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No OBstacle to Emotion (NOBE): an assistive technology for a multi-sensory experience of visual art

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Abstract

Objective The aim of this work is to introduce NOBE (No OBstacle to Emotion®), a multi-sensory platform aiming to allow everyone – especially people with disabilities – to enjoy the aesthetic experience of perceiving and interacting with an artistic composition by means of multi-sensory patterns.

Main content A new technology called NOBE (No OBstacle to Emotion®) has been developed to overcome the limitation that persons with cognitive and sensory disabilities can encounter while visiting art exhibition contexts and, at the same time, to provide an inclusive alternative form of art.

Results In order to investigate the user experience emerging during the interaction with visual art through the NOBE system, two open/closed-ended questionnaires and an eleven-items Likert scale were administered to people with and without disabilities. Findings show high satisfaction levels with no significatively difference for both groups.

Conclusion Since it conveys the experience through a plurality of meanings related to the work of art, NOBE can be considered both an assistive technology for people with disabilities and a medium between person and works of art, by offering a hermeneutic and gestaltic experience in a synesthetic senses' contamination point of view of reality.

Keywords. Assistive technology, multi-sensory aesthetic experience, psychotechnology, visual art

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Introduction

Although rules and laws to promote the access to museums for disabled people are actually set in many countries, the problem of the access to the information in the expositive spaces is still relevant for a large group of persons: disabled people is often excluded from mainstream cultural events since the translation of artistic information is frequently reduced to a mere substitutive forms of seeing.

Different solutions have been proposed to experience cultural heritage in alternative means by using haptic, visual, textual and/or acoustic ways to express the aesthetic message [1, 11], trying in this way to overcome the dominance of sight art in museums by breaking the cultural constraints imposed by a visuocentric representation of reality. 'It's forbidden to touch' is the prohibition sign often displayed in expositive spaces which proves the sight dominance to approach art [2]. This bias can be considered as representative of the actuality of the exclusion of all visitors whose perception is mediated by other sensory channels: these persons are indeed prevented to both explore and understand the artistic products usually presented in ways that requires just only a visual perception.

As pointed out by Newman and colleagues, the attendance to cultural events connected to museums, galleries or expositive spaces can help participants to improve confidence, self-esteem and learning transferable skills [8]. Moreover, different studies show that art facilitation improve both communication and social relationship in individuals with developmental disability [4-7, 9] and further the clinical practice in the use of visual art in rehabilitation contexts [12].

In this work we introduce a new technology called NOBE (No OBstacle to Emotion®), a multi-sensory platform accessing people with sensory and intellectual disabilities to benefit from an interactive experience of visual art through different sense organs, i.e. vision, hearing, smell, and/or touch. The main purpose of this multi-sensory device is to overcome the limitation that persons with cognitive and sensory disabilities can encounter while visiting art exhibition contexts and, at the same time, to provide an inclusive alternative form of art which improves a gestaltic representation of reality, as a synesthetic senses' contamination, and not just a mono-sensory, visual-mirroring experience of artistic message.

In the following sections a description of the components and the functioning of the system will be presented. Moreover, we will analyse the user experience emerging during the interaction with visual art through the NOBE platform during a multimedia exhibition of a figurative painting. The results of a questionnaire analysing the qualitative components of the interaction, which has been administered to people with and without disabilities, are here shown.

1. NOBE: a multisensory way to approach visual art

NOBE arises from the project 'The Roads of Art through Emotions' realized by the Centre for Rehabilitation, Integration and Inclusion of Persons with Disabilities of the Vaccari Institute of Rome, which led to the presentation of a multimedia exhibition at the National Gallery of Modern Art (NGAM) in Rome. The main purpose of the project was to allow everyone, with special attention to people with sensory and

intellectual disabilities, to fully enjoy the aesthetic experience of visual art through different sense organs – vision, hearing, smell, and touch – in an interactive way.

For the first time in Italy, a multimedia interactive art installation has been created by the Vaccari Institute of Rome at the (GNAM) in Rome with the collaboration of different social, scientific, and artistic institutions: the Santa Cecilia Academy of Rome, the Italian Union of the Blind, the National Federation for the Blind, the Institute of Cognitive Sciences and Technologies (CNR), and the National Institute for the Deaf. The four figurative and abstract paintings *Angular Line* (1930) by Vasilij Kandinsky, *In the Mirror* (1902) by Giacomo Balla, *Big Red* (1964) by Alberto Burri, and *A Reflection* (1887) by Filadelfo Simi have been exhibited through an experimental itinerary called 'The Roads of Art through Emotions'. Furthermore, a multimedia exhibition of the painting titled *Charge of Bersaglieri at Porta Pia* (1871) by Michele Cammarano is currently held at the Vaccari Institute of Rome.

The NOBE system has been designed to be customized for both permanent showrooms and temporary expositive spaces by promoting both maximum flexibility in managing the components of the device and low manufacturing costs. In the following section both an educational platform – designed to introduce users to a preliminary educational explanation of the work of art – and a multi-sensory platform – designed to enhance the aesthetic experience through different interactive sensory means – will be illustrated.

1.1. Educational platform

The system has been designed to be used with an accessible educational platform next to a corresponding visual art piece. This kind of device is designed to contain an introductive educational illustration in order to provide a first explanation of the corresponding work of art. This preliminary interaction prepares the user to the aesthetic experience which will be subsequently provided by the multisensory platform. The educational platform is composed of:

i. a tactile transparent thermoformed relief superimposed on a print of the corresponding work of art;
ii. a textual explanation superimposed on a Braille translation;
iii. an audio/video screen showing the explanation of the artistic composition in both sign language and verbal language.

Figure 1. Educational platform exposed at the GNAM of Rome in multi-language tests.

Figure 2. Educational platforms exposed at the GNAM of Rome in multi-language tests.

1.2. Multisensory platform

After the presentation on the educational platform explaining the work of art (figure 3), the user is guided towards the multi-sensory aesthetic experience of the related piece within an isolated interaction environment which allows a total immersion experience with the multi-sensory device. The NOBE platform is connected to an audio/video widescreen and is composed of three components:

i. a tactile thermoformed relief of the work of art on a frame with infrared sensors which allow visitors to activate a voice, a sound, an image, or a short story aiming to evoke a multisensory experience of the artistic composition;
ii. a vibrating membrane able to transmit sound pulses through tactile sense;

iii. a tactile table containing materials and smells suggesting some relevant objects and essences of the painting.

Figure 3. Multi-sensory platform at the GNAM of Rome.

Figure 4. Multi-sensory platform at the GNAM of Rome.

As follows, an illustration of the main composing parts of the NOBE multisensory platform is described in details (figures 5-6).

10. Lifting body of the platform;
11. panel of the platform;
12. base of the platform;

13. relief box;
14. short caption box;
15. Interactive box;
16. table containing samples of material (‘tactile painting’);
17. braille captions box;
18. electronic processor unit;
19. thermoformed panel equipped with an infrared active frame for the detection of the position of user's fingers;
20. infrared active frame;
21. tactile membrane which vibrates in correspondence with the sound. This box is connected to the electronic processor unit (18).

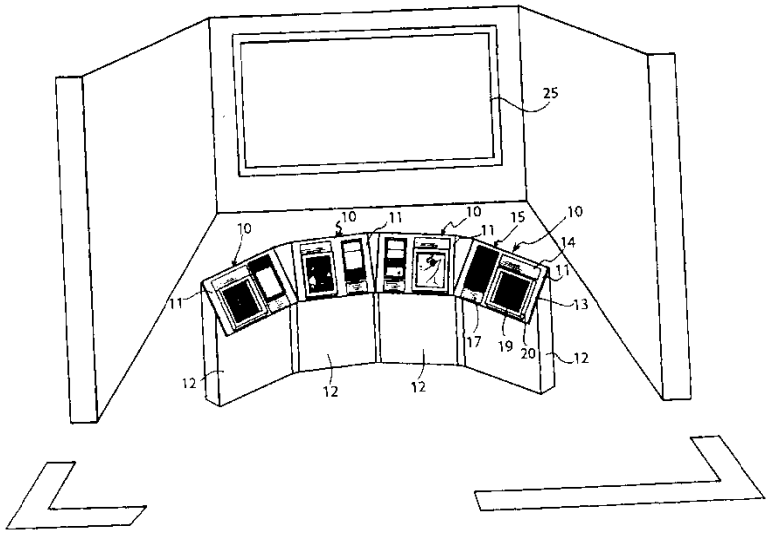

Figure 5. A perspective view of the multi-sensory platform.

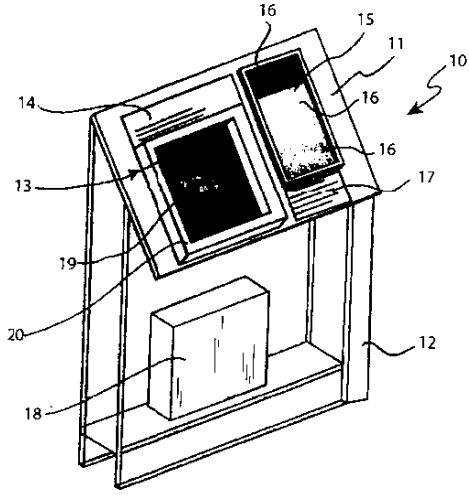

Figure 6. Plan view of the multi-sensory platform.

1.3. User experience evaluation

In order to investigate the user experience emerging during the interaction with visual art through the NOBE system, two open-ended and closed-ended questionnaires and an eleven-items Likert scale were administered to people with and without disabilities. Seven participants without disability (Group 1) (age range 19-60; 5 females, 1 male and 1 not declared) and seven participants with sensory, motor or intellectual disabilities (Group 2) (age range 19-60; 3 males, 3 females and 1 not declared) were anonymously asked to fill in a questionnaire after they attended the multimedia exhibition of the painting titled *Charge of Bersaglieri at Porta Pia* (1871) by Michele Cammarano, which is currently held at the Vaccari Institute of Rome.

Results show that the 65% of the participants declared they had been visiting the exhibition because they were interested in the displayed work of art; the 21% said it was for educational reasons and the 14% for other, unspecified reasons. The statistical analysis carried out on the results related to the evaluation questions of both satisfaction and quality of the interaction showed no significant differences (t=0.1206; p=ns) between the two groups of participants, which both scored positive average ratings (*M*=42,7; DS=4,71; *M*=34,71, DS=9,79) (figure 7).

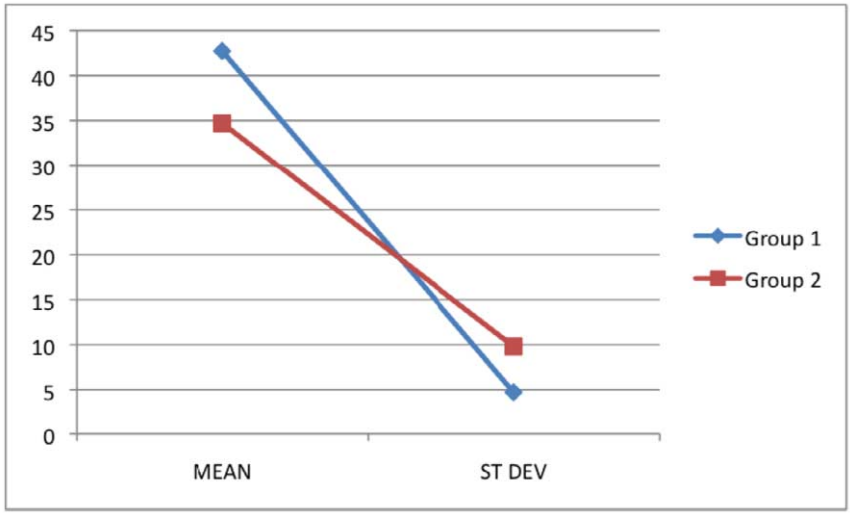

Figure 7. Participant's average ratings with t=0.1206; p=ns.

2. Conclusions

In this paper a new technology accessible to all – especially to disabled people – to enjoy the aesthetic experience of perceiving and interacting with an artistic composition by means of multi-sensory patterns has been presented. NOBE (No OBstacle to Emotion®) is a multi-sensory system accessing people with sensory and intellectual disabilities to benefit from the interactive experience of visual art through different sense organs, i.e. vision, hearing, smell, and/or touch. The qualitative results

obtained through the questionnaire show high satisfaction levels with no significant differences for both groups.

The NOBE multi-sensory platform seems to be a promising technology to contribute to promote the knowledge on cultural heritage to everyone, allow the aesthetic experience of art and, consequently, improve quality of life. The NOBE system has been designed to overcome the visuocentric barriers that prevent access to a work of art through either different sensory means or cognitive strategies. At the same time**,** NOBE is an independent work of art since it goes beyond the museum sight dominance of art by offering a hermeneutic and gestaltic experience in a synesthetic senses' contamination point of view of reality.

Concluding, as long as it conveys the experience through a plurality of meanings related to the work of art, NOBE can be considered as an assistive technology, a medium between person and art and a psychotechnology, i.e. a technology that 'emulate[s], extend[s], amplify[ies] and *modify*[ies] sensory-motor, psychological or cognitive functions of the mind' [3, 10], since it allows different ways to understand visual art.

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