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Shadowing as a Method of Monitoring the Museum Experience of People with Disabilities: Toward a Comprehensive Multimodality Design

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Abstract: The article explores the challenges associated with ensuring accessibility in museums for visitors with various disabilities. The analysis encompasses strategies for implementing technology and universal design to enhance accessibility while preserving esthetic and informational values. The study highlights multimodality as a promising solution integrating different forms of reception within museum collections. Research conducted at the Czartoryski Museum, a branch of the National Museum in Kraków, gathered experiences and opinions from visitors with disabilities regarding current accessibility solutions. The findings suggest that modern museums should offer multiple access channels to meet diverse needs, enabling visitors to effectively utilize resources. Additionally, the engagement of individuals with disabilities in evaluating and co-creating accessible solutions is crucial, as their input provides valuable and constructive insights. These conclusions emphasize the necessity of taking action toward inclusivity, which may contribute to redefining accessibility strategies in museums worldwide.

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Introduction

In the context of access to art and culture, the accessibility of museum collections can be defined as the degree to which every person can gain access to the physical environment and contents of the exhibition plan, notwithstanding their physical abilities, level of previous knowledge, and preparation (Jiménez Hurtado, Seibel, Soler Gallego, 2012). This is inscribed in the model of accessibility in the spirit of universal design. In practice, it denotes the creation of material and cultural environments which enable everyone to conduct everyday activities with a sense of comfort and safety, without unnecessary barriers and limitations (Story, Mueller, Mace, 1998; Gawron, 2015). The idea of a universal design grew out of a shift in the discourse on disability conditioning: from focusing on an individual whose limitations could be seen as precluding their functioning in the external environment to this very environment whose characteristics became subject to critical judgment on its level of oppressiveness or friendliness and openness (Shakespeare, 2008). In this respect, a universal design can be understood as the practice of the realization of inclusiveness policies, which interprets the integration processes in the ethical dimension (Gawron, 2015). A universal design, as it is focused on practice, is distinguished by a strategy of maximum effectiveness of the planned activities. In contrast to accessibility standards which are regulated by law and which require a minimum of basic security measures for access, a universal design is centered on the need to create the optimum environment which is comfortable for use and access (Steinfeld, Maisel, 2010).

In the context of the discussion on a universal design, the enabling technologies are most frequently presented as an interim measure, allowing access to a specific environment in the case of a lack of universal solutions (Dubiel, 2020). In other words, while the objective of a universal design is to build

one entry in the spirit of the idea of "the same entrance for All" (Ruiz et al., 2011; Rizzo, 2019), assistive technologies supplement the existing environment with equipment for audiences not included in the operational plans of specific places (Bryant, Bryant, 2003; Osterman, 2017).

In the debate on inclusiveness policies, the benefits (social, environmental, cultural) of the effects of a universal design are confronted with the premise of implementing assistive technologies (Rappolt-Schlichtmann, Daley, 2013; Eardley et al., 2016). Although it appears difficult to question the ethical suitability of the "one entrance" formula in this context, in individual cases the use of assistive technologies can be supported by arguments of the feasibility of creating a realistic access program (Dubiel, 2020). As a result, in response to the need of opening to visitors with diverse needs, some museums fulfill the requirements of access for individuals in wheelchairs, while others may offer tactile tours for those with visual impairments. The majority of institutions do not provide fully-inclusive access, namely for visitors with all needs: physical, sensory, or intellectual (Rappolt-Schlichtmann, Daley, 2013). The answer to this can be the introduction of multimodal solutions, based on a multi-sensory experience offered to all visitors as one of the options to explore museum collections (Eardley et al., 2016).

Multimodality as a new approach to accessibility

In this context, multimodality is understood as a socially- and culturally-legible message shaped by a careful combination of semantic and syntactic elements derived from various modes of communication (Kress, 2010). Multimodal activity would, therefore, involve a set of practices that allow for not only interlacing multi-sensory channels into an overload, intense stream of information but mostly also distributing sensory modalities in a meaningful and comprehensive way, for example by *augmenting* an image with speech (audio description), *reordering* collection of images according (e.g., to a variance of shape, texture, or color (visual search)), and *refining* visual experience with tactile modality (e.g., with the introduction of scaled replicas, typhlography, etc.). These measures allow museums to stand against social exclusion and promote access not only as far as the infrastructure of the premises and physical access is concerned, but also in social and cultural categories, rendering museum collections accessible to visitors with diverse needs and sensitivities (Sandell, 2005). In literature so far, multimodality in relation to the museum experience of individuals with disability has appeared in three fundamental contexts: education, technological solutions for persons with disability, and access for all.

Firstly, in the educational context, multimodality appears as a multi-sensory experience which, in line with the conclusions of research conducted thus far, improves perception effectiveness (von Kriegstein, Giraud, 2006; Seitz, Kim, Shams, 2006) as well as supports the processes of memorizing (Lehmann, Murray, 2005). This shows that the provision of information engaging multiple senses can broaden learning opportunities, understood here in the wider sense of gaining knowledge, for all visitors, not only those with disability (Nyberg et al., 2000; Murray et al., 2005; Eardley et al., 2016).

In the second field of research, scholarly articles propose the introduction of multimodal solutions using the latest technologies to provide, for people with disability, the opportunity of contact with art and museum collections. In this approach, they acquire the character of assistive technology, whose objective is to support visitors with disability in their activities (Bryant, Bryant, 2003). Here, discussion focuses on solutions created so far and on considering their limitations for enabling experience and impressions during a museum visit (Santoro et al., 2007). It is proposed to implement in their place the state of the art technological innovations, those which offer better and more inclusive museum experience (Ailisto et al., 2003; Bellotti et al., 2003; Goldberg, 2010; Wyman et al., 2016; Osterman, 2017).

Thirdly, literature points to multimodal solutions as a way to re-define the access category (Eardley et al., 2016). In this view, the latest technologies allow for the construction of multimodal communication responding to different requirements, inclusive of individuals with disability, offering experiences meeting their needs. At the same time, this approach envisages a museum visit where the audience is able to benefit from multi-sensory presentation and experience the collection through different senses, thus making the information accessible not only to individuals with disability but to people of all ages and abilities who come to interact with the collection (Eardley et al., 2016).

All three perspectives bring up the promising program to the inclusive design field and are linked by the notion that the use of multimodality in the museum experiences of visitors with disability not only expands their educational opportunities and access to culture, but also contributes to the creation of more open and inclusive spaces for all (Eardley et al., 2016).

What we find indispensable for developing the discussion on multimodality now, upon the mass experimentation with the inclusive technologies in public spaces, is the focus on the quality and internal ordering of the proposed solutions. We believe that through this reflection on quality only, the emerging standards of the museum practice can grasp measures of communication that are not only resilient but also agreeable for diverse groups within the audience. To put it differently, at the time being, one needs to ask how to avoid packing public spaces with annoying, useless technical gadgets which ultimately ruin the original intention of building inclusive sociocultural experience. For the research intervention presented below, we bring up the problem of quality and look for the research method that would swiftly phase out variants and distributions of multimodal design that break the threshold of data overload and successfully point to measures offering opportunities for the accessibility fine-tuning.

The scope of this article is a reconstruction of the experiences of visitors with disability, in contact with collections, which presents the potential for enhancing the quality of multimodal solutions in the context of facilitating access to museum collections. Based on the local sample's findings of the research, we propose some near-future recommendations for the multimodal accessibility evaluation and design.

Methodology

Research carried out to test models of access created by the use of multimodal solutions focused on the analysis of the experiences of visitors with disability in the reception of real and digital museum collections in the Czartoryski Museum, a branch of the National Museum in Kraków (MNK). This research was conducted in 2022, firstly from February to March and subsequently in June.

It posed the following research questions:

1) How were the solutions broadening the access range used by visitors with various kinds of disability?
2) What sort of experiences did these visitors with various kinds of disability have while using different multimodal solutions during their contact with the collection?

In order to gather data, we used the shadowing method, namely accompanying the participants during their visit so that we could observe behaviors and reactions. We decided to test this research approach in hope that it would enable adequate reconstruction of the perspective and experience of the observed individuals. The research was made possible owing to a combination of the observation of the visit and an interview carried out following the experience at the MNK Czartoryski Museum. In this way, we could reconstruct both the process of visiting and the use of the newly introduced multimodal solutions, also gaining some cues on the quality of the creation of a fully-accessible museum (McDonald, 2005; Quinlan, 2008).

The choice of method encountered the necessity of matching the methodology to a diverse group of participants. The group included individuals with disability of a sensory, physical, and intellectual nature, which required flexibility in the research approach to ensure an effective interaction with such groups (van der Weele, Bredewold, 2021).

Our research included people with mobility impairments, those with visual and/or hearing issues, and those with intellectual disability, as well as individuals on the autism spectrum – each of these was represented by two participants. In total, the group numbered six women and four men. The level of education amongst them was as follows: two individuals had a higher degree, two had a secondary college degree, two had a vocational degree, and four were in continuing education. As to their age, four were between 20 and 25 years old, two between 26 and 34, two between 36 and 40, and one over 40 years old. The majority of them (8) were in employment or in education. Eight of the participants lived in Kraków, one in Wieliczka, and one in Niepołomice, both of these towns being in the vicinity of Kraków.

Only six of the participants stated that they had visited a museum in the last five years, usually during either a vacation period or on school and group trips organized by foundations under whose care they were. Only two of them spoke about independently visiting chosen museum collections as a way of spending leisure time. As the most serious barrier to a museum visit, the participants identified:

the lack of information about accessible exhibitions and events (5), non-availability of their careers and anxiousness about independent visiting (3), and problems with transport and the organization of such an outing (2).

Only four participants declared that they frequently use digital resources and visit museums online. Two stated that they do it in relation to their jobs and to get acquainted with the digital access and inclusiveness practices implemented by other institutions. Other two people said that they preferred virtual to traditional visits.

Given the option to visit with a circle of friends, the majority of the group (6) indicated that they would rather do that than choose an online option. Three participants said that they are attracted to museums by their atmosphere and also three of them declared that such an outing is usually combined with a social meeting. At the same time, all the participants said that virtual resources and the ability to visit a museum online are necessary as an alternative means of access during crises such as the COVID-19 pandemic or if, for various reasons, one cannot visit a place in person.

The research was carried out in two stages:

The first objective was to examine the experiences of individuals with disability during their time in a museum and here the shadowing methodology was employed, meaning that a visitor was accompanied by a researcher who engaged him/her in short conversations and, at the end of the visit, carried out a longer interview summing up the experience.

In the second stage, shadowing was used while the participants engaged in the use of routes as well as accessibility resources on offer in the museum. A researcher was present also during the navigation through the museum's digital repositories and their use. This stage also concluded with an interview, with the objective of gathering opinions on the experiences during the use of such resources at the MNK.

Information about the data analysis method

In the study, a qualitative analysis method was utilized for the data collected at the MNK Czartoryski Museum. This process involved assigning codes to the participants' interview statements and observations conducted to identify significant themes, behavioral patterns, and touring strategies of individuals with disabilities under study. Subsequently, an analysis was conducted to examine the connections and dependencies among the coded contents, enabling a deeper understanding of the phenomenon under scrutiny and facilitating drawing conclusions that incorporate diverse perspectives and the participants' experiences. Data analysis was conducted using the MAXQDA software.

Table 1. Codes used in MaxQDA to analyze the data

Code	Description
Access solutions usage	How the multimodal solutions were used by visitors with different disabilities.
Visitor expectations	Different expectations and preferences of visitors regarding accessibility solutions.
Audio guide usage	Specific ways in which visitors used the audio guides, including preferences for audio description and sign language.
Sensory route	Interactions with replicas, dioramas, typhlographics, and Braille labels on the sensory route.
Feedback on audio guide	Comments on the functionality of the audio guide, including speed control and playback issues.
Hearing impairment challenges	Challenges faced by visitors with hearing impairments, including small labels and the lack of text rewind functions.
Physical barriers	Observations of physical barriers in the museum, such as locker codes and narrow passages.
Visitor engagement	Engagement levels of visitors with disabilities and their critical feedback on accessibility solutions.
Autism spectrum preferences	Preferences of visitors on the autism spectrum for using audio guides and the need for quiet reflection spaces.
Intellectual disability preferences	Preferences of visitors with intellectual disabilities, including the desire for interactive elements and storytelling.
Cross-preference of accessibility solutions	Instances where visitors used solutions designed for other types of disabilities and their feedback on those solutions.
Virtual tour preferences	Preferences for virtual tours versus in-person visits and the use of digital resources such as the online catalog.
Social interaction	The importance of social interaction and relationship building during museum visits.
Improvements suggested	Specific suggestions for improving accessibility solutions in the museum.
Museum accessibility perception	Overall perception of the museum's accessibility for visitors with disabilities.
Technology and accessibility	Views on how new technologies can improve accessibility and make museums more friendly for people with disabilities.

Source: own elaboration.

This methodological approach allowed for concentration on a single perspective connected to the individual experience of the participants and their opinions on the multimodal solutions in the context of creating facilities accessible to all. At the same time, it made it possible to highlight the results in a wider social context related to the accessibility of culture and implementing inclusive solutions facilitating the full participation of individuals with disability in the experience of visiting museum collections (van der Weele, Bredewold, 2021). The participants provided informed consent before engaging in the study. They were also informed that they could withdraw from the study at any time or request a break if needed. Establishing a good relationship between the researcher and the participant was key to achieving good results. It enables a partnership in generating observations and deepening the understanding by all parties involved, with regard to both the idea of accessibility and the practices connected to the necessity of implementing solutions facilitating better access (Quinlan, 2008; Bartkowiak-Theron, Sappey, 2012; van der Weele, Bredewold, 2021).

Ethical considerations

The research adhered to stringent ethical procedures to ensure the integrity and ethical rigor of the study. Before the commencement of the study, all participants had been fully informed about the research objectives, methods, and any potential risks or benefits. Informed consent was obtained from all participants, ensuring that they understood their participation was voluntary and that they could withdraw at any time without any consequences. The confidentiality and anonymity of the participants was strictly maintained throughout the study, with all data being securely stored and accessible only to the research team. Furthermore, the participants were informed that they could withdraw from the study at any time or request a break if needed.

The research proposal and methodology was thoroughly reviewed and approved by the Ethical Committee at the Faculty of Humanities, AGH University of Science and Technology in Kraków. This ethical approval was a prerequisite for the grant application and was pivotal in ensuring that the research adhered to the highest ethical standards. The study, which formed the basis of this article, was conducted as part of the program "Multimodality in making museum collections accessible for visitors with disability, evaluation of accessible solutions" and was financed by the State Fund for Rehabilitation of Disabled People (PFRON) as part of the second competition called "Disability in Humanities." The study was conducted in compliance with the ethical guidelines and regulations set forth by the committee, ensuring the protection and respect of all participants involved in the research.

Multimodal solutions at the research site

As the site for our research we have chosen the Czastoryski Museum in Kraków. Located in the historic center of the city, this newly reopened section of the National Museum houses a wide range of art objects and historic artifacts: from small scale plaques to solid commemorating historical figures to

pieces of armor, textiles, glass, ceramics, sculptures, and paintings. Both the location of the collection within the dense structure of Kraków's historic architecture and the diversity of the objects it contains contribute to the specific atmosphere of the exhibition, which is itself saturated in terms of the diversity of sensory modalities, sparkling with a variety of materials, scales, and colors. The accessibility of the exhibition is further enhanced by the introduction of state-of-the-art practical solutions, some of which are superimposed on the structure of the exhibition – e.g., self-guided tours and Braille signatures – while others extend the collection, namely material replicas of objects, typhlographics, and dioramas. It should be noted that the second type of installation represents no more than 5% of the contents of the exhibition. Some of them complement the presentation of the most important works of art in the museum (the typhlography of Leonardo da Vinci's *Lady with an Ermine*), while others make it easier to access the most representative elements of the exposition related to the historical program of the collection (e.g., material replicas of the elements of armaments). Online repositories accompanying the expositions include three virtual visits pathways, each accessible in five versions: Polish with reader, English with reader, sign language, audio-description, and simplified language (ETR). Digitized items are ordered in form of the catalog, thematic essays, and thematic galleries. In correspondence to the current regulations, the museum has declared that the user has the right to request that a digital website, mobile application or some element thereof be made accessible, as well as the right to request that information be made available in alternative forms, e.g., reading a digitally-inaccessible document or describing the content of a film without an audio-description [MNK declaration of availability 2024]. Ultimately, the accessibility solutions for the museum collection are characterized by a moderate balance between the information layer and the object content. In terms of exhibition esthetics, there is a tendency toward intense sensory overlay – the accumulation of objects, emphasis on the complexity of textures and materials, and the display of intense color accents. Accordingly, multimodal solutions are planned within this broader framework, once according to the interlacing in the information layer, otherwise complying with the rule of extending the sensory values of the museum objects.

Research results

The first stage of the research focused on understanding the experiences of people with disability while encountering the multimodal solutions offered by the MNK Czartoryski Museum in order to broaden access to its collections. As a result, it became clear that each individual had different expectations and preferences with regard to making the collection accessible. During their visit, the participants could use all the facilities on offer in the museum, notwithstanding the type of disability for which they had been originally designed. It should be noted, however, that they prioritized the solutions designed for their specific needs. When commenting, they relished the fact that the museum created audio guides including routes which are especially designed for visitors with various disabilities.

Participants with visual issues selected the audio guide with an option of audio description. Owing to this, they had an opportunity to conduct an independent viewing of the collection. They were focused

on their device during the whole visit. This also allowed them to discover the replicas of museum exhibits, dioramas, and typhlographics, which were part of the sensory route.

The participants would stop by these and as well as touching the replicas or typhlographics, they would read the Braille labels. They valued this solution as one that is helpful for better exploration of the collection. One male in the group stated that to him it was:

> […] a superb feeling, you listen to the description and can touch the raised elements, now I know how small and smooth the ermine held by the Lady was (a male with visual disability).

However, the participants noted during their visit that it would be:

> [g]ood if one could control the speed of description in the audio guide because such slow listening is tiring, I would like to be able to regulate the tempo of playback (a female with visual impairment).

During the visit to the Czartoryski Museum, individuals who are hard of hearing and deaf used the audio guide and interpretation in the Polish Sign Language (PJM). These participants noted relatively small labels which posed a problem, as it was not possible to get close enough to the display case to be able to read them. When using the audio guide in the PJM, the participants also mentioned the lack of a rewind function for the subtitles and labels or a complete lack of text as an impediment to the visiting experience. They said that:

> [s]ome of the labels which necessitated lots of spelling [by the interpreter], for example of surnames, required either a second viewing or additional text (a deaf female).

While following the visiting route, individuals with hearing impairment and deafness were strongly concentrating on the PJM interpreter and staring at the monitor. This caused them to miss those parts of the display which were not included in the guide and posed some hazards, e.g., tripping. When visiting, the participants had a problem with audio guide operation, especially when they wanted to return to a certain description. They could not obtain information from the staff on what to do in a situation when the device stopped functioning properly. The participants claimed that the instructions for use should be written and shown on the screen before the visit commences. As comments during the visit had shown, apart from those problems, being accompanied by the PJM was a pleasant experience for them and much more attractive than just looking at exhibits and reading labels.

What turned out to be informative for the observation of the qualities of multimodal systems is something that might be called a cross preference of the accessibility solutions dedicated to various groups of visitors. During the visit to the Czartoryski Museum, the participants on the autism spectrum especially appreciated the opportunity to use audio guides. The museum is usually quite crowded

and in the participants' opinion, this device enabled them to concentrate better on the collection. The participants chose various options; one selected the easy-to-read language (ETR), while another – wishing to listen to the descriptions – opted for the guide with audio description. These participants covered the whole visiting route from the very beginning, point by point, following the instructions from the audio guide. One of the participants said during the visit, passing by the quiet room, that:

> [v]isiting is super but unfortunately lasts a long time. It is tiring for me. That room for quiet reflection is cool, but I would have to sit there for a long time when I feel that it becomes too much for me. Usually nobody has that much time. In those situations, I leave the museum. The audio guide with headphones helps to focus on the visit (the male on the autism spectrum).

This shows that a museum, in addition to a room especially dedicated for quiet resting – a relief from the intense stimulation in the exhibition room – should provide other places where one can rest and return to the visit after a longer break. On the other hand, the participants with intellectual disability used the audio guide in a completely different way. They followed it only at the beginning of the visit and gave up later. These participants preferred a conversation about the exhibits and asked for comments on some of them. They were keen to touch objects on the sensory route and spent a lot of time commenting on the sensations derived from touch. It needs to be noted that the route dedicated to this type of visitors in the audio guide in easy-to-read language (ETR) did not include these artifacts. In addition, the participants with intellectual disability stated that they would want to hear "fun facts" and "wider-ranging stories" about the exhibits.

> It would be superb if there were more films, so one could see the armor on the knights. This I like. There should also be more stories, which one could play additionally if one wanted. (female with intellectual disability)

This demonstrates that individuals with intellectual disability and those on the autism spectrum approached the multimodal access solutions in the most open way and used them flexibly, without being constrained by the designer's audience specification. Participants with mobility impairments paid particular attention to physical barriers. Lockers for storing personal belongings had to be operated using a code and were located in narrow passages, presenting obstacles during the visit. However, at the same time, they said that overall in their opinion the museum is accessible for visitors with mobility disability.

During the interviews conducted after touring the collection, it was noticeable that visitors with disability were really engaged in trying to point to imperfections in the existing solutions to improving access. This critical approach was linked to the necessity of "pointing out the weak sides" and "creating ever better solutions". All the participants emphasized that in recent years, museum collections have become much more accessible and open to audiences with diverse needs. They all indicated specific solutions which, from their perspective, could aid in solving the problems which interfered with full engagement in the visitor experience. This demonstrates that individuals

with disability would gladly participate in the designing of accessible solutions. The participants emphasized that:

> [i]t is worth introducing new solutions – technologies make the world more accessible and thanks to these the museum can also become a completely friendly place for people with disability (female, mobility impairments).

The participants gladly shared their experiences from the visit, contrasting them with visits to other centers. The participant with intellectual disability said:

> I don't like this traditional visiting, I would prefer there to be more interactive elements, where I can play a film, listen to a story or touch an exhibit. I don't mean for everyone to interact in this way but for this possibility to exist (male, intellectual disability).

The participant with visual disability, calling on her earlier experiences, said that:

> [n]ow it is a completely different sensation. Before I had a feeling that a museum prepares itself especially for a visit from persons with visual disability. They bring out touch elements and descriptions in Braille. Now I can see that it is not an exceptional situation, and a museum is open to people with visual disability. Even the dedicated audio guide has audio descriptions. I would not go to a museum on my own. I would be afraid that I will destroy something by accident, but younger people will probably not have such fears (female with visual disability).

In the end, the majority of the participants (8 people) declared that they would return to the Czartoryski Museum on their own and with friends, because, in their opinion, the audio guides fulfill their function and allow for an independent tour of the exhibitions.

The second stage of research involved accompanying the participants while they were exploring three virtual online tours offered by the MNK Czartoryski Museum and digital resources in the form of a catalog (https://zbiory.mnk.pl/pl/katalog). Two people amongst those participating admitted that they prefer visiting based on online tours rather than the traditional way. The person with the visual disability stated that she prefers this formula, because:

> [i]t reminds me more of a classic museum visit with a guide. A walk with audio description gives me a feeling of touring – the descriptions are longer, more detailed. When I am looking for exhibits in digital resources, I have at my disposal only brief information about the work, and this is not too attractive (female with visual disability).

A similar opinion came from a male deaf participant saying that owing to the PJM interpretation, he could better understand the contents. He stated that:

> [r]eading long or a large number of descriptions is tiring – the PJM interpreter makes visiting more pleasant and it is easier to understand and remember the content conveyed. Only the walks come with such translation and so I prefer those (male, deaf person).

The participants pointed more often to more attractive virtual walks accessible on the Museum webpage rather than digital resources in the form of the catalog. It was noticeable that this choice was due to a lack of skills in searching the independent digital catalog according to the key which would find the most interesting artifacts. The participants chose the categories tab and also evaluated it as more interesting than independent searching of the digital catalog. The participant with intellectual disability also declared that he prefers virtual walks or searching digital museum resources according to the key ordering the collection into specific categories, since, as he declared:

> I prefer an ordered visiting plan because the digital resources catalog is vast, and I will not manage to look through it.

Only one participant preferred the digital resources (catalog) and said that:

> [t]he walk turned out to be too overwhelming and quickly caused tiredness and here I could choose what to look at, in which order and at what time (male on autism spectrum).

The digital catalog alone was relatively unattractive to participants with visual disability, because it only included short captions. Owing to this, the virtual walks with audio description were judged by the participants as more engaging.

Eight of the participants preferred visiting the Museum in person, although they indicated that virtual touring has its advantages. They thought it was a good alternative solution if someone had no possibility of getting to the Museum. As one of the participants said:

> In the museum we meet people, you can chat, get to know someone. I think it is not only visiting and looking but also creating relationships. Virtual walks don't allow for that. There is no interaction. Still, they are better than a lack of any possibility to get to know these collections (female with visual disability).

Conclusions

During the research on the experiences of visiting the museum collections of the MNK Czartoryski Museum by visitors with disability, it was noticed that different groups had different expectations and preferences on the multimodal access solutions. Although they were all offered diverse tools, participants with sensory impairments chose those solutions which were addressed specifically to them, preferring, for example, audio guides with audio description, or the PJM translation. It is worth

noting that individuals with intellectual disability and those on the autism spectrum used the offered solutions actively and flexibly, and were not put off by their originally intended purpose. The participants paid attention to the necessity of improving the existing solutions, suggesting, for example, the need to introduce on-screen instructions and expand the level of interaction. Participants with visual impairments reported problems with the regulation of the audio speed; deaf persons and those with hearing challenges came across difficulties while operating audio guides due to the lack of text and the possibility to rewind the descriptions. It needs to be noted that people with disability would actively engage in the design and improvement of the existing solutions, as they gladly expressed their views on the need for constant technological advancements and the creation of even more accessible museum environments.

With regard to digital access, it was observed that the participants preferred visiting based on virtual touring with audio description or the PJM interpretation, as those means resemble more the traditional museum visit with a guide. Others chose traditional visiting and paid attention to barriers to creating human relationships and interacting in an online environment.

Despite differences in preferences, the majority of the participants declared a wish to return to the Czartoryski Museum, emphasizing that multimodal access solutions, especially audio guides, facilitated independent visiting.

The observed differences in preferences seem to imply two points for the near future of design recommendations in the current research themes. First, the conclusions regarding the quality evaluation methods seem to confirm that the shadowing and interview methodology chosen for the research efficiently captures the variants and qualities of multimodal solutions. The second, perhaps less constructive, conclusion would be that the elimination of poor-quality solutions cannot be derived from a single normalized threshold. Although the observed diversity in the preferences of the research participants suggests that fine-tuning accessibility design according to an overstimulation criterion may be appropriate, the practical organization of the common accessibility space according to a normalized rule (e.g., a stable proportion of textual and auditory communication) does not seem feasible, even at the scale of a medium-sized museum display such as the one included above. In other words, it is correct to assume that sensory channels should not simply be sent as an overwhelming stream of stimuli and that they need to be selected, but for the moment one cannot safely assume a design for a museum route where tactile, visual, or auditory modalities complement each other according to a top-down fixed pattern. The third point is that just as selection seems to be indispensable, so selectability turned out to be equally important. The variation in preferences evident in the research sample suggests that the original threshold thesis should be revised to suggest that although visitors appear to opt for sparse models of multimodal communication, the fine-tuning of multimodal accessibility should allow the audience to switch between modalities and sensory channels with some freedom throughout the museum visit.

Overall, the reconstruction of the museum visit experience presented above suggest that the flexibility of multimodal communication, limited sensory stimulation rule, and the evaluation based on the

ethnography-derived qualitative methodologies could be presented as recommendations for the near future developments in the multimodal accessibility design.

The research demonstrates that today's museums should create multiple ways of making their collections accessible; thus, visitors with diverse needs will be able to benefit from those solutions which are best suited to them, even if they had not been originally conceived with their specific needs in mind.

In addition, the research results allow us to conclude that there is a need for constant design improvement and the creation of flexible environments in order to facilitate a better and fully inclusive museum experience for audiences with various disabilities. It is also important to engage those visitors more widely in the development and improvement of accessible museum solutions.

Discussion

Multimodal design recommendations presented in this research – those which are based on multi-sensory contact with museum collections and promote inclusivity – make up one of the available forms of interaction with the collections (Eardley et al., 2016). They are flexible enough to be used by visitors for whose needs they are not specifically intended. For visitors with intellectual challenges, replicas and dioramas which they could touch were very attractive. Audio guides designed to facilitate visits for people with sensory impairments were appreciated by those on the autism spectrum. Visiting was judged to be much more attractive owing to those devices. It needs to be noted that, next to ensuring access, multimodality understood in this way increases the attractiveness of museums (Kelly, 2004). They have the benefit of offering emotional stimulation, facilitating information flow, and memorizing facts (e.g., McManus, 1993; Del Chiappa, Andreu, Gallarza, 2014). This is especially significant because at present, due to the idea of "the economy of experience", museums and cultural institutions compete with each other aa well as with other recreational pursuits which offer an experience in stimulating emotions (Pine, Gilmore, 1998). It transpires that those museums which introduced multimodal solutions attract more visitors, including those with disabilities (Jiménez Hurtado, Seibel, Soler Gallego, 2012; Eardley et al., 2016; Cock et al., 2018).

It is, therefore, clear that designing multimodal solutions and their wide-ranging implementation in museums will facilitate the realization of the accessibility concept, which on the one hand makes it possible for visitors with various disabilities to use the collections, while, on the other, does not require the construction of "special" displays or the creation of a narrative and devices which later function on the margin of the museum's information zone (Jiménez Hurtado, Seibel, Soler Gallego, 2012; Eardley et al., 2016; Cock et al., 2018; Parzyńska et al., 2023). It is not the new technologies as such, but rather the designing of multimodal solutions, supported by the latest technologies facilitating the introduction of new forms of interaction, which enables access and improves the interactive experience of museum collections. Owing to this, museums can offer visitors a multitude of diverse access options that will suit and support the needs and preferences of various users, including those with disabilities

(Ruiz et al., 2011). This will ensure that museum institutions will fulfil the obligations of the ONZ Convention on the rights of people with disabilities, ratified by Poland in 2012, without separating visitor routes. Visitors will benefit from the expanding implementation of access solutions which allow them to enjoy a more rewarding cultural experience, fitting their individual preferences and needs.

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Cytowanie

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Shadowing jako metoda badania doświadczeń muzealnych osób z niepełnosprawnościami: w kierunku kompleksowego projektu multimodalnego

Abstrakt: Artykuł ukazuje wyzwania związane z zapewnieniem dostępności muzeów dla osób odwiedzających z różnymi niepełnosprawnościami. Analiza objęła strategie wdrażania technologii i uniwersalnego designu, aby poprawić dostępność przy zachowaniu wartości estetycznych i informacyjnych. W badaniu ukazano multimodalność jako obiecujące rozwiązanie integrujące różne formy odbioru w zbiorach muzealnych. Badania przeprowadzone w Muzeum Czartoryskich, oddziale Muzeum Narodowego w Krakowie, zebrały doświadczenia i opinie odwiedzających z niepełnosprawnościami na temat dostępnych rozwiązań. Wyniki badań pokazują, że nowoczesne muzea powinny oferować wiele kanałów dostępu, aby sprostać różnym potrzebom, umożliwiając odwiedzającym efektywne korzystanie z zasobów. Ponadto zaangażowanie osób z niepełnosprawnościami w ocenę i współtworzenie rozwiązań jest kluczowe, ponieważ ich wkład dostarcza cennych i konstruktywnych spostrzeżeń. Wskazuje to na konieczność podejmowania działań na rzecz inkluzywności, co może przyczynić się do redefinicji strategii dostępności w muzeach na całym świecie.

Słowa kluczowe: projektowanie uniwersalne, technologie wspomagające, multimodalność, niepełnosprawność, dostępność