



Eye Tracking and the Museum Experience in Italy

by Elena Di Giovanni

ABSTRACT: Understanding museum audiences and evaluating their experiences have long been at the core of theoretical and empirical research, from several disciplinary angles. Yet, a very limited amount of studies has, to date, resorted to eye tracking as a tool to map museum visitors' gazes, their preferences and also their difficulties in museum fruition. Eye tracking offers an objective window into audience perception and reception of a variety of stimuli, allowing the researcher to overcome many of the biases involved in qualitative empirical studies. This article presents the methodology used for two experiments carried out with eye tracking and other analytical tools at two different museums. It also focuses on the results obtained by the mixed-method investigations, with a view to promoting more systematic research into the museum experience with portable eye tracking technology.

KEY WORDS: museum audience; eye tracking; media accessibility; reception studies; museum accessibility; audiovisual translation



INTRODUCTION

Understanding museum audiences, monitoring and analysing their experiences, have long been at the core of theoretical and empirical research, from a host of disciplinary angles. Nonetheless, a limited amount of studies have, to date, resorted to eye tracking as a tool to map museum visitors' visual preferences and the difficulties they encounter during their experience. Eye tracking offers an objective window into audience perception and reception of a variety of stimuli, allowing the researcher to overcome many of the biases involved in qualitative empirical studies even when studying the visual and cognitive behaviour of a limited sample of individuals.

This article reflects on the methodology used for two experiments carried out with eye tracking technology associated with other tools and strategies at two different museums in Italy and it discusses their results. Without any claim to exhaustivity, the article aims to foster further empirical investigation relying on the direct and objective mapping of the visitors' experience, also encouraging the use of further physiological measures such as electroencephalography (EEG), galvanic skin response and heart rate.

The two studies discussed in this article were designed as part of the FACS (Full Access to Cultural Spaces) project, funded in 2014 by the University of Macerata, Italy, and carried out between 2015 and 2016. Led by linguists but featuring cognitive and social psychologists, IT engineers, museologists and accessibility specialists, the project had a truly interdisciplinary nature. Its main goal was to map and analyse overall museum accessibility as it is ensured by information tools and texts offered in different formats, first of all by gathering general data from as many EU museums as possible, and then focusing on one or two case studies for a more detailed analysis. For the first step of the project, a questionnaire was sent out to approximately 1,200 museums across Europe, selected to ensure variety in the types of collections, on the structure and on the number of visitors per year.¹ After analysing the questionnaire results and finding out that, on the whole, accessibility to museums was ensured through a host of different tools without uniformity or systematicity, the second stage in the project was designed. Experiments in two museums were thus planned, considering the specific features of each, in terms of structure, access and audience composition. The selected museums were the Museo Nazionale del Cinema located in Torino, Italy, and the ancient collection hosted by Palazzo Buonaccorsi in Macerata, Italy. The first experiment, carried out in Torino, was completed within the project deadline. The second one was carried out in early 2017, by the same team and using the same eye tracking technology, whereas the methodology was expanded and slightly revised on the grounds of the results of the first experiment.

Thus, after mapping European museum accessibility through questionnaires, enquiring about tools, texts and services for the general audience but also for audiences with special needs (Raffi), the FACS team moved to stage two in the project, first of all by designing an eye tracking + questionnaire experiment for the Museo Nazionale del

¹ The results of this survey are presented in Raffi.



Cinema in Torino. The experiment was carried out over two days in January 2016, by a team including two linguists, a museologist and two psychologists. After a detailed analysis of the eye tracking data and the questionnaire results, the methodology and the procedures were slightly revised and the second experiment was designed, with a decision to focus on two rooms of the ancient collection hosted by Palazzo Buonaccorsi in Macerata. The Catenati room and the Eneide room were selected upon a recommendation by the museum managers, but also for their different structure and the array of tools and texts for accessibility. This article reports on selected findings from both experiments, but it elaborates more specifically on the results from the second (Palazzo Buonaccorsi). Since these were largely satisfactory and extremely appreciated by the museum management, and since the methodology used was reviewed and expanded after the first experiment, discussing both the findings and the methodology may lead to replicating this study with museums across Italy and beyond.

Although, as stated above, the experiments were carried out with a truly interdisciplinary approach, its results are here discussed mainly from the perspective of audiovisual translation and media accessibility studies, i.e. the reference research fields for the author of this article and leader of the FACS project. Nonetheless, theoretical insights and previous experimental research here discussed were also drawn from museum studies and audience research; they were essential in the drafting of the FACS project and the construction of the eye tracking experiments.

Over the past few years, audiovisual translation and media accessibility studies have been opening up to research on museum access, thus fostering yet another strongly interdisciplinary avenue within this increasingly hybrid domain (Zanotti and Ranzato). Moreover, these past years have also seen a constant increase in studies on the perception and reception of original and translated media texts through eye tracking technologies, and the University of Macerata research unit was amongst the very first in Europe—the first in Italy—to use Tobii mobile eye tracking (MET) technologies to investigate museum accessibility and the visitor's experience.

As anticipated, the two museums selected as case studies for the FACS project were singled out among others for being very different in structure, collection and audience type, but also for offering several tools and accessibility strategies for various segments of their audience.

The sections below offer insights into eye tracking research from the perspective of audiovisual translation and media accessibility studies and a few reflections on the concept of museum audience development. Subsequently, previous empirical research using MET in museums is discussed, with an eye to those methodological and theoretical issues which were especially useful for the design of the FACS experiments. Two sections dedicated to the detailed exploration of the Torino and Macerata experiment follow, presenting both the methodology used and the main results obtained.



EYE TRACKING RESEARCH IN MEDIA ACCESSIBILITY

As Jan Louis Kruger recalls in an essay surveying some of the applications of eye tracking research to media accessibility studies, “the eye movements that can be detected by an eye tracker provide us with a window on the internal systems of the mind” (351). This is indeed true, as eye tracking monitors visual perception precisely as it is happening, thus without the filter of reception² and this is an invaluable asset for empirical research aiming to observe people’s spontaneous behaviour in selected settings. However, tracking eye movements in dynamic environments is no easy task: the visual field of participants in an experiment is never the same, as people move differently, they change position at different times and interact in unique ways with museum sections and objects on display. Having a huge variation in terms of visual field, visit duration and choice of objects to fixate and observe certainly adds complexity to data analysis and to the results that are obtained.

In his chapter, particularly useful for scholars aiming to embark on eye tracking research for the first time, Kruger also surveys the most common measures (metrics) that are used to analyse eye tracking data, amongst the many possibilities offered by the tool and its software. In particular, Kruger lays emphasis on the number of fixations (both total and average) and the fixation duration (again both total and average). These are precisely the metrics considered in our analysis of the first and second eye tracking experiment in the two museums. As Kruger further suggests, however, values and figures from eye tracking tests are best evaluated in relation to additional data, gathered for instance through questionnaires, interviews or observation protocols. Additional tools and strategies for measuring the visitors’ experience were also used for both experiments reported below, although differently.

OBSERVING AND ENHANCING MUSEUM AUDIENCES

In *The Engaging Museum: Developing Museums for Visitor Involvement* (2005), Graham Black emphasizes the importance for museums to become primarily, or even fully, audience-centred rather than object-led. In order to make such a seminal switch, he suggests that museums should become fully aware of the characteristics, the needs and the expectations of their own visitors. Ten years later, when the FACS team was designing its eye tracking experiments, this concern proved to have been acknowledged in many different ways, and with varying depth, by a wide range of museums across Europe. A questionnaire sent out to 1,200 museums of all types (Raffi 23), with the aim to find out what information tools and resources they offered to visitors (from the general audience to persons with special needs), revealed that a considerable number of museums were still anchored to traditional visits and tools,

² For a detailed definition and distinction between the concepts of reception and perception, see Di Giovanni 162-163.



although a few (generally not the larger ones) had already gone a long way to meet the audience needs and expectations in terms of accessibility across the spectrum of age, nationality, sensory impairments. In terms of accessibility for persons with sensory impairments, however, over 70% of the respondents declared that their museum offered opportunities for special visits and tours, but not inclusive tools allowing these visitors to enjoy the museum experience along with other people.

On the whole, more than 50% of the respondents directly or indirectly described a shift from a consideration of their visitors' needs to their actual, active engagement in the museum experience. In connection to this, Waltl rightly observes that the visitors' experience in museums can and should be enriched by tools and strategies aiming to enhance their enjoyment, not only in terms of learning but also in terms of entertainment. This twofold meaning attached to visitors' engagement is particularly relevant for the two experiments carried out with MET and here reported: while the Museo Nazionale del Cinema aimed to stimulate its visitors to move beyond a search for 'mere' entertainment and acknowledge its educational and historical value, Palazzo Buonaccorsi was perhaps aiming for the opposite, i.e. to make its visitors realize that they can learn about painting, sculpture and design across five centuries while having an entertaining experience. Before expanding on this and exploring the main results of the experiments let us refer to studies using MET technologies in museums that were available prior to our empirical research.

MOBILE EYE TRACKING IN MUSEUMS: PREVIOUS RESEARCH

When the FACS project was funded, in 2014, there were only a handful of studies reporting on the use of MET to evaluate the experience of museum visitors, as the technology itself was not widespread and it was mostly used in other contexts related to the neurosciences and marketing. The few studies available had been carried out in Germany and the USA. More specifically, the German experiments had been developed by Eghbal-Azar and Widlok on two exhibitions held in Stuttgart and Marbach, whereas the US studies had been conducted by a team guided by Silvia Filippini Fantoni, firstly at the Indianapolis Museum of Art and subsequently in comparative terms at Indianapolis Museum of Art, the Deutsches Museum in Munich and the Hatfield Marine Visitor Center in Newport, Oregon.

The study by Eghbal-Azar and Widlok was particularly inspirational for the FACS team. The two researchers reported on their experience in a 2013 article, which sets off by discussing the potentials and limitations of MET for museum visitor studies from the points of view of a media studies expert and an anthropologist. The article also highlights some of the major differences between the empirical procedures that had been used until then (data collection through paper-and-pencil observation, think-aloud protocols, videorecording, etc.) and the opportunities offered by MET, among which "data richness, high external data validity and nonreactive measurement" (106). As for data richness, it is undeniable that eye tracking experiments offer a wealth of information which need to be carefully filtered according to the researcher's aims. With reference to external data validity, mobile eye trackers record data through field and



eye cameras and objectivity is assured, as has been seen by many scholars in a number of different settings: as a matter of fact, participants cannot control their visual/cognitive behaviour unless it is for mere (and irrelevant) fragments of seconds at the very beginning of an experiment (Duchowski). In the ensuing sections, the two scholars also expand on the potential limitations of MET, among which the high costs of the eye trackers, the time-consuming and complex data processing, but also what they define as *selective sampling*: considering the complexity and the length of data collection and evaluation, MET can be used, in museums but also elsewhere, with limited numbers of participants. However, as Eghbal-Azar and Widlok demonstrated, meaningful results can be obtained even with small numbers and, as has been further proven in this field, quantitative analysis *can* be carried out at different levels even on fairly small samples of users (Hansen-Schirra and Grucza). One of their conclusions was also particularly inspiring for the design of our first experiment: MET provides a wealth of data but for more thorough results eye tracking should preferably be combined with other measurement tools and methods (for further details and resources, see also Orrego Carmona).

The Indianapolis/Munich/Newport experiment, as reported in Filippini Fantoni *et al.* in 2013, was also inspirational in that one of the researchers' main concerns was the visitors' approach to spaces and specific exhibits through labels and other informative material, which was right at the core of the FACS project.

This transnational experiment, however, was based on specific tasks assigned to visitors and monitored through MET, with an inevitable loss of spontaneity in the participants' behaviour. As a matter of fact, the experiment was mainly concerned with ascertaining the relevance of MET for this field of research and, notwithstanding a frequent reference to the limitations of the technology at their disposal (MET was in its early days in 2012), the researchers concluded that "this type of tool can be useful in a more experimental setting for in-depth analysis of interpretation strategies" (7), thus encouraging further experimentations in less constrained contexts.

Silvia Filippini Fantoni was involved as a consultant in the planning of the first experiment here described and carried out at the Museo Nazionale del Cinema in Torino, Italy, which is the object of the next section.

EYE TRACKING AND THE VISITORS' EXPERIENCE AT THE MUSEO NAZIONALE DEL CINEMA, TORINO

Selecting the Museo Nazionale del Cinema as the first site to carry out an experiment with MET was certainly not a random decision: the museum is well-known throughout Italy as it welcomes hundreds of visitors every day; its sections and exhibits combine, at varying levels, entertaining and educational purposes; the quantity and typology of informative material is wide and diverse. When the experiment was planned by the FACS team, the museum section named "Archaeology of Cinema" had recently been refurbished, with a new display structure and a set of additional information tools for the visitors. This section was selected upon recommendation by the museum managers,



which were interested in an evaluation of the new display, the information tools and the visitors' interactions with both.

Concentrating only on four visiting areas and the corresponding showcases (Optics, Peepshows, Stereoscopy, Panorama) this experiment comprised two steps, namely the free observation of the four areas by museum visitors equipped with MET and a short questionnaire administered by one of our operators at the end of the visit. The experiment took place in January 2016 and it relied on the newly released Tobii Pro Glasses 2, the latest generation of mobile eye trackers. Recording at 50Hz, controlled remotely from a Microsoft Surface Pro 3 tablet, these eye tracking glasses yielded high levels of accuracy. Out of 20 visitors who spontaneously accepted to take part in the experiment, 16 provided very accurate data (88% recording accuracy) which were used for the analysis: 9 men and 7 women, their ages ranging from 18 to 60 (38 on average). After data collection, the team moved onto the data analysis, which was at the time particularly strenuous as the Tobii Pro Lab software was still in its infancy, being tested and improved by the Swedish manufacturer. The analysis was thus completed in June 2016 and, as is customary with eye tracking data, it was based on designing areas of interest to isolate the elements (objects, areas, tools) that were relevant for data extraction. Figure 1 shows how areas of interest were designed for the Optics showcase.

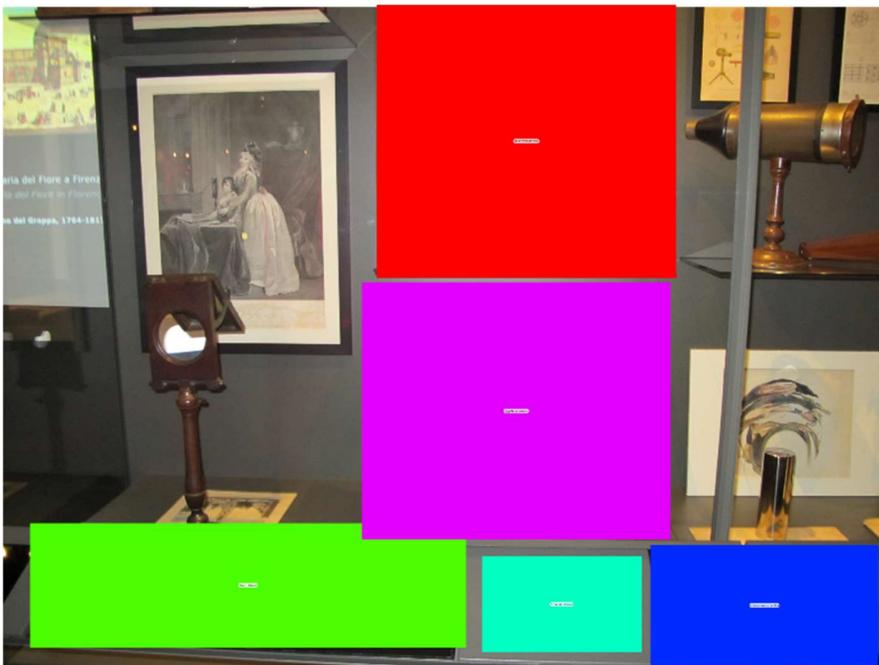


Fig. 1. Areas of Interests for the Optics showcase.

The following metrics (analytical parameters) were extracted from the data set obtained for the areas of interest: total visit duration, average visit duration, visit count, total fixation duration, average fixation duration, fixation count.

Besides this quantitative data analysis performed on Tobii Pro Lab and based on the metrics above, audio and video recordings from each participant, as provided by



the MET (equipped with field cam, eye cam and a voice recorder), were individually analysed, to map each user's experience through his/her gaze patterns. As a first datum, it may be worth stating that the overall visit duration varied considerably, ranging from 2 minutes to 17 minutes and 50 seconds, with an average value of 8 minutes and 46 seconds.

Before presenting some results, let us focus on the main hypothesis which guided this experiment, i.e. that the four areas of the "Archaeology of Cinema" section offered too much informative material and too many options: dark, backlit panels with long texts in two languages at the bottom of each showcase; embedded, interactive tablets; a bright red, backlit panel with a large, white eye at its centre aiming to draw attention to display highlights; QR codes for extra content; iPads available at the entrance to be carried around throughout the visit; traditional paper maps and brochures. Figure 2 below shows the first three information tools listed above.



Fig. 2. The Optics section and its main information tools.

As a matter of fact, the variety and richness of information tools proved excessive, as revealed by the experiment results. As Raffi says in her article,

Considering the total visit duration, visitors dedicated more than 80% of their time interacting with the informative area (i.e. information panel and interactive screen) and less than 20% looking at the objects exhibited. In terms of fixation duration, around 85% is concentrated on the information tools, and less than 15% on the objects exhibited. Interestingly enough, despite the interactive and more dynamic nature of the informative screen, it is the information panel, comprising only an Italian text together with its English translation, which attracted visitors' attention the most: 67% against 32%, in terms of fixation duration. (32)



Interesting though these findings may be, one further result is worth highlighting here. In the experiment reported by Filippini Fantoni *et al.*, the relationship between the objects on display and their pictures on the informative material was also tested, “with the assumption that objects attract higher attention than their photographic reproductions” (14). In the Museo Nazionale del Cinema experiment, no such preliminary hypothesis had been made, but results from the quantitative data analysis and the qualitative evaluation of the users’ experience shed light on a surprising feature: visitors who resort to the embedded tablets to read labels and see pictures for the objects on display, very often content themselves with viewing the photographic reproduction of that object on the tablet, without looking for the real thing. This was one of the most significant and surprising results for the museum managers.

Moving onto the figures obtained from the eye tracking data analysis, let us start with the first area of the visit named “Optics.” In this area, the average figures for total visit duration are as follows: 82.05% of the overall time was spent by participants on the information tools, whereas 17.58% was devoted to the first level of exhibits (visually easier to reach from the information tool level) and only 0.37% of the time went for the second level of exhibits, which incidentally was the most valuable in this section. As for the overall time spent on the information tools, 66.9% was devoted to the backlit panels with fairly long texts and 32.42% to the interactive tablet. The remaining 0.68% was used to quickly scan the red panel with the big eye for highlights. In the area named “Panorama,” the last one in our visit, the information tools went so far as to score 92.69% of the total visit duration (averaged on data from all participants), with the remaining time devoted only to a series of prints presented in the first level of exhibits. In the “Stereoscopy” area, 90.4% of the total visit duration was yet again devoted to exploring the informative material, with only 9.6% dedicated to the objects on display (only 2 out of over 15 exhibits were viewed).

Another interesting set of data was obtained from the analysis of reading times and patterns for the texts on the backlit panels. To quote but one example, for the backlit panel whose text is titled “Scatole Ottiche per Diorami Teatrali,” 63.88% of the total visit duration was devoted to the title and the first paragraph, whereas the second paragraph scored 23.43% and the remaining two paragraphs only 12.69%. These figures are revealing of the concentration spans and preferences of visitors, which, in the presence of several information tools and fairly long texts, normally opt for shortcuts in reading. On the whole, such striking and unexpected results, among the others presented by the FACS team at the end of the analysis, induced the museum management to reconsider their displays and limit the use of information tools.

EYE TRACKING AND THE VISITORS’ EXPERIENCE AT PALAZZO BUONACCORSI, MACERATA

In the wake of the interesting and also partially unforeseen results obtained by the MET experiment at the Museo Nazionale del Cinema in Torino, a new set of tests was designed in the following months, to be carried out in September 2017 in Macerata. As anticipated, it was a precise intention of the FACS team to investigate two different



museums and their visitors' behaviour with MET. Thus, after the first experiment in Torino, whose museum is often chosen by visitors for its recreational nature, a more traditional museum was selected, different in many respects. Palazzo Buonaccorsi in Macerata hosts three different collections on three floors, it is located in a significantly less touristy town if compared to Torino, and its peak features are in the so-called *piano nobile*, the best known and beautifully decorated part of the palace, which constitutes an exhibit per se and hosts the Ancient Art collection. With the museum managers, a decision was made to concentrate on two sections of the *piano nobile*, both featuring various information tools but differing in artistic content and structure: the *Sala dei Catenati* (Catenati room), is a rather small space dedicated to the Accademia dei Catenati, whose coat of arms appears in the room along with 25 paintings celebrating the seventeenth century members of this prestigious society.³ The *Sala dell'Eneide* (Eneide room), on the other hand, is a fully decorated, eighteenth century masterpiece with painted ceiling, doors and windows, enriched by large, framed paintings hung all across its four walls. Figure 3 below shows the Sala dell'Eneide.



Fig. 3. Sala dell'Eneide, Palazzo Buonaccorsi.

Building on the experiment carried out in Torino, some changes to the methodology were implemented. First of all, the end-of-visit questionnaires, which had provided interesting insights for the Museo del Cinema experiment but were not appreciated and completed by all participants, were eliminated. Instead, a structured observation protocol was designed by two psychologists and applied to each participant's visit: keeping at a distance from the visitors themselves, one of the psychologists recorded selected behavioural features for each of them and subsequently compiled a thorough analysis. Moreover, a detailed user experience analysis was performed on the audiovisual recordings provided by the MET for each participant. To this end, a more schematic framework was designed, focusing on the relative time spent on exhibits as opposed to the information tools, the passive vs active attitude of the visitors, the patterns of observation of the paintings in the Catenati and the Eneide room. As for the eye tracking data, a more limited number of metrics were

³ For more information, see the *Accademia dei Catenati* website: www.accademiadecatenati.it/la-sala-dei-catenati-nel-palazzo-buonaccorsi.html.



selected for this experiment, to be combined with the findings from the other methodologies. These measures were: total and average visit duration, total and average fixation duration, total and average fixation counts.

A total of 17 visitors took part in the experiment, 10 female and 7 male, aged between 27 and 76 (48 on average). Again for reasons of space, discussion of the results will be based on selected findings from all three lines of experimental analysis, and corroborated by a few final reflections.

As for the information tools available to the visitor, the Catenati room offers a multimedia totem placed at the very entrance to the room and only partially interactive, a large paper book which can be consulted by visitors and is placed on the left-hand side of the Catenati paintings, and a two-metre wide multimedia screen, rising approximately 50 cm from the floor and designed in 2014 by N03.⁴

The Eneide room, on the other hand, offers a fully-interactive totem placed on the left-hand corner of the room, next to the entrance, and a small plastic stand for free-to-pick paper leaflets, placed on the right-hand side of the entrance. The same Tobii Pro glasses used in Torino were employed in Macerata, but an improved Tobii Pro Lab software was available this time for data analysis. All 17 participants provided great recording accuracy (85%) and the overall visit duration was, on average, strikingly similar to the one recorded in Torino: visitors spent from 2 minutes 10 seconds to 17 minutes 55 seconds in the two rooms, with an average visit duration of 8 minutes 20 seconds. On the whole, participants spent 34.8% of the overall visit time in the Catenati room, with the remaining 65.2% dedicated to the Eneide room, which incidentally is almost three times bigger. Out of the overall visit duration, 2.6% of the time was spent using the paper information material (book and leaflets), whereas 30.4% was devoted to the multimedia tools in both rooms. Interestingly, the time distribution favours the long, multimedia screen in the Catenati room and the totem in the Eneide room, which scored respectively 28.7% and 32% of the overall visit duration in each room. The partially interactive totem placed at the entrance to the Catenati room, on the other hand, only scored 3.2% of the overall visit duration for that room and while the large, multimedia screen was observed by all participants, only 3 out of 17 stopped, if briefly, by the totem. One of the reasons for such a discrepancy, but also for the preference for the multimedia screen, may be that the totem is placed at hand-interaction level and displays moving images that invite the audience to touch but that aren't, in fact, touch-sensitive for the first 30 seconds approximately. This discourages users, who try to interact but soon give up and move on. Furthermore, the multimedia screen with its soft music, warm voices and captivating graphics, which are automatically activated as visitors enter the room, enhances a multisensory, immersive experience.

As for the overall time dedicated to the interactive totem in the Eneide room, it is important to clarify that (for approximately 40% of the participants) this includes the time spent to move away from the totem and reach one or more areas in the room where the frescoes and paintings, visualized on the totem, are located. On the whole, however, figures for the overall visit duration versus the amount of time spent on the

⁴ See the video www.neo.mi.it/works/hinc-a-te-nati for a brief description of this tool by its designers.



information tool in the Eneide room appears to be well-balanced and the patterns of movements by visitors, from the information tool to the paintings, are homogeneous and coherent.

More specifically, the participants' observation patterns, as they emerge from the detailed user experience analysis, are revealing of the visitors' approach to these areas. The Eneide room immediately captures the visitors' gaze with its astounding beauty: as they enter the room, they scan the decorated ceiling (100% of participants), devoting several fixations to the centre and the bottom of the ceiling, generally remaining in the entrance area. Then, from the bottom part of the ceiling, participants generally lower their gaze to fixate the gilded door placed opposite the entrance, at the end of the room (88.2% of participants). Subsequently, they move forward from the main entrance and to the left, where the interactive totem is located. From it, they select sections of the frescoes or the paintings hung on the wall (82.3% of participants), which they first visualize on the totem and then either seek with their gaze across the room, or find by moving towards them. In this case, photographic reproductions of paintings and sections of the frescoes are hardly ever used as a replacement for the original paintings (1 participant only), which bears witness to the efficacy of the interactive, informative totem and its position.

In the Catenati room, the user experience analysis yielded even more interesting results: virtually all participants (16 out of 17) entered the room and quickly scanned the 25 paintings, generally focusing on the fourth line from the top, with five paintings which are placed at eye level. Figure 4 shows the 25 Catenati paintings, with heatmaps from eye tracking analysis.

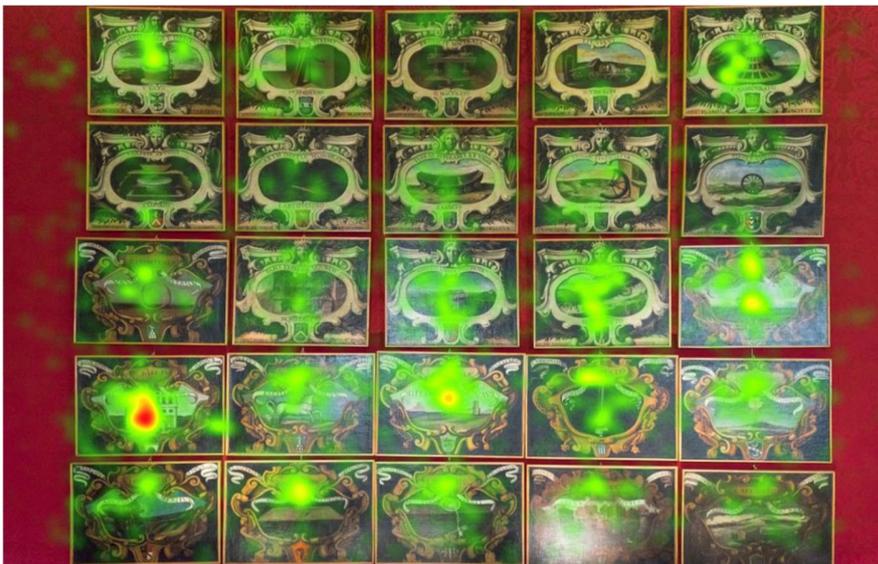


Fig. 4. Heatmaps on the Catenati paintings.



As anticipated, only 3 out of 17 individuals briefly stopped next to the totem at the entrance, while the others proceeded directly inside the room and placed themselves in front of the paintings, the long multimedia screen placed between them and the paintings themselves. At this stage, all participants scanned the 25 paintings again, generally producing no significant fixation. Subsequently, they observed the multimedia screen for 14.5 seconds on average, to then shift their gaze from the paintings shown on the multimedia screen to the actual paintings on the wall. Although briefly detailed here, the analysis of all the users' experience pointed to coherent and well-balanced gaze patterns, with meaningful, recurrent correlations between what is displayed or described on the multimedia screen and the actual paintings.

CONCLUSIONS

Besides what has been discussed above, one of the most interesting findings obtained from the Palazzo Buonaccorsi experiment, especially from the observation protocols and the combined analysis of the users' experience (as said before, MET also allows for audio recording of the participants' voices) is the overall satisfaction and positive feelings expressed during and after the visit by virtually all participants. As the psychologists in the team confirmed through the results of their observation, this type of feedback seems to corroborate the overall adequacy and efficacy of the interactive and multimedia tools and their being sufficient in guiding and entertaining visitors in the selected areas.

An overall comparison of the results obtained from the Museo Nazionale del Cinema and the Palazzo Buonaccorsi experiments, on the other hand, points to the detrimental effect of excessive information and access tools, especially if offered simultaneously and in multiple formats. In the first experiment (Torino), for instance, unexpected negative results were obtained from the eye tracking tests in relation to the bright red screen with a large white eye that points to the highlights in each showcase. The three types of analyses performed (quantitative, user experience, questionnaires) proved that no participant had understood the screen function, therefore they had not used it. As for the printed material available in Palazzo Buonaccorsi, the comparative data analysis showed that when effective multimedia or interactive tools are offered, paper leaflets or books are hardly ever used. In the Palazzo Buonaccorsi rooms, leaflets were mostly seen by participants as 'souvenirs' to be taken home. On the whole, even from the limited data here presented, it seems evident that when multisensory engagement is paired with the provision of information, by means of limited but effective tools, a balanced division of attention and the overall visitors' satisfaction are ensured.

As anticipated, this article has no claim to exhaustivity, especially in relation to data analysis for both experiments; eye tracking tests in themselves, as is known, provide a host of analytical paths and opportunities which are worth pursuing, as results that are obtained are often surprising and also unquestionably objective (see the section on eye tracking at the Museo Nazionale del Cinema). The cross-methodological



analysis here presented would also deserve further discussion, as the wealth of findings obtained lend themselves to multiple interpretations and interesting discoveries.

The aim of this article remains, first and foremost, to highlight the importance of experimental, interdisciplinary research on museum audiences and their interaction with exhibits mediated by information tools. As a final remark, we may add that experiments with MET technologies in museums should indeed be pursued, as they allow for thorough investigation and understanding of the visitors' real needs and preferences.

WORKS CITED

Black, Graham. *The Engaging Museum: Developing Museums for Visitor Involvement*. Routledge, 2005.

Di Giovanni, Elena. "Dubbing, Perception and Reception." *Reception Studies and Audiovisual Translation*, edited by Elena Di Giovanni and Yves Gambier, John Benjamins, 2018, pp. 159-178.

Duchowski, Andrew. "A Breadth-first Survey of Eye-tracking Applications." *Behavior Research Methods, Instruments, & Computers*, vol. 34, no. 4, 2002, pp. 455-470.

Eghbal-Azar, Kira, and Thomas Widlok. "Potentials and Limitations of Mobile Eye Tracking in Visitor Studies: Evidence from Field Research at Two Museum Exhibitions in Germany." *Social Science Computer Review*, vol. 31, no. 11, 2013, pp. 103-118.

Filippini Fantoni, Silvia, et al. "Capturing Visitors' Gazes: Three Eye Tracking Studies in Museums," paper presented at the *MW-Museum and the Web 2013* conference, mw2013.museumsandtheweb.com/paper/capTorinog-visitors-gazes-three-eye-tracking-studies-in-museums. Accessed 10 January 2020.

Hansen-Schirra, Silvia, and Sambor Grucza, editors. *Eye Tracking and Applied Linguistics*. Language Science Press, 2016.

"Hinc a te nati." *NEO. Narrative Environments Operas*, www.neo.mi.it/works/hinc-a-te-nati. Accessed 10 January 2020.

Kruger, Jan Louis. "Eye Tracking in Audiovisual Translation Research." *Routledge Handbook of Audiovisual Translation*, edited by Luis Pérez González, Routledge, 2019, pp. 350-366.

"La Sala dei Catenati nel Palazzo Buonaccorsi." *Accademia dei Catenati Macerata*, www.accademiadeicatenati.it/la-sala-dei-catenati-nel-palazzo-buonaccorsi.html. Accessed 10 January 2020.

Orrego Carmona, David. "Audiovisual Translation and Audience Reception." *The Routledge Handbook of Audiovisual Translation*, edited by Luis Pérez González, London/New York: Routledge, 2019, pp. 367-382.

Raffi, Francesca. "Full Access to Cultural Spaces (FACS): Mapping and Evaluating Museum Access Services using Mobile Eye Tracking Technologies." *De Gruyter Open*, vol. 9, no. 2, 2017, pp. 18-37.

Waltl, Christian. "Museums for Visitors: Audience Development - A Crucial Role for Successful Museum Management Strategies." Conference paper presented at the



Intercom 2006 conference, available online at www.arthurmckeown.com/BMG159%20Reading%2005%20Waltl.pdf. Accessed 10 Jan. 2020.

Zanotti, Serenella, and Irene Ranzato. "Intersections: Audiovisual Translation at the Crossroads of Disciplines." *Perspectives. Studies in Translation Theory and Practice*, vol. 27, no. 2, 2019, pp. 173.181.

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