FROM EMPATHY IN DESIGN TO SOCIAL INCLUSION

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Keywords

accessibility, empathy, design, typhlographics, universal design, aesthetics of touch

Abstract

The article concerns the social inclusion of people with special needs using universal design. It is related to the fourth principle of universal design, which is Perceptible Information. The first part explains the role of empathy in the design process and in the education of designers. The second part presents a case study: Comprehensive Typhlographic Solution for the Botanical Garden of the Jagiellonian University in Krakow and describes the design process, its challenges, and decisions leading to a socially inclusive design solution. The article takes into account the importance of multisensory experience in the process of memorization in blind people and the role of intersemiotic translation in the design of tactile graphics. The design solution proves the thesis of combining visual communication with tactile graphics as a real and noteworthy design compromise.

INTRODUCTION, ON PROCESS DESIGN.

Every person constantly, more or less consciously, changes reality, even when, by limiting the vegetative activities of his organism to sleep, a person takes oxygen from the environment, changes the chemical composition of his environment. However, we do not consider each of us in every action to be the cause of changes in reality. Consciousness or unconsciousness of action is not a reason for recognizing agency.

(Pawłowski, 2001, 126)

Design has been a secret knowledge for centuries. Often, specific behaviours have been designed into the culture and religion, habits, and traditions themselves. This means that regardless of the place on Earth, behaviours inscribed in tradition were and continue to be intended to ensure the well-being and health of the societies that cultivate them. If we start thinking, we can find examples of customs that affect a society designed with the happiness of that society in mind. Eating with chopsticks is Confucianism – an activity inscribed in the tradition of the Far East. Due to their design, it is difficult to eat quickly with chopsticks. In other words, the speed of eating can be regulated by the design of the tool we use. Eating slower will make us healthier. The design of a fork can force a specific positioning of the hand, and thus the way in which a specific group of users eats. Andrzej Pawłowski writes, "that 'things' (objects in design – author's note) are not an end in themselves, that they only serve to implement processes, and these, as important, must first and foremost become the subject of design" (Pawłowski, 2001, 168). Therefore, processes are designed that are hidden behind products or services. The design of a fork has an impact on the eating process. If we design a fork in a specific way and we manage to introduce this product as a leading one for a specific group of people. We can use this design to influence the habits of these people.

Social inclusion is a process, so it can be designed. In other words, every time we design any element of accessibility, whether it is a ramp, typhlographics, website accessibility or a toilet, we

design the target: social inclusion of people with special needs. We then influence the shape of the entire process of social inclusion and this influence can be good or bad. In this text, I want to focus on how empathy as an essential feature of a designer can and should influence the process of social inclusion.

In the first part of this article, I will focus on the relationship between design, empathy, social change, and a method for building empathy in design students. In the second part, I will present a case study of my own universal solution in the field of tactile graphics.

EMPATIA A PERCEPCJA.

To understand what empathy means to a designer, we need to delve a bit into the phenomenon of perception. This will help us see how empathy helps develop perception and ultimately influences design. Awareness of the environment is largely determined by its perception. Perception is the process of evaluating and interpreting sensory stimuli. The ability to select information, separating what is necessary for survival from what is irrelevant is the basic task of the perception process. Therefore, we define elements that are useful to us in everyday functioning, first learning to notice those on which our safety depends. Information reaching us is carefully segregated by the perceptual system, and some of the stimuli reaching us are received instinctively. Perception is gaining awareness of the environment, which gives us the ability to act in it. Being aware of the environment, we can influence it, and therefore design change in this environment. The very considerations about what and how we perceive can also affect the perception process. In other words, we can question what we "perceive" and, as a result, discover other features of the environment that we had not previously paid attention to in the process of selecting information. Empathy is helpful in discovering features of the environment that we had not previously paid attention to.

Empathy is the ability to feel the mental states of others (emotional empathy) as well as the ability to accept their way of thinking, to look at reality from their perspective (cognitive em-

pathy). An important element of empathy is the ability to imagine the perspective of thought belonging to another person. Empathy can and does have an impact on our perceptual processes. Here, in someone else's shoes, I imagine what it's like to be here and now in their life situation, having certain opportunities and limitations, having specific experiences that shaped them. I am not able to fully understand the needs and way of thinking of this person, but by getting to know another point of view, I enrich my perceptual system. I am able to identify elements of the environment that I did not notice before. Because I have knowledge about my own and, thanks to empathy, about others' ways of interpreting reality, I can notice other previously overlooked elements of it. Since perception consists of processes, it means that we can design it. In other words: science, language, culture, art are elements that design perception. By learning to speak, we learn to describe reality and thus understand it better. However, we are no longer able to return to the previous way of perceiving reality. Our perceptual process has been enriched by linguistic skills, so now perception depends on language. Going a step further, we should ask whether we can project empathy itself as an element of perception? Because if so, it would mean that we probably will no longer be able to perceive without empathy.

DESIGNING EMPATHY IN YOUNG DESIGNERS

Design in the field of design, UX, and architecture is primarily about finding and solving user problems. Teaching design must therefore be teaching empathy, used in practice to analyse user needs. After all, every best design solution starts with a design problem. Finding it requires observation and the participation of users in the design process. Teaching design is providing feedback on the problem selected by the design student. The student independently searches for a solution and must find it without being guided to a design solution. In the course of their search, they contact users and discover technological and workshop solutions. In other words, they collect experiences that help in solving

problems. Empathy-developing experiences include participatory design, i.e. designing a solution together with a group of users who have a similar need or design problem to solve. For example, when designing a city square for a group of people, residents of the area can be included in the design team. This can take the form of social consultations on the project, already at the stage of its assumptions. This approach will allow us to responsibly determine the needs of interested recipients of the project and avoid design errors. We will design a square differently in an ageing district of the city, and differently in a newly built one full of married couples with children.

There are also designed tools that force empathy through the experience of a situation. This experience can be overwhelming, but it allows us to get to know a different point of view and become aware of new ways of perceiving reality.

INVISIBLE SPACES

Decisions depend on consciousness. In my opinion, the best solution that touched upon empathy and built multisensory awareness is the *Invisible Exhibition*. In Warsaw, Budapest, Prague, and Stockholm (since 2016) you can visit such an exhibition. It is an exhibition that you visit in complete darkness with a blind guide.

After the initial moment of panic, because "we are in a new space and we cannot see", there is a sudden opening to the interpretation of reality through other senses. To what we did not pay attention to before. First, we move along the wall, listening to the instructions of a blind guide. If we gather our courage, we can walk through the middle of the room without the help of the wall, exposing ourselves to obstacles. Previously, when walking through the room, I would notice the carpet, I knew that there would be a change of ground, my perceptive system recognized the obstacle before it appeared and ignored the feeling of the change of ground as insignificant. It didn't really occur to me to pay attention to this feeling in my everyday life. For a blind person, the change of ground is an obvious

navigation point, one of the most important points of reference. At the Invisible Exhibition, for the first time since childhood, I sank into the carpet.

This experience drew my attention to the richness of the world, on which my survival does not depend, that I had previously ignored. It allowed me to expand my perception by consciously paying attention to touch and, in a broader perspective, to pay attention to the other senses pushed into the subconscious. Because, after all, I might not have paid attention to the information coming from other senses in various life situations. Thanks to this, I became a better designer. In other words: the experience of participating in the Invisible Exhibition developed my empathy. This experience should be mandatory in design schools and for all people dealing with broadly understood accessibility. Even if it does not ultimately increase the participant's empathy, it will certainly help increase their sensory awareness. After this experience, the participant will pay attention to more non-visual information.

CASE STUDY:
TACTILE TEACHING MATERIALS FOR VISUALLY IMPAIRED AND BLIND PEOPLE PREPARED FOR THE BOTANICAL GARDEN OF THE JAGIELLONIAN UNIVERSITY IN KRAKOW.

My design path related to designing for the blind began in my fourth year of studies. As an Erasmus student in Italy, I came across a design workshop for the blind: "Kaverljag workshop 016 – Insects for the blind and partially sighted", an international workshop of non-fiction illustration in Slovenia in 2011 (Vrezec, 2012). This experience had a huge impact on the choice of my further path. The workshops prepared by Prof. Zdravko Papič and Aleš Sedmak pushed me into the world of designing for the blind, unknown to me so far. However, the aesthetic layer of the book created after the workshops made the greatest impression on me. It resulted directly from the function and readability for the blind,

but due to the selection of technology, simplicity, and design discipline, it had a unique aesthetic character. The following case study is a description of a doctoral thesis conducted at the Faculty of Industrial Design of the Krakow Academy of Fine Arts in Krakow under the supervision of Prof. Czesława Frejlich and fully implemented in 2019.

Typhlographs are sometimes treated as an unpleasant addition to the work of a designer creating an exhibition arrangement or visual communication of space. That is why I decided to explore this design path to prove that it can be interesting and creative. I will use the example of a project carried out as part of my doctoral thesis titled *Tactile Didactic Materials for Visually Impaired and Blind People Prepared for the Botanical Garden of the Jagiellonian University in Krakow. fully implemented as Comprehensive Typhlographic Solution for the Botanical Garden of the Jagiellonian University in Krakow*. Its primary goal was to integrate blind and sighted people, which can be achieved thanks to tactile graphics. The design solution was to be characterized by readability and aesthetics for blind and sighted people. Other goals of the work were to criticize and expand the scope of tactile graphics design methods. The whole took into account the guidelines for designing tactile graphics, combining them with the principles of creating visual communication. An important part of the work was to examine the readability of the created tactile graphics and select the material so that it would be harmonious with the visual appearance of the garden. The project refers to the historical visual communication of the institution through the material used and does not interfere with the reception of specimens in the garden. Placing it in the Victoria greenhouse complex (where the plant specimens that are its subject are located) stimulates all the senses of a blind person. This in turn allows for better memorization of information in the field of botany. The typhlographics are enriched with an easy-to-use audio application, thanks to which the recipient can listen to the audio description.

INTERSEMIOTIC TRANSLATION

People with visual impairments base their knowledge of visual phenomena on the cultural description. This is due to the need to understand the omnipresent visual language. Part of their knowledge of the world is not formulated on the basis of experience, it is expanded by "stories about seeing" confirmed empirically. Transparency is a phenomenon that cannot be described without an example. We need to find a way to connect the experience of transparency with its concept, so that it makes sense. Parchment on a sheet of paper printed in Braille allows a person blind from birth to understand the concept of transparency: the convex inscription remains legible. We are able to build such an experience. The concept of transparency will become clear, experienced through another sense. This is what intersemiotic translation (from one system of signs to another) from one sense to another is all about. On this principle, visual phenomena can be explained to blind people, but can auditory phenomena be explained visually? It is possible: echo is a phenomenon inaccessible to deaf people, but mirror infinity can explain the principle of this phenomenon to them. A designer should set himself challenges.

After analysing the differences and similarities of the perception process, as well as existing solutions prepared for the main target group (blind people), I focused on preparing design assumptions. I wanted to bring about a meeting of blind and sighted people around universal adaptations, so that the information conveyed by graphics would enrich both, giving them a field of understanding.

TACTILE GRAPHICS

Creating typhlographics is a combination of graphic design using a drawing synthesis of the illustrated object with the construction of replicable objects in the form of relief illustrations. In order to fulfil an integrative function, illustrations should also be aesthetic for the sighted. We design an object whose visual aesthetic qualities should be in accordance with our sensitivity and sense of

beauty. If blind people rely on information about the visual world, and we, as specialists, tell them that the proposed solution is aesthetic, they will take us at our word. This is a huge responsibility—as well as a challenge for ourselves. It is often an adaptation for the blind that draws the attention of the sighted to an object on the educational path.

Another function of tactile graphics can be to satisfy the need for touch in sighted people, especially since in most institutions you can't touch anything. When designing tactile graphics, you have quite a lot of freedom in terms of its appearance. Of course, it has to be contrasting due to the needs of those with visual impairments. Therefore, in terms of visual communication, a blind person leaves us complete freedom—the designer's dream is seemingly fulfilled. In the case of the legibility of tactile graphics, however, we must absolutely introduce the comments of blind people who check its legibility by touch. The results of the tactile graphic legibility test can impose certain image simplifications on us, which will affect its appearance as visual communication. From my experience, I conclude that the functionality resulting from the image simplifications created during the tactile verification of tactile graphics with a control group builds a very synthetic and clear drawing. Such a drawing should be aesthetic in itself, but the choice of the material and the lack of graphic awareness of tactile educators can spoil this impression.

SCIENTIFIC ILLUSTRATION

Scientific illustration, or more precisely its subfield botanical illustration, is related to the communication of specific (defining) details of studied specimens using visual means. It can be used to convey anatomy and explain the biological functions of organisms. Such illustrations allow for the presentation of details: from the representation of the entire organism to its microscopic close-ups. A botanical illustration is a visual interpretation of a selected organism, not its mimetic representation, but rather a showing of the "truth about it". This type of illustration shows the plant in an

idealized form, non-existent in nature. At the same time, it presents all stages of the plant's development and its cross-sections. Thanks to this, the recipient can, based on such an illustration, recognize the found specimen. Botanical illustration seems ideal for translation into the language of tactile graphics. Of course, some simplifications have to be made in this process, but information about the plant can be written down in subsequent illustrations. The design work in the design of tactile graphics draws largely from scientific illustration. Its goal is to design a simplified, legible, and aesthetic (for blind and sighted people) solution that conveys the "truth" about the presented object. Drawing conventions must be rejected and the presented object must be shown in a projection (projections). The abstractness of the phenomena of vision described earlier has a fundamental impact on the way graphics are translated.

WHERE? LOCATION.

When I was thinking about a place where I could implement my thesis about combining visual communication with typhlographics, I contacted the director of the Botanical Garden, Prof. Józef Mitka. The garden is visited by blind people more often than museums.

We planned to create ten typhlographic representations of plants from the oldest greenhouse complex, Victoria. This choice resulted from the location of the greenhouse complex close to the entrance to the garden and the ease of finding it on the 9.6 ha of the park. We wanted to create a publicly accessible educational path that would be intended for both sighted and blind people. This complex of buildings provided such an opportunity. Placing the adaptation in the closed microclimates of the greenhouse should trigger a multisensory experience for blind people, just as it does for sighted people. The planned reconstruction of the greenhouse resulted in the implementation of the project. Representations of tropical plants have not yet been implemented in Poland in the form of relief graphics. Due to toxins secreted by

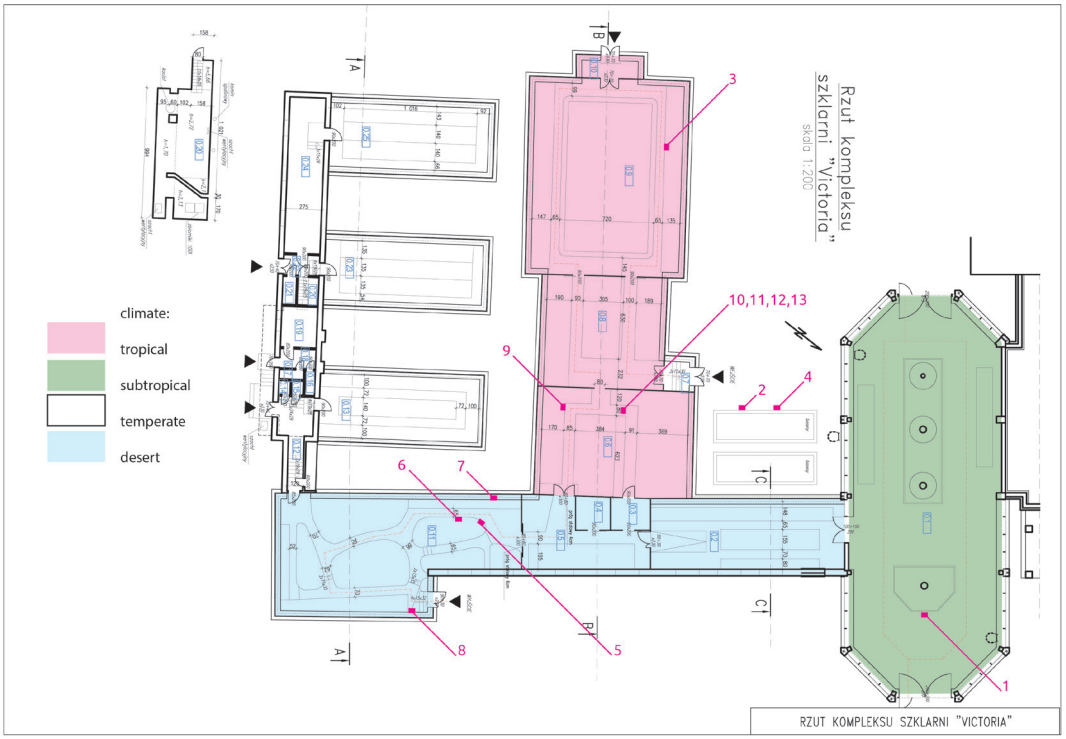

Figure 1: Location of illustrations in the Victoria greenhouse complex.

Figure 2: Educational boards in the Jagiellonian University Botanical Garden. (personal archive)

Figure 3: Porcelain tablet from the Botanical Garden of the Jagiellonian University. (personal archive)

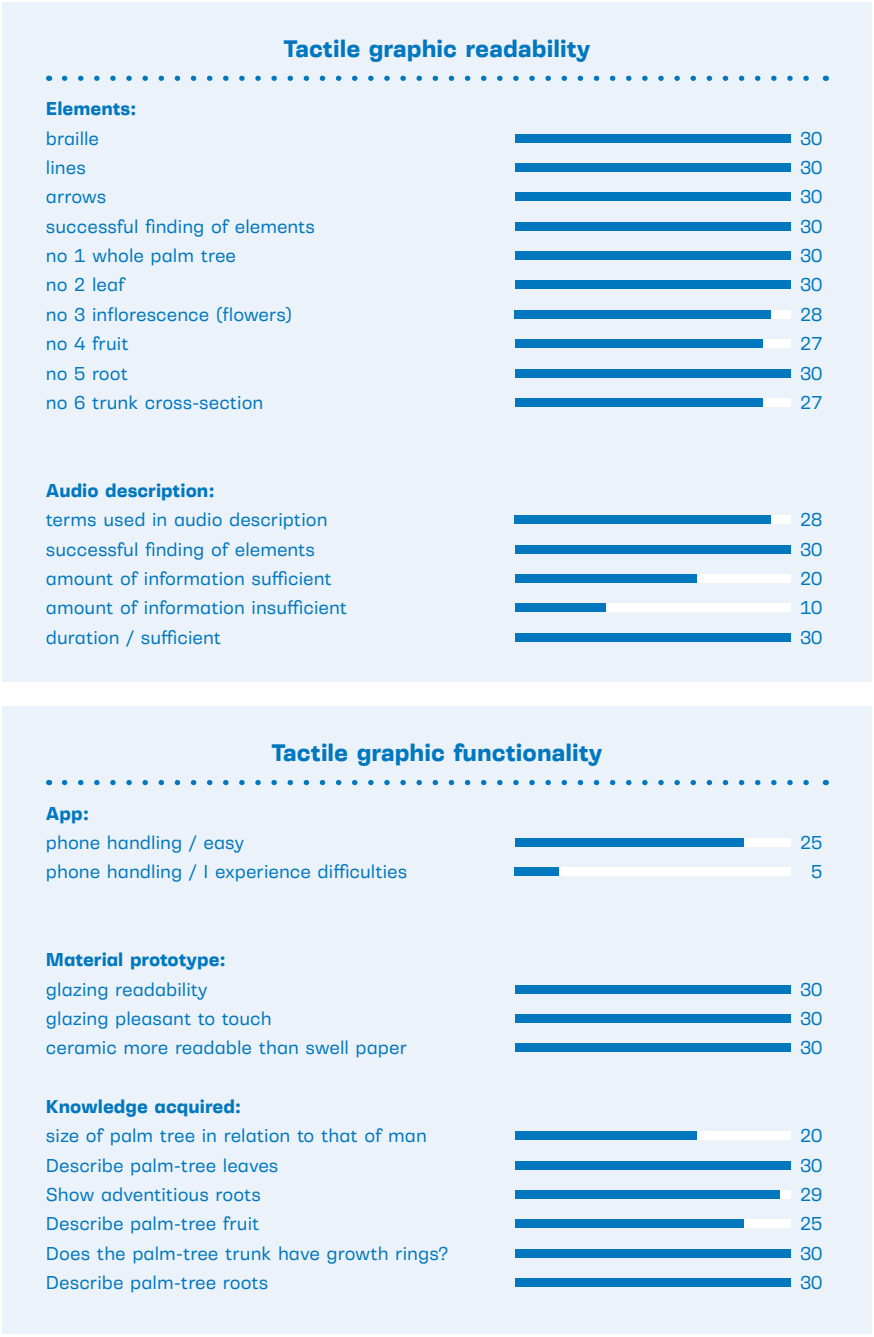

Figure 4: Adaptation readability test results: number of people who found the element readable out of 30 people tested.

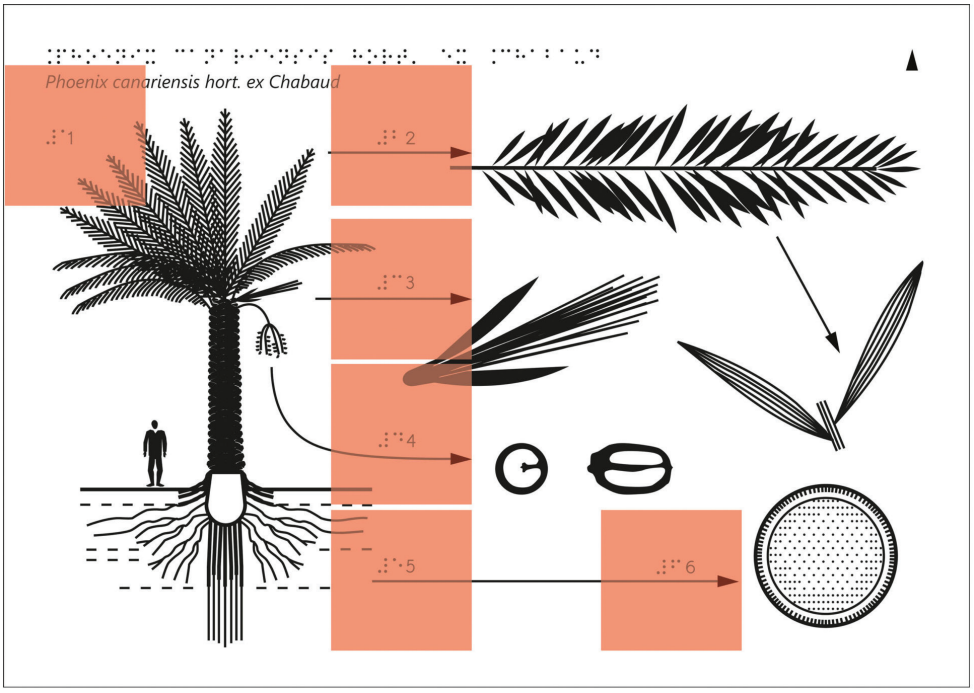

Figure 5: Location of NFC chips on typhlography.
(personal archive)

Figure 6: Adaptation of *Cereus Repandus Haw.*
in the Botanical Garden

some plants, it is not allowed to touch or pick any specimens in the garden. Safely distinguishing plants that can be touched from the rest is not possible with such a huge number of specimens. Tactile illustrations in the greenhouse thus help satisfy the need for tactile confirmation of what we see for the first time, and provide sighted people with a substitute for such confirmation.

WHAT? SELECTION OF SPECIMENS.

The selection of specimens to be adapted to the needs of blind people was made by the garden staff. The selection from a huge number of species was conditioned by additional guidelines. First of all, a typhlographic presentation of plants from one genus, whose visual representations are very similar formally, would not provide blind people with additional information. For example, the club-moss (*Cereus Mill.*) is a genus comprising 48 species of succulents from the cactus family. Yes, some plants from this genus differ significantly from each other, but most representatives differ in the colour of their flowers or the density and length of their thorns. With a high level of generalization, necessary for creating tactile graphics, these details may become illegible. In such cases, one species was selected that is suitable for a relatively easy presentation. In addition, plants should be selected that are not only interesting, but also allow for a biology lesson, raising issues related to the structure, reproduction, taxonomy of flora, etc. The choice of an object may also result from its uniqueness.

HOW? VISUAL COMMUNICATION IN THE JAGIELLONIAN UNIVERSITY BOTANICAL GARDEN.

Visual communication in the Jagiellonian University Botanical Garden was inconsistent, it was created as a result of subsequent projects written for specific parts of this institution, and is often created independently by the institution's employees. Analysing subsequent visual solutions in the park, I decided that the only solution that would meet the project's assumptions would be to refer to historical ceramic plaques describing the specimens col-

lected here. They have a unique character, resulting from their form and material (porcelain). Regardless of the changes that have occurred over the years, they will always fit this place, and they are already associated with it, unlike other communication solutions of this type.

HOW? PROJECT.

The design work began with a preliminary sketch of the typhlographics. It was made using a swell form machine and special swelling paper. I developed it based on my previous several years of experience with convex graphics. During my work, I used my database of proven textures and lines in the form of a printout (relief). This allowed me to verify the design by touch. The work was consulted with specialists from the Department for the Disabled at the Jagiellonian University. In parallel, audio description, the NFC application, and, after initial verification of the design, half of the ceramic prototype were created. Completing half allowed for reducing costs at this stage of the project and gave the opportunity to test the material and different levels of relief convexity. Then, I prepared a readability survey sheet and conducted a pilot survey (3 people) and a target survey (30 people) of people blind from birth and blinded in different age groups. The survey includes questions about: the readability of individual parts of the tactile graphics (Braille, subsequent parts of the illustration), the ease of working with the NFC application, other tactile graphics available on the market, knowledge gained by touching the adaptation, differences between the swelling print and the material prototype, aesthetic feelings related to touching the tactile graphics. During the pilot implementation of the survey, I made video recordings of the movement of the hands of the examined person while reading the tactile graphics. After making corrections after the pilot survey, the tactile graphics turned out to be fully readable.

The NFC application was to allow the use of audio descriptions by placing the phone on the spot where the special chip was placed. As can be expected, this significantly simplifies the recep-

tion of the tactile graphics, but the arrangement of the chips becomes another design challenge. The NFC chip has a range of 6 cm. In order for the reader (phone) not to confuse subsequent chips with each other, it is necessary to separate their ranges by approximately 1 cm. The arrangement of the chips therefore imposed a grid in which all the illustrations should be placed. In order to check the correctness of this grid, it was necessary to make preliminary designs of the remaining tactile graphics. The palm *Phoenix canariensis hort. ex Chabaud*, the main prototype, fits into a vertical rectangle, the lucky tree *Crassula ovata (P. Mill.) Druce* rather into a square, and similar differences also occur between subsequent enlargements or cross-sections of parts of these plants, present in the adaptations.

Taking care of the coherence of the entire system, I decided to keep:

- → the same margin, triangle informing about the orientation of the typhlographics, and the main caption for the entire series of adaptations.
- → for adaptations presenting whole plants together with their structure, an additional grid resulting from the arrangement of NFC chips, designed so that they remain aesthetically coherent and legible.
- → for the adaptation presenting a comparison of fern leaves, a separate arrangement of NFC chips, because referring to the above-mentioned series would negatively affect legibility.

At this stage of the work, an idea emerged to enhance the multisensory experience of plant typhlographics by including sounds from their place of origin in the audio description. The composition of sounds from the Canary Islands was made by Marcin Pawlukiewicz, who deals with, among other things, the sound recording of documentaries. It was added to the audio description files, dominates at the beginning of the main descrip-

tion of the plant, then forms the background for the narrator. This cooperation developed during the implementation of the project. The challenge was to compose sounds distinguishable for similar conditions of occurrence of specimens. One of the most interesting solutions turned out to be the use of cultural meanings of plants, for example in the target implementation of *Nelumbo nucifera Gaertn.*—the Indian lotus—was commented on with the sounds of a Buddhist temple.

HOW? MATERIAL.

The ceramic prototype made for the doctoral thesis met its assumptions, and was aesthetic and legible. In the legibility surveys related to the project, as well as during later meetings with people with visual impairments, the material used to make the prototype was described as aesthetically pleasing to the touch, more pleasant than typhlographic thermoplastics and tactile graphics made of puffy paper or plastic. However, during the implementation of the project, based on new experiences from the completed work, together with Bogdan Kosak, we managed to refine the technology of making porcelain typhlographics and significantly increase their legibility. This required design changes and the development of new technological procedures, including deepening the relief in milled plaster matrices. We achieved the best results in the case of two representations of cacti, where you can feel the pricks of the thorns, but they are not sharp enough to pierce the skin.

During its implementation, the project was expanded to include a simplified map of the entire garden and a detailed plan of the Victoria greenhouse complex. This is the simplest possible system, consisting of general and more detailed elements. Due to their size (60 × 80 cm), the plan and map were made of epoxy, but their appearance imitates ceramic solutions. Making such large slabs with precise relief in porcelain would require the development of a new technological path, which would be irrational in terms of cost and would not allow it to fit into the project's time frame. The

map and plan were enriched with a simple audio system: using two buttons, we can listen to basic information about the application's capabilities, how to install it (for iOS and Android), and how to use it. Additionally, the legend was also made in English, so that in the future we could add only the audio application in English (or another language) and a chip leading to a link in the store, from which it can be downloaded for free. The maps are also equipped with a set of NFC tags, so that a sighted person can familiarize themselves with specific rooms of the greenhouse or parts of the garden using the app.

DESIGN COMPROMISE

With the opening of the Jagiellonian University Botanical Garden in spring 2020, a system of typhlographics combined with visual communication was presented, supported by an application, also equipped with printed descriptions for people who do not use phones. This is a compromise resulting from the challenge: combining two different worlds, while maintaining minimal loss for each of them. A blind person can listen to audio files on the Garden's website before going there. A blind person selects from one to three illustrations during one trip. Familiarizing themselves with the whole thing at once (the estimated time of using typhlographics is 30–40 minutes) would be too tiring. A blind person starts the application and, standing in front of the illustration, holds the phone with the NFC reader to the triangle orienting the convex graphic to hear the technical description (instructions for use together with the arrangement of parts of the illustration). Then, they select the fragments that interest them. Listening to the subsequent recordings, they put the phone on the shelf that slides out on the right. The typhlographics are placed at a height that is also convenient for people with mobility impairments, who use wheelchairs. A blind person who prefers to use the texts in Braille can pull them out of a pocket placed behind the illustration. Sighted people can also use the audio application to deepen their knowledge of selected specimens.

SOCIAL INCLUSION

"To see" must be like predicting the future [...]. *Because you already know now that there will be a tree in a moment, and I will only know later, only when I approach the tree and touch it*.[1]

Predicting the future, or rather influencing it, through design is largely the domain of designers. A designer should see challenges, analyse them, and find a solution that has the greatest impact on the target group. A product becomes better not because it is different from others. It is better because of its purpose, function, and availability. The individual character of a product becomes secondary to its function.

Blind people move mainly in memory, it is memory that tells them about space. For them, space takes place in time. I am close to saying that it is not touch, hearing, or smell that replaces sight for blind people, but memory. The project prepared for the Botanical Garden is intended to inscribe the largest possible number of images into the memory of blind people, which, together with descriptions and feelings, should create a coherent introduction to the world of plants.

As a result, social integration of people with visual disabilities may occur. This is a long-term process. The project opens up the possibility of further implementation of similar solutions in other institutions. The project caught the attention of the Polish accessibility and design community as well as typhlopedagogues. They increasingly want to establish co-operation with visual communication designers. As a result of the project I implemented, more projects with a coherent visual and haptic layer began to be created. This project proves that in accordance with the principles of creating typhlographs, it is possible to design as aesthetic objects for sighted people, partially taking over the functions of visual communication. "Material truth" should be added to these principles in this field. In institutions where it is not allowed to touch

1 Explanation of a blind girl – author's note.

exhibits, tactile graphics can satisfy the need for touch in sighted people. If the object is visually encouraging, it will also be a place to expand experiences with touch, a place of meeting and mutual understanding between blind and sighted people.

Literature and sources

Białek I., Perdeus-Białek M. (2003): Widzieć, to znaczy przewidywać przyszłość. Studio Reportażu i Dokumentu.

Kolasiński, L. (2019): PORTFOLIO PROJEKTU. Kompleksowe rozwiązanie tyflograficzne dla szklarni „Victoria" w Ogrodzie Botanicznym Uniwersytetu Jagiellońskiego w Krakowie. https://www.uken.krakow.pl/images/dokumenty/aktualnosci/2021/portfolio-projektu-Kompleksowe-rozwizanie-tyflograficzne-dla-szklarni-Victoria-w-Ogrodzie-Botanicznym-UJ.pdf (5.11.2024).

Edman, P. K. (1992): Tactile Graphics. New York, American Foundation for the Blind.

Keller, H. (1991): The Story of My Life. Random House Inc.

Kowalski, K. (2024): Włącznik 2.0: Projektowanie bez barier. Warszawa, Fundacja Integracja. https://integracja.org/english/ (4. 11. 2024).

Pallasmaa, J. (2012): The Eyes of the Skin: Architecture and the Senses. Hoboken, John Wiley & Sons, Inc.

Pawłowski, A. (2001): Inicjacje: o sztuce, projektowaniu i kształceniu projektantów. Krakow, Academy of Fine Arts.

Salzhauer Axel, E., Sobol Levent, N. (2013): Art Beyond Sight: A Resource Guide to Art, Creativity, and Visual Impairment. New York, American Foundation for the Blind.

Vrezec, A. (2012): Žuželke od blizu. Koper, Društvo Kaverljag.