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Contents

Contemporary Art and Audio Accessibility from Translation Studies: An Essential Binomial in Current Artistic Creations

María Asunción Pérez de Zafra Arrufat and David Domínguez Escalona

Abstract BioArt is an interdisciplinary research project that focuses on contemporary art. It aims to advance the field of universal accessibility in experimental artistic spaces, emphasizing multisensory experiences. Utilizing a phased methodology that includes a literature review and sensory element analysis, the project identifies innovative practices for creating accessible multisensory exhibitions. In collaboration with researchers and artists with and without disabilities, the exhibition aims to blur the boundaries of the conventional concert hall and exhibition room by creating experimental visual and sound works based on the analysis of movement patterns in individuals with permanent or temporary disabilities, such as Parkinson's disease tremors or spinal cord injuries. Bioart will offer accessible experiences targeting diverse groups, such as visitors with hearing impairments. This chapter explores the barriers present in contemporary exhibitions and addresses them by implementing alternative accessibility measures for the deaf and hard of hearing. These measures include vibrating backpacks to translate the music track played in the room's soundscape, sign language translation, easy-to-read displayed information, and multichannel information. Contemporary art can provide fully accessible experiences for deaf and hard-of-hearing visitors when considering them from the concept design, even if the sound is a key concept. For this purpose, new approaches and accessibility solutions have to be considered to translate the sound experience through other channels (haptic, visual, or the sense of smell). Expected benefits include empowering attendees with diverse abilities, fostering social inclusion, and inspiring future international endeavors in the realm of accessible contemporary arts.

Keywords Accessibility · Contemporary art · Deaf · Sign language · Design for all

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1 Introduction

Contemporary art has the potential to be a powerful tool for promoting accessibility and inclusion for people with disabilities. The intersection of contemporary art and disability justice has been a subject of scholar research, with a focus on rethinking inclusion in arts education and addressing barriers to social inclusion for disabled individuals within the arts. The UN Convention on the Rights of Persons with Disabilities emphasizes the importance of ensuring accessibility to cultural goods and services, highlighting the obligation of states to adopt measures enabling persons with disabilities to utilize their artistic potential (Leahy & Ferri, 2022). However, despite these efforts, access to arts and culture for people with disabilities remains inconsistent (Leahy & Ferri, 2022).

The potential of contemporary art to foster social connectedness and belonging for individuals with severe and enduring mental health problems has been explored, indicating the role of artistic practices and spaces in promoting a sense of belonging for this demographic (Gratton, 2019). Moreover, the participation of people with learning disabilities in mainstream arts and culture has been a subject of participatory action research, shedding light on the need for consistent access to such opportunities (Gratton, 2019).

Inclusive education through the arts has been identified as a potential avenue for reviving inclusive education, with reflections on the implications for professionals involved in this process (Parr, 2006). Additionally, the role of art therapy and disability aesthetics has been examined, emphasizing the importance of understanding the intersection between art practice and disability discourse (Allan, 2014). Furthermore, the arts have been recognized as a space that welcomes disability self-representation and alternate ways of knowing, drawing on principles of disability studies, and the political agenda of disability art to imagine otherwise (Solvang, 2017).

The experiences of disabled artists, including their creativity and the environmental barriers they face, have been highlighted, emphasizing the essence of creative activities in deriving artistic value from painful experiences and creating numerous possibilities (Badía, 2023; Gabriel, 2022):

> My work as an artist focuses on the validation of error, the challenge to stereotypes of beauty and behavior. I seek an alternative path by researching the coexistence between normative and non-normative individuals. My identity as "disabled" is fundamental since I constantly need to claim that my body and the way I move are different. My source of inspiration comes from experiences and the relationship my body has with society. Some of my performances involve confronting the audience with a sense of discomfort caused by the different rhythms that people with disabilities have compared to normativity. I really enjoy reversing the roles present in society and bringing them into my own artistic realm.
>
> (Badía, 2023)

Furthermore, critical disability arts contribute to discourses about vision, visuality, and spectatorship in the arts, highlighting the significance of inclusive representation and participation (Bunch, 2021). Art making has been shown to have a transformative

impact on specific populations such as the health of individuals living with psychiatric disabilities. It emphasizes the value of art as a practical strategy for personal and group transformation in community arts studios (Howells & Zelnik, 2009). Additionally, the evolving norms and values surrounding the politics of inclusion and access play a pivotal role in shaping the opportunities available to disabled artists (Bang & Kim, 2015; Hsueh, 2021). Moreover, the lack of support, guidance, and community for neurodivergent artists underscores the need for inclusive spaces within disability arts and activist communities (Gold, 2021).

The concept of beauty in art is a complex and often subjective domain, steeped in cultural, historical, and personal aesthetics. Traditionally, beauty has been associated with harmony, balance, and the pleasure derived from sensory experiences. Artistic beauty transcends mere visual appeal to encompass a resonance with the viewer's inner sense of what is profound, stirring, and sublime. It can manifest in myriad forms, challenging traditional norms and evoking emotions ranging from tranquility to discomfort, thereby expanding our understanding of what is considered beautiful. Beauty in art is not static but dynamic, evolving with societal shifts and individual perceptions, inviting continuous dialogue and reflection on the aesthetic values that shape our interaction with the world. The transition from traditional forms of art like paintings and sculptures to performance art and immersive experiences marks a significant evolution in the art world. This shift represents a move away from the passive consumption of art toward a more interactive and experiential engagement. Performance art breaks the confines of the canvas and pedestal, often unfolding in museums and unconventional spaces like warehouses, streets, or natural landscapes. It invites the audience to become part of the art itself, engaging directly with the artists and the environment. This form of art blurs the boundaries between creator and spectator, art and life, fostering a deeper, more personal connection with the work. It reflects a contemporary understanding of art as a dynamic event rather than a static object, emphasizing process over product and experience over observation. This trend toward experiential art has expanded the role of museums and galleries, transforming them into spaces of live interaction, dialogue, and sensory exploration. According to Escalona (2012), the concept of beauty:

> (…)It's hard to set it, because beauty is what has been stripped of all kinds of prejudice. Learned standards are not good and the very concept of beauty already stick out like a sore thumb. To me, it's more interesting to talk about beautiful situations, those small accidents that pull you out of the routine and show you the world in a different light. To keep playing, and to perform pirouettes on what is known. That is beautiful.
>
> (Escalona, 2012)

Greco (2019) posits that accessibility studies encompass a broad range of disciplines, and there has been a sequential evolution from particularist views toward a universalist perspective. This universalist perspective acknowledges that media accessibility (MA), as defined by Szarkowska et al. (2013) and cited by Greco (2016: 11), is:

> The field of research concerned with the theories, practices, technologies, and tools that enable access to media products, services, and environments for people who are unable to access or adequately access content in its original form.
>
> (Greco, 2016: 11)

This domain shares aspects of its knowledge base with audiovisual translation (AVT), which Chaume (2004: 30) characterizes as:

> A type of translation distinguished by the particular nature of the texts being transferred across languages. These objects, as implied by the name, deliver (translatable) information through two simultaneously encoding communication channels: the acoustic channel (acoustic vibrations through which we receive words, paralinguistic information, soundtracks, and special effects) and the visual channel (light waves through which we receive moving images, as well as posters or signs with written texts, etc.). In semiotic terms, (…) its complexity lies in a sign-based structure that combines verbal (written and spoken) and non-verbal information, encoded according to different systems of signification simultaneously.
>
> (Chaume, 2004: 30)

Both MA and AVT are framed within translation studies and, in turn, partially within accessibility studies (AS). Accessibility studies within the artistic context incorporate various digital and analog elements that also involve the discipline of translation and interpretation to reach all audiences (Arrufat Pérez de Zafra & Álvarez De Morales Mercado, 2019). Considering accessibility in cultural spaces is crucial for both the visitors and the artists with disabilities. They have reflected on their commitment to welcome and engage all members of society. To get to this point, different international initiatives have played a vital role, such as the UN Convention on the Rights of Persons with Disabilities, which emphasizes the importance of ensuring accessibility of cultural goods and services. They enable persons with disabilities to utilize their artistic potential (Leahy & Ferri, 2022). Museums are transforming, moving beyond physical access to embrace multisensory experiences, thereby enriching the visitor's engagement with art and history (Kellouai, 2023). This includes tactile exhibits, audio descriptions, and sign language tours, allowing every visitor to experience the collections fully. Similarly, concert events are redefining the auditory experience for the deaf and hard of hearing through advanced technology like vibrating platforms and wearable haptic devices (Contreras Pérez, 2023; Garcfa López et al., 2022). These innovations translate sound into tactile sensations, enabling a more inclusive and holistic enjoyment of music. Furthermore, easy-to-navigate layouts, clear signage, pictograms and accessible online content cater to a wide range of cognitive and physical abilities (Niimah & Maina, 2019; Kamran, 2021; Weiss, 2013). By implementing such diverse accessibility strategies, museums and concert events are not only complying with legal requirements but are also embracing the deeper ethos of equality and inclusion, ensuring that culture and entertainment are truly for everyone.

In the context of education, aesthetics and art play a significant role in enhancing creativity and learning, particularly in children, emphasizing the value of art in education (Adu-Agyem & Enti, 2009). Furthermore, the pedagogical encounters with disability justice art exhibitions have the potential to disrupt and shift perspectives

through encountering works of art, highlighting the transformative power of art in challenging societal norms and perceptions (Gross & Keifer-Boyd, 2022). Museums and cultural environments have the potential to contribute to combating stereotypes and enriching perceptions. They emphasize the value of further learning opportunities in these spaces (Kanari & Souliotou, 2021). Additionally, the documentation of works by physically disabled artists serves as a valuable resource for art and special education (Osei-Poku & Acheampong, 2010).

The intersection of art, technology, and accessibility has become a prism through which the artistic experience can be reexamined and redesigned, opening new pathways for inclusion and universal participation. The BioArt project, initiated at the University of Granada, embodies this convergence. Focusing on creating multisensory experiences through experimental visual and sound works, the project aims to blur the conventional boundaries between the concert hall and the art gallery, advocating for broader inclusion. This innovative approach presents a unique opportunity to explore and expand the boundaries of accessibility in art, while challenging traditional perceptions of ability and disability.

The concept of universal design, underlying the philosophy of the BioArt project, is based on the premise that accessibility should not be an afterthought but an intrinsic principle in artistic creation. This perspective is essential to understand the project's approach to accessibility, which seeks not only to adapt existing art to be more accessible but also to create art with the explicit intention of being accessible from its inception. This approach reflects a paradigm shift in how we conceive accessibility, emphasizing the need for proactive engagement rather than corrective reactions.

Accessibility in art, especially in experimental ways integrating visual and sound elements, presents unique challenges. The audience for these works is inherently diverse, encompassing a wide spectrum of sensory and cognitive abilities. To address this diversity, BioArt adopts an interdisciplinary methodology that amalgamates accessible translation and interpretation, neurophysiology, music, and visual arts. Collaboration among artists, scientists, and accessibility experts is fundamental to this approach, enabling a deeper understanding of how different people experience art.

At the core of the BioArt project is the analysis of movement patterns of people with disabilities, including those suffering from diseases like Parkinson's or spinal cord injuries. This approach not only serves to inform artistic creation but also to emphasize the representation of these experiences in the art itself. Such representation not only increases awareness of these conditions but also challenges dominant narratives about disability, promoting a more nuanced and empathetic understanding.

2 Multisensory Translation Considerations for Sign Language Speakers

Museum spaces have conceptually evolved in recent decades to become places with educational and communicative purposes (Soler-Gallego, 2012). In 1974, the International Council of Museums (ICOM) advocated for the establishment of Departments of Education and Cultural Action, offering a new definition for this institution:

> A museum is a non-profit institution, permanent, in service to society and its development, open to the public, which acquires, conserves, researches, communicates, and exhibits, for purposes of study, education, and enjoyment, material evidence of humanity and its environment.
>
> (ICOM, 2007, p. 3)

One of the current challenges museums face is to disseminate knowledge to the public while acknowledging the inherent diversity of their visitors. Universal accessibility is the cross-cutting tool that can facilitate full social participation at different levels (Chaymae, 2023). This concept is internationally recognized and unified through the International Convention on the Rights of Persons with Disabilities, ratified by most countries. This is of special interest because it ensures the protection of everyone's rights, regardless of where they live, their culture or language, where they travel, or reside. There are universal values that by law must be respected. Museums, housing significant parts of historical and cultural heritage within their walls, as previously mentioned, bear the responsibility to meet society's needs. Nevertheless, it is crucial that the assurance of rights is not limited to isolated good practices (Juncá, 2011).

Accessibility in the artistic context through sign language has traditionally been considered in a linear way, as a resource created ad hoc by external. It is a complementary resource that hasn't any link to the creation process nor being part of the essence of the artist and the work.

Translation allows guiding the visitor through the room using audiovisual material such as sign language guides. It shows the contents of part or all the exhibited pieces. Accessibility is limited to its informative function because it acts as a bridge of communication. As pointed out in the introduction, art and accessible translation are two disciplines that have recently had more and more interactions and spaces of creation and confluence. These spaces have allowed offering resources to users that have opened windows of knowledge to many people. Some of those *windows* have been videos of the artwork and guided tours in the natural language of many Spanish deaf people, Sign Language (Abasolo Elices & Arrufat Pérez de Zafra, 2023). However, it is necessary to question whether a measure like translation into another language can really offer the viewer an immersive and equitable experience. Is there a hundred percent equivalent translation of a written text into sign language? Is it the same to translate from an oral, audiovisual, or written source text? Will the target text offer a completely equal experience to the one experienced by users who access the information through the auditory or visual channel with a written or spoken Spanish text?

Undoubtedly, a text contains a semantic and cultural load that can be complex to translate or that may lose nuances and gain others when translated. In the mere description of the location of an artwork, the visual-spatial nature of sign languages allows offering more precise information with fewer linguistic signs.

Moreover, it is important to consider that an oral or audiovisual text in Spanish contains paralinguistic information that plays an essential role in the communication process. For example, the volume of the voice, the speed at which a person speaks, the tone, the silences, etc. All these elements are part of the text and, when we translate into sign language, they automatically become part of the target text.

Perhaps at this point, the following question has suddenly appeared: Why do signed texts have to add automatically paralinguistic information? The answer is simple, a written text rarely contains these types of elements. They can be observed in literary texts, where the author may spend a few sentences describing the tone or intensity of the person speaking, but it is not the most common in other types of texts. In sign language, as it does not have an official written representation, the translator or interpreter adds this type of information to the target text.

One of the most well-known dubbing actors in Spain has been Pepe Mediavilla, voice of characters like Gandalf from the Lord of the Rings, Star Trek's Spock, or Morgan Freeman in many of his films. His deep voice has brought Tolkien's texts closer to thousands of followers, and his warm, intimate, and intense interpretation has gone down in history on his YouTube channel (Mediavilla, 2016). This special sparkle that his interpretation has is a light that any translation or interpretation into sign language can shed, as every text is ultimately enriched by the intonation, intensity, pauses, and interpretation that the sign language speaker impregnates in it. For this reason, it is possible to affirm that in this process of creation, it may be utopian to think that the information can really be neutrally translated into sign language.

Moreover, in the artistic context, the elements richly utilize sensory channels, and translating or seeking equivalent experiences through another sensory channel makes it arduously complex to obtain a target text with an identical meaning in which all the nuances of the original can be perceived and interpreted in the same way.

This can be observed with greater incidence in those texts that require intersemiotic translation or those that are per se multisensory texts. From a Deleuzian perspective (1977), an event cannot be conceptualized as a fixed entity, but its entity and identity are extensive dynamic. This allows it to be understood through the relationships that are established. If we focus on the event of a contemporary art exhibition, the multisensory experiences and the different ways of interacting with the work allow blurring the traditional linear and static perception to open paths that had not been previously considered through *aesthetic reason* (Maillard, 1998). In the process of blurring these lines, this path can be taken, returning to the origin or to the place where all possible forms exist, the Jaos in Hindu mythology (Escalona, 2024). This way of creating through multisensoriality and being aware of the different possibilities of interaction with the work constitutes a paradigm shift in the artistic context.

3 Users Diversity for Audio Accessibility

The landscape of audio accessibility in contemporary creations is a rich tapestry of diverse users, each with unique needs and experiences. Among these, individuals with hearing loss represent a significant group (Smith et al., 1998). The spectrum of hearing loss varies widely, from mild to profound, necessitating different levels of accommodation. For instance, those with partial hearing loss may benefit from amplified sound systems or hearing loop technologies in galleries and concert halls (Lopez et al., 2020). Meanwhile, individuals with profound hearing loss might rely more on visual or tactile interpretations of sound, such as visual sound representations or vibrating tools that allow them to experience the rhythm and intensity of sound (Quittner et al., 1994). This differentiation in needs underscores the importance of versatile and adaptable sound accessibility solutions in contemporary art and performance spaces.

Another vital group consists of diverse sign language speakers, who bring a unique cultural and linguistic perspective to the experience of sound in art (López et al., 2018). Sign languages, with their rich visual-spatial grammar and expression, offer a different mode of experiencing sound-related art. Translating textual content into sign language, or offering sign language translations of musical performances, not only makes these experiences accessible but also adds a new dimension to them. It's crucial for creators and curators to collaborate with the translators to ensure that their translations are sensitive and contextually relevant (Hindley et al., 1994).

Hearing users who are temporarily unable to hear due to contextual reasons, such as being in a talk or having a temporary hearing impairment, also benefit from sound accessibility features (Abascal & Nicolle, 2005). This group's needs highlight the importance of universal design in sound accessibility. Features designed for those with permanent hearing disabilities can also enhance the experience for those facing temporary auditory challenges. For example, providing subtitles or written descriptions for audio guides in museums not only aids those with permanent hearing loss but also assists visitors in a crowded and noisy gallery where the audio might be difficult to hear (Koo et al., 2008). This approach not only ensures inclusivity but also enhances the overall visitor experience, demonstrating that accessibility features can have widespread benefits.

Furthermore, the needs of deaf children, elderly people, and individuals with multiple disabilities must be considered (Moffatt et al., 2004). Deaf children, in their developmental years, require sound accessibility that supports their learning and engagement with art. Interactive, visually stimulating, and tactile elements can be pivotal in fostering their appreciation and understanding of sound-based art. Elderly individuals might face age-related hearing loss and could benefit from similar accessibility tools designed for those with permanent hearing impairments. For people with multiple disabilities, a holistic approach that considers all their needs is essential (Holone & Herstad, 2013). By considering the varied and sometimes overlapping needs of these diverse groups, creators can ensure that contemporary art and sound experiences are truly inclusive and enriching for all.

4 Sensory Accessibility in BioArt Design

In this endeavor to blur the conventional boundaries between music and art, concert spaces and exhibition centers, the current project has embarked on challenging and expanding traditional methods of accessibility for people with hearing impairments or in a context where a hearing person might have a similar experience (Arrufat et al., 2022: 227). Through the implementation of innovative technologies and inclusive practices, BioArt seeks to create an artistic space where the auditory experience is accessible and enriching for all visitors, including those with hearing impairments.

One of the key accessibility strategies in the BioArt project is the use of sign language to provide essential information at the entrance of the exhibition hall. This measure is realized through an introductory text displayed on an interactive digital screen, designed to capture attention and facilitate access to information. The same text is also accessible on visitors' mobile devices via a strategically placed and easily scannable QR code. Upon scanning the code, users can instantly access the information, with the added benefit of being able to view the video according to their usual preferences, such as the size of visual elements, screen brightness, contrast, and other aspects that enhance user experience.

Furthermore, in an effort to encompass the diverse accessibility needs of visitors, the integrated sign language playback system has been enriched with several adjustable options. Users have the freedom to select the playback speed, tailoring it to their comprehension pace and comfort. In addition, subtitles for deaf synchronized with sign language can be activated. They are helpful not only for individuals that speak in sign language and can visualize a term that they don't know, but also for those visitors who may be learning sign language. To ensure comprehensive accessibility, the option to access the full text of the presented information is provided, allowing users with different preferences and needs to enjoy a fully inclusive and enriching experience. This flexibility and adaptability in information has been conscientiously designed by the team for this artistic experience.

This approach not only facilitates access to information for deaf individuals but also elevates sign language to an artistic and expressive medium in its own right. By integrating sign language prominently, the project challenges conventional notions of storytelling and communication in the artistic space, underscoring the importance of linguistic and cultural diversity.

Another innovation is the use of vibrating backpacks to translate the sounds of soundscapes into geolocated vibrations (Fig. 1).

This technology allows users with hearing impairments to experience music and sound in a completely new way, through tactile sensations (Silvestri & Falk, 2023). This method of sound translation opens up new possibilities for the perception and appreciation of sound art, challenging our traditional understandings of how music and sound are experienced. These backpacks create a multisensory experience that aligns auditory and tactile stimuli. This synchronization not only enhances the artistic expression but also deepens the emotional and cognitive engagement of the audience.

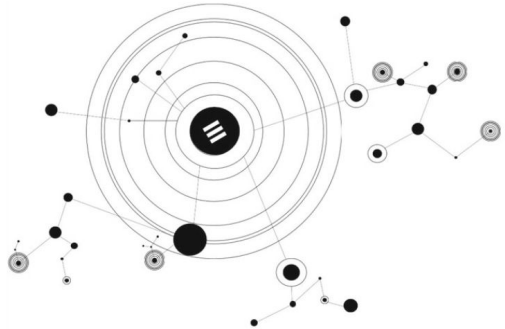

Fig. 2 Nocturno No.2 op.9. *Source* Alvaro Escalona (2023)

The artwork displayed combines visual rhythms with auditory elements to create a multidimensional sensory experience. This piece or alternative musical score has been designed to be showcased in an alternative format (Fig. 2).

It invites not just the eyes but also the hands to explore its contours and textures. The concentric circles and interconnected nodes suggest a cosmic dance of planets or the intricate pathways of neural networks. Such a piece becomes a tactile soundscape, where each relief and texture is a note to be felt, allowing visitors, especially those who are musicians to create, imagine, and "hear" through touch. This fusion of tactile and visual stimuli exemplifies a progressive move in contemporary art toward the concept of design for all, providing a profound experience that speaks to the interconnectedness of our senses. The artwork offers an immersive exploration that is as much about feeling as it is about individual creation.

Within the questioning of the limits of the concert hall and the exhibition room with the created sound art pieces, the harp of a piano has been included, whose parts have been dismantled like a puzzle. This is a particularly resonant choice with the ideas of John Cage, a pioneer in the use of prepared pianos. In a prepared piano, the sounds of the instrument are altered by inserting objects between or on the strings, resulting in a transformation of the traditional piano. However, the one that has been created is not a prepared piano per se, although it has been converted into a new instrument capable of creating a new range of sounds. The piece *Nada I* is the result of the integration of new technology to produce and maximize sounds (Fig. 3).

For this piece, vibratory speakers (vibration transducers) have been used, operating under a different principle than conventional speakers. Instead of emitting

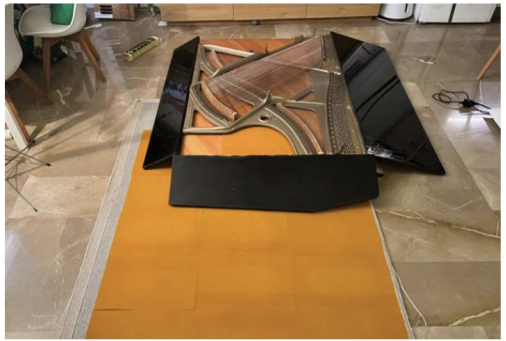

Fig. 3 *Nada I*. *Source* Alvaro Escalona and David Escalona (2023)

sound waves through the air, the vibrations they generate are transmitted through any solid surface they are in contact with (a table, a window, or even human bone). The effectiveness of the transmission will depend on the physical properties of the surface, such as its density and rigidity. When the vibratory speaker is in contact with the human body, as with bone conduction headphones, the vibrations are transmitted through the bones of the skull to the inner ear, bypassing the middle ear. This allows the person to perceive the sound without the need for sound waves to travel through the air and enter through the outer ear. In art and sound installation, they can be used to make a specific surface emit sounds, opening new possibilities in terms of sound exploration and its interaction with space and materials using new technologies. If the surface on which a vibratory speaker is placed is the wooden base of a piano harp, as in "Nada Brahma I", designed to resonate, it will become part of the piano's acoustic system. The curious thing about this sound installation is that the strings vibrate indirectly, creating a unique combination of sounds generated by the vibratory speaker and the harmonics of the piano strings. From several vibratory speakers, placed on its surface, various pieces will be played that, as electronic miniatures, have been composed from a series of graphic scores, whose symbols have been inspired by seismic swarm maps. Each of these sound micropieces is a reinterpretation of classic piano works that music students play and marked the composer's youth, such as the Moonlight Sonata. The sounds that are heard are emitted from the piano harp through four vibratory speakers. The piano has become a large music box, but it is a metaphor for our body, for the world we inhabit. It seems as if the piano's sonorous

Fig. 4 Cliczz. *Source* David Escalona (2023)

body becomes the theater of the world and vice versa. Its strings vibrate and project the sound of different sonic textures that fill the main room with resonances.

Within the project, one element that serves as a cohesive nexus for the experience is the scent of a beehive's honeycomb (Fig. 4).

This concept originates from the tattoo of the model featured in the exhibition, where nature plays a pivotal role. The sense of smell is engaged through this element, creating a multisensory bridge between the visual art and the viewer's olfactory perception. The aroma of honeycomb permeates the space, drawing visitors deeper into the artwork's narrative and symbolizing the intricate connection between humanity and nature. This olfactory dimension not only adds depth to the visual aesthetics but also evokes the natural world's raw beauty and complexity, enhancing the immersive quality of the exhibition and creating a visceral connection to the artwork.

In the exhibition, a conscientious effort has been made to ensure cognitive accessibility through the implementation of easy-to-read texts. These texts adhere to principles of clarity and simplicity, avoiding complex sentence structures and employing straightforward language to accommodate the visitors. This approach reflects an inclusive mindset, acknowledging that cognitive accessibility is as crucial as physical accessibility in the arts. By considering the cognitive load and processing demands of their content, the exhibition curators have made a decisive step toward inclusivity. The elements of the exhibition are designed with intuitive navigation and concise informational signage, which minimizes potential cognitive barriers. The consideration of these elements aim to invite a broader audience to engage with the art in a way that is meaningful, democratizing the artistic experience.

Collectively, these strategies exhibit a profound commitment to inclusion and innovation within the realm of sensory auditory accessibility. BioArt endeavors not

merely to render art accessible to a broader audience but also to explore and push the boundaries of how art can be experienced and enjoyed. This holistic and creative approach to auditory accessibility benefits not only individuals with hearing impairments but also enhances the artistic experience for all visitors, fostering a deeper and more empathetic understanding of diversity and inclusion in art. Contemporary art has the potential to offer fully accessible experiences for deaf and hard-of-hearing visitors, even when sound is a central concept. To achieve this, BioArt has considered new approaches and accessibility solutions to translate the auditory experience through other channels—haptic, visual, or olfactory. The BioArt project challenges and enriches our collective understanding of art and the aesthetic experience, signaling a transformative step in how we interact with and appreciate the sensory dimensions of artistic works.

5 Conclusions

The comprehensive examination of multimodal accessibility in contemporary artistic creations reveals two particularly significant conclusions. Firstly, the integration of diverse accessibility tools, such as tactile systems, sign language translations, and visual representations of sound, underscores the importance of a specific approach in artistic spaces. This approach not only caters to a wide spectrum of sensory needs but also enhances the overall experience for all audiences, regardless of their sensory abilities. Such inclusivity not only aligns with the principles of universal design but also promotes a deeper, more empathetic understanding of the diverse ways in which people perceive and interact with art. The adoption of these inclusive practices signifies a paradigm shift in the conception of art and accessibility, moving away from a one-size-fits-all approach to a more nuanced, tailored experience that acknowledges and values the diversity of sensory experiences.

Secondly, the collaborations between artists, musicians, and accessibility experts have been instrumental in pushing the boundaries of what is possible in sound accessibility. These interdisciplinary collaborations have led to innovative solutions that transcend traditional accessibility measures, offering new ways for people with sensory impairments to engage with art. For instance, the use of technology to convert audio art into visual or tactile formats not only provides access to individuals with hearing impairments but also introduces a new dimension of artistic expression. These advancements are not just technical triumphs; they are reshaping the cultural narrative around art and accessibility. They challenge preconceived notions of who can enjoy art and how it can be experienced, fostering a more inclusive cultural landscape where the diversity of human experience is not just accommodated but part of the narrative.

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References

Abascal, J., & Nicolle, C. (2005). Moving towards inclusive design guidelines for socially and ethically aware HCI. *Interacting with Computers, 17*(5), 484–505. https://doi.org/10.1016/j.intcom.2005.03.002

Abasolo Elices, A., & Arrufat Pérez de Zafra, M. A. (2023). Protocolo para la traducción a lengua de signos o señas de textos especializados: aproximación desde el proyecto Al-Musactra. *Revista de Estudios de Lenguas de Signos REVLES*. In: R. H. González-Montesino y M. C. Bao-Fente (Eds.), *La interpretación de lenguas de signos/señas en España e Hispanoamérica: periferia de la propia periferia* (Vol. 5, pp. 167–183). https://www.revles.es/index.php/revles/article/view/130

Adu-Agyem, J., & Enti, M. (2009). Learning: The role of aesthetics in education. *Journal of Science and Technology (Ghana), 29*(1). https://doi.org/10.4314/just.v29i1.46464

Allan, J. (2014). Inclusive education and the arts. *Cambridge Journal of Education, 44*(4), 511–523. https://doi.org/10.1080/0305764x.2014.921282

Arrufat Pérez de Zafra, M. A., & Álvarez De Morales Mercado, C. (2019). Aproximación epistemológica a la traducción y la accesibilidad en el contexto digital: Propuesta de una taxonomía. *mAGAzin Revista intercultural e interdisciplinar* (Vol. 27, pp. 17–41). https://doi.org/10.12795/mAGAzin.2019.i27.02

Arrufat Pérez de Zafra, M. A., Álvarez de Morales Mercado, C., & Olivencia Carrión, M. A. (2022). Análisis del diseño universal de la comunicación digital y las pautas de accesibilidad al contenido digital WCAG 2.1. In: R. Arroyo González, E. Fernández-Lancho & D. Brao Serrano (Eds.), *Investigación en comunicación inclusiva y multilingües* (pp. 227–236). Comares.

Badía, C. (2023). Conociendo a la artista Costa Badía. *ANIDA: Revista de arte y escuela, 3*, 39–42.

Bang, G., & Kim, K. (2015). Korean disabled artists' experiences of creativity and the environmental barriers they face. *Disability & Society, 30*(4), 543–555. https://doi.org/10.1080/09687599.2015.1030065

Bunch, M. (2021). Blind visuality in bruce horak's "through a tired eye". *Studies in Social Justice, 15*(2), 239–258. https://doi.org/10.26522/ssj.v15i2.2456

Chaume, F. (2004). *Cine y traducción*. Cátedra

Chaymae, K. (2023). Accesibilidad museística y experiencias multisensoriales en el arte contemporáneo: El contexto marroquí y el museo Muhammad VI. Universidad de Granada. https://digibug.ugr.es/handle/10481/81906

Contreras Pérez, M. (2023). Accesibilidad y traducción accesible en la música en directo: el caso de la Fundación Music for All. Trabajo de fin de grado. Available in https://digibug.ugr.es/handle/10481/82849

Deleuze, G., & Guattari, F. (1977). Introducción: rizoma. *Pre-Textos*.

Escalona, D. (2012). «*El arte no es una profesión. Es una actitud*». Diario ABC. https://www.abc.es/cultura/cultural/abci-arte-entrevista-david-escalona-201207190000_noticia.html

Escalona, D. (accepted). Acontecimiento, pájaros y heridas. Aproximación a la poética de Chantal Maillard y David Escalona. *Anales de Historia del Arte*.

Gabriel, J. (2022). Disrupting discipline: A discrit critique of behavior "management" in the art room. *Research in Arts and Education, 2022*(3). https://doi.org/10.54916/rae.125084

García López, A., Batán, D. Souto Rico, M., & Flys, E. (2022). Nuevos dispositivos tecnológicos universales para la mejora de los estudios y la percepción musical. *Dykinson*, 427–442.

Gold, B. (2021). Neurodivergency and interdependent creation: breaking into Canadian disability arts. *Studies in Social Justice, 15*(2), 209–229. https://doi.org/10.26522/ssj.v15i2.2434

Gratton, N. (2019). People with learning disabilities and access to mainstream arts and culture: A participatory action research approach. *British Journal of Learning Disabilities, 48*(2), 106–114. https://doi.org/10.1111/bld.12303

Greco, G. M. (2016). On accessibility as a human right, with an application to media accessibility. En A. Matamala y P. Orero (Eds.), *Researching audio description. New approaches* (pp. 11–33). Palgrave MacMillan. https://doi.org/10.1057/978-1-137-56917-2_2

Gross, K., & Keifer-Boyd, K. (2022). Pedagogical encounters with the indigeneity & disability justice art exhibition. *Research in Arts and Education, 2022*(3). https://doi.org/10.54916/rae.125085

Hindley, P., Hill, P., McGuigan, S., & Kitson, N. (1994). Psychiatric disorder in deaf and hearing impaired children and young people: A prevalence study. *Journal of Child Psychology and Psychiatry, 35*(5), 917–934. https://doi.org/10.1111/j.1469-7610.1994.tb02302.x

Holone, H., & Herstad, J. (2013). Rhyme: Musicking for all. *Journal of Assistive Technologies, 7*(2), 93–101. https://doi.org/10.1108/17549451311328772

Howells, V., & Zelnik, T. (2009). Making art: A qualitative study of personal and group transformation in a community arts studio. *Psychiatric Rehabilitation Journal, 32*(3), 215–222. https://doi.org/10.2975/32.3.2009.215.222

Hsueh, S. (2021). Politics of inclusion and lessons of access from disabled artists. https://doi.org/10.14236/ewic/pom2021.6

ICOM. (2007). *Development of the Museum Definition according to ICOM Statutes (1946–2001)*. http://archives.icom.museum/hist_def_eng.html

Juncà, J. A. (2011). *Accesibilidad universal al patrimonio cultural:Fundamentos, criterios y pautas. Real Patronato sobre Discapacidad*. http://hdl.handle.net/11181/3292

Kanari, C., & Souliotou, A. (2021). The role of museum education in raising undergraduate preservice teachers' disability awareness: The case of an exhibition by disabled artists in Greece. *Higher Education Studies, 11*(2), 99. https://doi.org/10.5539/hes.v11n2p99

Kamran, A. (2021, September 13). The Power of Pictograms: A study and guide on how to create inclusive navigational signage using pictograms to address low situational literacy [MRP]. OCAD University. https://openresearch.ocadu.ca/id/eprint/3513/

Koo, D., Crain, K., LaSasso, C., & Eden, G. (2008). Phonological awareness and short-term memory in hearing and deaf individuals of different communication backgrounds. *Annals of the New York Academy of Sciences, 1145*(1), 83–99. https://doi.org/10.1196/annals.1416.025

Leahy, A., & Ferri, D. (2022). Barriers and facilitators to cultural participation by people with disabilities: A narrative literature review. *Scandinavian Journal of Disability Research, 24*(1), 68–81. https://doi.org/10.16993/sjdr.863

Lopez, M., Kearney, G., & Hofstadter, K. (2020). Seeing films through sound: Sound design, spatial audio, and accessibility for visually impaired audiences. *British Journal of Visual Impairment, 40*(2), 117–144. https://doi.org/10.1177/0264619620935935

López, M., Kearney, G., & Hofstadter, K. (2018). Audio description in the UK: What works, what doesn't, and understanding the need for personalising access. *British Journal of Visual Impairment*. https://doi.org/10.1177/0264619618794750

Maillard, C. (1998). Filosofía en los días críticos: "Diarios 1996–1998". *Pre-textos*.

Mediavilla, J. (Director). (2016, August 19). Un cuento élfico: la princesa Mie, de Tolkien. https://www.youtube.com/watch?v=BpcOk4o368Q

Moffatt, K., McGrenere, J., Purves, B., & Klawe, M. (2004). *The participatory design of a sound and image enhanced daily planner for people with Aphasia*. https://doi.org/10.1145/985692.985744

Niimah, I., & Maina, J. (2019). Differences in navigation behaviour based on literacy levels within a tertiary healthcare complex in northwest Nigeria. In Laryea, S. & Essah, E. (Eds.), *Procs West Africa Built Environment Research (WABER) Conference* (pp. 451–466), August 5–7, 2019, Accra, Ghana.

Osei-Poku, P., & Acheampong, B. (2010). The disabled and art: Selected artifacts of Ghanaian physically disabled artists as a resource for teaching and learning. *Journal of Science and Technology (Ghana), 30*(2). https://doi.org/10.4314/just.v30i2.60547

Parr, H. (2006). Mental health, the arts and belongings. *Transactions of the Institute of British Geographers, 31*(2), 150–166. https://doi.org/10.1111/j.1475-5661.2006.00207.x

Quittner, A., Smith, L., Osberger, M., Mitchell, T., & Katz, D. (1994). The impact of audition on the development of visual attention. *Psychological Science, 5*(6), 347–353. https://doi.org/10.1111/j.1467-9280.1994.tb00284.x

Silvestri, J. A. & Falk, J. L. (2023). And the beat goes on: Using music to transform classes for deaf students with multiple disabilities through universal design. *Odissey,* 76–81.
Smith, L., Quittner, A., Osberger, M., & Miyamoto, R. (1998). Audition and visual attention: The developmental trajectory in deaf and hearing populations. *Developmental Psychology, 34*(5), 840–850. https://doi.org/10.1037/0012-1649.34.5.840
Soler-Gallego, S. (2012). *Traducción y accesibilidad en el museo del siglo XXI.* Tragacanto.
Solvang, P. (2017). Between art therapy and disability aesthetics: A sociological approach for understanding the intersection between art practice and disability discourse. *Disability & Society, 33*(2), 238–253. https://doi.org/10.1080/09687599.2017.1392929
Weiss, A. (2013). Museum signage design and implementation. *Graphic Communication.* https://digitalcommons.calpoly.edu/grcsp/93