IDC School of Design
अभिकल्प विद्यालय

P3 M.DES COMMUNICATION DESIGN

Game design for

Inclusivity

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Guided by:
Prof. Prasad Bokil

ACKNOWLEDGMENT

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CONTENTS

INTRODUCTION

I started my project with the motivation to explore game design. While exploring the topic we realised that very few games are available for individuals with visual disability, and the situation is even worse when it comes to games that can be played by the audience with or without visual disability.

User Group

The user groups may consist of individuals with weakened eyesight due to aging, those who have lost their sight, or individuals who are partially blind either from birth or due to an accident. It includes sighted individuals and those with varying degrees of visual impairment.

Image generated through Midjourney

Sighted | **Partially Blind** | **Blind**

WHY THIS TOPIC?

Goal

Create a gaming environment that fosters inclusivity, enabling users to come together and enjoy themselves regardless of their visual abilities.

Inclusive game

As designers it is important that we make inclusive and universal designs, particularly in the context of games.

Less work done in this area

There are very few/ no games are available that can be played by sighted and blind together.

Personal motivation

Having grandmother, who has low vision, has made me keenly aware of the challenges she faces in her daily life. Witnessing the difficulties she encounters while performing everyday tasks, I have gained a deeper understanding of the impact that visual impairment can have. This personal experience has motivated me to create a game that can be enjoyed by individuals with limited or no sight.

Image generated through Midjourney

SECONDARY RESEARCH

- Game design
- VIP

Game design

Theory

In order to grasp the concept of game design, Chapter 1 of the book “Rules of Play” was referenced.

Concept games excercises

We were two interns, two minors and a PhD student under Prasad sir doing a project/ course in Game design. We used some exercises to better understand game design and would discuss our ideas together in the weekly meetings. During the discussions, we were provided with prompts such as “create a game using only a specific body part” and were challenged to develop a game within that constraint. As a result, two main games were extensively discussed as part of these exercises.

Odd-eve hand
Game using body part

Tippy toe fingers
Teach maths with sounds

Breif: Design a game which uses your body part.

Game designed: “Odd-eve hand”

Game Setup
Number of players: 2 or more.

Objective:
To be the last player left with an un-slapped hand.

Instructions:
Players sit in a circle and hold their hands out in front of them.

Gameplay
- Players take turns slapping the hand of another player in the circle while trying to avoid getting their own hand slapped.
- Once a player’s hand has been slapped, they reduce the number of fingers by one.

Condition:
- You can only slap an even number of fingers with an even number of fingers and similarly odd with an odd. Otherwise, you loose a finger.
- Incase you have even no. of fingers and opponents have odd and you cannot hit anyone, you reduce a finger and then turn goes to the next player. Vice versa.

Power:
with even number of fingers you can slap twice.

Winning conditions
The last remaining player/ team wins the game.

Variations:
- Players can also play in teams and take turns slapping other teams.
- Alternative: Number of slaps can also be equivalent to the number of fingers left.

Issues
The game is getting a bit complex.

Brief: Design a game with just using sounds to teach maths.

Game designed: “Tippy toe fingers”

Game Setup:
Number of players: 2-4
Age: 2nd grade and above

Objective:
To be the last player remaining

Instructions:
Players sit in a circle with a table in between, keeping their hands extended in front of them.

Gameplay:
Each sound corresponds to a specific number:

- Slap: 1
- 2-finger tap: 2
- 3-finger tap: 3
- 4-finger tap: 4
- 5-finger tap: 5

Condition:
The starting player uses a 2-finger tap + slap, the second player uses a 3-finger tap + slap, the next player uses a 4-finger tap + slap, and so on.

Rules:
- Each player can only use the assigned number of finger taps. For example, a player with 2 taps cannot use 3 taps.
- Every player can use a slap (1 number).
- The total sum of taps and slaps cannot exceed 20.
- The number of slaps cannot exceed the number of taps assigned.
- Example:
- Player 1: 2 (2-finger tap) + 2 (2-finger tap) + 2 (2-finger tap) + 1 (slap) = 7
- Player 2: 3 (3-finger tap) + 3 (3-finger tap) + 1 (slap) = 7
- Player 3: 4 (4-finger tap) + 3 (slap) = 7
- Player 4: 5 (5-finger tap) + 2 (slap) = 7

Losing Conditions:
- Providing an incorrect sum.
- Using an incorrect number of finger taps.
- Taking excessive time.
- Having more slaps than the number of taps assigned.

Winning Condition:
The last remaining player wins the game.

Issues:
There might be challenges with audibility of the tapping sounds.

Visually Impaired People (VIP)

Categories of Visual Disability

In India **visual disability (19%)** is the **2nd largest persons with disability.** According to the guidelines of disabilities (2018), in India there are 4 broad categories based on percentage of impairment.

- 20% is **category I**
- 30% is **category II** (one eyed person)
- 40% - 80% is **category III** (low vision)
- 90% - 100% is **category IV** (Blindness)

Past IDC students projects

I referred to past projects undertaken at IDC related to the blind user group. There were 3 projects which I found were insightful for my topic.

Learning Aid for Visually Impaired Children

Priyanka Chavan
Prof. Mandar Rane

Design of teaching- learning aids for blind children

Patric John
Prof. R. Sandesh

Grapho: Bringing line chart accessibility to the visually impaired

Anurag Kumar Singh
Prof. Anirudha Joshi

The students in their project utilized documented insights and findings from respected organizations such as

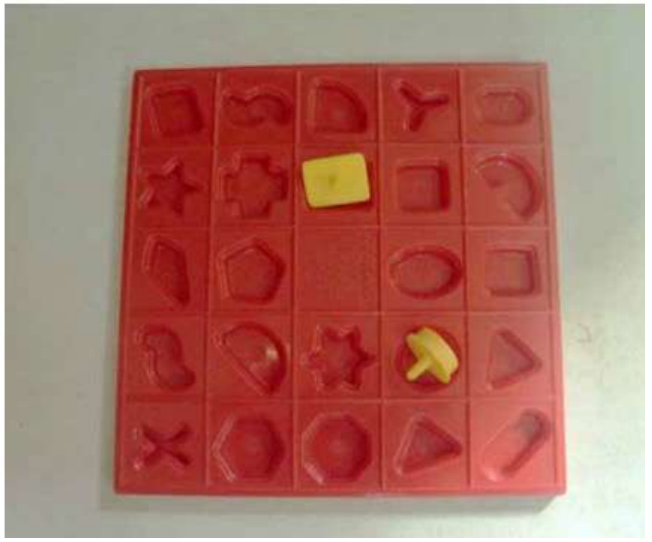
- **The National Association for the Blind (NAB) in Sion**
- **The Smt Kamla Mehata Dadar School For The Blind in Dadar**
- **The Xavier's Resource Centre for the visually challenged (XRCVC), CST.**

In my project, I also referred to their valuable findings and insights.

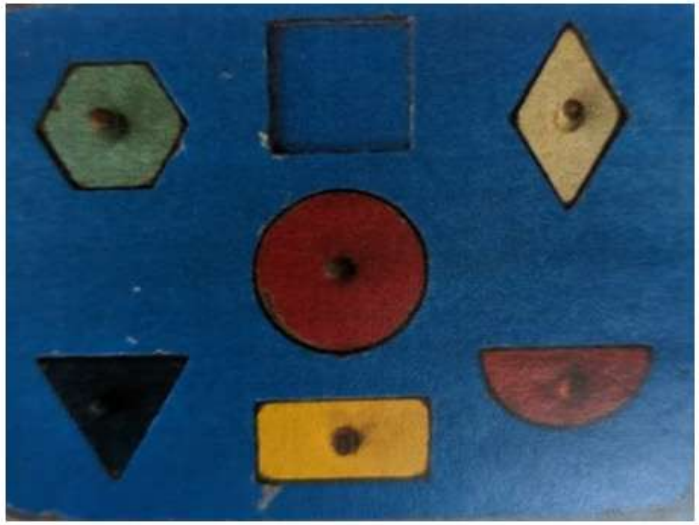
Images from Priyanka Chavan's report

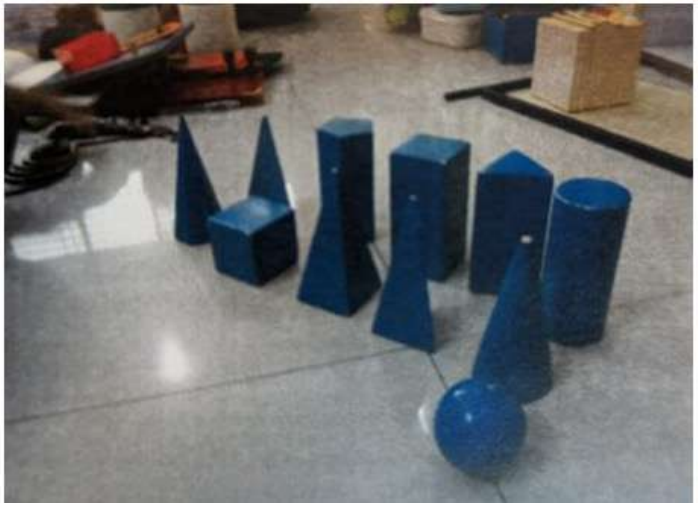
These images are taken from past stduent reports.
At to left we can see how the students are taught to cook.
Top right is the tactile chess for blind.
Bottom images shows tools used by the blind kids do maths.

Counting skills can be taught to blind children using beads and marbles. When selecting materials for this purpose, key considerations include their tactile and auditory features.



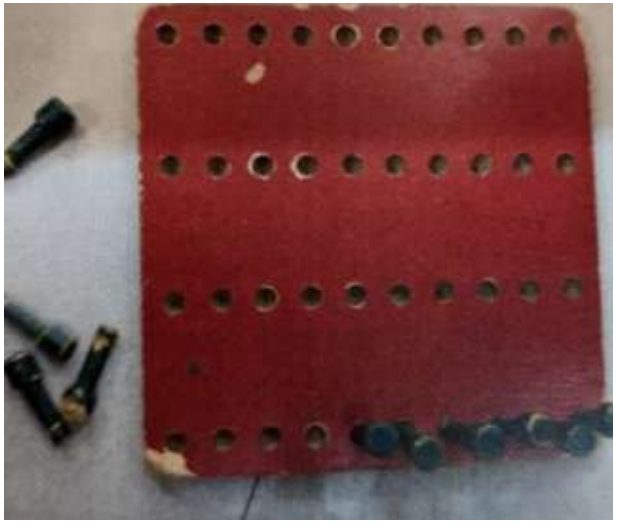
Matching and fitting shapes are common exercises employed to enhance tactile skills and develop a sense of shapes among individuals who are blind.





these are some of the tools used to teach blind children shapes.

The following tools are utilized for teaching counting, braille, and facilitating mathematical calculations

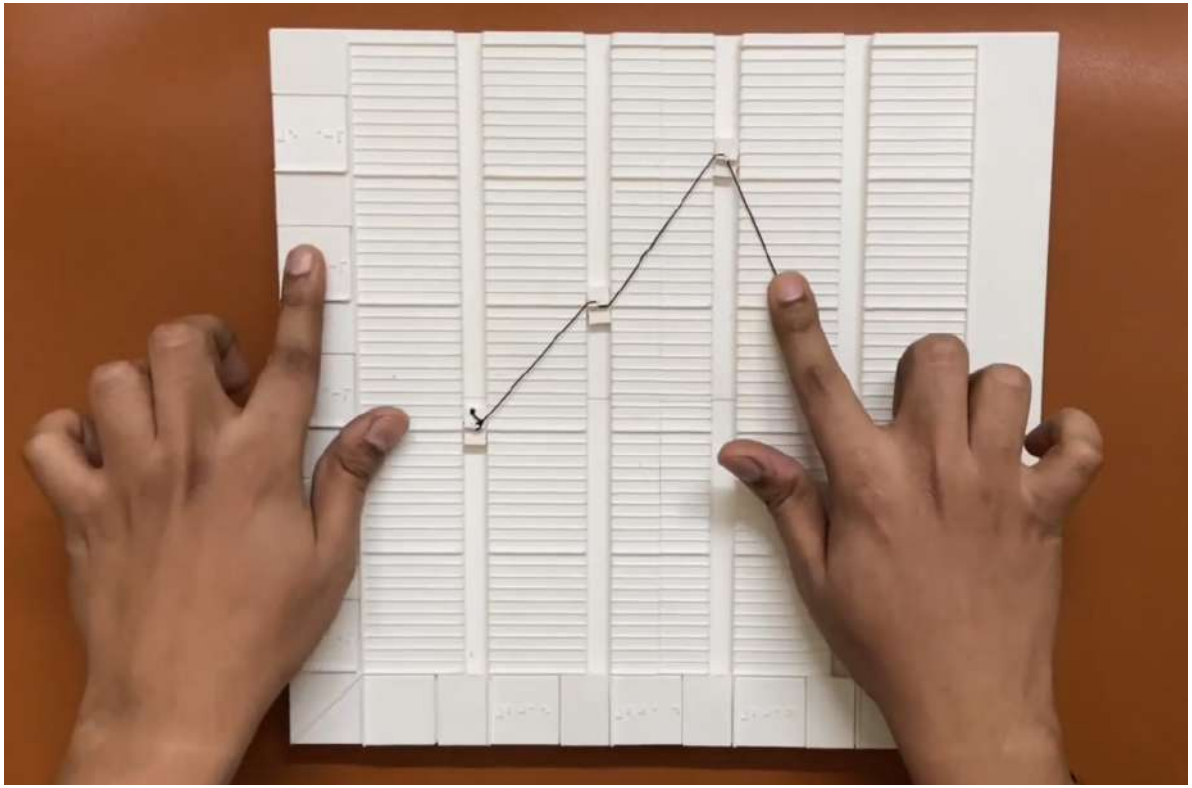


Grapho: Bringing line chart accessibility to the visually impaired

https://dl.acm.org/doi/abs/10.1145/3570211.3570213

Grapho is a proposed graph visualization tool designed by Anurag under the guidance of Prof. Anirudha, specifically for visually impaired individuals, aiming to provide them with the ability to perceive, create, and modify line charts. The current prototype allows users to generate line charts containing four “x” values and fifty “y” values. Following a training session, visually impaired individuals can independently utilize the prototype without the assistance of a moderator, empowering them to create their own line charts.

The project utilized a tactile feature to assist visually impaired individuals (VIPs) in navigation. The design of the board was straightforward yet efficient, incorporating a slider mechanism located at the bottom right. This slider mechanism ensured that the thread remained taut throughout the process.



Insights

Teach counting:

Counting skills can be taught to blind children using beads and marbles. When selecting materials for this purpose, key considerations include their **tactile and auditory features.**

To facilitate learning, tactile materials such as beads and marbles are chosen. These objects provide a tangible and tactile experience, allowing blind children to physically interact with them. By feeling the beads or marbles, they can develop a sense of quantity and understand the concept of counting.

In addition to the tactile aspect, sound is another crucial feature to consider. Some beads and marbles may produce distinct sounds when they collide or are manipulated, which can aid in reinforcing counting skills. The auditory feedback provides an additional sensory cue that assists blind children in comprehending and engaging with the counting process.

By utilizing materials with tactile and sound properties, educators and caregivers can enhance the learning experience for blind children, enabling them to develop their counting abilities effectively.

Teach shapes

Matching and fitting shapes are common exercises employed to enhance tactile skills and develop a sense of shapes among individuals who are blind.

Matching shapes involves identifying and pairing objects with similar shapes, sizes, or contours. This activity helps in recognizing and distinguishing different shapes through touch. By exploring and **feeling the surfaces of various objects,** blind individuals can learn to identify shapes based on their tactile characteristics.

Fitting shapes focuses on manipulating objects to fit them into corresponding spaces or containers. This exercise aids in understanding **spatial relationships, orientation** and developing **fine motor skills.** Blind individuals can refine their sense of touch and spatial awareness by aligning and fitting objects into designated areas or shapes.

These activities not only foster shape recognition but also promote sensory exploration and cognitive development for the blind. By actively engaging in matching and fitting exercises, individuals who are blind can enhance their **tactile perception, refine their spatial abilities, and gain a deeper understanding of shapes through touch.**

PRIMARY RESEARCH

- Visit to NADE (National Association of Disabled's Enterprises), Vikhroli, Mumbai
- Interaction with students of Victoria memorial school for the Blind, during the Kala Ghoda festival.
- Interactions with Kailash Tandel
- Interactions with Ravi and Manoj
- Conducting "sensory enhancement." workshop @IDC

Visit to NADE (National Association of Disabled's Enterprises), Vikhroli, Mumbai

NADE is a Non-Governmental Organization operating at a national level, registered with both Union and State Governments. Its primary goal is to offer specialized education to children with mental challenges, as well as provide vocational training, employment opportunities, self-employment prospects, and other welfare programs to unemployed individuals with disabilities such as those who are visually impaired, hearing impaired, orthopedically challenged, or mentally challenged, from all regions of India.

What they do

- A Special School for the benefit of Mentally Challenged Children
- A Vocational Training Centre for all categories of disabled persons like Visually Impaired, Hearing Impaired, Orthopaedically Challenged & Mentally Challenged persons.
- An Employment Project(Workshops) for the disabled.

My visit experience

During our visit, we had the opportunity to engage with several distinct groups. The first group comprised 8-10 visually impaired individuals who were actively involved in tasks such as making umbrellas and making switches. Another group consisted of individuals with mental challenges who were dedicatedly making cloth tags. Lastly, we encountered a diverse group consisting of individuals with both visual and mental challenges who were collaboratively engaged in the production of garments.
During our visit, we had the opportunity to engage with various individuals associated with the organization, including the organizers, staff members, and other members. We had detailed conversations with two of the VIPs named **Vikram More**, who is 56 years old, and **Mr. Khureshi**, who is 41 years old.

Image taken from the website: https://www.nade-india.org/



Visually impaired individuals who were actively involved in tasks such as making umbrellas.

Visually impaired individuals who were actively involved in tasks such as making switches.

Individuals with mental challenges who were dedicatedly making cloth tags.

Things crafted by VIP

Garments being made by the VIP.

Chat with Mr. Vikram More

At the tender age of 2, smallpox robbed him of his sight. However, he persevered and completed his SSC (Secondary School Certificate) from a Blind School in Chalisgaon. In 1981, he arrived in Mumbai, where he wandered the streets, facing thirst and hunger.

Amidst the glitz and glamour of Mumbai, the pain of helplessness and the sting of rejection fueled his determination to rise and fight. In 1994, he became a trainee at NADE, and today, he holds the position of Development Officer within the organization. He also serves as a valued member of NADE's Executive Council. Through his resilience, he has reclaimed his self-respect and now imparts the same to others.

He proudly proclaims, "NADE is the reason for my present achievements," acknowledging that his hard work and dedication have brought him success and happiness in life.

One question he posed to me left a profound impact. He asked whether I felt a sense of sadness for them for not having one of the most precious gifts - the gift of sight - and how fortunate we are to possess it, emphasizing the importance of appreciating it every single day of our lives. This encounter truly heightened my appreciation and deepened my compassion for them.

Among the tasks he mentioned were umbrella making, switch assembly, pin punching, crafting safety pins, paper wrapping, laundry tags, Diwali diya creation, and massage, to name a few.

When inquired about games, his response primarily included cricket, housy, and a number-guessing game. This observation underscored the **limited availability of games tailored to the blind community.** Furthermore, when prompted to suggest games that could be enjoyed by both sighted and visually impaired individuals, he struggled to come up with many options, **indicating a lack of inclusive gaming experiences.**

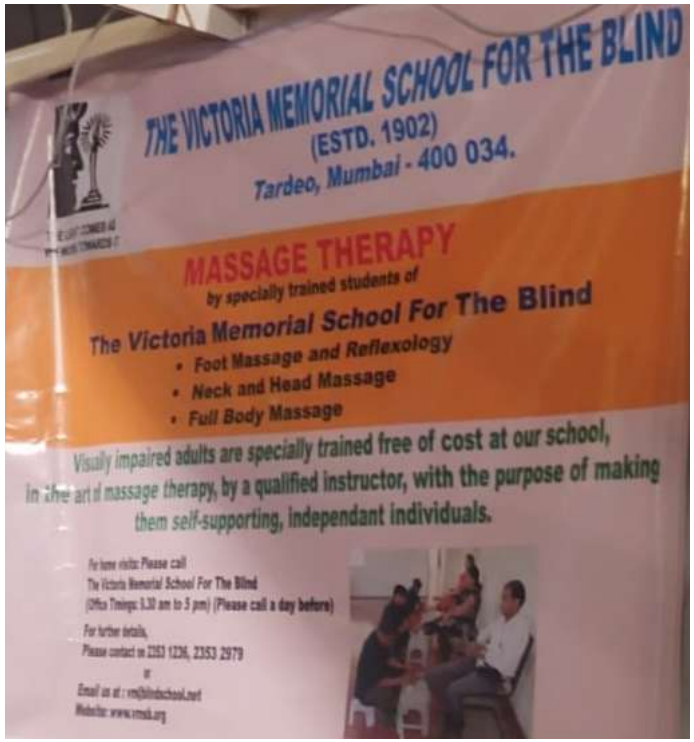
Chat with Mr. Ismail Quereshi

At the age of 2, he lost his vision due to Typhoid. Despite this setback, he exhibited unwavering determination and overcame various challenges to successfully obtain his B.A. degree from Mumbai University. Unfortunately, he encountered difficulty in securing a regular job thereafter.

Filled with disappointment, he turned to NADE in 2008. Presently, he is employed in our Godrej Packing Department, providing support for his wife and two children.

While conversing with him, he enthusiastically shared his passion for singing and recounted his numerous performances and accolades earned in school. He takes great pride in these achievements.

However, when asked about the games he played or enjoyed as a child, he struggled to recall many. He mentioned card games, chess, and cricket, but predominantly emphasized that most of the games he engages in are verbal in nature and can be played by both blind and sighted individuals.



Images taken during the Kala Ghoda festival.

Interaction with students/ staff of Victoria memorial school for the Blind, during the Kala Ghoda festival.

During the Kala Ghoda festival, numerous stalls were set up for people to explore and purchase crafts created by artists. There were captivating displays of calligraphy and paintings. As I wandered through the festival, I stumbled upon a particular spot where people were receiving massages. To my dismay, this area was occupied by students from "The Victoria Memorial School for the Blind," positioned in a corner without a proper shelter like the rest of the stalls.

Curiosity piqued, I stood there, observing how these individuals skillfully provided massages. Upon inquiring, I discovered that massage therapy is one of their specialities, and they are professionally trained in this field. It became evident that many blind individuals pursue careers in massage therapy as a means of livelihood.

The training in massage therapy serves as a pathway towards self-sufficiency and independence for the blind community. Witnessing their dedication and skill highlighted the importance of understanding the daily lives and occupations of blind individuals. This knowledge is crucial in designing effectively for their specific needs and creating inclusive experiences.

Interactions with Kailash Tandel

Kailash, a Ph.D. student at IIT Bombay, played a crucial role in my project and became someone I reached out to the most. He has been known to assist many past students with their projects, showing his willingness to help and share knowledge. From the moment I messaged him, he promptly responded, and we decided to meet for lunch at Gulmohar. During our conversation, we discussed our perceptions of blindness, and as someone new to this field, I was apprehensive about asking questions without unintentionally hurting the feelings of the blind. However, Kailash made me feel comfortable and began sharing his valuable insights about design in our surroundings.

Throughout the project, our friendship grew, and we became supportive of each other. Kailash would assist me with any doubts or concerns I had regarding my project, while I would help him with tasks like filling forms, creating tables on the computer, accompanying him to the hospital in case of emergencies, or assisting with printing needs. He also introduced me to his visually impaired friends, allowing me to interact with them and gain further insights for my project.

Together with his friends Ravi and Manoj, Kailash accompanied me to IDC for a discussion with professors and interns. We even decided

to organize a sensory workshop at IDC to address misconceptions that students may have regarding people with visual impairments. Kailash has been a constant source of support, motivation, and friendship throughout this project, and I am truly grateful for all the help he has provided.

Staying with Kailash and observing things firsthand provided me with invaluable insights. I observed how blind individuals use mobile phones and laptops, and learned the correct way to assist them in walking. Kailash also shared numerous difficulties and challenges faced by the blind community, which extended beyond the scope of our project. These experiences fostered empathy and sympathy within me, and one of Kailash's favourite lines, "Nazar nahi, nazariya badaliye" (Change your perspective, not your gaze), resonated deeply.

Kailash mentioned how he has assisted many design students in the past with their projects and highlighted the fact that many designs for the blind are created by sighted individuals who often design from their own perspective. He also discussed social behaviour within our community, such as assigning blind individuals a corner seat at parties and offering food without considering their preferences. Kailash emphasized that all the blind desire is inclusion and acceptance.
Kailash's contributions, guidance, and insights have been invaluable to the success of my project. He has deepened my understanding of blindness and has inspired me to approach design with inclusivity and empathy..

Interactions with Ravi and Manoj

Manoj, who is visually impaired, and Ravi, a partially blind Ph.D. student, are close friends of Kailash, and it was through him that I was introduced to them. Our interactions extended beyond project-related discussions, as we often met for lunch or snacks. During these casual gatherings, they shared their personal stories, providing me with a deeper understanding of their lives.

Manoj, in particular, shared his experience of losing his sight after being sighted earlier in life. He spoke about the challenges he faced during this transition and how he coped with the changes. His resilience and ability to adapt were inspiring to witness.

They also discussed the various games they enjoy playing. These included traditional games such as cricket, chess, and card games, as well as verbal games like antrakshree.

They told us about how they learned braille. Manoj took just two days to learn braille, whereas Ravi took a month to master it.

In addition to games, Manoj and Ravi opened up about the obstacles they encountered in academics and their personal lives. They shared the unique difficulties they encountered while pursuing their studies and the strategies they employed to overcome them. These conversations provided

valuable insights into the challenges faced by individuals with visual impairments and the resilience they exhibit in navigating through various aspects of life.
Getting to know Manoj and Ravi allowed me to gain a more holistic perspective on their lives, aspirations, and struggles. Their stories served as a reminder of the importance of inclusivity and the need to create environments that support and accommodate individuals with visual impairments.

Conducting “Sensory Enhancement.” workshop @IDC

We organized a sensory workshop at IDC, led by Kailash, Manoj, and Ravi, with a total of 20 participants. The workshop aimed to provide insights into the experiences of individuals with visual impairments and challenge preconceived notions about their abilities.

The workshop covered various concepts related to the daily routines of individuals who are blind, highlighting the tasks and career aspects that might be perceived as challenging. Participants engaged in discussions about their assumptions regarding the needs of individuals with visual impairments and explored the importance of orientation and direction in their lives.

To enhance the participants' understanding, the workshop included interactive activities. One such activity involved blindfolding participants and having them find their group members using their hearing and sense of touch. Another activity focused on identifying items solely through senses such as smell, touch, and hearing.

In order to simulate the experience of navigating without sight, participants were blindfolded and tasked with finding their way back to the starting point using touch, orientation, and direction cues. This activity aimed to shed light on the challenges faced by individuals with visual impairments and the importance of spatial awareness.

Additionally, the workshop addressed the sighted guide technique, which involves assisting a blind person in safely crossing the road. Participants learned about the correct techniques and procedures to ensure the safety and independence of individuals with visual impairments.

Through these activities and discussions, the sensory workshop provided a hands-on experience that encouraged empathy, understanding, and the breaking down of barriers between sighted individuals and those with visual impairments.

INSIGHTS

EXITING TYPES OF GAMES FOR VIP

There exist various games specifically designed for individuals who are blind or visually impaired, and they can be broadly categorized into three main groups.

Audio games

The market offers a variety of digital audio games that utilize sound to guide gameplay. While some of these games employ a talkback feature that may be bothersome for sighted individuals, there are others that can be enjoyed by both visually impaired and sighted users. However, the absence of visuals in these games might lead to a lack of interest among sighted players. Examples include " A Blind Legend', "Audio Dungeon," and "Blindfold Racer."

Braille games

These games incorporate braille, a tactile writing system, to provide an accessible and engaging gaming experience. By incorporating braille into the gameplay, these games allow blind players to navigate, make decisions, and interact with the game world.

Tactile games

These games utilize touch and physical interaction to create an accessible gaming experience. The game boards feature raised textures, embossed symbols, or braille labels to allow blind players to feel the positions of game pieces and navigate the board.

Existing tools for VIP

There are numerous existing tools and technologies designed to assist individuals who are blind in various aspects of their daily lives. Here are some examples:

Screen Readers: Screen reader software, such as **JAWS, NVDA,** and **VoiceOver,** converts on-screen text into synthesized speech or braille output. Blind individuals can use screen readers to navigate computer applications, websites, and digital content.

Braille Displays: Braille displays are tactile devices that convert digital text into braille characters, allowing blind individuals to read and access information. These displays often accompany screen readers and provide a tactile representation of the text on the screen.

Voice Assistants: Voice assistants like **Amazon's Alexa, Apple's Siri**, and **Google Assistant** provide hands-free interaction and assistance for blind individuals. They can perform tasks, answer questions, set reminders, and control smart home devices through voice commands.

Electronic Travel Aids: Tools such as white canes with electronic sensors or laser-based devices like the "**SmartCane**" can help blind individuals navigate their surroundings more effectively. These aids detect obstacles and provide feedback, enhancing mobility and safety.

Braille Embossers and Printers: Braille embossers and printers enable blind individuals to produce braille documents, books, or labels. These devices convert digital text into braille, allowing for independent access to written materials.

Alphabet Braille Blocks

Transparent Braille Keyboard Stickers

Braille Sudoku Set

Talking Books and Audio Libraries: Vast collection of audio books, magazines, and other recorded materials are available on the internet. These resources enable blind individuals to enjoy literature and educational content in an accessible format.

Tactile Graphics: Tactile graphics provide tactile representations of visual information, such as maps, diagrams, or charts. Raised lines, textures, and braille labels allow blind individuals to explore and understand spatial and graphical concepts.

Accessibility Apps: Various mobile applications provide assistance to blind individuals in different ways. **Seeing AI**, developed by Microsoft, uses artificial intelligence to describe the surrounding environment and recognize objects for blind individuals.

These tools and technologies empower blind individuals to access information, navigate their environment, and engage in various activities independently. Continued advancements in assistive technology aim to improve the quality of life and promote inclusion for the blind community.

Tactile dice

Tactile Continents Map

Textured, Traceable Cards, Upper Case

These textured cards allow children and adults to feel and trace uppercase letters to help master letter recognition skills. Directional dots and arrows indicate where to start and stop the tracing pattern.

Tactile Talking Clock with Bed Shaker

Magnetic Tactile Watch

Bones Helen Vibrating Clock

WORK DONE IN THIS FIELD

https://www.reachandmatch.com/

Reach and Match

Designer:

Team Name: Mandy Shuck-Manlau
Affiliation: Monash University
Project: Reach and Match
Client: Self

The Reach and Match project, developed by Mandy Shuck-Manlau from Monash University, caters to multiple disabled children, including those with visual impairments and hearing disabilities. This project involves children searching for the appropriate blocks and placing them in the correct positions. The primary goal of Reach and Match is to enhance children's confidence and playful learning experiences.

Viewpoint on the Project:

I appreciate the thoughtful utilization of textures and colors in this project. It's impressive how the game can be adapted and enjoyed by individuals with various disabilities. From my perspective, it appears to be an excellent game for developing the sense of touch, teaching braille, enhancing motor skills, fostering orientation abilities, and, most importantly, providing an enjoyable experience.

Takeaway:

I particularly admire the use of textures and colors in this project. The versatility of the game components and the ability to create multiple setups is a commendable aspect.

Arabian Pots

Takashi Hamada, a Japanese game designer, specializes in creating board games specifically for individuals with visual impairments. With approximately 280 million visually impaired individuals worldwide, including nearly 40 million who are blind, Takashi's games serve as a bridge, allowing both visually impaired and sighted individuals to enjoy a shared gaming experience through the use of sounds and tactile elements.

One of his notable analog games is "The Arabian Pots." In this game, players engage in sorting pots by **relying on the sounds** they produce when shaken. The game features three distinct groups, each comprising three pots that generate the same sound. The objective is for players to align three pots with matching sounds in a row. The first player to achieve this wins the game, combining strategic thinking and sound recognition skills.

Takashi's innovative approach to board game design for the visually impaired fosters inclusivity and provides an enjoyable gaming experience that transcends visual limitations.

Takeaway

I appreciate the approach taken in the game design, which **relies solely on sound without incorporating any visual cues.** This design choice **creates a level playing field** where sighted individuals do not have an advantage over blind players. It promotes inclusivity and ensures that everyone can participate on equal terms, fostering a more engaging and fair gaming experience. This approach not only caters to the needs of visually impaired individuals but also allows sighted players to broaden their perspectives and appreciate the game from a different sensory perspective.

http://www.analoggames.com/story/board-games-tabletop-game-design-for-the-blind-people-visually-impaired/

INSIGHTS

Food for thought

- Is our perception of the world limited to what we see with our eyes alone?
- Are we inadvertently making assumptions about what individuals with visual impairments desire?
- Are we designing primarily based on visual elements, neglecting the potential of other senses?
- Consider placing yourself in the user's shoes.
- Do we truly recognize and appreciate what we have, including our own abilities?
- It is worth noting that most games are designed by individuals who are not disabled.

Behavioral Insights

- People tend to treat individuals with visual impairments differently.
- There is a tendency to exclude the blind, whereas they seek inclusion.
- Every person requires assistance at times, but it is important not to impose help upon them.
- Once again, imagine yourself as the user, experiencing the situation firsthand.

Insights

Blind vs Sighted

- Sighted individuals tend to perceive the world from a **macro perspective**, focusing on the bigger picture and gradually narrowing down to the details. In contrast, blind individuals often approach things from a **micro perspective**, piecing together information to form a comprehensive understanding.

- Hearing plays a crucial role in **providing direction** for blind individuals, whereas sighted individuals rely on visual cues for precision and accuracy.

- Blind individuals may experience a higher **cognitive load** in certain activities. For example, in games like tactile chess, sighted players may have an advantage due to their ability to visualize the entire board at once.

- **Orientation** is a significant aspect for blind individuals, as they rely on their other senses to navigate and understand their surroundings.

- We tend to **notice and recognize familiar sounds**, such as the sound of our own name, as they hold personal significance to us. E.g we notice someone calling our name.

Me (left) playing a game of chess with a VIP.

Things to keep in mind while designing for Blind

- **Light weight:** Ensure that the designed objects or tools are lightweight, making them easy to handle and manipulate for individuals with visual impairments.

- **Curved/Blunt edges:** Opt for rounded or blunt edges to enhance safety and prevent accidental injuries during interaction with designed objects.

- **Cause and effect**: Emphasize clear cause-and-effect relationships in the design to help blind individuals understand the impact of their actions and make meaningful connections.

- **Feedback:** Provide sensory feedback, such as auditory or tactile cues, to convey information or confirm actions taken by the user.

- **Noticeable element sizes:** Make sure that important elements, such as buttons or markers, have sizes that are easily detectable by touch, enabling blind individuals to locate and interact with them accurately.

- **Teach turn-taking:** Since eye contact may not be a reliable indicator, incorporate mechanisms or prompts to teach blind individuals how to take turns during interactive activities.

- **Orientation:** Consider including orientation cues or mechanisms in the design to assist blind individuals in understanding their position and orientation within a space or environment.

- **Local experiences:** Incorporate familiar elements or references to known places, as blind individuals often rely on their prior knowledge and experiences to understand and engage with their surroundings.

- **Delays in gameplay:** Be aware that blind individuals may experience delays in gameplay compared to sighted players due to the nature of accessing and interpreting information through non-visual means.

- **Contrast in colors:** Use contrasting colors, especially for those with partial vision, to facilitate easier differentiation and recognition of visual elements.

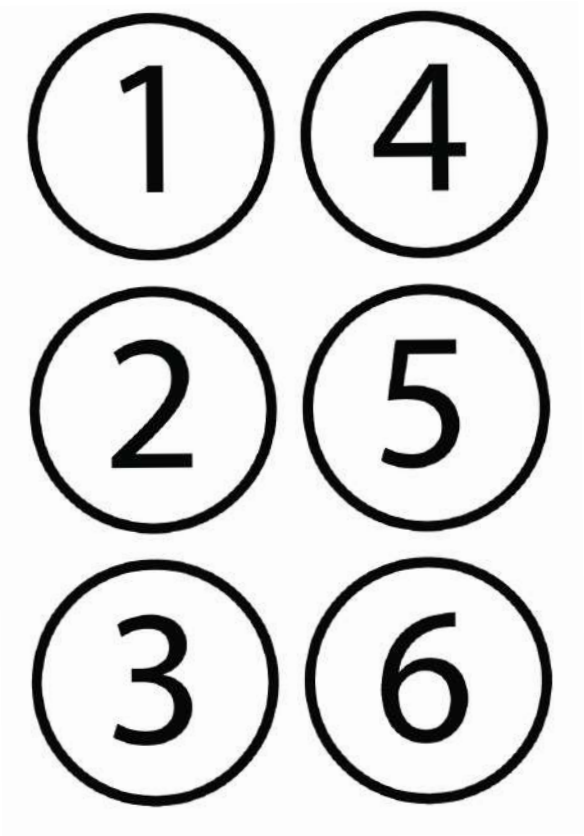
- **Starting point:** Provide a clear starting point or reference to help blind individuals initiate or engage with the designed experience.

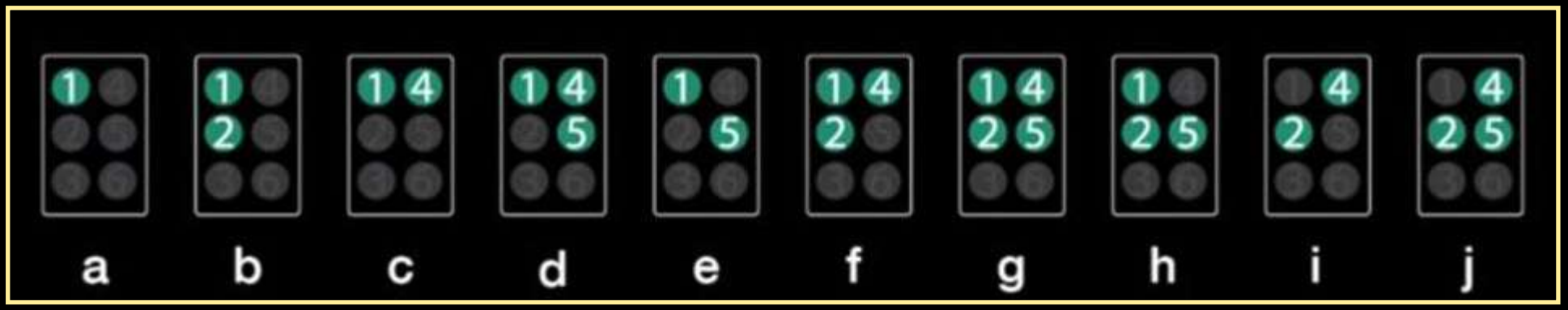
LEARNING BRAILLE

Braille script uses a system where each character is composed of six dots arranged in a vertical rectangle, consisting of two columns with three dots each, as depicted in the image.

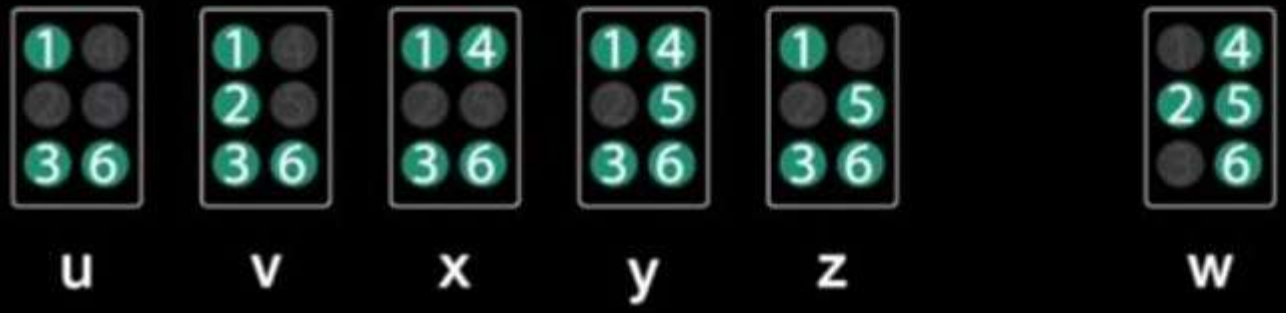
To form alphabets and characters in Braille, a dot can be raised at any of the six positions.

It is important to note that Braille is a **phonetic language**, allowing us to write any spoken language using the Braille script.





Dot 3 is added.

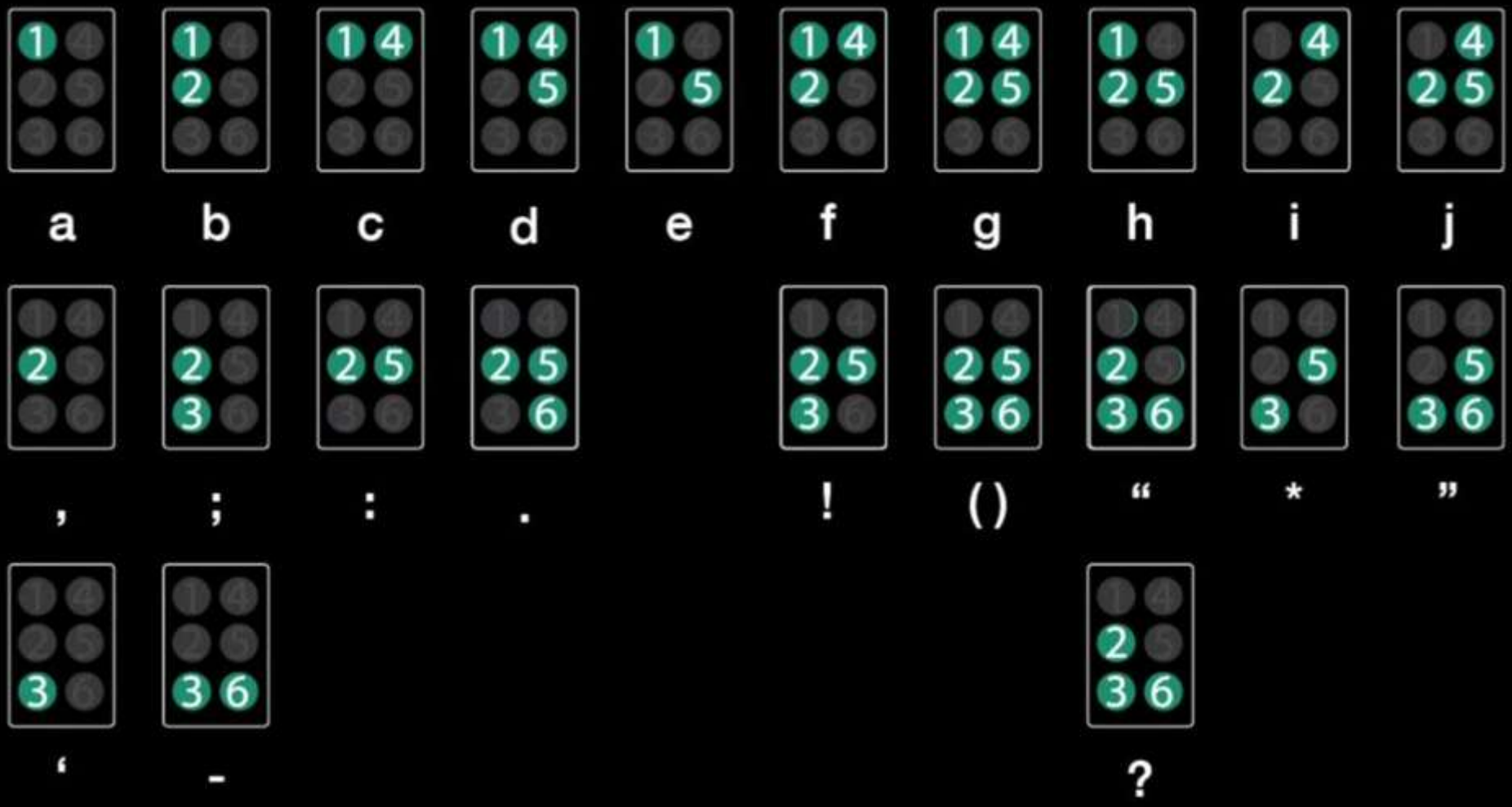


Dot 6 is added.

W is an exception.

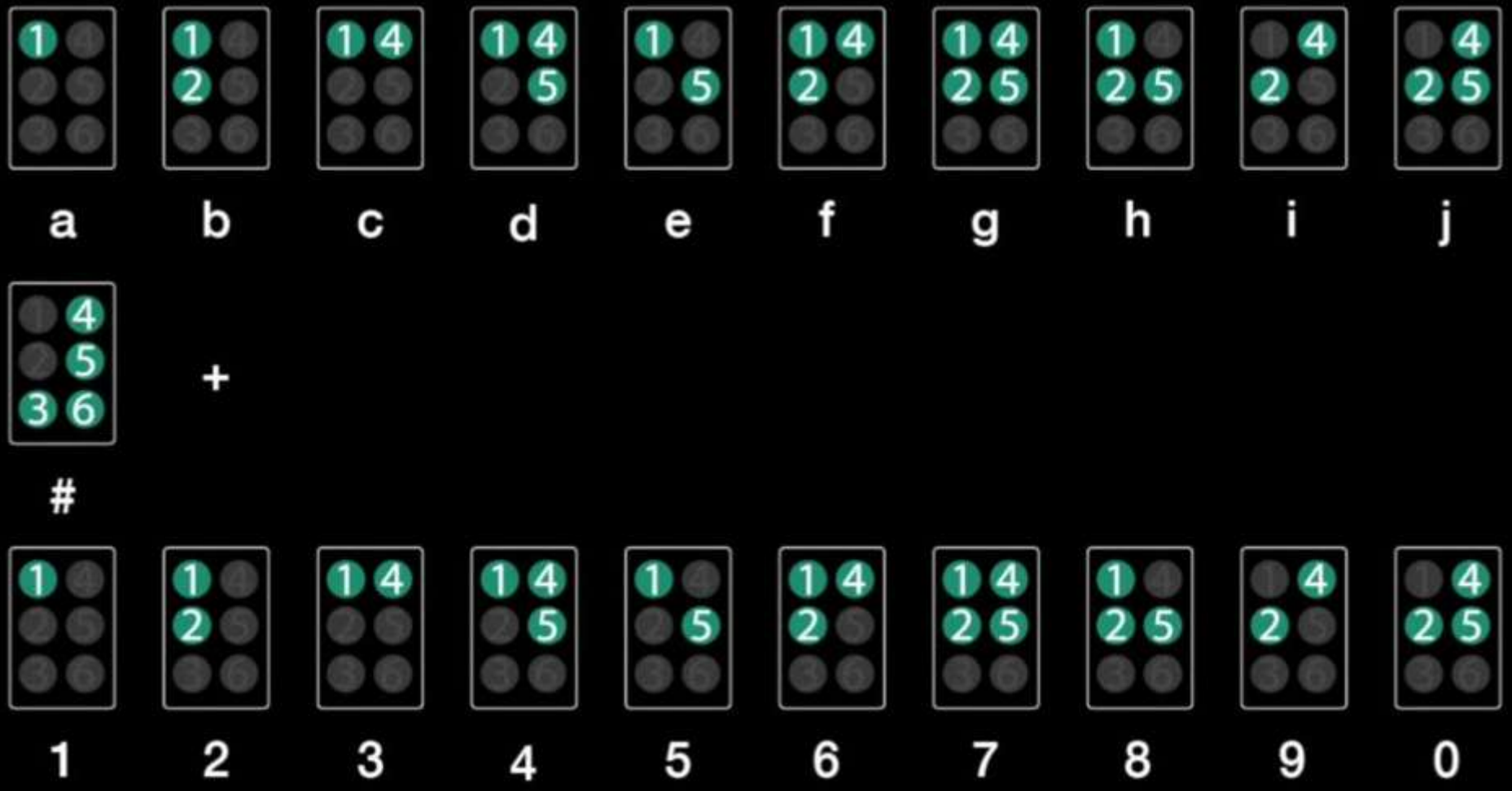
Pattern in Braille Script:

Upon observation, it becomes evident that Braille script follows a consistent pattern. In the second line of each Braille character, an additional dot, known as Dot 3, is added, while in the third line, Dot 6 is added. “W” is an exception.



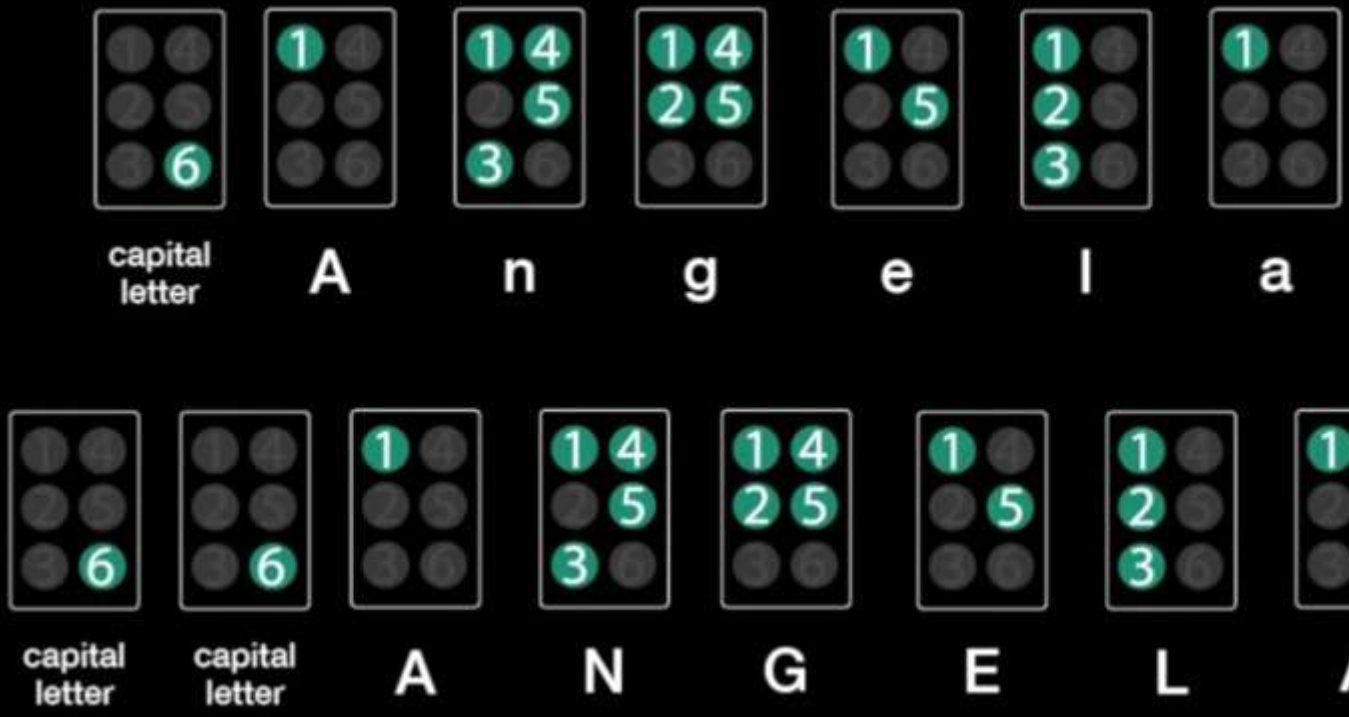
Pattern in Braille Script:

Upon closer observation, it can be noticed that in Braille script, the second line of each character has a dot shifted one place downward, while the third line has a dot shifted one place downward as well.



Pattern in Braille Script for numbers:

In Braille script, the representation of numbers follows a similar pattern as the letters A to J. However, to differentiate numbers from alphabets, a specific symbol is added in front of the character to indicate that it represents a number. This symbol serves as a visual cue to signify that the subsequent character represents a numerical value rather than an alphabet.



Pattern in Braille Script for numbers:

In Braille script, Dot 6 is used to indicate a capital letter. When all the letters in a word or sentence are capitalized, Dot 6 is repeated twice.

Apps available on Android

I tried to look up all the possible Braille leaning apps/ games available on the android. These are all the apps that I could find. I noticed that some of these apps used a “talk back” feature for the blind and some apps were for the sighted to learn braille.

These are apps that I downloaded on my mobile to study hen existing market.

GAME IDEAS

Redesign existing games and test it to understand the needs of the users.

Teach Braille
(Final output)

GAME IDEA 1

MATCH SHAPES

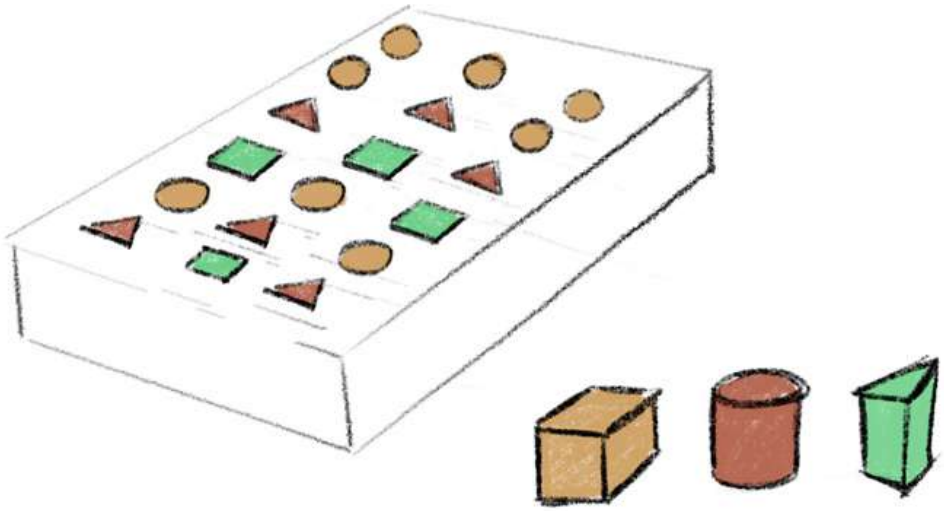
Concept
Increase the delay for the sighted.

Game
As observed, for the VIP to develop a sense of touch, orientation, and shapes, there are many activities that require you to match the shapes as discussed earlier.

Idea here was similar. To solve the issue of delay, I tried increasing the delay for the sighted. As discussed before, sighted sees macro to micro, and they observe colours before they observe the shapes.

The aim of the game is to connect the shapes as soon as we can. The person who did this first, wins the game. Where the blind child has a delay in touching and feeling the shapes and then matching, the sighted will have a delay with the confusion of the colours.

This game can be used by kids who are learning shapes and geometry.



Issue:
- This game was very simple and there was less competition in the game.
- Blind will still have more delay than the sighted.

Redesign existing games and test it to understand the needs of the users.

UNO: Card game

Connect 4

GAME IDEA 2

UNO: CARD GAME

UNO cards

UNO is one of the most famous games that are played and enjoyed by all age groups.

- A UNO deck consists of 108 cards,
- of which there are 76 Number cards,
- 24 Action cards and
- 8 Wild cards.
- UNO cards have four color "suits", which are red, yellow, blue and green.

UNO power cards

Possible modifications / existing solutions.

Braille Cards: In the market, there are UNO cards with braille on it for the blind.

UNO cards with braille

UNO cards with braille

Campaign UNO ColorADD

by Weber Shandwick

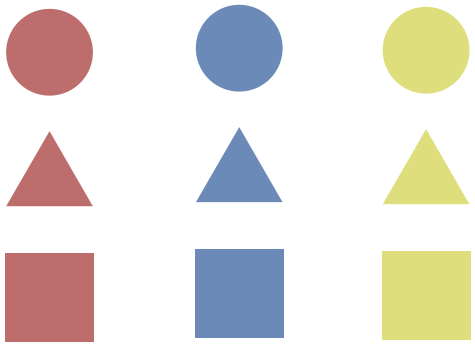
won Global SABRE Award 2018

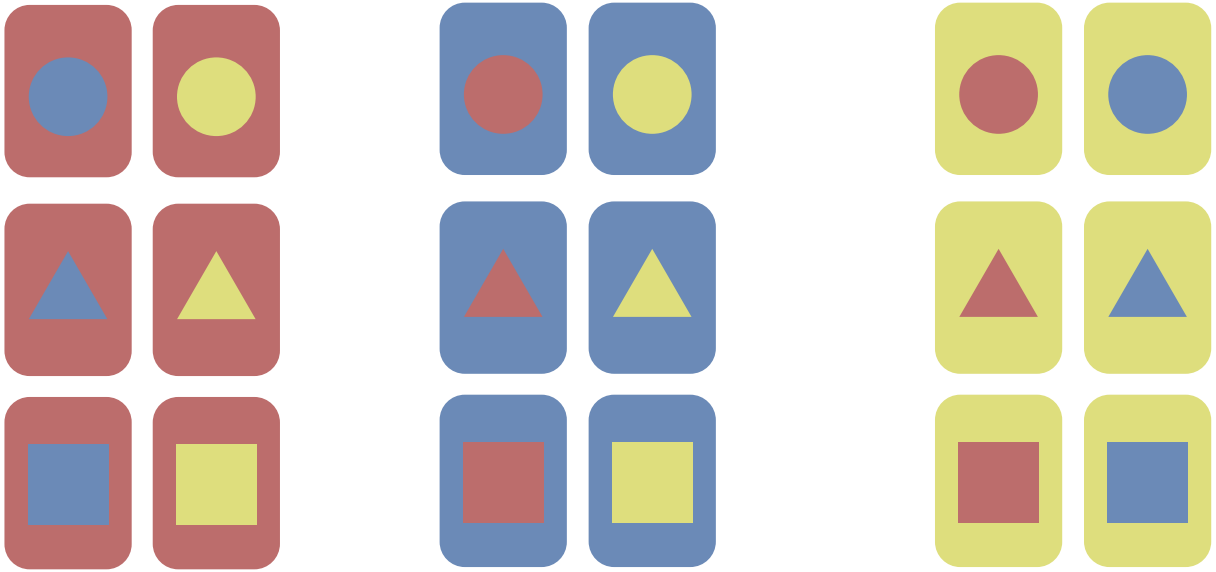
https://www.youtube.com/watch?v=iNoUX5J5Zn4

As depicted in the image, the designer utilized symbols that can now be comprehended by partially blind users as well, as demonstrated in the second image. This inclusive approach ensures accessibility and understanding for individuals with varying degrees of visual impairment.

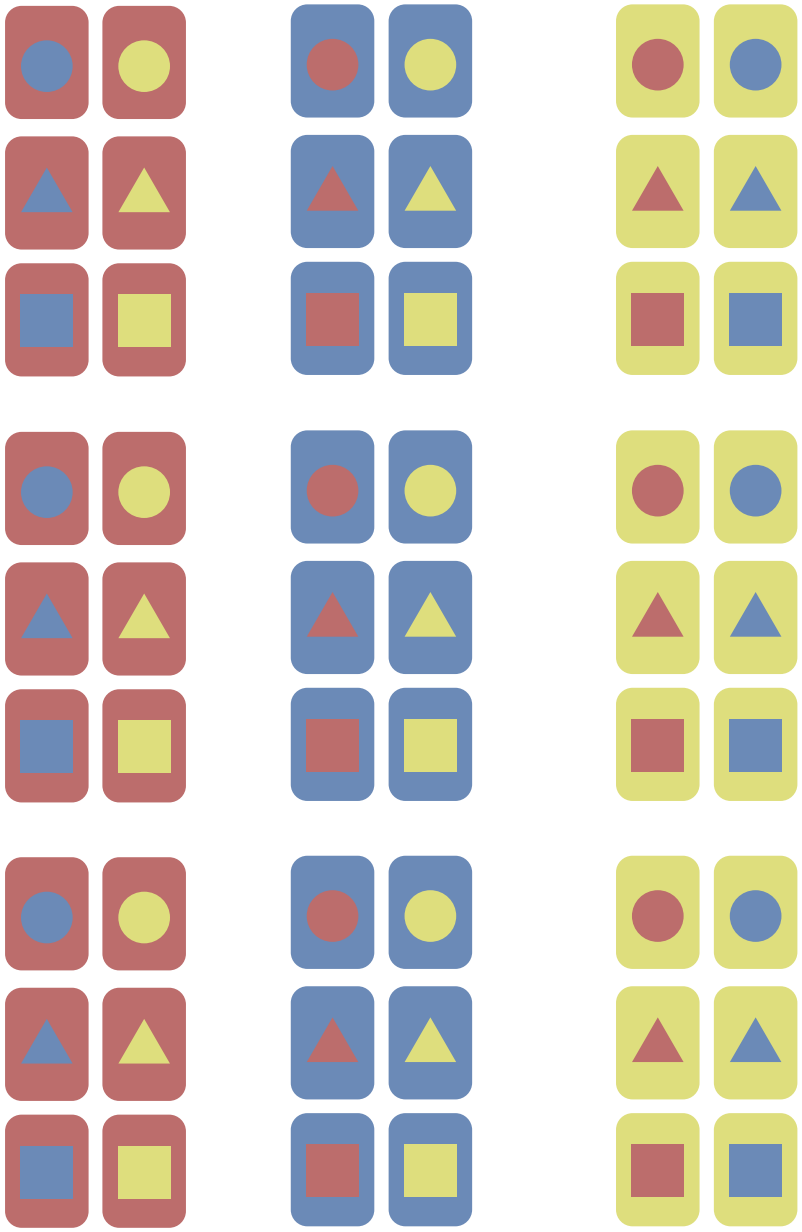
My approach

Instead of numbers and using braille, my attempt was to use **basic shapes** (blind find it difficult to learn and understand complex shapes) and three different **textures** to enhance the tactile experience and provide additional sensory cues for better understanding.

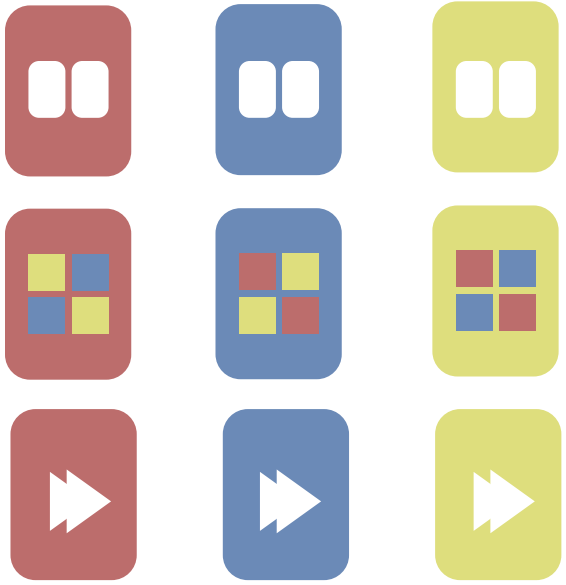




One set of cards.
Here each colour represents different textures. Before the final production of the cards, it was important to test the gameplay and come up with rules.



Cards



Power cards

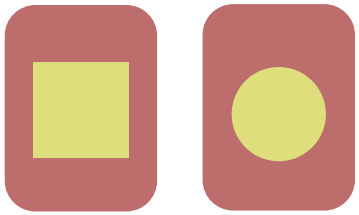
Total cards in the deck
There are total of 54 cards. and 6x4 power cards.
My attempt was to make the game as tactile as possibe.

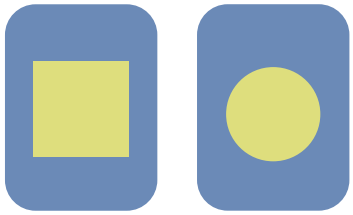
Gameplay

when a particular card is played. The next card should have two of the following

- opponent should play another shape.
- outside colour/texture should be the colour/ texture of the shape.

Card played





Cards that the oppoent can play

Issues

Regardless of the gameplay, it is important to acknowledge certain limitations when designing card games for individuals with visual impairments:

- **Cheating:** Blind players may face challenges in detecting if their opponents are cheating, as they cannot visually observe card movements or changes.
- **Orientation:** Maintaining proper card orientation is crucial for gameplay. While design considerations can be implemented to minimize orientation issues for blind players, managing multiple game elements can still pose a challenge.
- **Delay:** Blind players require tactile interaction to identify and register cards, resulting in a potential delay compared to sighted players who can quickly assess cards visually. Addressing this delay aspect can be complex and may require innovative solutions.

Insights

Things to consider while designing a game for the blind.

Braille Cards: Create Uno cards that have braille markings on them. This will allow players who are blind to read the cards and know what they are holding.

Textured Cards: Create Uno cards with textured surfaces that can be easily distinguished by touch. For example, the number "1" could be raised or have a rough texture, while the number "2" could be smooth.

Audio Cues: Include audio cues to announce the cards as they are played. For example, a "skip" card could be accompanied by an audio cue that says "skip" or a "reverse" card could be announced with a sound effect that indicates the direction of play has changed.

Tactile Mat: Create a mat with raised outlines to represent the different areas of play (draw pile, discard pile, etc.). This will allow players to orient themselves and easily locate cards during the game.

Card Holder: Provide a card holder that allows players to easily arrange and organize their cards without having to worry about accidentally dropping them.

Larger Cards: Create larger cards that are easier to see and handle for those with low vision.

GAME IDEA 3

CONNECT 4

Concept

Sighted players experience minimal disruption:
While sighted players can simply observe and play the game, blind players rely on tactile feedback. In the absence of sight, their other senses serve as their vision. To accommodate this, the game incorporates two distinct surfaces. This allows blind players to continuously explore the board without disturbing their opponents' pieces or moves.

Utilizing sound:
Each time a key is inserted, it produces a distinct sound. This sound serves multiple purposes. Firstly, it aids in developing a sense of position, helping blind players understand the spatial layout of the game. Secondly, the sound acts as an indicator to blind players that their opponent has made a move, providing valuable audio cues for gameplay progression.

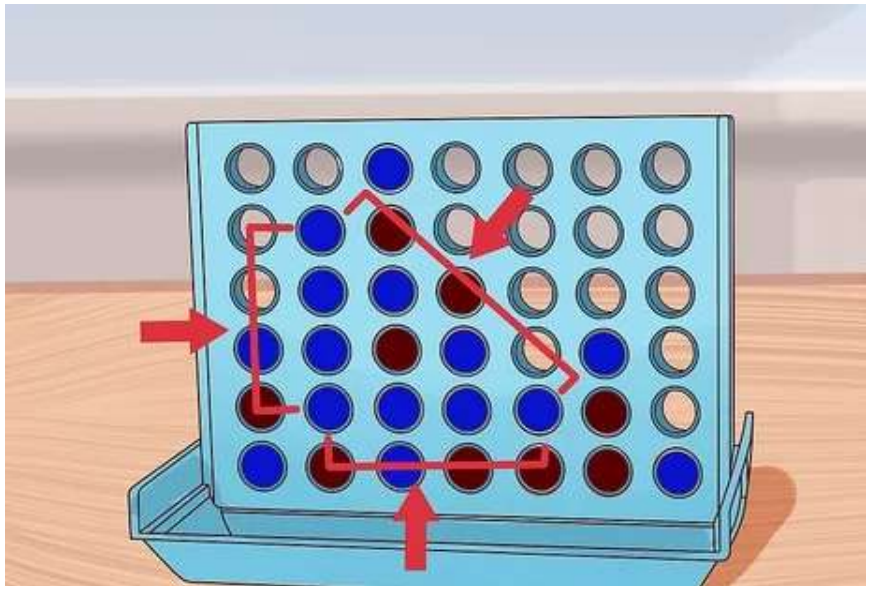


Image source: https://www.wikihow.com/Play-Connect-4

Original Connect 4 Game:

Connect Four, also known by various names such as Connect 4, Four Up, Plot Four, and more, is a classic two-player connection rack game. The game involves players selecting a color and taking turns placing their colored tokens into a grid consisting of seven columns and six rows. The tokens are dropped from the top and occupy the lowest available position within the chosen column. The goal of the game is to be the first to create a line of four of their own tokens in a horizontal, vertical, or diagonal pattern.

My concept:

As discussed on the last page, the two key features why I liked this game mechanics were:

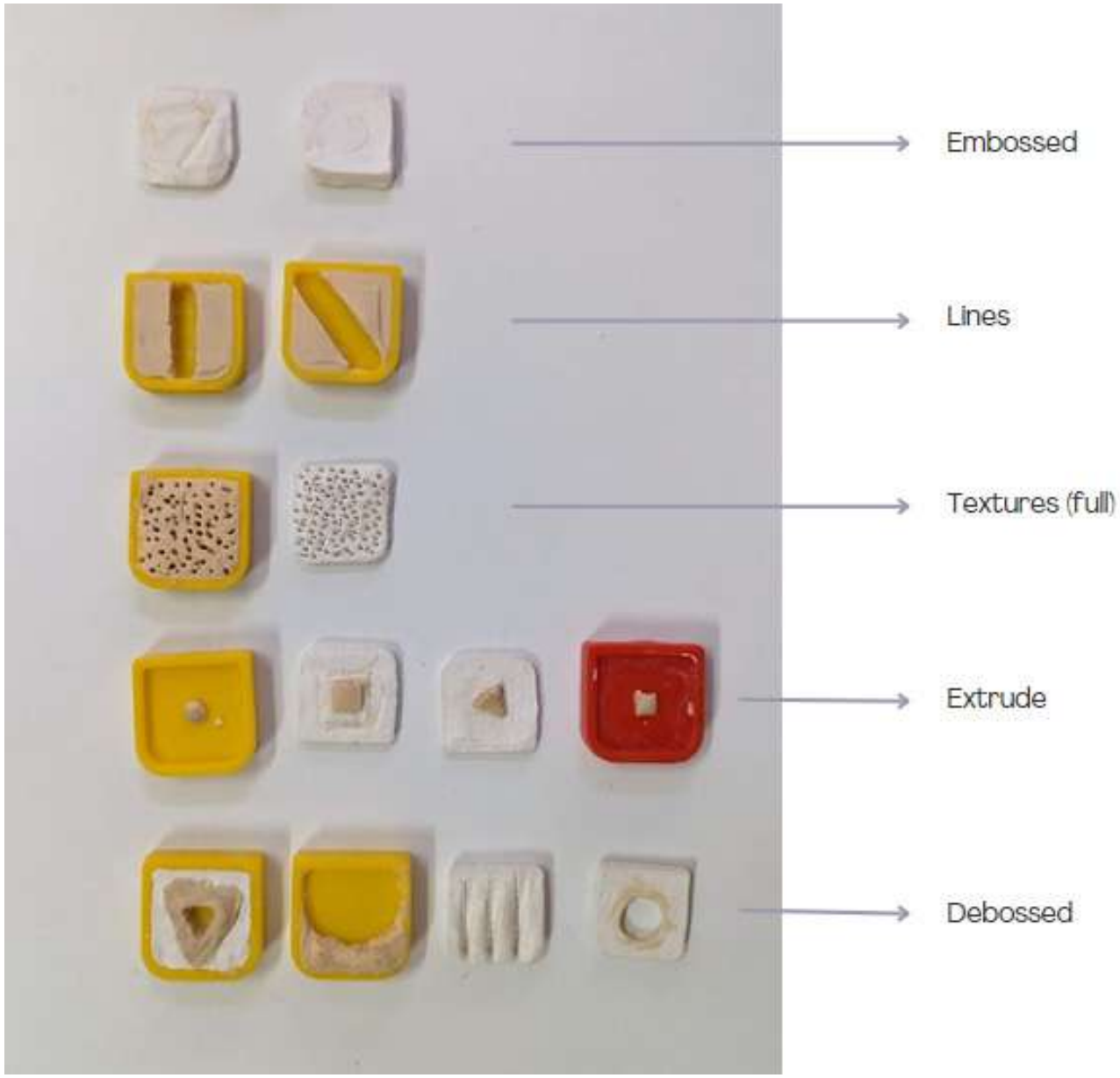
- Sighted players experience minimal disruption:
- Utilizing sound for blind.

Game board

The game board on the right was the first one I purchased. While I appreciated its mechanics, I found the size of the holes for feeling the tokens to be too small. This made it challenging to touch and understand the texture of the tokens.

Later, I purchased a larger game board with bigger holes and non-symmetrical tokens. This design choice proved helpful for orientation during gameplay.

I initially bought this mini game. Though I really loved the the product and its features, the sizes through which we can feel the keys was very small.



step 1:
Texture explorations

step 2:

Finalising 3 textures based on user feedback

step 3:
colouring the tokens

Game play

Iteration 1

Instead of two colors i wanted to have different textures to play with. The person who is able to connect the 3 shapes together wins. Players first get to decide on random three pattern alternately, and they have to make the same pattern horizontal, vertical, or diagonal pattern.

User feedback:

Advantages:

- The sound produced when placing the keys helped blind children know when their opponent made a move.
- The mechanism of using sound and tactile feedback was comfortable for blind children, as they were familiar with similar methods used in learning to count.

Disadvantages:

- Blind children found it challenging to remember the different patterns, leading to cognitive overload.
- There was confusion among blind children regarding how to arrange the patterns on the board.
- A delay was observed from the blind side, as they needed additional time to process and understand the game.
- Instead of touching the board on one side, blind children would touch both sides to comprehend the game, indicating a need for clearer tactile cues.
- even after hearing the sound, blind were bit confused about where the last move was played. Blind children faced difficulty in keeping track of the last move, and all the previous moves. Remembering all the moves and positions of the keys resulted in cognitive overload for them.

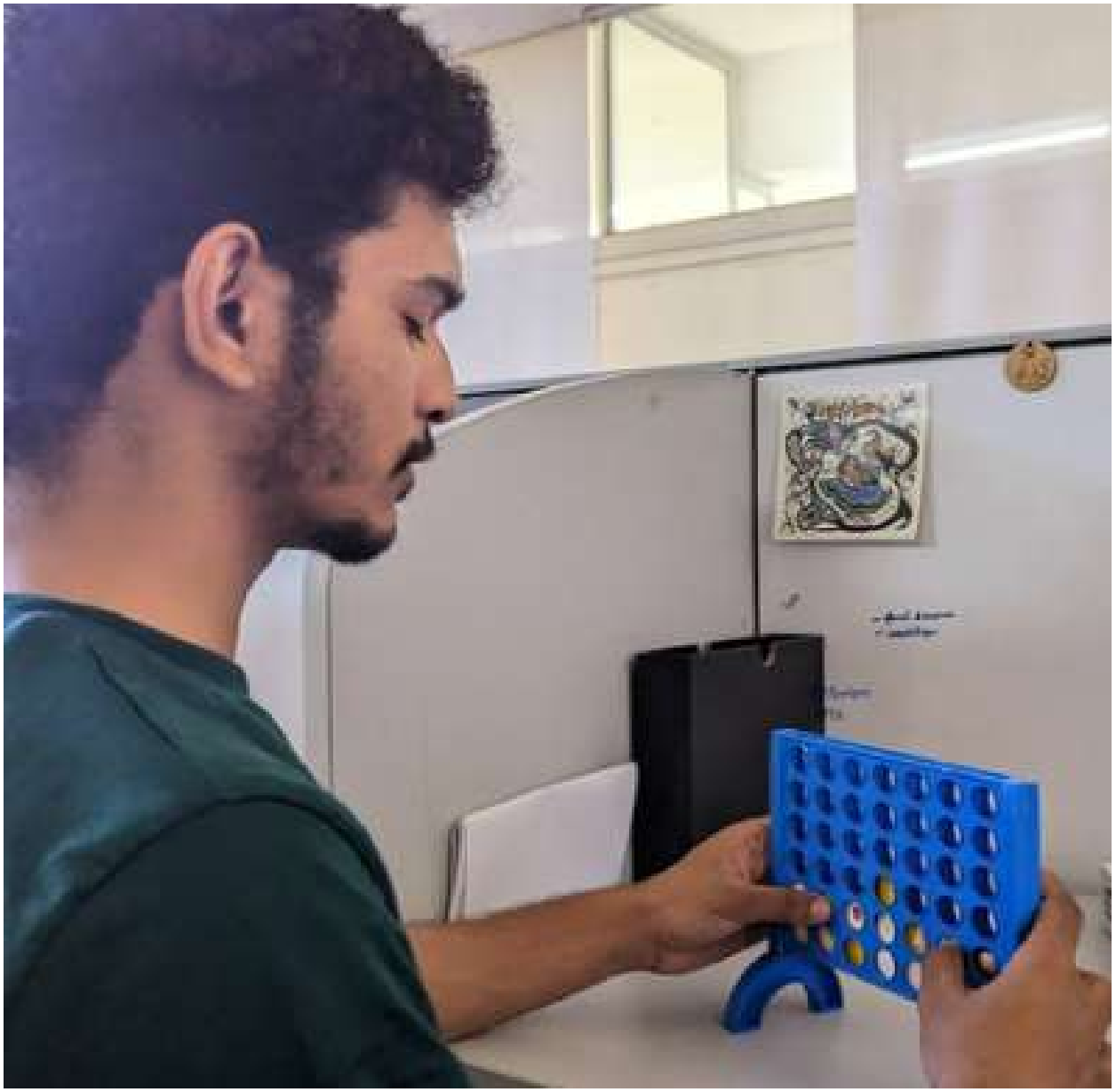
Iteration2

Instead of choosing three different patterns which would be different in each round, keeping the three patters fixed, made the game less complex, easy to understand, and fun to play.

User testing

Role play

During our game sessions, we would engage in role play by closing our eyes and playing as if we were blind. This allowed us to experience the gameplay from the perspective of a blind individual and provided valuable feedback on the game mechanics.



Visit to workshop

We had the opportunity to meet Mrs. Mrinal Palnitkar, a dedicated teacher who conducts workshops for blind children. These workshops take place three times a week, after school hours. Mrs. Palnitkar has been teaching blind students for over 10 years, driven by her love and care for them. During our meeting, she graciously shared some of the games played by the blind and provided invaluable feedback on our own game designs.

Feedback for connect 4 redesign game

The gameplay seemed familiar to the blind players, and they were able to grasp the game mechanics and understand the rules after a few games. However, we noticed that there was still a significant delay and confusion regarding the position of the tokens for the blind players. Even with the sound cues, they struggled to accurately determine the position of the tokens on the board. This highlighted the need for further improvements in terms of providing clearer spatial cues or alternative methods for blind players to track the position of the tokens.

Swaran Ahuja maam

Swaran Ahuja maam is a 92-year-old educator with a rich teaching background. She began her teaching career in 1957 in London and received advanced training in 1960 in America. When she returned to India, she faced challenges in finding suitable employment as she was considered overqualified by many. In 1959, she started working at Dadar School in India and eventually established a teacher education program. Her late husband was the head of the National Association of the Blind. Over the years, Saran Ahuja has not only educated numerous blind students but has also trained teachers to effectively teach blind students.

For blind children, the development of their sense of touch and hearing is crucial. Rather than focusing on what they lack, such as vision, enhancing and utilising their existing abilities is important. Many blind individuals prefer using a traditional blind stick instead of technologically advanced devices, as these devices may create additional sounds that can distract them from their surroundings and hinder their experience of the environment.

In education, providing diverse experiences is paramount. The emphasis is not solely on bookish knowledge but also on real-life

situations and reactions. Swaran Ahuja maam mentions Professor Sam Tarapura Wala, who heads the Psychology Department and has developed a center that uses machines to read out books and also transcribe books into braille.

She also addresses the social attitudes towards blindness and emphasizes the need for society to accept blind individuals as equals rather than treating them as different.

Regarding braille, she discusses how sign language has been made compulsory for all teachers in the new education system, promoting inclusivity. She suggests that braille should also be introduced alongside sign language and

encourages everyone to make an effort to learn braille.

Teaching blind students who were born blind differs from teaching those who lost their sight later in life. For adults who have experienced sight, the focus is not just on the number of braille dots but also on details such as the history of braille and related stories. In contrast, children begin with developing their sense of touch and learning braille at the actual size, without initially delving into the history of braille. Children recognize the shape of the braille characters, while adults rely more on cell numbers.

Initially, students are taught how to read braille, and later they are taught how to write. Writing in braille is a bit complex as it requires reversing the characters on the braille slate.

The correct way to read braille is to feel the embossed pattern horizontally without moving vertically across the paper. The emphasis is on recognizing the pattern rather than the number of dots.
Saran Ahuja also discusses contractions in English braille, which are shortcuts used by the blind to read faster. For example, “B” represents “but,” “C” represents “can,” and “D” represents “do.”

Meeting with her was quite insightful, and it cleared lot of our misconceptions about the blind and how they learn braille. These feedback was crucial for my project as I aim to make a game to teach braille.

Sadhanatai Vaze

Sadhanatai Vaze is a 69-year-old sighted woman trained by Shanta Aunty (blind since birth. She has authored over 90 books in Marathi, in braille. Interestingly, she mentioned that despite writing numerous books, she cannot read them herself, as she is not proficient in braille reading. She writes her books on a computer and then transcribes them into braille for blind readers. She shared insights about the braille slate and how students learn from braille characters of the same size.

She also spoke about the typewriter used for braille, which has only six keys. She explained that the size of the braille paper and the braille characters in a book are fixed. During the demonstration, she showed us how writing in braille requires flipping the paper and writing the letters in a mirror image. It appeared to be a difficult task from my perspective.

She also mentioned that her motivation to write books for the blind community began in 1998, inspired by the power of movies.

Meeting Sadhanatai Vaze Aunty made me realize that even someone who has written over 90 books and has been writing for many years may have limited incentive to learn

Braille themselves. As sighted individuals can already read letters visually, they may not feel the same need to learn braille. This reinforced the importance of involving the sighted community in the design of the braille learning game. The game should focus on fun and enjoyment, while also serving as a means to learn braille. The goal should be to make braille learning an outcome of the game experience.

I also observed that reading braille books with eyes closed can be challenging and uncomfortable. It requires developing a strong sense of touch to effectively decipher the raised dots. As sighted individuals, we are not accustomed to relying solely on touch for reading and interpreting information. It highlights the importance of tactile sensitivity and the need for practice to develop the necessary touch skills for reading braille.

Shanta Narsian maam

Shanta Narsian is a remarkable 73-year-old lady who has been blind since birth. Throughout her life, she has held two counselling positions at two organizations and was also associated with the National Association for the Blind (NAB) and the Indian Council for Mental Hygiene. She is an active member of various organizations, including NAB, BPA (Blind People's Association), and the National Federation. In 2014, she retired from her professional engagements.

Shanta Narsian is widely known for her impressive speed in reading braille. She has honed her skills over the years and is highly proficient in decoding the raised dots. She has a brother who is also blind, and plays chess very well.

During our interaction, she shared insights into the education system for blind students, specifically focusing on the teaching methods and daily life experiences in blind schools. She also discussed her passion for cooking and how she efficiently manages her kitchen by organizing everything in designated places, enabling her to easily locate ingredients and tools.

Contrary to common misconceptions, Shanta emphasized that she is not afraid to travel independently. She has developed strategies and

techniques to navigate unfamiliar environments confidently. Her adventurous spirit serves as an inspiration to others, challenging societal stereotypes about the limitations faced by blind individuals.

Shanta actively participated in testing and providing feedback on the games I designed. She shared valuable guidance on the learning process for Braille and offered stories of her personal achievements. To demonstrate how braille is read, she skillfully moved two fingers side by side and horizontally across the page, smoothly interpreting the embossed patterns.

Interacting with Shanta Narsian was an enlightening experience, as her wisdom and expertise shed light on the journey of blind individuals and the importance of inclusive education. Her passion for learning and sharing her knowledge exemplifies the resilience and determination of visually impaired individuals.

Tejas

Tejas is an experienced HR professional with a background in software engineering. He is completely blind. He has spent 12 years in the industry, initially working with Infotech and then transitioning to the role of an associate software engineer, specializing in Oracle database. Currently, he has been designing user interfaces for the past four months. During our conversation, he introduced us to the screen reading software NVDA, which assists visually impaired individuals in accessing digital content.

Tejas possesses a strong skill set in Python, Java, HTML, and CSS, showcasing his technical proficiency. Interestingly, he emphasized that one doesn't necessarily need sight to excel in computer-related fields. He mentioned his friend, Sagar Patil, who has a knack for electronics and is particularly adept with wires, demonstrating how even blind can have talents can contribute to the technology landscape.

When discussing games, Tejas shared insights into the digital gaming market and how it influences his own gaming preferences. He contemplated the idea of designing a game where sighted individuals would be blindfolded, allowing blind players to compete with them. However, he raised a valid point that some sighted individuals might not be comfortable being blindfolded for extended periods. To ensure inclusivity, he suggested creating a game that accommodates the comfort levels of both sighted and blind players. Tejas' perspective highlighted the importance of designing games that consider the needs and comfort of all participants, fostering an inclusive and enjoyable gaming experience for both blind and sighted individuals.

Sonali

Sonali is a college student pursuing a BA in philosophy, and she happens to be visually impaired. She attended Shrimati Kamalamaheta Blind School for Girls.

Sonali, when asked about games, mentions her interest in card games and chess. While she hasn't personally played online Android games, she acknowledges their popularity among others.

Sonali emphasizes that blind individuals are fully capable of achieving great things, despite common misconceptions suggesting otherwise. She cites the example of her friend Sagar, who has two patents to his name, highlighting that blindness does not hinder success. She believes that what blind individuals truly need is a sense of belonging, acceptance, and equal treatment, rather than being treated differently.

When the topic of playing games with sighted individuals arises, Sonali acknowledges the advantages of such interactions. She also shares the story of her friend Charudatt Jadav, who is blind but plays chess on a computer, showcasing the possibilities that technology can offer in enabling blind individuals to engage in various activities.

Sonali's insights shed light on the aspirations, achievements, and desire for inclusivity within the blind community. Her perspective challenges misconceptions and emphasizes the importance of treating blind individuals with respect, acceptance, and equal opportunities.

FINAL GAME DESIGN

Teach Braille

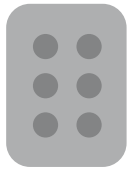
GAME IDEA 4

Braille dots

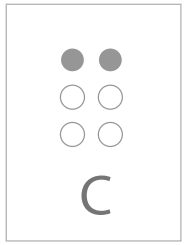
Concept

Teach braille through game. It is an inclusive game which can played by both sighted and blind.

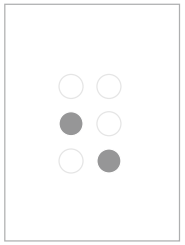
Game components



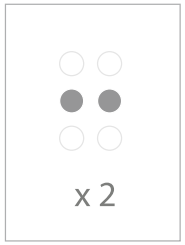
Braille cell
(10)



Alphabet cards
(26)



Dots card
(30)

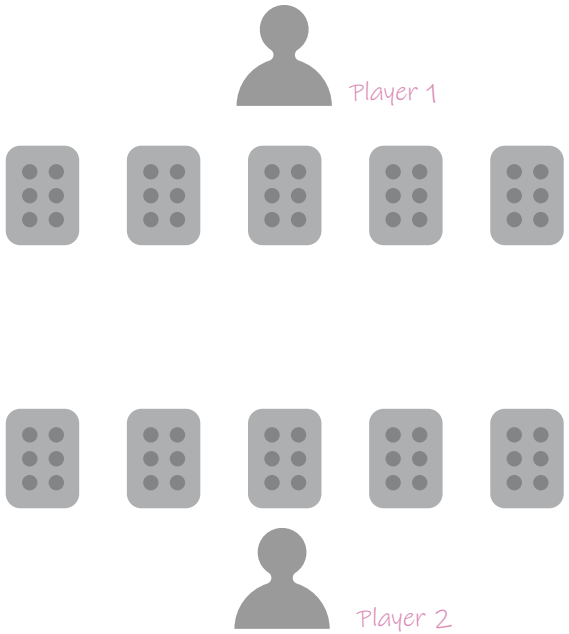


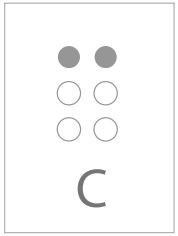
Power cards
(10)

Small token
(60)

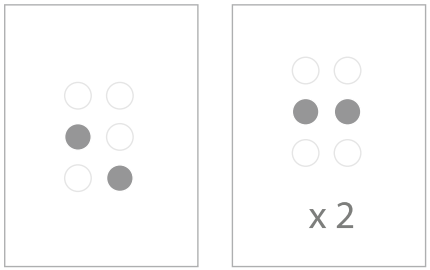
Big Tokens
(10)

Game Setup



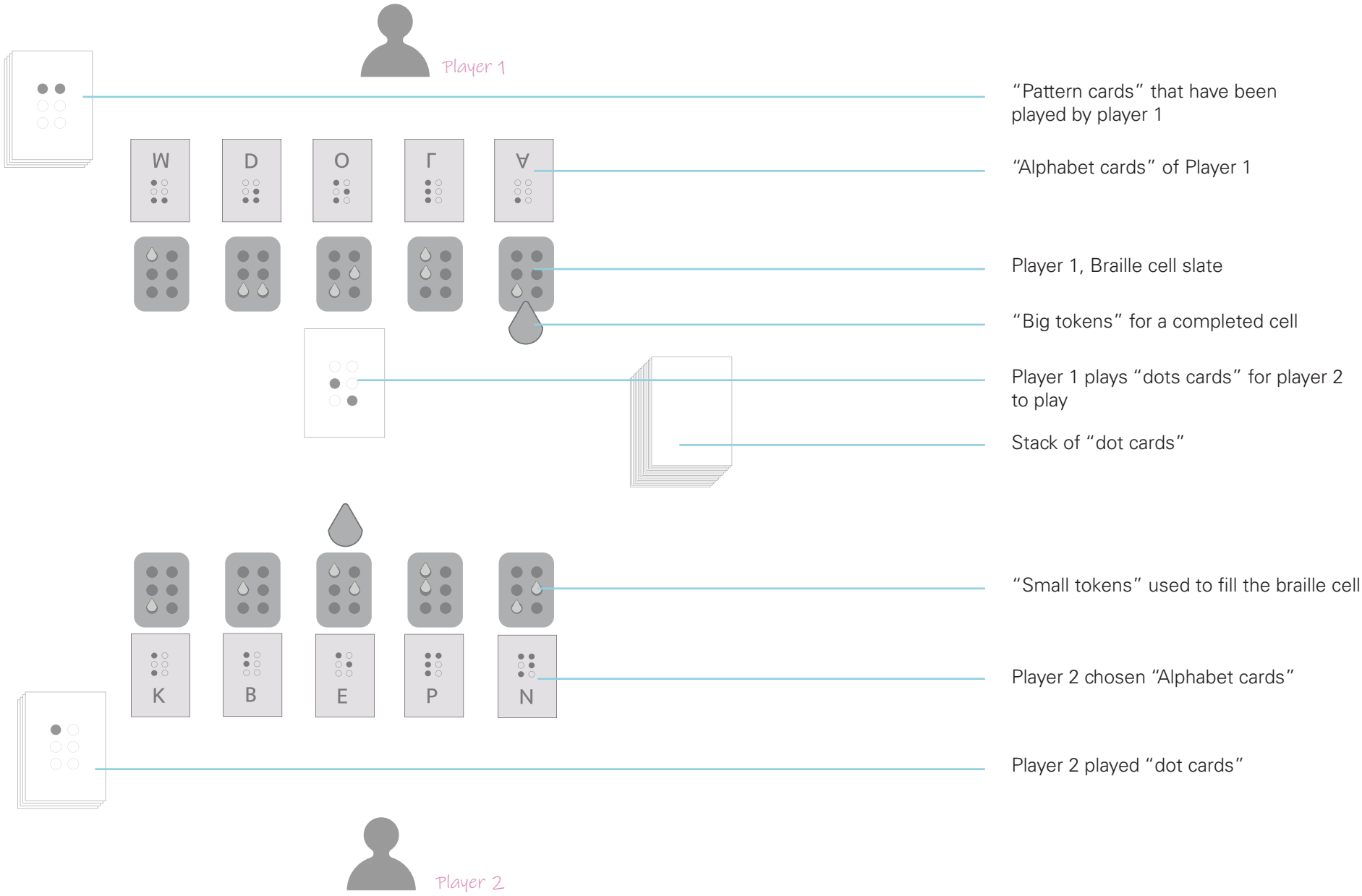


Step 1
Players take turns picking the alphabet cards and either give them to their opponent or keep them for themselves. After the 5 alphabet cards chosen, the opponent gets the remaining cards at random untill they have 5 alphabet cards as well.



Step 2
After 5 Alphabet cards are chose per person, the Dots cards are now taken out. Players place tokens on one of their braille cells according to the Braille dots cards played. To avoid cheating, the opponent takes the top card that the player needs to play in any one of the braille cell slates.

Gameplay


Player 1
W
D
O
Γ
∀
K
B
E
P
N
Player 2
"Pattern cards" that have been played by player 1
"Alphabet cards" of Player 1
Player 1, Braille cell slate
"Big tokens" for a completed cell
Player 1 plays "dots cards" for player 2 to play
Stack of "dot cards"
"Small tokens" used to fill the braille cell
Player 2 chosen "Alphabet cards"
Player 2 played "dot cards"

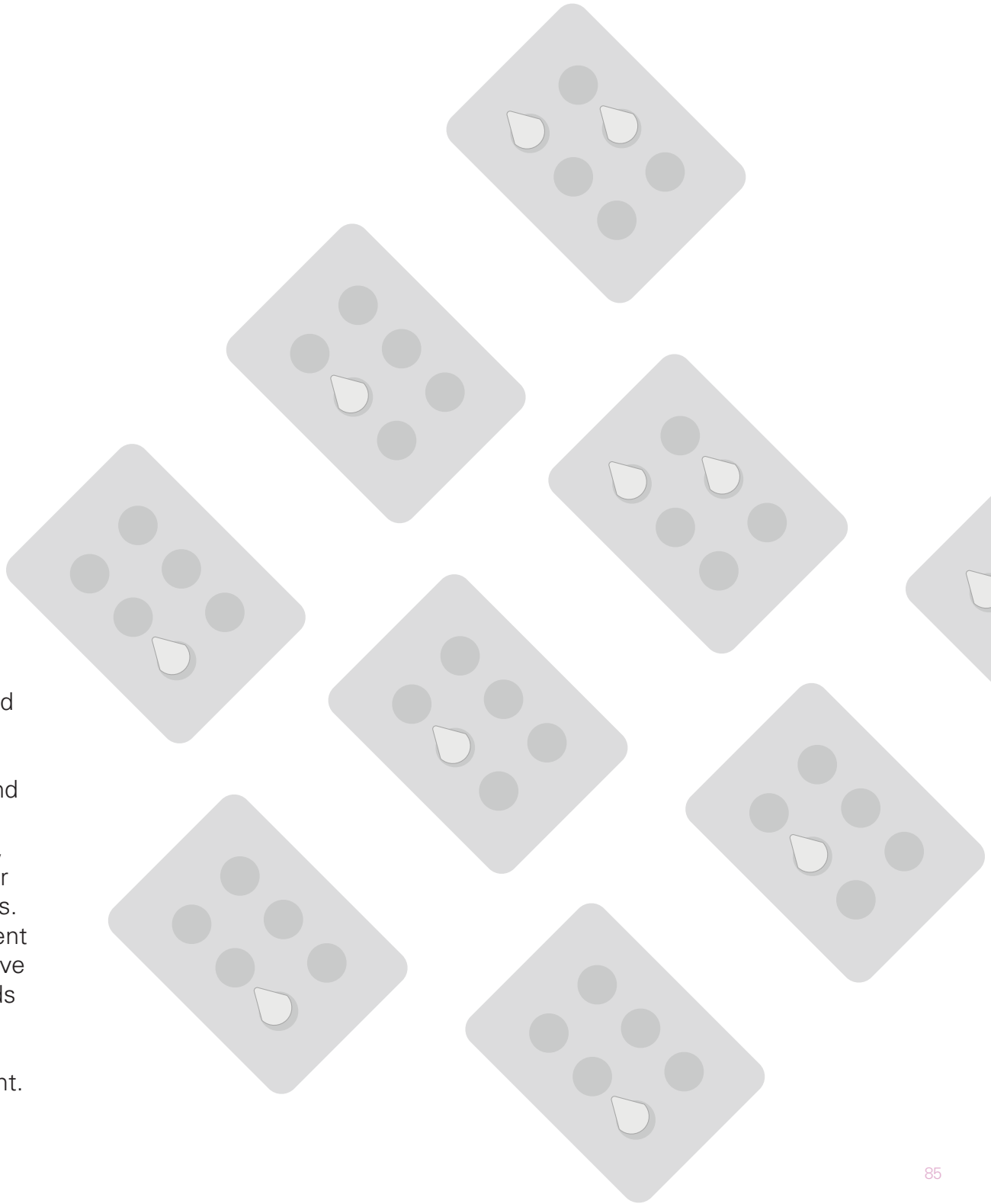
Game designed: “Braille cell”
VERSION 1

Brief
Inclusive game to teach braille.It can be played with both sighted and blind.

Game Setup
Number of players: 2
Age: Any age group

Objective
To complete the five braille cell slates first.

Summary
An inclusive game called “Braille Cell” has been designed to teach braille and can be played by both sighted and blind individuals. The game involves players completing five braille slates. Each player is given five braille cells, and there are two sets of cards: one with English alphabets and the other with random braille dots. During gameplay, players take turns picking the “alphabet cards” and either give them to their opponent or keep them for themselves. If one player completes five “alphabet cards”, the opponent gets the remaining cards at random so that even they have five “alphabet cards” in total. After the five alphabet cards are chosen by both payers, the cards with symbols are now taken out. Players place tokens on their braille cells according to the Braille dots cards played by the opponent.



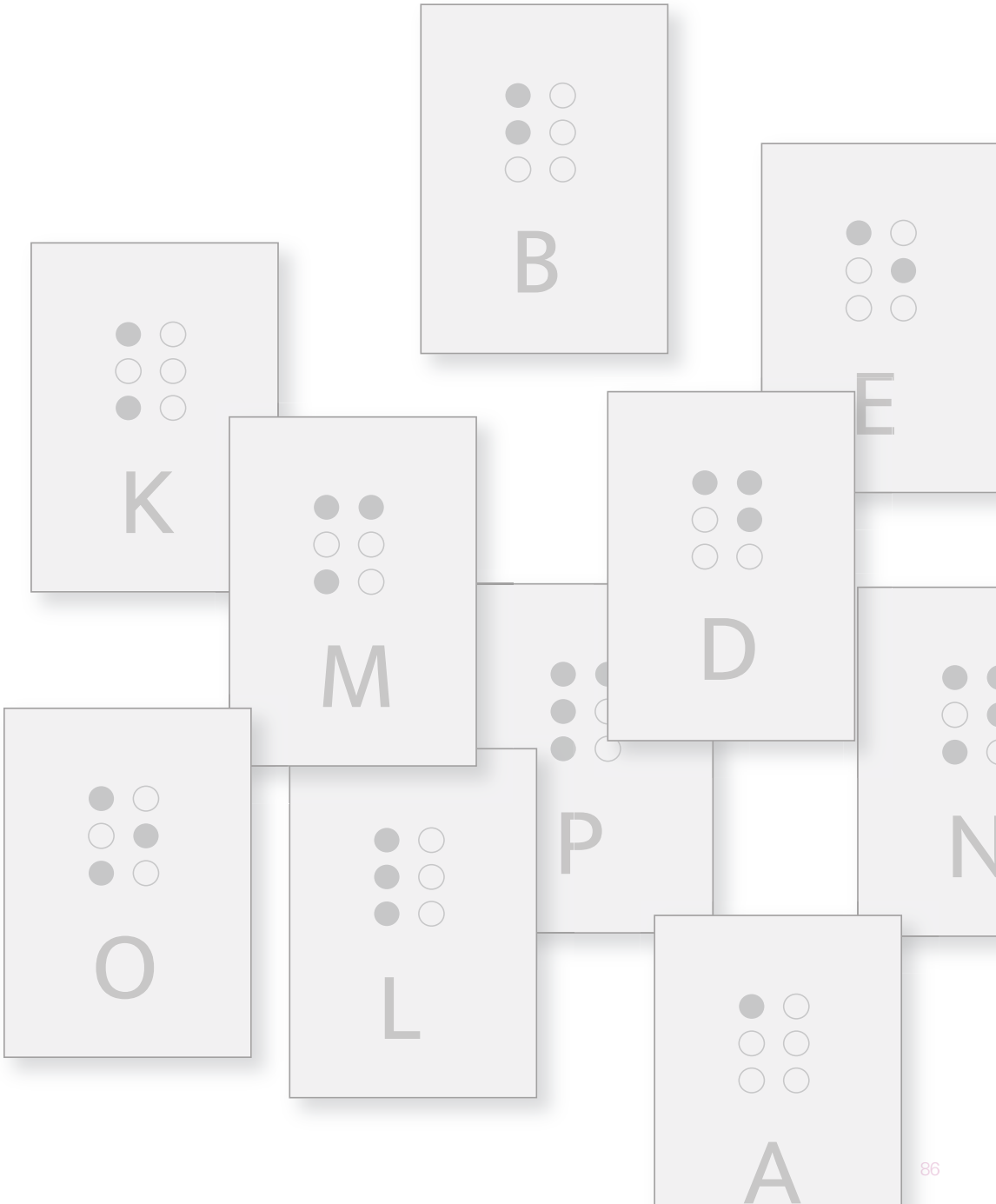
The first player to complete all five braille slates wins. Points are then distributed based on completed braille cells and the number of words formed with the chosen alphabet cards. The player with the highest score wins.

Instructions

Both players are given 5 braille cells each. There are two sets of cards one which has the English alphabet and the other with random braille dots.

Gameplay

- Each player will be given 5 braille cells.
- There will be an upside-down set of cards with braille letters. The player picks one and gives it to the opponent or keeps it with him.
- If one player completes five "alphabet cards", the opponent gets the remaining cards at random so that even they have five "alphabet cards" in total.
- After the five alphabet cards are chosen by both payers, the cards with symbols are now taken out.
- Player 1 plays a card, e.g. dot at position 1.
- The opponent needs to put a token in one of the braille slates with the same braille pattern as the card.
- Next, player 2 plays a card for the opponent, and so on.
- Once a player completes one of the braille cells, they have to announce and keep the bigger token in front of that cell, denoting a complete braille cell.
- Game ends when any one of the players completes all five braille cells.



Points:

After one player completes all five cells, points are now distributed to both players.

- 5 points each for complete braille cells.
- 5 times the number of words that can be formed using the five alphabet cards chosen by the player. For example, the player will get 5x3= 15 points if a three-letter word is formed.

The player with the maximum points wins.

Issues

- **Orientation of the cell:** for the blind, due to symmetrical braille cells, it was difficult to understand the orientation of their cells, and when they tried and feel the opponent cells, it was reflected.
- **Orientation of the braille dots cards** was important. Once flipped, it becomes a different pattern altogether. Since
- The third part of the game involves **making words**, and points are given based on the letters made. It was observed that it was getting difficult to make words. The vowel cards can be increased to increase the chances of word formation.
- It was observed that the **vocabulary** of the blind might not be as good as the sighted, and hence sighted have an advantage here.
- **Blind use contractions** in braille to make reading faster. E.g. "B" for "but". Hence there might be differences in how they form words.
- **The cards are not visible** to the blind. Blind rely on sounds and touch to get a sense of objects. There is a possibility of **cheating** from the sighted end without the blind knowing.
- **Less challenge** between the player. The game is becoming more l**uck based.**
- **Letters are breaking**. Connecting b/w braille and letter is weak. E.g. "B" can be seen as two separate dots, whereas the braille letter should not be broken into parts but seen as a whole.

Braille cell
VERSION 2

Changes

- **Removed Power Cards:** Power cards are no longer included in the game to maintain the simplicity and balance of the gameplay.

- **Removed Word Formation:** Word formation has been removed to avoid difficulties arising from contractions, vocabulary differences, and complexities in word building.

- **Eliminated the Selection of Alphabet Card:** Due to the increasing difficulty in deciding whether to give or keep the card, the choice was eliminated. Instead, each player now receives five cards randomly. This modification has simplified the gameplay, particularly for visually impaired individuals.

- **Dot Cards Play:** Both players now play the same braille dots card simultaneously, eliminating any chances of cheating.

- **Braille Cell Orientation:** Braille cells now have a distinctive side to indicate orientation, facilitating

understanding for both sighted and blind players.

- **Braille Dot Card Orientation:** Each braille dots card includes a line indicator to ensure correct orientation, with the line being raised for blind players' tactile perception.

- Based on user feedback, it was observed that the blind user group found it uncomfortable to handle five braille slates during gameplay. As a result, the number of braille slates has been reduced to three, aiming to improve usability and comfort for blind players.

Braille cells explorations to fix the orientation issue.

Some images from the user testing.
The feedback were taken from sighted users, teachers for blind and blind users.

Issues

- T**he cards are not visible** to the blind. Blind rely on sounds and touch to get a sense of objects. There is a possibility of **cheating** from the sighted end without the blind knowing.

- **Less challenge** between the player. The game is becoming more **luck based.**

- **Letters are breaking**. Connecting b/w braille and letter is weak. E.g. "B" can be seen as two separate dots, whereas the braille letter should not be broken into parts but seen as a whole.

- There is **less conflict and challenge** between the players. The players are individually focussing on their own game and focussing on making a pattern.

- **Weak connection between braille dots and letters:** The current representation of braille letters, such as "B" appearing as separate dots, hinders the understanding of the complete braille letter structure. The players seemed to focus just on the pattern as ultimately they had to complete the pattern with the given dot cards.

- The players seemed to take the game as a game of patterns rather than connecting the pattern to the braille letter.

- Since there were **too many elements** involved, such as two sets of cards, 5 braille cells, 10 big tokens, multiple small tokens, etc, making it difficult to manage and keep track of all the components for the blind.

- The opponent's braille cell was reflected, and hence when the player is checking the opponent's braille, they are seeing the vertically reflected image. The **vertical reflection** of opponent braille cells introduces confusion and hampers the learning of braille.

- **Cognitive overload** for blind players: The current game setup requires blind players not only to keep track of their own game but also to monitor their opponent's game simultaneously. This additional cognitive load can be overwhelming for blind players and may impact their overall gameplay experience.

- **Delays and disruptions** caused by tactile exploration: Blind players tend to rely on touch to gather information and understand the game state. However, this tactile exploration may result in increased delays, which can disrupt the flow of the game and potentially inconvenience sighted players..

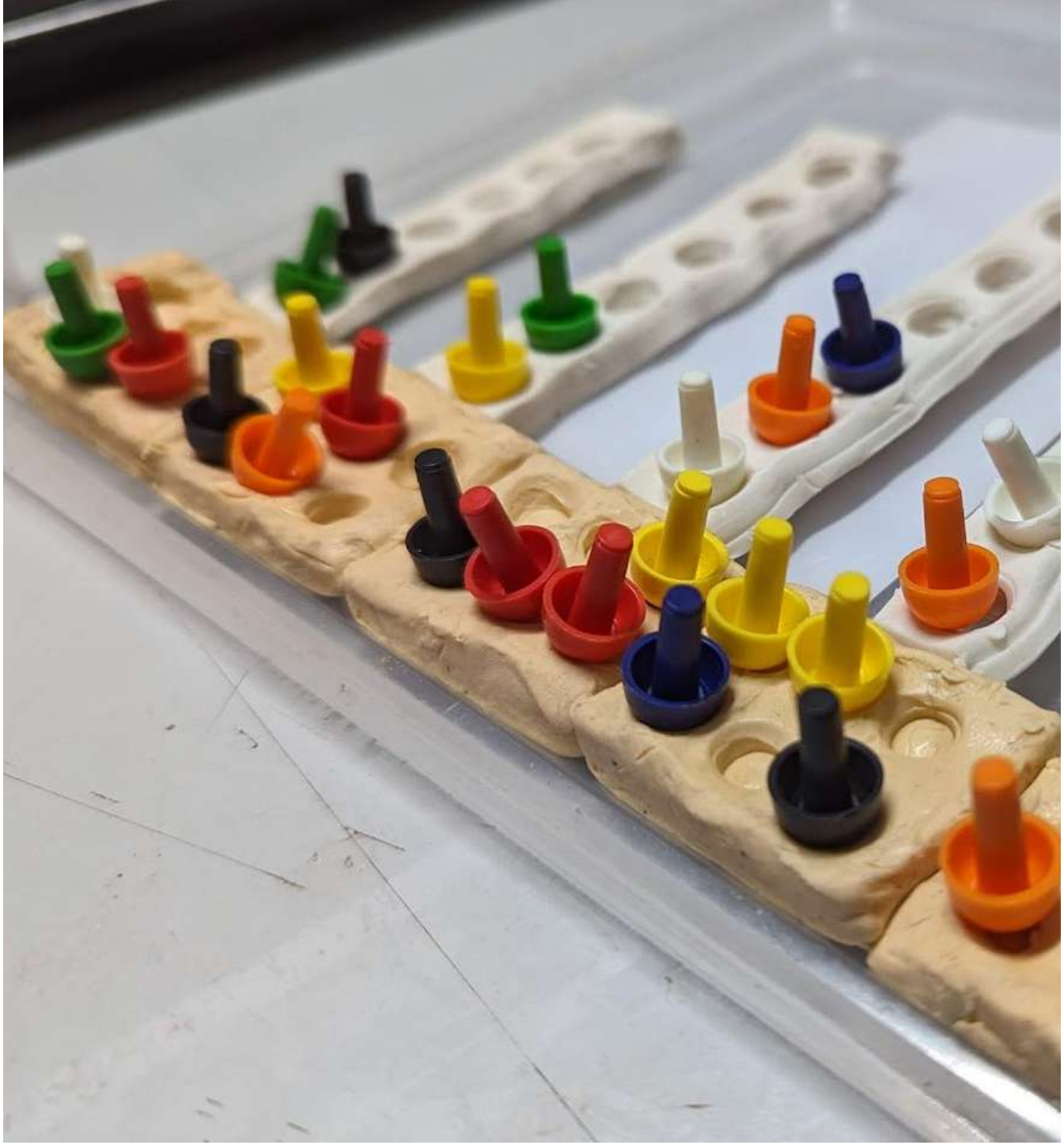
Conclusion

The game currently faces several critical issues that hinder its accessibility, engagement, and educational value for blind players and sighted players. The orientation issues, potential for cheating, reduced challenge, a weak connection between braille and letters, lack of player conflict, inadequate understanding of braille patterns, excessive complexity, and mirrored opponent braille cells all contribute to these concerns. Addressing these issues is crucial to create an inclusive, fair, and meaningful gameplay experience for blind individuals.

After carefully considering the significant concerns surrounding cheating, delays, cognitive overload, and the challenges blind users face in managing game components, I decided to discontinue the development of this game. Instead, I will utilize the valuable insights gained from these issues to create a new and improved game that effectively addresses and resolves these concerns. By doing so, the new game will provide a more inclusive, seamless, and enjoyable experience for all players involved.

GAME IDEA 5

Mystery Dots



Game designed: “Guess braile”
VERSION 1

Brief
Inclusive game to teach braille. It can be played with both

sighted and blind.

Game Setup
Number of players: 2
Age: Any age group

Objective
To guess the braille letter of the opponent.

Gameplay
The game is played between two players and revolves around guessing the braille letter of the opponent. In the first round, Player 1 selects a card without looking at it, and Player 2 attempts to guess the card. Player 2 places tokens on the braille display to represent their guess, and Player 1 provides feedback on how many tokens are in the correct dot positions. Using these clues, the next round begins, and the player must continue guessing the card. If the player successfully guesses the card within five turns, they acquire the card; otherwise, the opponent claims it.The player who is able to gather three cards first, wins the game.

Game reference

This game was inspired from the game Mastermind which I explored during this project . Mastermind, also known as a two-player code-breaking game. It shares similarities with a pencil and paper game called Bulls and Cows, which may have originated a century ago.

"The game is based on an older, paper based game called Bulls and Cows. A computer adaptation of it was run in the 1960s on Cambridge University's Titan computer system, where it was called 'MOO'. This version was written by Frank King. There was also another version for the TSS/8 time sharing system, written by J.S. Felton and finally a version for the Multics system at MIT by Jerrold Grochow.

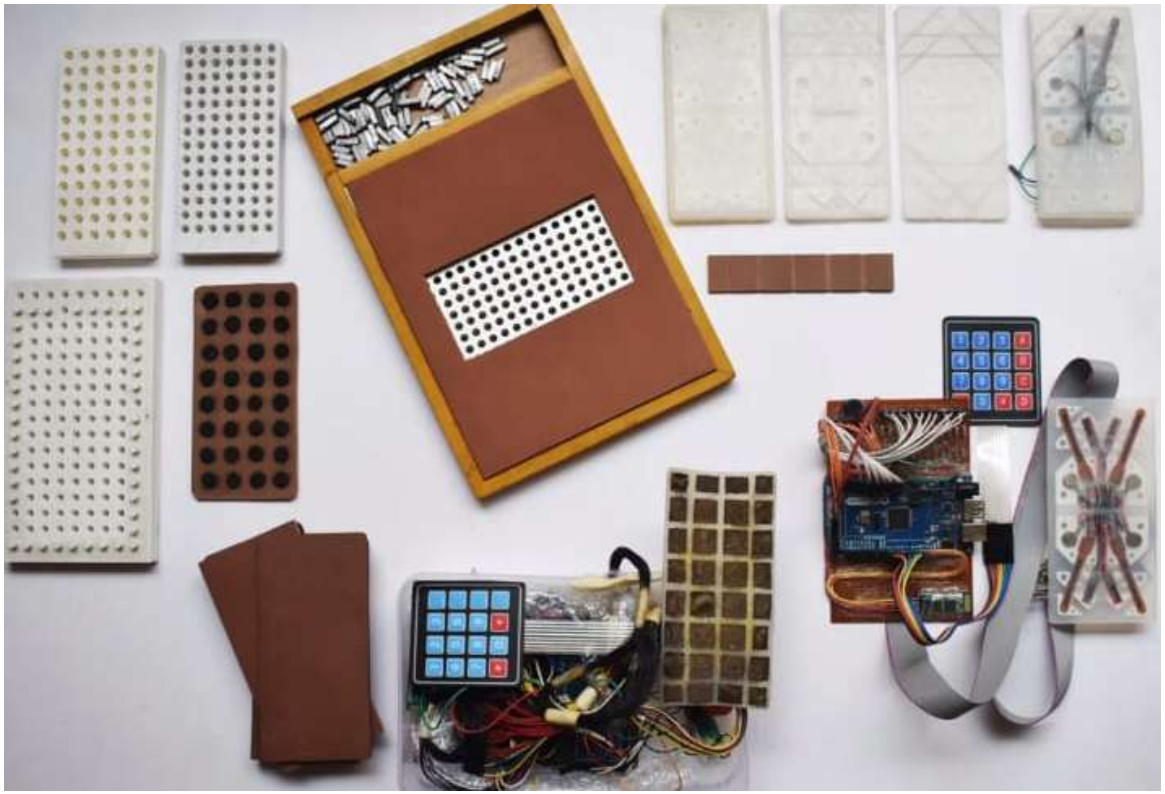
The modern game with pegs was invented in 1970 by Mordecai Meirowitz, an Israeli postmaster and telecommunications expert. Meirowitz presented the idea to many major toy companies but, after showing it at the Nuremberg International Toy Fair, it was picked up by a plastics company, Invicta Plastics, based near Leicester, UK. Invicta purchased all the rights to the game and the founder, Edward Jones-Fenleigh, refined the game further. It was released in 1971–2."

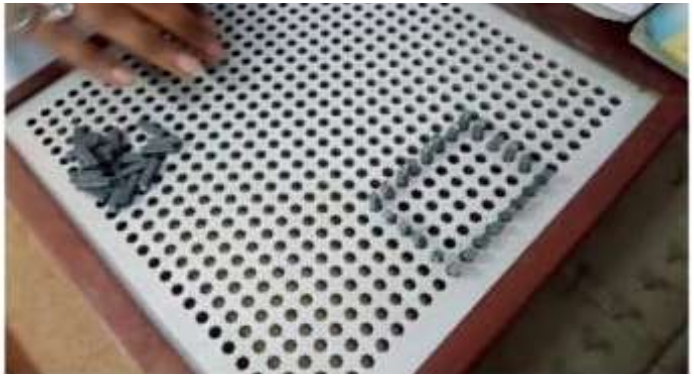
https://en.wikipedia.org/wiki/Mastermind_(board_game)

Matermind game

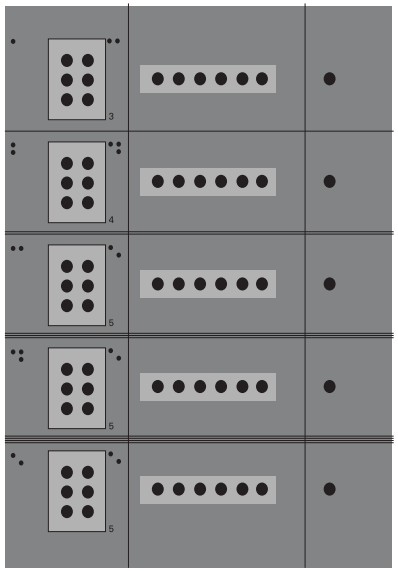
Reason behind game design

Designing the game was motivated by the existing tools available for the blind community, ensuring that the game would be accessible and comfortable for visually impaired individuals. The concept of pegs and holes, as well as the way they are positioned and held by the blind, were crucial aspects taken into consideration during the game's development. By focusing on these factors, the design aimed to create an inclusive and engaging experience for blind players.

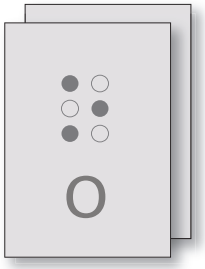




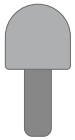
Game components



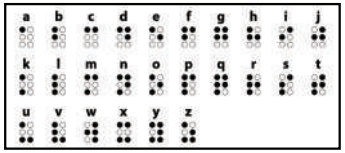
Game board



Alphabet cards

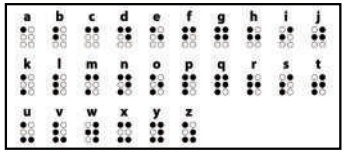


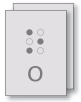
Small tokens

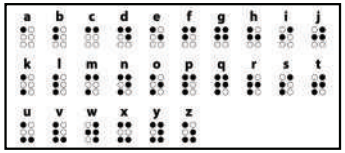


Reference braille cards

Game Setup

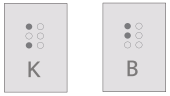




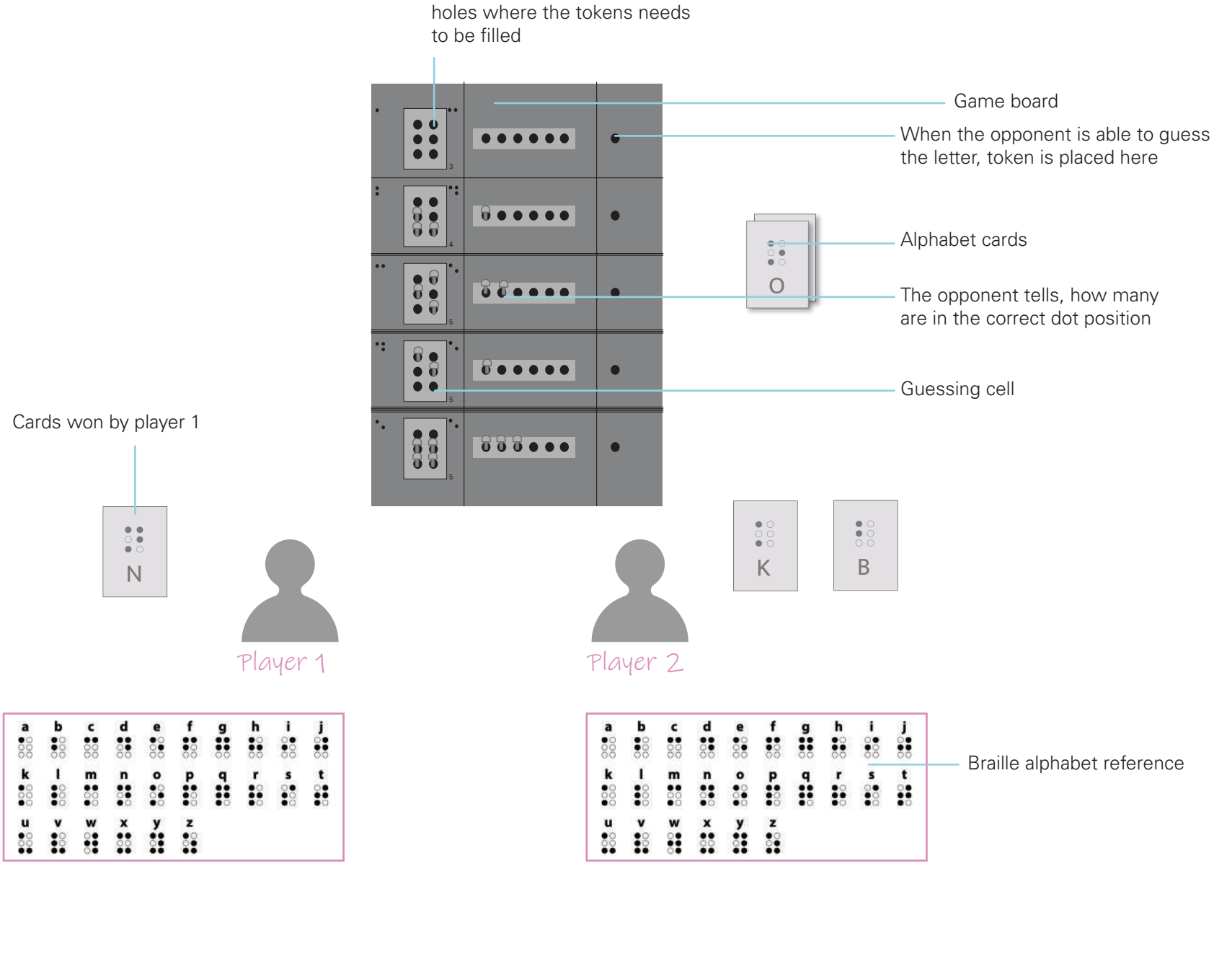


Player 1

Player 2



Gameplay


holes where the tokens needs to be filled
Game board
When the opponent is able to guess the letter, token is placed here
Alphabet cards
O
The opponent tells, how many are in the correct dot position
Guessing cell
Cards won by player 1
N
K
B
Player 1
Player 2
a b c d e f g h i j
k l m n o p q r s t
u v w x y z
Braille alphabet reference

Gameplay

The gameplay involves two players and the following steps:

- Player 1 chooses a card without looking, representing a secret code.

- Player 2, using any of the six braille dots available, inserts a token to guess the code.

- Player 1 then provides feedback by indicating how many tokens are in the correct dot positions.

- Based on this feedback, Player 2 adjusts their strategy and makes another guess in the second round.

- Both players have a reference sheet with the alphabet for easy access.

- Player 2 continues guessing the code within a limit of five turns.

- If Player 2 successfully guesses the code within the allotted turns, they obtain the card. If not, Player 1 receives the card.

- The turn now shifts to Player 2, who selects a card, and Player 1 tries to guess the code.

- The game proceeds in this manner with alternating turns.
  The game concludes when one of the players accumulates three cards, declaring them the winner.

Issues

- **Player advantage:** The player who starts the game has an unfair advantage over the other player. This can create an imbalance in gameplay.

- **Predictability:** After playing the game multiple times, players may start recognizing patterns, making it easier for them to guess the code within the given five turns. This reduces the challenge and suspense of the game.

- **Lack of focus on letter-braille connection:** There is a possibility that players may become too focused on the patterns themselves, neglecting the importance of relating the patterns to the corresponding braille letters.

Advantages of this game

- **Reduced delay:** The game successfully tackles the issue of delay of VIP that was observed in the previous versions. This improves the overall flow and engagement of the game.

- **Lower cognitive load for blind players:** The game design minimizes cognitive load for blind players, as they have to remember fewer elements and can focus on the gameplay itself. The game state is less in this gameplay.

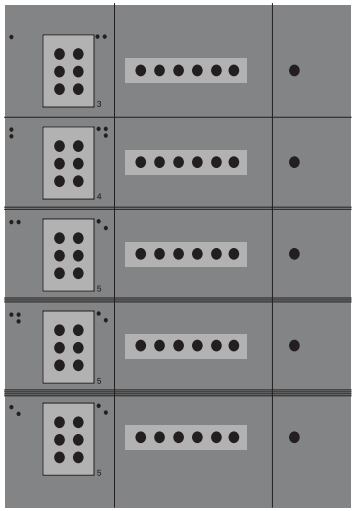
- **Stronger connection to braille patterns:** Unlike the previous game, the braille patterns in this game are not broken, ensuring a stronger connection between the patterns and the corresponding letters.

- **Accessibility for braille users:** This game allows players who are familiar with braille to participate and enjoy the gameplay. Players who dont know braille, learn while playing the game.

- **Comfortable board design for the blind:** The game board has been inspired by existing boards used by blind individuals, ensuring a familiar and comfortable playing space for visually impaired players.

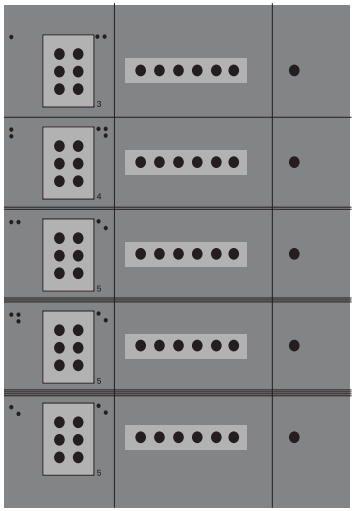
- **No cheating:** Since both the players are using the same board, the sighted cannot cheat or take advantage.

Improving the board



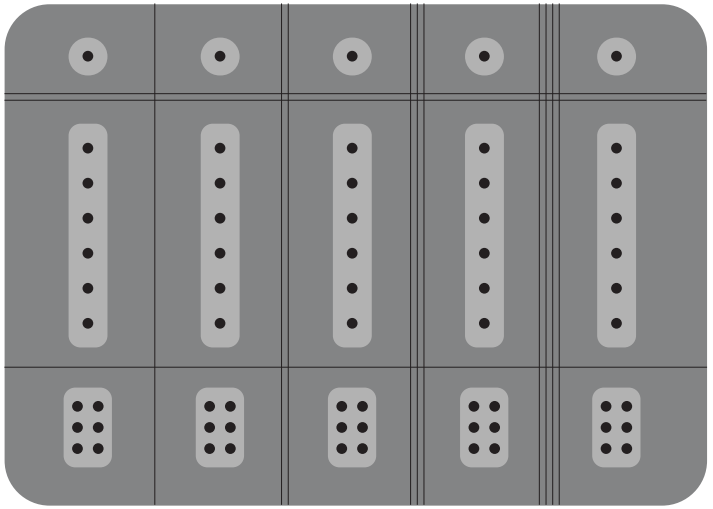
Version 1

The players go from bottom to top.



Version 2

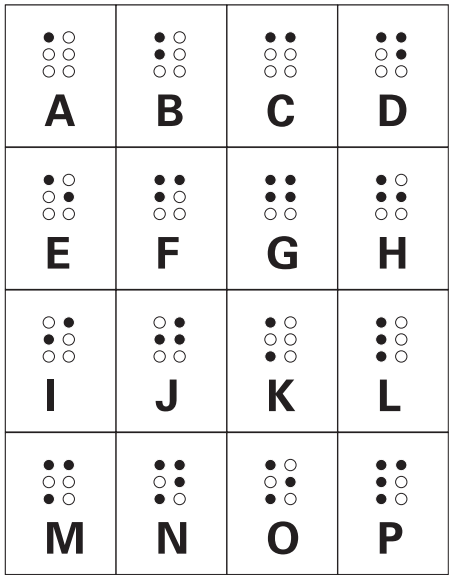
In the revised game design, the players now progress from top to bottom on the board. This adjustment provides a more convenient setup for the blind player, as it aligns with their natural reading and tactile exploration patterns. Moreover, this arrangement ensures that the tokens already placed on the board remain undisturbed during gameplay, allowing for a clearer understanding of the game state.



Version 3

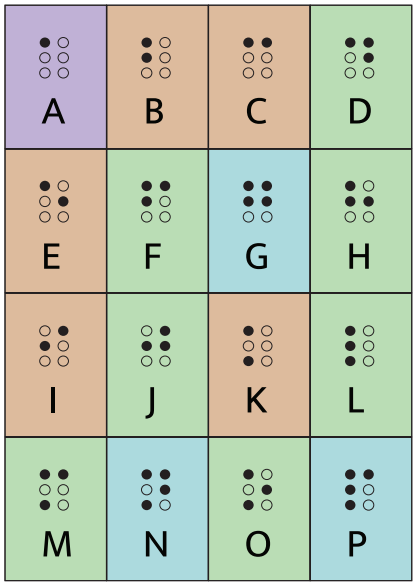
In the updated game design, the board has been horizontally oriented, and the player's progression goes from left to right. This modification provides a larger surface area for both players to sit facing the same direction, creating a more comfortable playing experience for the blind player. Additionally, this layout ensures that the previously played tokens remain undisturbed, enhancing the overall gameplay flow and ease of use.

Improving the cards



Version 1

In version one, I just kept the letters and the braille in black and white.

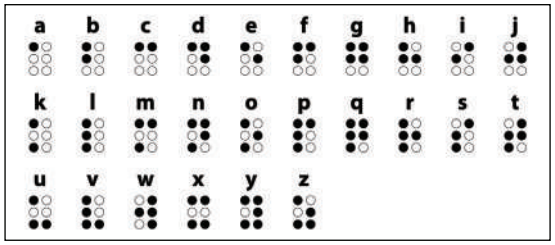


Version 2

In the updated card design, I incorporated the concept of redundancy to convey information about the number of braille dots using color coding. Each card is assigned a specific color that represents the number of braille dots. For example, a green card may signify three braille dots.

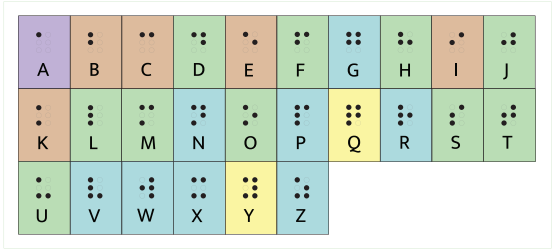
Now, players can gather information from multiple sensory channels, including text, color, touch, and even sound if applicable. This multi-modal approach enriches the gameplay experience, providing players with additional cues to make informed decisions and strategize effectively. The combination of these elements promotes inclusivity and allows players to engage with the game using different senses, catering to their individual preferences and abilities.

Improving the reference cards



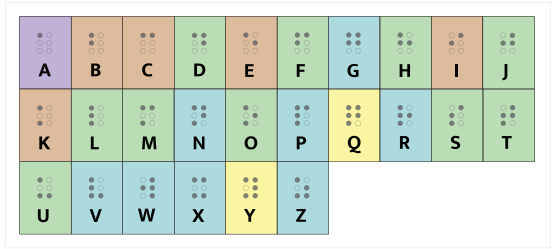
Version 1

black and white.



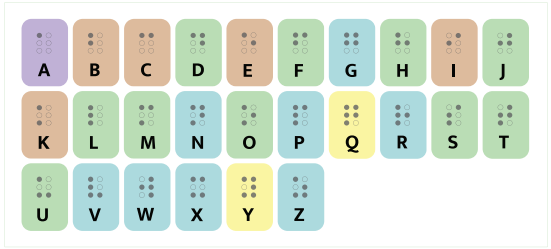
Version 2

I incorporated the concept of redundancy to convey information about the number of braille dots using color coding. Each card is assigned a specific color that represents the number of braille dots. For example, a green card may signify three braille dots.



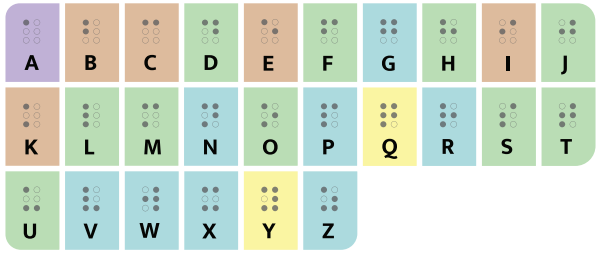
Version 3

Made the alphabet darker. This way the relation of letter and the pattern become stronger.



Version 4

Curved the edges.

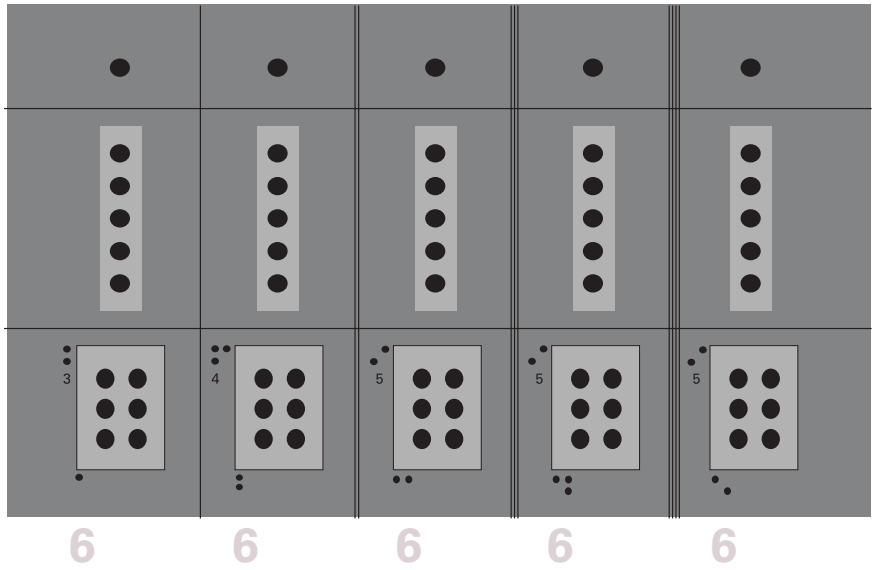


Version 5

There were white patters forming in the previous version. Also, this visual style matches the game board.

Exploring gameplay

Through user testing, I started exploring, the number of tokens that should be allowed in each turn which makes the game more interesting and fun.

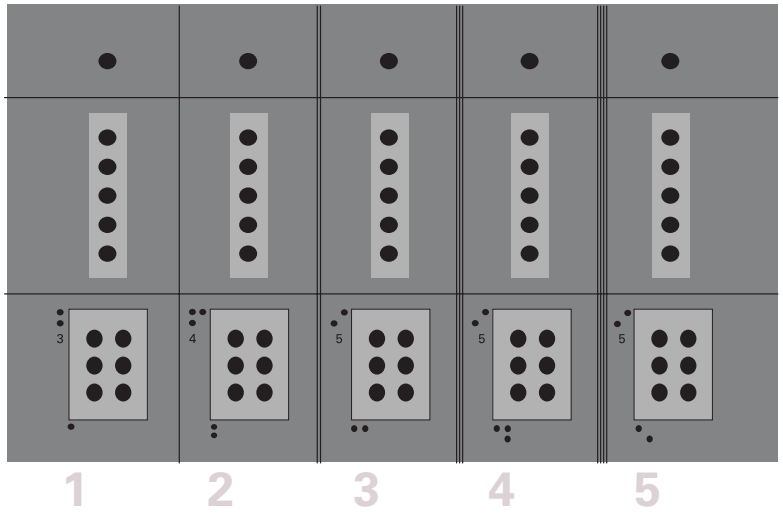


Version 1

Player can use all 6 cells of the braille slate.

Issue:

After multiple plays, players quickly recognize patterns, making the gameplay easier and potentially reducing the challenge.

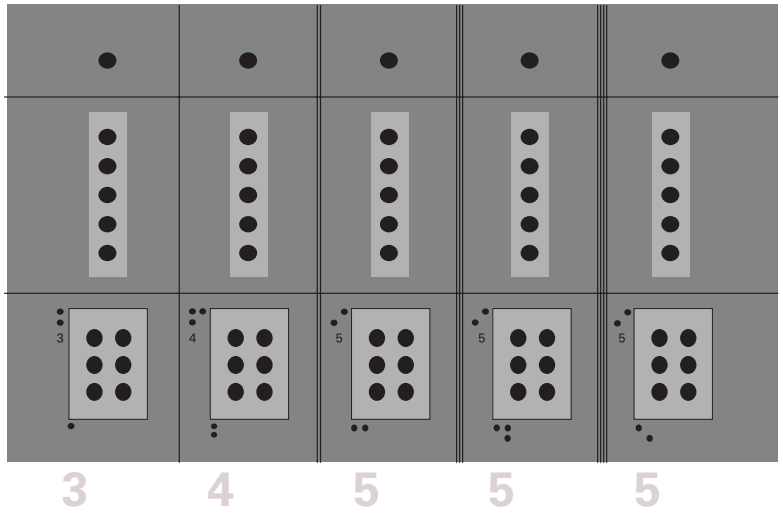


Version 2

Player can use a maximum of 1 token in the first cell, a maximum of 2 in the second, 3 in the third, 4 in the fourth and 5 in the fifth.. The maximum number of braille dots a letter can have is 5 (only two alphabets have 5 braille dots.)

Issue:

- After multiple plays, players quickly recognize patterns, making the gameplay easier and potentially reducing the challenge.
- Specifically, positions 1, 5, and 6 are frequently utilized as they provide the most informative clues. This predictability in the initial moves diminishes the level of challenge in the game and makes it boring.



Version 3

Player can use a maximum of **3** tokens in the first cell, a maximum of **4** in the second, **5** in the third, fourth and the fifth. The maximum number of braille dots a letter can have is 5 (only two alphabets have 5 braille dots.)

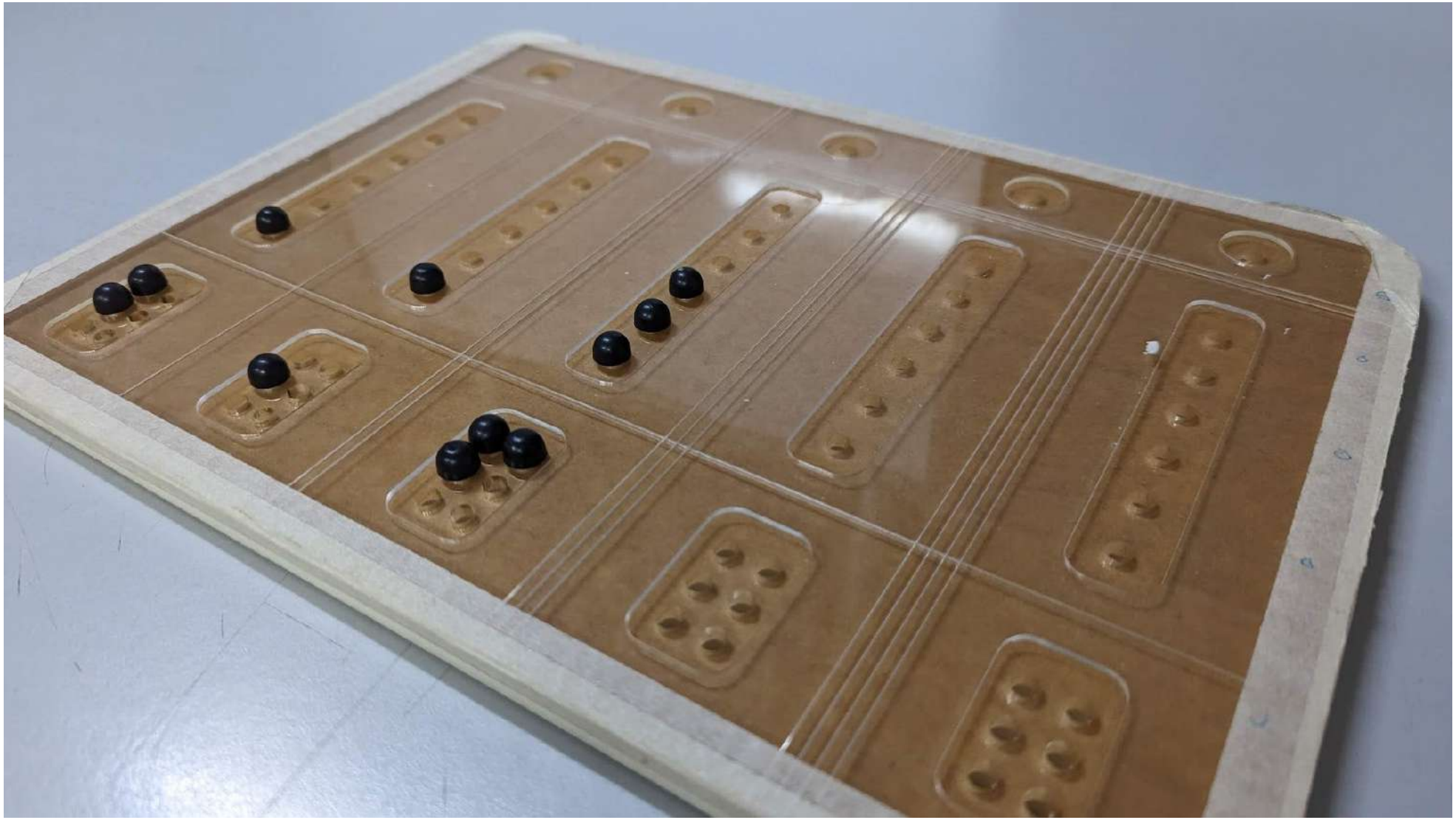
Advantage

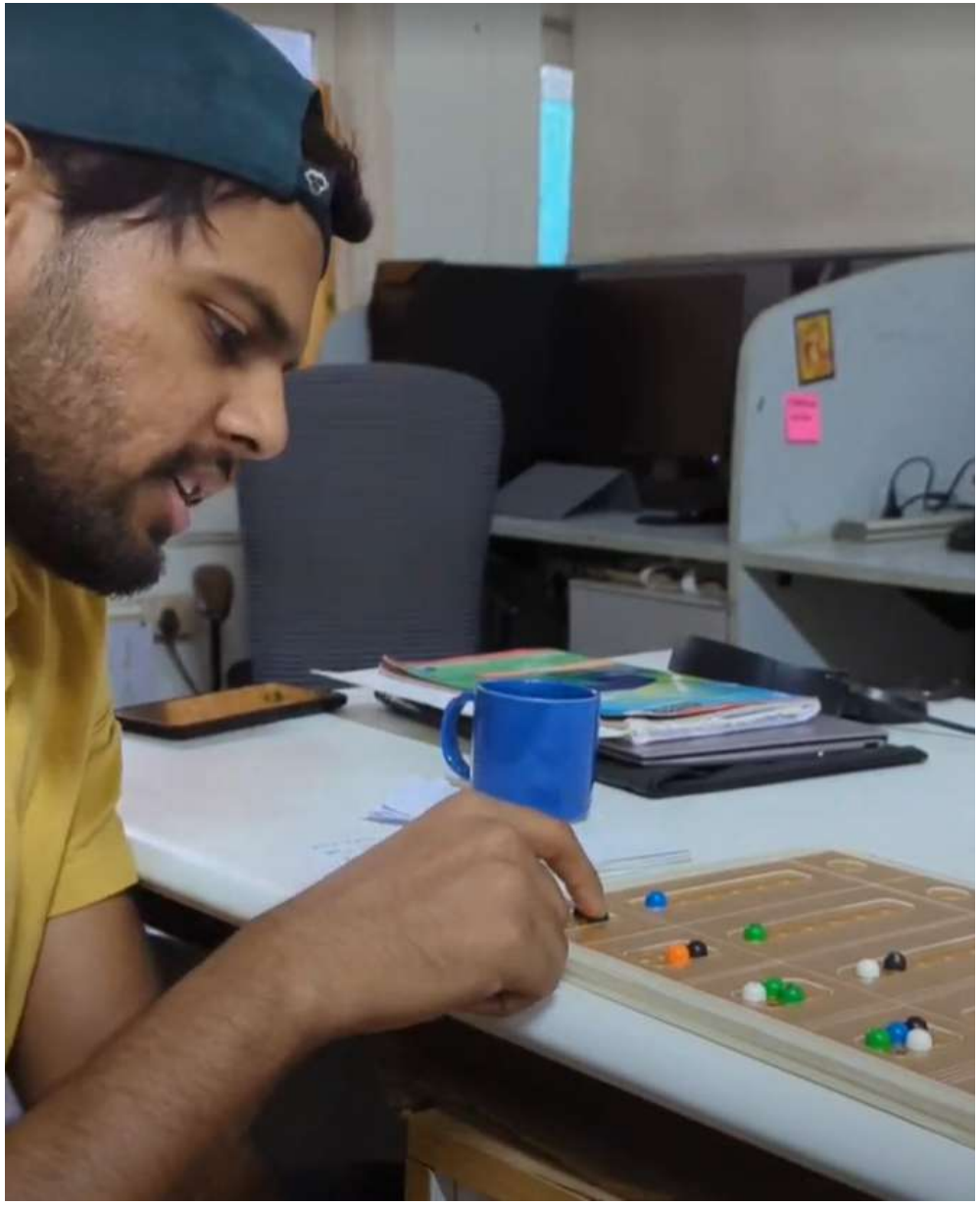
This adjustment allows for a greater variety of patterns to be formed, giving players more strategic options. Now, players can strategize and decide to place anywhere from 1 to 3 tokens in the first cell, 1 to 4 tokens in the second cell, and so on. This increased flexibility and range of possibilities enhance the gameplay experience and add depth to the decision-making process.

Issue:

After a while, it was comfortable to guess the braille letter by 5th turn. We wanted something to to motivate players to take risks and guess the pattern as soon as possible.

Protoype





USER TESTING

Sighted players

Key Observations:

- Players **recognized patterns over multiple rounds**, making it easier for them to guess words within fewer than five turns. This indicates the need for a mechanism that encourages quicker completion and risk-taking.

- **Increasing the challenge and interaction** between players was identified as important. To achieve this, players now have the ability to choose their own alphabet cards instead of relying on random selection.

- **Knowledge of Braille** was observed to give players an advantage, making the game faster. This benefits blind players while also incentivizing sighted players to learn Braille in order to improve their chances of winning.

- **Game duration**: the gameplay typically lasts around 15 minutes.

- **Subtle Pattern Recognition:** Although not explicitly prominent, players demonstrated an ability to make connections between

patterns and corresponding letters throughout the game. This suggests that there is a subconscious learning process taking place, allowing players to recognize and remember the relationships between patterns and specific cards.

- **Improved Memory through Winning or Losing:** An interesting observation was made regarding the players' memory of the cards. It was noted that the act of winning or losing a card during gameplay contributed to better card retention. This indicates that the emotional experience associated with winning or losing enhances memory recall, potentially aiding players in future rounds.

- **Initial Pattern Recognition:** When players engage in the game for the first time, they tend to rely on pattern recognition, particularly during the initial two or three rounds. However, it was observed that relying solely on patterns becomes challenging to win due to the multitude of possibilities. Therefore, it becomes crucial for players to reference the Braille letters and play accordingly in order to increase their chances of winning.

- **Enhanced Learning through Multiple Sensory Inputs:** To facilitate easier learning of Braille and strengthen the association between tactile patterns and their corresponding letters, a method was introduced where players must read out the numbers on the board where they have placed their tokens and call out the associated letter. This approach leverages redundancy by providing multiple sensory inputs. The players see the letter in the reference, the colors on the cards convey information about the number of dots, the Braille on the cards provides tactile feedback, the sound effects offer audio feedback, and calling out the cell number reinforces the information for each card. By receiving the same information through various senses, the chances of learning the Braille letters are increased.

VIP

Kailash Tandel

About Him:

Kailash, a visually impaired Ph.D. student from IITB, had insightful perspectives on the game.

Views of the Game:

- When I initially presented him with the game board, Kailash seemed to have difficulty understanding its orientation, as he kept rotating it. This indicated that the orientation cues were not clearly conveyed.

- During the explanation of the game, I realized that instead of using directional indicators, I had used shapes to describe the board. Kailash, being able to feel the shapes, understood the board more easily through this tactile representation.

- While playing the game, I observed that Kailash, having prior knowledge of Braille, was able to play with ease and at a fast pace. He didn't need to reference the alphabet extensively, relying on his familiarity with Braille. Rather than randomly placing tokens, he strategically formed letters, quickly narrowing down the possibilities.

- I also noticed that Kailash instinctively placed the mirror image of Braille on the board. This occurred because we were inserting

raised dots, which is similar to writting Braille, and game is based on reading Braille.

- Initially, Kailash preferred the smooth tokens, but he later agreed that the textured ones provided a better grip and were less likely to fall off the board.

- Regarding the game manual, Kailash advised against using contractions, as many blind individuals might have difficulty reading them. He also expressed concerns about blind people being able to access the audio manually through scanning QR codes on smartphones, as not all blind individuals may have access to such technology. Additionally, he mentioned that using a pen drive might not be feasible for those without regular computer access, particularly those from low-income backgrounds. Instead, Kailash suggested the idea of an audio book like greeting cards in which the music plays once the cards are opened.

- Kailash's insights shed light on the importance of clear orientation cues, the effectiveness of tactile representations, the advantage of Braille literacy, token grip preference, and considerations for creating accessible game manuals that accommodate the varying resources and technological accessibility of blind individuals.

Sonali Bhalerao

About Her:

Sonali Bhalerao is a visually impaired college student currently pursuing a BA in philosophy.

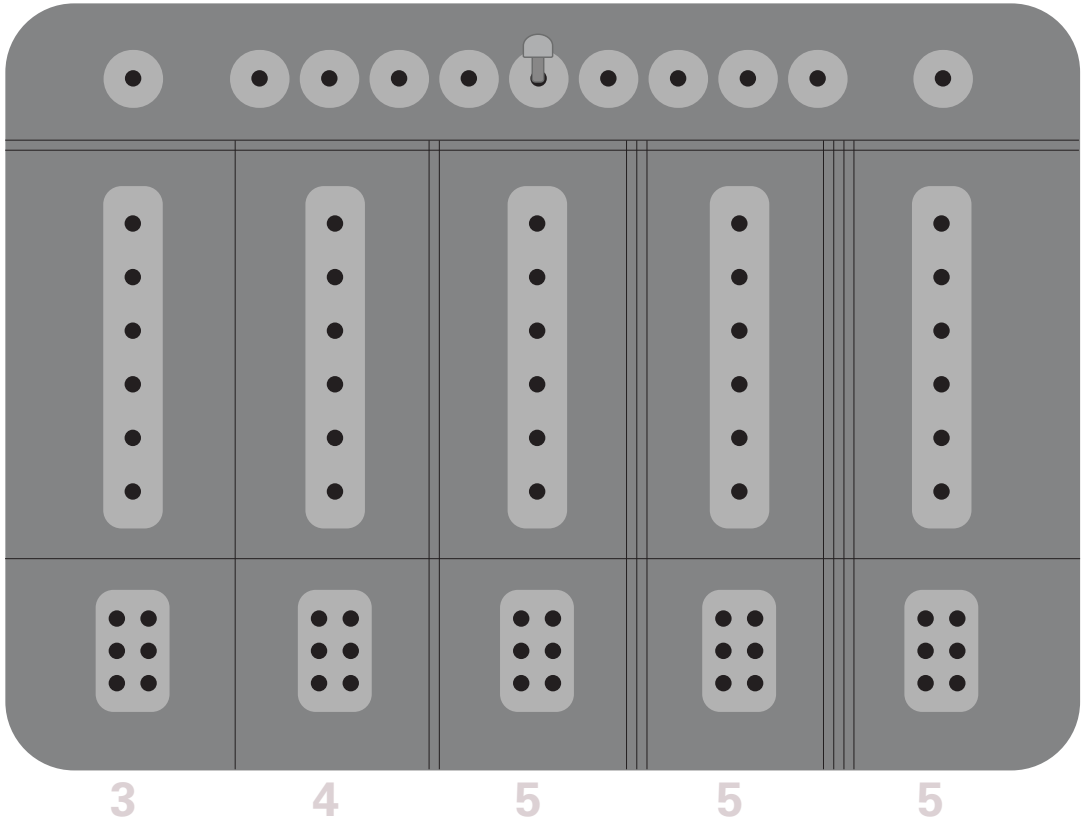
Her Views:

Sonali thoroughly enjoyed the game and expressed her comfort with the game board, cards, and tokens. She was able to read the Braille on both the reference cards and the playing cards without any difficulty. Among the different sizes of reference cards available, Sonali found the larger cards to be the most comfortable, as they were more spaced out and easier for her to navigate.

Sonali was delighted to learn that the game was self-designed and had a bit of difficulty believing it initially. However, she quickly adapted to the game and felt comfortable playing it.

Most of the other observations were similar to Kailash (I have stated them in the previous slide.)

Improving the board + Game play



Version 4

In the updated version, a bar is added at the top of the game board.

The token is positioned in the center of the bar. After each round, if player 1 successfully guesses the card within the third turn and player 2 guesses within the fifth turn, the token at the top of the bar moves two steps to the right (towards player 1).

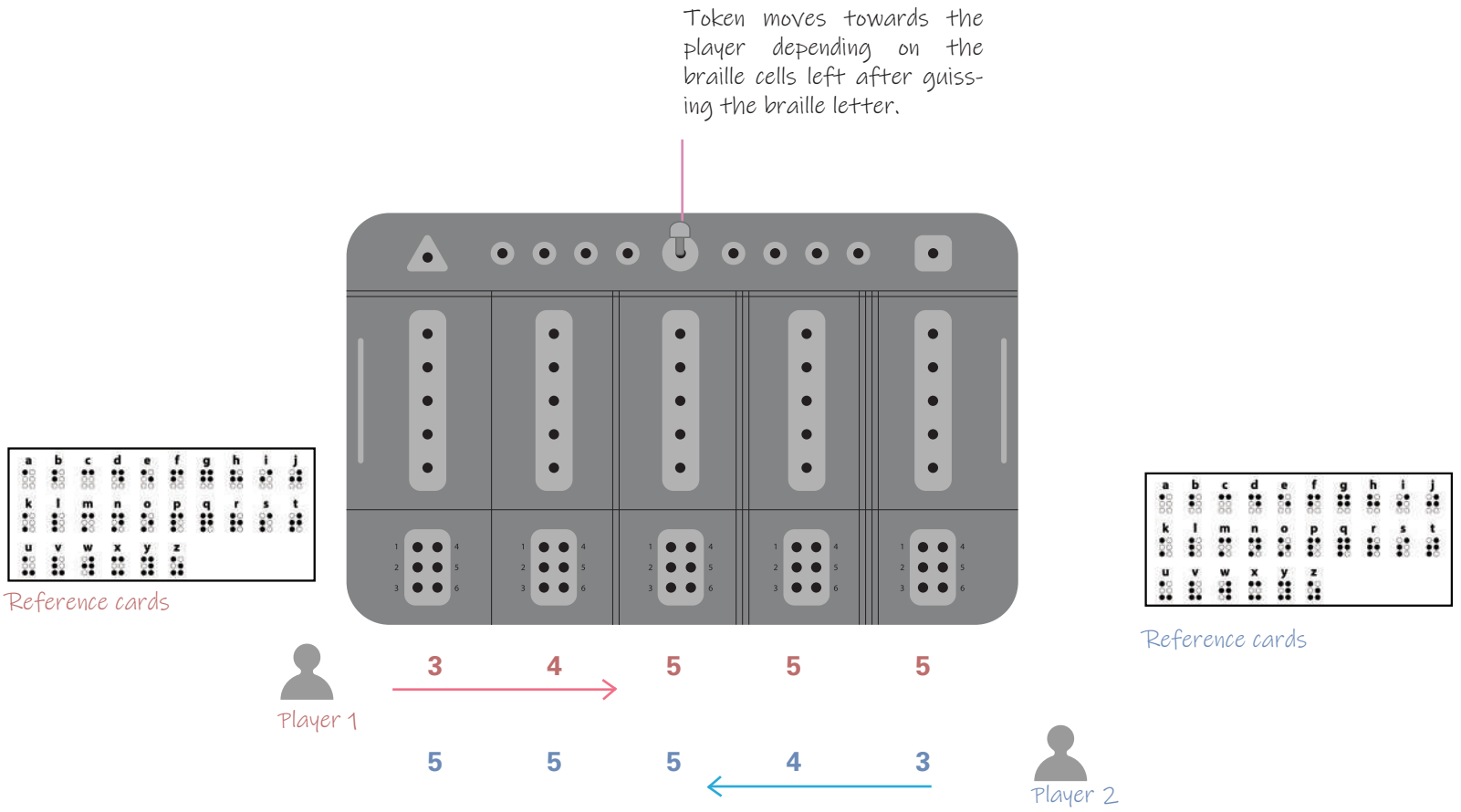
Winning Condition:

The game can be won in two ways:

- If the top token reaches either player's side of the bar, indicating that they have made more accurate guesses consistently.
- If any player collects five cards before their opponent, regardless of the token's position.

These updates introduce an additional strategic element to the game, encouraging players to make efficient and accurate guesses to advance the token and ultimately aim for victory.

Version 5


Token moves towards the player depending on the braille cells left after guissing the braille letter.
Reference cards
Reference cards
Player 1
3
4
5
5
5
5
5
5
4
3
Player 2
K
B
Won cards for player 1
(they are displayed for reference)
Remaining alphabet cards
(not displayed)
N
Won cards for player 2
(they are displayed for reference)

Gameplay

In the updated version, I have introduced additional shapes, namely a triangle and a square, positioned at the top of the game board. These shapes serve to indicate the directions of the token and assist players in maintaining their orientation.

In this version, players commence the game from their respective sides and advance towards the opposing player. For instance, player A moves from left to right, while player B moves from right to left.

Depending on the number of remaining Braille slates after correctly guessing the game, the top token moves a certain number of spaces towards the respective player.

Next, player B plays their turn. Once both players have completed their turns, it signifies the end of round one. At this point, round two commences with player A taking their turn.

After placing their tokens, players must audibly announce the position of the dots and the corresponding Braille letter they are guessing. This action confirms their move as final.

Winning Condition

- A player can achieve victory by either reaching their opponent's corner after the completion of a round or by winning five cards, provided the opponent fails to achieve the same feat in the same round.
-
- In the event that both players manage to win five cards during the same round, the winner is determined based on the position of the top token. The player whose corner is closer to the token emerges as the victor.

How are players learning braille

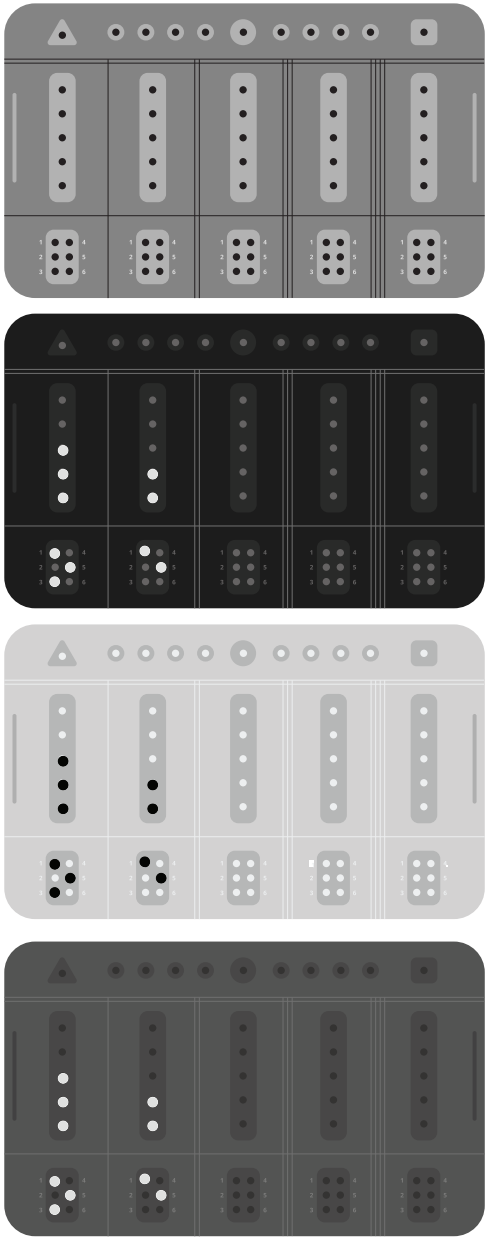
- **Visual:** Cards and Reference Cards - Visual cues on the cards aid in associating Braille patterns with their corresponding meanings.
- **Color:** Colors help reinforce the memory of the number of dots in a Braille character, providing an additional visual reference.
- Touch: Physical touch is utilized for Braille recognition, allowing players to feel the raised dots and interpret their meanings through tactile feedback.
- **Sound:** Each dot in Braille is assigned a distinct sound, enabling auditory learning and enhancing the memorization of Braille patterns.
- **Winning and Losing:** The act of winning or losing in the game contributes to memory retention, reinforcing the association between Braille characters and their interpretations.
- **Reading out the Dot Number:** Verbally announcing the numbers corresponding to the dot positions helps players remember the Braille characters through auditory reinforcement.

Token design

I tried exploring various forms for the game tokens, aiming to imbue them with texture for easy handling and comprehension. After exploring various shapes, the image on the right, emerged as the optimal choice. These tokens, when positioned on the board, seamlessly interlocked, and their height was perfectly aligned to ensure that pressing the button at the bottom required minimal force and they dont put much pressure at the bottom. Additionally, it was noticed that once the tokens were placed, they maintained a secure hold on the board, reducing the likelihood of accidental dislodging and providing a pleasant grip.

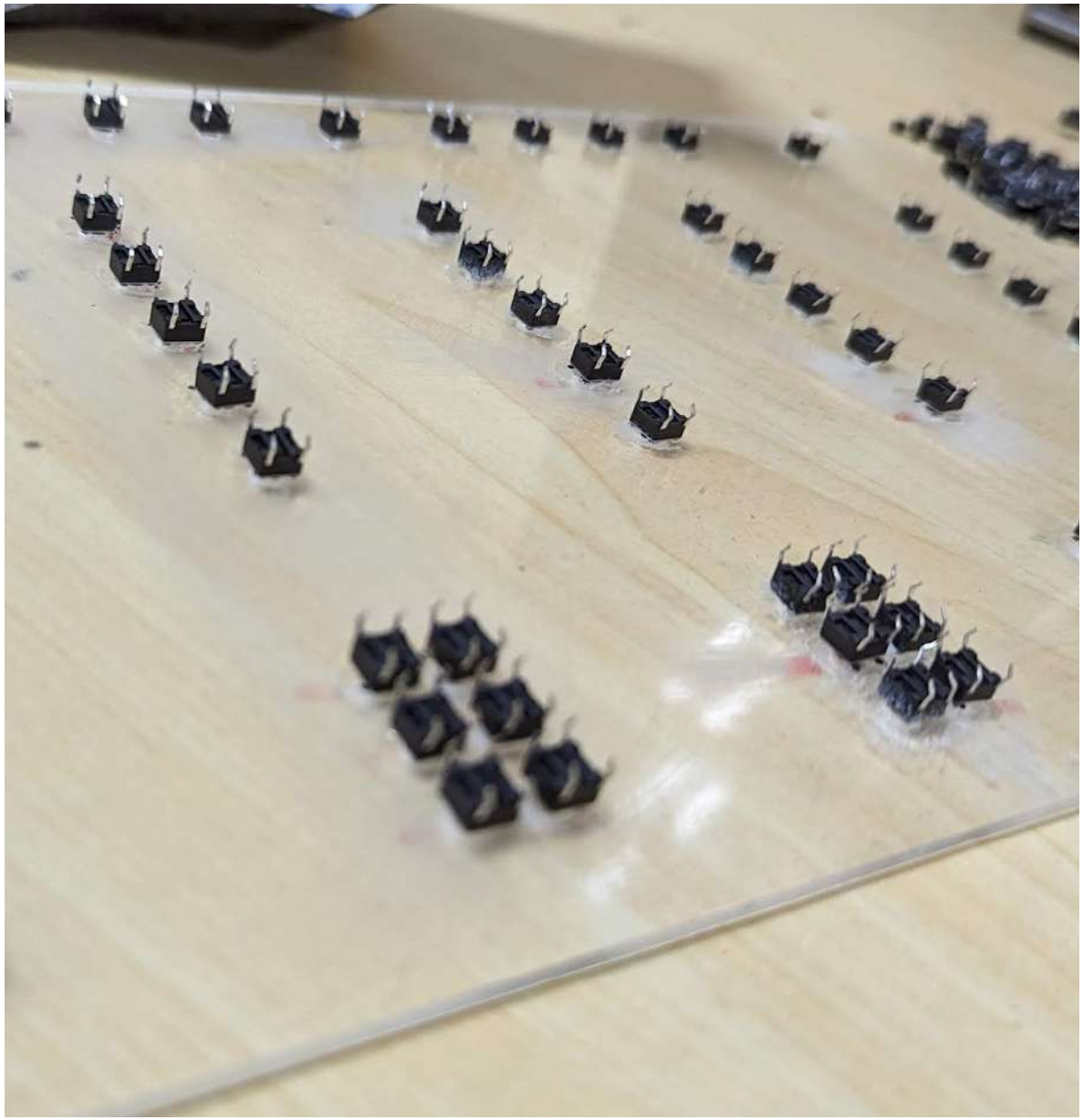
Colour:

For partially blind players, the colour of the token would be based on the board colour, such that it has maximum contrast.



Board color

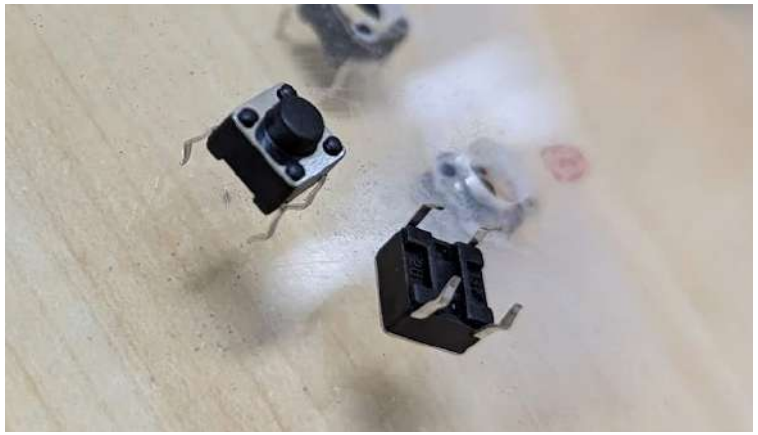
When considering the color for the game board, I opted for a neutral approach since the colored cards already served specific purposes with their respective hues. To achieve a high contrast visual, I chose a black board as the base. On top of that, a transparent acrylic layer was added, and the tokens were made white in color. This combination allowed the markings made on the 3mm acrylic to become clearly visible and created a striking shine and contrast against the black backdrop. The black color not only enhanced the visibility of the markings but also added a sleek and attractive aesthetic to the overall design.

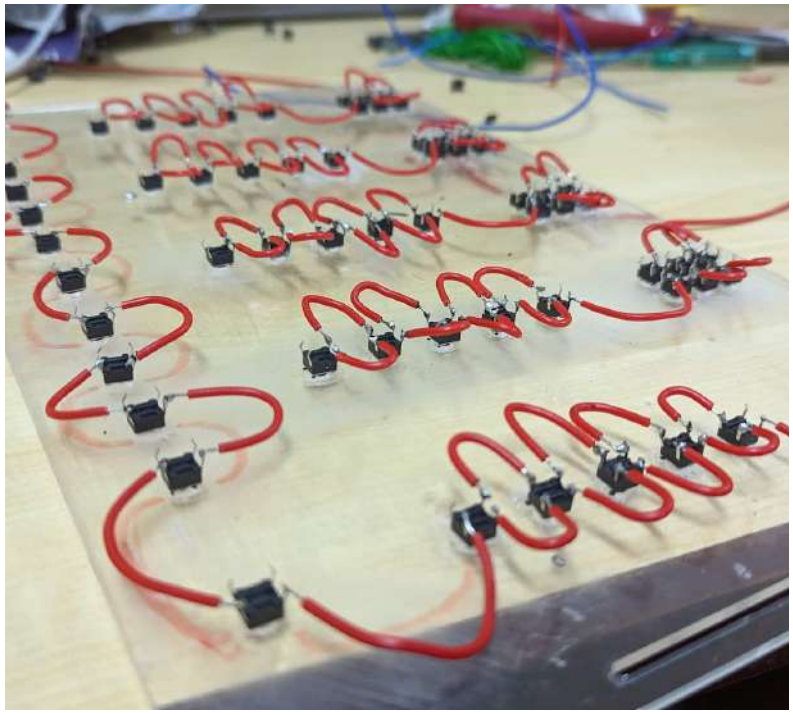


Audio feedback

I have implemented audio feedback as an addition to the game. This feature assists the visually impaired person (VIP) in determining the **position** of the token on the board. The use of sound effectively becomes their "eyes," eliminating the need for constant physical contact with the board to perceive the moves made by the other player. Consequently, this **reduces delays** caused by the process of physically sensing the opponent's actions.

Moreover, the audio feedback serves as a **redundancy**, aiding the players in learning Braille through auditory cues. A total of ten distinct sounds have been incorporated into the board, facilitating the identification of different locations on the game board.





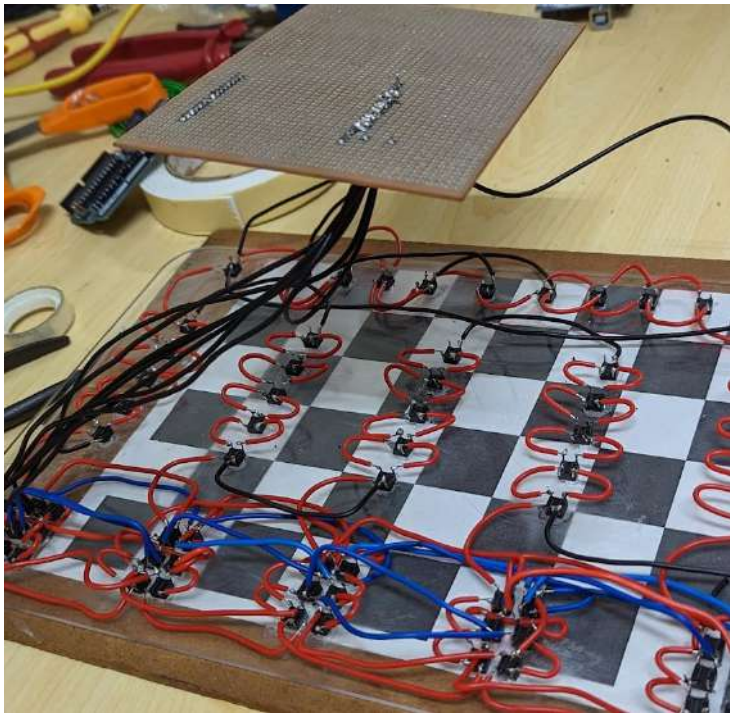
Circuit building

We first glued the buttons to the board and connected them with the wires.

A special acknowledgment goes to Rahul, an M.Tech student in Electrical Engineering, and Shreyas for their invaluable assistance in creating the board.

Coding

Coding the different sounds.



Testing

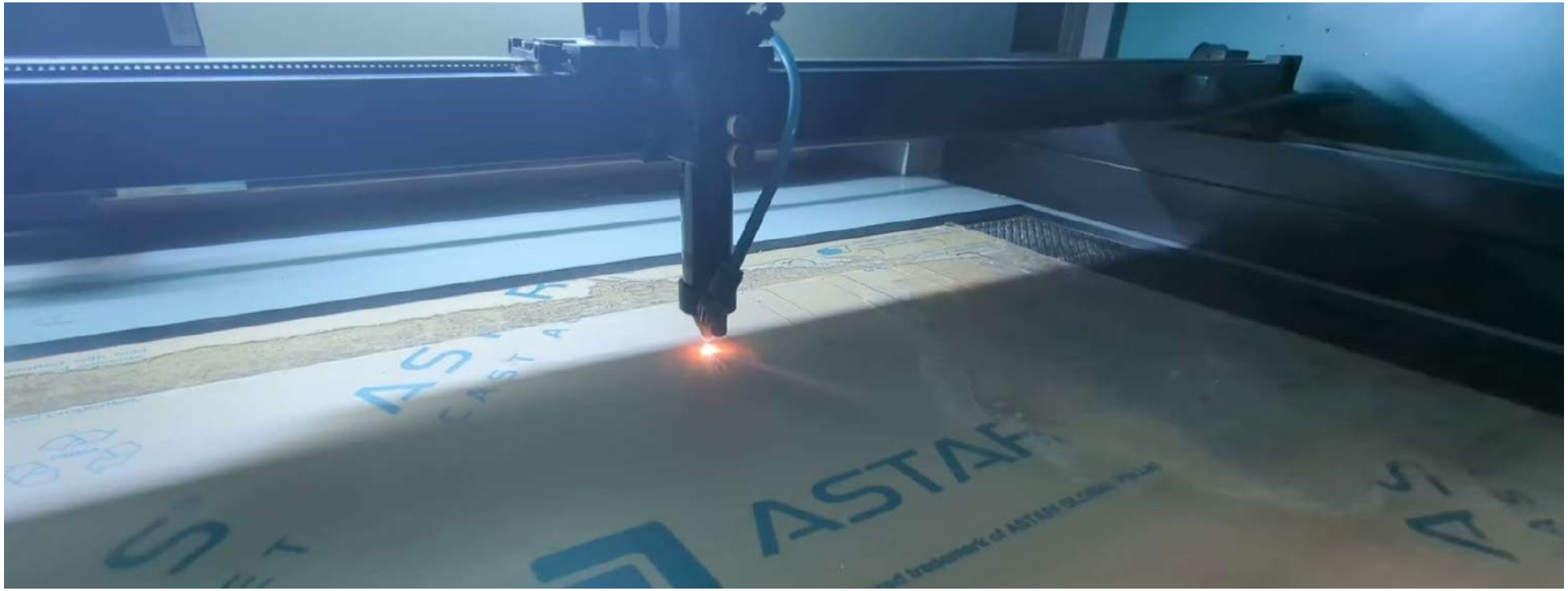
Conducting a test to verify if all the sounds are being played according to the intended plan. Additionally, trying that the sounds are as distinct from each other as possible.

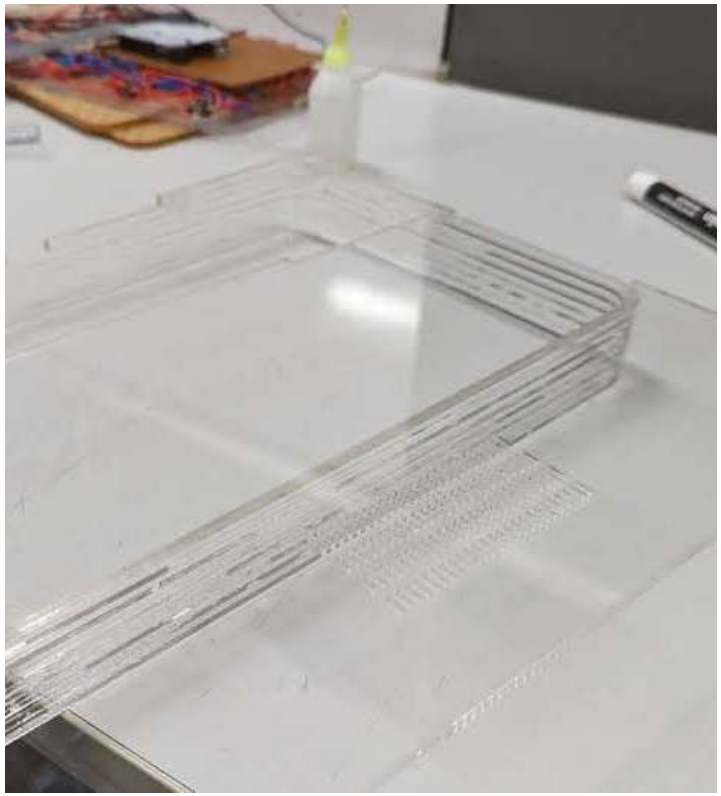
Production

After finalizing the game and its plan, the next step was to proceed with the production of the final game. Drawing inspiration from the earlier prototypes, I created the latest design file in Illustrator and utilized a laser cutter to fabricate the desired shapes. For the game tokens, I employed a 3D printer to produce them. Once the shapes were precisely crafted, they were colored in accordance with the predetermined color scheme.

Output

I am creating two versions of the game: one with sound and one without. Eliminating the sound feature offers several advantages. Firstly, it reduces the overall weight and size of the game, making it more compact and portable. Secondly, by removing the sound component, there are fewer chances of issues arising from circuit or button failures, ensuring a more reliable gameplay experience. Removing sound also reudces the cost. Lastly, the absence of sound contributes to less wear and tear on the game components, potentially prolonging its lifespan.





Special thanks go to Amit, Prathamesh, and Snehdeep, who are M.Des PD students, for their valuable contribution in determining the most efficient method to construct the box within the given time constraints.

After laser cutting, the box was then painted in the IDC painting studio.

User testing

Swaran Ahuja Maam

Maam overall provided a very positive feedback. She particularly appreciated the incorporation of sound, stating that it added an element of interest to the game. Although she took some time to grasp the gameplay herself, she insisted that young people would adore the game and benefit from it. She also praised the game's ability to engage both types of users and effectively teach Braille without favoring any particular user group.

Shanta Aunty

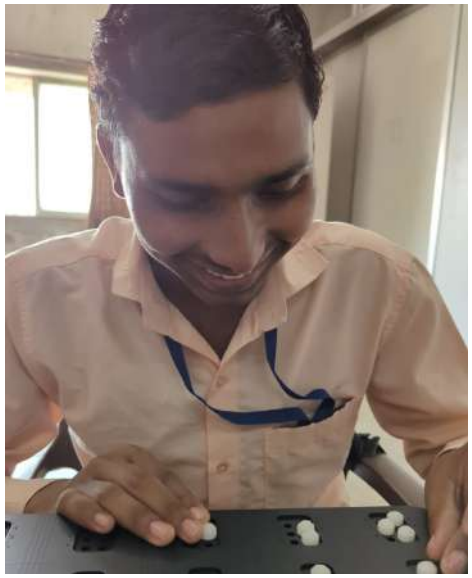
Auntie expressed difficulty in comprehending the game, explaining that she lacks experience playing games and is not accustomed to such activities. Consequently, she found it challenging to grasp the mechanics of this particular game. She mentioned that while youngsters would likely enjoy the game, it may prove difficult for older individuals to understand and participate in.

However, Auntie did appreciate the inclusion of sound in the game, as it enhanced the overall engagement. She found the scoring system to be the most perplexing aspect, followed by the section indicating the number of correct positions. Additionally, she experienced confusion when it came to reading and writing Braille.

Visit to NAB (National Association of Blind, Worli)

Vikas Kumar, 20 yrs

Vikas Kumar, a 20-year-old individual, has partial blindness and is currently undergoing teacher training. He displayed a remarkable affinity for the game and quickly grasped the concept after a single demonstration. He enthusiastically participated in approximately 3-4 rounds and expressed a desire to continue playing, but unfortunately, time constraints hindered his further involvement. Vikas appreciated the game's unique combination of challenge and entertainment. In particular, he found the sound version to be highly engaging, believing that it enhances the game's overall appeal and entertainment value.



Raju Kumar, 21 yrs

Raju Kumar, a 21-year-old individual, is currently undergoing teacher training and has partial blindness. Among his peers, he is recognized as one of the fastest Braille typers. Raju displayed remarkable fluency in Braille, hardly needing to refer to the reference sheet during the game. However, he initially struggled to grasp the gameplay and required two test rounds to fully understand it. Raju specifically found the scoring system to be somewhat challenging. Additionally, he expressed his preference for a shorter gameplay duration, considering the existing gameplay to be lengthy.

Shabhnam Rana, 26 yrs

Shabhnam Rana, a 26-year-old student who recently lost her sight, thoroughly enjoyed the game, particularly the sound version. Not only did she engage in gameplay with me, but she also played with other blind players. In the subsequent round, Shabhnam took on the role of a teacher, instructing a fellow blind player on how to play the game. This allowed me to observe the challenges and issues present in the gameplay.

Meghna Anil Jadhav, 27 yrs

Meghna Anil Jadhav, a 27-year-old student who is completely blind, was introduced to the gameplay by Shabhnam. I had the opportunity to observe how one blind individual teaches another blind person the game and the challenges they encounter. Meghna specifically struggled with understanding the points system and required 2-3 turns to grasp it fully.

Sapna Saroj, 22 yrs

Sapna Saroj, a 22-year-old sighted teacher well-versed in Braille and experienced in teaching blind students, is actively involved with the NAB (National Association for the Blind) and receives training to effectively educate visually impaired individuals. Given her extensive experience working with blind children, Sapna assessed my game and provided valuable feedback. She appreciated the game's concept of utilizing Braille and providing a tactile experience for blind players. Sapna emphasized how the game can enhance a child's strategic thinking abilities while simultaneously facilitating their learning of Braille.

Understanding the game came naturally to Sapna, and she expressed confidence that even blind children would be able to grasp it easily. She offered a few suggestions, such as incorporating tactile lines on the cards to indicate their orientation and direction.


NATIONAL ASSOCIATION FOR THE BLIND, INDIA
SERVE THE BLIND


IT BOMBAY

Latest game Version and its components

The game consists of a game board, two different types of tokens, alphabet cards, two reference cards, two pouches (used to conceal the cards during selection), a printed manual, a Braille manual, and a video/audio manual.

Braille Manual

The Braille manual was meticulously typed by students from NAB (National Association for the Blind). It required approximately 2-3 hours of dedicated effort to complete the typing process.

Gameplay and other files

Scan the QR code

FUTURE SCOPE

There are several avenues for further development of the game:

User Testing with a Diverse Range of VIPs: To enhance the game's inclusivity, it is crucial to conduct extensive user testing with visually impaired individuals from different age groups, especially children. Unfortunately, due to exams and school closures during summer vacations, I was unable to avail of this opportunity. Therefore, conducting user tests with a variety of VIPs would provide valuable feedback for further refinement.

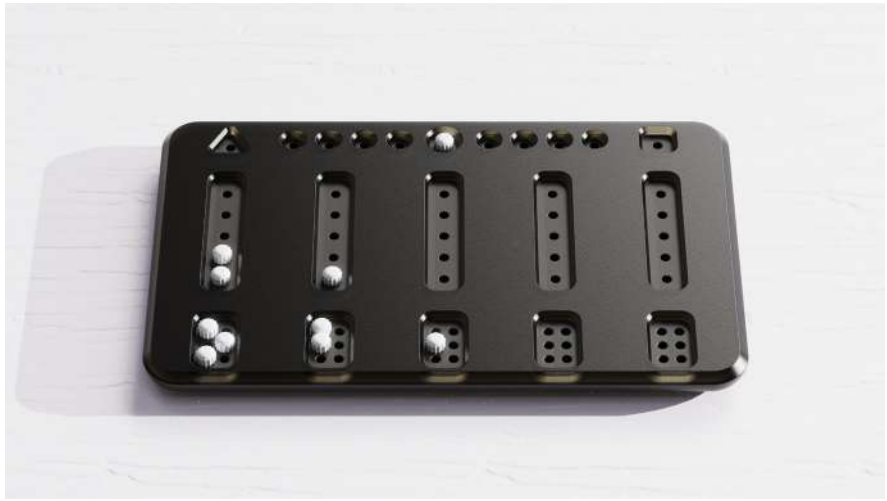
Improved Accessibility for Colorblind and Partially Blind Users: To ensure accessibility for individuals with color vision deficiencies or partial blindness, it is necessary to incorporate design elements that accommodate their specific needs. User testing and feedback from these user groups will be instrumental in making the game more accessible and inclusive.

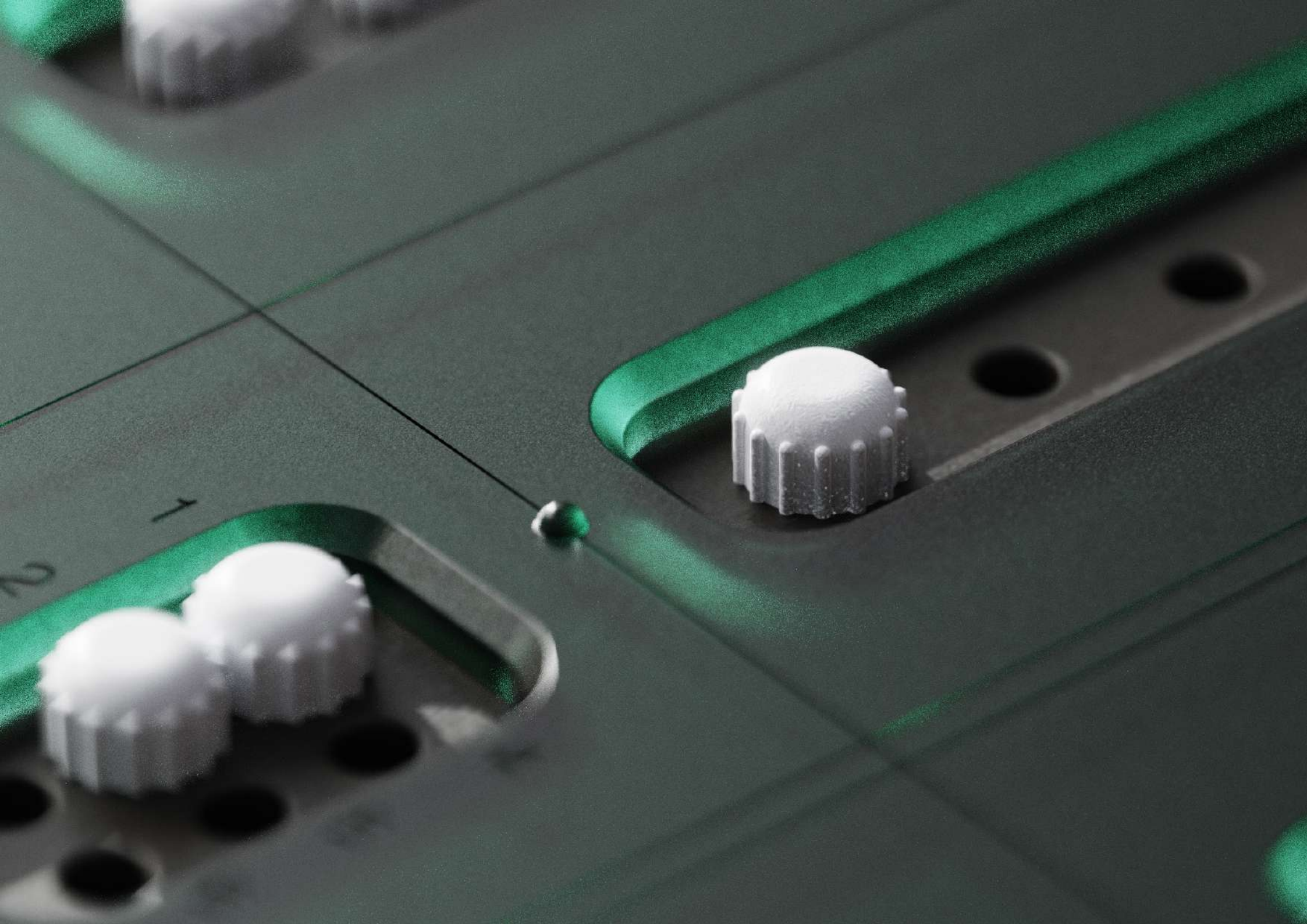
Testing with Different Age Groups: Exploring how children and older individuals engage with the game will provide insights into tailoring the gameplay experience to suit their unique abilities and preferences. Conducting user tests with diverse age groups will enable the identification of areas for improvement and enhance the game's overall appeal.

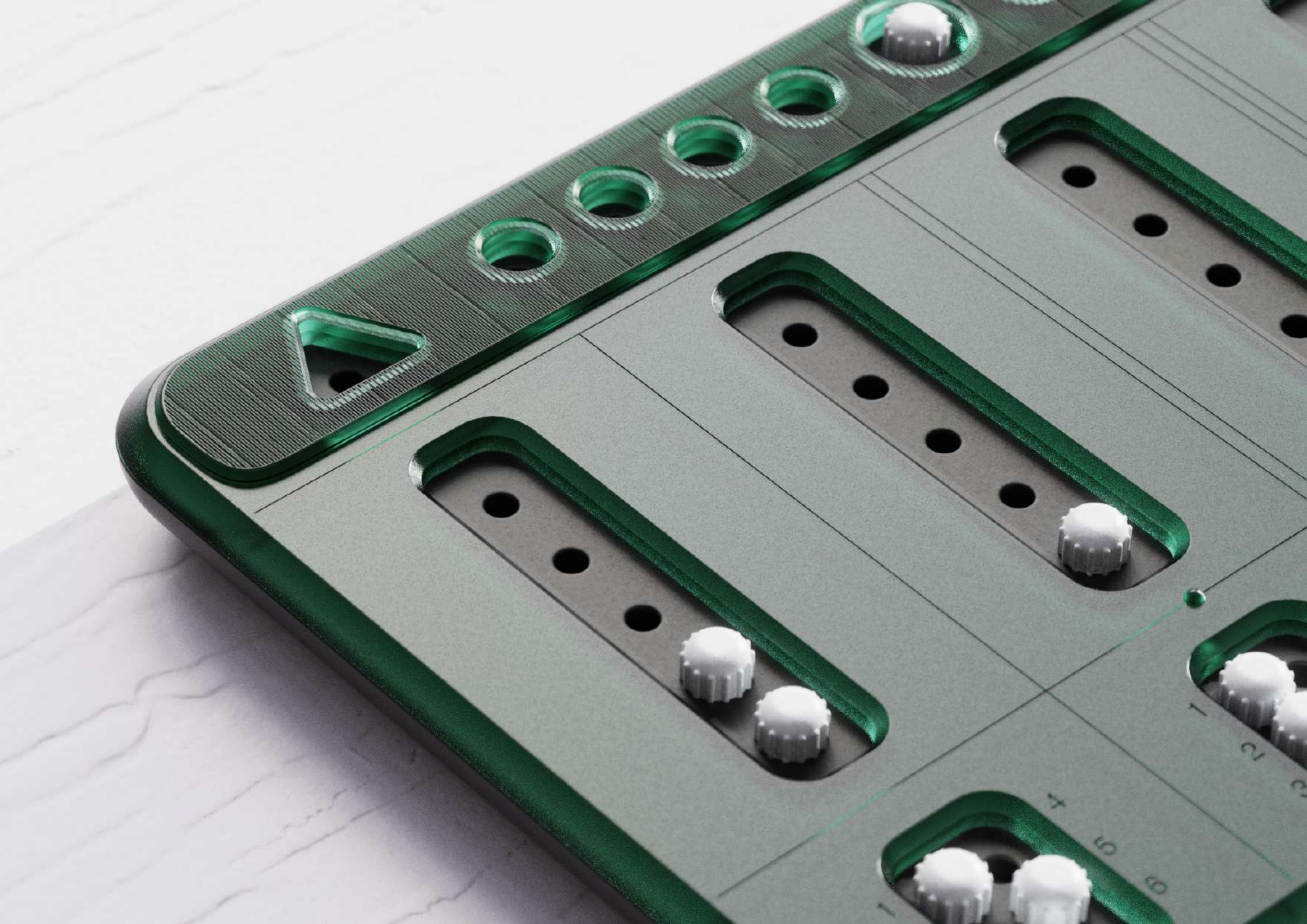
By pursuing these future endeavors, the game can be refined to offer an even better experience for visually impaired individuals across various age groups, fostering inclusivity and enjoyment for all players.

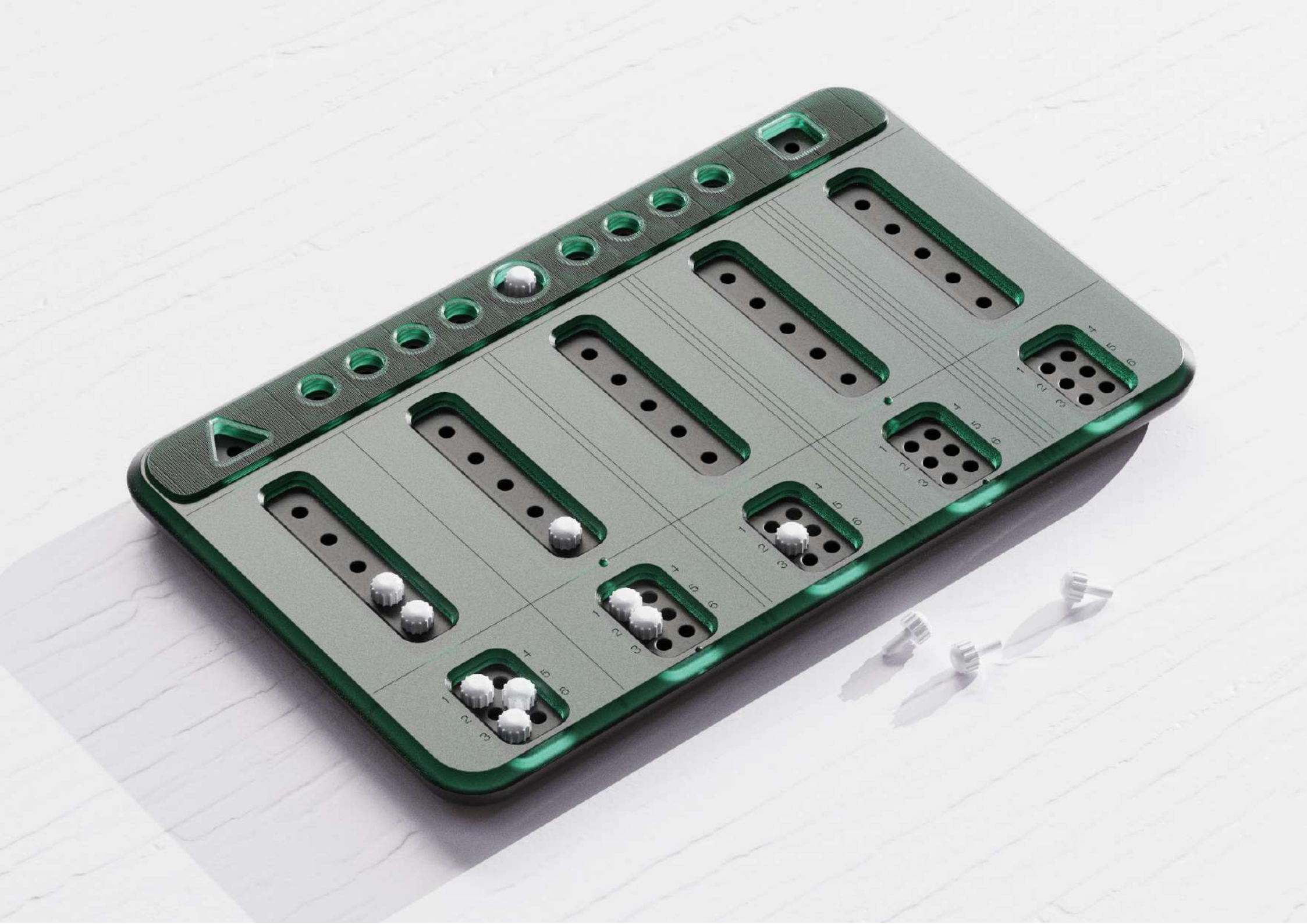
Visualised final product

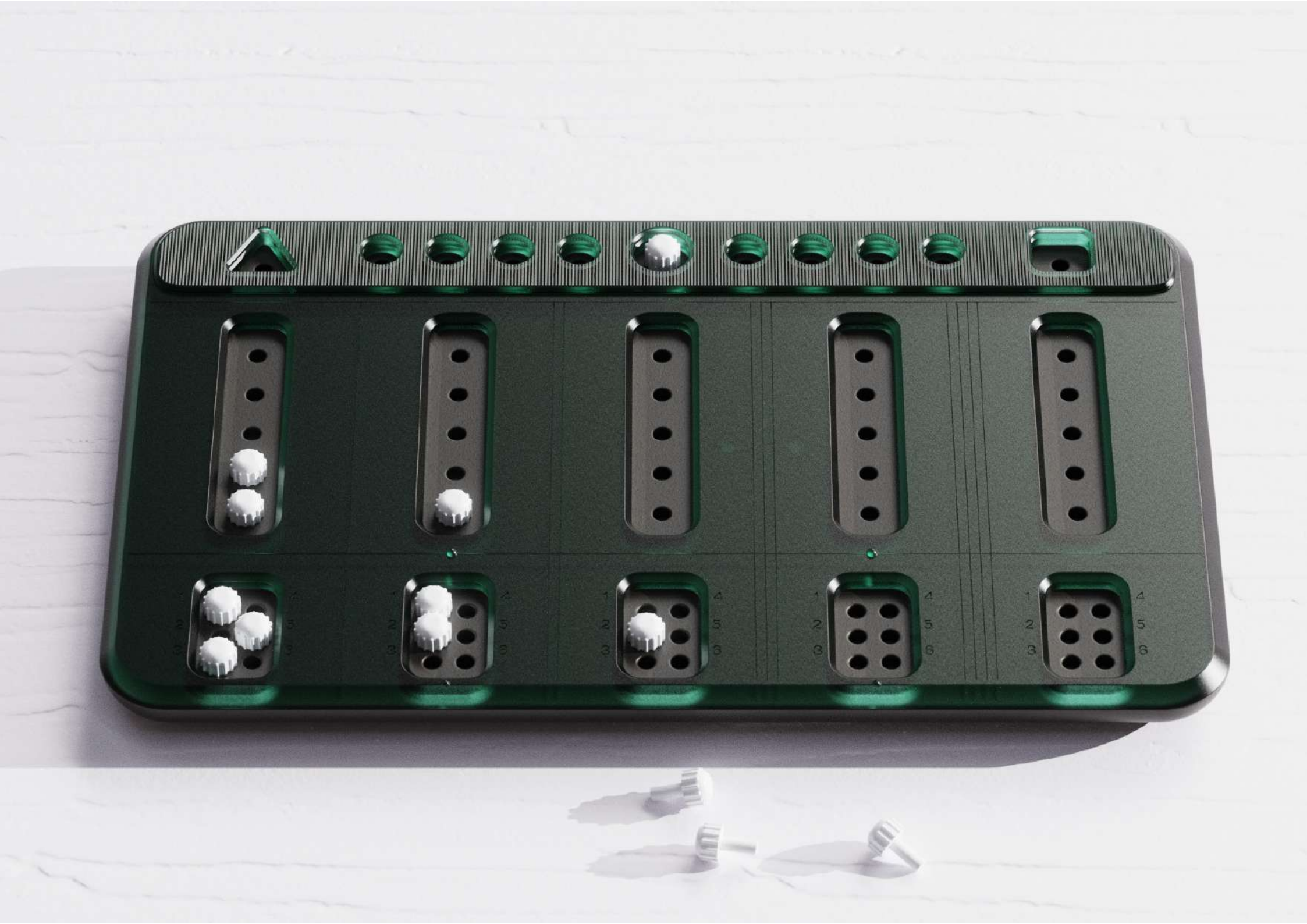
The envisioned final product is a visually appealing and technologically advanced solution. Through meticulous production, the product aims to achieve a sleeker and more compact design while incorporating a high-quality sound system. The use of lightweight materials will contribute to the product's reduced weight, making it easier to handle, and ensuring a comfortable grip for the user.











CONCLUSION

It is crucial to acknowledge that our assumptions about the needs and preferences of blind individuals may not align with their actual experiences. When designing for the blind, it is common to rely on our own perspectives and assumptions, which can inadvertently lead to solutions that do not effectively meet their specific needs.

Currently, there is a lack of board games that cater to both sighted and blind individuals. Most games are designed exclusively for one group or the other, with limited options for inclusive play. As a society, we need to embrace universal designs that can bridge this gap and make inclusive games a part of our world.

One insightful perspective from a teacher is that simplifying things for the blind does not necessarily help them. Instead, the focus should be on creating inclusive designs and teaching blind students how to navigate various life situations. By equipping them with problem-solving skills, we empower them to become independent individuals.

Similar to sign language being made compulsory in the new education system, the importance of braille should also be recognized. Braille literacy is crucial for facilitating accessibility and inclusion for blind individuals.

Through my final game design, the goal is to introduce people to braille and provide a platform for learning. By recognizing the significance of referencing braille and implementing multi-sensory learning techniques, players can develop a deeper understanding of the braille system while actively engaging in the game. This approach enhances the educational aspect of the game and promotes inclusivity for both blind and sighted players.

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Mira Tzvetkova-Arsova and Tamara Zappaterra
7 Play in Children with Visual Impairments

Introducing Human-Centered Research
to Game Design: Designing Game
Concepts for and with Senior Citizens

Research and Developing Design Concepts for Developing Educational Games for Adult Education
Guide: Prof. Sumant Rao
Triveni Ghadge

Learning Aid for Visually Impaired Children
Priyanka Chavan
Visual Communication
Guided By: Prof. Mandar Rane

Mdes 1st year, Product ergonomics class designing kitchen utensils for blind

Accessible Bend Gestures for Users with Blindness or Low Vision
https://ppborah.com/

Happy playing :)