Towards Inclusion in Museums: Multisensory and Cross-Modal Translations/Interpretations of Visual Artworks

By

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ABSTRACT

Access to art and cultural works is a fundamental human right, irrespective of abilities and human differences. However, traditional museum experiences heavily rely on visual perception, which creates barriers for visitors—especially for those who are unable to access art through sight. How can visual art be "translated" into other modalities, and what might be their affordances, limitations, and impact? This qualitative investigation focused on a graduate course on multisensory museum experiences embedded within a unique partnership between the Art Gallery of Ontario and OCAD University. Observations and interviews with students, instructors, museum visitors, and stakeholders (including community members with vision impairments and museum professionals) revealed: a range of translation/interpretation strategies, from "literal" (mapping visually perceived spatial properties of artworks to non-visual perceptual modalities) to "constructivist" (non-literal mappings that aim to engender audience memories that are akin to what might have inspired the original artwork); transformative student journeys, such as building meaningful connections with art; and significant impact on diverse audiences and students. This study revealed promising directions for inclusive museums, a preliminary technical language to support the design of translations/ interpretations, and a need for theoretically informed and tested standards to guide these designs and practices.

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1. INTRODUCTION

Museums are community centres of learning, healing, contemplation, and inspiration (Levent and Pascual, 2014) that house historical, artistic, or cultural objects. Access to such centres is a fundamental human right irrespective of cognitive, sensory, or physical abilities, as well as age, gender, cultural background, and other forms of human differences. Museums increasingly stress their interest and focus on: 1) their audiences (Falk and Dierking, 2012; Watson, 2007) by, for example, developing educational programs to provide newcomers to the arts a way of understanding and building meaningful connections with artworks in the collection and 2) the multidimensional nature of access (Dodd and Sandell, 1998) by, for example, providing multisensory tours that include: tactile engagement, text descriptions, sonic experiences and more. However, traditional museum experiences heavily rely on visual perception, which creates barriers for visitors—especially for those who are unable to access the museum through sight. Whether in need of a touch tour, verbal description, or a guided tour, going to a museum is something that often has to be planned and booked in advance.

Contrary to beliefs that reconfiguring museums to provide increased access introduces unrealistic costs, in Europe alone, the tourism sector is overlooking the opportunity for 142 billion euros in profits every year as a result of poor infrastructure, services and attitudes towards travellers with access

requirements (European Commission, 2014; Eardley et al., 2016). One of the main perceived barriers of providing access for people with sensory impairments is a misguided understanding of the cost-impact ratio. However, this notion is ignoring the fact that multisensory exhibits benefit many other groups, including sighted individuals, as research shows that our perception of the world is driven by all the information we process, and is strongly influenced by our previous knowledge, understanding, experiences, and internal predictions/expectations (top-down variables: Vartanian and Kaufman, 2013; Aglioti et al., 2014). Although we use different sensory systems to collect information, our brains process the information in a multisensory way. Amongst the many affordances of multisensory approaches, a particularly important one is an enhanced learning experience (Eardley et al, 2016). Research shows that multisensory exposure enhances performance for both perceptual and memory tasks (Eardley et al., 2016). Given the knowledge driven from neuroscience that we experience the world in a multisensory way (Levent and Pascual, 2014), museums and/or art forms should be designed to address all of our senses.

In addition, research demonstrates that multisensory integration is fundamental for achieving a full appreciation of aesthetics (Jacobsen, 2010; Freedberg and Galles, 2007; Lacey et al., 2011; Aglioti et al., 2014). Furthermore, by providing a diversity of perceptual cues, access and opportunities for inclusion of individuals with diverse sensory capabilities is engendered (Eardley et al., 2016, McGinnis, 2014). This suggests that multisensory museum

experiences are more educational, memorable, and meaningful for diverse audiences, thus adding value to one's life, while also breaking barriers to inclusion.

Interestingly, multimodal interaction with exhibits was the norm in the early stages of the museum (Classen, 2007; Classen and Howes, 2006; Howes, 2014); in the late seventeenth and eighteenth centuries, visitors to the Ashmolean and British Museum touched, picked up, smelled, and even tasted artifacts that were on display (Levent and Pascual, 2014). Historians have documented the gradual transition towards restriction of the senses by privileging vision and sight in the museum context (Rees Leahy, 2012); this is mainly due to the need to protect and conserve valuable artworks by restricting visitors from touching and physically interacting with the original artifacts. In today's museums, including other modalities in an exhibit is considered an emerging practice; while there are examples of such multisensory museum experiences, those are still few and difficult to achieve.

The ultimate goal of this research is to discover how access to art and evocative cultural works can be engendered by using multisensory techniques to make existing art accessible and/or to create new art forms that are accessible. This introduces important questions, such as: how can visual art be "translated" from one sensory mode to another, and what might be the affordances, limitation, and impact of such translations/interpretations?

This qualitative investigation focused on a graduate course on multisensory museum experiences, embedded within a unique partnership between the Art Gallery of Ontario (AGO) and OCAD University, as the class was configured to explore inclusive design practices of multisensory and cross-modal translations/interpretations of original visual artworks. Therefore, studying the class by observing and conducting in-depth interviews with students, instructors, stakeholders that were involved in the class (including community members with vision impairments, and museum professionals), and audience members supported the goals of this investigation. In the class, students worked together with the stakeholders through co-design/participatory design (DiSalvo, Clement, & Pipek, 2012), which is design that attempts to include those who are affected by the solution in the design process, in this case, community members with vision impairments, representatives from the Canadian National Institute for the Blind (CNIB), and museum professionals. In other words, designing together with the users, rather than designing for them. Six final artifacts/experiences were studied as part of this research; while all had the same goal—to create a multimodal translation/interpretation of a visual artwork to increase access—our study reveals a diverse range of strategies and demonstrates their affordances, limitations, and impact on community members and museum visitors.

To achieve the goals of this investigation, the objectives of the research are as follows:

Objective 1: To identify the current state of access to art, including the affordances and limitations of emerging inclusive practices, focusing on multisensory approaches. This will help expose gaps and opportunities for new inclusive practices.

Objective 2a: To describe the objects/experiences created in the class *Multi-Sensory Studio/Seminar* and their impact on diverse audiences.

Objective 2b: To support Objective 2a, develop a means to describe the objects/experiences created in the class. This will require adapting technical terms and concepts from fields such as semiotics to describe the affordances, limitations, and impact of translations/interpretations of visual artworks on diverse audiences.

Objective 3: To describe the students' journeys towards the creation of these objects/experiences, and the impact of those journeys on the students. This will help expose how various events and experiences in the class shaped outcomes, which could also inform the design of future iterations of this class.

Objective 4: To identify recommendations for future work.

2. METHODS

This qualitative research was conducted with the use of mixed-methods, together with several different groups of participants. An integral part of this research is a graduate course entitled *Multi-Sensory Studio/Seminar (INCD-5002)* that was synergistically designed with this research, for the two to support one another (all researches were involved in the process of designing the course and the research). As mentioned before, the class employed *participatory design* (DiSalvo, Clement, & Pipek, 2012) as an inclusive platform and methodological tool for enabling social-driven collaboration with communities that are directly affected by exclusionary practices in museums. Participants of this research included students of the class, teachers, stakeholders that were involved in co-design sessions in the class (including community members with vision impairments and museum professionals), and audience members.

In addition, the method of *naturalistic participant observation* was used in this research to ensure a safe environment of learning and engagement for participants, and to engender freedom of creativity during all classes and co-design sessions that were part of the course. To better understand the processes and insights of the participants, we also conducted in-depth qualitative semi-structured interviews with all the participants of this study, from the various groups described below.

2.1. Sampling and Recruitment

The participants of this study included: An expert in Museum Accessibility from the Art Gallery of Ontario (AGO), who liaised with the course; 16 students from diverse professional backgrounds (however, the majority of students were in the process of pursuing a Masters in Inclusive Design); an OCAD professor co-teaching the course (who is also one of the researchers of this study); 2 stakeholders with vision impairments (one is fully blind, and another with a vision impairment); and 12 audience members from diverse cultural backgrounds and age groups (one was also hearing impaired), who interacted with the final translations/ interpretations created by the class.

The recruitment for most participants took place in the *Multi-Sensory Studio/Seminar* class (with an approved Research Ethics Board Application). On the first class of the course the research was introduced and explained to the students (the purpose of the research, its voluntary nature, and what will be required of the participants); recruitment letters and consent forms were provided to everyone, while *no-obligation-to-participate* was emphasized. 16 students consented to participate, and 3 students decided to not be included in the study, but had no problem with the research being carried out in the class. The stakeholders were recruited during the co-design sessions in the class, and audience members were recruited during the final event at the AGO, which we refer to as the Big-Reveal, where the translation/interpretations were on display

for two hours throughout the museum next to the original artworks (on a night with free admission to the museum).

2.2. Data Collection

Data was collected from September 2017 until April 2018. To address *Objective 1* (identify the current state of access to art) data was collected through literature review to understand the international context, as well as an in-depth interview with an expert in museum accessibility focused on the AGO in Toronto Canada, which is where our field study took place. To address *Objective 2* (describe the objects/experiences created in the class) and *Objective 3* (describe the students' journeys and impact on students), data was collected through observations and interviews with students, instructors, community members, and audience members. To address *Objective 4* (to identify recommendations for future work) data was collected through several discussions between the researchers at all stages of the study.

Furthermore, all of the classes and co-design sessions in the *Multi-Sensory Studio/Seminar* course were observed, photographed, video recorded, and notes were taken. The students participating in this study were interviewed multiple times throughout the course, mainly once in the beginning of the course and once again after the course ended (16 students did the first interview, and 12 students did the second interview—4 opted out of the second interview due to time constraints and/or deferring from their studies). Interviews always took

place outside of the class and were anonymous. The approach to the second interview with the students was inspired by participatory design, where the participants and the first author-researcher were co-creating together sketches and journey maps (as can be seen in Figure 1, and 2). The teacher of the class and the co-instructor on behalf of the Art Gallery of Ontario (AGO) were both interviewed separately, at different times of the course (during the semester, and after the course was completed). In addition, in-depth interviews with two community members with vision impairments, who were involved in the co-design sessions, were carried out and afforded a better understanding of the impact of the translations/interpretations on diverse audiences. However, to address the impact on the audience, data was additionally collected through observations and semi-structured interviews with museum visitors from the Big Reveal event at the AGO.

2.3. Data Analysis

All of the above resulted in a rich dataset. The analysis was ongoing—the researchers met weekly to discuss progress and findings at all stages of the investigation. This afforded an iterative process during the data collection phase based on feedback and emerging insights. The researchers continued to meet at least once a week after the data collection phase was completed. Interviews were transcribed and notes were taken; also, photography and videos recordings were reviewed and notes were taken. Furthermore, the data was

analyzed using grounded theory (Strauss and Corbin, 1998), facilitated by NVivo software, where a thematic approach was employed with the use of coding of recurring concepts/themes. To describe the translations/interpretations created in the class, the researchers recognized a need and developed a preliminary technical language during the analysis phase. Finally, the researchers continued to meet in order to discuss the findings and to determine future work.

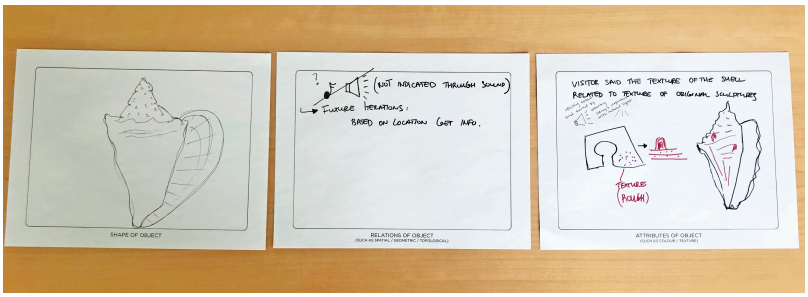


Figure 1: Students Participating in the Analysis

Figure 2: Creating Journey Maps with Students

3. CURRENT STATE OF ACCESS TO ART

3.1. Introduction to Section

This section will aim to discuss the terrain for access to art focusing on a variety of emerging inclusive practices that employ multisensory approaches within the context of the museum world. This section can be viewed as an overview that will allow us to identify opportunities and needs through discussing: examples that are taking place globally, strategies employed to achieve these practices, and opportunities and gaps that remain for new incisive practices focused on multisensory approaches.

The section will begin with the early pre-history of access to art and its influence on what is currently happening globally. We acknowledge that there has been significant work in the last two decades to study, promote, and create multisensory museum experiences. Our literature review reveals 3 main 'types' that we will refer to as: Type A: Fully Accessible Museums; Type B: Additional Accessible Exhibits; and Type C: Artworks Designed to Be Accessible. Each type will be explained considering the proposed parameters of: where these examples are located in the world; the type of work that they do and their approaches; a breakdown of specific key strategies that are being employed; and a discussion of remaining gaps and opportunities (where applicable).

Following the discussion on emerging inclusive practices focused on multisensory appraoches is an introductory discussion on the barriers to

inclusion, recognizing that though there are examples of multisensory museum experience around the world, these are still few and difficult to achieve.

3.2. Precursors

In the last several decades advancements and research in the area have been made, one key organization is Art Beyond Sight (ABS, formerly Art Education for the Blind), which was established in 1987 and has since been pivotal in encouraging a dialogue between museum practitioners, cognitive researchers, and other professionals. Their works have promoted multisensory museum experiences, successful collaborative partnerships, and research that has engendered access and inclusion (Levent and Pascual-Leone, 2014).

Art Beyond Sight's original goal was to make museums and visual cultural artifacts accessible to people who are blind, therefore much of it's effort was initially focused on developing multisensory tools for blind audiences, such as tactile images, verbal descriptions, touch collections, and sound images (Levent and Pascual-Leone, 2014). In addition, the founder of ABS Elisabeth Axel together with her team pioneered tactile book printing such as the tactile art history encyclopedia *Art History through Touch and Sound,* and developed a tactile language of lines and patterns. In the 1990s, ABS established itself as a think-tank and clearinghouse for research on multisensory perception, including tactile images for people who are blind, haptic perception of forms and shapes, auditory perception, verbal description, sonification, and art education through

the senses (Levent and Pascual-Leone, 2014). One of ABS's first national conferences was held in 1990 at the Metropolitan Museum of Art, and was focused on research done by cognitive psychologists, including John M. Kennedy (Drawing and the Blind, 1993) and Morton Heller (Psychology of Touch, 1991). Over the next two decades ABS became a hub for cutting-edge research and best practices in museum pedagogy.

One important partnership that ABS established is with the Metropolitan Museum of Art, which began on a biennial international conference, Art Beyond Sight: Multimodal Approaches to Learning (Levent and Pascual-Leone, 2014). With creative input from Rebecca McGinnis at the Metropolitan Museum of Art, the conference expanded to address a larger scope of issues around multisensory learning of all museum audiences. Since then, several other similar conferences have taken place and have brought together researchers and practitioners from various disciplines including neuroscience, social psychology, museology, education, art history, computer science, and art therapy (Levent and Pascual-Leone, 2014).

The work ABS has done is highly important and contributes to the emergence of multisensory museum experiences on an international level. Rebecca McGinnis at the Metropolitan Museum of Art explains, "The perspective of visitors who are blind and partially sighted, a group often excluded or marginalized by art museums, is significant in drawing attention to the richness of experience beyond the visual that a museum visit can offer" (2014). For

instance, most museums and galleries prohibit the audience from interacting with the artworks through touch, yet touch adds additional layers of information for everyone, including sighted individuals (Levent and McRainey, 2014, Eardley et al., 2016). Additionally, touching an artwork can result in an emotional/intimate encounter with art, and provide an aesthetic pleasure caused by the experience of touching beautiful artifacts (Eardley et al., 2016).

3.3. Emerging Multisensory Inclusive Practices: Type A: Fully Accessible Museums

Examples of museums that are fully accessible are few and hard to find. In this section we will discuss only three examples: two are studied and compared in the article *Redefining Access: Embracing multimodality, memorability and shared experience in Museums* by Eardley et al. (2016); the third is an additional example of a fully accessible museum in Canada.

3.3.1. Global Examples

The two examples from the article mentioned above are two case studies of Portuguese museums that employed an approach called "access for all", where the concept of accessibility is applied at all levels, including physical access and access to the content of the museum. The two museums that experimented with the implementation of this approach are: *Museu da Comunidade Concelhia da Batalha*, often referred to as *MCCB,* which is a small community museum in

Batalha, Portugal; and *Museu Nacional do Azulejo* also known as the *MNAz,* which is a national tile museum.

The third example is The Canadian Museum for Human Right (CMHR) in Manitoba, Canada, which is the first museum that is solely dedicated to the evolution, celebration and future of human rights. On their website, they describe the museum as: "Creating inspiring encounters with human rights, we will engage Canadians and our international visitors in an immersive, interactive experience that offers both the inspiration and tools to make a difference in the lives of others." Since this museum is committed to ensuring these experiences are offered to all people, irrespective of abilities, it is designed to be fully accessible.

3.3.2. Strategies Employed

MCCB is an internationally recognized example of an inclusive museum, where multisensory museum experiences are offered. The MCCB was developed in a way that would maximize access through the preparation of accessible information about space and objects, and testing of alternative modalities used to convey this information; for example, all text is available in braille, digital formats (e.g. virtual books, interactive displays) and analogue (e.g. paper); small text is also available in black and white, high contrast and big print. Tactile maps and tactile displays are incorporated into the collection as seen in Figure 3. The tactile displays are often placed together with audio and/or video guides.

According to the authors of the study, size, texture, and above all simplicity impact the results of the representations, where less is often more. The team of experts and advisory committee, who designed this museum, aimed to find ways to guarantee access without jeopardizing the interests of museology, which were equally central to the design. As a result, Eardley et. al. claim the team had to move from 'perfection' towards 'what is possible', understanding this is a compromise they have to make (2016).

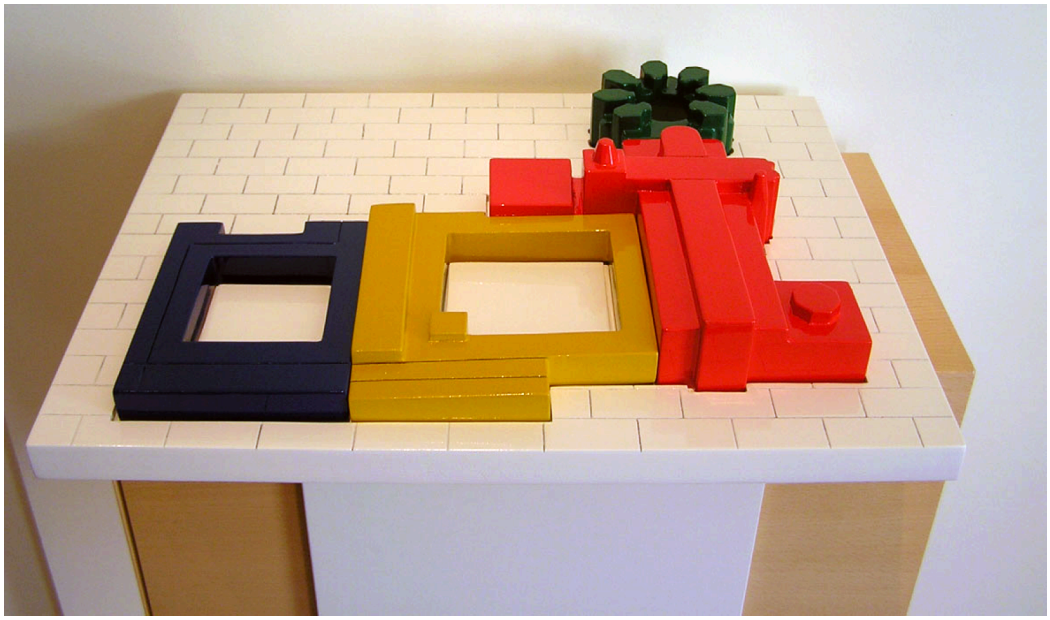


Figure 3: MCCB - A Basic Puzzle Model of the Monastery (Photo: Joselia Neves, Eardley et al., 2016)

Through participatory visits and workshops, visitors can find their personal journey throughout the MCCB museum, irrespective of cognitive, sensory or physical abilities. In addition, in the stops on the audio tour, not only did they guided hands in the exploration of objects, but also guiding movement in the entire space, which contributes towards blind people's autonomy and

allows them to navigate through the exhibit freely and independently. The freedom to visit a museum at any time is crucial, as it highly impacts one's quality of life (Weisen, 2011). Eardley et. al. view the experience the MCCB created as one that adds value not only to the cultural landscape, but also to society as a whole; it demonstrates that we can share our world, without impairing anyone's experiences (2016). The MCCB recognizes that the approach of "access for all" requires an ongoing process of trial and error and constant improvement. This museum has become a reference at national and international level, seen as an example for others to follow, and is often visited by museum professionals from across the world. It also plays an important educational role in the wider context of museum and communication studies and practice (Eardley et. al., 2016).

The second example of a fully accessible museum is MNAz (National Tile Museum). A multidisciplinary team of about 30 professionals designed the museum, and every step was developed in consultation with advisory groups of people with visual and hearing impairments. As with the MCCB, MNAz was also designed through 3 phases including: addressing architectural barriers to access, creating accessible information (e.g. easy to read labels and using plain language), and creating alternative formats for the museum content. One of the most important tools employed here was the creation of raised tactile replicas of selected tile panels. The team working on these replicas discovered through an iterative process that simple designs enhance understanding, therefore,

elaborate patterns were broken into several replicas, and in some cases, 3 dimensional representation of one motif or scene in the original tile panel was also provided (as seen in the figure 4). The replicas were made in white, as to not compete visually with the originals and to enable partially and fully sighted users to focus on the experience of touch (Eardley et. at., 2016).

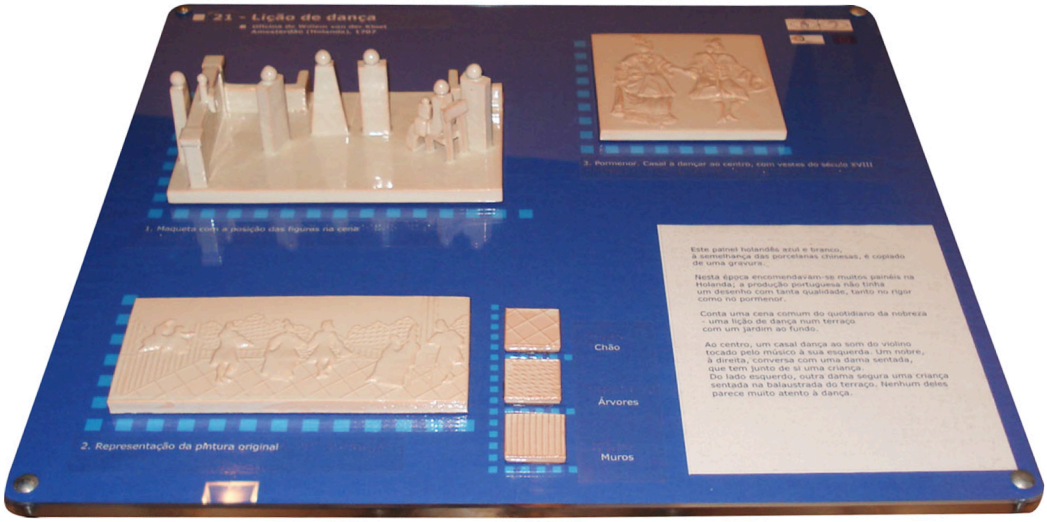


Figure 4: MNAz Tile Replica Display with a 3D Representation of the Scene
(Photo: Clara Mineiro, Eardley et. al., 2016)

Although the feedback the museum received suggests that open-access provision is well-received by the public, such projects need to be embraced within the museum's curatorial priorities and ethos—which unlike the MCCB, the Tile Museum failed to do (Eardley et. al., 2016). "The project was not incorporated by the Museum into an ongoing strategic access plan, in which all departments and members of staff had a role to play in assuring the direction and success of the project. As a consequence, 'access for all' has not been taken

on as a core value within the practice of the museum curatorship (Eardley et. al., 2016)." Thus, impacting the ongoing success of the museum as an inclusive museum that is accessible for all.

The Canadian Museum for Human Rights (CMHR) was established in 2008. Many strategies are employed throughout the museum, including addressing physical barriers as well as the accessibility of the museum content. To address physical barriers, the museum has ramps, elevators, renting of wheelchairs and strollers (for free), cane-seats to borrow, and permission to use electric scooters for mobility within the museum. In addition, there is an accessible mobile app for a fully accessible self-guided museum tour that includes features, such as: an audio guide, sign language, and an accessible interactive map.

Furthermore, the CMHR also offers in-gallery features that are multisensory and systemic. Universal Access Points are where all exhibition content, as well as audio tours, can be accessed through a tactile markers. According the CMHR website, these UAPs are located at strategic points throughout exhibits. The tactile markers are digitally enabled by a device carried by the visitor, and consist of raised numbers and Braille codes that also link to audio files (CMHR website). In addition, adjacent to each touch screen interface is a Universal Keypad (CMHR website); this pad allows visitors to experience the digital content in touch screen interfaces through accessible tactile controls and voiced instructions.

In addition, CMHR offers: ASL/LSQ interpretations on screen (by members of the Deaf community), a braille gallery guide upon request, graphics/print sizes are made as accessible as possible, tours with descriptive audio are available to book, and videos with spoken words are closed captions (in both English and French).

3.3.3. Summary of Key Strategies, Opportunities, and Gaps

Both Portuguese museums are designed with accessibility and inclusion in mind, where the use of multimodalities to represent what sighted visitors can visually see is evident. The strategy of simplifying complex content is used to enhance the understanding of visitors with vision impairments. The notion of "less is more" applies to the translation/interpretation of art/cultural artifacts, and according to the study, it was done in both of these museums due to user testing with people who are blind and vision impaired. Furthermore, as shown in Figure 4, a single tile/object is being broken into several elements to represent what can be visually perceived. The various elements are all tactile, however, the approaches to these tactile representations vary—for instance, one is a 3-dimentional representation and the others are flat surfaces with raised lines.

While both museums employed principles of "access for all", the study done on them discovered they succeeded to varying degrees. This is due to a difference in attitudes towards the approach, namely within the museum's curatorial priorities and ethos. In other words, designing a museum that is fully

accessible is not enough to ensure a long-term success of access and inclusion. It is key to understand that the solution and approach is ongoing, rather than temporary as an initial investment.

In addition, though MCCB offers audio tours that include guides to the space, which supports a blind person's autonomy (as mentioned earlier), it only does it to some degree; a full accessible wayfinding system would enable visitors to explore the museum more freely and independently without the need of an audio tour. It may also benefit other visitors, including those who are sighted.

The information on the strategies employed at the Canadian Museum for Human Rights was gathered through personal experiences and information found on their website. These strategies were not studied and presented in a peer-reviewed article that examined the effectiveness of these strategies, however, it showcases many emerging practices within one museum that is fully accessible to all people of different abilities. These include addressing both physical barriers by providing, for example, ramps, wheelchair to rent, and an accessible app that incorporates into it accessible wayfinding; as well as addressing access to museum content by providing, for example, multisensory experiences with Universal Access Points for tactile information, audio and interactive key pads, and other formats that makes all information available through various sensory modes and interactions.

3.4. Emerging Multisensory Inclusive Practices: Type B: Additional Accessible Exhibits

Here we will discuss additional exhibits that engender access through multisensory approaches. Examples of museums that have taken steps to create such spaces recognize the benefits of interactive and multi-perceptual exhibitions, however, these are often small additions to the main collection or temporary travelling exhibits.

3.4.1. Global Examples

Examples of museums with additional accessible exhibits that focus on allowing its audiences to engage with touching are *Museo Omero* in Ancona, Italy, *Museo Tiflologico* in Madrid, the *Tactile Museum at the Lighthouse* in Athens, Greece, and the *Touch Gallery* at the *Louvre*. Originally, these spaces were designed for the people with vision impairments, to allow access, yet today the majority of visitors of these spaces are in fact sighted visitors (Levent and McRainey, 2014).

There are also examples of exhibits that focused on exploring the sense of smell; for instance, *Museum of Perfume* in Paris; *Osmotheque* in Versailles; and the *International Museum of Perfume* in Grasse)—with exhibits including perfumery ingredients and famous perfumes (past and present), with many available for smelling. Examples of exhibits that focus on scent and the act of smelling as the subject of the exhibit are *Adventures in Scent* at the *British*

Museum in London (2011), *Sensorium* in New York (2011), and the *Art of Scent* 1889-2012 (2012) at the *New York Museum of Art and Design*.

In addition, there are over 1,400 museums devoted to different aspects of eating and drinking (Stevenson, 2014). Many of these involve sampling, sniffing foods, or ingredients—be it noodles in Japan or condiments at the *National Mustard Museum* in Wisconsin. In addition, there are also museums dedicated to wine around the world; they exhibit history, manufacturing techniques, and, of course, appreciation of this product (Stevenson, 2014).

An additional example, yet here the exhibit addressed all senses including touch, sound, vision and smell, is the temporary exhibit *Blue Whale* at the Royal Ontario Museum in Toronto (2017); the one exhibit, we the researchers, had the opportunity to visit and explore from a visitor's perspective.

3.4.2. Strategies Employed

Tactile additional exhibits include touchable plaster, fiberglass, and bronze replicas, scale architectural models, and original works of art that are meant to be touched. At *Museo Omero*, *Museo Tiflologico*, the *Tactile Museum at the Lighthouse*, and the *Touch Gallery* at the *Louvre,* replicas of original artworks are on display, where both contemporary and historical pieces have been recreated for intimate interactions.

The collection of *Museo Omero* is chronologically organized and includes casts of *Michelangelo's Pieta* and *Moses*, as well as original works by other well-

known Italian twentieth century sculptors such as *Francesco Messina* and *Arnaldo Pomodoro*. Educational officers of the museum build tours and experiences based on the strength of this encyclopedic collection, and the ability to discuss history while the visitors run their hands over the scale models of Rome's architectural monuments or replicas of artifacts (Levent and McRainey, 2014).

Furthermore, *Museo Omero* works closely with local artists to create new original artworks where visitors can engage specifically through touch; "The museum takes its role as a regional art center seriously and works closely with and promotes contemporary Italian sculptors, many of them local, asking them to create works that can be explored through touch (Levent and McRainey, 2014)."

The Touch Gallery at the *Louvre Museum* is a public gallery that features thematic exhibits of touchable replicas of works from the museum's collection. "The exhibit typically includes about fifteen works in bronze, terracotta, and plaster, and changes every couple of years. The themes are varied and in the past have included explorations of animals as symbols of power and movement in ancient Greek and Roman art (Levent and McRainey, 2014)." The collection has become such a success that in 2005 the collection began traveling globally, allowing access to people who have yet to visit France or do not have the means to. Since the exhibit started travelling, approximately thirty exhibits have taken

place in Europe, Asia, and Latin America. In china, 40,000 visitors viewed and touched the exhibits in just one month (Levent and McRainey, 2014).

To increase access in museums for blind and individual with vision impairments, tactile solutions have been used the most, not surprisingly given that this medium affords the representation of visible objects. Nevertheless, smell and taste have been invoked as other mediums to enhance the museum experience of vision impaired visitors (Handa, Dairoku and Toriyama, 2010). As mentioned above these are often museums devoted to perfumes, food and drinks, commonly offer sampling of scents/foods to smell and/or taste. In addition, there have been exhibits that were solely dedicated to the olfactory sensorium; for instance, *Sensorium* was a fragrance-focused pop-up scent museum in New York City, offering the audience an interactive exhibition exploring the emotions and instincts behind scent. Interestingly, while dedicated to the sense of olfactory, the exhibit engaged all five senses.

There are more examples that include taste and smell as part of a wider multimodal exhibit that also has, for instance, tactile and auditory displays (like in the case of *Sensorium*). In most cases, the idea of using smell as part of a wider multimodal exhibit is to create a more realistic and engaging sense impression (Stevenson, 2014). “Odors can serve as powerful retrieval cues, bringing to mind evocative memories from a person’s childhood. More generally, they can make one feel a part of what is being smelled and can create powerful, and often negative emotions—emotions that may be quite appropriate and add

significantly to the impact of particular exhibits (e.g., fear/disgust in the context of a World War I trench (Stevenson, 2014)." Additionally, at a subtler level, smell can affect one's mood, possibly without the person being aware of it (Stevenson, 2014).

A recent example of a multimodal exhibit that had an element of smell is *The Blue Whale* exhibition at the *Royal Ontario Museum* in Toronto (2017). The exhibit offered a wide range of ways to explore the subject on display—the blue whale—from tactile replicas, to sonic-visual displays, interactive displays (for instance, listening to the whale's heartbeat compared to other animals), and even games and costumes. It also had a display that was both visual and 'smelly'—it was a wrist watch that Mark Engstrom wore as he helped preserve the bones of the 24-metre female blue whale, whose full skeleton was part of the exhibit. The smelly watch was exhibited inside a plexiglass box allowing for the visitor to decide whether they would like to smell the scent of a dead blue whale.

3.4.3. Summary of Key Strategies, Opportunities, and Challenges

Engaging the senses in an exhibit seem to provide a museum experience that not only engenders access, but engages visitors without disabilities. Tactile replicas afford the representation of visible objects, but addressing other senses such as sound, smell and even taste can enhance the experience. It appears that multisensory exhibits that address a variety of senses can create an experience

that is more complete and realistic, given we experience the world via all of our senses.

Furthermore, the sense of olfactory, which is often the forgotten sense in art and exhibits, should be underestimated; as noted above, the use of odors can serve as a powerful retrieval cues, bringing to mind evocative memories. This can enhance the experience of a visitor, making it more memorable and meaningful.

In addition, the strategy employed by *Museo Omero*, where the museum works closely with local artists to create new works for the space is an opportunity to create art that is made accessible (Type C), while raising the awareness of creative individuals who produce art for museums.

The Touch Gallery at *The Louvre* has become such a huge success, however, it also raises the question of why these tactile exhibits are separated from the rest of the collection? In other words, why are the tactile replicas not placed next to the originals and are on display throughout *the Louvre,* rather than limiting their exhibit to 15 works at a time, and to a "categorized" separated gallery? Though access is engendered through *The Touch Gallery*, in a world where there is such a taboo on touching, separating the gallery can be viewed as a gap, if the goal is to engender inclusion, beyond mere accessibility.

3.5. Emerging Multisensory Inclusive Practices: Type C: Art Designed to Be Accessible

Here we will discuss a few artists who have created art that is multisensory, and is therefore designed to be accessible, in addition to the approach of relational/participatory art. While there are many more examples of artist employing such strategies around the world, the purpose of this subsection is to introduce the reader to such artworks in order to get familiarized with this type of multisensory inclusive practices. It is also important to note that although multisensory art forms and participatory art is created globally, most art exhibited in museums is still created strictly for vision.

3.5.1. Global Examples

There are examples of art that is multisensory and accessible all around the world. Here we discuss the works of Felix Gonzales-Torres, who designed works that are meant to be replicated by the museum, as people can engage with art through touch, consume, or take it out of the museum. Janet Cardiff, who is known for her sound installations, and together with her husband Bures Miller have created renowned multimodal installations. Then we introduce the approach of relational/participatory art from the perspective of Nina Simon, author of the book *The Participatory Museum*.

3.5.2. Strategies Employed

In the article *Touch and Narrative in Art and History Museums*, Nina Levent and D.Lynn McRainey discuss many beautiful examples of artists using the audiences' sense of touch as part of their artwork/installation (2014, pp. 68-84); for instance the works of Felix Gonzales-Torres. His candy installation at the *MoMA* in New York, and *beaded curtains exhibition* featured at the *Museum of Fine Arts in Boston*, are great examples of an artist who was engaged in a critical conversation about touch, ownership, and the experience of art (Levent and McRainey, 2014). Torres's works are designed to be replicated, and it is the responsibility of the museum to manifest the work of art, as these works can be touched, consumed, and taken out of the museum.

Another example of an artist who creates art that can be viewed as accessible is Janet Cardiff, who is internationally known for her sound installations; especially a form she calls *audio walks*. Cardiff is Canadian, living in Germany, who has worked collaboratively with her husband and partner George Bures Miller since 1995; their first multimodal installation was showed in Vancouver, and consisted of a dimly lit room, furnished with cardboard, carpets, and collected ephemera artifacts, through which sounds were playing triggered by the visitor's movement, such as musical segments, portions of conversation, and bites of stories (Wray, 2012).

Cardiff and Miller had an exhibition at the Art Gallery of Ontario (AGO) in 2013 titled *Lost in the Memory Palace,* a selection of seven installations

incorporating complex soundtracks, videos, objects and images that had never before been shown together in Canada. Curator of the exhibit Kitty Scott elaborated, “When you enter these spaces and are confronted by soundtracks, images, moving images and objects, you understand the physical environments to be works of art themselves. As you engage with the artworks, you become a true participant… As a result, these installations are deeply moving. (Art Gallery of Ontario, 2013).” Bruce Grenville, senior curator of the Vancouver Art Gallery added, “These two great artists have done so much to bring true interdisciplinarity and multi-modal production to contemporary art today (AGO website, 2013)."

Furthermore, relational/participatory art and active participation can create artworks that bridge gaps and enhance inclusion. In the book *The Participatory Museum*, Nina Simon describes three key reasons why museums should seek to engage in co-creation with their visitors:

1. To give voice and be responsive to the needs and interests of local community members.
2. To provide a place for community engagement and dialogue
3. To help participants develop skills that will support their own individual and community goals (Simon, 2010).

One example of participatory art is the *Take me (I’m Yours)* exhibition at the *Jewish Museum*. A New York Times author reviewed this exhibit and shared her insights on such an experience; while her article raises questions about

'what is art' and the value of art, she shares the fact she left the exhibition 'wanting more' due to her participation.

3.5.3. Summary of Key Strategies, Opportunities, and Challenges

A main strategy is creating art that is not meant to be kept long-term, rather engage the audience and allow them to touch, consume, and take out of the museum. In today's museums, where touching is usually restricted, to engage in a critical conversation about touching art, ownership of art, and the experience of art is refreshing and important.

Another main strategy is creating art that addresses more than one sensory mode, such as the installations by Cardiff and Miller. These works of art, by their nature, provide increased access and do not require a "translation" for those who cannot access art due to sensory impairments. Seeing a shift towards immersive experiences offered by artists (instead of artworks that are strictly visual) is beautiful and encouraging, as we experience the world through all of our senses.

Then there is the approach of participatory art and the participatory museum, that encourage co-creating with museum visitors, engaging the community, and allowing everyone (not just artists) to participate is a truly inclusive approach to art. However, this raises interesting questions about what is art and what is its value? This also ties to what is the bigger question of what is the role of the museum?

3.6. Barriers to Inclusion

As evident from the examples above, there have been attempts to address the different senses through designing museums, exhibits, and art that promote multisensory experiences, however, in the grand scheme these attempts are rare and hard to come across (Levent and Pascual-Leone, 2014). Museums face many challenges and barriers to inclusion; a lack of funding is often one of the most quoted barriers, as mentioned earlier in the introduction. There are other barriers to inclusion, including: the very idea of the museum (power dynamics and its history), attitudes of museum professionals, and lack of awareness. The focus of this study is on affordances of multisensory museum experiences that promote inclusion, but it is also important to recognize the many barriers along the way. Here, we will present an introductory discussion, as barriers within this context are integral to the understanding of the problem and to the work discussed in the following sections.

Many have been questioning what is the role of today's museums in the context of a fast-paced era and a technology-driven society? Why do museums often exclude marginalized communities? Why do museum professionals often value visual aesthetics above all? These are all important questions that are rooted within the barriers to inclusion in museums. Walters's research shows that while there are anti-discrimination legislation and efforts made by museums to improve access, attitudes of museum professionals remain a key barrier to genuine inclusion (Walters, 2008). Another case study that reflects

this problem is discussed by Eardley et. al; The Tile Museum (the MNAz), discussed previously in this section, employed an "access to all" approach, however, this museum failed to maintain long-term success due to non-sufficient ongoing commitment to sustain and develop the initial successes by the staff members working there (Eardley et. al, 2016)

While museums have transitioned from being focused primarily on collections-based to more education-focused centres, "from being about something to being for somebody" (Weil, 1999), museums are still considered to be intimidating and places for the elite, where marginalized groups are often excluded. The original idea of the museum is a collections-focused institution, which was viewed as a 'cultural authority'. The interests of a narrow social grouping dominated how museums operated based on a claimed exclusivity in determining the role of museums (Hooper-Greenhill, 2000). This exclusivity was, in turn, linked to claims about the very idea and the social role of museums, which were to 'civilise' and 'discipline' the mass public to fit their position within society (Bennett, 1995). This was done through differentiating between ' high' or 'elitist' art and cultural works, which are worthy of preservation, and 'low' or 'mass' that are not (Griswold, 2008). Thus, museums are often viewed as centres that house art that suits the cultural tastes of particular elitist social groups.

Literature review suggests elitism and attitudes of museum professionals are part of the vicious cycle that prohibits change and contributes to social exclusion. Change in museums is crucially needed, though it can be challenging.

Whitfield and Wismerm suggest strategies to employ a change towards inclusion in an institution (through a study focused on inclusivity and Dementia where health services are planned with individuals with Dementia). The suggested strategies can be applied in the museum too. According to Whitfield and Wismerm, change should include a vision, structure and board that accommodate people of different abilities; acknowledging that inclusion requires resources; and development of an organizational culture that is ready and willing to move towards inclusion (Whitfield and Wismerm, 2006).

While there are only few and far between examples around the world, emerging inclusive practices in museums, where the institution embraces their communities as partners and diversify their activities, represent the first steps towards inclusion as opposed to mere accessibility (McGinnis, 2014). This is highly important not just because access to information is important, but because "in the twenty-first century, museums are more than just institutions in the public service; they are places for social interaction as well as engagement with art; places for finding out about oneself as well as discovering other cultures and times" (McGinnis, 2014).

4. THE AGO-OCADU PARTNERSHIP AND CLASS

The AGO-OCADU partnership is a unique collaboration that is an integral part of this study. In this section we will share the process involved around this partnership, from its onset and preceding events, to designing the *Multi-Sensory Studio/Seminar* course, to the purpose of this collaborative initiative, and finally, gaps and opportunities for future work.

4.1. Background

The AGO-OCADU partnership began collaborating in the summer of 2017 with the design of a graduate course focused on multisensory museum experiences. Preceding attributions to the partnership are important and intertwined with the personal journey of the first author, Annie Levy. As an Inclusive Design Masters student, Annie noticed a gap in the state of access to art and cultural artifacts due to personal and professional interests, which led her research to focus on this subject and multisensory approaches. Upon her suggestion to explore this area, she and her peers started working on potential solutions for the problem in a class project (in the course *INCD: Lab*), which in turn resulted in meeting Melissa Smith from the Art Gallery of Ontario. Smith is the Access to Art Programs Coordinator, Gallery Guide, and Adult Education Officer at the AGO, and she was happy to be interviewed by Annie and one of her peers for the purposes of that course.

Meanwhile, other courses, initiatives, and a research group (Perceptual Artifacts Lab/Accessible Graphics Initiative) led by Dr. Peter Coppin, have been focusing on applying multisensory and cross-modal approaches to inclusive design problems. He had recently led the development of a proposal for a new studio-seminar hybrid project course, approved in Fall 2016, called *INCD: Multi-Sensory Studio/Seminar,* that aimed to explore multi-sensory perception within the context of inclusive interaction design. Dr. Peter Coppin began to advise Annie on this research in the winter of 2017. This new path of exploration, and all of the preceding events, courses, and initiatives, had also contributed to a summer intensive course, called *INCD: Inclusive Art, Design, and Communication*, in the Inclusive Design Program, that focused on multisensory exhibition design during the Summer of 2017. Due to this focus, the class included student and faculty participation in the AGO's Multisensory Tour, led by Melissa Smith. This course engendered our interactions with the AGO (Melissa Smith), setting the stage for a unique and groundbreaking partnership, and the decision to focus the first version of the *INCD: Multi-sensory Studio/Seminar* course on multisensory museum experiences for access at the AGO.

Dr. Peter Coppin is the Graduate Program Director of Inclusive Design, which is a two-year graduate program at OCAD University focused on the study and design of inclusive solutions for a wide range of problems, with students coming from diverse professional and cultural backgrounds. Inclusive Design is an emerging field that has multiple definitions around the world. Inclusivity is

defined as “an intention or policy of including people who might otherwise be excluded or marginalized, such as those who are handicapped or learning-disabled, or racial and sexual minorities” (Oxford Dictionaries). The IDRC (Inclusive Design Research Centre), which is a leading research and development centre based at OCAD University, suggests the following definition: Inclusive design is “design that considers the full range of human diversity with respect to ability, language, culture, gender, age and other forms of human difference (IDRC).”

In addition, inclusive research is often embraced and encouraged in the program. Inclusive research can be thought of as research *with, by*, or sometimes *for* the people that are researched, rather than research *on* them (Nind, 2014). The gap between the researcher and those researched is bridged by inclusive research methods and approaches, which are dynamic and depend on the goals of the study. Overall it shares the common ground of qualitative research (Nind, 2014), while also respecting humans’ individuality and diversity. It is a growing field, which supports inclusive design, social inclusion, inclusive education, and many other forms of inclusive practices that help solve issues we faces in the world today.

4.2 The Purpose of the Partnership/Class

As noted throughout this research project, there is an evident gap and need to engender access and inclusion in museums. The AGO-OCADU partnership and the multisensory class aim to respond to the problem, where there is no clear means to provide access to visual artworks without relying on visual perception. The partnership aims to explore the key questions related to this problem and elaborate on what is meant by "access" in this particular context, where many of the objects in question were specifically made by artists to recruit the affordances of visual media and human visual perception? Furthermore, the decision to produce a "translation" of a visual artwork, such as a painting, introduces important questions, such as: What is afforded by a visual artwork? How can those affordances be replicated via non-visual perceptual modes? Is—or how is—the meaning of an artwork altered when it is "translated" from one perceptual mode to another? Other key questions pertain to culture and access, mainly: What might be the affordances, limitations, and impact of these translations/interpretations within societies that strive to include increasingly diverse audiences?

This partnership worked together to co-design a semester-long project class embedded in the AGO. The class, which will be further discussed in subsection 4.3, was focused on creating multisensory and cross-modal translations/interpretations of visual artworks that were on display at the AGO, in order to increase access. Students were learning about multisensory

perception and multisensory design practices, worked together with stakeholders and produced objects/experiences that remain with the AGO for their multisensory tours.

The purpose of this partnership can be viewed through three dimensions: from the perspective of the AGO, the perspective of OCAD University, and a hybrid dimension that encompasses both perspectives and shared goals and values. From the AGO's perspective, this partnership is an opportunity to enhance access at the AGO through objects created in classes such as the *Multi-Sensory Studio/Seminar* course (as they are donated to the AGO's multisensory tours). It is also a way for the AGO to engage with the community, increase awareness of inclusive practices within the museum, and share knowledge.

This partnership directly relates to some of the barriers to inclusion at the AGO (discussed in section 5); one of the main challenges the Access Programs face is getting funding—and when funding is available, it arrives in sprouts, which only allows for temporary moments of research and deep inquiry. Whereas planning and research needs to be continual and ongoing, which is another aspect targeted by the partnership and its collaborative work, as the class is viewed as a natural research lab.

From OCAD University's perspective, classes created by the partnership allow for students to participate in a unique learning experience; students learn from and work with a leading national museum, to help solve 'real-world' problems. Furthermore, the problem of inaccessible art and exhibit design is an

excellent vehicle for teaching students inclusive design principles while simultaneously engaging in research that can yield results that can then be transferred to other inclusive design problems.

Furthermore, there is a theoretical problem that requires investigation: What techniques can enable non-visual access to visual artworks? Many of the problems noted above result from a lack of knowledge on how to translate a cultural artifact that was configured for visual access to a non-visual perceptual mode.

Both organizations recognize a lack of conventions (theoretically and practically) when employing strategies to translate/interpret visual artifacts with the goal of engendering access. This lack of conventions is also evident in the literal review (section 3), pertaining to a global gap that needs to be addressed. The partnership affords a strategic linkage between the AGO and OCAD University, and provides a sustainable ecosystem for both institutions to benefit from. It is also an attempt to discover techniques that can inform conventions, and therefore inform inclusive museum practices.

4.3 The Multisensory Class

The Multisensory class created by the AGO-OCADU partnership is part of the response to the problems discussed above. The first iteration of the class ran in the fall semester of 2017 and was taught by Dr. Peter Coppin and Beverley Dywan. The purpose of this class was to develop new paradigms that included:

the development of design solutions to the problem, involving museum professionals and audience members; to design solutions that are informed by insights from the science of perception and the cognitive science of external representation; to incorporate inclusive methods and approaches in the class, such as co-design sessions with the stakeholders.

The objectives that led this course were:

1. Students will explain and use fundamental concepts of human multisensory perception to develop creative approaches for presenting aural, tactile, and visual information;
2. Students will apply standard and emerging sonic, tactile, and visual design tools and strategies to create a tangible solution to an identified problem;
3. Students will communicate clear knowledge of procedures and techniques within each phase of a multisensory interface design process; and
4. Document and present the development of a multisensory interface design project from problem definition, to methodology selection, prototyping, and evaluation.

The students of the class came from diverse disciplines and backgrounds (including design), and were asked to collaboratively design multisensory or cross-modal translations/interpretations of original visual artworks for accessibility, together with stakeholders (such as audience members with vision

impairments and museum professionals). The class included: an initial co-creation session with stakeholders, guest lectures from experts in a variety of fields (including a wide range of museum practitioners), in-class exercises related to the senses, readings, gallery visits, presentations by students and instructors, as well as a 'Proto-Reveal' co-design session with stakeholders, and a final display of the artifacts at the AGO next to the original artworks, which we refer to as the Big-Reveal. Most of the final artifacts created by the class were donated to the AGO and are currently used by education officers as tools on the multisensory tours. The final artifacts are analyzed and discussed in section 6 of this report.

By embedding the class in the institution and supporting co-creation with community members with vision impairments, the partnership aimed to enact a version of Freire's (1970) dialogical theory of action which involves not an authority but Subjects who meet to name (or, in this case, build) the world to transform it, moving past simple replicas to question conceptual and perceptual barriers in an art museum context (Coppin, 2018).

5.4 Scope, Limitations, and Opportunities for Future Work

The AGO-OCADU partnership is currently working on the future iterations of the multisensory class. The hope is that this class will become a component of a larger ecosystem that addresses the problem of access to art and

cultural artifacts. The partnership recognizes that there is still much to strive for, as the scope of this collaboration is still new and therefore limited.

While this MRP investigation helped to collect rich data that can inform future iterations of the multisensory class, the researchers recognize that this was a single one-year study, thus further research is required, and we recommend continuing to study future iterations of this class and the evolution and affordances of this unique partnership. Based on feedback and discussions thus far with students, instructors, AGO colleagues, researchers of this study, and others involved, we learn about our successes, failures, uniqueness, and above all the importance of this collaborative work. The impact of this course will be shared throughout sections 6, 7, and in our final discussion.

5. ACCESS TO ART: FOCUSED ON THE AGO

In this section, we will discuss the current state of access to art focused on the Art Gallery of Ontario (AGO). Canadian museums are required to align with provincial legislation, such as the Accessibility for Ontarians with Disabilities Act 2005-2016, without the proper funds this proves to be a challenge. The federal government offers support to Canada's museums through a variety of important although very modest funding programs; according to the Canadian Museums Association, these programs have been subject to many cuts over the years, they are difficult to access, and no longer meet the needs of today's museum community (2016).

In this section we will share an in-depth qualitative interview with Melissa Smith, who is the Access to Art Programs Coordinator, Gallery Guide, and Adult Education Officer. Melissa is also a committee member of this research project, an inspiring colleague, and a friend. Prompted by Bell Hooks's 'radical' style of interview writing (1992)—we purposely share our semi-structured conversation about access to art focused on the AGO in an untraditional way, as it seems appropriate for a study that strives to reflect how we can creatively break away from traditional practices.

We recognize that the scope of this section is limited to the AGO; however, given it was the location of our field study where the *Multi-Sensory Studio/Seminar* took place enabling student to directly work with staff, and that

the AGO is a major national museum in Canada, we believe it is important to establish the context in which these practices were employed and studied.

5.1 Interview with Melissa Smith

Annie: Can you please start by describing the current state of access to art and cultural works at the AGO?

Melissa: We currently have an access to art program. In 2010, my predecessor, Doris Van Den Brekel, created the multisensory program. Around the same time, Gillian McIntyre also through donor support, created something called the GWAP program, which is the Garfield Weston Accessibility Program. They co-created this program with mental health experts in the field and trained the adult education officers to offer tours for people with mental health challenges who felt barriers to accessing the collection. It ran the gamut from people who were transitioning from addiction to people who were struggling with eating disorders. […]

Melissa: The multisensory program was actually run by volunteers because that was the footprint that Doris Van Den Brekel had. She worked within the volunteer field to train people on descriptive presentations, and then also sought out objects in the collection that could be touched with nitrile gloves, and really used the training and the documentation that came out of the time and the funding that was given to the National Gallery of Canada. That placement was held by Elizabeth Sweeney, who wrote this document that went between the

AGO and the National Gallery. I myself was trained at the National Gallery for the multisensory program, for the accessibility program.

Melissa: We also have an Art in the Moment program. I'll get to it, but this is good background because it's how it all feeds into what we do now. [The] Art in the Moment program was also volunteer-led and there was a partnership with Alzheimer's Toronto, which we still have today. The volunteers led what was meant to be a discursive tour where they were asking questions that avoided "do you remember?" [And instead asking] "What do you see?" Supporting conversations in the gallery spaces between not just people with Alzheimer's [...] but with their caregivers [too]. That was organized [...] because we have a challenge supporting individuals; we can support groups if they come to us, but it's very difficult as a big institution with one of me to be like, "Okay, here's a drop-in tour," right? Particularly if I have to pay people, which is the new model because we went from having two volunteer access programs and one staff lead program to having only staff offer the access programs. That was the change I put into place about a year and a half ago. The reason we did this is because we were running into challenges with having volunteers available and keeping track of the proper delivery of the programs. We have seven adult education officers who now currently operate within our access to art program that has brought all of those disparate programs together, three in total.

Melissa: What used to be GWAP is now known as the Accessibility for Mental Health Organizations Program. We call it AMHOP for short so that we

don't identify that people are having mental health challenges on those tours. Our multisensory tours, and then our Art in the Moment tours, are now under the umbrella of access to art. What we hope to do moving forward is undo those rigid programmatic descriptions or silos so that when people connect with us for a group visit they don't have to self-identify, because the methodology is quite similar between all of them. Except for in the multisensory tours, we engage in tactile touching, guided touching, description and moments of "what did you get from this?"

Annie: Today, if someone wanted to book a tour like that, what would they have to do?

Melissa: That's the more exciting part—we were able to build a webpage that was part of my shifting to the Eos [education officers] so that we could book on demand, which you couldn't before. It was much more challenging because you had to figure out who I was, connect with me, and then I would book it for you. Now we have a webpage that has descriptions, pictures, it's clear about who our partners are because I also officially partnered with CNIB for our multisensory programs. That's all clearly described on the website and we have an online booking form so people can book when they want to come. We just need three weeks notice, which again is a challenge, but because we work in a union environment, I have no choice because once you book, that booking form goes to our group sales team. That gives them about a week to process, get it to us, process payment if we are asking for payment, or to process that it's free

because we offer 12 free tours per bucket. Twelve free for AMHOP, 12 free for Art in the Moment, 12 free for multisensory.

Annie: So usually it's about three weeks in advance?

Melissa: Yeah, because we need a week for administration and then we need to book our education officers, giving them two weeks notice as far as our union rules describe.

Annie: Okay. Then in your opinion, what are the limitations of access to art at the AGO?

Melissa: We do not support accessibility self-guided visits very well. It's a challenge because that means that we would have to actually change the infrastructure of the building. We haven't received funding in that capacity, and to be fair, although that's something that I advocate for on a daily basis, we've been shifting really important things as well, like switching from incandescent light to LED. It's hard because as much as we want to support access, we need art to be there and not [lose] its pigmentation, right?

Melissa: I think institutionally there's a hope that we'll get there, it's just that as we've transitioned, since the architectural renovation in 2008, we went from having about 400 to 500,000 people a year to having almost a million people visit. We're an institution that's still growing and still getting things into place. That's my role, to advocate for that to happen. I think that's also why we're excited about the potential [of] continuing the [Mutli-Sensory Studio/Seminar] course; [… In the future, it] would be to put the tables I was talking about, that I

came across when I went to France—where there are tactile tables set up to key works that facilitate self-guiding.

Melissa: Now you have to book in advance to have a guide, to help you have that moment, so it isn't as inclusive as we would like. […] We have no guiding moments on the floor, and in fact even for sighted people our way finding is challenging. We know this. It's hard in any building because there [are] five iterations of architectural renovation. Even our maps—we don't even have final maps. We're testing out how to work with wayfinding in that capacity, and then because we're just rehanging the whole entire collection, we've also taken down old donor names, put up new ones, so they're bigger—more AODA [Accessibility for Ontarians with Disabilities Act]—also gallery numbers... Then you have the curators that are weighing in and they don't want really bright numbers on the walls, so they end up being silver.

Annie: [Shifting back to the current Access Program,] you talked a little bit about it, but can you further elaborate [on] the museum experiences that are currently offered to individuals with different abilities? You said, for example, with the multisensory [tour that] it's more tactile and description-based.

Melissa: Yeah. Again, inquiry-based learning methodology is used throughout all of them. Again, the reason I feel some of those silos could come down a bit, and what that means is that what we're trying to do, first and foremost, is break down the barriers that people perceive to the collection, be it physical, ideological, whatever. The idea is that we're empowering you to see

yourself in the collection and to see that art doesn't necessarily have to have that rigorous art history background. Rather you can have a conversation about your current state using artwork as a common place. Some of that requires using visual thinking strategy, different methodologies that are well known within the museum education field, but what you would get, for instance, on an Art in the Moment tour, [which] are an hour long. We definitely keep them to 60 minutes because we know museum fatigue sets in after that, and particularly for somebody who's struggling with early onset Alzheimer's or dementia… It needs to be short, but what we do more in that particular program is really try and get every participant to have a conversation. We don't identify who has Alzheimer's and who doesn't, and sometimes you can't tell, right, which is nice. […]

Melissa: It's also not about talking down to people, that was some of the critique that we got and I love our volunteers, they're passionate, wonderful people, but they did tend to talk down, where education officers are always operating in a place of inclusion to support the conversation. After that 60-minute tour, particularly with our partnership with Alzheimer's Toronto, we definitely take people down to have coffee. It's a debrief session and a support group. For them, that's a key part and then they have coffee and cookies, and it's usually the support workers that are able just to chat with one another and have a moment where they're not talking about healthcare. That's key, right? That's that experience in a nutshell.

Melissa: The Accessibility for Mental Health Organizations Programs operates again, same methodology. Particularly for people who can be triggered by various elements in the gallery that we just will never be able to get rid of. Feeling safe in that capacity is really important. Then also trying to have those conversations. That means having the EO explain there's going to be different flooring in here. Now we're going up into a space in this elevator, the elevator might be a bit small. When you see people with the blazers on, those are security guards. Yeah, they have radios on. It's also just being able to explain what's happening in this space, being their "wayfinder" there, their space maker I guess. Again, super important to ensure that people have time to have an opinion, right, because often their opinions aren't listened to or they aren't given time to just speak about anything. Now does that mean that things can trail off and maybe not be centered in that? Yeah, but that's fine because that also means that the person probably really needs to share their thoughts and opinions - to be heard. It ranges with the cognitive levels of each person who's participating, so we also do provide tours for military officers who are serving with PTSD. One of the works that we use often for that is *Massacre of the Innocents* by Peter Paul Rubens, and it becomes a common place for people to speak to their feelings and challenges.

Melissa: Then the multisensory we've spoken to—tactile descriptions, guided touching. One time when I did a tour, there was a Niagara Falls painting next to an Iguazu Falls painting. In an example like that, I played the sound of

Niagara Falls versus Iguazu Falls. Sometimes you can play music. I'm careful about that though because it irks me when people play music just because it's from the same time period, it doesn't mean the artist was listening to it. I'm constantly challenged personally, but also during tours to speak about abstract expressionism. This is why I was so keen to get exhibitions to create a 3D model of a *Borduas* abstract artwork, so when I do speak to it - it's not just colors and form, but also the music, like John Cage for instance, which we do know that these artists did actively listen to and that did influence the way that work was produced.

Annie: Other than the artifacts created by [*the Multi-Sensory Studio/Seminar*] course, how do you get artifacts for the tour?

Melissa: We made some of them. We have foamcore signs that we often use for wayfinding. I recycle those and I have an art background, so I just made them. Then I use hot glue gun [...] making my own raised-line drawings. We took the last bit of funding from our donor for this Senior Arts Engagement Program, which is another iteration of the Art in the Moment program. We purchased something called a thermoform machine where now we're able to produce raised-line drawings, and what the machine does is it allows you to print on a regular printer and then you just send it through this enigma-like machine.

Annie: Have you gotten feedback from visitors about their effectiveness?

Melissa: Yeah. We used one. I haven't put those out on a tour because the thing is—people need to book, right? But we did produce a map to help with

orientation, and they love the map. Most of this is super grassroots in comparison to what it should be and probably what people would expect. […] Most of the feedback was where you put the braille and what the braille says; people hate when there's stairs [in the map]—that was interesting.

Annie: Okay. Then maybe from the perspective of a museum practitioner—can you talk about the affordances of multisensory approaches to art and exhibit design?

Melissa: My God, so much better. It's just more engaging. There's a couple of examples that I can think of that were necessary projects that I was involved with, but because I'm on the floor so much—because I coordinate other groups that interact with the public—not only do I get feedback from them, but I see it myself. Any kind of participatory thing, which is innately a part of inclusivity and sensory engagement, gets people more engaged. [For the] Boxwood [Project], for instance, they asked a master carver to carve the outside in maple because they couldn't do it in boxwood—he said it was impossible, even now. They 3D printed the interior because it's literally impossible [to carve]. They had these chained and attached to a table for people to use and feel. That was really incredible and people sat there and waited, and the comments we got from that moment were that they just could see a little bit more how it was a personal devotional object, and then just felt more of a connection to the objects in general.

Melissa: Another show that's going around right now called *Anthropocene* that's very AV/VR oriented. We're going to host that at the

AGO. Anyway, they had a video of Niagara Falls at the end of the Idea of North exhibition and you could hear the sound all around you. There was these screens set up in a 3D way in the space, but they were quite large and you could almost feel the light on your face, and people just... it was a bottleneck all the time. We haven't really done smells so much [at the AGO], but if I were to think of the ROM's [*Royal Ontario Museum's*] recent whale exhibition, I know people just went on and on about the watch that was on display which was covered with rotting whale smell, right? Because we're about to support a Rebecca Belmore exhibition, my colleague is really interested in smell and she's hoping to produce something similar with a plexiglass box.

Annie: Which is a smart, in my opinion, a smart solution because you don't have to smell it—you can choose to smell it.

Melissa: Yeah. People dig it. Again, you're participating, you're doing something, you're engaging with something differently.

Annie: We talked a little bit about the affordances, but then what are the barriers to inclusive practices in a museum?

Melissa: The very nature of the museum. Even inclusivity for marginalized, racialized communities is a struggle because the very nature of the museum is that it was created as an exclusive wunderkammer, right? It came from wealthy people—The Ashmolean, the Louvre—all of those began with people who were super wealthy that had the ability to purloin objects from places and then create these little microcosms of the world, and then with

enlightenment expanded, it was about teaching the masses, but that comes from an authoritative space. Then there's always this weird concept of neutrality in museums, which is not at all the case. [It is] so political. We often have donors and people that are coming from oil sand and things like that. The very nature of the museum, the structure itself, is imbued with authority, racism, and elitism. That's a struggle, which again is why interpretation for me was what really resonated, particularly coming with an academic art history background. It just turned me off so much and I really lost myself for a bit, and then when I started working at the National Gallery and was giving tours and trying to make it relatable—it meant so much to me to see someone wake up and make a connection with their lived experience, or any kind of connection!

Melissa: That's scary to me, that we have these really incredible pieces of our culture that are incredible when you think about the fact that art is only made when you have all of these other things covered, like food, living… It's the "plus plus" of culture and usually representative of that time period, and what a great way to learn about those periods. That was what attracted me art history to begin with […] but then you want those objects to be safe. I don't know how I feel about that. I remember one moment when I was doing my museum studies degree where somebody was talking about some sculptures that were out in the open in Italy, and the person in the class was like, "We need to go in there and take them and save them." And I was like, "Do we?!" It's more that notion of—

who do you think you are? No, not every object was made to exist forever, and that is actually ok.

Melissa: There's this notion of continuity that's comforting that I also like. It's so amazing that we can see *Leonardo da Vinci* or that we can go and see [art] by people that really changed the way that we view the world—so that's important to me, but if we're perpetuating a violent system to keep those objects in perpetuity, I don't know. Those are big questions for me. The challenges are keeping the objects safe, ultimately you're walking into what would be akin to a bank vault because a lot of the objects are quite expensive. […] People struggle with the notion of an original—are these real? That's the most common question. Keeping something in perpetuity, promising that, typically to donors and to the public, particularly if you're publicly funded. Ensuring that things are kept at a certain environmental level and a certain space, especially if you want to be acknowledged as a museum or given accreditation. The one of [a kind], you really can't touch. The *Mona Lisa* is not going to ever be a thing that you can take out and smell. Those are all challenges. Plus the fact that primarily art objects are made for aesthetic appreciation. That's not going to change until artist change the way that they produce things.

Annie: Yeah. Visual aesthetics. I also remember you mentioning on another occasion funding to be a challenge?

Melissa: Yes, funding. As an example, the Senior Arts Engagement Program, which was a dream of a program to run where we bused people in

from the city of Toronto long-term care homes who really needed activities to do and experience art because we know that being it, being creative really activates your brain in a different way and actually promotes wellbeing. […] To have a donor support us in that way, we were able to bring in marginalized folks, have them see art, have them have lunch, have them make art. I would love for the multisensory programs, and all the [access] programs, to end with people making something. No way could we afford that. Right now, what we do primarily is we comp tickets and we offer the education officers at cost, just for their labour. We make no profit whatsoever, and then we've also budgeted to offer a certain number of free tours a year. We're taking the hit. […]

Melissa: Our development department is constantly working to get funding for exhibitions, and that's how we get money and how we can pay people. Until we have our structure in place, and that's what our leadership team is working to do, where we can then do the programming funding, that's a different thing. We don't apply for grants as individual workers also in our structure. It means that has to come through the development department. It depends on what they're focusing on. Like I said before, it can be lighting. It can be a ticketing system. Those are pretty significant things that need to come before the programs unfortunately, and right now, we are supporting probably about 200 people per program a year, which isn't as much as a million people coming through the building. These are the real brass tax things, you just have to

admit. Could we grow this program? Yes. Do we need more money? Yes. Is that coming? Hopefully. That's just the reality.

Annie: Speaking of growth, could you speak about other emerging inclusive practices in the industry—and then what of those you would like to see at the AGO?

Melissa: I went to France for an exchange; we went as a delegation and went to Paris and then to the *Louvre*, *Musee d'Orsay*, *Rodin*, all of these spaces—and they all had wayfinding for non-sighted folks on the ground, […] they all had tactile tables—they were lower tables accessible at the right height. For everyone and every institution had one… and I was like, "This hurts." (Because the ministry funds them). That was one of the big things and France—it's interesting how advanced it is, but then the exhibition at the *Quai Branly* was the primitivism of Picasso. Written big on huge banners on the outside, but then you go in and there's even the part that's underneath what used to be a shipping space has this rubber way finding tool for non-sighted folks. Even outside. And inside, it had these amazing lines that led you directly to the tactile tables. Even if the dream comes to fruition where we have the tactile tables, I don't think I would easily get approval to put a big rubber line down the middle of our museum.

Melissa: Then our wifi isn't always working, although we just got that upgraded. There's the *BlindSquare* app that's been developed by one of the gentlemen that's come before to our tour. That might be something, if I ever get

the time or the money to partner with him to be like, "Let's create a *BlindSquare* moment for people to come through the gallery." Yeah, it would be to have the wayfinding on the ground and then to have tactile tables; to have not just 3D printed objects in resin, but also have them coated in bronze, because bronze is naturally an antiseptic. Then to have a recording of a description, and to have that in ASL, and also captioned. Have a label that also has sound. Have the whole thing—everything on a table, for everyone.

Annie: Then people won't have to book tours in advance…

Melissa: Yeah. Who has time to book a tour three weeks in advance?

Annie: It makes you angry…

Melissa: Yeah.

Annie: Okay so let's shift the subject a little bit. Let's talk about the multisensory course; from your perspective what worked well and what didn't work?

Melissa: It was incredibly low impact I think surprisingly for everyone except for the students. I think how we were able to connect and that we both had needs, right? A site to have a real context for creating, and then me—needing objects that could be more readily made by students emerging in the field. The fact that I have no budget and the fact that Peter was interested in creating that partnership was really great. I loved seeing everybody's enthusiasm, interest, and creativity. I think they worked really well and found a lot of affordances in a really challenging structure. Then it was really incredible

to do the co-creation sessions, not only to see design thinking and action in that capacity, but also to be able to work with participants from the blind community, from CNIB, from various stakeholders in the building [of the AGO]. We did make a lot of headway there—creating a footprint in the institution with institutional people. Involving the community because I'm always constantly aware that I'm an able-bodied coordinator. Really what should happen is that we get money and then we hire someone from a disenfranchised community to do the work with me. It should actually not be me. It should be making space for someone that understands living with challenges to access. It shouldn't be an able-bodied person in that role for access. It should be someone who's from a community that can then go into the community to incorporate it.

Melissa: [What worked…] The students, the partnership, academic and practice. I think the Big Reveal was really great and the [Proto-Reveal] was the most rewarding. That stands out to me still as one of the most successful parts of it actually because it just really resonated with everybody. Then the Big Reveal that really resonated with the public. Because [this partnership] is unique and different, no one has done it before in Canada, and we were able to really send that out into the world via social media. And I think also, what stands out to me is our ability to write about it. I think that'll be really important, and then present about it at the AAM [American Alliance Museum Conference]. It's not that anyone's actively working against this—the entire building wants to improve. It's just that there are so many things that need to improve. Then when

we're looking at such a small segment of our visitorship, it's a challenge. I think people need to talk about that more because if you're working, yes, it's a not-for-profit, but we still have to be aware of the fact that there's a business model at play. […] I think also just the times have changed, so I think that will change. I need to believe that it will change. I need to believe that there's going to be movement towards there. […]

Melissa: That's where we get into curators, because it's actually the curators that run the show. When we have a curator, who interestingly enough is part of the low-vision community refuses to have labels near artworks because it messes with the visual aesthetics of the space. The very, again, structure notion, idea, ideology rather, role [of the museum] is counterintuitive to inclusion.

Annie: My last question is… in your opinion, what is the future of museums? I don't know if you want to take a positive approach or a more realistic one?

Melissa: I don't know. I think that we need to be more inclusive, right? Not just as a buzzword. I think we need to represent more diversity. We need to think about things in different ways. Get pass the ethnographic display case over an object, right? I think we need to be aware of climate change, right? I don't know if we're going to be here. I think we need to be more fun. I think we need to have less of a connection to academia and ... yeah. I don't know. That's a big question. It's a big big big question.

Melissa: I think we need to be a leader in creating spaces for people to think and discuss, and because art can be a common place for conversations to rise from […] and what kind of conversations can you have about a work that will enlighten the people around it?

Melissa: I don't know. It's hard. Because then you think about what's happening with the *New Museum for Toronto* where there is no location to where they're creating exhibitions, that's a really interesting model, right? A pop-up museum totally created with the community and city.

Annie: Yeah, it could be that the future of the museum is not within the walls of the museum.

Melissa: Yeah! Why should it be? I think about things like *nuit blanche*, right? A couple years ago, they had so many multisensory artworks - someone making lava and when you walk towards it the lights had smells coming out of them. What an immersive, incredible [experience]... Then I'm also very leery of really Disneyesque things, like the *Bowie* exhibit. I hated that. Everybody was like, "I loved it so much because you walked around with an audio guide that activated close to objects and described it and had moments of him", but I just thought it was a super hollow experience designed to showcase *Sennheiser* technology.

Melissa: I don't have an answer, but I'm open to seeing where it could go and hopeful I guess. I think I have to be because I think it's such an ingrained part of our society—If we're just lagging a bit, fine, because it becomes a comfort,

right? When people are comfortable with museums, they go in and know how to behave in them. There should be no behaviour that is established, but whatever. That's the thing I often tell people: sure, we might want to have a conversation in our tour, but there are going to be people on the tour that just want you to talk at them because that's the way they expect to be treated. So we're always going to be a bit of a lag. We already have things that are objects from the past, but hopefully you can apply what you learned from the past to making the future better.

Melissa: Also really great things, like the British Museum, when they did the history of the world in 100 objects, it's a bit dated now [...], but what a wonderful way to get outside of the museum walls and really talk about objects in 15 minutes per thing/iteration, and then you learn about the world.

Annie: Yeah. That's a good answer. I'm still trying to answer that question myself—find a way to continue with research, but also to create change in that institution that I think is a great place. A place where so much can happen, yet it's not accessible and it's not very inclusive. From an inclusive designer point of view, I'm still trying to wrap my mind around it

Melissa: Yeah and I think it would come through with exhibition design, but you got to get to the curators. In England, they're called the keepers of the collection. I think that's the challenge.

Annie: Then how do you get to them?

Melissa: Through the artist... Again, I think we won't really see forward motion unless everyone is aware of that, right?

Annie: A lot of it is awareness I think.

Melissa: We tried so hard to get the curators to come.

Annie: Did some of them come to the Big Reveal?

Melissa: No.

Annie: Interesting. You said some of the feedback from other AGO staff members was positive though?

Melissa: Completely positive and we had people in leadership and directors coming, but they weren't the curators, and at the end of the day, as much as I don't want to admit it, they're the people that drive the institution.

5.2. Key Finding

The AGO has access to art programs that include guided tours. These programs were originally run by volunteers, but are now run by staff members only. Currently, the AGO has seven adult education officers, who operate within the access to art programs to deliver the following tours: Multisensory, Art in the Moment, and AMHOP. Inquiry-based learning methodology is used throughout all of the three tours, creating a place for engagement, conversation, healing, and wellbeing.

To book a tour, one can access the AGO's Access to Art Programs website, which has descriptions and pictures that explain what to expect. These tours must be booked with a minimum of a three weeks in advance; Smith realizes this is a major challenge, however, she explains that because they work in a union environment, they simply have no choice. Melissa believes the program can further grow, but the reality is that it is difficult not easy to achieve.

The AGO's Multisensory tour currently offers tactile descriptions through guided touching. Up until the collaborative *Multi-Sensory Studio/Seminar* class at OCAD University, most of the tactile representations used on the tour were self-made, for example, raised-line drawings with glue gun. The AGO also has a thermoform machine, which they have used to produce a few raised-line drawings, and a map to help with orientation (the map received positive feedback from people on the tour). In addition, the program received some funding to create several professionally made 3D tactile replicas. 3D printed replicas are expansive to get made, and it is a very mediated experience. They afford access and engagement, however they are limited to one sense—providing a tactile experience—therefore these replicas are not engaging enough. Ideally these 3D replicas should be made from bronze, as it is a natural antiseptic material. Another method used in the AGO's multisensory tour is the use of Illustrative environmental sounds. While the AGO sometimes uses sound interpretations as part of their multisensory tour, Melissa also expressed her

concern when using auditory sounds; she believes these have to be meaningful, rather than random, which is why one must be careful with their choices.

While the tours provide some access, the AGO is not as inclusive as they would like it to be. The AGO does support self-guided visits, but not in the case of those who are blind. To support self-guided visits the AGO for Blind visitors, they would have to change the infrastructure of the building, which is a big challenge in itself. There are architectural barriers, along with a wayfinding system that is often challenging even for sighted individuals.

Furthermore, funding is an ongoing challenge that impacts access at the AGO given it is impacting a small segment of their visitorship. In addition, while the AGO would like to fund access, it must also fund the conservation of art and other aspects that are more impactful, such as ticketing, lighting etc. One of the main challenges when it comes to access and inclusive practices is working with curators, who essentially run the museum, and often value visual aesthetics above all. Another barrier is the very idea of the museum, the notion it is for the elitist, and its role, which is counterintuitive to inclusion.

The *Multi-Sensory Studio/Seminar* course resonated with Melissa on many levels; through the successful partnership, collaborating with enthusiastic students, engaging the community (mainly those with vision impairments and representatives from the CNIB), working with colleagues from the AGO, and creating a footprint within the institution. However, she did find the course to have an overall low impact; perhaps related to the fact that none of curators

participated in the process or came to support this initiative in the Proto-Reveal and/or the Big-Reveal at the AGO.

It was hard for Melissa to answer what might be the future of museums for it is a big complex question. She believes museums should be more inclusive, represent more diversity, and be more fun. She also thinks museums should lead in creating spaces for people to converse meaningfully. Where should these spaces be? Anywhere—possibly outside of the museum walls, whether these are pop-up museums that are created with the audience or events like *nuit blanche* that offer immersive experiences. Furthermore, in a follow up discussion Melissa shared that not having established conventions around multisensory museum experiences is a challenge and evidently there is a need for it (Smith, 2018). While open and hopeful for what the future may bring, to move forward towards inclusion everyone has to be aware of such practices, thus, raising awareness of inclusions in museums is key.

6. RESULTS: THE TRANSLATIONS/INTERPRETATIONS

In this section we will aim to discuss the final objects/experiences created in the *Multi-Sensory Studio/Seminar* course that took place in the fall semester of 2017. The class produced eight final translations/ interpretations, along with an open-sourced website that documents the artifacts and how to re-produce them. In this study, we examined six translations/interpretations. All of the final objects/experiences were on display at the AGO, allowing for the public to interact with these multisensory museum experiences. As mentioned before, we refer to this event as the 'Big-Reveal'.

During the Big-Reveal museum visitors were interviewed anonymously, which provided insight into how such approaches to art and exhibit design might impact the experiences of diverse audiences. In addition, two stakeholders that were involved in the class through co-design sessions, including the Proto-Reveal (two weeks prior to the Big-Reveal), were interviewed as well, exposing how these translations/interpretations might impact people with vision impairments. For the purposes of this paper we will refer to the two community members as Natasha, who has a vision impairment, and David, who has been fully blind his whole life.

Furthermore, as suggested in the objectives of the investigation, we discovered a need to develop an approach to describe these objects/experiences. This entails to develop terminology, a technical language, and supportive diagrams and tables, in order to be able to properly analyze these

translations/interpretations and the strategies employed to create them. To frame this work we draw upon researches, such as research on affordances of external representations and signs (Coppin, 2014; Coppin, Li, & Carnevale, 2016), as well as research on the cognitive semiotics of the picture sign (Sonesson, 2014).

Cognitive semiotics can be defined as an emerging field with the ambition of "integrating methods and theories developed in the disciplines of cognitive science with methods and theories developed in semiotics and the humanities, with the ultimate aim of providing new insights into the realm of human signification and its manifestation in cultural practices (www.cognitivesemiotics.com) (Zaltev, 2011)". Scholars including Sonesson have analyzed the picture sign; drawing on his work, we attempted to analyze multisensory signs. In other words, we will attempt to analyze the semiotics of translations/interpretations of original artworks and the strategies employed using Peirce's classification of signs: icon, symbol, and index. Icon refers to the "similarity" between the sign and the referent (e.g. a picture of a person and the person); a key point about Peirce's definition of iconicity is that it does not privilege vision, thus it can also be applied to sound, touch, and other modalities. Index refers to an indirect relationship between the object and the sign (e.g., wet ground to indicate rain, an arrow for the next direction, smoke to indicate fire). Symbol's relation to its object is arbitrary (e.g. words and their meanings); usually symbols are the signs that are used based on convention and agreement.

In our analysis, building on the above knowledge, we will describe and analyze the translations/interpretations through the study of properties including: shapes (forms/size), spatial relations amongst objects, and attributes (such as textures and colours). In addition, we will consider how each object/experience functions. All this information will help expose to better the affordances and limitations of the translations/interpretations, as well as the range of strategies that emerged in the class.

Our analysis reveals three strategies that were employed to varying degrees in six translations/interpretations that coincide with the cognitive semiotics notions of iconicity, symbolicity, and indexicality. We present our findings through taxonomy of the strategies that we refer to as: I. "Literal/didactic," II. "Constructivist/participatory," III. "Original Artwork." Figure 5 represents this range of strategies, which was discovered during a 3-way discussion between Dr. Peter Coppin, Melissa Smith, and Annie Levy.

I. The literal/didactic strategy sought to map visually perceived spatial, topological, or geometric relations to ones that could be perceived through non-visual perceptual modes. This approach is akin to Peirce's notion of iconicity because students aimed to design representations with an iconic correspondence to the visually perceived properties of the original artwork (which were themselves iconic representations of a situation that the artist sought to convey).

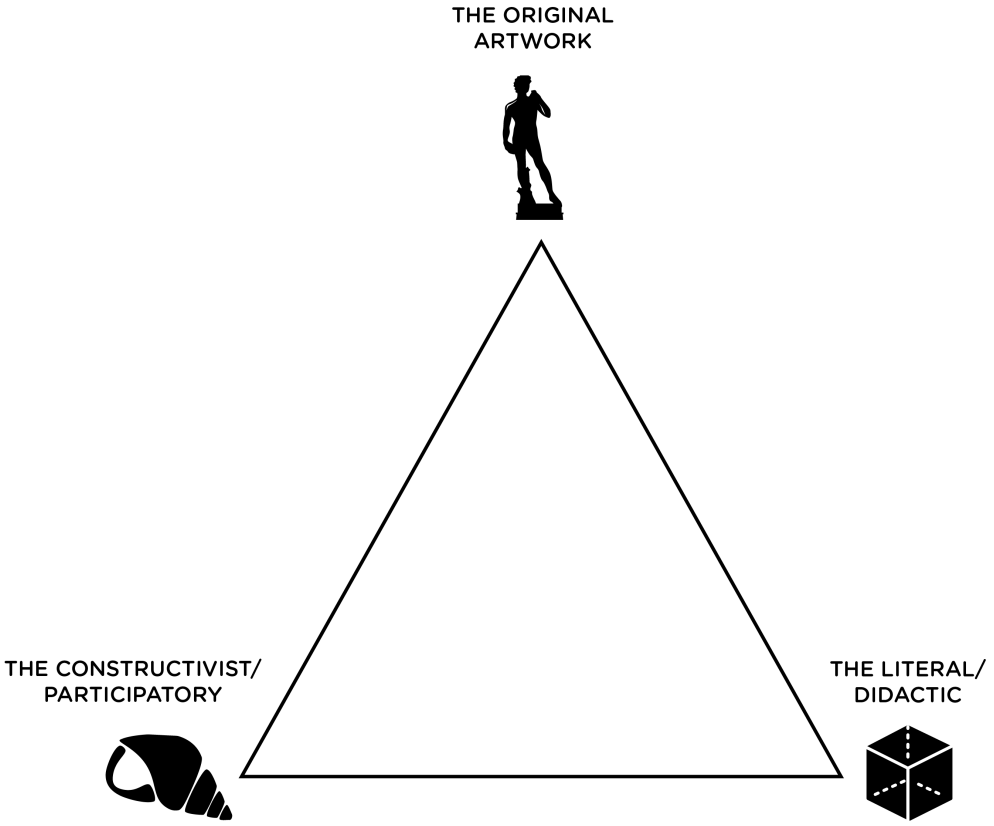


Figure 5: The Range of Strategies

II. The constructivist/participatory strategy made no attempt to produce a literal (or iconic) mapping between their translation and the original artwork and instead sought to employ non-visual perceptual cues to engender the retrieval/recall of memories. This approach is akin to the semiotic notion of symbolicity because the relationship between the perceptual cues and the original artwork they refer to is through convention.

III. The original artwork strategy focused on equipping museum audiences with protective gloves, enabling them to directly touch and experience the contours of an original artwork tactilely. This strategy is akin to the semiotic

notion of indexicality because the audience experiences the artwork by physically interacting with it (the meaning is engendered through their spatio-temporal contiguity to the artwork).

It is important to acknowledge that all of the artifacts employed a combination of these strategies to varying degrees.

The outline of this section is as follows: each artifact will be analyzed through a systematic manner: first, we will describe the original visual artwork; then, we will analyze the translation/interpretation using the technical language we developed alongside supporting diagrams and tables (considering the correspondence with the original artwork); then we will describe how the translation/interpretation functions, followed by the impact on audiences and community members; finally, we will discuss the key findings of each translation/interpretation. In some cases, we will include a subsection with important context to note that impacted the design of the objects/experiences. For translations/interpretations that include several objects, we break down the analysis and consider each one separately. Following the analysis of all six translations/interpretations is am introductory discussion on the overall impact on diverse audiences with respect to all of the translations/interpretations.

6.1. Walker Court

6.1.1. The Original Design—Walker Court Hall at the AGO by Frank Gehry

Figure 6: Walker Court, AGO, Toronto (Photo: Wikimedia Commons)

Walker Court is a large room, as can be seen in Figure 6. It is located at the heart of the AGO on the first level of the museum; it has pathways leading to, from and around the space. Walker Court was expanded in the 2008 renovations, the room is about three stories high with a glass roof overlooking the room, which creates a space that is suffused with sunlight, where sound echoes through the space. A walkway around its perimeter on the second floor allows visitors to see into and across the court.

The floor of Walker court is made out of beige marble with a black marble counter, and is slightly lower than the rest of first level of the museum. Each wall within the space has three large arches that are about two stories high (starting

at the height of the rest of Level One, as can be seen in Figures 6 and 7); the bottom part of the room walls are made out of the same black marble, continuing the contours of the floors, while the arches counters are made out of the same beige marble. The walls are painted in light warm off-white (currently the work of Robert Houle titled *7 grandfathers* is hung around all four walls covering the architectural roundels, however, the group did not attempt to include this part in their translation/interpretation. Also, please note that the artwork in Figure 6 is not Houle's, as the picture was taken at a different time. Houle's artwork will be replaced in the future). The middle arches on the south and north walls are open for pathways, where there are steps on the south and north walls, and ramps on the north wall, that are made out of the beige marble to allow access to the court itself.

Figure 7: Students and Audience, Big-Reveal, Walker Court; Arch in the Background, Marble Floors, and Steps Leading to the Space (Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

By the pathway on the south wall, in the centre, is a sculptural large-scale spiral staircase designed by Frank Gehry (Figure 8). This dynamic architectural element is prominent in the space and has become a figure that represents the AGO. The spiral staircase leads from the second floor, spiralling up through the glass roof, to the upper levels of the south tower. The staircase is made of fir, which is a type of softwood, and is in the colour of a warm orangey light brown.

Figure 8: The Spiral Staircase at Walker Court, Art Gallery of Ontario
(Photo: Wikimedia Commons)

Furthermore, Walker Court is the starting point for the AGO tours, and unlike other galleries in the museum, will not be redesigned or removed in the foreseen future (according to the students working on this artifact). Education officers may address any number of aspects of Walker Court, with respect to the age and interests of the visitors, including Canadian history, various unusual building materials, the renowned architecture of the Frank Gehry extension, and an interesting approach to renewable resources and structural engineering.

6.1.2. Translation/Interpretation Analysis

This solution aimed to translate the space of Walker Court through the different senses including touch, taste, sound via touch, and smell. The group presented several items that were put together into a kit; as one of the group members further explained:

> We focused on the gallery as the artwork. We did an overview tactile model of the gallery as a whole on a large scale, and on a medium scale we focused on Walker Court, and that is where most of our effort was focused. (2018)

It appears the group translated/ interpreted the space starting at the macro level, progressing towards the micro level; the kit included several objects, as can be seen in figure 9, which we refer to as follows: Object 1 is a set of tactile maps (flat tactile floor plans with raised lines) aiming to represent the first two floors of the museum; Object 2 is a 3D model of Walker Course aiming to represent the entire room; Object 3a is a separated 3D model of the spiral staircase made from plastic, and Object 3b is a model of the same spiral

staircase, but made from edible candy; and Object 4 is a collection of materials focused on the attributes, which afforded people to touch and feel the materials that were used in the construction of Walker Court along with scent jars.

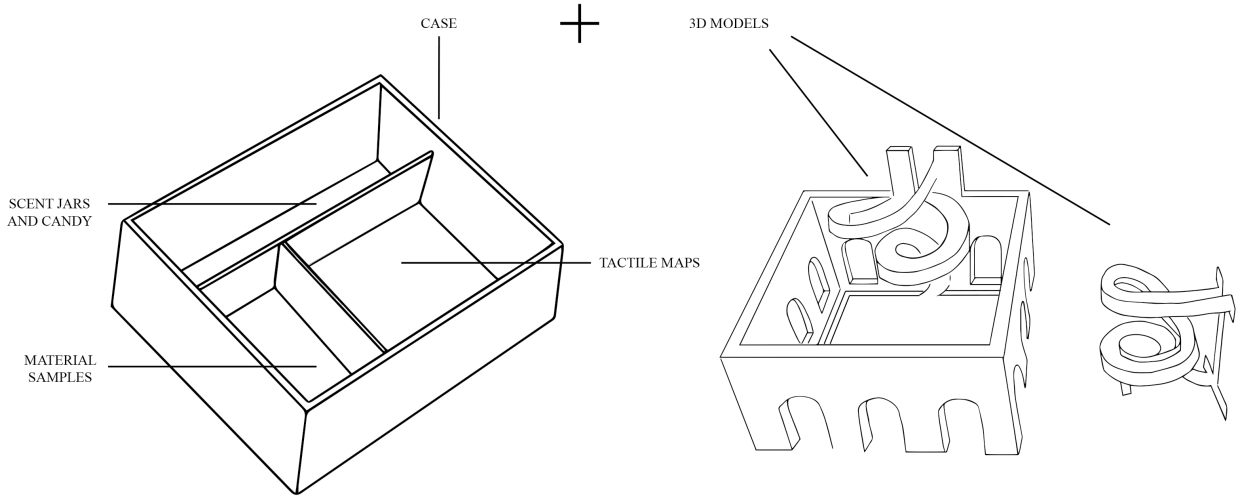


Figure 9: Illustration of the Translation/Interpretation of Walker Court

Object 1: Tactile Maps

Form, Space, and Other Properties:

These flat maps were 3D printed and have raised lines to represent the AGO's floor plans. The shapes used are lines, dots, and text to represent the macro shapes of rooms and layout. The model aims to replicate the spatial, topological, and geometric relations of a visually perceived 2 dimensional floor plan (larger scale). In addition, Walker Court is highlighted in the tactile map of Level 1, as can be seen in Figure 10. While the shapes and relations are

attempted to be translated (at a macro level), the attributes that can be visually perceived are omitted.

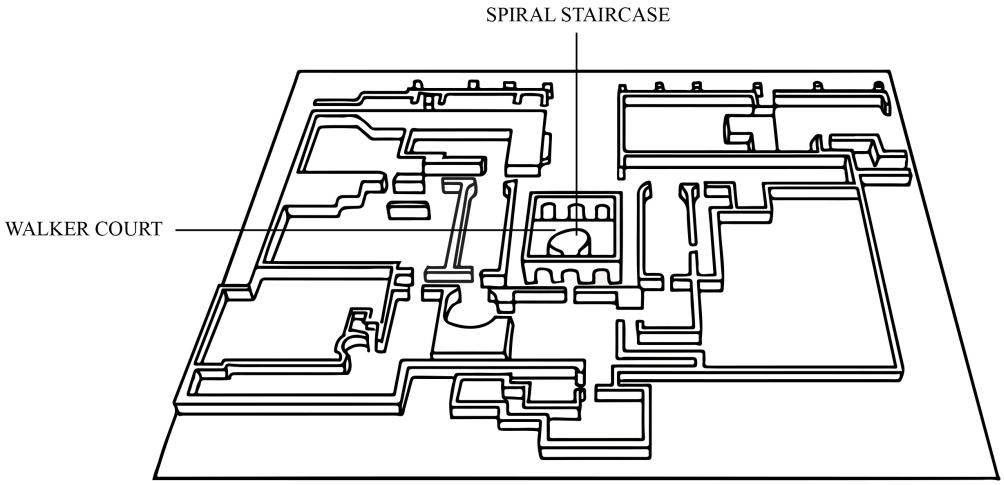


Figure 10: Illustration of Tactile Map Representing the First Level of the AGO

Function:

David was observed moving his fingertips along this map in a systematic manner during the proto-reveal co-design session, similar to how one would read braille (Figure 11). Instantly, David was able to tell where the street is. He explained that in his head he simulates a similar map through calculating distances, and he finds tactile maps such as these to be very helpful and informative (for wayfinding and orientation). He was also able to understand the length of a museum floor at the AGO, as he made a reference of it being equal to a city block based on his interaction with the tactile map.

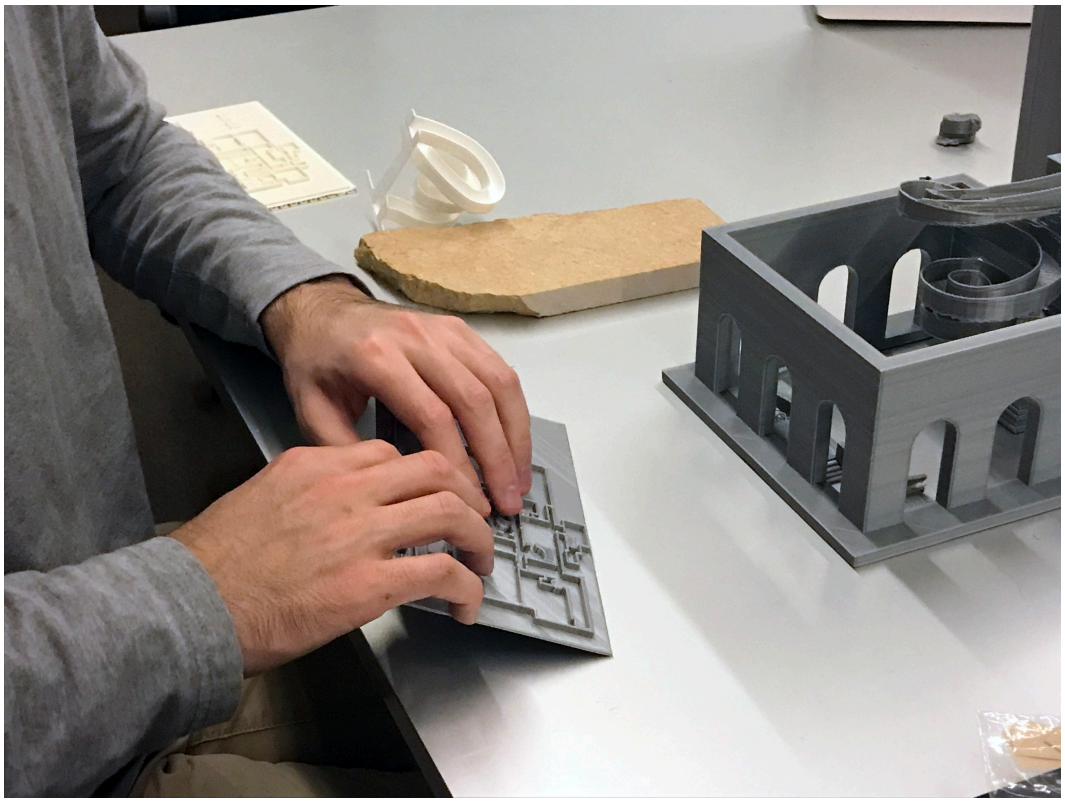


Figure 11: David Interacting with the Tactile Map (Proto-Reveal)

The group had a long discussion with David during the proto-reveal, and that was very helpful according to students, especially with determining which objects were the most useful/effective for a blind audience member. According to David, the tactile maps were effective for orientation, and were then further polished for the Big-Reveal based on his feedback (e.g. he was able to determine what was illegible to a blind visitor, which was then omitted or fixed); other stakeholders from the AGO and CNIB contributed as well. Unfortunately, due to technical difficulties and time constraints the students were not able to include

braille in the final tactile maps, or add marker points such as washrooms, elevators, etc.

Impact on Visitors and Community Members:

Overall, the tactile maps received very good feedback from visitors and stakeholders (as indicated by the group members). Based on the stakeholders' feedback we learn that such representations afford access to information, specifically for orientation. In David's opinion the tactile maps, which he defined as "schematic flat maps", afford a different type of information than the other objects, such as the 3D models.

Object 2: 3D Model of Walker Court

Form, Space, and Other Properties:

This object is a 3-dimensional tactile model of the room, where the students attempted to employ a literal strategy that corresponded to the visually perceived spatial, topological, or geometric relations within the room. The floor, four walls of the room along with its arches, the spiral staircase, the different levels, and the ramps/stairs in the room are conveyed through a tactile representation that corresponds to the visually perceived shapes of the objects (Figure 12). In other words, the properties of the shapes and relations are translated in a way that is akin to the semiotic notion of iconicity. While the spatial, topological, or geometric relations within that room are maintained through the tactile representation in terms of scale and size, the attributes were

not preserved in the model. In other words, the white colour and the texture of the plastic material of the replica do not correspond to the visually perceived attributes of the objects in the room.

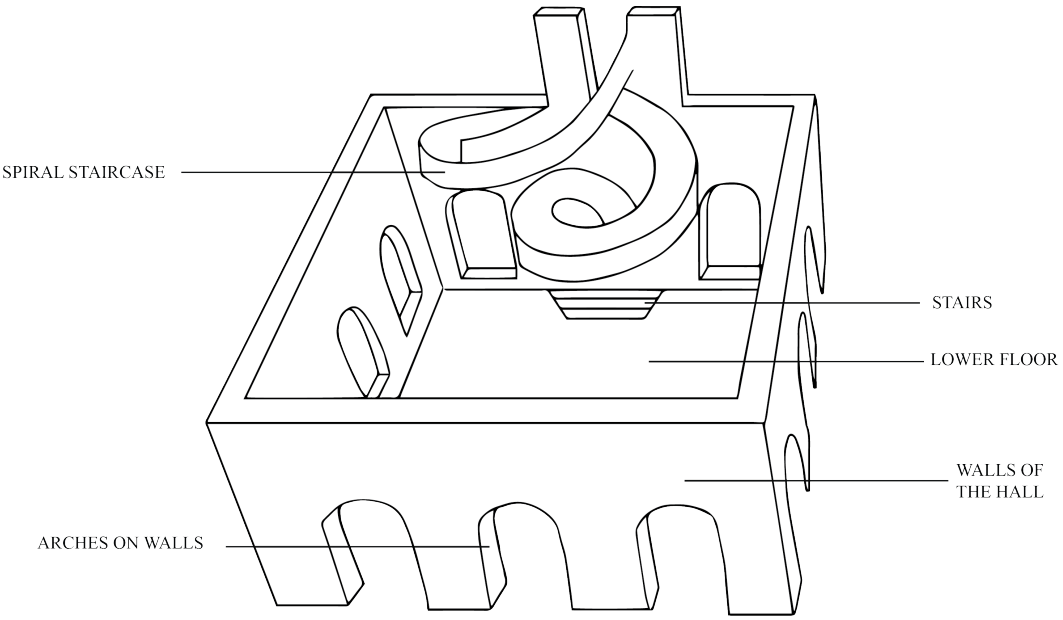


Figure 12: Illustration of the 3D Model of Walker Court

Function:

Audience members and stakeholder, including Natasha and David, were observed interacting with their hands and/or fingers, feeling the shapes, and the spatial, topological, and geometric relations within the room through touch during the Proto-Reveal and the Big-Reveal. Sighted individuals were observed closing their eyes and feeling the model as well. In Figure 13, a museum visitor was captured while interacting with the 3D model of Walker court and conversing with the students who worked on this translation/interpretation.

Figure 13: Interacting with the Translation/Interpretation at the Big-Reveal
(Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

Impact on Visitors and Community Members:

Natasha noted that although she was able to see and visually perceive the design of the room, the tactile representation allowed her to explore and learn more about the spatial relations of the space through moving her fingertips along these elements. She also added that "[the model] in some ways seemed so technical, but would better so many lives, yet it's still art."

David shared that through touching the 3D model, he was able to understand the shape of the spiral staircase it's size and length with relation to the room, which he said was new information, which he appreciated. Unlike the tactile map, that is more similar to the schematic map he creates in his mind, the

3D model is different and is useful for different information, such as the shapes, and relations within the room. However, David specifically pointed out how at the top of the staircase, after coming up the stairs, he will not know which direction he is facing, as he does not have access to the view from that vantage point (outside of the room).

Furthermore, he explained that 'inside' and 'outside' are very different spaces for him that lack a connection; in other words, when David interacted with the model he noted that he can imagine himself 'inside' the model/room, but it is hard to imagine where he is, relative to where he came in from and the rest of the museum without seeing the view outside in the model. Without labels on the 3D model that explain where you are with relations to the museum, David said he would assume this is a representation of the whole gallery. He suggested adding accessible labels on the model itself to allow it to become a stand-alone piece in the space; thus, a combined model with braille (and type) can convey the information more effectively without the need of an educational officer's explanation.

David's feedback helps us understand, from the perspective of a blind audience member, the information that can be accessed through the 3D model, as well as the information that remains inaccessible; hence, his feedback allows us to better understand the affordances and limitations of this tactile representation.

Objects 3a and 3b: 3D Models of Spiral Staircase

Form, Space, and Other Properties:

These were separate 3D tactile representations of the spiral staircase that is in Walker Court, including two versions: one plastic, and one from edible candy. Figure 14 represents the plastic version; since it was 3D printed, it has a "spine" holding the object in place. The shape of the tactile spiral staircase corresponded to the visually perceived shape of the original staircase, however, the stairs were omitted in an attempt to simplify the overall shape of the artifact, and the handrails were made thick yet possibly not in proportion. While the students felt like they were losing some of the shape's accuracy, they did it in an attempt to enhance understanding; by omitting details and simplifying the shape, they attempted to not distract museum visitors with details.

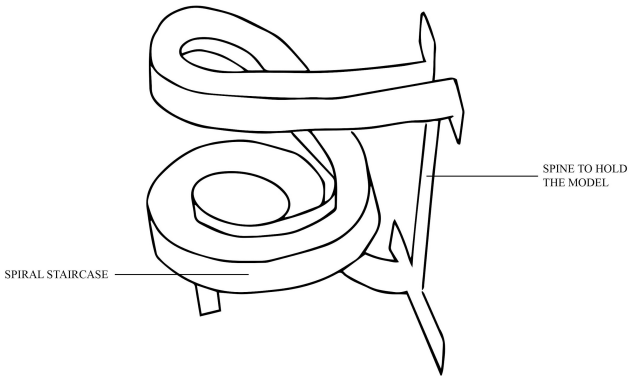


Figure 14: Illustration of the Spiral Staircase (Plastic)

The shape of the edible candy version was even further simplified than the plastic one (and was even less accurate according to the group members). The candy version allows a visitor to explore the shape of the spiral staircase

with their tongue/mouth, which is considered as densely innervated by many different classes of sensory receptor. It is a highly sensitive area compared to the fingertips; “the sensory surface of the tongue is often thought to have a specific role in haptic exploration and exteroceptive tactile perception of objects in the mouth (Haggard and de Boer, 2014).”

If considering the geometric relations of the complex spiral shape itself, one can claim that the spatial, geometric, and/or topological relations are included in the translation/interpretation; however, for the sake of this analysis, we are considering the relations within the space of Walker Court, rather than within the shape of the spiral itself. In both object 3a and 3b the attributes, such as colours and textures of the original design, were not attempted to be conveyed.

Function:

Audience members were observed interacting with their hands and/or fingers, feeling the complex spiral shape of the staircase. While the edible candy offered the opportunity to feel the shape with the tongue/mouth, no one at the Big-Reveal tried the candy.

Impact on Visitors and Community Members:

Interacting with the separate model of the spiral staircase afforded access to information for blind visitors; David indicated he was able to feel and understand the shape of the spiral staircase by touching the plastic model. In

addition, audience members were intrigued by the idea of using the sense of taste as part of a museum experience that is more 'whole'. Furthermore, an audience member and David suggested the edible candy would be a great addition to the museum's shop.

Object 4: Materials Focused on Attributes

Form, Space, and Other Properties:

The kit included examples of the materials that are used in the room such as wood, titanium metal, marble, and scents of softwoods (figure 15). The group created a sample of wood with elevated grain to enhance the texture of the material in order to enrich the sensation created through touch. The titanium metal was used as part of the exterior design of the gallery, but was included nevertheless.

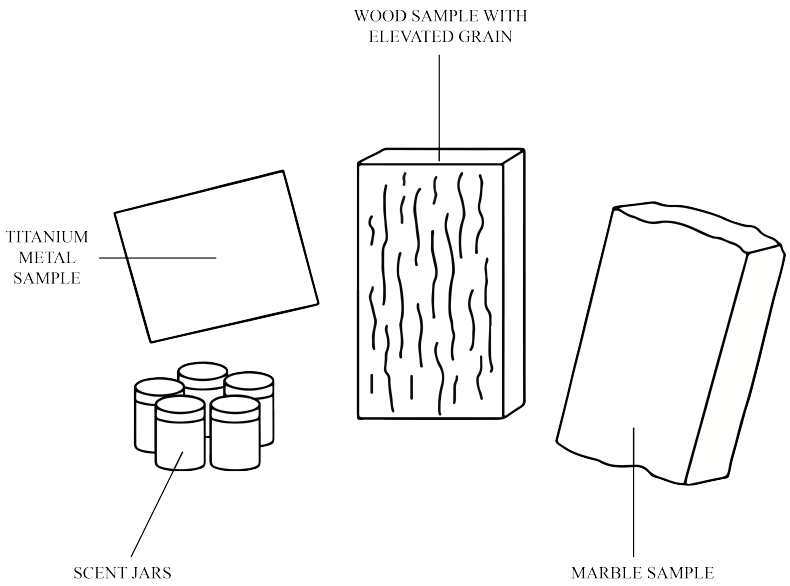


Figure 15: Illustration of the Materials focused on Attributes

The shapes of the materials do not correspond to the shapes that can be visually perceived in the original design of Walker Court. The spatial, topological, and geometric relations are excluded as well, but the attributes of the materials, such as colour, texture, and sonic cues (e.g. sounds that are produced by knocking on the material), were conveyed. The collection of materials did not attempt to replicate or convey the shapes and the spatial and topological properties of the room or staircase, but instead sought to replicate or convey the textures and colours of the space. In other words this object was not designed to have an iconic correspondence to the shapes and relations in the room, but instead was designed to iconically represent the textures on those shapes.

On the other hand, for some attendees, these objects served as non-visual perceptual cues to possibly engender the retrieval/recall of memories associated to the materials used in the space, or design process. For instance, the smell of Fir wood might trigger memories for some visitors, unrelated to the iconic properties of the materials. In addition, one of the students (who is sighted) noted that the attempt here was to also correspond to the unique and interesting use of softwood as part of the renovations of the space. In this case, the attributes are being symbolically represented.

Function:

David was observed feeling the wood samples for several minutes, knocking on the titanium metal sample, and touching the marble tile of the floor. When he smelled the scent of Fir he immediately smiled and said it was

interesting. Interestingly, he then asked whether the tiles in the museum are in these irregular shapes, but the students explained that these are broken pieces of the marble, and that in the gallery itself the tiles are complete (the shapes were not attempted to be conveyed).

Audience members were observed exploring this project through touch, sound, as well as with smelling the scent jars. In figure 16, an individual was captured smelling one of the scent jars. The scents were made from essential oils of Canadian softwoods; while they offered visitors the opportunity to smell various scents, the students thought the two 'main' scents were Spruce Pine and Fir, as those two seemed the most realistic.

Figure 16: Interacting with Scent Jars at the Big-Reveal
(Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

6.1.3. Key Findings

Table 1 aims to present our findings based on an analysis of each object, considering how the translation/interpretation aimed to translate the shapes, relations, and/or attributes (iconically, symbolically, or through a combination of both).

The group employed a combination of "literal" and "constructivist" strategies. On one hand, their strategy attempted to employ non-visual perceptual cues that aimed to afford an iconic representation of the visually perceived shapes, as well as the spatial relations of the space (such as the tactile maps). While on the other hand, they also attempted to translate/interpret the space through non-visual symbolic properties, where the relationship between the perceptual cues and the original space that is being translated/interpreted is through convention (such as the scent jars).

It appears they broke down the translation/interpretation into several objects that as a result engendered access to different types of information that could now be understood through various modalities, irrespective of abilities. It is unclear whether this approach was intentional or not, but the outcomes/affordances of enhanced understanding and access to information are evident.

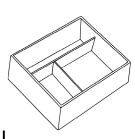
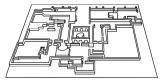
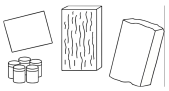
	 CASE	 OBJECT 1	 OBJECT 2	 OBJECT 3a	 OBJECT 3b	 OBJECT 4
RELATIONS	None	Iconic	Iconic	Symbolic (if Verbally Described)	Symbolic (if Verbally Described)	Symbolic (if Verbally Described)
SHAPES	None	Iconic	Iconic	Iconic	Iconic	Symbolic (if Verbally Described)
ATTRIBUTES	None	Symbolic (if Verbally Described)	Symbolic (if Verbally Described)	Symbolic (if Verbally Described)	Symbolic	Iconic; Symbolic

Table 1: Walker Court Translation/Interpretation Object Analysis

While the group's exploration started at the macro level and scaled down to the micro level, the kit does afford a fluid informal reconfigurability in terms of the sequence of interactions, unless that is determined/provided by a guide/education officer. In other words, if one is to interact with the kit independently, one can choose to learn about the textures or colours of the materials first, and then about the shapes and spatial, topological, or geometric relations. It affords a variety of interactions, where the properties of the objects and their functions vary, and as a result convey different types of information.

In addition, it appears that for some objects, such as the collection of materials focused on attributes, one's perceptual mode could impact the semiotics of the representation. In other words, while for blind visitors, these

materials allow access to the iconic properties of the materials attributes (textures, colours etc.), for others individuals who can access this information visually, the set of materials can also represent symbolic properties.

Furthermore, simplification proves to be an important aspect of the design of the representations in order to enable understanding, where often less is more (e.g. omitting details such as the stairs in the staircase to enable the understanding of the spiral form). One of the group members recognizes the impact on accuracy saying that, “For technical reasons, as well a to avoid distracting with too much detail, the models were simplified and [are] somewhat less accurate (2018).” However, seeing how these representations, such as the 3D models and tactile maps, did enable understanding, it should be considered to simplify objects in addition to breaking complex shapes into several representations. This approach is also discussed in the literature review (with the examples of the MCCB Museum and the Tile Museum in Portugal, where they also indicate that simplifying representations and breaking down one object, such as a tile, into several objects, can enable/enhance understanding, especially for blind and visually impaired visitors (Eardley et al., 2016)).

6.2. The Shell

6.2.1. The Original Artwork: Two Piece Reclining Figure No. 2, Sculpture by Henry Moore, 1960

Figure 17: Henry Moore, Two Piece Reclining Figure No. 2, 1960, Art Gallery of Ontario

This large sculpture (dimensions: 1250 x 2900 x 1375 mm) is made of original plaster and is the second in a series of four large-scale two-piece sculptures of reclining figures that Moore made between 1959 and 1961 (Correia & Morgan, 2015). In this work the figure has been divided into two separate parts positioned on a base: one rises vertically to a central point and may be understood to represent a head, shoulders and torso, while the other takes the form of a curvaceous arch and may be understood to represent legs, bent at the knees (Figure 17). However, when seen in the round, the identification of singular figurative forms is brought into question (Correia & Morgan, 2015). From the other side of the sculpture, a series of forms project

away from the central mass and appear to suggest an alternative 'front' view. The other section of the sculpture comprises four irregular columns that curve smoothly into arches of varying sizes and create an uneven upper surface. Unlike other parts of the sculpture this part's shape and proportions serve to challenge figurative associations (Correia & Morgan, 2015).

In addition, the gallery label at the Tate Museum indicates as follows:

> According to Moore this fusion of human and landscape forms served as 'a metaphor of the relationship of humanity with the earth'. The character of that relationship, however, remains open to interpretation. It could suggest a harmonious union of mankind with nature or equally a crisis-ridden sense of isolation and fragmentation. (2004)

6.2.2. Translation/Interpretation Analysis

The group's translation/interpretation is a handheld auditory and tactile experience using a conch shell with a Bluetooth earphone inside of it (as seen in Figure 18 and Figure 19); the Bluetooth earphone is connected with Velcro in order to be able to recharge it. The audio includes natural sounds created by the shell itself along with a three-minute audio recording consisting of curatorial information, biography on the artist, beach sounds (recorded by the students and retrieved online), and descriptive information on Moore's inspiration. This handheld device is meant to support the AGO's multisensory tours, where visitors also get to touch the original sculpture.

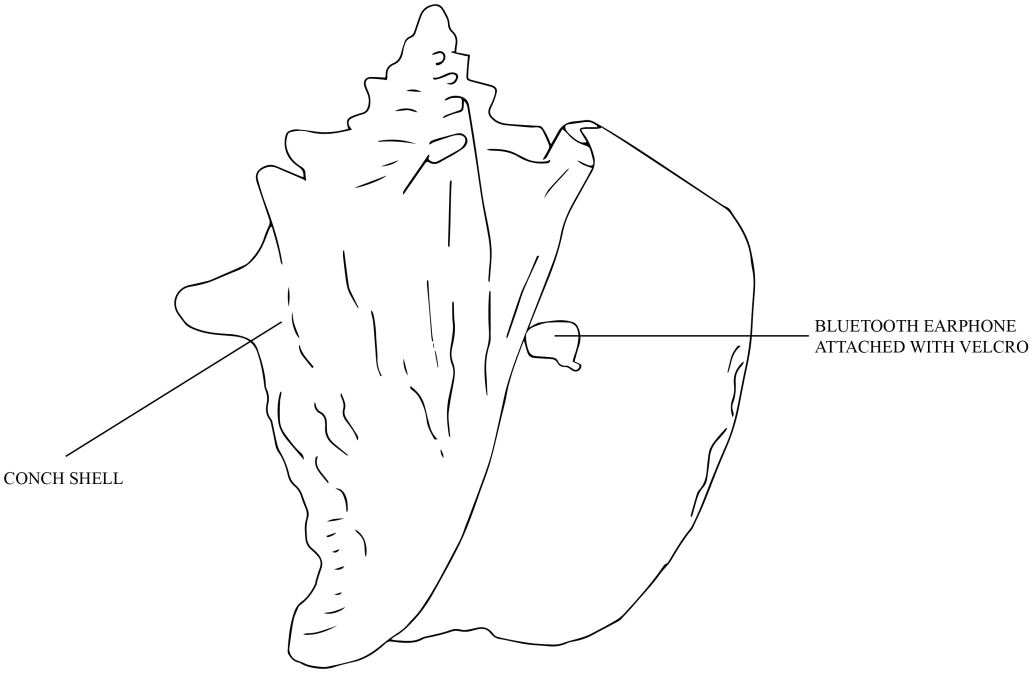


Figure 18: Illustration of the Shell Translation/Interpretation

Form, Space, and Other Properties:

The strategy of this group's solution was more "constructivist". The shapes and the relations of the conch shell do not attempt to iconically correspond to the shapes and relations of the original sculpture. However, the attributes of the original artwork are conveyed through the rough/smooth textures of the shell; in other words, the textures, are akin to the notions of iconicity. In addition, the group attempted to convey the artist's inspiration and the beach through the textures as well; thus, the textures are represented both iconically and symbolically. In terms of the colours, the lighting in that gallery space was low and it was hard to determine based on our observations, but

according to one of the students who created this translation/interpretation, the neutral sandy colours of the conch shell are similar to those that can be visually perceived in the original sculpture, but not exactly the same.

The natural sounds, as well as the audio recording, do not iconically represent the spatial properties of the original sculpture. In terms of the natural sounds, since the shell has a different shape than the sculpture, the sound it naturally creates is different than that of the sculpture. Thus, there is no meaningful resemblance between the natural audio and the relations and shape of the sculpture. In terms of the audio recording, while the group used non-linguistic sounds (illustrative sounds recorded)—in this case, these sounds are symbolic as they sonically refer to the category of a beach (referred to as earcones in sonification/ auditory display design). In addition, the sculptures are not iconic representations of a beach; rather they were part of the artist's creative process when creating the original sculpture, which is also akin to the notion of symbolicity, as connection and meaning is made through convention. The same applies to the audio that uses language in the recording, which is therefore also symbolic.

Figure 19: The Shell Translation/Interpretation
(Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

If this translation/interpretation is used on the multisensory tours at the AGO, when participants of the tour touch the original sculpture, it enables them to directly feel the contours of the original sculpture. This strategy is akin to the semiotic notion of indexicality because the audience experiences the artwork by physically interacting with it, thus, the meaning is engendered through their spatio-temporal contiguity to the artwork.

Function:

Holding a seashell to your ear (Figure 20), one can hear the soundscape created with all the different sonic sources. One of the main goals of this translation/interpretation was to help audience members transform from inside the gallery to the beach—to where the artist was inspired to create the original artwork.

Figure 20: A Museum Visitor with the Shell; in the Background*: Two Piece Reclining Figure No.2* by Henry Moore, 1960 (Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

Museum visitors were observed holding the shell to their ear and listening to the diverse sonic cues, as seen in Figure 20. Although the intention of the group was to translate/interpret the specific sculpture, *Two Piece Reclining Figure No.2*, the audio recording did not speak about it specifically, rather it described Moore's inspiration in general. Perhaps as a result, visitors were

observed interacting with the translation/interpretation while walking around the entire exhibit, which features many more sculptures by Moore.

Impact on Visitors and Community Members:

Several audience members indicated that, in their opinion, choosing an object, such as the shell, which matches the experience and the information that is being conveyed is effective. A number of the interviewed audience members claimed the experience offered by the shell transformed them outside of the museum walls, as was the group's goal and intention.

Furthermore, the group received feedback from a visitor who said that holding the shell takes away the need to touch the original sculpture because of shared attributes such as textures. Another visitor indicated that the heaviness of the shell corresponds to the heavy mass of the sculpture, which can be visually perceived—this may suggest that the weight of the shell has a notion of iconicity.

In terms of impact on community members with vision impairments, the feedback varied; on one hand, Natasha spoke about her experience with this artifact as an extremely emotional and effective one, she explained in tears during an interview:

> The first thing I did, is had that recollection of a young child, on the beach, when being told 'when you hold a seashell against the ear you will hear the sounds of the ocean'... At this point in my life, it was also the freedom of being able to walk by the water on the beach, which I don't have that privilege within the last year... [Due to her sensitivity to light]. (2017)

On the other hand, David claimed this sort of object is creating new art, which conveys different information than the original artwork. He explained that as a blind person, he would prefer to learn more about the "literal" information that can be visually perceived. It is important to note, however, that on the multisensory tours a blind participant would have access to that information through touching the original sculpture, which David did not have the opportunity to experience.

Natasha was not the only one to report being transformed to a different location as a result of interacting with the shell; a visitor shared during an interview:

> The shell here was really different, [and] kind of had the effect like you're being put somewhere. Almost like you're not in any earth-bound location—like here we are in Toronto at the AGO, but no we're not because we're somewhere else—these sculptures are from what year? The one in the way-way back, I was fixated on the eyes and I was wondering how many people these eyes have seen—in different times, places, and it completely breaks the limits of being in this specific spot here and completely makes all this fluid, which I thought was super cool. (2017)

6.2.3. Key Findings

This group attempted to employ a "constructivist" strategy, using tactile and sonic perceptual cues that, other than the textures, do not correspond to the iconic properties that are visually perceived (Table 2). Overall, the group's goal was to engender the retrieval/recall of beach memories that are associated with the original intention of the artist, and/or his inspiration for the original

artwork. Thus, this group's approach was the one that is most akin to the semiotic notion of symbolicity, as the relationship between the perceptual cues and the sculptures are mainly constructed through convention.

	CASE	SHELL	NATURAL SOUNDS	AUDIO RECORDING	ORIGINAL SCULPTURE
RELATIONS	None	Symbolic	Symbolic	Symbolic	Indexical
SHAPES	None	Symbolic	Symbolic	Symbolic	Indexical
ATTRIBUTES	None	Iconic (textures); Symbolic	Symbolic	Symbolic	Indexical

Table 2: The Shell Translation/Interpretation Analysis

It is important to note that without the experience of touching the original sculpture, as offered on the multisensory tour at the AGO, access to the original sculpture is limited through the translation/interpretation. However, Melissa Smith shared during a discussion about the artifacts later in 2018 that these were always viewed as tools for the tour "that never stands alone, you need the human interpretation in that case to contextualize that objects and what was nice and exciting about the shell was that it was so experimental and it provided flexibility (2018)"—a flexibility for the tour, for the experience that is offered, for the vision impaired participants, and for the education officers.

6.3. The Umbrella

6.3.1. The Original Artwork: The Storm by Narcisse Virgile de la Pena Diaz, 1871

Figure 21: The Storm, Narcisse Virgile de la Pena Diaz, 1871

This group focused on translating/interpreting The Storm, a painting by Narcisse Virgile de la Pena Diaz made with oil on canvas. In order to analyze the translation/interpretation, we will describe the painting by defining the features from the background to the foreground, from the left to right at each level. The breakdown of the painting is illustrated in figure 22.

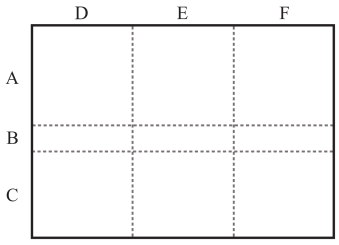


Figure 22: Breakdown of the Painting The Storm

Background (Figure 22, Row A)

The background of the painting could be thought of as the representation of the sky, which covers the upper half of the painting (Figure 22 Row A). On the extreme left (Row A, Colum D), the sky is rendered with dark gray colour that gets increasingly lighter as we progress to the center of the painting (towards Row A, Colum E). The brushstrokes are clearly visible, creating an almost expressionist effect that conveys a feeling of stormy turbulence. Around the centre of the sky (Bottom of Row A Colum E), there is a much lighter, almost white area that can be viewed as the sun creeping through or lightening. As we progress to the right (Row A, Colum F), the sky gets dark again (similar to the left side of the painting).

Midground (Figure 22, Row B)

The midground could be thought of as the region of the painting along the horizontal plain that represents bushes and trees in the distance (Row B in Figure 22). They are mostly dark in colour, and details seem to be omitted due to the distance. On the left hand side, (Row B, Colum D), there are large yellow-green trees that are on the edge with the foreground of the painting (Row C). As we progress to the left (Row B, Colum E), the bushes and trees return to being darker again (dark brown or even black) continuously all the way to the right (Row B, Colum F), yet underneath the lighter part in the centre of the sky, the

bushes and trees are slightly lighter in colour and have more detail to represent the light/sun shining on them (Row B, Colum E).

Foreground (Figure 22, Row C)

The foreground of the painting could be thought of as the representation of a wide field, with hills that are green, yellow, and dark brown (Row C). The field covers the bottom half of the painting, the brushstrokes reveal a dramatic scene of a bushy grass field with small hills along the way, that is overall dark from the shadows of the stormy clouds in the sky above, yet again, it become lighter in the centre due to the sunlight/thunder (Row C, Colum E). Around the centre of the painting, slightly to the left, close to the area with the lighter field, is a small figure of a man with an animal that appears to be a goat or a sheep (left of Row C, Colum E). The figures are small in size, and dark in colour (with the animal being slightly lighter).

6.3.2. Translation/Interpretation Analysis

Form, Space, and Other Properties:

This artifact attempted to translate/interpret the painting *The Storm* through a sonic and tactile representation (Figure 23). As seen in Figure 24, the artifact is an umbrella, with an audio speaker that is placed within the umbrella at the top facing upwards, to allow sound to travel down all edges of the umbrella in order to create a 360-degree immersive sonic experience. In other

words, the attempt was to translate/interpret the painting from a rectangular shape to a hemisphere surround sound, as depicted in Figure 25.

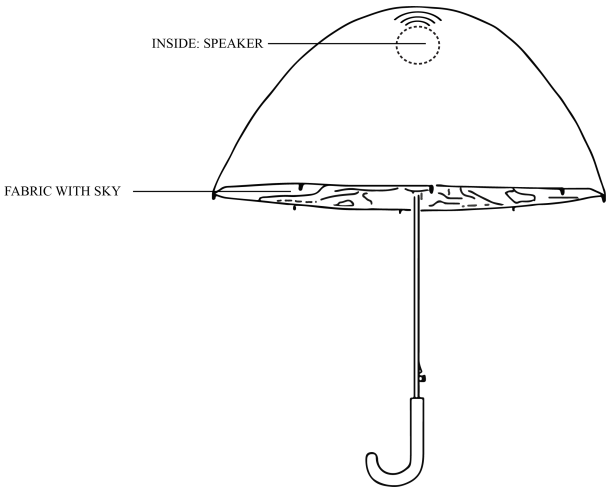


Figure 23: Illustration of the Storm Translation/Interpretation

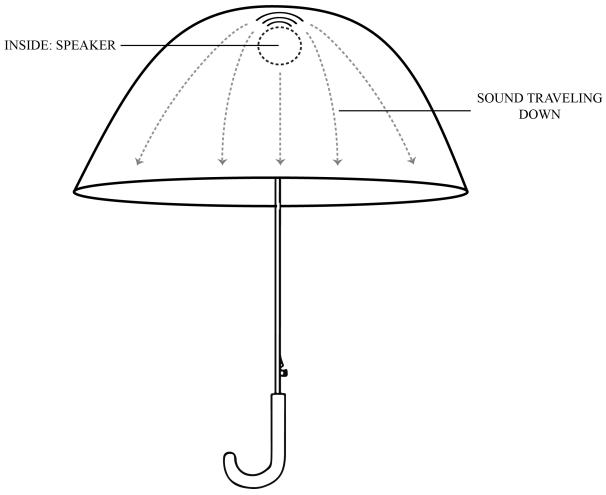


Figure 24: Sound of the Umbrella Translation/Interpretation

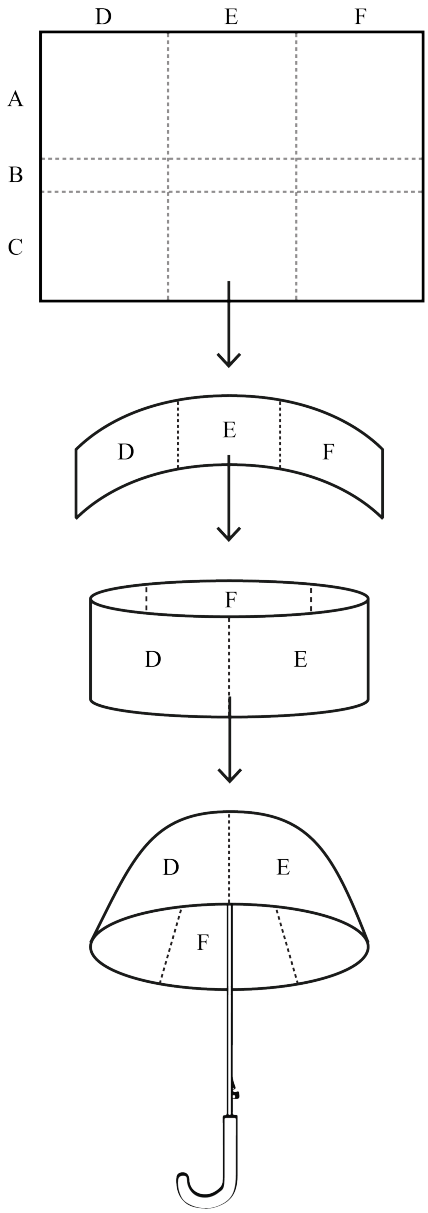


Figure 25: Illustration of the Strategy Employed

Based on the students' previous design proposal (where there are speakers spread out all around the umbrella edges, as seen in figure 26), we can interpret this translation/interpretation as one where the intent has iconic correspondence, yet the implementation is noisy (final artifact). Throughout the group's journey, the students were debating whether to attach to the umbrella's handle a tactile representation of the original frame of the painting, but their final iteration did not include this solution.

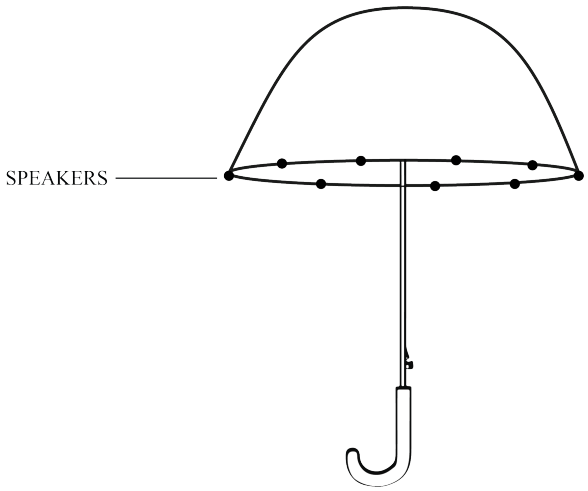


Figure 26: Illustration of the Group's Previous Design Proposal

In the translation/interpretation the audio recording attempts to convey sounds that bare an ecological resemblance to the situation/scene it is aiming to represent (e.g. rain, thunder, wet surface, sheep/goat in the distance etc.). The spatial relations and shapes that can be visually perceived in the original painting are conveyed in a way that is akin to noisy iconic representation through the sound. For instance, because the sky is more dominant in the painting (covering all of row A, which is about half of the painting), the sound of

the storm is more dominant (persistent and louder) in the audio recording, suggesting a noisy iconic correspondence to the relations; also, because the figure and animal are small in size, the sound that illustrates them is more faded, suggesting a noisy iconic correspondence to the shapes (size).

In terms of the attributes, it appears both the original painting and the translation/interpretation (in terms of the sound) aim to convey wet texture; the brushstrokes in the original painting seem to represent a wet-muddy scene/texture in the original artwork, which is also being conveyed sonically in the Umbrella translation/interpretation. As illustrated in Figure 27, on one hand, the sound of rain might be an attempt to iconically represent wet texture (referred to as an auditory icon in sonification/ auditory display design (Jeon, 2015)), while on the other hand it could be an attempt to represent a label referring to the category of 'wet', which would make it symbolic (referred to as an earcone in sonification/auditory display design (Jeon, 2015)). However, if it is symbolic, there is iconicity involved that helps the audience know what the symbol is. In order for us to know the intention of the group, further investigation with the students is required. It is also important to note that all representations are made of iconic and symbolic properties. It could be that some of these sounds are representations that fall in between the two extremes of iconicity and symbolicity.

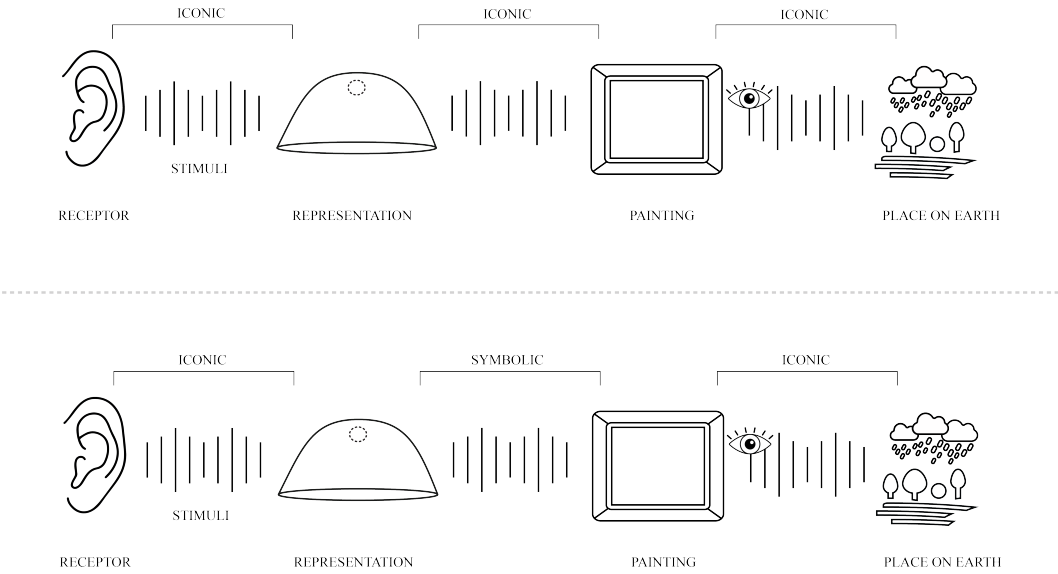


Figure 27: The Umbrella Translation/Interpretation Two Levels (Sound)

In Figure 27, the iconic properties of the sonic representation (from the Umbrella) are conceptualized as the stimuli that is produced and picked up by sensory receptors. This is based on Coppin's dissertation work (2014) where he conceptualizes pictorial properties of a graphic as the optical structure (Gibson's optic array) that reflects from a marked surface, is picked up by retinal detectors, and makes use of lower level perceptual categories that were shaped by and that enable perception-action in the physical world. Sonic and tactile representations would unfold in the same way; thus, the sounds coming from the umbrella would be iconic but not the umbrella itself.

As seen in Figures 23, the speaker and interior of the umbrella are covered with fabric that has the sky from the original artwork printed on it. This element is only visual, which suggests this is not an attempt to provide access to

those with vision impairments, yet it suggests an attempt to communicate the mapping itself to the audience. If one is to look up when interacting with this translation/interpretation, he/she will see the sky; in other words, sighted audience members can see the rectangle painting being translated/interpreted into a dome, representing the group's strategy (as seen in Figure 24, where the dome of the umbrella corresponds to row A, columns D, E, and F).

Function:

Visitors were observed holding the umbrella while facing the original painting, listening to the auditory immersive experience (Figures 27, 28, 29 and 30). Given the small size of the room where it was displayed during the Big-Reveal, and the loudness of the sounds of the storm, the artifact drew the attention and curiosity of other individuals who were not interacting with the artifact (this could be viewed as an intrusive/distracting experience).

Figure 28: Visitors Engaged with The Storm and The Umbrella (Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario); Figure 29: The Storm and The Umbrella, Big-Reveal
(Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

Figure 30: The Umbrella with The Storm in the Background, Big-Reveal (Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario); Figure 31: A Visitor Engaged with The Storm and The Umbrella, Big-Reveal (Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

Impact on Visitors and Community Members:

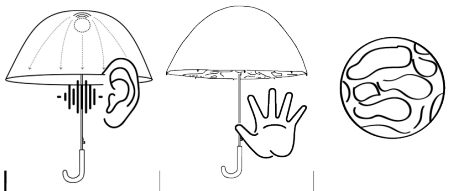
Visitors spoke of the effectiveness in choosing to use an umbrella in the translation/interpretation, as the tactile activity of holding an umbrella corresponds to what one may do/feel while experiencing stormy weather, such as the weather depicted in the original painting (similar to the shell in terms of effective choice of object). Here again, the notion of being transformed to a different place was brought up in interviews with audience members. In addition, one hearing-impaired visitor spoke of an enhanced experience due to the vibrations created by the sounds through the handle of the umbrella. For him, the tactile vibrations corresponded with the information that he was visually perceiving. These tactile-vibrations can be viewed as a correspondence

to the tactile experience of holding an umbrella in the rain when raindrops are hitting the dome above and bouncing off of it. This outcome was unintentional by the creators of the artifact, but resulted in a tactile interface to the sound, which represents the painting tactilely as well. Without user testing it is difficult to determine whether the vibrations of the translation/interpretation iconically correspond to the feeling of holding an umbrella in the rain; we cautiously suggest an iconic relation and acknowledge that this is a future area of exploration.

Another visitor spoke of how the translation/interpretation impacted what she was visually perceiving in the original artwork—the sound of a thunder made the light area in the centre appear even brighter than before. In addition, another visitor spoke about the effectiveness of the this translation/interpretation, "The storm was really interesting, because it's audio, this way you close your eyes and you're 'in the area'; it was a 360 surround effect, which really added—that you're in this environment now". Overall, the group received positive feedback; according to the students one visitor who loved this artifact was even convinced that water drops were part of the experience offered (although water was not part of the translation/interpretation).

6.3.3. Key Findings

This translation/interpretation offers an immersive sonic experience through a tactile interface with the effective use of an umbrella. The attempt was to translate/interpret the original painting from a rectangular shape to a hemisphere surround sound. We interpreted this translation/interpretation as one where the intent has iconic correspondence, yet the implementation is noisy (Table 3). The sonic cues in this translation/interpretation could be viewed as having two levels of correspondence—icnoic and/or symbolic—as seen in Figure 26.



	AUDIO RECORDING	THE UMBRELLA	INSIDE FABRIC
RELATIONS	Iconic (Noisy)	Symbolic	Iconic (Sky)
SHAPES	Iconic (Noisy)	Symbolic	Iconic (Sky)
ATTRIBUTES	Iconic; Symbolic	Cautiously Suggested: Iconic	Iconic (Sky)

Table 3: The Umbrella Translation/Interpretation Analysis

If someone is both blind and deaf, an interface such as the Umbrella translation/interpretation can afford access to some of the information that is in

the painting through the tactile vibrations created by the sound, and the action of holding an umbrella, which is most likely an action they have experienced before. This interface provides some access, even to an *edge case* such as this, and therefore a translation/interpretation like the Umbrella can be experienced by a wide range of diverse audiences.

6.4. Group of Seven

6.4.1. The Original Artwork—Rain Squall, Georgian Bay by F.H. Varley, 1920

Figure 32: Rain Squall - Georgian Bay, by F.H. Varley, 1920, Oil on Wood, Art Gallery of Ontario

This group focused on translating/interpreting a landscape painting by the Group of Seven. In order to describe the painting, we will define the features from the background to the foreground, starting from the left to right at each level. The breakdown of the painting is illustrated in figure 33.

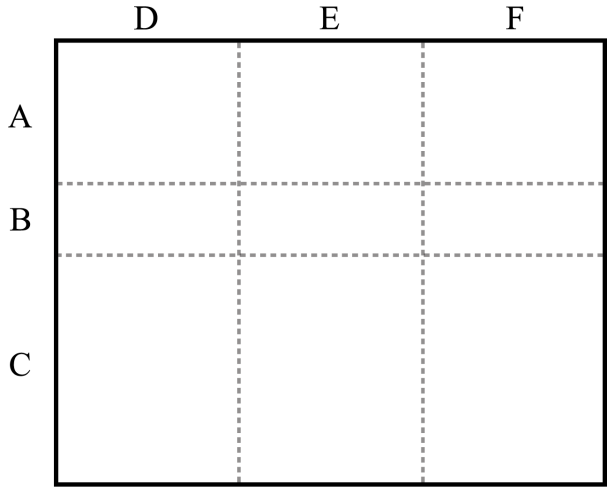


Figure 33: Breakdown of the Painting Rain Squall - Georgian Bay

Background (Figure 33, Row A)

In the background is the sky and what appears to be landscape in the distance. The sky on the very top is full of clouds that are white-grey on the right, and as you progress to the left they become darker grey and blue. On the extreme left the clouds are the darkest and the brushstrokes are highly visible. In the distance (closer to Row B) the sky is painted in light blue and appears to be clearer towards the horizon. There are rocks/island/land in the distance (Row A, Columns E and F).

Midground (Figure 33, Row B)

In the midground is the water representing the lake by Georgian Bay in Ontario, Canada. The colours are vivid and expressive, on the left side (Column D) the strokes are in shades of dark blues and turquoise, and as you progress to

the right (Columns E and F) the strokes become more of a mixture of red-pink together with the blues and turquoise. One might say that the clouds from the sky are reflected in the water.

Foreground (Figure 33, Row C)

In the foreground of the painting is the land made of rocks, from which Varely painted this piece. The rocks and land are painted on the bottom half of the painting (see how Row C occupies almost half of the painting in Figure 33). There are three pine trees on the rocks/land and though they are in the foreground, they are painted over the upper half of the painting (Rows A and B), over the lake, horizon, and sky. The trees seem high, and the leaves are dark green, blowing in the wind. The rocks of the cliff are colourful with a pink earthy tint, and shades of orange, red, and a little bit of green. The brushstrokes are highly visible and seem to represent textures. Onwards to the right (Row C, Column F) is the shoreline that is underneath the rocky cliff, which is painted in dark blue/turquoise.

6.4.2. Important Context

There are important contextual factors to note here, which will be covered in depth in section 7.3, when discussing the group's journey. It is important due to its impact in the development of this translation/ interpretation, including the design ideation, exploration, and implementation. This group consisted of three students; all with non-design professional

backgrounds, where instead of using traditional design techniques they adapted other techniques from their own lived experiences to translate/interpret the painting. These techniques included camping, knitting, and event planning with social media, which became a part of the design process and materials used for the translation/interpretation. One of the students used her passion for camping as a material/skill; it is not something that is taught in design school, however, an interesting 'hack' happened, where camping became a material. She went to Georgian Bay and found a remote location that resembles the location that is painted in the original painting, as seen in Figure 34. There she built a repository of experiences from the location that acted as an iconic representation of the original painting; a place with more stimuli that allowed her to then create a greater repository of resources.

Figure 34: Remote Location in Georgian Bay and the Original Painting by Varley

It is difficult, and perhaps impossible, to determine whether the chosen remote location is the exact same location as the one in the original painting by

Varely; yet the accuracy of the chosen location is irrelevant because that specific location (amongst a wide range of other possible locations in Georgian Bay) was chosen due to its iconic correspondence to the original painting—this means the chosen remote location functions as a representation of the painting (as seen in Figure 35; some elements in the diagram will be further explained in the analysis). This afforded a way to generate perceptual cues (including visual, tactile, sonic etc.) that can iconically represent and correspond to the visually perceived properties of the original painting.

Another student in the group used her passion and experience with knitting to learn a new knitting technique—crochet—to translate/interpret the painting. This shows again, how a student's experience is being used as a technique rather than traditional design techniques. It also provided a way for the student to build a personal connection with the art through creating a translation/interpretation in a way that she enjoys. The third student used her passion for event planning and social media to build a meaningful connection with art through a participatory activity that engages the community, and through working together with the student that used camping as a material.

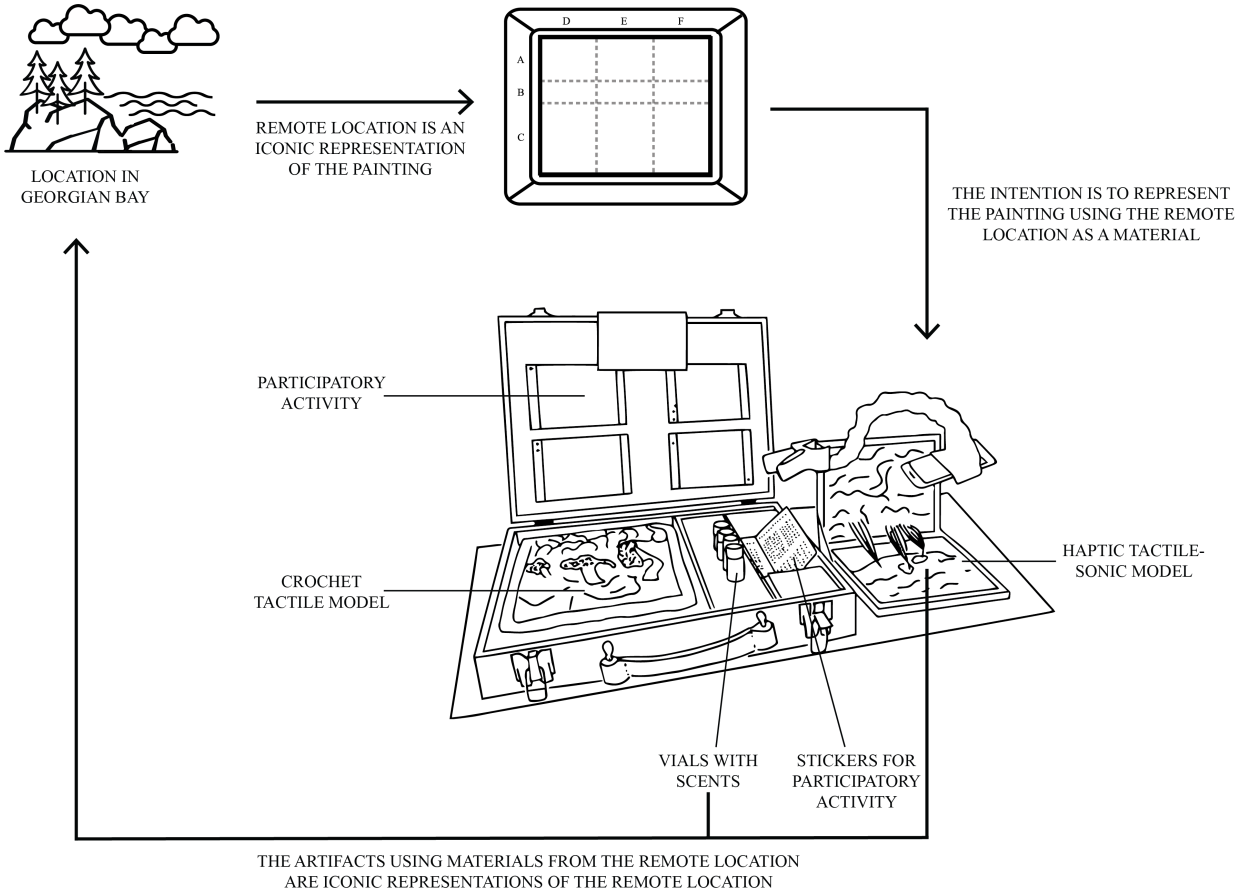


Figure 35: Explanation of the Relations and Correspondence for the Group of Seven Translation/Interpretation

All three students shared that this experience enabled them to build meaningful connections with the artwork, when before they had very little or no connection at all. Furthermore, the three students are immigrants, but at different stages of immigration, and through the class and this project were trying to find meaning in an artwork that is an integral part of Canadian culture and history. The student with passion for event planning and social media, who's a recent immigrant, shared how through this project she has learned about Canada and Canadian culture.

6.4.3. Translation/Interpretation Analysis

The group's solution aimed to translate a landscape painting by the Group of Seven through tactile, sonic, and olfactory elements. All of the elements of this translation/interpretation are cased together in an artist's suitcase (Figure 36), which relates to the group's goal of aiming to transport the visitor to where the artist was while he painted this artwork. In other words, the case of the translation/interpretation has symbolic properties that are made through convention.

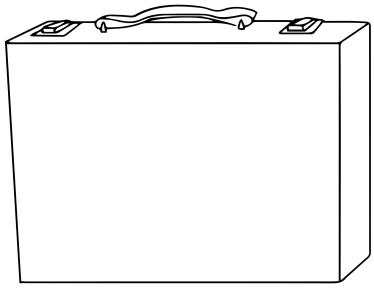


Figure 36: Illustration of the Case of the Translation/Interpretation (Artist Suitcase)

Inside the suitcase are two tactile representations of the artwork: one made predominately with natural materials from the remote location in Georgian Bay, which is also haptic using augmented reality technology (sound plays according to the location of the hands); and the second is a tactile model made with yarn and fabrics, using the technique of crochet knitting.

The haptic tactile sonic model was made in its own 'mini case', which is small and fits into the suitcase; when presented during the Big-Reveal, the small case was placed next to the suitcase, as illustrated in Figure 37. As seen in

Figures 37 and 38, an additional element included in the experience was a participatory activity that took place during the Big-Reveal at the AGO, where the public could vote on where to go camping next, to co-create another multisensory translation/interpretation of a landscape by the Group of Seven (with the use of stickers). People from the camping community were invited to the Big-Reveal event to participate. The goal was to make the experience not only multisensory, but also participatory with the community (in Figure 38, a visitor posted a response to the event post).

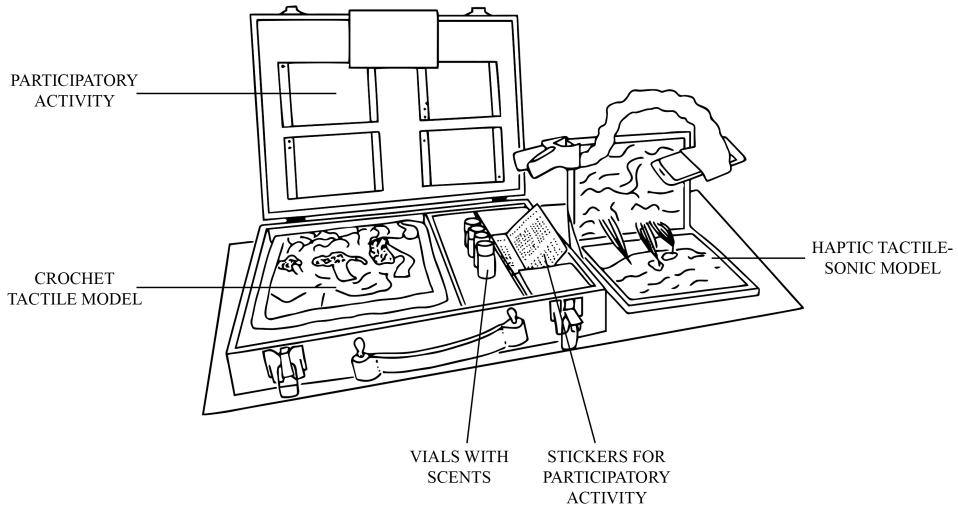


Figure 37: Illustration of the Group of Seven Translation/Interpretation

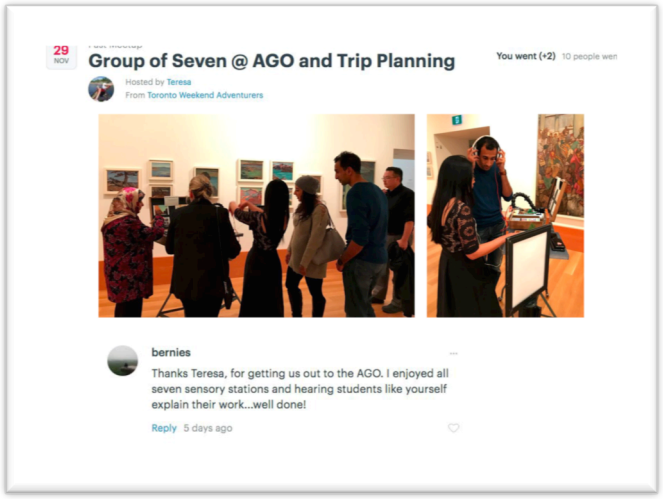


Figure 38: Engaging the Community with the Translation/Interpretation

Another object in the translation-interpretation is an interactive activity offered through a tablet, where a visitor turns around looking at a video created by the students at the same remote location in Georgian Bay, providing visual and sonic cues that correspond to that specific location (Figure 39). The tablet is attached to a small fan device that creates the sensation of wind blowing on your face, as a visitor turns around she/he can listen to and see the location, creating a 360-degree visual and sonic experience upon movement (Figure 39, B and C). In the suitcase are also vials with scents, to offer the audience an option to engage with scents of woods and nature as part of their overall experience.

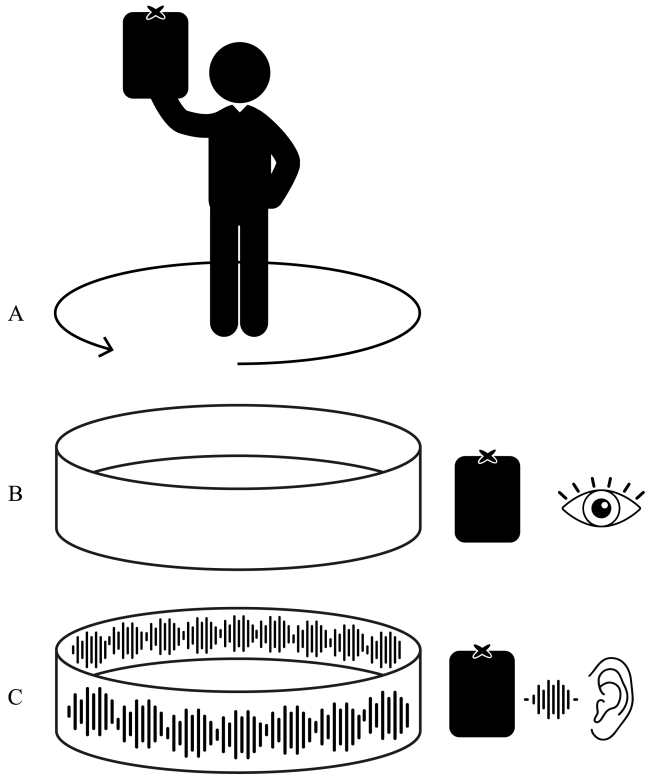


Figure 39: Video on iPad - Visual and Sonic

Object 1: Haptic Tactile-Sonic Model

Form, Space, and Other Properties:

Figure 40 illustrates the haptic tactile-sonic model. The trees and rocks are made with natural materials that are from the remote location (that resembles the scene of the painting); the sky is made of painted yarn in similar colours to the original painting, and are covering the top part of the mini case; and the water is made of aluminum foil in order to create a cold session by touch. The little rocks were placed on the far side of the mini-case because in the artwork you can see islands on the horizon (Figure 33, Row A, Columns E and F). The majority of the bottom mini-case is covered with big stones/rocks to

represent the cliff (Figure 33 Row C). Through these rocks pine needles are coming out vertically to represent the trees in the painting. These aim to iconically correspond to the spatial relations that can be visually perceived in the original painting.

The student explained during an interview, "I wanted people to be able to feel the board, and also be able to hear the sounds that are associated with each part;" for that, she used augmented reality technology. With the use of an iPhone app, invisible 'buttons' are placed 'on' the tactile model (which can be seen on the screen, but not on the tactile representation), then when a visitor's hand touches a button, the sound plays accordingly. For instance, if a visitor touches the stone part, she/he will hear the sound of walking on that stone, if they touch the water, they will hear the sound of waves (amplified, but not isolated). The goal was to create a tactile-sonic representation that feels seamless—to be able to touch the model without any additional barriers—which was afforded by the use of invisible buttons.

The haptic tactile model was made in 3D, inspired by pop-up cards/books (Figure 40). It was an attempt to employ a strategy that is more literal; as explained earlier in Figure 35, the natural materials iconically correspond to the remote location that is an iconic representation of the the original painting, thus the natural materials iconically correspond to the visual properties in the painting. Initially, this model was made on a flat surface, as can be seen in Figure 41, while still tactile, David explained to the group in the Proto-Reveal that he

could not perceive the spatial relations when the representation is flat (more two-dimensional). Therefore, the final iteration of this model aimed to be more 3-dimentional (Figure 40).

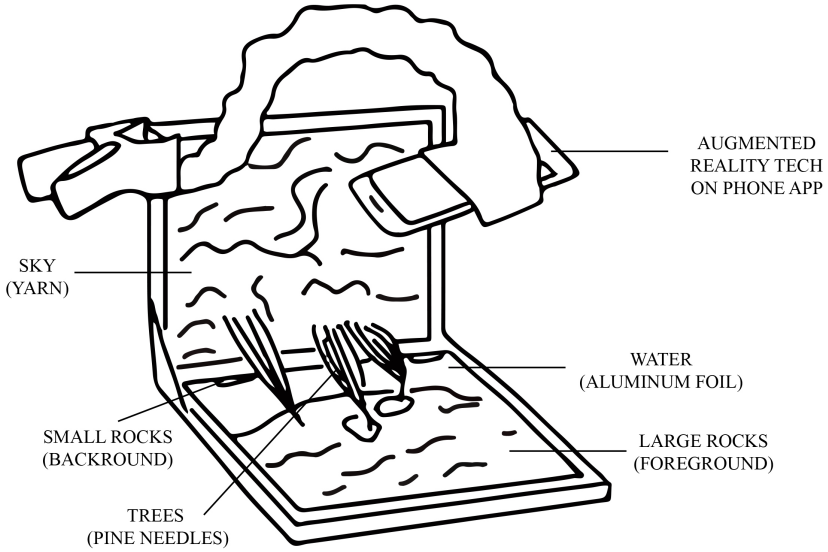


Figure 40: Illustration of the Haptic Tactile-Sonic Model

Figure 41: Tactile Model in the Proto-Reveal

The shapes of the pine needles do not correspond to the shapes of the trees, but the textures and relations are maintained in the model. Pine needles are used as a label that refers to the category of a particular type of tree. It appears that as with the sound in the Umbrella translation/ interpretation that has a symbolic level (earcone, referring to the category of wet/rain), here the shape of the trees also refer to the category, where iconicity is used to understand the label of pine trees. In other words, the pine needles can be viewed as a tactile version of an earcone. The relations amongst the pine needles seem to be iconic, and the textures and colours are iconic representations of tree leaves. While the attempt was to be literal/iconic, some elements are a combination of iconic-symbolic representations.

The shapes, relations, and attributes a of the rocks also attempted to iconically correspond to the original painting; for example, rocks were placed accordingly to how the rocks split into three main "chunks" and one little rock on the bottom left (as interpreted by the students). The attributes of the rocks iconically correspond to the colours and textures of the 'real' objects in the remote location and in the painting. Interestingly, according to the student who collected these materials, the texture and colours of the rock is characteristic to that particular region (Georgian Bay).

Function:

The tactile and audio cues are controlled by the visitor's motion of hands; visitors and stakeholders were observed moving their hands on the model (Figure 42) and listening to the audio with headphones, at times with their eyes closed.

Figure 42: A Visitor Engaged with the Haptic Tactile-Sonic Model, Big-Reveal
(Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

When touching the big rocks, one would hear the sounds of footsteps on those specific rocks in that scene of the painting; given that the cliff is situated above the water one could also hear waves in the distance. If one moves their hands closer to the edge of the rocks/cliff, the sound of waves gets louder, and you can hear the waves hitting the rock. Then if one is to touch the model further down, where the actual water is further from the shore, you hear the wind. As the hands progress further away on the water, the sound of wind gets louder (instead of waves). In other words, the spatial relations are not only conveyed through tactile cues, but also through sonic cues.

Impact on Visitors and Community Members:

David provided feedback on how to improve the proto-translation/interpretation during the Proto-Reveal, for example by suggesting to make it more 3-dimentional. Though he did not get to interact with the final translation/interpretation, he shared during an interview that he was very impressed, even with the proto-model. It afforded access to information of what is being visually painted in the original artwork. He understood what each element represented (for instance, pine needles to represent trees, aluminum foil to represent water etc.), and had a better sense of what is being painted—that it is a landscape painting. Unfortunately, it is unclear whether the technique used to make the model more 3-dimentional afforded better access to the spatial relations that can be visually perceived in the painting.

Other audience members that interacted with this artifact claimed in interviews that it affords an enhanced connection with the original artwork; one visitor explained, “It really puts you in the shoes of what the artist might have experienced when they made the painting, it takes it to the next level, you get to be where they were." Visitors also spoke of how much more interactive and engaging their experiences were.

Object 2: Crochet Model

Form, Space, and Other Properties:

This model was made of yarn and fabric using two techniques: crochet to translate/interpret the trees and rocks (where most of the student’s effort was spent) and knitting to translate/interpret the sky and sea. The student also added cotton balls underneath the land/rocks to elevate the fabric, and make the model more 3-dimentional (and less flat). The water is represented with a multi-colour thread and lace, to add texture, as a correspondence to the waves in the sea. To create the sky, she used fluffy yarn and had crochet in the background in the same colours as the rocks, as a correspondence to what is visually perceived in the original painting.

The trees were created through an iterative process, trying to achieve an accurate shape and texture. Suggested by one of the instructors, one of the trees is removable to allow visitors to feel the shape and texture independently of the model as well (it can be attached or unattached with the use of Velcro).

While the model attempted to translate/interprete the painting using a literal strategy, the student who made this does not think the end result is truly literal. She sees similarities, but the shapes, relations, and attributes are not necessarily the most accurate. It appears the relations do iconically correspond to the original painting. In addition, the textures of the trees also iconically correspond to textures of leaves. To create other textures she used yarns that had different textures; for example, the trunks of the trees were made with yarn that has a rougher texture (suggested by the teachers of the course). During the Proto-Reveal, David was able to identify one of the trees, however, the other two trees were identified as flowers. Therefore, for the Big-Reveal, the student recreated these two trees in a way that corresponds to the shapes and textures more accurately. Furthermore, in terms of attributes, the colours used in the model iconically correspond to the colours in the original painting (which can be perceived visually).

Function:

Visitors and stakeholders were observed moving their hands along the crochet tactile model, and feeling the tree that is removable separately from the rest of the model. According to the student who created this model, the haptic tactile-sonic model supported and enhanced the understanding of the crochet model.

Impact on Visitors and Community Members:

David did not find this model very impactful, as it was hard for him to understand the painting through this model. The sensation/feel of the yarn did not help him indicate what is painted, or enhanced his understanding. However, this model did offer a different tactile experience for visitors, with the textures of the trees being the most effective outcome. In addition, a museum visitor even felt inspired by this model.

Object 3: Video on iPad

Form, Space, and Other Properties:

As seen in Figures 39 and 43, this was an experience offered with the use of an iPad. It is an interactive activity requiring a visitor to rotate around while holding an iPad, looking and/or listening to a video that was created at the remote location in Georgian Bay (Figure 39). It provides a visual and sonic experience that iconically corresponds to the original painting, since the remote location is an iconic representation of the painting (Figure 35). The idea here is to create a 360-degree visual and sonic experience (requiring the user to turn around). In addition, a small fan device is attached to the tablet to create a sensation that emulates wind blowing on one's face; this can be viewed as a tactile sensation.

Function:

Audience members and stakeholders were viewed turning around while interacting with this object/experience/activity. Visual, auditory, and tactile cues represented what one may experience in the remote location, which resembles the location in original painting. The visual and auditory stimuli presented by the tablet becomes circular due to spinning around (as depicted in Figure 39, B and C).

Figure 43: Group of Seven Translation/Interpretation – Video on iPad, Big-Reveal
(Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

Impact on Visitors and Community Members:

The visual and auditory cues are conveyed through the video, affording visitors to experience more stimuli than by simply looking at a painting on a wall. It is another way for the audience to engage with the original painting. A visitor shared, "I like it so much because I felt the art, the place, the wind;" while this visitor spoke about her overall experience with the translation/interpretation (including all other objects), it seems the video with the fan had an impact on her.

Object 4: Vials of Scents

Form, Space, and Other Properties:

The vials of scents were made of chopped natural materials including moss, pine, rock, and tree-bark. The chopping was done in an attempt to enhance the scents of what one would smell in the remote location in Georgian Bay. Given that the scents are made with the natural materials, this follows the same path of analysis, where these can be viewed as an iconic correspondence to the original painting. Furthermore, for instance, the scent of pine might engender the understanding that a pine tree is painted to a blind visitor, affording the communication of its iconic properties. However, as with the scent jars in the Walker Court translation/ interpretation, visitors might also recall memories that are akin to the remote location, which makes is constructivist (symbolic).

Function:

Audience members and stakeholders were viewed smelling the vials of scents during the Proto-Reveal and the Big-Reveal, in addition to experiencing the other objects of this group's translation/interpretation.

Impact on Visitors and Community Members:

Visitors reported their experience to be multi-layered due to addressing a wide range of their senses, including the often forgotten sense of smell. One visitor spoke about her overall experience with the Group of Seven's translation saying:

> It builds context, it gives more meaning to the pieces than what you might have just based on the visual experience. I can look at a painting and think it's beautiful, but to experience *ALL* the other senses with it, just gives it… more layers, it's a more multilayered experience. (2018)

Other visitors also regarded their experience as a 'whole experience' after interacting with the various artifacts.

6.4.4. Key Findings

The group attempted to translate/interpret a landscape painting by the Group of Seven using multiple objects, addressing multiple senses. The strategy employed was mostly literal, but also constructivist in terms of the translation/interpretation (Table 4). Many of the perceptual cues iconically correspond to the original painting (due to the remote location being a representation of the painting). Overall, this translation/interpretation seemed

to engendered access by making a blind stakeholder understand a visual painting he never had access to before.

Furthermore, the strategy employed by the students has a dominant constructivist element, as the students themselves built meaningful connections with the artwork through their chosen routes of explorations and design processes (discussed in 6.4.2). This element is more akin to the constructivist approach (not included in Table 4).

	CASE	HAPTIC MODEL	CROCHET MODEL	VIDEO ON IPAD	SCENT VIALS
RELATIONS	Symbolic	Iconic	Iconic	Iconic	None
SHAPES	Symbolic	Iconic; Symbolic	Iconic	Iconic	None
ATTRIBUTES	Symbolic	Iconic; (trees: just leaves)	Iconic; (trees: just leaves)	Iconic	Iconic; Symbolic

Table 4: The Group of Seven Translation/Interpretation Analysis

Similarly, visitors spoke about transforming outside of the museum walls, to where potentially the artist painted the original artwork, allowing them to build meaningful connections with the artwork and/or artist as well. A visitor shared, “I think it’s more of an emotional experience. Being able to hear, and

then look at the picture, it's definitely... what the artist was experiencing while painting." Visitors concluded that such a museum experience offered them an experience that is more 'whole', a visitor shared:

> People trying to experience it as a whole, try to capture the artist's thought processes—what they [might have] experienced with [creating] this piece. It helps you connect with the piece more. That can be beneficial for not just someone who is limited with their senses, but also for everyone by trying to stimulate all the senses, which we all experience. (2018)

This translation/interpretation had a significant impact on one of the community members—David seemed truly moved and impressed by this project and shared how he did not expect to be as affected by it as he was. He also added that up until then, he had never seen such an effort to make a painting accessible with the use of natural materials "from the scene".

In addition, this translation/interpretation included a call for participation by the community (through a participatory activity). The participatory activity, which was posted on social media in various groups prior to the Big-Reveal event, even brought visitors who rarely go to museums. Their shared interest in camping attracted them and got them involved and excited. One of the students shared in an interview, "it's a way of reaching out to the community and demonstrating what inclusive design is, and creating that awareness." Though we did not analyze the activity itself in this investigation, we view it as an area to explore in future work since we believe this model of co-

creating a translation/interpretation with the community is highly important (truly implementing Freire's (1970) dialogical theory of action).

6.5. The Moose Story

6.5.1. The Original Artwork—The Moose Story, William Kurelek, 1976

Figure 44: The Moose Story, William Kurelek, 1976, Mixed Media on Hardboard, Art Gallery of Ontario

This group focused on translating/interpreting a visual painting by William Kurelek of a small-town winter scene (possibly in Quebec), where a moose and a moose calf are in the centre of a town-street, surrounded by a large crowd of people. The painting represents the perspective of a spectator. In order to describe the painting, we will define the features from the background to the

foreground, from left to right at each level. The breakdown of the painting is illustrated in figure 45.

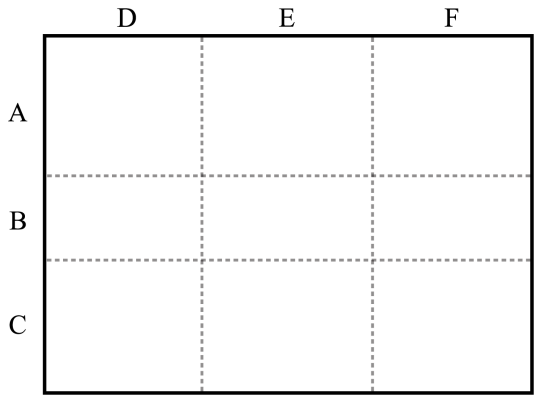


Figure 45: Breakdown of the Painting The Moose Story

Background (Figure 45, Row A)

In the background are houses and low-rise structures; on the left (Row A, Column D) is a large three story wooden white house, slightly behind it and to the right is another house with the word Irving on a sign (Row A, Columns D and E). As you progress to the right, around the centre of the painting (Row A, Column E), you can see houses in the distance in turquoise, a light tint of pink-burgundy, and red, a large naked tree (smaller trees are in between the houses), and crowd in the distance with a police car and officer right in front of the crowd in the centre along the midground (Row A, Column E, along Row B). It is hard to tell the details of the crowd that is in the distance, the figures are very small, yet the clothes are colourful; the police car and officer are painted in what appears to be dark green and yellow, with the police car blocking the crowd's way to the

mouse that is in the midground (Row B); the policeman is facing the moose (as well as the spectator/perspective of the painting). On the very right (Row A, ColumnF) is a large low-rise structure in red that is situated on a small cliff, elements in the painting suggest this is a school.

Midground (Figure 45, Row B)

In the midground, there are more details about the crowd; people are dressed in warm colourful winter clothes, standing in a row (diagonally along the painting, from left almost to the centre of the painting, Row B Column D towards Row A Column E). The people are standing in front of snow that was plowed to the side of the road, observing the moose. In the centre of the midground of the painting are the two moose figures (Row B, Column E); the moose is standing in what appears to be a protective posture, and the calf is very close to the left of the adult moose, almost as if its leaning on it. Their heads face opposite directions, the calf looking to the left, and the adult to the right. To the left of the moose are the paved town road, more snow that was plowed, and more people (edges of Columns E and F). The crowd here is standing more vertically, and therefore it is hard to see their faces. Behind the people is a gate that surrounds a cliff covered with snow and a red low-rise structure (perhaps a school) (Row B, Column F). Figures of two adults and children are scattered over it this area. The two adult figures are dressed in all black (possibly nuns); two children climbed a high pole to get a better view of the moose, another figure of a

child is lying on the snow, possibly to suggest he or she fell, and a couple more children are sitting on the snow facing the moose.

Foreground (Figure 45, Row C)

In the foreground is a crowd with people facing the moose. Here we mostly get to see people's backs (Row C). People are dressed in heavy winter clothes, puffy jackets, hats, gloves etc. On the left, slightly to the centre (Column D) is a figure with a camera held to the face while in the action of taking a photo. To the right (edge of Column E) is a mom with a baby and a child. In the centre of the painting (Column E, and edges of Columns D and F) is a hood of a bright blue car with a couple of young adults sitting on it, one of them is laughing, and seems to be enjoying the event. Moving to the right (Column F) is a young child that seems to be teasing or trying to play with the moose figures; next to the child is another adult with a camera taking a photo. At the very front of the foreground, close to the right corner of the painting (Column F), is a man wearing a white jacket with the words "Norte Dame des Monts (a municipality in Quebec) on its back in black large type. Next to him at the very right corner (Column F) are two female figures that seem to be engaged in conversation.

6.5.2. Translation/Interpretation Analysis

Form, Space, and Other Properties:

This group created a soundscape of the painting that is about a minute long, aiming to sonically represent the painting through storytelling using

illustrative sounds (from online bank sounds). There is important context to note here: both students who created this translation/interpretation have a professional background in film. Therefore, their final translation/interpretation uses a strategy that follows a classic plot structure, as illustrated in Figure 46.

Initially, the students were considering translating the painting with an interactive binaural audio (a method of recording sound that uses two microphones, arranged with the intent to create a 3D stereo sound). However, due to time constraints, and wanting to achieve a high-level outcome that is portable and easy to use on the multisensory tours, as well as non-intrusive to the gallery, they decided to go with storytelling through sound. (One of the students added during an interview that students in the class could have used a better explanation of what tools are available to education officers on the multisensory tours). This strategy affords an optimized sequential audio—a story with an exposition, rising action, climax, falling action, and resolution.

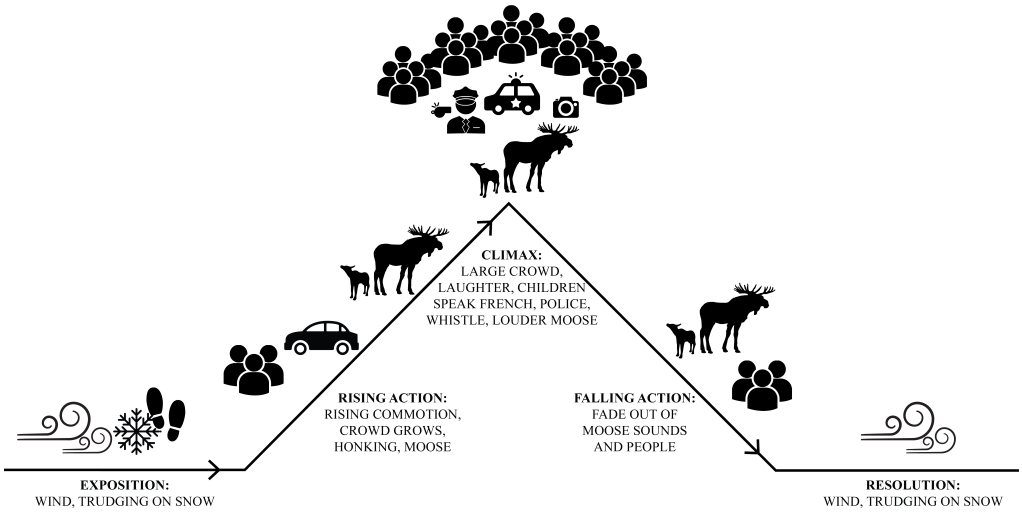


Figure 46: The Moose Story Plot Structure

As illustrated in Figure 46, the audio starts with what may sound like a peaceful day on a town-street in the winter, sound of wind blowing, and trudging on snow (Exposition). Then, voices of people are introduced, honking, and the accumulation of people to illustrate a commotion—the volume gets louder in order to convey this information; the sound of the moose can be heard in the scene, which sounds similar to a cow (Rising Action). Then sounds of a large crowd can be heard (volume is higher), people are laughing, children speak in French, pictures are taken (sound of camera shutters), and then a siren of a police car enters the scene followed by a whistle (Climax). As a result, the adult moose makes a louder sound, and then its sounds start to fade out, suggesting the moose are leaving the scene (Falling Action). The sounds that represent the people also fade out, as the event has come to an end. Finally, the audio ends with wind blowing, representing a calm winter day where peacefulness is restored, the moose are gone, and the commotion is over (Resolution).

The experience could be heard with the use of headphones and a device to play the sound (Figure 47); during the Big Reveal event it was connected to a tablet (Figure 48).

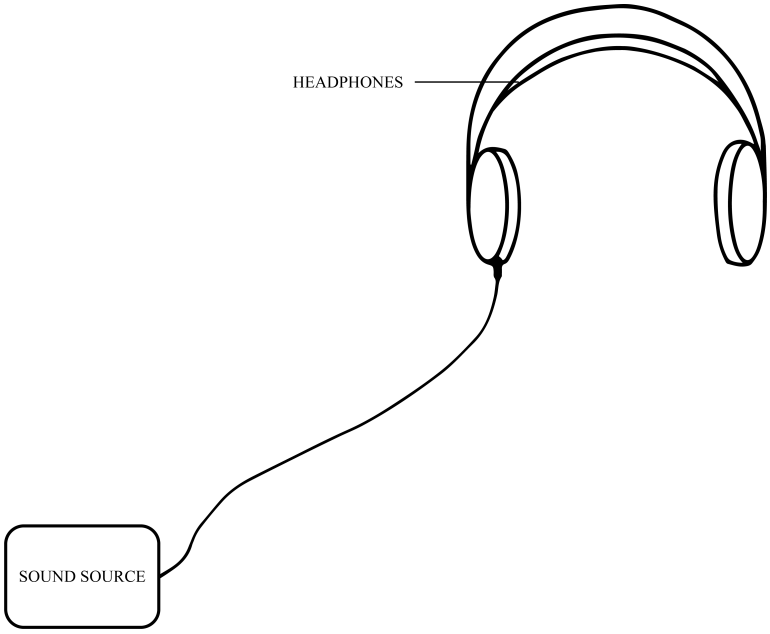


Figure 47: Illustration of The Moose Story Translation/Interpretation

In an interview, one of the students shared that they would have liked to make the sonic representation binaural too, if they had more time and access to different technology. During the Proto-Reveal Natasha suggested altering the sound in a way that would convey the event is taking place on a cold winter day, as that can be visually perceived in the painting, but was not communicated sonically in that proto-iteration. According to Natasha, sonic cues, including voices and breath, sound differently when it is cold. As a result, the students added the footsteps/trudging on the snow and wind blowing, and altered people's voices to some degree, to help the audience perceive the coldness through sound. Natasha explained, "It was cool that the [students used] a narrative, but in order for it be effective the audio needs to be on point." Thus,

the audio has to convey what can be visually perceived as precisely as possible, including that it is a cold winter day otherwise this information is lost. According to the students, Natasha's feedback was very useful, as they had not considered that element before.

All properties of this translation/interpretation are being conveyed through sound. It appears these representations are earcones that tell a story (Jeon, 2015), as these are sounds of labels referring to a category of, for instance, "cold" or "moose". While the relations amongst objects do not seem to be conveyed through the audio, we know from interviews that the groups intentions were to translate the painting from left to right; they wanted to iconically correspond to the spatial relations, however, their implementation took the form of a sequential storytelling instead. As a result, the relations are conveyed through the volume of the sound, and the mapping of all spatial properties is transitioning from a rectangular painting into a linear sequence (the linear sequence is illustrated in Figure 46). This type of linear sequence packages information that is presented to audiences in a non-interactive way. In other words, the plot structure of the audio symbolically correspond to the spatial relations in the painting. While the earcones (that tell the story) symbolically correspond to the shapes and attributes in the painting, where the understanding is made through convention of the label and the category it refers to (for instance, the sound of a camera shutter to represent a camera device).

Function:

As seen in Figure 48, visitors and stakeholders were viewed listening to the sonic translation/interpretation, while also looking at the original artwork (sighted individuals) during Big-Reveal. Community members were seen listening to the experience during the Proto-Reveal two weeks prior to the Big-Reveal. The students who created this work introduced the painting first, then would offer the visitors/stakeholders to experience the auditory experience they had created. According to the students, they did not attempt to lead them in any way, or tell them it was a narrative prior to their experience because they wanted them to experience it themselves. They believe their strategy of storytelling with the use of earcones was quickly understood and did not require further explanation.

Figure 48: Visitors Engaged with the Moose Story
(Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

Impact on Visitors and Community Members:

According to the students in the group, visitors at the Big-Reveal gave them positive feedback. Interestingly, a couple visitors said the audio experience changed their perspective on the painting—they had a different interpretation of the depicted scenario in the original artwork—which the group found a little concerning because their intention was to create a translation that is less intrusive/interpretive and more literal. However, given the design decision to create an experience with earcones that tell a story, the strategy employed was more symbolic/constructivist. In other words, the outcome ended up being more interpretive than they had initially planned for and/or hoped.

Some visitors said they felt concerned or sorry for the moose. One of the students shared based on the feedback they received from visitors:

> It was interesting, because while the intention of it was [to increase access] for people who are visually impaired, people who don't have any visual impairments said it added to their overall experience; [visitors said] it was a fun different way to experience a painting, and it made it more multi-modal and more engaging because of that. (2018)

In addition, during an interview a sighted visitor shared, "it just really tells a story, so taking it from the perspective of someone who could potentially be visually impaired, I felt like there was still that aspect of being able to enjoy the artwork." This may suggest the strategy of storytelling with earcones worked well or effectively; the audience reacted positively, while also raised their awareness of inclusion in museums.

6.5.3. Key Findings

The group initially attempted to create a literal translation/interpretation through a sonic binaural experience, however, they changed their approach and created a sonic experience using earcones that tell a story inspired by the original painting, as the students interpreted it. In other words, while the intention was to create an iconic representation of the painting, the outcome ended up being more constructivist (as seen in Table 5). According to audience members this strategy was effective. The students' goal was "to allow people who [cannot] see the painting to engage with the culture;" initially they thought a more literal approach would achieve that, however, according to Natasha (who does have vision, but is visually impaired) the translation/interpretation is effective, though some of the earcones had to be refined or added to convey certain information that was lost in the proto-iteration (e.g. the cold temperature).

	AUDIO STRUCTURE	AUDIO SOUNDS
RELATIONS	Symbolic (sound volume)	None
SHAPES	None	Symbolic (earcones)
ATTRIBUTES	None	Symbolic (earcones)

Table 5: The Moose Story Translation/Interpretation Analysis

6.6. Reminiscence of Youth

6.6.1. The Original Artwork—Reminiscence of Youth, William Kurelek, 1968

Figure 49: Reminiscence of Youth, William Kurelek, 1968, Art Gallery of Ontario

Reminiscences of Youth is a unique self-portrait; in this painting Kurelek paints himself engaged in the act of reminiscence. He is looking at a representation of a painting on a bedroom wall that illustrates a childhood scene from the 1940's. In other words, there is a painting/scene within the painting itself. We will refer to these as "inner scene" and "outer scene". The breakdown of the painting is illustrated in figure 50. We will define the features in the outer scene from left to right (the left diagram of Figure 50, where the outer scene is highlighted in white). For the inner scene, which is the central image in the artwork, we will define the features from the background to the foreground, left

to right at each level (the right diagram of Figure 50, where the inner scene is highlighted in white).

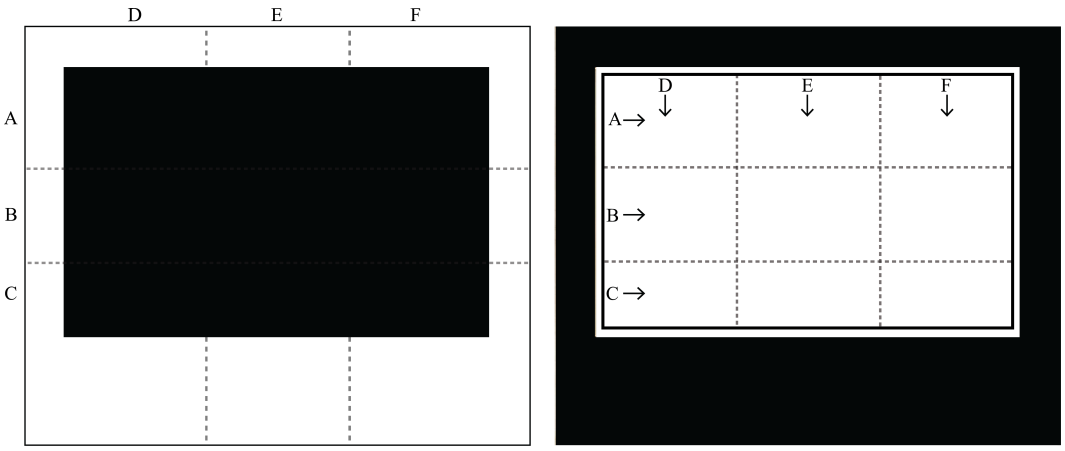


Figure 50: Breakdown of the Painting Reminiscences of Youth

Outer Scene (Figure 50, Left Diagram):

This part of the painting is painted directly on the wooden frame and is likely to be depicting a scene from Kurelek's bedroom in Winnipeg, where he lived while attending high school and university in the city. The scene has a dim lonely setting, yet hopeful. On the left along the edge of the painting (Rows A, B and C, Column D) are: a door to the bedroom, the edge of a picture of Christ is revealed on the wall, and a suitcase against that same wall. A sliver of brightness emanating from under a door suggests enlightenment. Next to it, to the left, the artist appears as he did in his formative years, a young man lying on a bed (Row C, Columns D, E and the edge of F). Moving to the left is a record player, a student's desk with a chair, and vinyl records on the desk and on the floor of the

bedroom (Row C, Column F). There are additional elements on the desk including an open book, music sheets, glass bottle etc. On this desk is the presence of the hastily scrawled words of the Ukrainian folk song "*There Stands a High Mountain*," written by the nineteenth-century Romantic lyric poet Leonid Hlibov. The words and music, which we imagine Kurelek listening to through his record player, highlight the painting's bittersweet tone: *"Spring time will return anew / This it is that brings sadness and pain / For youth will never come back / It will not ever return again.*" On the right edge is a window with a blind almost completely shut, and through a tatted window blind brightness appears again, also to suggest enlightenment (Rows A, B, and the edge of C, Column F).

Inner Scene (Figure 50, Right Diagram):

Background (Row A):

In the background is a large flat field of snow, all the way from left to right (Columns D, E, and F). The upper third of the painting (Row A) represents a blue clear sky painted in light blue, with a very small airplane that looks like a dot in the sky on the left (column D). The view of the centre of the sky is blocked by a high snow-covered pile of hay that is in the midground of the painting (Row B, Column E). Towards the right in the background there is a very small figure in the distance, and on the very right along the horizon is a church and a house in the distance (Row A, Column F).

Midground (Row B):

In the midground are figures of children playing by, and on, a snow-covered pile of hay. The children are scattered all around the pile, sliding on it, having fun, yet hints of children's cruelty are also depicted. On the left there seems to be a small group of children who are building a structure from snow, hiding and pointing towards the pile (Column D). The snow-covered pile is in the centre of the image (Column E), while at its very top (nearly reaching the height of the image, going over Row A) are a group of kids holding onto each other, and several others on their way up or down (perhaps even pushed down, as hinted by the painting). Moving to the right are exposed hay and more children playing (Column F); it appears a child may be forcing another child to eat straw while play-acting master and horse.

Foreground (Row C):

In the foreground, close to the left is a group of children of various ages, standing tightly close to each other, though you can only see half of their bodies, or just the face in the case of the youngest child (Column D). They are all facing the spectator/audience, waving at them, and smiling. They are dressed in warm winter clothes that are colourful and bright, in contrast to the white snow that is surrounds them. On the right foreground of the painting (Column F) are a couple children facing the opposite direction leaning on a snowball nearly their size,

and playing with it. They are dressed in warm colourful winter clothes as well that stand out against the white snow.

6.6.2. Translation/Interpretation Analysis

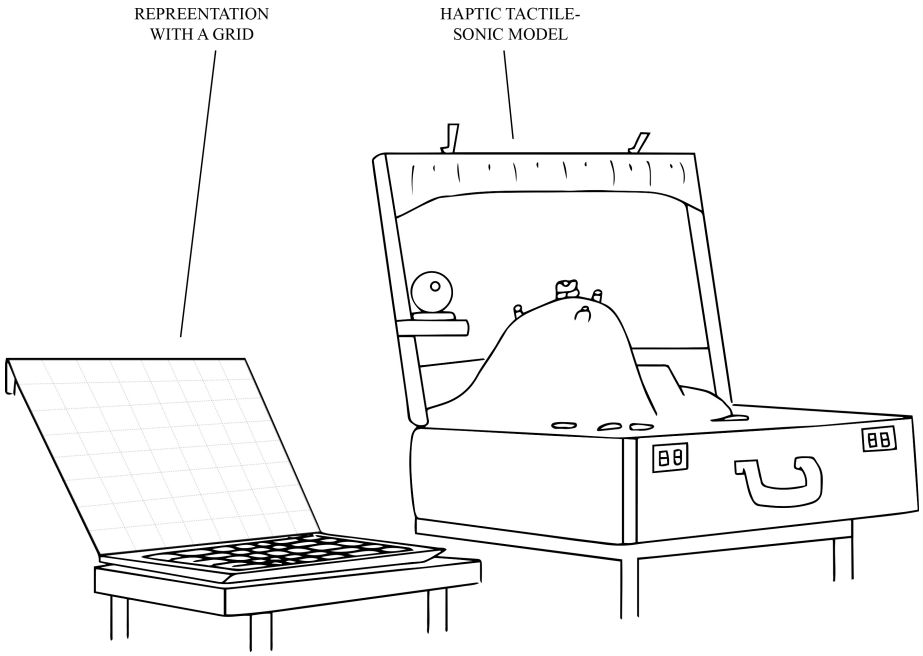


Figure 51: Illustration of the Reminiscence of Youth Translation/Interpretation

This group attempted to create a cross-modal translation/ interpretation of the original painting, conveying the information through touch, sound, and vision. As can be seen in Figure 51, the translation/ interpretation is made inside a suitcase from the time period of the painting, where the inner scene is represented with a 3D haptic tactile-sonic model. Next to it, on a laptop screen, is another representation, which was made in order to explain the painting and its features to one of the students in the group who is blind. The screen

representation has the painting broken down with a grid overlay; each square has a word description of the element that is painted in that location, and could be heard verbally upon touch (text to speech).

Form, Space, and Other Properties:

Haptic Tactile-Sonic Model (Inside the Suitcase):

Inside the suitcase the children and snow-covered pile are made tactilely in a way that iconically corresponds to the shapes in the original painting (Figure 52). However, the children were made from paper, which was not as effective as the snow-covered pile that was truly 3D and more robust (as can be seen in Figures 54). These tactile elements also iconically correspond to the relations amongst objects that can be visually perceived in the original painting. The group attempted to produce an iconic representation of the texture of the snow, as well as create a cold sensation that is felt through touch; however, they were not able to create the cold sensation for their final prototype due to time constraints and technical problems. While textures, namely of the figures, seem to be omitted, the colours in the original painting were iconically conveyed through the translation/interpretation.

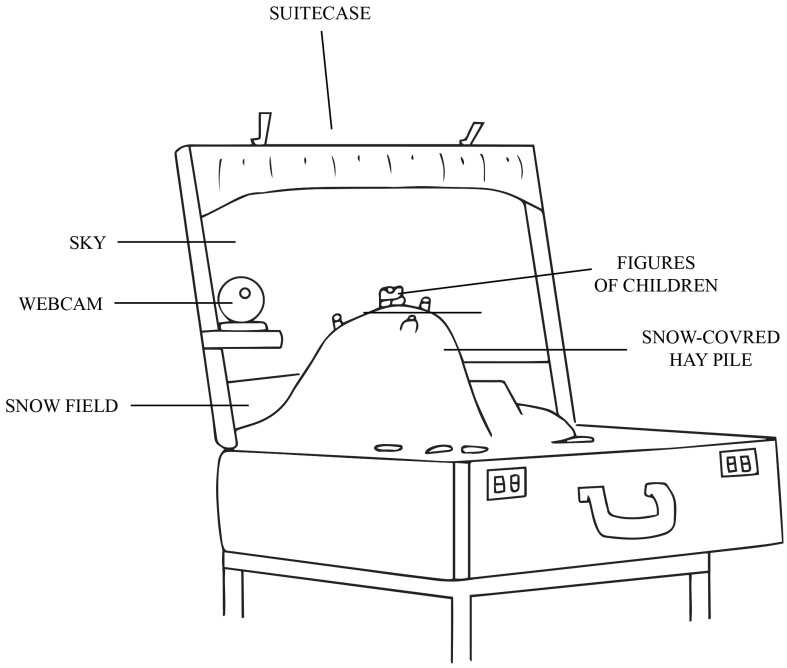


Figure 52: Illustration of the Haptic Tactile-Sonic Model
(Reminiscence of Youth Translation/Interpretation)

The soundscape worked with proximity sensors—based on visitors' distance from the translation/interpretation different sound cues play: when visitors are further away, the Ukrainian folks song plays louder (outer scene) while the sounds that correspond to the inner scene are nearly imperceptible (Figure 53, A, outer scene highlighted in white). As the visitor approaches the translation/interpretation, the inner scene sounds would get louder and the Ukrainian song would get lower. Then, up close, the Ukrainian song is very quiet and the sounds of the inner scene are loud and dominant (Figure 53, B, inner scene highlighted in white).

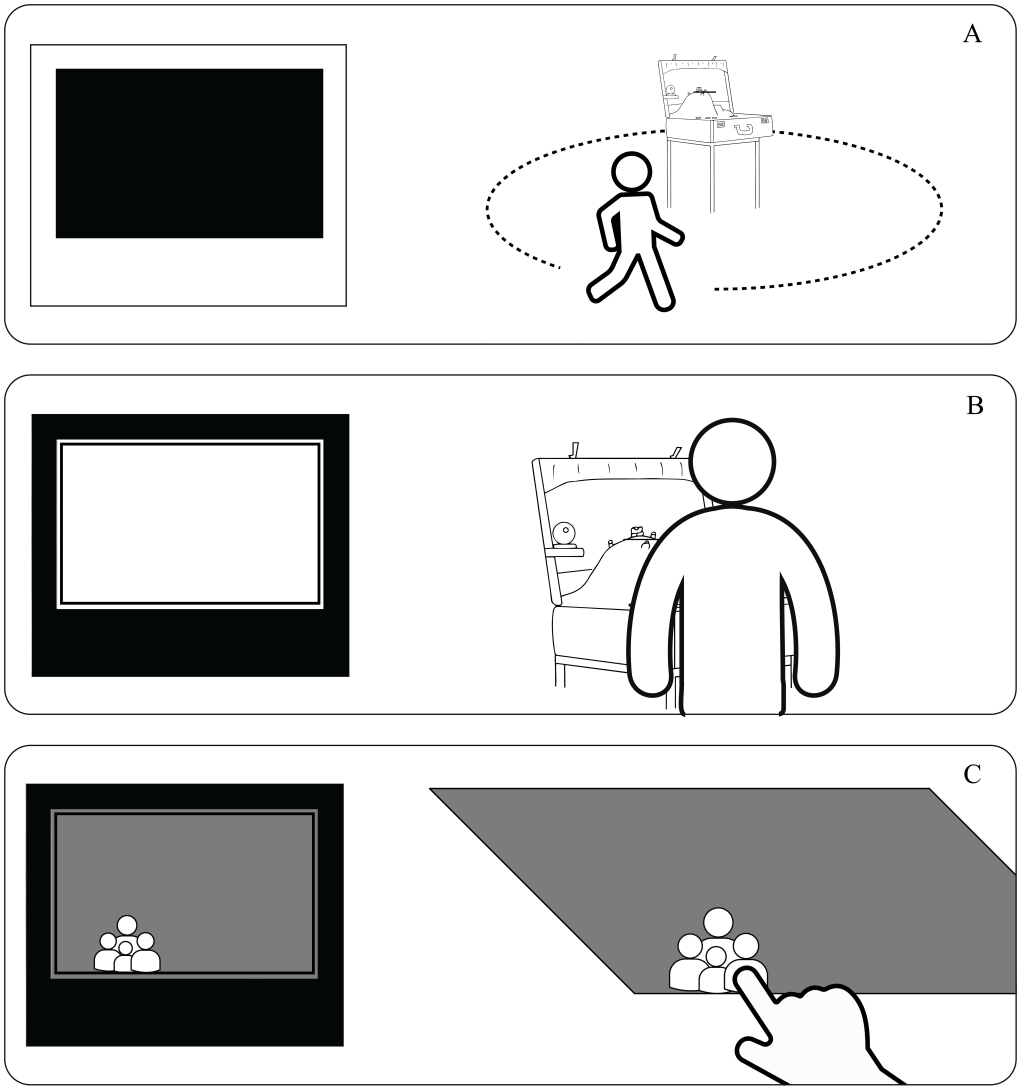


Figure 53: Breakdown of the Sound in the Translation/Interpretation

The soundscape created for the inner scene is intricate. It is about a minute and a half long, and plays on a loop, where spatial audio was used intensely by the blind student, attempting to iconically correspond to the spatial relations that are in the original painting. In addition, with the use of sensors/buttons placed underneath the tactile representations, the auditory

cues change based on the tactile feedback. In other words, when a visitor touches one of these sensors/buttons, the soundscape that is on a loop lowers, and the sound played is a particular illustrative sound that corresponds to that specific element in that specific location (Figure 53, C, specific element in painting highlighted in white). For example, there are sounds of children sliding, wrestling, and a sonic representation of children playing master and horse ('giddy-up!') etc. These sounds could be analyzed as having symbolic properties, as they correspond to a label that refers to a category, such as the 'giddy-up' sound to illustrate children act-playing master and horse. While the sounds are symbolicly representing the element, it appears the spatial relations of the sounds (and tactile elements) iconically correspond to those that are in the original painting.

Function:

Visitors and stakeholders were observed interacting with the translation/interpretation during the Big-Reveal event at the AGO (as seen in Figure 54). Since the students in the group were managing putting together this model when each student is located in different parts of the world, this model (mainly the tactile component) was only ready for the final event. However, the ability of students to participate remotely from around the world afforded diversity of perspectives in the class (it also allowed a blind student, who currently resides in the Netherlands, to participate and highly contribute to the

class). Visitors were viewed interacting with the model, some even closed their eyes in the process. The sound could not be heard properly according to visitors and stakeholders—the group, specifically the student who worked on the sound, learned that for this prototype to work properly, they would need to have noise-cancelling headphones, if you want to properly experience the soundscape.

Figure 54: Visitors and Stakeholders with the Reminiscence of Youth Translation/Interpretation (Photo: Jennifer Rowsom © 2018 Art Gallery of Ontario)

Natasha and David were not able to interact with this artifact, as it was not available during the Proto-Reveal, and their time during that session was limited. However, since one of the students working on this translation/interpretation is part of the blind community, this group incorporated his own insights into their work.

Impact on Visitors and Community Members:

A visitor shared during an interview, "I closed my eyes and tried to go into the situation from the [perspective of a] blind person… [As a sighted person] it's a different experience because you can touch it. It's also different because people who cannot see are included." This visitor spoke about how this experience raised her awareness about inclusive practices in museums; in fact, she was surprised by it, as she never thought it is possible for people with vision impairments to go to museums because visitors are never allowed to touch anything in museums.

The Grid Strategy

Form, Space, and Other Properties:

As illustrated in Figure 55, this representation was presented with the help of a laptop, that had a paper overlay with the original painting printed on it. This strategy employed a combination of iconicity and symbolicity: iconic properties of the spatial relations are conveyed through the grid, yet the word is a category that corresponds to symbolic properties. In other words, the group attempted to create representation of iconic relations amongst symbolized objects. The shapes, as well as attributes, are omitted in this strategy. However, with the help of this translation/interpretation, the student who is blind in the group was able to understand the composition and the elements that are in the painting, and to develop the soundscape.

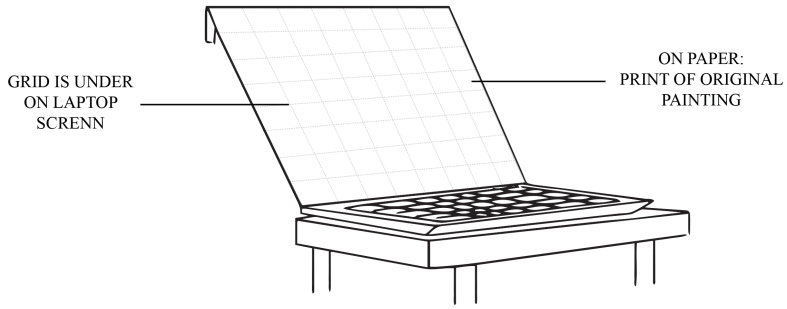


Figure 55: Illustration of the Reminiscence of Youth Translation/Interpretation (The Grid Strategy)

Function:

During the Proto-Reveal David had the opportunity to interact with this translation/interpretation. The group noticed that the screen of the laptop was not pleasant to touch, as it is cold and not welcoming to explore through touch. This encouraged the group to create the paper overlay in order to facilitate a better touching experience. When touching the screen with the paper, based on the location on the grid, one can hear a word description that represents what can be visually perceived in the original painting (in that specific location). For instance, when you touch the snow, one can hear the word "snow" (text to speech).

Impact on Visitors and Community Members:

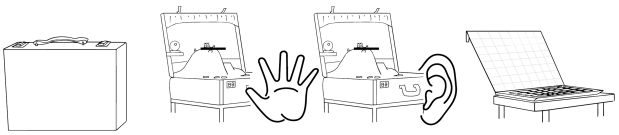
David shared during an interview that this representation, in his opinion, does not belong in a gallery/museum, as something like this could easily be available online. He shared:

> Suppose I were in a discussion about art history and I wanted to understand a painting. If I could [use a representation] like that and touch the different sections, and maybe get a sense of where

things are, and what the picture is of… it's like any time you suggest information that is not interactive, it's like reading about a painting. (2018)

6.6.3. Key Findings

Overall this group employed a combination of the strategies, with an attempt to be more literal-iconic and (Table 6).



	CASE	HAPTIC MODEL	HAPTIC MODEL	GRID ON LAPTOP
RELATIONS	Symbolic	Iconic	Iconic	Iconic
SHAPES	Symbolic; Iconic (Outer Scene)	Iconic	Symbolic	Symbolic (Verbal)
ATTRIBUTES	Symbolic; Iconic (Outer Scene)	Iconic; (colours)	Symbolic	Symbolic (Verbal)

Table 6: Reminiscence of Youth Translation/Interpretation Analysis

It appears both objects engendered access, in different ways. While enabling access through various modalities, David believes the representation with the grid is something that belongs online, rather than in the gallery space. The haptic tactile-sonic model engendered access mainly through touch, as the

auditory experience could not be heard well. The figures of children were not completely made 3D (made with paper-cut figures that were elevated), however these still represented the iconic properties of the location (relations) and the contour shapes of the figures. Given that the soundscape was created by someone who belongs to the blind community, the sound could have enhanced the experience had it worked properly, perhaps with noise-cancelling headphone.

According to the students in the group, due to time constraints and geographic challenges, the artifact is more of a prototype, which is not solid enough and requires further work. However, the students found the challenging collaboration to be effective; one of the students explained:

> It was a great challenge to collaborate with people in different cities, countries, and continents, and with very different abilities. We were very fortunate, as we could use the best of every member… We chatted and worked a lot on characteristics of the art piece using a lot of collaboration over Google sheets and Skype. (2018)

The ability to include students from distanced locations proved to be an affordance, as it highly contributed to the diversity in the class.

Furthermore, though the final translation/interpretation was not as solid and robust as they had hoped, it still received positive feedback from audience members in interviews, and raised their awareness of inclusive practices in museums. One of the students found it surprising to see how visitors spent a longer time interacting with their translation/interpretation compared to

original artworks that are on the museum walls. This aligns with our observations and visitors' feedback in interviews about their experiences with the objects/experiences created by the class.

6.7.1 Overall Impact of All Translations/Interpretations - Introduction

While the impact on visitors and community members thus far has been discussed with respects to each translation/interpretation, the following subsection will discuss the overall impact on diverse audiences of all the translations/interpretations, and the wide range of experiences that they offer. This analysis was based on interviews conducted with Natasha and David after the Proto-Reveal, as well as 12 anonymous museum visitors after the Big-Reveal event at the AGO. The data was coded and analyzed on Nvivo and excel spreadsheets to allow us to gather the common themes. We recognize this is a small sample size, which is why further investigation is required to determine the impact of such approaches on a diverse audience. However, this data does shed light on what might be the impact, as the interviewees have different abilities (blind, vision impaired, and hearing impaired, as far as we know), and come from diverse cultural backgrounds.

6.7.2 Overall Impact of All Translations/Interpretations - Findings

Overall the community seemed supportive and excited about the translations/interpretations created by the *Multi-Sensory Studio/Seminar* class.

The analysis reveals 9 out of 14 participants were surprised by it, either by 'all of it' or certain aspects of it. David shared he was surprised by all of it, others were more specific; when asked if they were surprised by anything, one visitor replied with, "Definitely the taste aspect. That's really great (2017)." Another said, "I was surprised by the technology. How manipulating a sound board to determine what I was seeing/touching (2017)." An additional visitor reflected,

> I was surprised by my experience and the strong reaction I had to it because I just wouldn't have expected that. I was not expecting to have as an intensive experience. How much you can actually experience something when you take that element out of it, because you take your vision for granted in some level, because that's typically the way you experience most things, so it was interesting to take a step back and experience something in a different way. You don't necessarily always have the opportunity to do it. (2017)

Almost all interviewees (13 members) brought up the idea of how refreshing / new / different their experiences were: "It was very exciting, stimulating, new, very refreshing and very inspiring. I think it's absolutely excellent if visually impaired can come and experience [art] in a different way (2017)." Another visitor explained why it is different for her:

> It was definitely a different experience. Especially because you're used to walking into an art gallery and it's very visual, and you associate art galleries with visual, so I think it's definitely a different experience or almost a different thought process. This can also be an experience that you can have when you walk into a place of art, and it was a lot more fun. (2017)

Ten individuals spoke about how more interactive and engaging their experiences were. One visitor explained that even if the information she learned

is ‘traditional’ the way it is being conveyed impacts the experience: “Information in terms of art history—I guess that’s a little bit more traditional—but, so interactive! It’s bound to make a person smarter cause it involves the different senses (2017).” David explained why this is important from his perspective as a blind person:

> There's not much in [traditional museum experiences] for me... Like when I read descriptions of a painting, I'm very curious. I feel like it would be interesting to look at, but there's no reason for me to go to gallery. I don't get more out of being there than I would reading a description at home, unless there's something interactive like that. (2018).

He shared that as an adult he does not go to museums; he remembers being dragged to museums by his parents as a child, “they would try to explain what's on the painting, but it didn't make much sense, or it didn't have any concrete impacts (2018).”

As indicated throughout the section, the translations/interpretations created an experience that made people feel more connected to the artwork (and/or the artist), to be exact, 7 individuals mentioned this in interviews. In addition, 6 people described their experience as emotional, a visitor summarized her experience as one that has, “more layers, more emotions, more perspectives, and more inclusive."

Inclusion and/or the awareness of inclusive practices, especially within the context of a museum, was mentioned by other people as well. Our analysis reveals 7 people spoke about this subject, while many others were observed

interacting with these objects/experiences with their eyes closed (as mentioned throughout this section), suggesting they are trying to focus on the tactile/auditory cues and/or approach this from the perspective of someone who does not use sight to access art. A sighted visitor reflected:

> [the experience was] definitely exciting, and even for people with disabilities to have a bridge to that gap, making it more inclusive to people who might have visual impairments, or other ones too… it kind of makes it more accessible to people as a whole. (2017)

Given that the multisensory course was offered through the Inclusive Design Graduate Program, which was indicated by the students as they presented their translations/interpretations and the goals of their projects during the Big Reveal, we believe that even if visitors did not mention this in interviews, the interaction with the students itself raised awareness of inclusive practices amongst most audience members.

Another common theme in interviews was referring to the experience as interesting; 6 individuals to be exact, one of them shared, "I think this is really unique because of I've only ever seen art visually for the most part, so it's an interesting way to sort of go through and touch and feel and hear; I thought it was very interesting (2017)."

5 people spoke about having a better understanding as a result of their multisensory experience, though as indicated earlier in the section, this may also depend on one's mode of perception. For instance, for David the literal-iconic approach enhanced understanding of what is being translated/interpreted:

> My hope is to be able to go to the gallery and come out and talk to someone else who was there and have a conversation about what we saw and be sort of on the same page… The shell was interesting as art, but ... [as a] translation, I didn't understand it. (2018)

It is important to note, however, that when offered on the multisensory tour at the AGO to non-sighted individuals, they get to also touch the sculptures, which David did not have the opportunity to experience. A sighted individual explained from her perspective regarding the Shell:

> We were looking around, and I was taking it for what it was, but once you start adding some sounds to it and a little bit of background information, all of a sudden you're seeing so much more than what I was seeing [before]… you're experiencing the artwork through more sense, it's stimulating more senses, so you're going to receive more from it. (2017)

4 people mentioned being stimulated, with one visitor explaining why he finds this significant:

> I think it's important that people can be stimulated as much as you can, because there's only so much you can do visually. There are so many senses that contribute to the whole [experience]. Looking at this, just knowing that multisensory exhibits could be 'a thing'—I think it can be very fascinating (2017)

A 'whole experience' was another common theme in the interviews, specifically mentioned by 4 people, but suggested by several others.

Finally, while only 3 people specifically referred to their experiences as more 'meaningful', many of the themes above contribute to what can be thought of as adding value/meaning to one's life. As noted by a visitor, "it builds context, it gives more meaning to the pieces than what you might have just based on the visual experience (2017)." Another visitor shared:

> I think you spend more time looking and participating with art, when you have all those other elements to it vs. when you walk into a gallery, you look and move on; this forces you to pause and interact with it in so many different ways. It makes your experience longer, and I think it gives it more meaning personally. (2017)

All of the above testimonies alight with our observations of audience members taking more time to interact with the translations/interpretations, when compared to other visual artworks in the space. All of the themes above also support the notion suggested in the literature review that a multisensory approach to art and exhibit design can create museum experiences that are more educational, memorable, and meaningful for diverse audiences, thus adding value to one's life.

7. RESULTS: STUDENTS' JOURNEYS & IMPACT ON STUDENTS

This section is focused on the students who took the *Multi-Sensory Studio/Seminar* course in the fall of 2017 (and participated in this study). In the previous section, we discussed six of the translations/interpretations they created and their impact on diverse audiences; the purpose of this section is to understand the journeys leading to the creation of these translations/ interpretations—and what might be the impact of those journeys on the students themselves.

Three groups out of the six were purposely chosen for this section, as these examples reflect one journey where the approach was the most "literal"—Walker Court; one where the approach was the most "constructivist"—The Shell; and one where the design ideation and exploration took an unusual path—Group of Seven (using the students' own lived experiences as a material and technique). Each group's journey will have 4 subsections: the first will briefly introduce the reader to the students' professional backgrounds; the second will discuss the students' journey, including quotes by the students in the group to share their insights in their own words; the third will discuss the impact on the students in that specific group—again, including quotes to share their reflections as they described them; and finally, a summary of key findings for each group.

In addition, each group will have a supportive journey map, illustrating the journey of the students throughout a semester-long course (12 weeks). The journey maps in this section are designed in a way that aligns with the structure

of the course; the horizontal line (x-axis) represents time, and the vertical line (y-axis) represents common themes throughout the journeys from our analysis including: interaction with stakeholders (AGO staff / community members with vision impairments), interaction with audience members, feedback from instructors, research, design ideation, design exploration, and design challenge. Along the horizontal lines are 3 events/experiences that are highlighted, as these stood out based on our analysis, including: the initial co-creation, Proto-Reveal, and Big-Reveal. Events/experiences that left an impact on the students, based on the interviews, will be marked graphically. It is important to note that while the students received weekly feedback from the instructors and Melissa Smith, the feedback will only be marked on the journey maps if students spoke about it in interviews. In each group we will refer to the students as Student 1, Student 2, etc., which will also be represented in the maps (according to who said what during the interviews). The students' sequence of appearance has no meaning and it is strictly used for the purposes of maintaining their anonymity.

7.1. Walker Court

7.1.1. Students' Professional Background

Two students worked on the translation/interpretation of Walker Court. Student 1 is a second year Inclusive Design grad student with a background in architecture (in red in Figure 56); Student 2 is a first year Digital Futures grad

student with a background in engineering, while this was his first course in the Inclusive Design Program (in purple in Figure 56).

7.1.2. Journey (Figure 56)

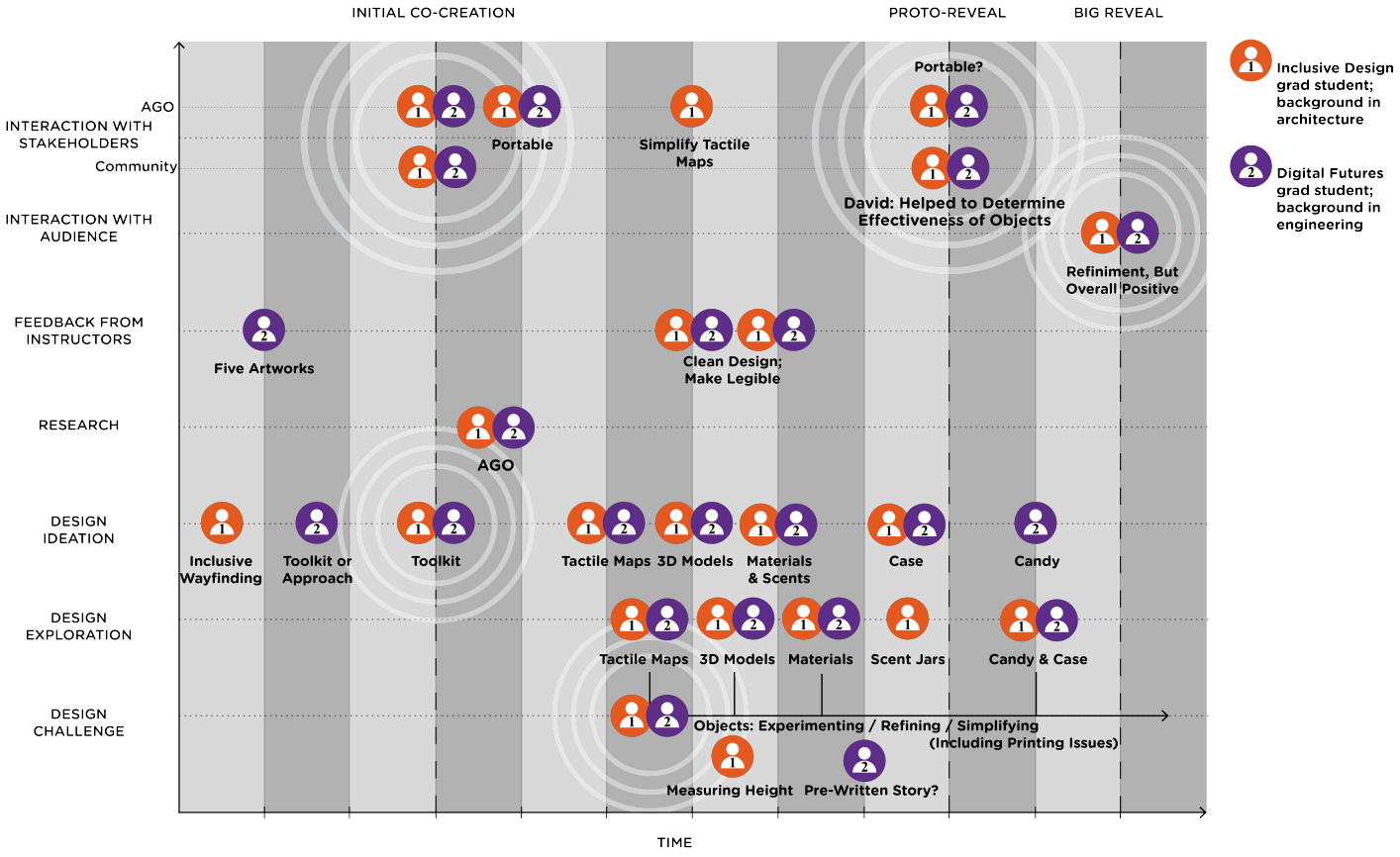


Figure 56: Walker Court Journey Map

As seen in this group's journey map (Figure 56), Student 1 wanted to focus on wayfinding from the very beginning of the course; Student 2 explained the course began with each student picking 5 ideas/artworks, and he was drawn to things that could be generalizable such as a toolkit or an approach, however,

he soon realized that would be too ambitious for the scope of this course, yet picking the gallery itself as their artwork seemed to share many of the themes.

Three weeks into the course the initial co-creation session took place, where two groups came up with similar ideas of toolkits for the educational officers, which continued to inspire both students. Their approach was not to make something for the gallery visitors, but for the educational officers/guide; Student 2 explained:

> We don't want to prescribe what the gallery [officer] is going to do with it, we want to give them some options and they can decide how to tell the story, and change directions on the fly according to the interests of the group. (2018)

In addition, they knew there were some specific challenges with orientation at the AGO, which they wanted to tackle as part of this project.

The two students started working together on their translation/ interpretation soon after the initial co-creation, they researched the history of the AGO, and more specifically gathered information on Walker Court (for instance, they looked into the 2008 renovations). As several students in the class mentioned in interviews, after the initial co-creation session they were reminded by Melissa Smith that the translations/interpretations created by this class must be portable objects/experiences, which prompt this group (as well as other groups) to focus and/or narrow down their design solutions.

These events led this group to start exploring tactile maps; the first iteration needed work, the plans had to be simplified (as they were too detailed),

and made more legible. Next the students explored with 3D printing a tactile model of Walker Court (together with the second iteration of the tactile maps). Initially they rendered the room without the staircase and with the roof, but the teachers and the museum expert (Melissa Smith) suggested to not include the roof and advised them to leave a void for people to touch—feedback that Student 1 indicated as helpful, and something he now understands/agrees with.

Walker Court was translated in scale—the students measured the space and used plans provided by Smith. Getting the height of the room accurately was a challenge according to one of the students; they did not have access to that information, and had to rely on vision and assumptions. In addition, the first model of Walker Court that was 3D printed had no levels or a physical floor (a void was left). Around that same time they also printed the spiral staircase as a separate object. Both students mentioned their design exploration consisted of experimentation, and going with what worked well (sometimes, that also meant what they were able to 3D print without technical difficulties).

Since the tactile maps and the 3D models lacked the translation/ interpretation of attributes in the space, such as textures and colours, the students were questioning how one might magnify the texture of something we perceive with our eyes? Could it be enlarged? Could one make a model of that? Such questions contributed to their following step, which was figuring out a way to convey information regarding attributes such as textures. As a result, Melissa Smith was able to help the students and provide pieces of original materials

from the construction of the space. This collection of materials became part of the group's toolkit. Given the accumulation of objects as part of their translation/interpretation, the students started exploring with creating a case that will hold all these objects together towards the Proto-Reveal session.

The Proto-Reveal took place two weeks prior to the Big-Reveal event at the AGO; it was a key learning experience in the class according to the students. Student 1 mentioned how meaningful and impactful it was for him to interact with members from the community who are blind/vision impaired (mainly Natasha and David). Overall both students found the feedback that day to be positive and helpful. However, Student 2 mentioned that some of the feedback (mainly from AGO staff) required a serious change in direction, for instance play-based learning or making the models interactive, which is why it was not implemented in the final designs. In addition, an AGO education officer (not Melissa Smith) raised the question of portability during this session, which prompt and supported the students to continue experimenting with the case design.

The proto-reveal was very helpful according to Student 2, mostly with determining which objects were the most useful for a blind person (based on David's feedback). Also, as mentioned in the previous section, it helped the group discover what questions remain after interacting with these artifacts, for example, information on the view from certain vantage points/windows of Walker Court was not communicated.

The group incorporated the feedback from the Proto-Reveal into their objects for the Big-Reveal, including the following changes: bigger sizes, some elements less prominent, more polished, and more mechanically robust. They also tried to fix the braille that was not legible, but without success (due to printing issues), and therefore it was omitted in the final artifact. Student 1 mentioned that he wishes braille was included in the final design, and for future iterations, he believes it is important to include it. Overall, they tried to simplify the designs throughout the process, because of technical reasons, as well as to avoid distracting audience members with too much detail.

During the Big-Reveal event at the AGO feedback from stakeholders who had expertise included smoothing certain edges, or highlighting certain edges for refinement of the objects. Student 1 said that for the most part he thought the feedback from stakeholders and visitors that night was very positive. However, Student 2 shared:

> We weren't gallery officers, the audience members weren't the intended target audience—but people can imagine… it was a little bit like… [visitors] would look at it, and go 'okay…' not know what to do with it, and go 'neat' and hand it back. It didn't lead to a big discussion, except in a few cases; and in those cases where there were a lot of follow up questions, potentially we weren't able to answer them because we only have so much knowledge about the gallery, and in other times it was questions about how do blind people perceive the world, which again we're not really qualified to answer and it wasn't really the point… I think the biggest single piece of feedback that I took away from that is, it's great if you could make it more exploratory artifact or experience, rather than a 'here's a thing we made, it's done'. (2018)

In terms of the group's overall approach, Student 2 explained that one of the challenges was the question of pre-determined story—"it was tempting to have a very programed pre-written story along with the objects, but we didn't want to reinforce the hand of the educational officer of the tour (2018)." Therefore, they left it more factual and less interpretive. However, the same student explained that one of his concerns was whether their approach is too literal and unimaginative. If he continues to work on this project in the future, he would like to create something that is more participatory, more open-ended, and possibly less literal (he does believe that when the approach is not literal, further investigation is needed to understand the effectiveness.

7.1.3. Impact on Students

Student 1, from the Inclusive Design graduate program, shared that the most impactful experience for him was interacting and learning from community members with vision impairments; "I don't want to repeat myself, but hearing from that group of people, [who became] part of the research, was an important factor (2018)." He found their feedback to be informative and truly impactful. While many discussion and design projects in the Inclusive Design Program highlight the importance of participatory design and involving members of marginalized communities, he shared that he never truly felt the importance of it until the *Multi-Sensory Studio/Seminar* course.

Another aspect that was impactful for the same student was the diversity of ideas the emerged in the class; seeing the creativity of the whole class, and interacting with all of the translations/interpretations created by other students made an impact on him. The class inspired him, and he sees himself using multisensory practices in his creative practice in the future.

Student 2, from the Digital Futures Graduate Program, shared, "By even doing just one multisensory course with the inclusive design folks it was an eye-opener to a lot of stuff I haven't thought about (2018)." Reflecting upon his current creative work during the interview, it is evident the student is involving the lens of multisensory design in his practice, for instance, an installation where he adapted a multisensory approach and considered inclusion and accessibility in his design (using haptic sound and lights walking through the installation). In addition, he considers accessibility in his practice much more, for example, when working on web projects. In addition, at the time of the interview, he was working on an app project that was not multisensory, but he thought how it has to become multisensory.

Another meaningful aspect of the course for Student 2 was the relationship created with AGO staff members, namely with Melissa Smith. For him, it was beyond the course content, it was the conversation he had with the stakeholders, working with people who are in charge of these programs at the AGO, and the understanding of what it takes to bring "this kind of stuff, or any

kind of stuff, to the public." Finally he added, "It was great that we actually put these stuff in the public, and it's not some abstract exercise (2018)."

7.1.4. Key Findings

The students started collaborating based on shared interests and worked together on the translation/interpretation throughout the semester (as can be seen in the journey map, Figure 56). It appears the idea of the toolkit was integral to their journey from the beginning of the course—the initial co-creation further inspiring them to explore this idea. The toolkit included several objects that broke down the translation/interpretation to objects focused on relations, shapes and attributes (tactile maps, 3D models of Walker Court and the Spiral Staircase, materials from the construction of Walker Court, scent jars, and a candy in the shape of the spiral staircase). It is important to acknowledge Melissa Smith's contribution in the process, for instance with providing access to the materials that are focused on attributes (from the construction of Walker Court).

Overall, the group's strategy was mainly "literal". Though evident to be effective, mainly with David and Natasha, it is unclear why Student 2 was concerned about this strategy as being too unimaginative. Interestingly, he sees himself taking a more "constructivist" path if he continues to explore translations/interpretations of visual artworks. He was also the one that found it

challenging to not have a pre-determined "Story" for all of the objects in the toolkit.

According to both students, the co-design sessions were impactful events in the course: the initial co-creation inspired them, and the Proto-Reveal was informative and helpful in determining effectiveness and identifying design opportunities (though sometimes, according to Student 2, the feedback required a change too vast, and therefore could not be implemented). Working with community members with vision impairments was especially meaningful for Student 1—realizing the importance of participatory design through first-hand experience in this class-project. Student 2 found the conversations with the museum professionals throughout the course, namely with Melissa Smith, to be inspiring and meaningful.

In addition, both students reported on a change in their creative practices, with Student 1 recognizing the benefits of using multisensory practices, knowing that he will incorporate it into his own practice in the future, and Student 2 already incorporating multisensory practices into his designs. Furthermore, Student 2 reported on being more aware of access and inclusive practices as a result of taking the *Multi-Sensory Studio/Seminar* course.

7.2. The Shell Group

7.2.1. Students' Professional Background

4 students worked on The Shell, however only 3 participated in the study. All three are first year Inclusive Design students; Student 1 with background in physical geography and sustainability (in red in Figure 57); Student 2, with background in urban design (in blue in Figure 57); and Student 3, with background in product design and graphic design (in green in Figure 57).

7.2.2 Journey (Figure 57)

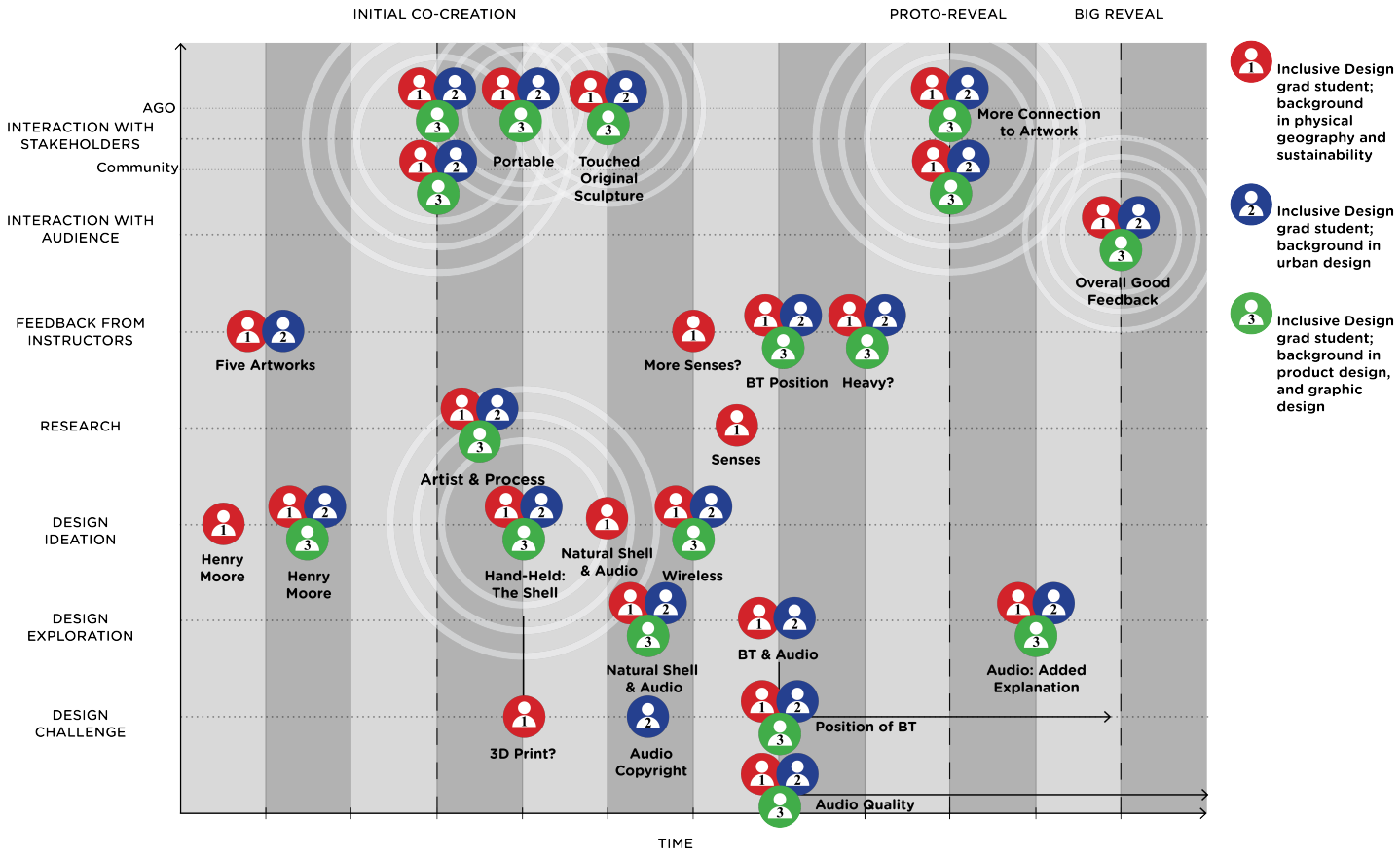


Figure 57: The Shell Journey Map

Student 1 was very keen on translating/interpreting Moore's sculptures as soon as they were asked to choose five artworks by the instructors of the class. Moore's sculpture was her top choice due to the cavernous shapes and the reclining figure; she found that intriguing and was drawn to it. Based on shared interests and skills groups were made in the class, while in this group only one person did not choose any of the Henry Moore sculptures, but after further thought she was highly interested in translating/interpreting the sculpture.

During the initials co-creation students were working in various groups that did not coincide with the groups of the translations/ interpretations. Looking at the bigger picture of how to promote inclusion and access in museums, students in this group were inspired to create an immersive installation (a full room) with tends in which are sandboxes, soundscapes, interactive games, and different materials that represent textures, the beach, and other elements related to the sculptures. However, in class they were reminded by Melissa Smith that the goal was to create a mobile object for the multisensory tour at the AGO—meaning it has to be a portable tool.

Student 1 immediately had the idea that their translation/ interpretation has to be a hand-held device, and she thought of the conch shell due to its natural properties, along with research on the artist and his process, which supported the shell idea. Student 2 elaborated, "being with nature, using natural materials,

we wanted to emulate that through the shell, and not make a literal translation[/interpretation]—we wanted to get them thinking (2018)."

While in the initial ideation phase, Melissa Smith took the students of this group to the gallery, where they were able to engage with the original sculpture through touch (with gloves). The students explored the sculptures with their hands, as would a community member when participating in the multisensory tour, and were even able to feel a fingerprint on the sculpture. This experience seemed to highly impact the students (observed in the interviews), which was also confirmed by Melissa Smith in a later discussion.

Student 2 was focused on the audio recording. She recorded sounds by the beach, and the group was able to find a recording in Moore's own voice, talking about how he likes to sculpt outdoors in natural light. However, it was difficult to find other materials in his voice due to copyright issues, therefore, she used other audio sources retrieved online. Earlier on they were using a cheaper Bluetooth, which had an impact on the quality of sound according to all three students. The audio was refined and worked on throughout the course.

Around the same time, in the initial ideation phase, the device was connected to a cell phone, but the wireless solution was already included in the first iteration of the artifact. The audio recording that can be heard through the Bluetooth earphone inside the shell had it's own iterative process throughout the course; Student 2 explained regarding the audio, "Originally, we didn't think

of including description documentary [information] in it, only sonic sounds (2018)."

As for the tactile experience, at first they considered 3D printing a shell, but then the affordance of using a natural shell is that it already creates natural sounds, which also supports their goal of transporting the audience to the beach. Most of the iterative process in terms of the physical artifact was to determine how and where to attach the Bluetooth speaker. The instructor in one of OCAD's makerspaces, who was supporting this course, suggested placing the Bluetooth in a hole, in such a way that would plug the hole. The group tried this, however, the first student did not feel comfortable with it, and after researching shells she learned that all shells have these holes, which are a natural part of the shell. Therefore, the group decided to continue with the iterative process of looking for the right placement of the Bluetooth earphone.

During their design exploration, one of the instructors of the course suggested to incorporate more senses into their translation/interpretation. This prompt Student 1 to research the senses to learn more about senses that "compliment each other"; according to the paper she read, tactile and audio were two that worked well together, and they suggest to refrain from representing many different things with many different senses. The same instructor also raised the question of whether the artifact (the shell itself) was too heavy? Therefore, the students asked stakeholders during the Proto-Reveal, who were not concerned about the weight (they were, however, concerned about the

audio). (In addition, one of the feedbacks they got during the Big-Reveal was that the weight of the shell represents/resembles the mass-structure of the original sculptures—something they did not intend on doing).

Another feedback the group received from AGO staff members during the Proto-Reveal is to add more of a connection between the shell and the original artwork through the auditory experience. This prompted the group to add an explanation on Moore's inspiration to the beginning of the recording. Student 1 shared:

> That too didn't sit right with me because it's not what we were going for, but I also recognize that we were not the experts, and so we had to find a way to show that we reacted to that feedback, because it is valuable feedback. (2018)

The group wanted to maintain the ability for the audience to have their own interpretation, and the second student believe visitors would have been able to naturally make the connection without the added explanation, but she does think the explanation help.

Despite using a more expensive Bluetooth earphone, the challenge with the quality of the audio was not resolved. Student 2 believes it could be because the audio was generated from many difference sources, which means it was difficult to balance out. Student 3 added that visitors found the voice of the explanation in the beginning of the audio track to be nice and soothing (the voice of the first student), but then the transition to the next voice was too harsh. In addition, she said about 95% of the people that tested the artifact before the Big-

Reveal suggested increasing the volume. While the audio was never perfected, visitors, stakeholders, and the students themselves were happy with the end result. The first student shared:

> I'm not an artist, I might have some artistic abilities in some way or another, but I don't call myself an artist, I have a science degree, and I didn't want to try to pretend I was a fine-artist. Being giving a chance to exhibit something that we created in an art gallery, when you're a scientist, was a really special experience, it was a lot of pressure too, so I think that using a natural object was helpful… Having tactile and audio together worked really well too. (2018)

All three students thought the constructivist approach worked well. They all mentioned in interviews they received good feedback, where visitors reported on transporting outside of the museum, which is what they attempted to achieve.

7.2.3. Impact on Students

> Student 1 shared during the final interview:
>
> It really changed the way that I look at galleries and art actually… I go to galleries, but it made me realize that not everything is black and white in the sense that there isn't one way to interpret art, and there doesn't need to be. It can be an iterative process of how you want to experience it. Multisensory… it just gives you so many different points of view, it helps you appreciate the experience of what art is way more. (2018)

She added in the interview how she used to think art meant artifacts hanging on a wall, but you can actually have an experience when you are seeing, hearing, and touching it; rather than reading about the art, hearing about it, or listening to the artist speaking about it, is bound to make one feel more connected with the artwork.

When asked whether learning about multisensory approaches had an impact on her, Student 1 did not know where to begin. When she found the words, she said:

> Since I have the ability to hear and see and touch and smell, and all these things, I didn't really think of the importance of multisensory before, and now, it's one of those things that once you know about it, how could I go backwards?! Now I incorporate it in everything, or I'd like to anyway, I think about it way more, and I think about access to art. (2018)

The same student also spoke about how this experience made art more accessible to her:

> I did have this idea that fine art was a prestigious thing, but being able to be a person who got to do this translation, I'm just a "normal" person but I got to do this… it made art more accessible to me, even though I could already see it, but now I got to be part of it, so that was really cool. (2018)

In addition, she added how this course impacted her practice and has become an integral part of her own Major Research Project for her Master's degree. She shared, "I have such a strong emotional connection to this [the shell] (2018)," and she is planning to continue working on it (for instance, perfecting the sound, and possibly adding a GPS interactive component to it, seeing how visitors were walking around the entire Henry Moore exhibit with their translation/ interpretation).

Student 2 said this was by far her favourite course. To employ multisensory strategies required a big change for her, as working in urban design is usually strictly visual. To bring in audio was scary—but a really good

experience, and if they had more time she would have liked to explore more senses (although they received positive feedback on using those two senses). Going into this course she thought they would have to use all of the senses, which could be daunting, but it was good that the instructors assured the students that not using all the senses is also good. This was something that she had never done or experienced before.

While she admits she does not go to museums often, when she does go she feels like all she does is stand there—and she really wants to touch stuff yet she is not allowed to. Before this class, she was not aware of the multisensory tours that are offered at the AGO. She concludes:

> [The class] made me appreciate museums a lot more. I take my time going through them now… [The class] was fun because it lets you explore something that you weren't able to before, because with the museum you're the outsider, but this took us inside and 'behind the scenes'; it gave you more of an impact, and it helps you understand what goes into planning an exhibit and allows you to appreciate the people behind it. (2018)

As Student 1, Student 2 is also bringing multisensory approaches to her Major Research Project focused on environmental design to facilitate good health. While she views herself as a visual learner, and someone who considers the visual elements more, now she thinks of other senses too. This course has opened up her mind to other senses, for instance, to sound, smell and taste. She said it rejuvenated her creativity; when all the other classes require writing

reports and making presentations, in this class you get to explore and create something.

Student 3 shared (over Skype from half the world away, though she attended the class in person):

> [before this class] I have never designed something considering the non-visual aspect of it. All of my designs have been always so strongly visual. Someone who is visually impaired, or partially impaired, would never be able to understand it, or use it. This was the first project where I was getting used to the importance of non-visual aspects. (2018)

Now she's continuing to focus on multisensory solutions to solve design problems. In fact, when this student was interviewed just a few weeks into the course, she could already tell this course was going to impact her creative practice. Months before the final interview she said:

> [The class] makes me doubt every single thing I designed on [my] portfolio now, and I don't know if I'll [have] time during the course… but I really want to work more on that aspect of it. And now, onwards, if I start designing something, I will take into consideration the multisensory aspect in the beginning [of the design process], rather than at the end. It's a tool for me, everything I see now, I always tend to notice if it's multisensory or not. (2017)

As with the previous two students in her group, she also shared her Major Research Project will revolve around multisensory approaches, as "multisensory is more inclusive".

7.2.4. Key Findings

This group employed a strategy that was the most "constructivist" in the class, creating a hand-held device with a natural shell that also includes an audio recording. According to the interviews, the idea of the shell and experimenting with it seems to have been an important breakthrough in the students' journey. Initially their ideas entailed a large scale immersive experience, however, being reminded by Melissa Smith that the objects/experiences must be portable for the multisensory tours at the AGO, highly influenced them, as it required a change of concept.

One key event in this group's journey is the experience of touching the original sculpture with Melissa Smith at the AGO (with protective gloves). Having the ability to explore the original artwork with their hands, feeling the contours of the work, as would a community member on the tour, seemed to highly impact the students. Feeling the fingerprint of the artist on the work made one of the students feel especially excited—it is unclear whether this experience inspired them to translate/interpret Moore's creative process, but evidently this allowed the students to build a meaningful connection not just with the artwork itself, but also with the artist.

Throughout their journey there were several challenges, mainly with the positioning of the Bluetooth earphone, as well as with the quality of the audio. Student 1 spoke about several ideas/concerns brought up by one of the instructors in the class (e.g. the shell being too heavy), which did not prove to be

a reason for concern. However, all of them see the importance of exploring and going through an iterative process.

As with the previous group, the co-design sessions were impactful on the students; however, all 3 students do not see how the initial co-creation session inspired their translation/interpretation (although one of the instructors does see a connection). While there may not be a direct connection, the students still found the initial co-creation to be a meaningful event in the course, for the participatory aspect of it (as Inclusive Design students).

The Proto-Reveal further engendered their interactions with stakeholders, and overall the feedback they received was positive. Museum staff asked the students to provide more connection between the translation/interpretation and the original sculpture—as a result, the group added an explanation to the audio recording, which proved to be important feedback. In addition, some of the stakeholders were concerned about the volume of the audio recording. The quality of the audio, including the volume, was not perfected for the Big Reveal, however overall the students were very pleased with the final outcome.

The class-project shows a significant impact on the students' creative practice. All 3 students have shifted their focus from being predominately visual designers prior to the course to multisensory. They all recognize the benefits of multisensory practices and see how it can increase inclusion. Student 3, who is a strong visual designer, noticed an impact on her practice after only several

weeks into the course. All of them plan on incorporating multisensory approaches to their own Major Research Projects in the Inclusive Design Graduate Program.

Furthermore, it appears The Shell allowed the students to form a meaningful connection with art. They all seem to have an emotional connection with the translation/interpretation, and Student 1 and 2 spoke about changed perspectives—viewing art and galleries/museums differently after the *Multi-Sensory Studio/Seminar* course. Student 1, in particular, spoke about how this experience has made art more accessible to her, despite being a fully-abled individual.

7.3. Group of Seven

7.3.1. Students' Professional Background

Three students worked on The Group of Seven translation/ interpretation, all three are second year Inclusive Design grad students. Student 1 with background in psychology and human biology, working in autism services (in turquoise in Figure 58); Student 2, with background in tailoring, dressmaking, and charity work with refugees (in pink in Figure 58); and Student 3, with background in economics and social media promotions (in brown in Figure 58).

7.3.2. Journey (Figure 58)

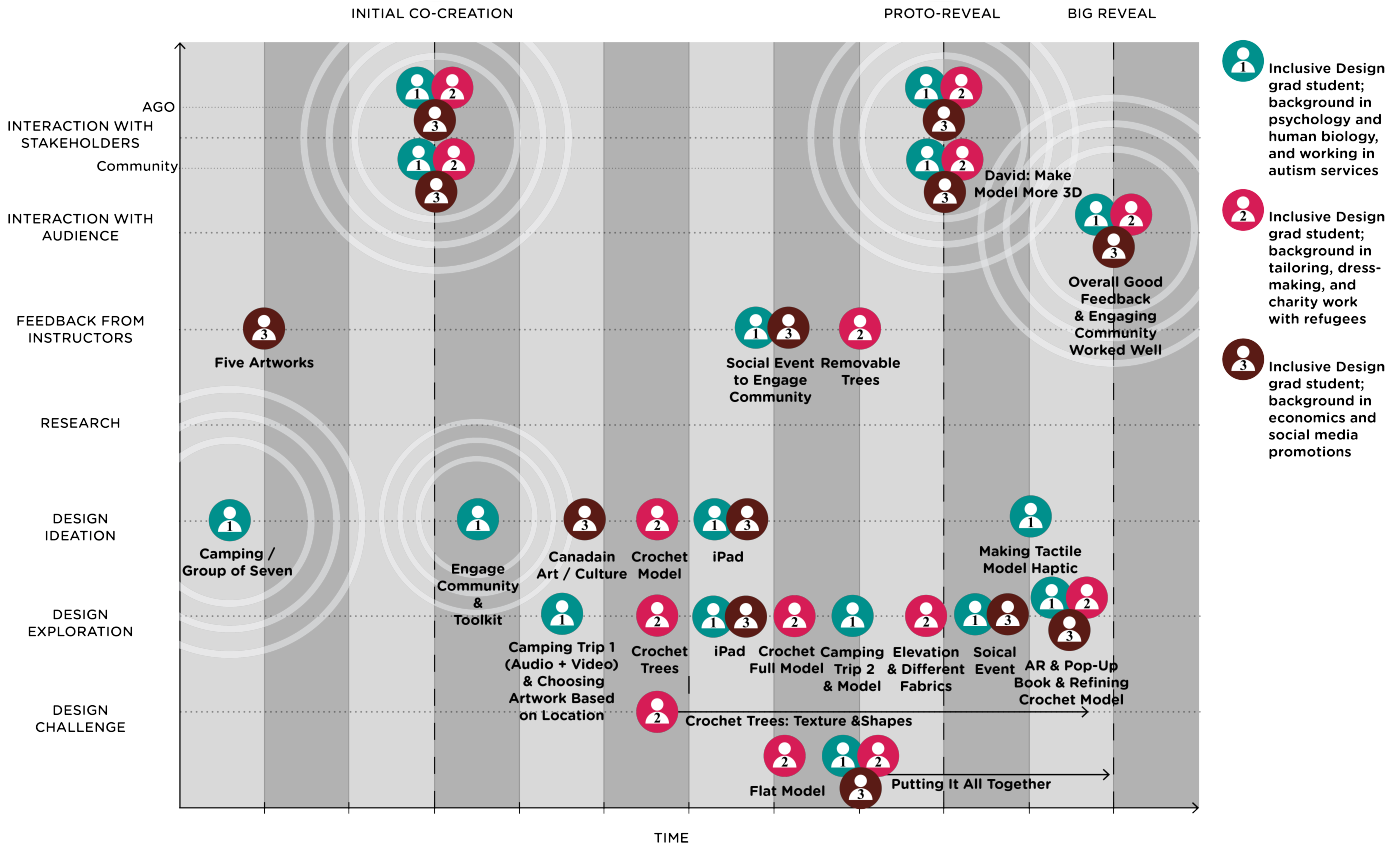


Figure 58: Group of Seven Journey Map

We discuss some of this group's journey/context in the previous section. Here we will elaborate on this group's untraditional path in their design processes. Student 1 reflected upon the beginning of her journey in the class:

> Going into the course I knew that I wanted to focus on the Group of Seven because I was thinking along the same way of… people who see the paintings in the gallery are missing out a whole bunch because they are not there to experience the wind, the sound, the smell, and all that is being captured in the painting… So I knew that's what I wanted to focus on going [into the course] because I'm crazy with camping! (2018)

Student 3 also shared later in class that she saw this project, this choice of artwork, as an opportunity to learn more about Canadian art and Canadian culture, given that she immigrated to Canada and knows little of it.

The initial co-creation, prior to starting to collaborate on the Group of Seven translation/interpretation, was an inspirational learning experience for all. Student 3 spoke about how meaningful it was for her to work together with stakeholders throughout this class, starting with the initial co-creation. During initial co-creation ideas were gathered focusing on how different senses could be captured through the translations/ interpretations. The idea of the 'toolkit' (which came up in two groups in the co-creation session) inspired this group to incorporate different tools that address the different senses into their translation/ interpretations, where visitors can "pick and choose what they wanted to experience" with the artwork that the toolkit came with (as described by Student 1).

Interestingly, the artwork was chosen due to the location of the scene in the painting: based on where Student 1 and her friend wanted to go camping (in Georgian Bay), they picked relevant artworks by the Group of Seven, and then went camping. They went to Killbear (Provincial Park), to see if student 1 could find a similar location to ones that are in the original paintings. Student 1 heard that there were some paintings done in that area, but not the ones that are at the AGO (many of those are at the National Gallery of Canada). Yet she was randomly walking around, taking different video clips, and then she found the remote

location that is a representation of the one in the chosen painting (Figure 36 in section 6.4.2.). In other words, her camping experiences and exploration chose the painting for her, camping became a design material.

On the first camping trip, most of the audio and video recording was done. Then on the second trip Student 1 took the canoe out to Franklin Island (it was a 3-day trip, where she took the canoe into Georgian Bay and paddled around), and there, she saw more and more sights that were similar to the scene in the painting. Due to a rainstorm in the area, she was able to break off some the rocks, "normally I wouldn't be able to carry a chunk of rock, but then it chipped off layers of rock, and it worked out perfectly (2018)." Around this time, the group also started discussing ways of engaging the community (an idea inspired by the co-creation session); Student 1 elaborated, "how do we engage the community to recreate this type of tool, or be able to collect sensory bits and share with people? —Make it a fun communal activity, so it's not all on the gallery (2018.)".

Meanwhile Student 2 pursued her own design exploration—she decided to learn the technique of crochet knitting for the purposes of this course and the translation/interpretation. Given this student's professional background, she found a way of exploration that she relates to and enjoys. She started with the trees and slowly built the rest of the composition. In the early stages, and throughout, she was mainly focused on getting the right shape and texture of the trees. After managing to get what felt like the 'right texture' she knitted the rest

of the painting—the model; at first she knitted the sky in blue yarn, but then noticed it was not just blue, so she knew she would have to change it—that is when she started exploring different fabrics such as the lace for the water. She also attached the crochet model to a board, but noticed it was too flat. As a result, she added cotton balls underneath the rocks to give it elevation, attempting to create a model that has more depth (and is not flat). Around the same time, she also added chains of crochet for the shapes and textures of the rocks. One of the instructors suggested to the student to make the trees or one of them removable to allow visitors to explore the shape and texture independently from the rest of the model, which she was able to do for the Proto-Reveal.

Prior to the Proto-Reveal the group decided to explore the idea of offering visitors to spin around while looking at a video made on one of the camping trips. The fan was added to the iPad to create the sensation of wind blowing on one's face. The big question/challenge that the group faced at that point was how are they going to put everything together? This continued for the remaining of the semester, while Student 1 was also attempting to figure out how she was going to create a model or an experience with all the materials she had been collecting on the trips? In her own words she said, "How am I going to put it all together so it seems like one seamless experience, rather than separate bits that people had to put together? I wanted it to be as 'whole' as possible, so people are 'in it' (2018)."

During the Proto-Reveal the group showcased their first iteration, inside an artist suitcase, which was provided by the instructor of the makerspace that supported this class. The different elements included the two tactile boards (one made with crochet and one with natural materials), the iPad video, and scent jars. Student 3 shared, "David's feedback with regards to the first prototype was highly valuable, he told us he can not feel the space [in other words, the spatial relations] when he's touching a flat model, and suggested to make it 3-dimentional (2018)." This encouraged the group to pursue a different way of presenting the model with the natural materials, inspired by pop-up cards/books (discussed in the previous section). For Student 3, to hear the different perspectives of representatives from the blind community (mainly David and Natasha) was one of the most meaningful experiences in that course.

Student 2 also found the Proto-Reveal to be helpful; confirming her concerns, she learned that the sensation/feel of the yarn does not indicate/enhance understanding of what is being translated/interpreted. David also confused two trees for being flowers, which prompted her to redo those two trees and improve on their shapes and textures.

Student 1 wanted to include sound in the tactile model with the natural materials after the Proto-Reveal, not because of something someone said, but simply because it was something she wanted to achieve. She thought of putting it together with wholes on the tactile board and an iPad underneath it—"but then it would not have been seamless, it seems interrupted". Then, she considered

using Arduino (with motion-tracking, based on location it would play sound), but because it would have been too bulky and less portable, she continued looking for other options. Then finally, she decided to explore the idea of Augmented Reality (AR button). In addition, she posted on social meet-up groups to engage the community and invite them to the Big-Reveal event at the AGO to participate in an activity to continue this project beyond the gallery and the course.

Finally, the group presented their translation/interpretation that included the various elements, as discussed in the previous section. According to all three students, they received positive feedback, however there were issues with the final objects. Student 1 shared, "The idea panned out, that worked well, it achieved what I wanted to do, but it had a lot of kinks (2018)." The air-button idea worked well for portability, but there were issues because it depends on the camera and position of the camera/hands; if the hands were close to the camera (blocking the whole view of the camera), it deactivated the buttons. The holder of the phone also challenged the effectiveness of the AR buttons.

Student 2 thought her crochet model did not translate/interpret the painting well enough for people with vision impairments, however, she noted how one visitor felt inspired by her work. In addition, the textures of the leaves seemed to be successful, according to stakeholders and instructors. Student 3 thought the participatory activity with the community worked well, and she would like to continue working on it. She thinks it is important to continue the

conversation/dialogue that started that night. Though Student 1 was the one who invited people from the camping community, Student 2 is an expert on event planning through social media, which enabled her to build meaning. This type of community engagement was suggested by one of the instructors, as he saw it as a way to unite the group, allowing all three students to work on the translation/interpretation through their passions and lived experiences.

Student 1 also thought that part of the translation/interpretation worked well. People that were invited through social media felt excited about it and came to the AGO; some of them actually came with her on the second camping trip, and in a way were already involved. They were interested, and got to vote on where they would go next—"so that worked really well, getting people come in, involved, and talk about multisensory, and why create something multisensory [in a museum] (Student 1, 2018)." She added that when she goes camping and people ask her about her studies, it sounds very "abstract" to them; while the Big-Reveal event afforded a more concrete way of explaining inclusive design, she shared:

> People can experience and actually see the benefit, and think about inclusion, creating things more inclusively, recognizing people have different experiences, and people are excluded because of the way they experience things given the constraints or differences. That was meaningful. (2018)

7.3.3. Impact on Students

Student 1 shared:

> It was exciting for me to be able to engage with art, in the way that I like. I don't usually go to art galleries, that's not something I appreciate much in my life, but by doing this activity I was like—oh now I get it, it's an old version of Instagram basically, which is what I do, and I finally understand what they're trying to do—and how do I make that a little bit more accessible… and how can make it engaging, not just within the gallery, but make the experience extend beyond the gallery walls? (2018)

Another aspect that was impactful for her was trying out technology—she would not have gone down this path had she not taken this course. This project made her figure out how to use AR buttons, and it was exciting for her to try new things. She also added it was really cool to work with the other two students, because they had so many different ideas, but then their main idea was to give people as many options as possible to experience the scene of the painting, which she thought worked well.

In terms of the course itself, Student 1 appreciated the process book idea, as she liked the act of putting it all together and documenting their process because it's not something she usually does. She always has notes and sketches, but through this activity she was able to look back and pick the most meaningful moments in her process, which was really helpful.

Student 2 said she liked the course and found it very helpful, but she also thinks one has to have the right tools, especially if creating a translation/interpretation for someone with vision impairment. She also

thought that translating/interpreting a landscape painting was a challenging choice. She thought the other model (haptic tactile-sonic model) was effective with enabling better understanding, and she learned from it too. Overall, regarding her crochet model, she was not very satisfied with the final outcome.

Nevertheless, this project encouraged her to learn how to crochet knit, and she now finds herself continuing to use this technique when she has the time. Also, the idea that she can use this technique to translate/interpret a painting has inspired her to create tactile artworks as gifts using the same technique. In addition, she shared:

> I really enjoyed working in a group, I really enjoyed to create something, and it can be very helpful if you have the right tools/skills… I really wanted to do it, to see what the results [will] be. First I [thought], I can't do, but then I made it and I enjoyed [it] a lot, doing it and changing different parts, every time [people interacted with the work] it gave me new ideas to improve it, and it is still incomplete, after [the Big-Reveal] I thought maybe I could use different yarn for the sea, such as silk. (2018)

In fact, this student said she continues to touch and feel yarn/fabrics after the completion of the course, in order to see what they feel like to touch, and to explore what fabrics can be used in tactile models.

Student 3 believes that "this [approach to art and exhibit design] brings fresh air into the museum (2018);" when she took the course, she did not think about access to art and cultural works much, but upon the completion of this course, she understands it better and creates works in her practice that apply

multisensory or other inclusive practices. She believes that small projects such as this can make a big difference, and that it is an ongoing process.

One of the most important notions that she brought up was collaborating with people like David and Natasha, and other representatives from CNIB—When asked why, she replied that everyone has different experiences and different perspectives—"we can't truly understand what they're experiencing and feeling"—and by collaborating with them she and her peers had access to learn about their experiences and needs. "Before this course I didn't think there is much importance to translate a painting, but after the Proto-Reveal and the [Big-Reveal], thinking of the feedback [we received], it really changed my thoughts… [This] is really important (2018)."

7.3.4. Key Findings

This group created a translation/interpretation that included several objects, taking an unusual path employing non-traditional design techniques. Student 1 knew how she would like to incorporate camping into her explorations in this course from the very beginning. Her camping trips, finding the remote location that became a representation of the original painting, collecting a wide range of stimuli repository, all shaped the translation/interpretation and the student's journey. Student 2 and Student 3 started collaborating with Student 1 several weeks into the course; this group's formation was not based on skills, in fact, they are all from non-design

professional backgrounds. However, perhaps this is partly why the interesting breakthrough of non-traditional design techniques happened in their journey. Student 2 used crochet knitting to build a tactile model, and Student 3 helped with planning the participatory activity, and putting the objects/models together (mainly working with Student 1).

One of their main challenges along the way was figuring out to put it all together, however, working collaboratively, which they all enjoyed and appreciated, allowed them to create a translation/interpretation that offers visitors a wide range of experiences. They shared the same goal along the way of providing a translation/interpretation that creates an experience that is more 'whole' for the audience. Using their lived experiences as a material and technique, Student 1 and Student 2 also learned new techniques for their objects: for example, how to work with AR buttons, or how to crochet (new knitting technique for her despite previous experience with tailoring and knitting).

As with the previous two groups, the co-design sessions were important events in the course for the students in this group. While they were not collaboratively as a group at the time of the initial co-creation, they all found it to be an inspiring experience. It is also due to this session that Student 1 was inspired to pursue the idea/approach of a toolkit. In addition, engaging the community is something that was brought up in the session and influenced her design process throughout the semester.

The Proto-Reveal provided the students with feedback that influenced the design of the final translation/interpretation, for instance, making the tactile model more 3-dimnentional, or creating trees in the crochet model that are better represented in terms of shape and texture.

For Student 3, working with community members with vision impairments during all co-design sessions was the most rewarding and meaningful experience in the course. She thought it is incredibly important to learn about their perspectives and their experiences. Furthermore, this class-project changed her perspective on access to art and its importance.

Student 2 also spoke about working with stakeholders as an important experience. Though she fears her crochet model is not as successful with increasing access to visual artworks, she found the journey to be rewarding and inspiring. She continues to explore fabrics and crochet, and consider the tactile experience they provide. Additionally, she spoke about learning from her peers, mainly the other two students in her group, and how she enjoyed their shared journey in the class.

The Big Reveal event was meaningful for all three students, with the participatory activity being perhaps the most successful (according to the students). They found it important to engage the community throughout their journey—and during the Big Reveal, they fulfilled this goal with a participatory activity. People who were invited from the camping community prior to the

event came and participated, which as a result, also raised their awareness of Inclusive Design.

The main takeaway for this group's journey is that all 3 students were able to build meaningful connections with art through employing untraditional design techniques, driven from their own lived experiences. Those experiences and passions had become a material and/or technique used in the design process. Student 1, who does not appreciate art much, found a way to connect with it through camping. She believes this process allowed her to understand art and art galleries/museums better. Student 2 built meaning through the participatory activity, as event planning through social media is something she is passionate about. According to a statement she made in class, this project allowed her to learn about Canadian art and Canadian culture as an immigrant to this country. Student 3 built meaning to art through knitting, which relates to working with fabrics and tailoring—something she has been doing for many years. The project-class inspired her creative practices and she enjoyed the learning experience very much.

8. DISCUSSION & CONCLUSIONS

This study reveals promising directions for inclusive museums through a qualitative research investigation that aimed to be thorough, meaningful, and rewarding for the participants and the authors. We recognize that the problem it is attempting to solve is vast, and therefore requires further investigation. Nevertheless, this study reveals a path forward towards inclusion in museums, exposing a diverse range of strategies to translate/interpret visual artworks, a preliminary technical language to support the design of translations/interpretations, an introduction to the affordances, limitations and impact of such designs and practices on diverse audiences, and a need for theoretically informed and tested standards to guide these designs and practices.

The study revealed a diverse range of strategies that were employed by students in the class *Multi-Sensory Studio/Seminar*. The translations/interpretations employed a combination of strategies that range from more literal-iconic representations, on the one hand, to more constructivist-symbolic, on the other, to varying degrees, often in varying hybrid combinations that employed both iconic and symbolic strategies in a single design. In Table 7, we summarize the emerging strategies and present an inventory of strategies to work from.

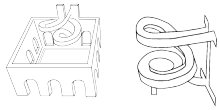
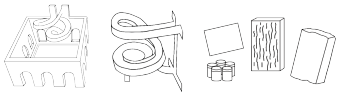
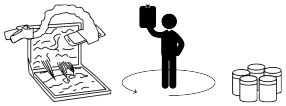
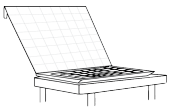
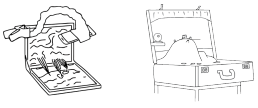
	STRATEGY	DESCRIPTION	EXAMPLE
1	3D Models	Aiming to map the visually perceived spatial properties to non-visual	 Walker Court ; Spiral Staircase
2	Breaking Down Representations	Breaking down the representations into objects/experiences that correspond to relations amongst objects, shapes/forms, and attributes (textures/colours)	 Walker Court: Relations, Shapes, Attributes
3	Immersive Binaural Audio	Aiming to map a rectangular painting into an immersive hemisphere surround sound (iconic and/or symbolic)	 The Umbrella
4	Plot Structure	Aiming to map a rectangular painting into a linear sequence that follows a classic	 The Moose Story
5	Physical World as a Representation	Using the physical world, finding a real place on earth, that represents the original artwork	 The Group of Seven
6	Lived Experiences as a Material/Technique	Constructing meaningful connections through the use of own lived experiences as a material/technique in the design process (symbolic-constructivist)	 The Group of Seven
7	Grid Using Text to Speech	Representing a painting using a grid and text to speech (iconic relations amongst symbolized objects)	 Reminiscence of Youth
8	Haptic Tactile-Sonic Models	Models where the sound plays according to the tactile feedback (touch of hands, or proximity from object)	 Group of Seven; Reminiscence of Youth
9	Symbolic Materials	Representations that use materials aimed to engender audience memories that are akin to what might have inspired the original artwork (symbolic-constructivist)	 The Shell

Table 7: Inventory of Strategies

An approach to describing the artifacts was developed in the analysis phase, including a technical language supported by figures and tables. Using terminology of semiotics, cognitive-semiotics, the cognitive science of external representation, and sonification/auditory display design , we were able to develop a provisional understanding of affordances and limitations of the objects/experiences. We recognize that our analysis of the translations/interpretations embodies within it our own interpretations and understanding to some degree. While analyzing the objects/experiences created by the class, we discovered a surprising diversity of creative strategies/approaches. What we did not anticipate is how this diversity of strategies would challenge our ability to constrain our analysis to a reasonable scope. The uniqueness of each translation/interpretation strategy required us to develop unique diagrammatic and descriptive techniques for each cross-sensory mapping. We acknowledge that this approach and language are preliminary, and therefore require further thought and refinement in future work. Yet these descriptions still afford a bridge to multisensory and cross-modal techniques and practices, and provide further meaning and understanding to meaningful objects/experiences. In addition, by documenting these strategies, we lay the groundwork for a path forward and future work.

For instance, while an artifact such as the shell (a strategy that is more constructivist), might be viewed as limited in terms of access to the visually perceived information, it does provide flexibility and context to the multisensory

tours, where visitors are also allowed to tactilely engage with the original sculpture it is attempting to translate/interpret. In addition, the shell resulted in audience members having an emotional or enhanced experience due to the retrieval/recall of beach memories (that are akin to what might have inspired the original artwork), and reported on being transported outside of the museum walls.

Another example is Walker Court, where the strategy employed was more literal, aiming to translate/interpret an interior space at the AGO by mapping the visually perceived spatial properties to non-visual perceptual cues. The group created a toolkit that breaks down the translation/interpretation into several objects, where each object focuses on different features of the Walker's Court environment. These include shapes, relations, and attributes, including: tactile maps, a 3D model of Walker Court, a separate 3D model of the spiral staircase, candy in the same shape of the spiral, and a collection of materials from the construction of Walker Court, along with scent jars. As a result, community members with vision impairments reported on engendered access to different types of information. In addition, though the group's exploration started at the macro level and scaled down to the micro level, the kit affords a fluid informal sequence of interactions that can be determined by the education officer on the tours at the AGO, which helps with group management.

All translations/interpretation employed a combination of iconicity and symbolicity, and have their own value—beautifully reflecting the creativity that

emerged in the class. We recognize that students had time constraints and technical problems along the way, which in some cases influenced the outcomes. It is also important to note that given this was the first iteration of the class, there was no budget for the creation of the objects/experiences; all translations/interpretations were made with the generosity of the students themselves. In future iterations of this class, the AGO-OCADU partnership would like to provide students with financial aid to support the design production.

The translations/interpretations revealed a significant impact on diverse audiences and the students themselves, who experienced transformative journeys towards creating these objects/experiences. Community members with vision impairments reported on increased access to varying degrees. Natasha shared:

> I saw 5 different groups, and absolutely every group had a different [approach to the] interpretation! That was refreshing and astounding at the same time! Because you saw what everyone's backgrounds were, where their school of thought lay, and you also see someone else's interpretation of the world… the approach to the Moose [Story] painting interpretation was so different than the approach to the model of Walker Court; apples and oranges. […] That's one of things that I was so impressed with last week, is that I had met with 5 different groups and walked away with 5 completely different experiences. I walked in with an open mind, but I was surprised and impressed. I was really impressed… I think there is a lot of value to what they were doing, and NOT just for someone who necessarily has a disability. (2017)

Natasha found her participation with the class and this research to be rewarding; despite the many challenges she has faced since the onset of her vision impairment, during an interview she reflected, "I have the gift of thinking

about different things that others don't, that will actually enrich other people's experiences" (2017). David was also impressed and surprised by the translations/interpretations created in the class, namely with Walker Court and the Group of Seven. In his own words, he shared:

> I was surprised by all of it... I didn't expect to be as affected by the Group of Seven interpretation... I haven't seen such serious effort to make a picture out of objects that would be in the scene like that before. And it was nice. It was very... I don't know how to explain it. (2018)

Museum visitors also reported on being surprised by the translations/interpretations, which offered them an experience they referred to as: new/refreshing/different, engaging/interactive, 'whole', emotional, educational, multi-layered, interesting, enhanced, or unique. They also describe how it allowed them to be transported outside of the museum walls, and to build meaningful connections with the original artwork. In addition, through interviews with audience members it is evident that such projects can raise the public's awareness of inclusion and inclusive practices.

Students in the class were significantly impacted; through this class and the creation of translations/interpretations, art and museums became more accessible to the students themselves, mainly through building meaningful connections with art. For instance, an interesting breakthrough happened with the students working on the Group of Seven translation/interpretation, where their own lived experiences were used as a technique and material in the design process (rather than traditional design techniques), allowing them to build

meaningful connections with art through camping, knitting, and event planning with social media.

Many students also shared how through this class, new knowledge and techniques have influenced their creative practices, where they now employ multisensory design techniques and see themselves continuing with this new path of exploration. Additionally, students from programs outside of Inclusive Design shared how it raised their awareness, and now consider access and inclusion in their practices as well.

Furthermore, all of the students participating in this study indicated how valuable and rewarding it was to work with stakeholders, including community members with vision impairments and museum professionals. Students were exposed to intriguing dialogues and conversations with the stakeholders that highly impacted not only their prototypes, but also their personal perspectives, for instance, how they view the museum and access to art. The two co-design sessions (the initial co-creation, and the Proto-Reveal), proved to be the most impactful experiences/events throughout the course, along with the Big Reveal event, where the public/community was engaged. As evident in the journey maps, the co-design sessions were far apart, in the beginning of the course and towards the end. In future iterations of this class, we believe co-design should happen more frequently and throughout the course. However, we acknowledge it was challenging to get stakeholders, namely community members, to participate due to the physical and financial barriers. We recommend finding the

financial means to support the participation of community members, as their insights are extremely valuable and the goal is to further enact Freire's (1970) dialogical theory of action. There should be a more systematic way of involving potential end users in this process. In addition, the multisensory tours at the AGO could potentially become integrated with the class in the future.

One of the students in the class, who is also blind, shared in an interview:

> It gave me a lot more hope that art will become a lot more accessible in the future. That was really good. It also allowed me to really work on an art piece, and I've never really done anything like that before, and in a cross-sensory way, and that was really cool. Honestly, this is the epitome of what I think education should be. (2018)

The partnership hopes that with initiatives such as these, we are creating a footprint for change in a challenging institution, such as the museum, while also creating a valuable learning experience for students.

Through the literature review, the conversation between Melissa Smith and Annie Levy focused on the AGO, as well as the collaborative work of the partnership and the results of the multisensory class, we discover a need for establishing theoretically informed and tested standards to support and guide the design and practices of multisensory and cross-modal translations/interpretations of visual artworks for increased access. For example, in the literature review, when discussing fully accessible museums and additional accessible exhibits, current practices and advancements around the world towards inclusive multisensory museum experiences are evident,

however, it is clear through these examples that there is a lack of conventions when applying these strategies. Furthermore, the diverse range of strategies that emerged in the multisensory class reveals the very same need, which we recommend to further investigate in future work.

While this study is mainly focused on a graduate course on multisensory museum experiences to engender inclusive practices, we hope readers can draw insights that may be applied to other inclusive design problems. We see much value in establishing a collaborative partnership, such as the AGO-OCADU, where partners from the industry and the academia work together with the community to break down barriers to inclusion we faces in today's era. While there is still much to explore in future work, this is a resourceful research to work from, towards inclusion in museums.

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