

# Creative engagement and meaning creation: A first experimental protocol on interactive cultural experiences for conservation data

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## ABSTRACT

This paper presents a study conducted in the framework of the PERCEIVE project, which focuses on fostering a "caring attitude" towards Art collections threatened by the phenomenon of colour change. "Sense of care" is indeed shown to exist only if there is a relationship between caregiver and care-receiver and can be elicited using specific triggers, such as "hooks" based on users' curiosity starting from a "knowledge gap". As art practices are proved to elicit transformation in users' behaviours, this article starts from the assumption that visitors' artistic engagement could be also applied in interactive applications to improve visitors' caring attitude. We hence describe an experimental protocol for a first qualitative evaluation of a "caring prototype", which pursues this goal, focusing on Matisse's *Bathers by a River* as case study, starting from conservation data. The results show the potentiality of this approach as new participatory strategy towards conservation data.

## 1. Introduction

In recent years, increasing attention has been paid to investigating the effects of art practices performed by citizens. Creative activities have indeed been proved to have a beneficial impact at a psycho-cognitive level, improving interest, engagement, mood, social relations and memory, also for minority and disadvantaged groups (Belver et al., 2017; Pike 2014). At a more general level, Edmond and colleagues have demonstrated that similar engagement strategies, defined as *creative engagement*, may lead to a *transformative dialogue*, a term through which the scholars identify the possibility of accessing and changing users' specific attitudes and beliefs (Bildt et al. 2008). Their work, in particular, focuses on interactive art installations, hence stressing how art galleries and museums - and cultural institutions in general - may be a fruitful context to catalyse similar cognitive processes.

On the other hand, heritage science is increasingly concerned in the analysis of citizens' behaviours towards Cultural Heritage (CH). In recent years, this relationship has become increasingly complex: the frequency of cultural artefact and site vandalisation is dramatically rising. For instance, in Italy, the Colosseum, Pistoletto's *Venus of the Rags* in Naples, and Vasari's Corridor in Florence were vandalised in just three months in 2023. All the while, eco-activists, through non-violent protests in museums, are posing the provocative question whether

modern society cares more about protecting a painting or our planet. These episodes clearly indicate how the concept of care towards CH is today of paramount importance. This relevance has been also underlined by European projects, such as PERCEIVE (Perceptive Enhanced Realities of Coloured Collections through AI and Virtual Experiences, <http://perceive-horizon.eu/>), whose prime focus is on the analysis of coloured art collections and on how they may be affected by the phenomenon of colour change. One of the goals of this initiative is indeed to promote citizens' "sense of care" towards artworks and the risk of an alteration - or of even a loss - of their pigmentation, also through interactive media applications.

The following research hence stems from this awareness and draws on the conclusions of recent studies, which show that a *caring attitude*, based on the relationship between a care-giver and care-receiver (Soto 2005), may be elicited if specific triggers are adopted (Fiorenza 2023). In particular, this paper aims at verifying if creative engagement may challenge visitors' behaviours also to foster caring attitudes towards CH and, if possible, at identifying the most effective strategies. The ultimate goal of this research is the elaboration of a set of guidelines and best practices which may support designers and museum professionals in setting up interactive experiences, able to enhance visitors' "sense of care".

To address this research question, we proceeded with a recognition

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of the existing literature on the topics of creative engagement and care theory, prioritising - when possible - contributions from UX and Interaction Design (IxD). The outcomes of this stage allowed us to draw an initial set of requirements for a *caring prototype*, based on a canvas by Matisse. Besides the strategies adopted to fulfil the cognitive goal, one of the peculiarities of this interactive application, *MyTISSE*, is that creative engagement encourages art practices directly on conservation data related to the chosen painting, hence providing a new participatory approach to exploit this scientific resource also for the general public. A qualitative analysis on the data gathered during a first testing session was then performed to answer the initial research question(s).

As a result, the paper is divided into two main sections. The first one aims at depicting the current state of the art, while the second one describes the followed methodology. In particular, starting from a brief description of the chosen case study and of a preliminary proof of concept, we present an experimental protocol, specifically prepared for *MyTISSE*, which guided the first evaluation session of this UX. The results of the preliminary qualitative analysis carried out on this data are then presented to support the major findings of our work.

## 2. State of the art

To the best of our knowledge, the aforementioned contribution by Edmond, Bilda and colleagues is still today the most relevant source on the cognitive impact of art practices in the design of interactive experiences. Indeed, the authors, besides demonstrating the relationship between *creative engagement* and *transformative dialogue*, also propose an *ad hoc* engagement model, articulated in different modes and phases (for a complete description, refer to Bilda et al. 2008). One of the most relevant findings of their research is that, when an *unexpected* element in the interaction is present, the phase of “deeper understanding” may be reached. This is when participants are expected to achieve a more complete understanding of the work of art and of their own “relationship to the artwork. They start finding the meanings the artist was trying to convey, and finding out what the whole artwork means. In this phase they judge and evaluate at a higher, conceptual level. They may discover an aspect of an artwork or an exchange they were not aware of before” (536).

This result hence shows how creative engagement provides a fertile background for processes of behavioural change, knowledge acquisition, and meaning creation, in which visitors’ deeper Self is accessed. The final outcome of this engagement strategy is therefore *per se* extremely subjective, as it “as varied as the individual people who interact with it” (525). This peculiarity is perfectly consistent with the most recent approaches to museum mediation, such as Nina Simon’s *participatory museum* (Simon 2010), now mirrored by several actors of the museum context (e.g. ICOM itself; for a broader analysis of “museum participation”, see the corresponding entry in Mairesse 2023). In her monograph, the author stresses how cultural institutions should incentivize visitors’ input by asking meaningful questions which should be “open to a diversity of response” and not “draw on [audience’s] comprehension of institutional knowledge”, in order to make “visitors feel confident and capable of answering” (140).

These key concepts of subjectivity, of relationships between visitors and the artwork, and of meaning creation processes can be also retrieved in the existing literature on care theory and on the possible trigger to elicit a sense of care. Unfortunately, a comprehensive framework on caring relationships between citizens and cultural heritage is still absent, but can be partially reconstructed through different sources, ranging from art history, to philosophy and psychology. In particular, the feminist reflection of the second half of the 20th century proposes several fruits for thought. One of the most authoritative definitions of care theory is provided by Gilligan, who focuses on the relationship of care established between humans care-giver and care-receiver (a summary of her theory is provided by Soto 2005). However, for the purposes of our research, we adopt the broader definition provided by Joan

Tronto in *Moral Boundaries. A Political Argument for an Ethic of Care* (1993). Here, the philosopher argues that (103):

On the most general level, we suggest that caring can be viewed as a species of activity that includes everything that we do to maintain, continue, and repair our ‘world’ so that we can live in it as well as possible. That world includes our bodies, our selves, and our environment, all of which we seek to interweave in a complex, life-sustaining web.

This approach is convincing as it recognises that any care relationship is based on a set of different *caring practices*, which may be also directed towards an inanimate care-receiver (in our scenario, the work of art). Moreover, the author stresses that the act of “care-giving” is always preceded by a stage, “caring about”, in which the care-giver pays attention to the need of the care-receiver (106–109). These theses result in two major issues for the design of the final interactive application:

1. Defining a specific caring practice which should be fostered and incentivised by the final application
2. Identifying a possible solution to “hook” visitor’s attention to establish a caring relationship.

A possible solution to the latter one may be found when considering how “sense of care” can be associated with curiosity. This apparent shift is supported by recent studies, which demonstrated the intimate links between the two. Phillips (2015, 158–159) argues that “curiosity involves a quality of attention, [which] expresses a relation of care, which encompasses both carefulness and also a particular kind of interest. In other words, we are curious about things we care about”. Curiosity has indeed been defined as a quest for information to fill a knowledge gap (Hidi and Renninger 2020) and more and more often interactive experiences try to elicit it as it helps hook visitors’ attention.

Conversely, limiting the cognitive goal of an interactive application to eliciting curiosity might fail in bringing about a proper behavioural change and a deeper emotional involvement; rather, sparkling interest might result in more radical and long-lasting effects. To this regard, Hidi and Renninger underlined that “curiosity and interest differ in terms of their triggers, duration, goals, affect, and knowledge” (2020, 100): 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 experience.

Curiosity and interest, which have been shown to be two crucial aspects for building caring relationships, appear thus inherently linked to a third “cognitive subgoal”: meaningfulness. Catalysing meaning creation processes can hence be individuated as a possible *caring practice* to elicit in a “caring prototype”. Setting this goal for a UX in the cultural sector is also consistent with the findings by Chen and Rahman, who demonstrated that visitors naturally seek for meaning, as meaning-making is proved to facilitate the understanding of what has been experienced (Chen and Rahman 2018). More specifically, the process of meaning-creation is catalysed by formulating questions (Kashdan and Steger 2007) and is intrinsically related to the establishment of mental connections (Baumeister and Vohs 2002). Baumeister and Vohs also defined it as an active process that stems from several needs; among these, major emphasis was placed on the key terms of Self and the identity, which - as seen - are of paramount importance in the relationship between the visitor and the artwork at the basis of Edmond et al.’s *transformative dialogue* theory (see *supra*).

For the purpose of the main goal of the research, this brief overview on the state of the art helps us tackle the set design challenge, providing a first set of requirements for the definition of the design brief. On the

basis of these studies, interactive “caring prototypes”, which are conceived to engage visitors in a participatory way towards art collections, should firstly propose a “knowledge gap” and ignite meaning creation processes relying on a deep engagement with visitors’ Self (i.e. past experiences, beliefs, behaviours, emotions), in particular through hands-on activities, such as art practices. As a result, the final UX would echo the statement by Luis Camnitzer in his ongoing site-specific installation *A Museum is a School*: “A Museum is a School/The artist learns to communicate/The public learns to make connections” (Camnitzer 2009).

### 3. Methodology

#### 3.1. Case study: “Bathers by a river” by Henri Matisse (1909–1917)

To answer the research question, an experiment has been carried out on a famous canvas by Matisse, exhibited at the Art Institute of Chicago, associate partner of the PERCEIVE Project. The painting, *Les demoiselles à la rivière* (*Bathers by a River*, 1909–1917; see Fig. 1), is particularly interesting owing to its complicated compositional history.

In 1909, the canvas was commissioned by the Russian art-dealer Sergei Schukin together with *La Musique* and *La Danse II* for the decoration of his staircase. The former two paintings were eventually accepted (and now exhibited at the Hermitage Museum in San Petersburg), while the *Bathers* was rejected at the stage of preliminary sketch. Nonetheless, the artist continued working on the canvas, re-painting several times on the outer pictorial film.

As a consequence, the canvas can be interpreted as a precious witness of Matisse’s artistic research and conservation data may provide fruitful insights to reconstruct the evolution of his painting practices. The online catalogue by Art Institute of Chicago (D’Alessandro 2019) provides possible reconstruction based on X-Radiography (see Fig. 2) and cross-section photomicrographs. These assets show how Matisse changed considerably the disposition of the figures on the canvas and the chosen pigments: scholars identified at least six possible versions and an overall trend can be identified.

The first version was supposed to feature a variety of poses and the same dynamism as in the contemporary painting *La Danse*; however, those peculiarities would soon be replaced by rigidly standing figures and an overall eurythmy of the composition. Similarly, the used colours are considerably different across the several rearrangements. On the lower layers of the cross-section photomicrograph, it is possible to notice how the original palette reflected typical Fauvist aesthetics, with warm, vibrant colours. Later, Matisse introduced paler and brownish hues, which eventually resulted in the palette in “a minor key” which characterises the current version of the painting.

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, the historical context should be taken into account, with a special regard for the Great War. The painter’s concerns in that perilous time might be reflected also in the choice of darker hues and the more rigid and vertical position of the female figures.

#### 3.2. Proof of concept

A first proof of concept was carried out to qualitatively verify the soundness of the initial hypothesis, i.e. if creative engagement might succeed in provoking a deep involvement of the visitors’ Self. It involved thirteen university students, who had no previous knowledge of Matisse’s painting, aged between 19 and 23 years old. The required instruments consisted of one tablet (iPad) and the application GoodNotes 5, which allows users to draw with an Apple Pencil. Each participant was shown an image of the X-Ray scan (Fig. 2) together with the title of the

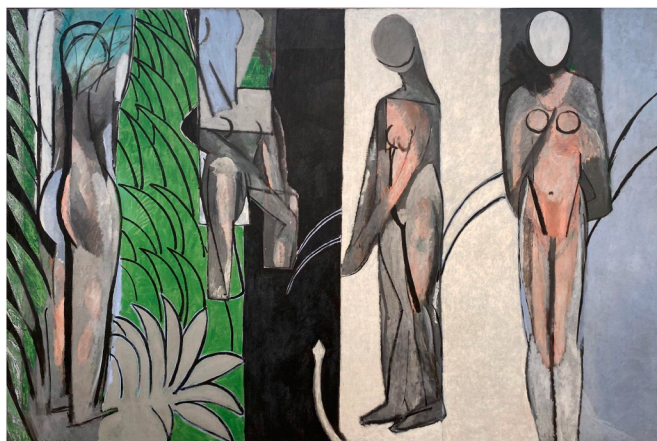


Fig. 1. Matisse, *Bathers By A River* (*Les Demoiselles à la rivière*), Art Institute of Chicago (1909)–1917.

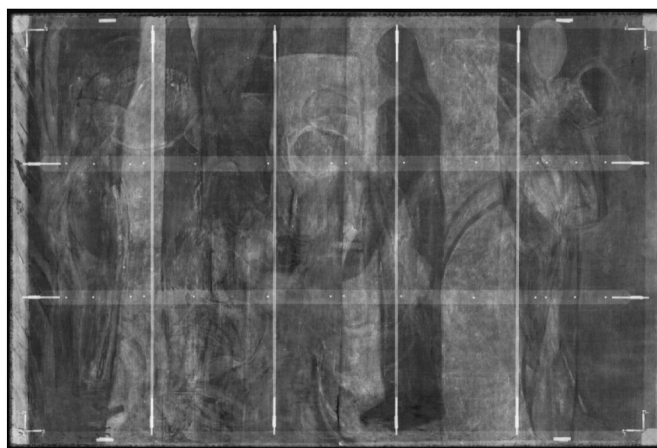


Fig. 2. Matisse, *Bathers By A River* (*Les Demoiselles à la rivière*), X-Ray scan (D’Alessandro 2019).

painting: they were later asked to recognise human figures (as a part or as a whole), to draw their borders and to count them.

This task is expected to elicit participants’ curiosity: Matisse’s compositional rearrangements are registered by X-Ray in an extremely intricate scan, which can be hence open to a plurality of interpretations by a non-specialist audience. In a neuroaesthetic perspective, little does this scenario differ from the description of Michelangelo’s *Dying Slave* by Zeki Semir (Zeki 1999). 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. Thus, in both cases, the cultural experience proposes a knowledge gap through which visitors’ Self can be easily accessed (see *supra*).

Even with such an extremely simple set-up and a statistically insufficient population sample, the experiment managed to provide promising results (see a more detailed analysis in Veggi, 2023a). The reinterpretations<sup>1</sup> are unique and completely different from Matisse’s original canvas. The disposition of the figures indeed varies considerably, and seldom reflects the eurythmy of the *Bathers*. In addition, a considerable amount of interpretations identified predominantly single

<sup>1</sup> These reinterpretations are freely available at the following link: [https://github.com/ManueleVeggi/mytisse/blob/main/testing\\_sessions/221027\\_p roofOfConcept/MytissePoC.pdf](https://github.com/ManueleVeggi/mytisse/blob/main/testing_sessions/221027_p roofOfConcept/MytissePoC.pdf).

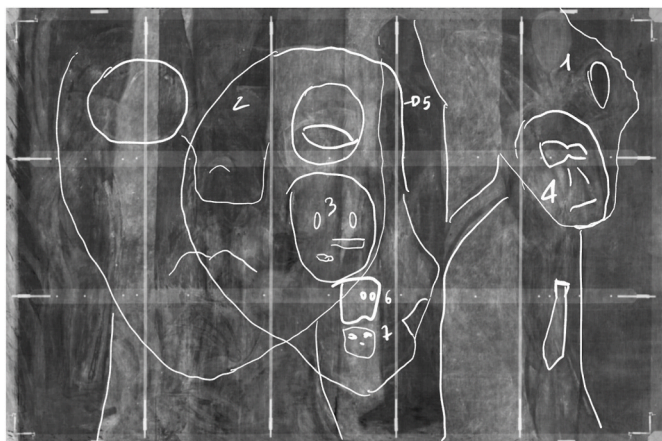


Fig. 3. Experiment on *Les demoiselles à la rivière*, no. 10.

parts of human bodies, in particular faces, as shown in Fig. 3:

These reinterpretations eventually showed that through creative engagement it is possible to obtain a deep involvement and participation of the visitors, who contributed with personal and unique drawings. The experience was also authentic as it managed to touch the deepest chords of visitors' Self: in a subsequent interview, almost the unanimity of the participants (only one exception) admitted that, during the experience, they caught themselves wondering whether they were identifying the correct figures. This result is crucial as it shows that this UX effectively challenged one of the most relevant topics of 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, due to the absence of a systematic surveying session at the end of the experience about meaning creation processes and the reduced population sample, a more solid experimental protocol was deemed necessary. This second experience, in particular, may take advantage of the exploitation of colour semantics and the change of the pigmentation used by Matisse. The entire aesthetic of Fauvism was indeed based on a personal choice of the used hues and, as shown by physicochemical and art-historical analysis (Bock 1990), the colour palettes of *Bathers by A River* reflect the author's psychological states across different biographical and historical contexts. Moreover, this approach is also compliant with the deliverable requirements indicated by the reference working group guidelines of the PERCEIVE project, which is the framework of this ongoing research.

### 3.3. Description of the prototype and of the experimental protocol

Relying on the encouraging results of the proof of concepts, a second prototype has been hence set up. As seen above, its cognitive goal is the catalysation of meaning creation processes, which can be defined as a possible *caring practice*, starting from the phenomenon of colour change in compositionally rearranged artworks. A wealth of contributions underline that the understanding of an artwork is a multifaceted, never-ending process, which may stem from different features of the studied object. With regard to paintings, studies show how these processes are rooted in the analysis of figurative elements, such as the line, the shape and the colour; the title (Barrett 2000); the historical context (Goldman 1990). In addition, as "feelings are guides to interpretations" (Barrett 2000, 6) and are also crucial elements in achieving a meaningful and authentic UX (in this regard, see the experimental analysis by Spotti 2023), visitors' emotional responses to the artwork (in particular, as required by PERCEIVE, its colours) and to the cultural experience as a whole should be investigated.

A qualitative analysis hence appears to be the most promising approach to solve these problems (see a possible methodological framework in Creswell and Poth 2018). This first preliminary study in particular will be conducted in the form of a testing session of this first prototype; moreover, as to our knowledge no evaluation framework has been already put forward to experimentally answer our research question, we developed an *ad hoc* protocol for this UX (Veggi and Pescarin 2023a), which stresses the most relevant element for meaning creation processes. Indeed, while trying to answer the initial research question of our study, this evaluation is also expected to define further requirements of the final interactive application. Particular attention will be paid to observing i) which elements of the artwork and its history may ignite a deeper understanding of *Bathers by a River* and meaning-creation processes which are effectively "open to a diversity of responses", independent of visitors' mastery of institutional knowledge; ii) whether an emotional response to colour change may be effectively elicited in an interactive environment. Given the iterative nature of any UX design process, the results of the current analysis will be then used to redesign the application and to guide further testing sessions. These subsequent evaluations will be conducted on a larger scale and will allow us to verify our assumptions by adopting a quantitative approach, to support in the future the findings of this first research with more robust statistical analysis.

The protocol (see Chart 1), which describes only a minimum viable product of the final application, is articulated in three phases and requires that the participants are divided into three main groups (A, B and C; see later) and do not have any previous knowledge of the painting. At

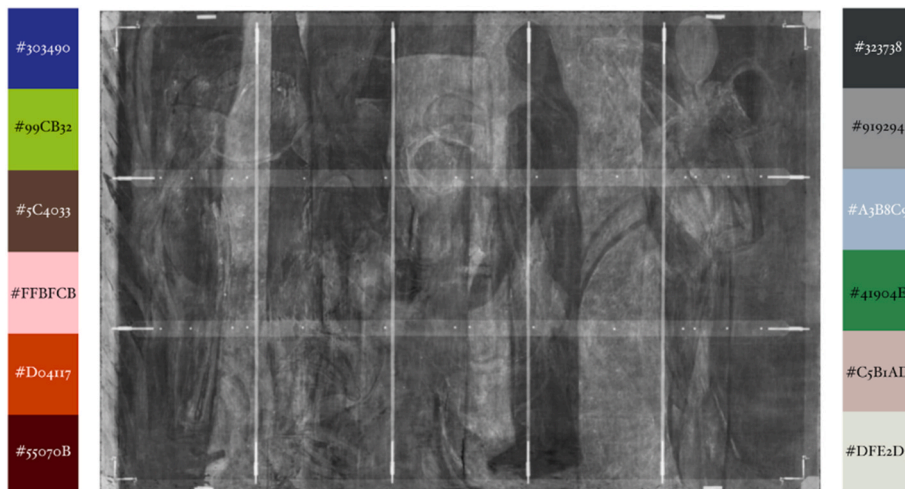


Fig. 4. Initial interface of the MyTISSE Prototype, *Creative engagement* phase.



Fig. 5. Demonstration of the step of Creative engagement.

the beginning of the experience, participants are asked to read and sign an Informed Consent form and every member of each group is identified anonymously by a code (a letter corresponding to the group and a number), thanks to which each interpretation can be associated with the answer of the final questionnaire (see later). Later, participants are given a tablet and an interactive pen; the device contains the application Ibis Paint X with a preloaded image of the X-Radiography (XRR) and two colour palettes: the first one (on the left-hand side of Fig. 4) is associated to the first version of the canvas and has been reconstructed from the cross-section photomicrographs and the comparison with *La Musique* and *La Danse*, while the second one reflects the hues of the outer pictorial film of the final version.

After this preparation, the first step (“creative engagement”) can be carried out. It is based on the proof of concept described in §3.2, as visitors are expected to identify human figures, parts of them and other elements and colour them using only one of the two palettes (see Fig. 5). They are told exclusively that the data concern a masterpiece by Matisse which underwent several compositional rearrangements. During this presentation, it will be stressed that the goal of the experiment is to enjoy art and not to reconstruct almost “philologically” the original painting: responses can hence be neither correct nor wrong. Each group

will be provided with different pieces of information and instructions: Group A is given no other element; Group B is given the correct title, *Bathers by a River*, while Group C is given a wrong title, *Soldiers by a River*: this highlights a possible factor for the change in the composition implemented by the author, i.e. World War 1 (see §3.1). As a result, the task differs across the three groups: while all the participants are expected to draw and colour on the XRR, only Group A members are also asked to provide a plausible title for their reinterpretation.

All the members of one group carry out the experience simultaneously. At the end, the reinterpretations are saved and the experience can proceed to the next section, “knowledge acquisition”, which does not differ among the three groups. It consists of an explanation of the painting, structured as a brief speech lasting less than 5 min (see attachments to Veggi and Pescarin 2023a). The third one, “Reflection and Evaluation”, consists of a survey prepared and handed via Google Form.

This survey, consisting of fourteen questions, is aimed at assessing the fulfilment of the cognitive goals, i.e. meaning creation and sense of care elicitation. As studies in psychology verified that the meaningfulness of an event or an experience may be assessed through verbalization processes (Baumeister and Vohs 2002), the first question of the survey aims at identifying through a summarization task which elements of *MyTISSE* have been perceived as most important; the second one, instead, provides a selection of these relevant elements, whose salience should be assessed by the participants, re-ordering them from one to five. In addition, the survey asks which palette was chosen during the “Creative engagement” stage, to justify this choice and to associate its hues to any feeling, image or impression.

The emotional involvement of the participants is instead assessed through an auto-evaluation, following an approach already implemented by the evaluation framework *muse* (<https://muse.stream/en/>) (Kocsis and Kenderdine 2014): i.e., assessing on a Likert scale (ranging from one to five) the emotions felt when observing the final painting. The reference emotions are drawn from Plutchick’s studies, i.e. anger, disgust, fear, anticipation, joy, sadness, surprise, and trust (Plutchik 1982). These results are then compared with the feelings evoked by two reinterpretations of the painting, created for this testing session. On GIMP, the colour palette of *Bathers by a River* has been swapped with the one of another masterpiece by Matisse, whose semantics is clear already by the title: *La bonheur de vivre* (*The Joy of Life*). This juxtaposition is not completely arbitrary, because the year of creation of this latter canvas is not distant from the first version of the *Bathers* and its twirling central group is at the basis of the composition of *La Danse*. In this section of the questionnaire, the colour palette has been considered here almost as a single linguistic *seme*, that can retain (at least partially) its own meaning also in different contexts; in addition, to facilitate the interpretation of the results, participants were also asked to hypothesise a title for the second picture (see Fig. 6).

A third section of the survey is instead intended at verifying the elicitation of a sense of care in the participants. A first question provides a fictitious scenario: the artwork would be undergoing an irremediable corrupting process and, in a few years, the damages to the pictorial film



Fig. 6. a, b. Personal reinterpretation created in GIMP based on *Les demoiselles à la rivière* and *La bonheur de vivre*.

may be unrepairable. Participants are asked to state how sorry they would be for this loss on a Lickert scale (values from 1 to 5). The second one relies on Montanari (2023), who in his latest essay *Se amore guarda* underlines that cultural experience can provide visitors a psychological benefit in a huge variety of domains, far beyond the sole knowledge acquisition: participants are hence invited to describe in a free-text question which have been the major takeaway from this experience.

Lastly, the remaining two questions focus on participants' interest in the exploitation of creative engagement in the cultural sector. They consist of two statements to which visitors can agree or disagree: the first concerns the possibility of comparing their own reinterpretation with those of other members of the group. The second asks whether cultural institutions should be encouraged to organise similar activities to exploit their collection.

#### 4. Qualitative analysis of the results

After a first preliminary test which was performed on a limited population to verify the feasibility of the experiment, a primer of this experiment was organised at the beginning of June 2023. It involved a first focus group, composed of twenty-four master students, PhD candidates and young researchers of the field of digital humanities of the University of Bologna, which gave their availability to participate in this evaluation. The definition of the size of this focus group has been supported by the fact that, in particular with a homogenous population, also very small qualitative samples may be sufficient to a “deep, case-oriented analysis, that is a hallmark of all qualitative inquiry” (Sandelowski 1995, 183; see also Boddy 2016; Creswell and Poth 2018). This population was then subdivided in six slots of four people: the three groups defined in §3.3 were consequently composed of eight members each (two slots per group). The collected data (Veggi and Pescarin 2023c) were saved as \*.csv file and processed in Python:<sup>2</sup> the use of simple algorithms (mainly, retrieval of frequency matrices and visualisations/plotting of the data) helped us in identification of general trends, yet these figures should not be intended as statistically relevant, as the adopted methodology is not suitable for statistical hypothesis testing.

At a general level, this evaluation proved that creative engagement is an effective trigger for caring practices such as meaning creation. At a closer look, summarization tasks showed that *MyTISSE* managed to give visitors an understanding of the *Bathers* starting from different keywords, such as “figure/shape” (here considered synonyms, given the context), “colour” and “interesting”. This is consistent with the results of the second question of the survey, when visitors were asked to order according to their importance five possible aspects of the history of the painting (from now on identified as *meaningfulness factors*): the change of colour, the possibility to reconstruct the different versions of the painting through conservation data and the impact of the war in the composition of the *Bathers* were by far the most relevant.

Besides the figurative elements (here colours and shapes), the title too was proven to be an important element for the understanding of the artwork and of visitors' expectations. Reading the visitors' explanation for their initial choice of palette, this correlation is clearly evident in the answers provided by some of the participants:

Because of the title [“Bathers by A River”], I imagined a colorful naturalistic image, for which strong summer colors seemed to be a better choice. (Participant B1, who chose colour palette A)

Personally, as the title that I was told was “Soldiers <by A> River”, I perceived an angrier and more of a denunciation tone and I wished to

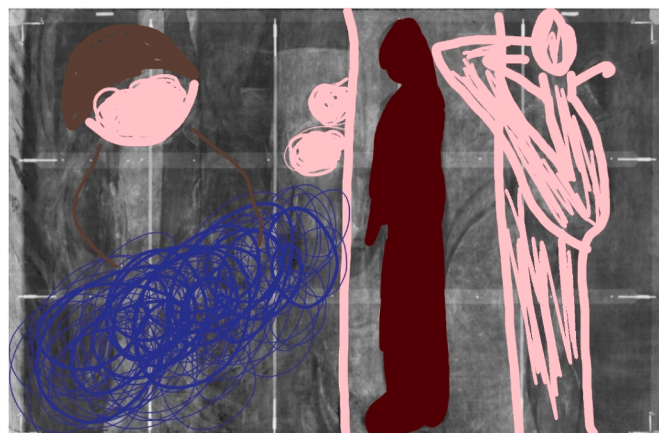


Fig. 7. *Soldiers By A River*. Reinterpretation of the *Bathers by A River*. Participant C3.

use more “aggressive” colors. (Participant C2, who chose colour palette B)

The observation of the produced reinterpretations (Veggi and Pescarin 2023b) also provides precious insight on how the title influences visitors' expectations on the work of art. Compared to the results of the proof of concept, the reinterpretations are less varied: the predominance of single faces which characterised some of the drawings in the first testing is now absent, with a sole possible example for the participant C3, who is dominated by an unproportioned and abstract face in the upper left corner. This latter interpretation is also interesting because its iconography seems to closely mirror the indicated title, *Soldiers by A River*: the figure on the left carries a tangled blue object, which, following the metaphor of the war, may resemble a skein of barbed wire (see Fig. 7).

Again, none of the reinterpretations reproduced faithfully the original canvas by Matisse, even though the second standing figure on the right hand-side has been almost always identified. The heterogeneity of the participants' drawings hence confirms anew the conformity of these results with the requirements defined by Simon. In this perspective, an interesting insight has been provided by the members of the first group, who were also asked to guess a possible title for the reconstructed canvas. The provided titles often reflect moral (*Vices and humanity*, participant A1) or religious themes. Besides *Moment of Prayer* (participant A4), three of them relied on famous Christian iconographic models, such as *The Resurrection* (participant A7) and *The Adoration of the Magi*, which was suggested independently by two different participants (A2 and A3).

At the light of these first observations, *MyTISSE* managed to propose “unexpected elements” to ignite meaning creation processes starting from visitors' expectation about the correlation between title and shapes and title and colours. In addition, it proved that the greater the knowledge gap (here, the absence of a title for Group A participants), the more diverse are the results of visitors' participation. Given that the majority of the population claimed to have studied the Parisian artistic context between 19th and 20th century in different formal and informal educational contexts, the titles put forward by Group A show how visitors made meaningful connections with other past artistic experiences, mainly on the basis of an expected iconography.

Moreover, the analysis of the other sections of the questionnaire prove that it is possible to achieve, also in the phase of knowledge acquisition, an emotional involvement of visitors. When observing the different reinterpretations of *Bathers by a River* and *Joy of Life*, visitors were asked to describe the emotions associated with the shown image. On average, if we consider Plutchik's emotion primary dyads (here retrieved combining in pairs the three most frequent emotions in every case study), we can notice that the semantics suggested by the palette

<sup>2</sup> The source data and the developed algorithms, as well as the saved images of the reinterpretations, have been made freely available in Zenodo and Github, [https://github.com/ManueleVeggi/mytisse/tree/main/testing\\_sessions/230608\\_unibo](https://github.com/ManueleVeggi/mytisse/tree/main/testing_sessions/230608_unibo).

seem to prevail on the one indicated by figures. As shown by [Chart 2a](#) and [2c](#), the greyish hues of the *Bathers* are often associated with pessimism (sadness and anticipation), anxiety (anticipation and fear), despair (fear and sadness), or awe (surprise and fear); on the other hand, if the case study canvas is re-painted with the vibrant colours of *Joy of Life* ([Chart 2b](#)), delight (surprise and joy) and optimism (anticipation and joy) are the predominant feelings.

Eventually, this emotional involvement appears to be correlated with the establishment of a caring relationship. When asked how much they would be sorry for the potential loss of this painting, the participants' answers demonstrate the creation of an intense sense of care: all the values are either extremely high or high (based on the Lickert scale). In addition, according to the answers' on the question about the major takeaway of the experience, *MyTISSE* was claimed to be beneficial for three participants out of four. A mere frequency-based key-word extraction emphasises the presence of the lemma *think*, which may indicate the effective elicitation of a *transformative dialogue*. A closer look at the single answers supports this claim: apparently, *MyTISSE* succeeded in filling knowledge gaps and questioning visitors' beliefs on art, colour, and cultural experiences, as shown by the following answers:

Yes. I think it helped me to approach art in a new, different way, a way I had never thought of before. I'll probably attend exhibitions and visit museums with a different mindset from now on!! (Participant A1)

It helped me to fill the curiosity that this exercise arised. (Participant A4)

It was helpful - also through the use of this questionnaire- to put down the feelings that this painting gives me, because I often do not consciously think about that when I look at pieces of art. [...] It is inspiring, thought provoking and admirable the way a painting of a casual, carefree activity such as bathing by a river, brought me a sense of sadness and fear considering the style of the painting but especially the context of the artwork. (Participant A6)

I think it did somehow. I think that it has helped me with questioning my own perception of color and of different ideas. It certainly has me question my own idea of art and color. (Participant C2)

It helped me in developing a sense of care for art and overcoming stereotypes about styles and colors associated with an author. (Participant C4)

This enthusiasm towards this kind of activity is also mirrored by the explicit question about whether museums should encourage similar activities: the unanimity of the participants agreed with the statement. Moreover, all the visitors also claimed that they would be curious to see the reinterpretations of the other visitors, paving the way to possible pursuit of collective participation.

## 5. Conclusion

This research presented a qualitative analysis of an interactive prototype designed in the framework of PERCEIVE, an European project aimed also at fostering citizens' reappropriation of coloured art collections starting from the key concept of *care*, adopting the definition provided by [Tronto \(1993\)](#). The major assumption of this study has been based on the findings by Edmonds and colleagues, who showed how, in interactive applications, a transformative dialogue and a behavioural change may be achieved through creative engagement (see [Bildt et al. 2008](#)). Relying on contributions in the fields of psychology about caring and cultural experiences ([Hidi and Renninger 2020](#); [Chen and Rahman 2018](#); [Kashdan and Steger 2007](#)), this work has identified meaning creation as a possible *caring attitude* and has tried to assess if this cognitive goal may be triggered also by visitors' participation through artistic activities. We have focused on *Bathes by a River* by Matisse and an

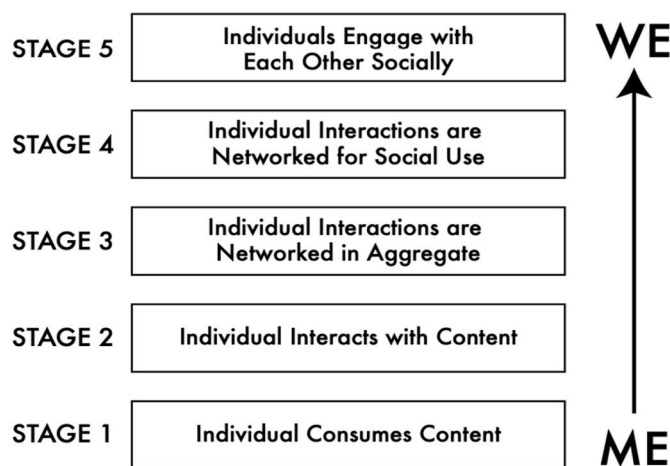


Fig. 8. Taxonomy of social participation ([Simon 2010](#)).

experimental protocol has been set up on a minimum viable product of the UX to answer this initial research question. The results of this qualitative analysis have shown that engaging visitors through artistic practices can bring about a behavioural change in the audience, fostering a "sense of care" towards CH, which fulfils the requirements defined by the PERCEIVE Project. As a matter of fact, participants were able to exploit creative engagement to focus on colour change and semantics, to create an emotional link with the artwork and to challenge their own beliefs. Besides, *MyTISSE* proposed a novel participatory approach to conservation data (in particular, X-Radiography) for non-specialist audiences.

In addition, the experiment has identified which elements should be paid major attention to by designing a *caring prototype*, in order to catalyse meaning creation processes in a participatory approach. The qualitative sample does not make it possible to infer sharp statistical trends, nonetheless even the sole analysis of the single answers clearly show an interdependence between the title, the historical context, the painted shapes on the canvas and the chosen hues. These latter two aspects appear to play a major role, as indicated by the results of both the evaluation of meaningfulness factors and the summarization task: colour change and its semantics in particular resulted to be extremely relevant.

The self-assessment based on Plutchik's model has highlighted a clear correlation between colour palettes and emotional responses. Indeed, palettes do not have a univocal semantic, rather they are vague and polysemous; nonetheless, participants successfully recognized their meaning as originally intended by the painter. This importance seems to outweigh the pieces of information provided by the disposition of the figure and the iconography. As a matter of fact, when a painting with a joyful subject such as *Joy of Life* is re-painted with the colour palette of the *Bathers*, the semantics given by the pigmentation seem to prevail. Moreover, as revealed by several free-text answers, the creative engagement and this new participatory approach to conservation data have proved to elicit a transformative dialogue between the participants and the work of art: this solicitation concerned the cultural experience as a whole, with a prime focus on the importance of colour and the different modality through which an artwork can be explored.

As anticipated, in the future these observations will be considered as a new set of requirements to re-design the next version of the application. They also suggest how the relevance of the concepts of care, meaning creation, colour semantics, compositional rearrangements and knowledge gaps deserves to be better scrutinised in further evaluation sessions. In particular, we plan to proceed with broader testing involving a bigger and more representative population sample to statistically assess the relevance of these findings.

Lastly, the results of the survey have clearly shown how participants

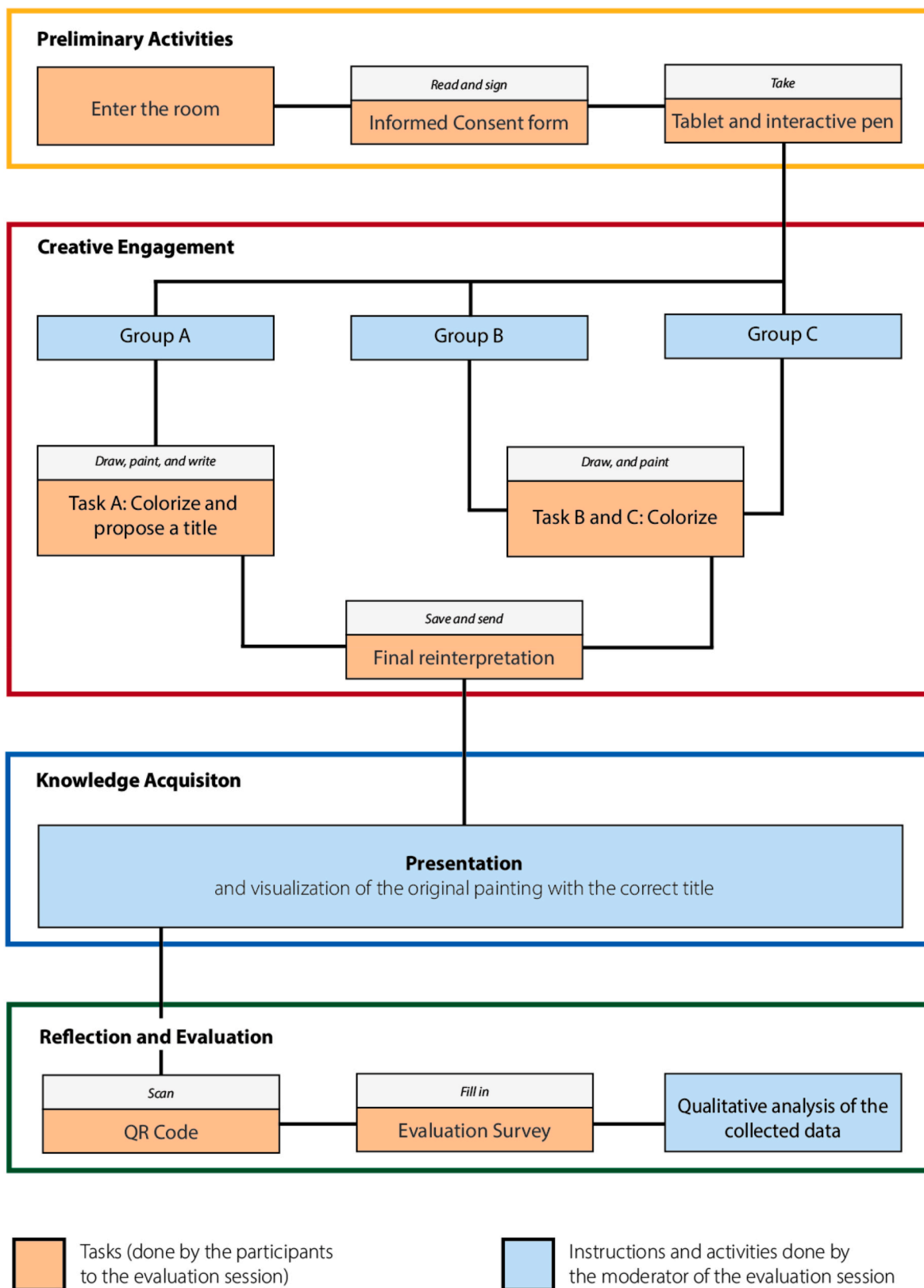
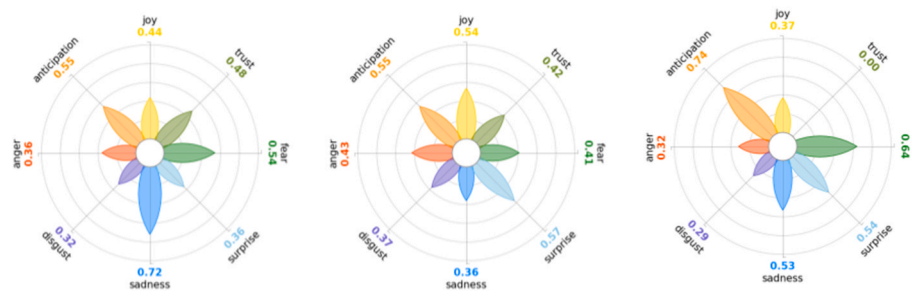


Chart 1. Illustrative diagram of the experimental protocol.

expect that the experience should not be limited to individual participation. On the contrary, collective participation should be pursued. This expectation is also coherent with the paradigm of the participatory museum and the taxonomy of social participation described by Simon.

The author indeed argues that the majority of museum experiences can be associated with the first two categories of Fig. 8, where the visitor either passively consumes or actively interacts with the content. MyTISSE prototype itself fulfils the requirements of the second stage,



**Chart 2. a, b, c.** Self-assessment of the emotions according to Plutchik's model on *Bathers by A River* and the two reinterpretations (Fig. 6a and b). Visualisation realised in Python through the library PyPlutchick (Semeraro et al. 2021).

even though the performed aggregate analysis of visitors' feedback is also coherent with the characteristics of the third class. The clear indication provided by the visitors hence should encourage designers in extending similar applications both for a social use (stage 4), i.e. allowing participants exchange content and interests, and eventually to allow visitors to engage with each other. Only in this way creative praxes may contribute in making "the entire institution feel like a social place, full of potentially interesting, challenging, enriching encounters with other people" (Simon 2010).

### CRediT authorship contribution statement

**Manuele Veggi:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Conceptualization. **Sofia Pescarin:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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