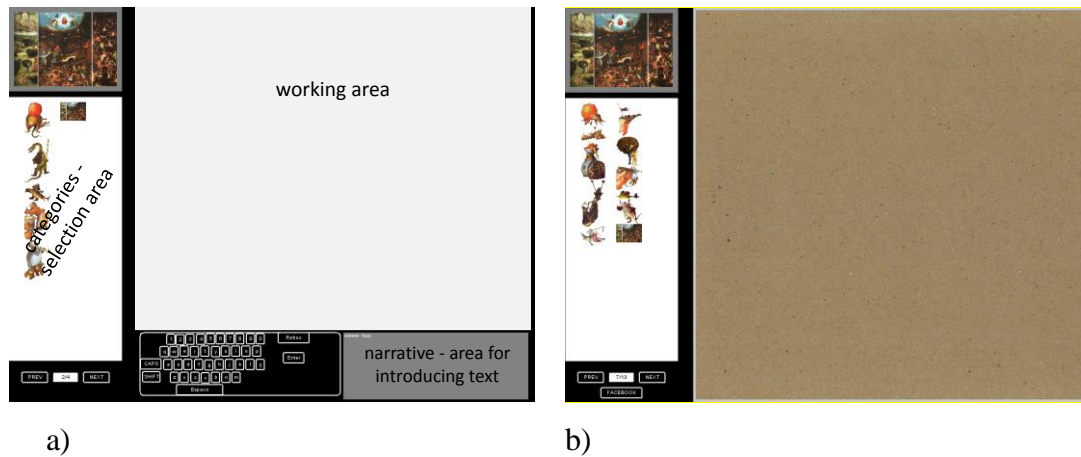

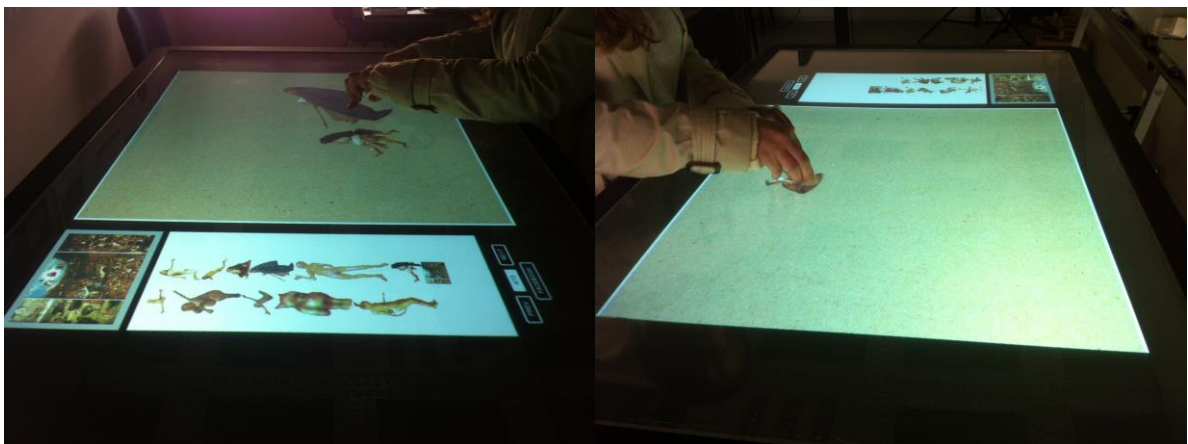Fig. 3: Interfaces of the prototype: a) with a narrative area; b) with a Facebook button interface.

Fig. 4: Examples of interaction procedures.

Fig. 5: Examples of a pictorial works

3.3 Usability

Usability is a term used to describe the quality of interaction of a user with a specific interface [Brev95]. With this characteristic are associated five principles: the ease of learning; effectiveness; memorization; avoiding errors and satisfaction [Niel95]. Given the specificity of a certain context usability refers to, in that scenario, as the manner in which a product may be used by specific users with a view to reaching specific objectives, obeying the criteria of efficiency, effectiveness and satisfaction [Inte98]. Allowing for the hybrid nature of this project, we imported some characteristics deemed as from the video game domain. Thus we considered that in the evaluation of the interaction of users with the prototype, that the elements presented by [Sánc09] should be considered. When in front of a platform the users/participants feel capable of carrying out desired tasks, with quick performance, without having to face errors, there is a tendency to feel satisfaction, which motivates a possible return to the experience [Niel93a], [Rudi08]. In order to validate our prototype, we foresee the carrying out of a series of usability tests. This method would allow the collection of information on the manner in which users/participants interact with the prototype [Niel93a].

3.4 Exploratory study

In line with the recommendations of [Niel93a], [Rudi08], the evaluation of the prototype test included the participation of a group of potential users. This phase had as objectives: 1) the exploration of the category menu for the creation of visual compositions; 2) verify the making of visual compositions; 3) observe the type of interaction (individual or collaborative) and 4) verify the publication of images/visual compositions on the Facebook page. The first test session had five participants. All participants were invited to be present at the session. Despite the reduced number of participants, [Virz92], [Niel93b] and [Rudi08] defend that a number between three and five participants may be considered sufficient. The test session occurred in the Computer Graphics Center, in the engageLab, at the University of Minho, Guimaraes campus. The group of participants was made up of four 11th year high school students, three boys and a girl, ages 16 to 17, and a University teacher, aged 52. The session was carried out in three instances, in accordance with the arrival of individuals or groups. Before each test, a reading was done of the "Test Session Orientation Guide", previously delivered to each

participant. Along with the guide was explained the finality and the objectives of the test. It was requested that during the interaction that participants verbalize their thoughts (Think Aloud protocol). After these formalities, the participants started the exploration of the prototype run on a commercial multi-touch table. The events observed were registered in the field journal and noted on a grid. Once concluded the interaction with the prototype, the participants filled out their "User Characterization and Satisfaction Questionnaire". From this session we got several elements. From the direct observation, the Think Aloud protocol and the video recording was extracted the information regarding the involvement, performance and difficulties pointed out/felt. In this manner it was verified that there were differences between individual or collective use. The individual tests were carried out by female participants. These tests were done in an environment of greater reflection, paused and the creation of only two visual compositions each. Of these compositions only one made by a 52 year old participant was posted on Facebook. From the group participation as regards image production, 12 were posted on Facebook of a total of 15 compositions created. The group did the test in an extroverted manner. In this test session three problems related to the prototype were pointed out: 1) the absence of a button to clean the screen completely; 2) the background selected for the tasks was selected for all sessions, and could only be altered by restarting the application; 3) smaller pictures were hard to handle. From a first analysis of the data collected from the questionnaires we verified that regarding the involvement with the artwork all the participants expressed agreement that there was greater involvement with the artwork through the experiment (1 participant indicated "agree" and 4 participants indicated "strongly agree"). The interface was indicated as intuitive (1 participant indicated "strongly agree" and 4 indicated "agree"). All participants indicated "completely agree" as regards the ease of memorization. The experiment was recorded on video for further analysis using the webQDA analysis tool [WebQ13].

4   Conclusions and future work

From the work developed we may conclude that projects that bet on the participation of the public in museums may constitute a new action domain at the level of the construction of creative, cultural and educational dynamics. The involvement accomplished with the

implementation of the participative projects may add value to the set of representative/significant experiences of a visit to a museum. This value may be considered within the domain of learning, individual and/or collaborative, of pleasure, entertainment and also at the social level. With this exploratory study we collected the first data on the prototype. Noteworthy is the fact that the combining of two distinct areas, in the design of the interface, promoted a significant rapprochement of the participants, to the more singular aspects of the artwork, nominally, the perception of the existence of small elements spread in the original work. The division of the elements in the category menu promoted oral discourse between the participants that, not knowing the basis for the categorization, attempted to discover its meaning. From the data collected from the observation records we noted the need for technical improvements in the prototype. From the data treatment we concluded that an application of this nature may stimulate the participation of the museum visitors and impress in a significant way their experience in the museum space. From carrying out and observing the first test it was possible to determine the ludic potential of the application. In future works we will seek to deepen the exploratory field of the ludic side present in the project and proceed to improvements of the problems detected. In order to better understand the dynamics developed by the museum visitors we intend to test the next version of the prototype in the context of a museum.

Literature

[Bona10]   Bonanni, Leonardo, *et al.*: Tangible Interfaces for Art Restoration. In International Journal of Creative Interfaces and Computer Graphics (IJCICG) 1(1) 2010, pp 54-66.

[Hemc13]   Hemc Crea: creative hybrid environments for museums communication [Available online at: http://www.facebook.com/tangiblehieronymus.bosch/] 2013.

[Horn08]   Hornecker, Eva: I don't understand it but it is cool: Visitor Interactions With a Multi-touch Table In a Museum. In Proceedings of IEEE Tabletops and

Interactive Surfaces Conference, Amsterdam, The Netherlands, 1-3 October 2008, pp 113-120.

[Inte98]   International Standard Organisation (ISO). Ergonomic requirements for office work with visual display terminals (VDTs). Part 11: Guidance on usability. Genève, 1998.

[Grei13]   Science and Industry Museum of Chicago [Available online at: http://museum-science-industry.visit-chicago-illinois.com/] 2013.

[Logt09]   Logtenberg, Jeroen: Multi-user interaction with molecular visualizations on a multi-touch table. In Master thesis Human Media Interaction, University of Twente, Enschede, The Netherlands 2009.

[Louv13]   Louvre Audio Guide App, [Available online at: www.louvre.fr/en/louvre-audio-guide-app] 2013.

[Niel93a]   Nielsen, Jakob: Usability Engineering. Academic Press, New Jersey 1993.

[Niel93b]   Nielsen, Jakob & Landauer, Thomas: A mathematical model of the finding of usability problems. In Proceedings of ACM INTERCHI'93 Conference, Amsterdam, The Netherlands, 24-29 April 1993, pp 206-213.

[O'Mal04]   O'Malley, Claire & Fraser, Danae: Literature Review in Learning with Tangible Technologies. NESTA Futurelab series, Bristol 2004 [Available online at: http://archive.futurelab.org.uk].

[Pras08]   Prasad, Asmita: Rain Table [Available online at: http://www.gizmowatch.com/entry/interactive-table-exhibit-to-educate-museum-goers-about-rainfall/] 2008.

[Reas13]   Reas, Casey & Fry, Ben: Processing [Available online at: http://processing.org/] 2013.

[Rudi08]   Rubin, Jeffrey & Chisnell, Dana: Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. John Wiley, New York 2008.

[Sánc09]   Sánchez, José, Zea, Natalia & Gutierrez, Francisco: From Usability to Playability: Introduction to Player-Centred Video Game Development Process. In Proceedings of the International Conference on Human-Computer Interaction (HCII 2009), San Diego, CA, Berlin: Springer-Verlag, Lecture Notes in Computer Science 2009, pp 65-74.

[Simo10]   Simon, Nina: The Parcipatory Museum. Museum 2.0., Santa Cruz 2010.

[Swar10]   Swartout, William et al.: Ada and Grace: Toward Realistic and Engaging Virtual Museum Guides. Berlin Heidelberg, Springer 2010, pp 286-300.

[Tomp12]   Tompkins, Dave: fbcmd a command line interface (CLI) for Facebook [Available online at: http://fbcmd.dtompkins.com/] 2012.

[Unit13]   Unity [Available online at: http://unity3d.com/] 2013.

[Virz92]   Virzi, Robert: Refining the Test Phase of Usability Evaluation: How Many Subjects Is Enough? In Massachusetts, Human Factors 1992, 34 (4), pp 457-468.

[WebQ13]   webQDA [Available online at: https://www.webqda.com/] 2013.

[Youn10]   Young, David: Inventing Interactive [Available online at: http://www.inventinginteractive.com/2010/11/22/los-angeles-museum-of-the-holocaust/] 2012.