Joana Barros (https://orcid.org/0009-0004-9884-2886)

Joana Barros holds a bachelor's degree in visual arts and technologies and is currently taking her master's degree in game design and playful media at Lusofona University.

As a researcher, she is passionate about games, art, and their accessibility.

Cátia Casimiro (https://orcid.org/0000-0002-5606-5474)

Cátia Casimiro has a bachelor's degree in Applied Communications, a Master's Degree in Organizational Communications, and is a PhD student in Communication Sciences. Her master's Thesis focused on the equity of organizational communication between hearing people and people with hearing loss.

Cátia's research interests include communication, and social and organizational inclusion of People with Disabilities, publishing, and participating in projects in these areas.

"MEEPLE-CENTRED DESIGN" TO ASSESS COLLABORATIVE PLAY: THE CASE OF TEAM3

JOANA BARROS

HEI-Lab, Lusófona University, Lisbon, Portugal

CÁTIA CASIMIRO

CICANT, Lusófona University, Lisbon, Portugal

HEI-Lab, Lusófona University, Lisbon, Portugal

Abstract

The social model of disability refers to the fact that disabilities occur when the surrounding environment isn't prepared to accommodate the needs of People with Disabilities. Since accessibility has been given more importance in several areas of social life, we argue here that board games can also contribute to promoting the social life of People with Disabilities, since they can help combat their social isolation. As such, we will be doing an analysis of a game based on its accessibility.

In this paper, we analyze the accessibility of the game Team3 in its two versions (green and pink), based on the guidelines 'Meeple Centred Design'. Team3 is a cooperative board game developed to improve players' collaboration, communication, and cognitive spatial reasoning abilities. The game is designed for three or more players, with each player taking on one of three roles: the architect, the builder, or the supplier.

Upon examining both versions and their distinct challenges, we reached the conclusion that the game is accessible from both a physical and socioeconomic standpoint. We identified that the category related to intersectionality is where most issues arise.

Furthermore, the game should come with a disclaimer saying that it can be challenging for neurodiverse people, people with the same sensory disability playing together, and people with multiple disabilities so that the players or the person that supports them can decide if the game is adequate for its intended purpose.

Keywords: *Board game accessibility; Team3; Accessibility guidelines; Accessibility evaluation; Inclusion*

1. Introduction

Throughout history, People with Disabilities were often excluded from society, but with the United Nations Convention on the Rights of Persons with Disabilities, and the emergence of the disability justice movement, more awareness was created for their right to be equal and included in society. Board games can be a useful tool to promote inclusion, since they can help people interact and socialize with others as they contribute to informal communication and their integration into the cultural economy, therefore improving their communication skills (Da Rocha Tomé Filho et al., 2019; Heron et al., 2018; Niedderer et al., 2022). Board games also provide access to modern culture as they "can help us shape our understanding of the world in which we function" (Heron, 2022, p. 145), and thus should be made accessible to everyone especially considering that it is what is popular that people understand their lives, interact, integrate themselves in different relationships and how they exercise power (Ellis & Goggin, 2017; Heron, 2022). Board games are now increasing in popularity once again and are a tool for socializing (Heron, 2022), so it is important to guarantee that they are accessible. As Heron (2022) mentions, non-participation in social activity or other types of activities must come from the fact that the person consensually doesn't want to participate, rather than being forcefully excluded because of an inaccessibility barrier of said activity. Since accessibility has been given more importance in several areas of social life, we argue here that board games can also contribute to promoting the social life of People with Disabilities (PwD). As a way to evaluate the accessibility of board games, Heron et al. (2018) developed the 'Meeple Centred Design' guidelines. These guidelines evaluate games in six different aspects, being:

a. Visual impairments

b. Cognitive impairments

c. Physical impairments

d. Communication impairments

e. Socioeconomic impairments

f. Intersectional issues

The study aims to explore the different accessibility categories of a collaborative analog game - in this case Team3 (Cutler, Fantastic & Pētersons, 2019) - according to the categories established by Heron et al. (2018) in the Meeple Centered Design Heuristics.

The article is structured as follows: first, we present the method used to conduct the analysis, secondly, we do a brief presentation of the game followed by the accessibility analysis of Team3 based on the guidelines of Heron et al. (2018), and finally, we discussed the results of the analysis and present the limitations encountered and suggestions for future studies.

2. Method

The following review was based on the formal analysis of gameplay having been adapted to analog games and having as a reference the model of analysis developed by Heron et al. (2018). A formal analysis consists of evaluating carefully a given artifact and its particular elements, as well as the relations among them which, when applied to games, can help to better understand the game system (Lankoski and Björk, 2015). For that, researchers usually play the game numerous times or observe someone play (Lankoski and Björk, 2015).

Figure 1
Game elements

For this review we opted for several approaches, mainly: (a) observing a group of players playing the game; (b) discussing among us the possible limitations that players could encounter while playing; and (c) through empathic understanding (commonly known also as Verstehen). This last technique was developed by Max Weber and relates to the researchers putting themselves in the realities of others (Tucker, 1965).

We wanted to evaluate if a game that has its underlying design to put the player in the reality of someone with a disability was accessible. We also wanted to review a collaborative game to understand if it could be played by people with different characteristics. For that, we used convenience sampling and chose to analyze Team3 (Cutler, Fantastic & Pētersons, 2019).

3. The Game

Team3 (Cutler, Fantastic & Pētersons, 2019) is a cooperative board game that enhances collaboration, communication, and spatial abilities. For three or more players, the game entails three roles: architect (draws the blueprint card and

describes it nonverbally to the supplier), supplier (provides information verbally to the builder), and builder (assembles the blueprint structure blindfolded). Team3 is available in green and pink versions, each with unique challenges.

The green version focuses on communication and collaboration to build structures according to the blueprint. In the pink version, players must use spatial reasoning and three-dimensional perspective skills to fill in missing parts on the blueprint. Both versions require teamwork, communication, and collaboration within a given timeframe. Mini-expansion challenges introduce additional gameplay mechanics and objectives. It is advised to start with the base game before attempting the mini-expansion challenges to grasp the rules and mechanics. Game elements of the green version are depicted in Figure 1.

4. Accessibility Evaluation of Team3

4.1 Visual Accessibility

The first category presents a detailed breakdown of visual accessibilities that can impact the inclusiveness and enjoyment of tabletop games for players with visual impairments. Heron et al. (2018) categorizes these accessibilities, as follows: (1) *color choices*, related to the color palette used in, for example, the tokens, board, cards or in the tracking score and its potential impact on individuals with color blindness or visual impairments; (2) *contrast*, that considers the level of contrast between different colors within the game referring that it should be "a minimum color ratio of 4.5:1 for normal sized text and 3:1 for text of font size 14 or higher" (p.105); (3) *font choice*, indicating that in order for the font have maximum readability

it should be **bold** and *italics* or ALL CAPS; (4) *tactility*, referring to the tactility of tokens, since most of them are very difficult to be differentiated through touch; (5) *binocularity*, referring to the need of, on some games, being able to differentiate depending on distance and perspective; (6) *paper money*, the usage of paper money in games can be difficult for some people due to the velocity of its circulation and the necessity of counting money during the game; and (7) *non standard dice*, some gamers may have a replacement dice, which can be an oversized dice and/or have braille inscription on its faces.

Regarding *color choices*, the base game utilizes distinct colors and shapes for each pair of pieces, ensuring that individuals with visual impairments and/or color blindness aren't impacted. However, the neon colors of the two versions (pink and green) may be distinguishable by those with various types of color blindness, although the color version isn't identified on the box or base game cards/blueprints (Figures 2, 3, and 4).

Figure 2
Example of how different types of color blindness view the different versions (Software used: Adobe Photoshop 2023)
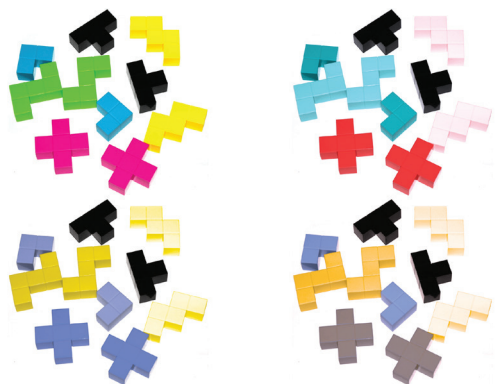
On the other hand, the pink mini-expansion presents challenges for individuals with visual impairments as they are required to build the blueprint utilizing perspective and three-dimensional perception (Figure 5). The blueprints also include cutouts, making it imperative for the architect to be able to distinguish between shapes accurately. As a result, the pink mini-expansion is less accessible compared to the base version, and the green mini-expansion. Nonetheless, it is worth noting that, although accessible to color-blind players, the color palette remains a problem since it deprives them of one information channel.

Figure 3
Example of how different types of color blindness view the different pieces (Software used: Adobe Photoshop 2023)
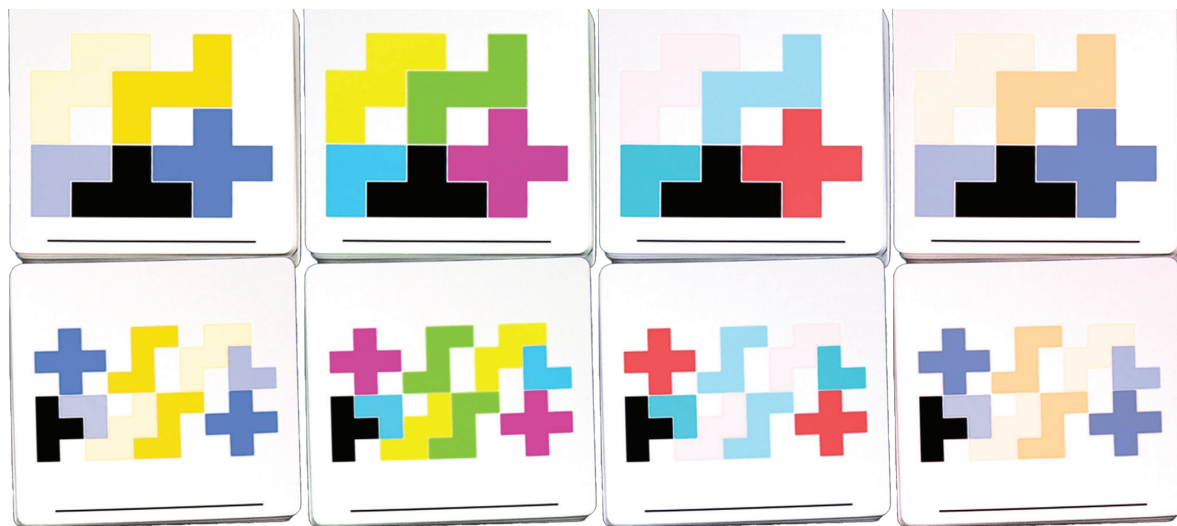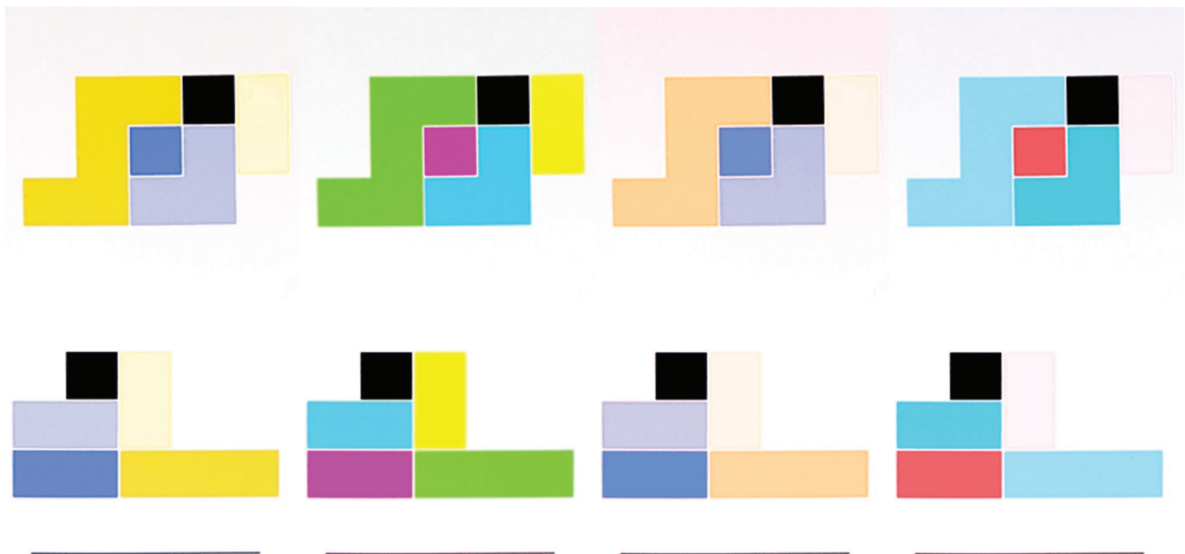

Figure 4
Example of how different types of color blindness view the different cards (Software used: Adobe Photoshop 2023)

The level of *contrast* in the game is an important factor in promoting accessibility and ensuring that individuals with visual impairments can participate fully in the gameplay. Both versions employ the same six colors and the mean contrast ratio between them is approximately 4.17:1 (Table 1), which is somewhat low of the recommended ratio of 4.5:1 as per the Web Content Accessibility Guidelines (2021).

However, it is important to note that individuals with moderate to low visual acuity, congenital or acquired color deficiencies, or aging-related loss of contrast sensitivity may require a higher contrast ratio of at least 7:1 to effectively discern different color shades (Web Content Accessibility Guidelines, 2021). For non-text graphic objects, a contrast ratio of 3:1 is recommended to ensure accessibility (Web Content Accessibility Guidelines, 2021).

Although this game may not meet the specific contrast ratio requirements for individuals with low vision, testing with low-vision simulators yielded results indicating that it is still possible for such individuals to play the game with relative ease, as seen in Figure 6.

Figure 5
Example of how different types of color blindness view the cards of the pink mini-expansion (Software used: Adobe Photoshop 2023)
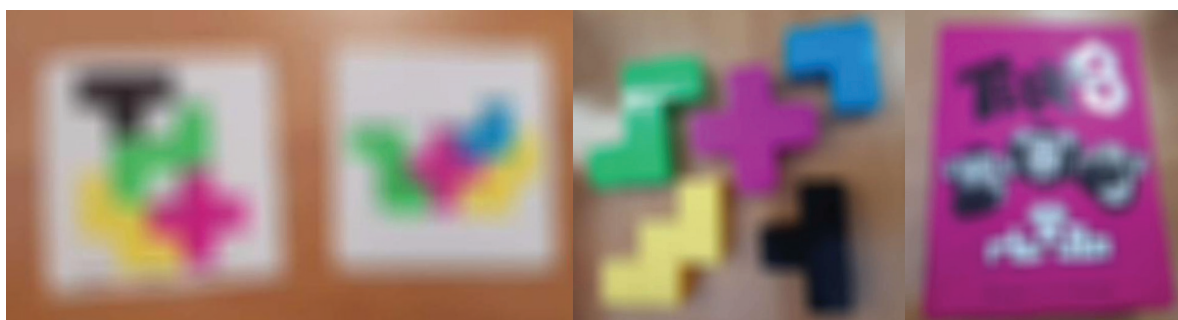
Figure 6
Example of low vision around 20/80 (Software used: Tengo Baja Visión)

Font selection plays a crucial role in ensuring effective communication and legibility in various contexts (Zineddin et al., 2003). In the box, a large handmade non-serif font is employed, which enhances the visibility of the font from considerable distances.

On the other hand, the instructions use Myriad Pro, a sans-serif typeface designed for accessibility and legibility. Its versatility and neutral appearance make it well-suited for a broad range of applications (Adobe, n.d.; allbestfonts.com, 2019). Despite the benefits of this font, the manual's font size is small, which may hinder clarity for individuals with less-than-perfect vision. Additionally, the rulebook fails to explicitly address the accessibility of a PDF version. Nonetheless, accessible PDFs can be found online, although their official status is uncertain. It is worth noting that, apart from the instructions, the rest of the game doesn't contain any written content.

The incorporation of *tactility* in game design can significantly enhance the gameplay experience, particularly for individuals with visual impairments (Thevin et al., 2021). In this game, for instance, each pair of pieces is uniquely identifiable based on its distinct color and shape. The utilization of large 3D shapes further facilitates recognition, enabling players to distinguish the pieces even while blindfolded. However, the absence of any tactile features in the cards or blueprints poses greater challenges for players who rely solely on touch rather than vision. In this case, the identification of shapes and colors becomes the primary means of discernment. Additionally, it is worth noting that the instructions provided in the box are solely reliant on visuals or reading abilities, lacking any tactile elements, and can impede players' understanding of the game rules. Nevertheless, the publisher's website offers a link to third-party websites that provide interactive and video tutorials.

It's crucial to mention that the game box lacks tactile features, making it difficult for color-blind or blind individuals to distinguish between different game versions. To promote accessibility and inclusivity in game design, it is vital to prioritize the inclusion of tactile design elements, similar to braille markers in medication packaging.

Table 1 - Color contrast ratio of the colors used in Team3

Contrast Ratio						
	-	1.82:1	3.61:1	4.92:1	1.37:1	3.34:1
	1.82:1	-	1.99:1	8.93:1	1.33:1	1.84:1
	3.61:1	1.99:1	-	-	2.64:1	1.08:1
	4.92:1	8.93:1	-	-	6.72:1	16.41:1
	1.37:1	1.33:1	2.64:1	6.72:1	-	2.44:1
	3.34:1	1.84:1	1.08:1	16.41:1	2.44:1	-

During gameplay of Team3, players collaborate to construct a structure using provided instructions. Accurately perceiving the position and orientation of the blocks can be challenging, and *binocular vision* can help perceive their size, shape, and position accurately. So, players need to communicate effectively to ensure that they are building the structure correctly, and having good eye coordination can aid in making precise movements and avoiding potential mistakes while building, but it isn't an essential requirement to play the game.

Based on the description, we conservatively recommend Team3 in this category.

4.2 Cognitive Accessibility

According to Heron et al. (2018), it is difficult to generalize feedback due to the dependency on an analysis of the rules, player agency, and game flow, for which the authors define this category as being the examination of the game as a whole and how its singular uniqueness can be related to it being cognitively demanding. With this being said, it is possible to find nine different subcategories, them being: (1) *reading level*, which relates to the amount of text in the cards and the complexity that the instructions can have on players (the authors don't consider the rules manual on the assumption that someone will explain the rules); (2) *game state complexity*, which means evaluating the complexity of the game, as the more complex it is the higher will be cognitive load to play; (3) *memory requirements*, that is while some games allow the players to consult the cards, rules and actions available, others require that they remember the possibilities, cards and rules in order to make informed decisions in the game, which can make the game not being cognitively accessible; (4) *game flow*, some games have a structured flow while others are flexible - it can be possible to skip turns, the players turn can suffer alterations, so on -, and the more flexible the flow is, the greater will be the difficulty to have an cognitive accessible game; (5) *number of tokens combinations*, relating to the number of tokens necessary to play, as the higher the number the higher the memory load; (6) *synergy of rules*, referring to the possibility of some rules in the game amplifying or nullify other rules, the higher the number of combinations the higher the cognitive burden will be; (7) *scoring*, some games

use complex scoring systems with the intent to hide the score until the end, and while this can be good to avoid, for example, 'ganging up' to one player, it can turn the game cognitively challenging as the players can't assess the best move for the current play; (8) *general knowledge/trivia*, the games that require general knowledge to be played can depend on other players or people who aren't playing to explain the questions or to have knowledge about geopolitical context, it may be also be needed to have knowledge of cultural references, being necessary to be able to recall and/or recognize; and (9) *multitasking*, some games require that players keep track of competition goals and systems and how those systems act, which influences cognitive accessibility.

The game doesn't require any significant *reading level* as it is primarily a visual-spatial game that emphasizes communication and collaboration. The game instructions are usually presented straightforwardly, and any text that is present is typically very basic and easy to understand, additionally, the fact that is accompanied by images that complement the text can also help to understand how to play the game without needing to read the instructions. Such is especially important if there is someone who has difficulty reading or understanding the text. Players must work together to build various structures using specific building blocks, but these tasks are typically presented through visual diagrams and pictures rather than written instructions, which can cause hindrances to accessibility and playability, as more explainable diagrams may result in less enjoyable gameplay.

Regarding the *game state complexity* of Team3, the same is moderate, as it requires a solid understanding of the game's mechanics and a collaborative approach among team members to build a structure that meets specific criteria. While the game rules may appear straightforward, the challenge lies in the players' ability to coordinate and effectively communicate with each other. Additionally, the difficulty levels offered by the game introduce an element of complexity that necessitates strategic planning from the players. The game's state is dynamic, constantly shifting based on the actions of each player and necessitating keen attention to detail and effective communication among the team. Overall, the game's complexity is rooted in the players' ability to work together and make strategic decisions to achieve their goals.

Team3 requires a degree of *memory* capacity from players. The game's mechanics entails that players recall instructions and designs from prior rounds to build upon them effectively. Additionally, players may also benefit from retaining some memory of their prior successes and failures to make informed decisions in the game. While the memory demands of the game aren't excessive, they are nonetheless integral to optimizing gameplay, something that can, possibly, impact the gameplay of people with short/long-term impairments.

The consistency of *game flow* in Team3 is well-maintained throughout the game, whilst flexible since the players can change roles. Each round follows the same basic structure, with players taking turns as the architect, the builder, and the supplier each one with their forms of acting and communicating. This structure enhances the consistency of game flow by providing a structured and standardized method of communication between players. The phases of the rounds are defined by time limits, and players must execute their roles efficiently

to complete the structure. This time limit adds a necessary sense of urgency and pressure to the game, which further ensures an engaging and consistent game flow. It's important to note that real-time systems can add accessibility hurdles in general. As for the *synergy of rules*, each player has a specific role to play in the construction process, and their actions and decisions are interconnected and dependent on the other players' moves. The game also encourages players to take turns leading their team, which helps to distribute responsibilities and encourages collaboration. This rules synergy creates a cohesive game flow and ensures that all players have an equal opportunity to contribute to the team's success.

The *scoring*/winning on Team3 depends on the number of missions your team completes. To win, players must complete Blueprints equal to the deck's number of Stars plus the number of players. For example, if a team of three players wants to play the 1-star difficulty level, the team needs to complete four blueprints (three players + one star).

Players lose the game if they fail as many Blueprints as there are players. For example, in the same team of three players, if they fail to complete three blueprints (three cards each with a time limit of completion of three minutes), they lose. Additionally, the game doesn't require any complicated calculations, it's intuitive to understand the state of each team but if any team member feels confused about the winning system the instruction manual provides clear explanations with examples.

Team3 is a game that demands a significant level of *multitasking* from players as they work together towards building structures under the constraints of time. This game requires players to engage in effective collaboration and strategic planning while taking into account potential bonus and penalty points to optimize their final score. As such, the ability to multitask is integral to succeeding in and enjoying this game.

According to this analysis we cautiously recommend Team3 in this category.

4.3 Emotional Accessibility

The emotional accessibility of a game is related to the concept of 'fun' for each player and each game will trigger different emotions in different players (Heron et al., 2018). Having said that, the 'Meeple Centred Design' guidelines identify ten other emotions that can emerge during a board game play: (1) *challenge*, where the 'fun' of the game is on being challenged, but if the game poses a significant challenge it can originate frustration in the player; (2) *despair*, the game was created to have an extremely high challenge Where it is expected players will most likely fail; (3) *arbitrary fates*, the level of control that a player lacks the control of their destiny can trigger an emotional upset; (4) *bluffing/lying*, in order to play the game players must bluff or lie in order to win; (5) *need for closure/symmetry*, the game was created to look like it can be finished when in the actuality it can't in the sense that players can be penalised for the attempted of trying to finish a task, resulting in incomplete creations, which can trigger emotional upset ; (6) *'Take That' mechanics*, it happens when a player can countermanding another player's actions after they played; (7) *upsetting themes*, some games can be based on themes that are incompatible with a player's moral codes or can be

triggering of past trauma and provoke negative emotions; (8) *score disparity*, when a game allows that a big score gap between players can occur, it can generate negative feelings like failure, among others, in the player(s) that loses by a big difference when compared with the player that won; (9) *player elimination*, when a game allows for a player to be eliminated while the game occurs it can generate feelings of exclusion on that player, or other negative emotion, because they will have to watch everyone having fun; and (10) '*ganging up*', when a player as a significant lead in a multiplayer and competitive game the other players can focus all of their attention in that player, teaming up to defeat them, such tactics can have an emotional impact on that single player.

As such, it is possible to notice that the game has in its core element *challenge* and *despair*. Taking into account the above mentioned, in the analysis that follows we will not be mentioning several themes: the game isn't about arbitrariness; bluffing, or lying; it doesn't generate a need for closure or symmetry, since it doesn't penalize the players for attempting or trying to finalize a task; the players can't countermand each other's plays; it isn't based on upsetting themes; the players aren't eliminated, at maximum there's rotation among them so that everyone can play; and since it's a team game, a player can't focus all their attention in one player because the person is winning. With this being said we will be focusing our analysis on the categories of challenge, despair, and score disparity.

Challenge in the sense that all the players have to understand each other, which is the challenge, and when that doesn't happen it can generate feelings of frustration among the team,

besides this, the fact that one can only gesture, one can only talk and the other can only build the construction through tact, without the use of vision, can also pose a challenge.

This game, in the specific case of neurodiverse players or players with physical limitations, could cause *despair*, since it could be very difficult for them to do the construction vertically autonomously. The alternative is to not play that mini-expansion and focus only on a two-dimensional game, but that can also be difficult if the players don't have much mobility. It can also cause despair when the players' group has some disability, for example, if they are all blind and/or deaf.

Notwithstanding, it is also important to mention that in case the game is played at a competitive level, *score disparity* can happen if there is a mixed level of ability and blend of impairment between the groups. if the game isn't adapted to have some common ground between the teams then a big score gap can occur between the teams, which can create feelings of resentment, frustration, envy, etc., among the team players (of the PwD) and feelings of disappointment, frustration, sadness, etc. in the PwD.

We recommend Team3 in this category with these caveats.

4.4 Physical Accessibility

When playing a game it might be needed to move tokens, shuffle cards, move places with other players, etc. As such, in this instance, the authors consider physical accessibility as the degree to which movement is required regarding the frequency of the movement, as well as the space and precision

needed. in this sense, this category is related to the: (1) *card size*, the cards can have an odd form, be extra-large or extra-small, such aspects will have an impact on the physical accessibility of the game; (2) *shape of the token*, it is important that tokens allow for easy manipulation during the game, as if they are too small, too smooth, difficult to manipulate, etc., it won't promote physical accessibility; (3) *regularity of piece manipulation*, related to the number of physical interactions needed during the game; (4) *ease of communicating instructions*, one adaptation that can be made while playing with someone with a physical disability is having them give verbal instructions to someone, this subcategory is related to the ease of mentioning the areas of the game as well the judgment of the person who the instructions are given; (5) *physical acting*, some games are based on physical movement, like 'Guesstures', which are completely inaccessible to certain players; (6) *paper money*, having this element in the game can prove to create a physical barrier as it can be difficult to

manipulate, as well a visual one to people who have lower vision or can't see; (7) *number of tokens*, as if the game board is full of tokens it will be difficult to handle physical manipulation of the tokens; and (8) *size of the game board elements*, that is the smaller the elements are the higher will need to be the precision of physical dexterity to place the pieces in the board.

Starting by referring to the *size of the cards*, they are standardized to approximate a post-it note. In the course of a game, the architect player is only required to draw one card, which may be held manually or placed on a stand. This design feature offers a degree of accessibility, especially for individuals with physical disabilities.

While this game doesn't incorporate tokens, the *shape and size of the quadrangular pieces* have been evaluated. In Figure 7 it is possible to observe that the pieces are characterized by their large size and thickness, measuring two centimeters tall and a max of 6 cm in length and/or width, rendering them doesn't present any obvious interaction challenges for individuals with physical disabilities. Additionally, we tested and all pieces, despite their smooth texture, can be easily grasped with two fingers and no requirement for a thumb or intermediary or distal phalanges, while still providing adequate stability.

The *regularity of piece manipulation* varies according to the player's role in the game. Specifically, the architect has access to only one card and zero pieces, making their manipulation duties inexistent. Likewise, the supplier doesn't interact with any pieces and has a manipulation rate of zero. Alternatively, the builder assumes the responsibility of handling between four to ten pieces, depending on the type of game mode and

Figure 7 -
Cards and pieces of Team3

the number of players involved. However, the builder isn't obligated to manipulate all pieces at a time, and can instead work sequentially and place one piece at a time in the correct location as specified by the architect's project card, and according to the supplier's instructions.

Player roles dictate *physical action*. The role of the architect, in particular, is characterized by their ability to communicate with the supplier, observing and then implementing the contents of their card, necessitating consistent physical acting. Consequently, this role may present challenges to individuals experiencing physical disabilities.

The efficacy of *communicating instructions* in Team3 is a salient element that warrants examination. This assessment is predicated on various facets, namely the explicitness of the regulations, the uncomplicated mechanics of the gameplay, and the efficiency of the communication utilities offered. To begin with, the guidelines of Team3 are succinctly presented with illustrative examples, which efficiently convey the objective and principles that govern the game.

Furthermore, the gameplay is relatively uncomplicated, requiring players to take turns placing blocks and collaborate in constructing structures. This simplicity reduces the necessity for elaborate explanations and prolix guidelines, thus enhancing the ease of communication between players.

In conclusion, the ease of communicating instructions is high, on account of its explicit rules and uncomplicated gameplay.

Finally, when it comes to the *number of pieces*, in this game the builder is entrusted with the movement of between four to ten pieces, depending on the game mode and player count. However, due to the nature of this task, where pieces need not be moved simultaneously, the builder can singularly take and place each piece, until the architect's construction is complete. Additionally, most of the designs featured in its cards are of somewhat stabilized constructions that require almost no balancing. Thus, the successful positioning of the indicated pieces in their appropriate location negates the need for a player to grasp more than one piece at a time, unless the player has some kind of involuntary quick/harsh movement that can affect the stabilization of the pieces the completion of the blueprint shouldn't be a problem.

Considering what was said, we recommend the game in this category.

4.5 Communicative Accessibility

In some games, players must communicate among themselves, either about strategy, intention or even ask questions (Heron et al., 2018). Taking into consideration how the game is played, communication is crucial for the game to be played.

According to the guidelines, there are five considerations when it comes to communicative accessibility, them being (Heron et al., 2018): (1) the *reading level*, which refers to what extent the text part of the game can be understood, for example, instructions; (2) the *audibility*, in some games there is an audio component associated to the game, eg. CD or digital app, where the availability of other alternatives to access that

information is what defines the aptness of the game for hard of hearing/deaf people; (3) *lying/bluffing*, where confidence, verbal fluency, and body language are decisive, but when people have some sort of disability their bluff might be limited, this component of the game can also leave some people uncomfortable or stressed in doing so; (4) in some cooperative games, due to the level of difficulty be much higher because there is no competition, it may be needed that the players do some *communication of strategy*, it could also occur that the originator of a strategy has to advocate for their strategy to the detriment of another; and (5) it may be needed *audible communication*, this is, some games require that non-trivial sounds are made to communicate state game or game intention.

As said before, in this game there is no bluffing or lying, as such we will not be evaluating this category.

Regarding the *reading level*, and according to what was said previously, the game's instructions don't have much readability, which can be a barrier to understanding how the game is played. Notwithstanding, if at least one player already knows how to play, then this barrier can be easily overcome by the oral explanation of the game. Additionally, since the game has explanations on how to play through the images in the back of the box, it isn't necessarily required to have a reading level, although some base rules will be lost (for example, the time limit, the different levels, etc.). It is also worth mentioning that there isn't any alternative for blind people to have (officially) access to the instructions, thus becoming dependent on other people to explain the game to them.

In the game, players may want to establish beforehand which gestures they will use and what their meaning will be, although this is a *communication strategy* it doesn't, to our best knowledge, have any implications regarding communication accessibility as they can make it as the game progresses.

Given the game's purpose, *audible communication* is needed as one player has to give directions to another player to play, which has pros and cons. If in the group there is a hard of hearing/deaf person then this person can play as the architect, but if the group is composed of two or more hard of hearing/deaf players then the game doesn't allow for them to play the game as it is. It will be necessary to do some sort of adaptation. If the group is only composed of people without disabilities it can be a great opportunity to work on their communication skills.

We cautiously recommend Team3 in this category.

4.6 Socioeconomic Accessibility

The authors mention that the accessibility of a game isn't only about disabilities but also about the sociological aspect of it. That is, it also matters if the game is relevant to the public and/or player and if it is economically accessible to the wider audience.

With that being said, Heron et al. (2018) identify five categories of socioeconomic accessibility, them being: (1) *inclusive artwork* of the game regarding gender and ethnicities balance; (2) the *sexism in art and instruction*, which refers to the fact that games have been, for a long time, thought to be a

hobby for the male gender, thereby the artwork, writing, chosen colors, and sometimes the assumption of the gender of player in the game manuals being male; (3) the *theme* of the game can, occasionally, be triggering to some, and thus it should came with a disclaimer it there is that possibility, so players are aware of that, for example it should come with a trigger warning; (4) the *player counts*, or the 'cost per player' (Heron et al., 2018, p. 110) it is also important to consider , especially if someone is on a budget and wants maximize the game, for example, a low player counts game might not guarantee the participation of all the group members, while a high player counts game might prove to be difficult to arrange

Figure 8
Game artwork at the back of the box

the necessary number of people to play; and (5) the *cost* of a game also could pose a barrier to accessibility, particularly if there is a budget constraint, and since board games are usually expensive and viewed as being a 'luxury hobby' (Heron et al., 2018, p. 110), it is important that people feel that they are getting the most out of it.

The box *artwork* (Figure 8) is constituted, essentially, of three monkeys, one with its mouth covered, one with its ears covered, and another with its eyes covered. Also, the monkeys are part of the illustration of the game manual. As such the first category isn't relevant to this game.

It isn't possible to point out what the gender of the monkeys is, and the game manuals used gender-neutral language, with that being said we consider that there isn't any *sexism in art and instruction*.

The *theme* was based on the proverbial three wise monkeys, say, hear, and see no evil (Fantastic, 2021), as such we argue that this game doesn't need to have a trigger warning.

Relatively to the *player counts*, this game can be played by three or six players, but it can also be played with the two versions at the same time which broadens the number of players. Considering this, this game is flexible as far as player counts go.

Lastly, as *costs* go, it is relatively inexpensive as each version costs up to 20€/US$ brand new.

Thus, we recommend Team3 in this category.

4.7 Intersectional Accessibility

The last category of the guidelines is related to intersectional accessibility, which relates to how it can affect someone who has multiple disabilities (e..g., someone who has a visual and cognitive disability). For example, the usage of text-to-speech creates accessibility for people with visual disabilities, but if a person also has a cognitive disability, using text-to-speech can be a challenge due to the cognitive expense that originates when compared to the use of natural speech.

In this sense, the authors divide the categorization into six different groups: (1) people with *physical* and *cognitive disabilities*, which can face barriers when it comes to the *size of cards/hands*, *board complexity*, *dice*, *hidden hands* and *agency*; (2) people with *emotional* and *cognitive disabilities*, were *downtime* and *competition* can affect their attention span and the enjoyment of the game as they watch the game unfold and notice that something bad is going to happen to them when it is their turn, which in itself can trigger some challenges emotionally or cognitively to deal with the consequences; (3) people with *physical* and *visual disabilities*, were the *token size*, the *placement of tokens* and the *board size* must have to be taken into consideration so that they to can enjoy the game without hurdles, where the bigger they are the better; (4) people with *cognitive* and *visual disabilities*, were the *aesthetics* and *symbolism* can pose a challenge, since the aesthetics of a game and the symbols in them can turn the game inaccessible and put a great cognitive load on the players; (5) people with *physical* and *communicative disabilities* can have some difficulties *comunicating instructions* to the person that is playing for them when they can't make their intentions clear to that person; and (6) people with *physical*, *cognitive*,

emotional, *communicative,* and *visual disabilities*, were *time constraints*, the *ability to drop in/out* and the *length of game sessions* play a considerable role, in the sense that if the game allows for flexibility when it games to time for these players, allows for someone to drop in or out of the game without affecting everyone else's and if it the game is of short duration, then the game will be more accessible to people with all these disabilities and will not create discomfort in them.

Physical and cognitive disabilities

Concerning the *size of cards/hands* and *hidden hands*, in this game, exclusive access to the blueprint card is granted solely to the architect, namely one card per round (three minutes). Consequently, the architect possesses the liberty to either conceal the card within their hand or place it within the designated card stand enclosed in the game box. If the architect requires assistance, the instructions don't forbid an external participant from the group or any individual who isn't currently engaged in active gameplay.

As for *agency*, Team3 possesses a degree of it. This is because all players need to collaborate and contribute their unique skills and perspectives to complete the structures. Each player has a specific role and responsibility, leading to a sense of agency. The game requires players to communicate and strategize effectively to overcome various challenges. This active involvement encourages players to actively participate, make decisions, and take action, contributing to a sense of agency.

However, it's important to consider the specific physical and cognitive impairments that an individual may have. The

accessibility of the game may vary depending on the impairments and the extent to which they intersect with the game's mechanics. For example, if a player has physical limitations that prevent them from manipulating the blocks, their agency within the game may be constrained. It might be needed, for example, to have someone to help them move the blocks or increase the time for that team. To sum up, adaptations must be implemented.

People with emotional and cognitive disabilities

Team3 has some periods of *downtime* between turns as each player takes their turn being the architect, builder, or supplier. However, this downtime is minimal, as each round of the game usually only lasts a few minutes. Additionally, during the downtime, players can strategize with their team and plan their next move, which can keep them engaged and mentally active throughout the game. The downtime may vary with the number of players, if the team isn't multiples of 3, players will need to rotate positions but overall, the downtime isn't excessive and is balanced by the fast-paced gameplay and collaborative nature of the game.

Additionally, the game also provides a *competitive* element when played with more than five players. When played with four or five players, the game is a cooperative game where players work together to complete construction tasks. However, when played with six or more players, the game changes to a cooperative-competitive style, where players are split into two teams and compete to complete construction tasks faster than the opposing team. While the teams work together to finish their building challenges, they are competing against

each other to earn. So, Team3 provides both a cooperative and a competitive gameplay style, depending on the number of players involved.

People with physical and visual disabilities

Concerning the *size* and *placement of the tokens*, since this game doesn't incorporate tokens, we evaluated the shape and size of the quadrangular pieces. These bright color pieces have an average of six centimeters in length and width, and are two centimeters tall, making them easily graspable and identifiable. Even though the pieces need to be placed in specific places, the shape and size of the pieces and the fact that most of the level 1 blueprints don't require balancing make the game achievable to someone with physical and cognitive disabilities.

As for the *aesthetics*, both the instructions and the game elements are devoid of any visual clutter that could potentially impede the comprehension of the game. The instructions are presented in a cohesive and structured manner, accompanied by carefully selected colored illustrations that are neither distracting nor irrelevant. Moreover, within the game itself, the cards are composed exclusively of the necessary components required by the players, all set against a clean white backdrop that is easy to understand.

People with physical and communicative disabilities

As discussed in the section "The game", this game has three rules: architect (draws the blueprint card and describes it nonverbally to the supplier), supplier (provides information verbally to the builder), and builder (assembles the blueprint structure blindfolded). As such, having clear and effective *instructions communication* is a key aspect of the game, as players must work together and convey their strategies and suggestions. Without clear communication, it will be challenging for players to coordinate their moves and achieve the desired outcome. Not to mention, if a player can't talk and has physical disabilities (e.g. hand mobility) it will limit their experience, they may be restricted to the architect's role and it may also be necessary to add more time to the game so that they aren't pressured to accelerate their moves. If, on the other hand, the player doesn't have mobility at all and can't communicate then the game isn't accessible to them.

People with physical, cognitive, emotional, communicative, and visual disabilities

Team3 has *time constraints* that add a sense of urgency and excitement to the game. Each building challenge in the game has a time limit of three minutes, and players must work together to complete the structure before time runs out. The sand timer or the phone timer during the game ensures that players stay on track and complete each challenge efficiently. Overall, these time constraints can make the game a more exciting and challenging gameplay experience for people without disabilities but for players with certain disabilities such as those with motor disabilities as well as those who may need more time to process information or communicate with their team, time constraints can be challenging.

Moreover, being a party game, it is possible to *add or subtract players* mid-match. The only constraint in this regard is that

one box must have three to six players and with two boxes three to twelve.

As for the *length of the game session*, each round is three minutes, with the maximum time of the entire match being thirty minutes. While the game has a recommended playtime of thirty minutes players can take their time and adjust it to fit their needs.

Overall, we cautiously and conservatively recommend Team3 in this category, although it should be noted that if there is more than one person with the same disability playing it may prove difficult to play this game.

5. Discussion

As communication is crucial in all spheres of life (Casimiro, 2023) and considering that games promote interaction before, during, and after play (Heron, 2022) it is important to understand if games are accessible to all, especially collaborative games as they are heavily dependent on communication, and therefore, interaction among players. As such, we proposed here the analysis of a collaborative board game, Team3 (Cutler, Fantastic & Pētersons, 2019), to understand if it is accessible. Particularly, considering that the game is based on giving the players different characteristics that are similar to disabilities (one player can't see and the other can't speak), while one player is the intermediary between the two.

One of the strong factors of this game is that it allows players that are, for example, deaf or blind to play the game as there are roles that involve just doing gestures, and not seeing the

pieces while building, although if a deaf player wants to be the builder, it may be necessary to alter the concept of the game altogether. This brings us to the weaknesses of the game: the game constricts the roles that people with disabilities can fulfill, and it could be difficult to have one team of people with the same or similar disabilities, not because they have disabilities but because the game requires that players have determined skills, as mention in the section about intersectionality.

As seen through this review, this game is relatively accessible, having noted that the most accessible categories are the physical, and socioeconomic, not having found any not accessible. The rest of the categories are cautiously recommended taking into account the caveats mentioned.

To sum up, the game should come with a disclaimer that the game mechanics can be challenging for neurodiverse people, for people with the same sensory disability playing together and for people with multiple disabilities, as a way to guarantee that the players (or carers) can decide if the game is adequate for its intended purpose. In that disclaimer, it could also be useful to recommend alternative ways to play the game so that everyone can enjoy it.

Throughout this analysis are several limitations that must be considered, mainly: (1) the contents here presented were not validated by people with disabilities nor a diverse group of people, as such we tried to follow an accessibility approach, which is relevant to all, rather than a disability approach, since we can't really comment on that; (2) the authors are persons without disabilities, as such there may be important considerations left out or wrongly presented, although we tried to

focus on what the game asks the of the players and not who can play the game, our intentions might not be clear; (3) the authors only observed a limited number of plays of Team3 within the same group of people without disabilities - although there was a language barrier among the group, which can be equivalent to a Deaf person communicating with a hearing person (Young et al., 2019) - that doesn't represent the difficulties lived by people with disabilities, because living and experiencing inaccessibility (which we all do at some point) is different from living with a disability as highlighted by Heron (in press); and (4) the analysis only considered one collaborative game.

Having said that, it would benefit the literature and the board game industry if the conclusions here presented were validated with a diverse group of people that includes people with and without disabilities if this analysis were extended - with validation - to more collaborative games. Also, it would be beneficial to the industry if people with different disabilities were to participate in the pilot testing of games, as their knowledge is critical to achieving accessibility in games, and since intersectionality was one of the main accessibility issues identified it would be beneficial to consider having people with multiple disabilities on the pilot group.

Finally, is important to consider that no one person can represent an entire group of people, and every individual has its one particularities and needs, so the gaming industry and researchers must be mindful of that.

Disability is becoming a central subject in the study of media and cultural studies (Ellis & Goggin, 2017), and considering that games are both media and cultural products (Flanagan, 2009) it is important to evaluate their accessibility to all.

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