PROTECTION OF CULTURAL HERITAGE

EYE TRACKER AS A PRO-SOCIAL TOOL OF MANAGING URBANISTIC AND ARCHITECTURAL HERITAGE

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ABSTRACT: The subjective point of view of experts is often translated into attempts at free reinterpretation of legal acts. The participants of the " dispute about a monument" may include the investor, architect, conservators, politicians, officials, as well as third parties - citizens. In order to make it possible to objectivize the decisions made, to establish a dialogue based on a common point of reference or to give the public the opportunity to object, I suggest performing oculographic examinations. Eye tracking (or oculography) allows to track how people become visually familiar with the objects presented to them. By registering the movements of eyeballs of a large group of observers, it is possible to examine the preferences governing this process as well as to observe the changes resulting from modifications introduced within the presented object. The article briefly discusses the possible use of eye trackers for the purposes of diverse legal protection of historical monuments and a multifaceted opportunity for the society to participate in this process. The text also includes arguments for and against the introduction of such a method to common use. For the legibility of the argument, the phenomenon is described based on the example of the library erected in Ostrów Tumski in Wrocław. The aim of the article is not to undertake an individual criticism of the mentioned realization, but only to list the problems that could be efficiently solved thanks to a completely new research approach.

KEY WORDS: Eye tracking, management of historical monuments, monument revitalization

1. Introduction

There are many situations in Poland where, as citizens, we have doubts as to whether during revitalization, adaptation, renovation or extension, an architectural monument was in fact given the best possible form of care. Objections expressed in person or in writing concern various aspects of contemporary interventions: landscape protection, works related to facades, the external shape of the buildings and historical interiors or reconstructed details. An example is the dispute that arose in relation to the construction of the Archdiocesan Library (Fig. 1) within the area of Ostrów Tumski in Wrocław, which is under conservation protection, and it is this case that will serve as a reference point for the considerations contained in this article about eye trackers (oculographs) as a pro-social tool for carrying out conservation protection.

2. The aim and scope of the study

The aim of the article is to present eye tracking research as an opportunity to socialize and significantly objectivize the process of monument management. I intend to take a closer look at the advantages and disadvantages of such a solution, and I will conduct my interview based on the specific case mentioned in the introduction. This analysis, however, does not constitute a criticism of one particular object, but I believe that it will allow to draw attention to some general, systemic deficiencies in the current model of architectural and urbanistic heritage management.

3. Description of the analyzed situation

The parties to the dispute over the appearance of the newly erected service building on Ostrów Tumski, apart from the protesting activists, some conservators, architects and urban planners, were two decision-making groups gathered around the Regional Monument Conservator Barbara Nowak-Obelinda and officials nominated by the Mayor of the City, Rafał Dutkiewicz, who, in accordance with the law, are in charge of taking care of most of the monuments located in the city.

The new building was erected on the site of the Baroque alumni house, destroyed during World War II. The new building corresponds to the formerly existing edifice through the divisions used, architectural details, and adaptation to its former scale. The only, but as it turns out, significant reason for the dispute was the final color scheme of the roof of the new library. The original visualizations which were presented as a multimedia presentation for public consultation[1] did not indicate that the designer, engineer architect Jerzy Gomółka, together with the investor - the Archdiocese of Wrocław, were planning to cover it in its entirety, both the facades and the roofing, with a white and grey concrete composite material. Barbara Nowak-Obelinda negatively assessed changing of the object's colour scheme in relation to the variants commonly presented in the media. She even announced a review of the supervision and care over the historical

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[1]   An example of the materials made publicly available by the Archdiocese of Wrocław is the presentation https://www.youtube.com/watch?v=yfTMJGf0aiU.

monuments performed by Mayor of Wrocław and his subordinate - the Municipal Monument Conservator, Agata Chmielowska. Nowak-Obelinda said that "The zoning plan recognizes the most important landscape values of the area, it also introduces the principle of reconstruction of historical buildings. (...) When looking at Ostrów Tumski, one notices that such a bright building disturbs the panorama of the historic ensemble". The Provincial Conservator called the emerging object "a mirage", which instead of complementing the existing historic complex, "escapes" in a completely different direction (E.W., 2016)[2]. This decision was also not understood by the members of the Association for the Embellishment of the City of Wroclaw, on whose behalf Przemysław Filar spoke out, calling this, in his opinion totally unjustified, decision to cover the roof with a pearl-grey tile a "Disneyland" located in such an important place[3].

Fig.1 The view of a fragment of Ostrów Tumski in Wrocław with the newly erected building of the Archdiocesan Library (photo by MR)

Piotr Fokczyński, the City Architect, presented a different opinion on the building. He expressed the opinion of some of the architects, who do not want to be only authors of faithful copies and aesthetic imitations. For these artists, attempts to reinterpret the past within the broadly understood reproduction seem to be highly justified. In the past, as a consequence of the damage caused by natural disasters, warfare, social revolutions, and political upheavals, there were often twist that broadened the understanding and justification of the reasons for undertaking reconstruction (Mager, 2015). It was probably this diversity of applied practices that the Architect of the city of Wrocław referred to when he said: "There are two ways of recreating monuments. One assumes a far-reaching reconstruction of their original appearance, the other weaves in contemporary elements. I believe that in this case, the imitation would look

[2]   Resolution No. XIIT/442/99 of the City Council of Wroclaw on 21 October 1999 on the adoption of the local development plan for the area - Ostrów Tumski, the islands and Botanical Garden in Wroclaw.

[3]   The statement is available at: http://www.radiowroclaw.pl/articles/view/47302/Perlowe-dachowki¬-czyli-kontrowersje-wokol-nowej-Biblioteki-Archidiecezji-Wroclawskiej, (DOA 28.12.2019).

simply kitschy". (E.W., 2016). Fokczyński did not touch on one more aspect important from the point of view of restoring the old architectural form. It is not entirely clear what material originally covered the roof of the building and what color scheme was given to the elevations. After all, over the years, the color scheme of the object was subject to modifications, so which color scheme would the architect theoretically refer to?

3.1 The observed legal, political and social issues

Studying in detail the arrangements of the local zoning plan in force in this area, one can see that the City Architect's argumentation aimed at defending the freedom of artistic expression is incorrect in this case. Regardless of individual preferences, in the light of the law in force, there should be no free retroversion (Lubocka-Hoffmann, 2000). It is possible that the provisions are too restrictive and the mimetic reconstruction would be an abuse from the point of view of the authenticity of the preserved heritage, but when deciding to build an object in such an exceptional area, both the investor and the designer must be ready to limit their freedom of action. It should also be noted that the object, even if the traditional color scheme of the roof is preserved, would not be a true copy anyway, as the contemporary material of the façade was allowed to testify to the time of its creation.

The presented problem, not only signals the differences in aesthetic preferences, and probably the objections that go beyond architecture and lie closer to the political-administrative sphere, but it should also evoke a general reflection on how to manage the architectural heritage in Poland. Offices which should function objectively, professionally and impartially may arouse controversy because they do not care about investors' compliance with the law. Such state of affairs certainly does not inspire trust of the residents. Situations in which citizens have doubts about the degree of respect for the law may cause the public office's clients to doubt the professionalism of decisions made there. There may also be accusatory voices suggesting that an ordinary citizen does not have the same rights and is not able to win as much for himself as an influential institution, here a religious one, or a well-known artist-architect.

Another important aspect of the outlined situation is hiding from the public some administrative bodies, the true face of the planned solutions. Consciously misleading and manipulating public opinion is morally questionable. The spokesman of the Archdiocese, Father Rafał Kowalski, told the journalist of Gazeta Wrocławska that from the very beginning "the library was not supposed to imitate the eighteenth-century building, but to indicate the contemporary time of its creation... already at the stage of the creation of the project, in consultation with the Municipal Architect and the Municipal Monument Conservator - it was decided that the library should not be colored in any way. Therefore, it has a natural texture of the material from which the facade was made. A similar assumption was made for the roof". However, this statement is contradictory to the actual state of affairs, because the press materials presented, available before the beginning of the realization, showed a building with a red-colored roof.

It is worth asking the question about the purpose of the visualizations of such objects presented in public. The thesis that city residents should have the right to express their opinion on the true

face of change seems justified, since "in a constantly changing urban performance, everyone is an actor, or at least a spectator". (Kłosek-Kozłowska, 2017). This is particularly important within a place so important in cultural terms, where citizens making up a community can become "bio-sensors". (Aa Chun, & Artigas, 2015) which can facilitate making a diagnosis of planned changes. How to build people's faith in their empowerment (Stawasz, & Sikora-Fernandez, 2016), if even if they were to speak on this issue, it would turn out that they were deceived because their opinion would refer to something that was never meant to be realized in this form?

Is there a chance of exercising social control in such situations? Does the conservation community remain helpless against this kind of abuse? Will architects and investors ever have a chance to prove their point? It will not be possible until we start to have the tools to objectively assess the impact of contemporary transformations on the reception of the historic environment. I believe that the answer to this problem may to some extent be a device known as the eye tracker.

4. What is a video eye tracker?

Eye trackers, are various devices used to track the way people move their eyeballs. Video eye trackers are the most common ones among contemporary researchers because they are non-invasive. With the help of several appropriately selected infrared light beams sent in the direction of the observer's eyes, the eye tracker can record at what distance from the center of the pupil its reflections are formed. This is how the axis of the field of vision and the place in which the person participating in the tests is looking are determined. There are three groups of these devices. The first one is used to examine images displayed on a monitor screen (static - like photos, or dynamic - like movies or websites). (Rusnak, & Szewczyk, 2018). Another group are the devices worn on the head of the subject, which can move in the analyzed space (Rusnak, & Ramus, 2019). The third type of eye trackers is used to observe objects displayed within virtual reality[4]. Regardless of the eye tracker type, the whole cognitive process is recorded as a series of fixations - visual stops - and saccades - moments of transferring visual focus from one place to another (Soluch, & Tarnowski, 2013).

Thanks to mathematical processing of the recorded biometric data, it is possible to learn both the preferences of a particular person and to examine the trends governing a larger group of observers. These tendencies can be described by giving the average fixation duration, total fixation duration, number of fixations (fixation count) in the designated area of interest. In many cognitive situations, the order of looking at recognized elements presented during the study may also be important, which is characterized by the average time after which the observers make the first fixation on the viewed object (time to first fixation). For more advanced tests, the analysis may be more detailed, giving further parameters of the cognitive process (Holmqvist et al., 2011) (Duchowski, 2017).

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[4]   See also: *How do we look at Architecture?* Research using eye tracker and VR goggles, https://pwr.edu.pl/uczelnia/aktualnosci/jak-patrzymy-na-architekture-badania-z-uzyciem-eye-trackera-i-gogli-vr-10809.html.

Depending on the purpose of the observations, researchers are forced to prepare an appropriate methodology for their tests. They should always decide on the size of the research group, who and for what reasons cannot participate in the tests, how not to suggest the way in which they should look at the images presented to them, and whether eye tracking recording needs to be supplemented with some other form of research, e.g., a survey or recording of heart rate and blood pressure. Most often it requires a lot of experience or consultation with a psychologist, sociologist and/or bioengineer. According to the aim of the research, the testers also decide how many and which areas of visual interest should be identified in the area of the examined visual stimulus and how to diagnose these areas.

4.1. Eye tracking as a new management option

No country has yet decided on the systematic use of eye trackers as tools to improve urban space management. My proposal is to socialize and objectivize the process of heritage management by extending the range of conservation studies to eye tracking research. This technology is used wherever knowledge of the cognitive process and the resulting changes can generate profits, optimize processes or minimize losses. In the case of historical monuments care, this can also happen. In today's world, it seems necessary to acquire modern diagnostic technologies faster, thus opening up to society, allowing citizens to participate in the management of cultural heritage. Within the public space of cities, the functional and cultural offerings must be more and more often and better adapted to the rapidly transforming tourist market and the evolving needs of the inhabitants (Chhabra, 2015). Civil society should demand more transparency from its authorities in the process of making the most important decisions from their point of view. According to many researchers, the implementation of complex, partially automated systems for diagnosing social needs (Aa Chun, & Artigas, 2015), (Stawasz, & Sikora-Fernandez, 2016), (Grabowska, Pancewicz, & Sagan, 2015) especially within cities with a strong historical identity, seems inevitable in the next 10-15 years. Eye trackers, on the other hand, offer the possibility of obtaining previously unattainable data that could have an impact on devising sustainable development strategies for historic urban complexes, as well as on reaching compromises during the process of revitalization, adaptation and expansion of individual buildings. It seems that the conservation community would benefit from reaching for contemporary achievements in the field of marketing, including eye trackers (Parowicz, 2018).

5. Oculographic conservation care

The easiest way to carry out the research, which will result in discovering the visual preferences of the observers is to use a stationary eye tracker and examine the prepared flat visual stimuli in the form of photographs, visualizations and photomontages. However, we should consider what is the goal and the most convenient moment to conduct such research.

5.1 Intervention control tests

The first possibility is to resolve an already existing conflict. In this variant of eye tracking examination, the basic question would be whether the new building violates the provisions of the local development plan (LSDP) or other conservation guidelines. Coming back to the described exemplary dispute, the question should be clarified: whether by changing the color of the roofing, the new building becomes an element that disfigures the historic landscape. The aforementioned resolution of the City Council (Resolution No. XIIT/442/99 of the City Council of Wrocław of 21 October 1999 on the adoption of a local development plan for the area - Ostrów Tumski, the islands and the Botanical Garden in Wrocław) clearly indicates that the view of Ostrów Tumski from the Bastion Ceglarski is protected (§11.2.1). It was also pointed out that it is necessary to protect the dominant historical urban complex, ordering detailed landscape studies for the reconstructed objects (§12.11). In order to objectively check whether these provisions of the law have been violated, it would be sufficient to take a picture of the new Archdiocesan Library with a large fragment of its urban surroundings from the opposite bank of the Odra River from the elevation of the Bastion Ceglarski (Fig. 1). The illustration should then be shown to a sufficiently large group of people, preferably those who do not have professional education (in architecture, urban planning, conservation, or art history) affecting the perception of the cultural landscape. It should be seriously considered whether the illustrations should be shown to people who know the city well, as they could pay too much attention to the changes that have been introduced, which differ from the views they are used to admire. Each time, when conducting the eye tracking recordings, one should also consider giving the observers a single identical goal by inventing, with a psychologist a false task, which would be performed by the volunteers participating in the tests. This would guarantee that all participants of the research conducted at any stage of the tests will look at the presented graphic material with similar motivation. Only a unified and carefully described methodology would guarantee that the data could be considered authoritative and comparable or possible to repeat. Therefore, each time the parameters of eye tracker used should be given (e.g. sampling frequency), the method of conducting a personal calibration of the device, the time of recording, the number and type of illustrations accompanying the test, and the parameters of the monitor on which the experiment was displayed. A specimen of the illustration should also be included, as its resolution, proportions, contrast, brightness and coloring are important.

I managed to collect a small amount of data for the example discussed in the article while conducting other eye tracking tests, in which a picture of Ostrów Tumski (Fig. 1) with a visible body of the new library was used as an illustration in the presentation. The methodology of the study was not thought out in terms of determining the hierarchy of the presented stimulus, e.g. the precise scope of the frame was then considered, and the profile of the observers was not analyzed in terms of the purpose of the current theoretical deliberations, e.g. they were city residents. The research group was quite numerous (over 70 people), but the time of the stimulus presentation was limited to 8 seconds according to the purpose of the current deliberations (Rusnak, Fikus, & Szewczyk, 2018). Due to the fact that the methodology was not adapted to the purpose I am describing in this article, the data in the table should not be seen as conclusive,

however, I decided that it constitutes valuable reference material. Based on a concrete example and the numerical values assigned to it, it will be easier to outline the idea of using an eye tracker for heritage management.

5.1.1. Proposal No 1 - Analysis of the viewing time

Once the data has been collected, the most universal analytical method would be to perform a valorization, according to which areas of interest (AOI) corresponding to the most important protected landscape elements would be selected and the average time of looking at them would be determined. In the example presented, these would be the dominant features of this waterfront: the Cathedral of St. John the Baptist and the Church of the Holy Cross. The third visual zone to be analyzed should be the AOI field, corresponding to the view of the erected object (Fig. 2). For the so designated areas of interest, the data obtained are shown in the tables (Tab. 1 and 2).
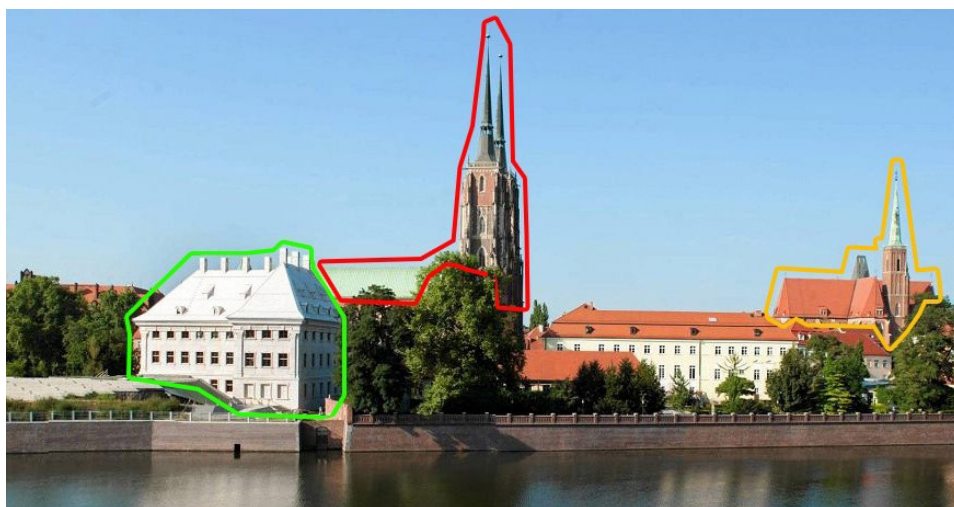

Fig. 2 Disposition of areas of interest (AOI) in the photo of a fragment of Ostrów Tumski in Wrocław (MR)

Example	Red AOI The Cathedral	Yellow AOI Church of the Holy Cross	Σ Red and yellow AOI The Cathedral and the Church of the Holy Cross	Green AOI The New Archdiocesan Library	Other elements of the photo
An average duration time of all the fixations	30.1%	9,6%	39,7%	42,2%	13%
Range of individual results	23.2 – 37.1%	5.3 – 13%	27.5 – 50.1%	32.1 – 59.8%	7.5 – 18%

Tab. 1 Analysis of the time devoted to view the designated areas of interest (AOI) (MR)

Although the data cannot be considered conclusive, the unfavorable tendencies shown by these preliminary tests are noteworthy. On average, observers spent between 32.1 and 59.8% of their time focusing their gaze on the body of the new object, while statistically the elements that are supposed to the dominant features received much less attention (Table 1).

The disturbance of the hierarchy, introduced into this landscape by the new element, is best visible when we compare the average time spent on visual focus on both dominant features (3.2s - 39.7%) with the result obtained for the body of the new library (3.3s - 42.2%). The attention paid to the appearance of the two historical dominant features turned out to be less than the attention paid to the new Archdiocesan Library also in relation to the range of recorded results of all the participants in the study, ranging from 27.5% to 50.1% of the time of looking at the visual stimulus presented.

What is important is that the new architectural objects must be noticed in the city landscape, and it is necessary to focus the gaze at their forms. This may affect the success of the function they have inside. However, the situation when the time spent on eyeing the newly erected object clearly dominates the whole process of getting acquainted with such an important cultural landscape is a cause for concern.

5.1.2. Proposal 2 - Principle of preferred order of looking

Another, even simpler method of numerical determination of the rules of intervention in the historic surroundings would be, in some cases, to determine the preferred order of looking at the elements building a given composition. Again, referring to the reconstructed view of Wrocław's Ostrów Tumski, the cathedral should most probably be the first element to be noticed, and probably the tower of the Holy Cross Church should be the next in order. This would signal what elements are the visual dominants of this cultural landscape. If the element added in the illustration was to disturb this chronology, it should certainly not be realized in the presented form. Obtaining this kind of data through eye tracking tests is also possible (Table 2).

Example	AOI of the Cathedral	AOI of the Church of the Holy Cross	AOI of the new Archdiocesan Library
Average time to the first visit	1.3 s	3.7 s	1.2 s
Average number of revisits	2.1 times	1.4 times	3.5 times

Tab. 2 Table showing the preferred chronology of looking at the designated areas of visual attention (AOI) (MR)

Analyzing the table, we can see that the most numerous group of viewers in the first place looked not at the cathedral, but at the building which is a retroversion of the former alumni house, which indicates a disturbance of the chronology described above. In addition, the body of the new library was viewed more often than the other elements of the visual stimulus prepared for testing. The viewers looked at the cathedral towers on average twice in 8 seconds, while the new building usually attracted attention 3 or 4 times. Of course, both methods, concerning the analysis of viewing time and the chronology of the cognitive process, can coexist and complement each other.

6. Research at the concept development stage

Eye tracking tests could also be used at an earlier stage of the design work. They could be used during consultations between the investor and the architect and conservator. In this case the examination of color variants would allow to obtain objective guidelines for both sides. In case of any doubts, the conservator could commission a visualization with different color variants of the roofing. In addition to the most bold variant submitted, illustrations should be made showing a building with a brick-colored roof (Fig. 4), or perhaps even one that imitates a patinated copper roofing (Fig. 3). The comparison of the data obtained in three independent studies with three different color schemes would give a better idea of how much the color of the roof affects the reception of the historic landscape.

Fig. 3, Fig. 4 Photomontages made of the photos of a fragment of Ostrów Tumski (MR)

7. Research at the stage of landscape studies and adoption of conservation guidelines

Eye tracking examinations can be an opportunity not only to resolve disputes but also to create legal and administrative procedures based on objective premises. Eye tracking tests carried out by designated and trained officials could facilitate the creation of objectively relevant and reasonable standards governing the maintenance of a given space or specific facility. It is, however, an idealized situation, not without defects. The performance of tests relating to the visual perception of all protected areas would be very costly for the budget of the state, voivodeship, or city. Even if only the most important monuments and urban ensembles were to be covered by such an obligation, many hundreds of visual stimuli would have to be tested, and the results of these tests would then have to be interpreted and included in the conservation programs, which would generate huge costs and require a huge amount of work.

Guidelines for the interpretation of eye tracking tests, at the stage of drawing up local development plans, could be recorded thanks to the analysis of the compositions performed in accordance with the previous practice. In the mentioned resolution there was a provison that the dominant features of this Wrocław landscape are the visible forms of the churches. One could add that the most important element of the composition is the cathedral. Such formulations could easily be translated into visual parameters:

1. Observers should devote most of their time to viewing the towers of the cathedral and the church.

2. The church towers should be the elements which, in the view of the waterfront observed from the designated points of the opposite quay, should be the first eye-catchers.

3. Other single objects of the urban composition should not be viewed by the observers earlier to and more often than the cathedral towers.

Additionally, the scope of views covered by conservation protection should be precisely defined. For example, the local plan could include a note that the eye tracking analysis could include any characteristic viewpoint, chosen by the Regional / Municipal Conservator, situated on the southern bank of the Odra River between Grunwaldzki Bridge and Piaskowy Bridge or on a walking boulevard on Piaskowa Wyspa [island].

8. Other arguments for and against the introduction of eye tracking examinations into the system of monument protection

The text already mentions the need to adjust the testing methodology to the specific cognitive situation each time. Other aspects that may be questionable will be discussed in the following subsections.

8.1. The state of preservation of the historic landscape

The urban and natural environment is constantly changing. After all, the light conditions, both natural and artificial, are changing. In addition, elevations darken with time, or become bright and shiny after cleaning. Trees grow, are turned over by storms or cut down. These are aspects that modify the perception of the preserved heritage to a varying degree.

In my opinion, there are circumstances that prevent a simple examination of the relationship between contemporary architectural interventions and the historic surroundings. One of them is a situation in which a new cubature is erected in a very neglected but historic area. In such a case, the new object will probably be the one that attracts the most attention - not because of its inadequacy to the rules of protected composition, but because of its otherness. According to the contents of Erst Gombrich's publications, among others, the eyesight is directed most quickly "to places of irregularity". (Gombrich, 1979). When the departure from a rule is too big, the element standing out will be noticed faster. The distinguishing feature of the new creation would, in this case, its neat appearance. Does it mean that such an oculographic study of the attention paid to the neglected system that has undergone re-composition would have to be done for a visualization simulating the final appearance of all the monuments included in its scope? Preparation of stimuli for such studies would be very time consuming.

The situation quoted in the article does not raise such doubts, because the monuments of Ostrów Tumski in Wrocław, as well as their surroundings, are very well maintained.

8.2. Laymen's and experts' point of view

There is no shortage of experts - conservators and architects - who are full of reservations as regards the use of eye trackers. Some of them are probably afraid of undermining their competence or position of scientific authority. Others doubt whether equally important aesthetic issues should be co-decided by an uneducated public. There is a concern that common or even bad taste projects will be promoted. On the other hand, similar risks can be reduced if the choice of visual stimuli and the procedure for their preparation is decided by experts or parties involved, as well as by psychologists who control whether the research methodology is as neutral as possible to the task at hand. Such a lay opinion would provide information as to which aspect of the professionals' decisions are potentially controversial and require reworking or careful justification. It can be assumed that eye tracking

would make it possible to avoid "extremes" (Gołaszewska, 1984). After all, it is known that the expert value system may be extremely different from the motivations governing the rest of society (Ingarden, 1970) (Murzyn, 2014).

Eye tracking research introduced into the system of monument management would be a pro-democratic modification of the law, making modern social consultations (crowdsourcing) a reality, but also promoting openness of experts to a different way of thinking and perceiving reality. Turning to the "wisdom of the crowd" and mass collaboration, i.e., cooperation with individuals and perhaps organizations outside of formal local government structures, even without sharing with them the power to make final and formal decisions, simply arouses reluctance on the part of the community. Not everyone sees the problem in the strictly arbitrary, expert, and thus extremely subjective system of heritage management (Stawasz, & Sikora-Fernandez, 2016). This is a problematic situation, as one of the basic assumptions of the currently very popular participatory design is the cooperation of diverse partners, and the slogan of sustainable development can be found in almost every planning document at the municipal, provincial and national level.

8.3. Education and promotion of care of monuments

Looking at the interest of volunteers in the tests carried out so far at the Wrocław University of Technology, eye tracking could be an important element of promotional activities carried out both for the protection of monuments and for the benefit frequently unnoticed and underestimated professional groups involved in the care of cultural heritage (French, 2011). Participation in public consultations would be promoted. This is important because in Poland civic involvement is relatively small, as much as 2/3 of the population remains outside the sphere of such activities (Grabowska, Szczawiel, 2001), which is largely a consequence of the post-war economic condition of the country and the authoritarian way of exercising power during the communist era (Tarkowski, 1994). Perhaps eye tracking would also give an impulse to develop new sustainable and bottom-up ways of using heritage.

8.4. Public offices

The proposed modification would certainly require numerous legislative changes in related documents. Many aspects of such a modification of the law are difficult to predict in advance, which could result in a very chaotic transition period as well as consequences difficult to measure in advance. It would be extremely difficult, for example, to estimate how long the delay in issuing administrative decisions would have to be anticipated in order to make such an examination possible - after all, the reported cases would have different degrees of complexity. Moreover, there is no private sector of eye tracking examination in Poland that is sufficiently developed to provide stable support. The fact that the government has to be able to provide the same kind of support could be unfavorable, as it is often the government that may turn out to be one of the parties to the dispute. Research should be commissioned to an independent research unit from outside the region or supra-regional social organizations with an established tradition, which would ensure efficiency and impartiality (Bogucka, 2001).

The implementation of the new form of control would be a further burden for the office staff, who are already complaining about the large number of cases to be examined. They would have to refer specific projects for oculographic inspection, fill in forms, edit letters and follow subsequent procedures. An additional difficulty would be that inexperienced officials would require numerous - and relatively costly - training.

Perhaps one of the offices would agree in the nearest future to carry out a pilot program that would verify the usefulness of such a method in practice.

8.5. Costs

The financial aspect may also raise concerns, as preparation, data collection, processing and interpretation is currently expensive. There will probably be those who think it would be better to spend these sums on real activities. The counter-argument, however, is that it is unfavorable to spend money on dubious activities that could potentially harm the places under care. Another reason for supporting the management of the market with the help of eye trackers may turn out to be the tendencies governing the eye-tracker sales market. Currently, the purchase of a stationary video eye tracker together with software is about 50-200 thousand PLN. It is predicted that their prices will decrease significantly within 10-15 years, therefore the cost of purchasing devices and software will cease to be such an important factor. There is also a real possibility that personal devices such as smartphones or laptops will in some time have modules allowing for non-contact visual service, and then automatically the cost and time consumption of such research would decrease significantly, allowing the research itself to become a common phenomenon.

On the other hand, in some cases the use of eye tracking could bring real profits. Many institutions, for example museums, operate in historic buildings. Oculographic research conducted at the stage of creating a concept consulted with the conservator could indicate places requiring longer reflection, e.g. on the location of the new entrance to the object, the form of the logo etc. Eye tracking research could also increase the safety of the users of historic buildings, allowing for example to objectify the location and type of signs indicating the direction of evacuation. Thanks to eye trackers, it would be possible to work on more functional solutions and effective forms of monument promotion, which would have a chance to directly translate into financial benefits.

8.6 Traditionalists and innovators

Some architects may see such tests as another tool limiting innovation and development of contemporary architecture or interfering with their copyrights. It should be remembered, however, that the use of eye trackers could also work to their advantage, when an opposing official decision would meet with a negative reaction from the respondents. Eye tracking tests are not intended to close but to open the door to an interdisciplinary discussion. They could serve to work out an optimal solution for the investor, architect and society - most often represented by officials.

As an eventuality, when conservation recommendations may be the result of "creative and too far-reaching activities of officials" (Filipowicz, 2010), an eye tracker would be an objective tool for raising protest.

8.7. Sustainability

An important question is also whether the eye tracking guidelines would be permanent. We do not know at what pace - among other things, under the influence of changing education, access to media, advertising, evolving theories and fashions - the visual expectations of society will change. Will every record concerning the visual protection of a monument be universal enough to make the research carried out, for example, 10 years after the establishment of the given one, still relevant? Moreover, the dynamically changing eye tracking technology may quickly make it impossible to carry out analyses under the original conditions - for example, there is a purely theoretical possibility that in the future, no one will produce an eye tracker and software , which will download data at 120Hz.

9. The advantages and disadvantages of the potential introduction of an eye tracker into the process of architectural and urbanistic heritage management

Advantages	Disadvantages
Research	
- only a small room is needed for the tests; - experience shows that test participants are quickly recruited; - quite an easy way to prepare 2D stimuli; - safe and non-invasive testing.	- lack of sufficiently developed eye tracking research sector in Poland; - the need to verify the accuracy of the research methodology every time; - complicated way of preparing spherical stimuli (3D).
Costs	
- the equipment is used repeatedly; - research, if they have a similar methodology, can be conducted on the same research groups; - the price of the equipment is expected to decrease.	- the need to buy expensive equipment; - the need to pay research participants; the research group must be large enough; - using funds not for real activities.
Test results	
- have a numerical form, which can be presented in different ways; - are objective when performed by an experienced research unit outside the region.	- It is difficult to determine how long the results will be valid.

Legal regulations and administrative procedures	
- the possibility of forcing unambiguous legal provisions e.g. with regard to landscape protection, fire protection of monuments; - the possibility to easily prove one's point of view in court (this applies both to investors and officials as well as to social organizations).	- the need to modify the law; - It is not known how much delay in issuing administrative opinions would cause the introduction of these studies, e.g. into the process of obtaining a building permit; - additional costs of proceedings; - lack of experience of e.g. appraisers.
All the participants of the process of monument care and heritage management	
- gaining a new opportunity to verify the actual impact of the proposed change on the viewer; - participants in the heritage management process gain a common point of reference during the negotiations.	- gaining a new opportunity to verify the actual impact of the proposed change on the viewer; - participants in the heritage management process gain a common point of reference during the negotiations.
Designers	
- the possibility of carrying out projects to consciously direct the attention of observers; - have experience in the use of graphic programs - they will easily be able to prepare stimuli for the experiment.	- further limitations of "freedom of artistic expression"; - fear of losing "authority"; - the possibility of promoting solutions in "bad taste".
Public officials	
- an argument facilitating mediation of conflict situations e.g. with investors or politicians; - possibility of directing the process of selection of examined options; - gaining knowledge about which aspects of their decisions should be best justified to the society.	- additional duties and procedures; - necessity to write down guidelines for experiments.
Conservators	
- acquisition and verification of knowledge; - possibility of easy examination of variants; - possibility of directing the process of selection of examined options; - possibility to learn about heritage management tactics tailored to the needs of a particular monument and group of users.	- fear of losing "authority"; - the possibility of promoting solutions in "bad taste".
Investors	
- possibility of verifying the effectiveness of the proposed visual solutions, marketing; - possibility of appealing, proving its rightness in case of clerical abuse.	- possible extension of the time it takes to obtain administrative opinions.
Society	
- promotion of care of the monuments; - democratic implementation of public consultations, the results of which can easily be translated into design aspects.	- relatively low activity of Poles in the sphere of social consultations.

10. Summary

Despite many doubts expressed in the article, I believe that an eye tracker can be a valuable tool for objectivizing and socializing the process of monument protection. Some of the drawbacks mentioned in the aforementioned balance would disappear with the development of this research sector and the participants of the heritage management process getting used to the new technology. It is an instrument that has a chance to support and initiate a dialogue between different social groups, and which refers to the urban space and historical heritage. Finally, thanks to the eye trackers, the agreements of experts from different fields could finally gain an important, objective and common reference point.

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