Interaction design as catalyzer of creative and interpretative praxes in museum context

M. Veggi[1]

[1]University of Bologna, Italy

Abstract
This paper argues that interaction design (IxD) can suggest valid solutions in rethinking museum mediation, focusing on conservation data as reference case study. Eliciting interest, it is possible to conceive meaningful and authentic experiences, aimed at activating a transformative dialogue with the visitors: with this approach, audiences are creatively engaged to reconsider their own expectations, behaviours and beliefs. To support this hypothesis, major attention will be paid to describe the set up and the results of a first proof of concept, conceived in the framework of the PERCEIVE Project and based on Les demoiselles à la rivière *by Matisse, now exhibited at the Art Institute of Chicago.*

CCS Concepts
• Human-centered computing → Interaction design process and methods; Empirical studies in interaction design; • Applied computing → Arts and humanities;

1. Introduction

It is a common stereotype that educational initiatives within museums and art exhibitions often rely on a monodirectional approach, eventually failing in providing a meaningful experience for the audience. This out-of-date strategy has been however radically challenged in recent years by more inclusive paradigms. This shift can be traced back already to the *nouvelle muséologie*: this new sensibility, raised at the beginning of the Eighties in France, advocated the social mission of museums and envisioned a new model for this cultural institution, proposing a novel approach relying on the active engagement of the community.

This sensibility is now mirrored by different actors of the museum context. Indeed, the ICOM itself updated the official definition in 2022, highlighting how these institutions are expected to "operate [...] with the participation of communities, offering varied experiences for education, enjoyment, reflection and knowledge sharing" [ICO22]. On the other hand, also audiences themselves are claiming for more participatory and entertaining experiences: recent studies [SC12] indeed proved that the majority of visitors "highly expect an experience of easiness and fun" (to this regard, the relationships between XR applications and fun has been already scrutinized [SGCR*19]).

The following research will rely on this brief theoretical and historical overview to inquiry which could be the role of IxD in facilitating visitor participation in museums and art galleries. This topic will be narrowed down to a specific asset which is increasingly displayed to enrich art collections, i.e. conservation data. This approach is indeed enthralling, as it allows visitors to explore hidden details lying under the pictorial film. Due to this high potential, an increasing number of digital projects have been developed in this direction. They often rely on captivating metaphors or storytelling techniques: possible examples are *Pictouch* and *Wetpaint* [BSX*12], which managed to address such a highly-specialist resource also to a generic audience.

Nonetheless, creation of meaning is again either completely left to the visitor, without any guidance, or follows the monodirectional approach of traditional museum education: in this latter scenario, specific details are for instance shown to the visitor, who is now able to read in that specific fragment of data the history of the painting (the most intuitive case is compositional arrangements implemented by the painter). Albeit it might succeeds in the acquisition of limited pieces of knowledge, this approach ignores other potentially more participatory strategies to the works of art, which may elicit visitors' sense of care and interest, as well as, eventually, catalyze collaborative processes of meaning creation.

Therefore, this paper will argue that interactive systems are able to revolutionize the approach to museum mediation towards conservation data, hooking visitors' curiosity and interest to stimulate active, artistic and interpretative praxes. These methods may create an authentic and meaningful experience, connecting visitors' deeper Self and the works of art. To support this thesis, this paper firstly introduce main cognitive goals which may be pursued in the design of similar applications. Later, a proof of concept is presented, which provided interesting results and encourages deepening similar lines of research.

2. Cognitive goals: major guidelines from the state of the art

The high potential of conservation data of compositionally rearranged paintings lies in the fact that multiple configurations of the same work of art are condensed into one single scan, such as X-Radiography. If for the conservation scientist these pieces of information are useful to understand materiality of the artwork, the restoration interventions and to reconstruct artists' creative process, we believe that they could also trigger peculiar emotional and cognitive responses in the visitor, when a neuroesthetical perspective is embraced.

Indeed, little does this scenario differ from Zeki's analysis of Michelangelo's *Dying Slave* [Zek99]. In his monograph, the author recognized that this masterpiece "endows the brain a great imaginative power": through the technique of the *non finito*, the sculptor invites in fact "the spectator to be imaginatively involved and the spectator's view can fit [into the artwork] many of the Concepts" stored in his brain. As a matter of fact, in both these situations the visitor is exposed to a form of "gap" of knowledge that he is asked to fill in. Similar situations are an effective trigger for curious behaviors, which have been defined precisely as a quest for information to close a knowledge gap [HR10].

On the other hand, limiting cognitive goal of an interactive application to eliciting curiosity might fail in bringing about a proper behavioral change and a deeper emotional involvement; rather, sparkling interest might result into more radical and long-lasting effects. To this regard, it has been underlined that "curiosity and interest differ in terms of their triggers, duration, goals, affect, and knowledge" [HR10]: the *knowledge gap* should be indeed enhanced and put into relations with high level "Concepts", which embrace "life themes" of "high levels of intensity" and "self-related information". Moreover, a positive correlation between interest and hands-on activities has been remarked.

In this perspective, triggering interest towards an artwork and exploiting it to set up an interactive application is intended to allow the audience to live a meaningful and authentic experience. Chen and Rahman [CR18] indeed demonstrated that visitors intrinsically seek for meaning as meaning-making is proved to facilitate the understanding of what has been lived. More specifically, meaning-creation is inherently linked to the establishment mental connections [BV02]. This active process is also considered to stem from several needs: among these, major emphasis has been laid on the key terms of Self and the identity.

These two concepts have been playing a central role in the analysis of the cognitive goals which IxD may pursue. In particular, authentic experiences are often claimed to touch our deeper Self. A recent analysis on this field, which merged state-of-the-art perspective with data extracted from cultural probe kits, remarked strong connections between authentic experiences and relevant psychological traits of our Self (e.g beliefs, attitudes or behavior) [Spo23]. In particular, it demonstrated that "experiences that are perceived to be most authentic are those that elicit emotions".

On the basis of these studies, interactive systems which are conceived to engage visitors in a participatory way towards art collections and conservation data should firstly propose a "knowledge gap" and catalyze a deep engagement with visitors past experiences, beliefs behaviors, emotions, in particular through hands-on activities. A possible solution to fulfill these requirements is indicated by Bilda et al. [BEC08], who focused on *creative engagement*: this concept entails a *transformative dialogue* between the user and the interactive systems and results into "a shift in intentions and expectations", which can be associated also to a proper behavioral change.

To the set up of this first proof of concept, a simplified and adapted version of the proposed model is adopted. The system indeed shows the artwork to the users, who develop their expectations, emotions, and behaviors and accesses their memories and beliefs. Through the interaction, they creatively engage in a transformative dialogue with the artwork, which is expected to eventually result into the discovery of "an aspect of the artwork or an exchange they were not aware of before" [BEC08]. This model is expected to prove that artistic praxes can work as bottom-up and participatory meaning creation processes: rooting in visitors identity traits, it is possible to discover unique and personal interpretations of the artworks.

3. A first proof of concept about compositional rearrangments

3.1. A case study on Matisse

The following proof of concept is expected to lay the basis of a *caring prototype*, as indicated by the guidelines of the recent EU PERCEIVE project (https://perceive-horizon.eu). As a consequence, the collection of one of the partners of this initiative has been considered, i.e. the Art Institute of Chicago. Specifically, the chosen case study is *Les Demoiselles à la rivière* (*Bathers by a river*) by Henri Matisse, a large canvas whose complex gestation lasted from 1909 to 1917.

Figure 1: *Henri Matisse,* Les Demoiselles à la rivière*, 1909-1917.*

The painting was commissioned by Shchukin, who yet eventually rejected it after seeing a first preliminary study. Nonetheless, the artist continued working on this canvas, re-painting several times on the pictorial film. This artwork is hence a precious witness of Matisse's artistic research during the second decade of the 20th century; physicochemical analyses demonstrated in fact the presence of at least six versions [D'A19]. In these changes, as proven by the cross section photomicrographs, the chosen palette was drastically modified, considering that the first version was characterized by the bright and "aggressive" colors which are typical of the

Fauvist aesthetics. Moreover, X-Radiography (see Fig. 2) showed a clear rearrangement of the position of the characters and of the natural elements.

Among the most plausible justifications for this change, two factors are the most convincing. On the one hand, the artwork should have been deeply influenced by the contemporary Avant-gardes (Picasso's Cubism above all) and by Matisse's impact with North African art during his journey to Morocco (1912). On the other hand, the historical context should be taken into account, with a special regard for the Great War. The painter concerns in that perilous time might be reflected also in the choice for darker hues and in a more rigid and vertical position of the female figures.

3.2. Experience

The *Mytisse* experience, developed for this exploratory work and for the design of an interactive application, involved a group of participants, who had no previous knowledge about the painting, which was presented only at the end of the activity. They were shown the X-Ray scan on a tablet and were asked to first observe it and then draw on top of it what they would see and recognize: this triggered their interpretation and solicited their curiosity. The experience did not aim at increasing the knowledge on Matisse of participants, but to create a personal re-connection with the artwork and to stimulate observation of conservation science material, through art-based practices. The final expected result was to develop an interest and caring attitude towards the painting and the artist.

3.3. Methodology

The following section presents a first proof of concept of an interactive application based on the conservation data retrieved during the physicochemical analysis conducted on Matisse's *Les Demoiselles à la rivière* [D'A19]. In particular, this first experiment is focused on the followin X-Radiography (Fig. 2).
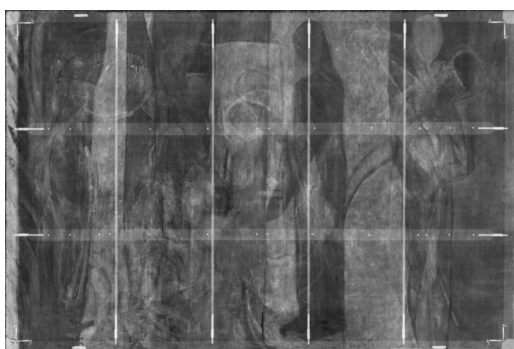

Figure 2: *X-Radiography of Henri Matisse,* Les Demoiselles à la rivière.

The experience produced meaningful results even with a minimal set up in terms of number of participants, constraints, and instruments. In particular, to what pertains the former aspect, about ten Italian university students, aged between 19 and 23 years old, were involved. This audience was quite homogeneous for different characteristics, among which the educational level, and none of

them previously knew the painting. This condition has been recognized as the essential requirement of this experience, as a vivid memory of the final configuration of the bathers on the canvas might result in a potential bias.

To what concerns used instruments, this experience relied on a tablet and a touch pen: in particular, the used set-up consisted of an IPad with an Apple Pen and the interactive tasks were carried out on the app GoodNotes 5. One per time, only one X-Ray scan was shown to participants. A mediator explained that this datum was referred to a painting which underwent several compositional rearrangements. After presenting the title of the work of art and revealing its author, participants were then invited to identify human figures (or parts of them) by delimiting the shapes with the pen and enumerating them progressively.

3.4. Results

The thirteen obtained reinterpretations (`https://github.com/ManueleVeggi/mytisse/blob/main/testing_sessions/221027_proofOfConcept/MytissePoC.pdf`) are eloquent if compared with the results of physicochemical analyses. Indeed, conservation scientists managed to recognize the several figures (human and non-human) of the canvas with the support of different techniques, such as transmitted infrared and infrared reflectogram (see in particular figures 25.40t and 25.67t of official catalog by the Art Institute of Chicago [D'A19]).

The first striking observation is that the experiments lead to unique results and none of them coincides with the final canvas by Matisse. Some interpretations correctly individuated a few of the figures present in the aforementioned scientific reconstructions, yet other are considerably different. In general, the first most significant variation is in the number of identified bathers, which ranges from two to eleven, even though the majority of the participants identified five bathers (median and mode value).

In addition, albeit several participants recognized the second standing *demoiselle* from the right, most of them identified mainly parts of human bodies rather than entire figures. To this regard one of the most interesting peculiarity of the resulting reinterpretations is the presence of faces, which characterizes two tests of the dataset: for instance, test no. 10 (see Fig. 3) is dominated quite exclusively by this pattern.

A last interesting remark pertains the disposition of the figures: Matisse revised considerably their position on the canvas and the X-scan condensate all these different changes. These second thoughts influenced the density of the figures identified by the participants. Over the majority of them spread the bathers all over the canvas, however without reflecting the eurythmy of Matisse's final painting. Nonetheless, almost one participant over three collocated the *demoiselles* exclusively on the right, while only one person on the left.

Moreover it is worth mentioning that a common behavioral pattern might be identified among the participants. Most of them were indeed caught wondering whether they were identifying the correct figures. A subsequent survey tried to collect more systematically this first impression: almost the unanimity of the participants (one single exception) has expressed this doubt.
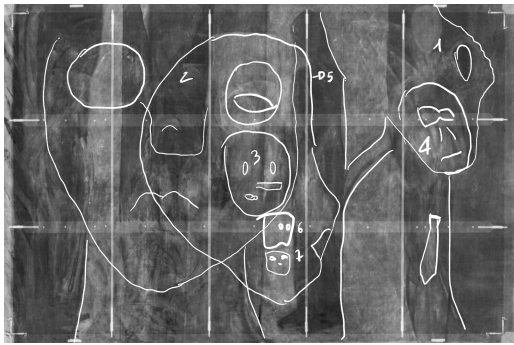
Figure 3: *Experiment on* Les Demoiselles à la rivière*, no. 10*

4. Major conclusions and future works

This simple proof of concept produced interesting and promising results to what pertains both the variety of the realized reinterpretations and the fulfillment of the cognitive goals. Indeed, even in a low representative sample, completely different paintings were created by the participants. This originality can be justified by a considerable engagement of the users, which had to rely just on their intuition and interpretations. By virtue of this peculiarity, this experiment can be indeed considered as "participatory", since - adopting one of the definitions proposed by Simon [Sim10] - it is open to a diversity of responses.

Moreover, the soundness of the original research question has been partially proven. Transformative dialogue laid the basis for a meaningful and authentic experience, which can in future provide fertile ground for a proper behavioral change. Indeed, as demonstrated by the behaviors of the participants, the use of simple interaction patterns for creative engagement eventually managed to "access visitors beliefs", hence allowing them to establish a connection with their deeper Self. In particular, it effectively challenged one of the crucial topics for the contemporary museological discourse, i.e. whether it is possible to still apply the dichotomy between correct and wrong to museum mediation.

On the other hand, the limited structure of the proof of concept and the absence of thorough direct surveying methods were not sufficient to observe and quantify the relevance of all the different parameters identified by the state of art. Among these, the emotional engagement of the visitor should be better investigated in a final user experience. To this end, the use of colors and the analysis of their semantics (both the one intended by the author and the one perceived by the audience, which may not *per se* coincide) could be a promising strategy.

As a matter of fact, the Fauvism has in the use of color one of its main principle and the name itself of the avant-garde is rooted in the aggressive and brutal use of the chosen hues. The vibrant colors of Matisse are indeed often used to translate a psychological state, and the palette of the *Demoiselle*, which is clearly in a minor key, has been often put into relation with the historical context of the Great War. The data of the cross section photomicrographs could hence be used as a precious asset to refine the final UX in this direction. This approach is mirrored as well in the reference PER-

CEIVE working package, which encompasses among its goals also the analysis the semantic of the works of art as originally conceived by their authors.

In conclusion, IxD can become an efficient support to transform museums in participatory systems and can help them to broaden the scope of their actions. Indeed, although evaluation sessions of the prototype are still to be carried out in the next months to assess the fulfillment of the cognitive goals, this simple proof of concept showed that scientific data may support the development of new applications, which can satisfy the quest for meaning, easiness and fun visitors are pursuing. Indeed, on the one hand this experiment paves the way to other open questions, in particular which could be possible strategies to expand this approach in collaborative experiences. On the other hand, it overcomes traditional approaches to conservation data, raising the awareness of the importance of looking "with the eyes of a child [to] express ourselves in an original, that is, a personal way" [Mat78].

References

[BEC08] Bilda Z., Edmonds E., Candy L.: Designing for creative engagement. *Design Studies 29*, 6 (Nov. 2008), 525–540. doi:10.1016/j.destud.2008.07.009. 2

[BSX*12] Bonanni L., Seracini M., Xiao X., Hockenberry M., Costanzo B. C., Shum A., Teil R., Speranza A., Ishii H.: Tangible interfaces for art restoration. In *Innovative Design and Creation of Visual Interfaces: Advancements and Trends*. IGI Global, 2012, pp. 47–58. 1

[BV02] Baumeister R. F., Vohs K. D.: The pursuit of meaningfulness in life. Oxford University Press, New York, NY, US, 2002, pp. 608–618. 2

[CR18] Chen H., Rahman I.: Cultural tourism: An analysis of engagement, cultural contact, memorable tourism experience and destination loyalty. *Tourism Management Perspectives 26* (Apr. 2018), 153–163. doi:10.1016/j.tmp.2017.10.006. 2

[D'A19] D'Alessandro S. (Ed.): *Matisse Paintings, Works on Paper, Sculpture, and Textiles at the Art Institute of Chicago*. Art Institute of Chicago, Chicago, 2019. 2, 3

[HR10] Hidi S. E., Renninger K. A.: On educating, curiosity, and interest development. *Current Opinion in Behavioral Sciences 35* (2020-10), 99–103. doi:10.1016/j.cobeha.2020.08.002. 2

[ICO22] ICOM: Museum definition, 2022. URL: https://icom.museum/en/resources/standards-guidelines/museum-definition/. 1

[Mat78] Matisse H.: Looking at life with the eyes of a child. In *Matisse on Art*, Flam J., (Ed.). Phaidon Press Limited, New York, 1978. 4

[SC12] Sheng C.-W., Chen M.-C.: A study of experience expectations of museum visitors. *Tourism Management 33*, 1 (feb 2012), 53–60. doi:10.1016/j.tourman.2011.01.023. 1

[SGCR*19] Sheehy K., Garcia Carrizosa H., Rix J., Seale J., Hayhoe S.: Inclusive Museums and Augmented Reality: Affordances, Participation, Ethics, and Fun. *The International Journal of the Inclusive Museum 12*, 4 (2019), 67–85. doi:10.18848/1835-2014/CGP/v12i04/67-85. 1

[Sim10] Simon N.: *The participatory museum*. Museum 2.0, 2010. 4

[Spo23] Spotti S.: *Authenticity in hybrid experiences: Towards the design of a unique and meaningful experience*. Master's thesis, University of Bologna, 2023. 2

[Zek99] Zeki S.: *Inner vision: an exploration of art and the brain*. Oxford University Press, Oxford ; New York, 1999. 2