Article

Broken immersion in media accessibility: How barriers disrupt the connection between players with dyslexia and video games

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Abstract: Cognitive accessibility in video games remains one of the least explored and most challenging areas to address, as the target audience comprises a diverse group, including individuals with cognitive disabilities, but also learning difficulties. To gain deeper insights into how cognitive accessibility in video games could be improved, and due to the wide array of potential users, we conducted a study with persons with dyslexia, since this learning difficulty has not been examined in detail in the existing literature on game accessibility. Two focus groups were carried out to elicit information about the experiences of people with dyslexia in relation to video games, focusing on the barriers that break immersion and hinder the physical and emotional experience of gameplay. Thematic analysis was used to interpret the results. Findings suggest that while video games can offer enjoyable and immersive experiences, they may become alienating if not fully accessible. The main barriers preventing the participants with dyslexia from fully immersing themselves in a video game are reading, memorizing information and controls, and keeping up with the pace of the game. Particularly, they encounter difficulties with heavily text-driven games, and consequently prefer action games or those with a faster pace. In the conclusion, we lay the groundwork for a future reception study aimed at overcoming these barriers to foster more immersive game experiences.
Keywords: video games; cognitive accessibility; dyslexia; focus groups; easy-to-understand language.

1. Introduction

Video games play a crucial role in the entertainment industry, as they provide endless entertainment and immersive experiences to users, allowing them to escape from their daily routine. In addition, playing video games provides numerous benefits, such as reducing stress, enhancing problem-solving skills, and strengthening social interactions (Granic et al., 2014; Smirni

et al., 2021). However, there is still an important segment of the population who has difficulties accessing video games: people with disabilities, who account for 16% of the world population (World Health Organization, 2024) and people with learning difficulties, who represent 15% of the global population (The Treetop, 2024). Game accessibility's ultimate objective is to help users overcome the barriers present in video games when there is a mismatch between user's abilities and the abilities required to play the game (IGDA GASIG, 2024).

Regarding people with cognitive disabilities or learning difficulties, considerable efforts have been devoted to developing detection techniques and training programs. While this approach can be beneficial, it largely reflects the medical model of disability by emphasizing inabilities, thereby inadvertently reinforcing ableist perspectives. In contrast, current studies increasingly align with the social model of disability, as originally proposed by Marks (1997), whichs aims at suggesting ways of preventing cultural products or society in general from creating barriers that contribute to exclusion.

The social approach to accessibility has gained significant traction in video games in recent years, particularly since the release of *The Last of Us Part II* (Naughty Dog) in 2020. The game includes more than 60 accessibility features and has three accessibility presets for visual, hearing, and motor accessibility (Molloy & Carter, 2020). It exemplifies how involving accessibility consultants and integrating inclusive design principles from the outset can lead to a more positive and engaging experience for a wide range of players. Several authors, such as Simon-Liedtke and Baraas (2022) and Torrente et al. (2014), have argued that users with diverse needs and preferences should participate in the entire design process to ensure an adequate implementation of accessibility features. However, *The Last of Us Part II* is not without limitations. One notable shortcoming is the absence of a specific preset for cognitive accessibility. In fact, cognitive accessibility in video games remains one of the least explored and most challenging areas to address, as the target audience comprises a diverse group, including individuals with cognitive disabilities, such as autism or Down syndrome, as well as those with learning difficulties like dyslexia (von Gillern & Nash, 2023).

To better understand how cognitive accessibility in video games can be enhanced, and given the diverse range of potential users, we decided to center this research on individuals with dyslexia as a case study, as this learning difficulty has not been examined in detail in the existing research on game accessibility. Considering the motto of accessibility, "nothing about us, without us", we performed two focus groups to gather information about the opinion and the experiences of people with dyslexia regarding video games. Specifically, we examined the barriers that break their immersion and how these obstacles hinder the physical and emotional experience of video games.

The paper is structured as follows: after this introduction, section 2 provides an overview of dyslexia as a multifaceted learning difficulty to contextualise the study. Section 3 describes the interactive nature of video games, while section 4 explores video games and their promise of embodied experiences. Section 5 presents the methodology of the focus groups and the thematic analysis of the data, followed by the results and the discussion that draw on participants' insights and relevant prior studies. The conclusion highlights the main contributions of the study and outlines directions for future research.

2. Dyslexia as a multifaceted learning difficulty

The estimated prevalence of dyslexia varies depending on the language, ranging from 8.6–11% among Spanish-speaking populations (Carrillo et al., 2011; Jiménez et al., 2009; Rello & Baeza-Yates, 2012) to 15–20% in the U.S. population (Cowen, 2016). That means it is common enough to receive attention, yet it often remains invisible, as it is frequently mistaken for a lack of effort or concern on the part of those who experience it (International Dyslexia Association, 2022). Its origin has been shown to be hereditary (Galaburda et al., 2006; Landi & Perdue, 2019; Temple, 2001), although the specific mechanisms underlying its manifestation remain uncertain. The most common hypothesis is a weakness in phonological processing (Démonet et al., 2004; Goswami, 2000; Ramus, 2003; Snowling, 2000). However, there are many other hypothesis, such as the magnocellular theory (Stein, 2001, 2003; Stein & Talcott, 1999; Stein & Walsh, 1997), which explains the appearance of difficulties in letter recognition (Giofrè et al., 2019; Stein, 2014; Stein & Walsh, 1997), or the multifactorial hypothesis (Pennington, 2006), which suggests that there is a cognitive as well as a linguistic component associated to dyslexia.

Regardless of its origin, the term *dyslexia* refers to varying degrees of literacy difficulties that persist despite educational training. What is crucial, as the International Classification of Diseases (ICD) specifies, is that dyslexia is characterized by difficulties that are "not due to a disorder of intellectual development, sensory impairment (vision or hearing), neurological disorder, lack of availability of education, lack of proficiency in the language of academic instruction, or psychosocial adversity" (World Health Organization, 2019). In other words, the definition excludes the influence of intelligence or external factors not related to cognition, such as socioeconomic status or cultural background.

This learning difficulty is often linked with other disorders or difficulties, such as dyscalculia, which entails barriers in the understanding of numbers, and dysgraphia, which implies finding obstacles in written expression. All three are categorized under the Specific Learning Disorder by the American Psychiatric Association (2013). Hendren et al. (2018) highlight the high rate of comorbidity, particularly between dyslexia with dysgraphia (70%) and, to a lesser extent, dyscalculia (40%). The authors also draw attention to the link between dyslexia and the Attention Deficit Hyperactivity Disorder (ADHD), with co-occurrence rates ranging from 20% to 40%. They also speculate on a potential relation between this learning difficulty and the Autism Spectrum Disorder (ASD), with reported comorbidity rates between 6% and 30%. However, reading difficulties in individuals with ASD seem to differ from decoding or phonics-related challenges.

Dyslexia usually appears at a young age (the so-called *developmental dyslexia*) and, along with other learning difficulties, it has been associated with absenteeism and dropouts (American Academy of Pediatrics, 2009; American Psychiatric Association, 2013). When children experiment frustration in their early years, they might feel inferior in comparison to their peers and might develop feelings of incompetency, leading to a low self-esteem (Alexander-Passe, 2006), as well as to distorted misconceptions of themselves, such as being lazy or incapable of adequately learning to read (Washburn et al., 2011). This sense of failure may generalize beyond the classroom and last into adulthood (International Dyslexia Association, 2022), causing mental health outcomes (McArthur et al., 2022). However, dyslexia can be alleviated through treatments such as

hemisphere-specific stimulation (Lorusso et al., 2011) or audiovisual training (Magnan & Ecalle, 2006), where serious games could play a meaningful role.

The primary challenge encountered by individuals with dyslexia lies in their difficulty with reading. Dyslexia has been associated with poor word reading abilities (Melby-Lervåg et al., 2012), particularly in a text with infrequent and long words (Cuetos & Valle, 1988; Hyönä & Olson, 1995; Wimmer, 1993). Assimilating words for a person with dyslexia entails more effort than for a neurotypical person, thus causing stress (Buchweitz et al., 2023), and the impact in learning (Simoës & Largy, 2011) co-occurs with a detriment in comprehension (Cutting et al., 2013; Simmons & Singleton, 2000).

Although dyslexia has been predominantly defined by phonological decoding (Peterson & Pennington, 2012; Shaywitz & Shaywitz, 2005), many other traits of people with dyslexia have been explored. Some studies have assessed their short-term memory (Martinez Perez et al., 2012) and their working memory (Gathercole et al., 2006; Smith-Spark & Fisk, 2007). This difficulty related to memory is linked to serial learning in the context of reading (Bogaerts et al., 2015), although it has also been associated with non-verbal material such as drawings (Hachmann et al., 2014). Other studies associate dyslexia with deficits in different processes, such as executive functions (Brosnan et al., 2002; Reiter et al., 2005) or attentional orientation (Buchholz & Aimola Davies, 2008; Gabay et al., 2013), which aligns with the fact that this learning difficulty often co-occurs with attention-related challenges, such as the aforementioned ADHD.

3. The interactive nature of video games

Video games have consolidated as a medium in the last two decades, but their roots can be traced much further back. Games, in general, have always been a part of culture. Huizinga (1968) goes as far as to assimilate one to the other, stating that culture emerges from games and that games develop in culture. Caillois (2001, p. 9-10) builds upon Huizinga's work and identifies a set of essential characteristics that define any game. The act of playing must be *free*, meaning participation is voluntary and not obligatory. It is *separate*, existing within its own boundaries of space and time. A game is also *uncertain*, as neither its progression nor its outcome can be predetermined. Furthermore, it is *unproductive*, serving no purpose in creating goods or generating wealth. It is governed by *rules*, operating under its own set of conventions. Lastly, a game is *make-believe*, creating a second, imagined reality distinct from everyday life.

However, video games have expanded far beyond their predecessors. They are not only digital but also incorporate a diverse array of elements drawn from other audiovisual media. This raises a fundamental question about their nature: are they a new form of narrative, like an evolved version of cinema? Or are they an entirely unique medium, defined primarily by their interactive qualities? The first perspective is called *narratology,* and the second one, *ludology*. Both approaches can offer interesting views on the origin and the etiology of video games. However, it is important to note that conceptualizing video games solely as narrative structures can obscure the complex role of the player, since player agency, and their activity and actions are what gives sense to these productions (Newman, 2004).

The interplay between television and computers that characterizes video games is mediated through the active participation of the player (López Redondo, 2014), who is conceived as an actor (Juul, 2011) that both reads and produces the narrative simultaneously (Nitsche, 2008). This captures the essence of *interaction*, which could be considered the chore characteristic of video games (Landay, 2014), setting them apart from other media and cultural forms. Furthermore, this concept also serves as the foundation for distinguishing different genres, depending on how rules shape the outcomes that emerge from it (Egenfeldt-Nielsen et al., 2013).

The significance of interaction is evident in Caillois's rule of *free*, which asserts that the player must have the freedom to play whenever they wish, stop at any time, and resume the game again. For this rule to be satisfied, an *unbroken interaction* is needed (Newman, 2004, p. 83). The perception of the game as an ongoing continuum enables players to step in and out of the game seamlessly. At the same time, this constant need for feedback is what makes video games an escape route from alienation (Egenfeldt-Nielsen et al., 2013).

Recognizing the importance of player agency and interactivity allows us to conceptualize video games as experiences (Kuhn, 2016; Muriel, 2018), which unfold through the interface via "the screen, speakers (and microphones), input devices (such as keyboard, mouse, joystick…), as well as onscreen graphical elements such as buttons, sliders, scroll bars, cursors, and so forth" (Wolf & Perron, 2003, p. 15).

4. Video games and their promise of embodied experiences

The controller and other devices transform the interaction of video games into a physical activity, since they require input from the player to function (Wolf, 2001). Physicality creates a connection between the player and the video game that leads to a tacit agreement. After all, these "interactive games promise an immersive experience" (Raynauld, 2011, p. 85). For this to happen, the video game must engage the player via immersion, which can occur at several levels according to Kuhn (2016): *imaginative immersion* is the feeling of being transported to another space; *sensory immersion* is the blocking of sensations outside of the activity; *challenge-driven immersion* grants agency to the user, and *shared immersion* is the ability to socially interact. What is striking about video games is that, unlike other media, they include all four levels.

Immersion is achieved by three conditions: (1) the user's expectations must align with the conventions of the game or environment; (2) the user's actions should have meaningful impact on the environment, and (3) the conventions of the world and the narrative play a crucial role in aligning the user to their expectations regarding the logic of the world (McMahan, 2003). A breach in any of these conditions can break immersion and stop the interaction because it seems unaffordable or frustrating, resulting in the promise of immersion being broken.

However, when the promise is kept, the line between life and play is blurred (Eskelinen & Tronstad, 2003). At this point, the three elements that shape the experience of play—the technical aspects of the game, the narrative it conveys, and the player's involvement—merge and transcend, making their boundaries less clear and becoming interdependent (Aarseth, 1997). After all, a video game involves abandoning one's own body to enter a different world, where the player becomes what they are controlling. "Players experience games through the exclusive intermediary

of another—the avatar—the 'eyes', 'ears,' and 'body' of which are components of a complex technological and psychological apparatus" (Rehak, 2003, p. 104), which encapsulates the concept of *embodiment*. Video games are not simply concerned with creating alternative realities, they emulate *second realities* in which players experience emotions as if they were actually there (Portillo Fernández, 2017).

It is this sense of literal presence, reached by the video game and no other media (Rehak, 2003), that emotionally activates the body and the brain: perceptions and emotions generate cognitions that trigger physical actions in a flow that repeats endlessly, leading to what Lahti (2003, p. 158) calls the "corporealization" of the experience of playing. In fact, the main goal of a video game is "to envelop the player in technology and the environment of the game space" (Lahti, 2003, p. 159), and advancements in technology, with virtual reality and all its complements: rumble packs, pedals and wheels, and motion-sensing technology, are getting us closer to the ultimate bodily experience (Lahti, 2003). Salen and Zimmerman (2004) provide a precise definition of the bodily experience involved in playing a video game:

> To play a game is to experience the game: to see, touch, hear, smell, and taste the game; to move the body during play, to feel emotions about the unfolding outcome, to communicate with other players, to alter normal patterns of thinking (Salen & Zimmerman, 2004, p. 354).

Therefore, video games cannot be trivialized or reduced to mere entertainment. They engage both our bodies and minds, compelling us physically and emotionally, and in doing so, they offer experiences that we live with our entire being. In this context, certain traits of these audiovisual products pose obstacles to people with dyslexia, which may prevent them from fully engaging with these new realities. There is a tendency to associate dyslexia with a specific body part, often linking it to the eyes and the act of seeing (Berent et al., 2021), despite its cognitive origins (World Health Organization, 2019). This need for embodiment is shared with video games. Thus, if video games experiences cannot be embodied, difficulties derived from dyslexia might be more prevalent.

When designed exclusively for neurotypical users, video games become accessible only to those who do not face barriers, leaving a wide range of players feeling frustrated, alienated, and diminished in self-worth. By understanding the barriers dyslexia poses for users, developers can adopt the social model of disability and incorporate accessibility solutions into their games, helping to ensure that these players remain both physically and emotionally engaged and connected to their creations.

5. Methodology

As part of the research, two focus groups with people with dyslexia were conducted with a semi-structured approach consisting of a set of open-ended questions to guide the sessions. Initially, we considered the possibility of using a questionnaire, since they are easy to distribute, but focus groups were finally chosen because previous interactions with people with dyslexia showed us that they did not like questionnaires due to the amount of reading involved. Moreover,

focus groups are useful to examine experiences and needs (Morgan, 1998) and allow group interaction (Kitzinger, 2004), which could help us elucidate the experiences of a variety of players with different ages and playing habits.

The first step was to gather participants. To do so, we emailed several associations, posted an announcement in LinkedIn, and reached out to the press department of the Universitat Autònoma de Barcelona (UAB) to publish a news article. In the end, we established contact with two associations for dyslexic people, Associació Catalana de Dislèxia and Disnavarra, as well as with the Servei Per a la Inclusió at UAB. A brief questionnaire was sent to all potential participants to gather some basic demographic data and information about their playing habits.

Those who were interested in participating in the study, 15 in total, were divided in order to have two groups with less than 10 participants, since most authors recommend not exceeding that number per group (Bryman, 2012). However, some participants did not answer when they were contacted in subsequent steps, or were unavailable on the day of the study. In the end, we conducted the first focus group on the June 4th 2024 with 4 participants and the second on July 4th 2024 with 5 participants, having a total of 9 participants, with ages ranging from 18 to over 50 to account for generational differences.

The first group was composed of three people from Navarra and one from Catalonia. Two identified as women and two as men. Two participants were under 30 (aged 22 and 25), while the other two were over 30 (aged 44 and 57). The older participants reported not engaging in video games, while the younger participants played either weekly or monthly. These regular players used various platforms, such as PC and PS5, and occasionally participated in social gaming.

The second group included four participants from Catalonia and one from Navarra. Four identified as women and one as a man. Most were under 30 (aged 18, 21, 24, and 27), with only one participant over 30 (aged 51). Four participants described themselves as regular players, with three reporting weekly gaming habits. They engaged with a variety of platforms and game genres, although most indicated a reduction in their gaming time compared to their high school years.

Both sessions took place via Microsoft Teams, due to the geographical location of some of the participants. The procedure involved a moderator guiding the session, while a note-taker recorded participants' contributions. The discussion was guided by a prepared set of questions outlined in a previously developed protocol. In addition to defining the study's objectives, participant profile, timeline, and materials, the protocol detailed the specific steps to be followed during the sessions. The sessions began with an introduction to the topic, where the researchers explained their aim of making video games more accessible. Participants were assured that they could express their opinions freely and withdraw their consent at any time. After thanking them for their participation, they were invited to introduce themselves.

Then each session was divided into two main blocks. The first one, "About video games and user needs", focused on participants' experiences with video games—both positive and negative—and their general perspectives on accessibility. Questions aimed to identify difficulties they frequently encounter while playing, accessibility features they currently use, and any specific preferences they may have. The second block, "About easy-to-understand language", began with a brief explanation of this simplified form of language, followed by a discussion in which participants were asked to choose their preferred excerpt from a selection provided. The content and results

of this second block are described in a forthcoming paper. At the end, conclusions were summarized and then confirmed by the participants.

The information was analysed via thematic analysis following the steps suggested by Braun and Clarke (2012, 2013), aided by the practical example of Byrne (2022). The approach was constructivist, as themes and categories were created according to their relevance for the objectives of the study. It was also experiential, prioritizing the participants' opinions. Additionally, the approach was predominantly inductive, with codes generated from the data itself. A mixed perspective was applied for semantic and latent coding, since some contributions were coded based on participants' direct statements (semantic) and others based on researcher's inferences (latent).

Since the steps involved in a thematic analysis are usually intertwined, we present the method chronologically to provide a general overview of the coding process. We started by familiarizing with the data. The two transcriptions generated by Microsoft Teams were read twice in order to have a general sense of the discussion. Simultaneously, these transcriptions were corrected comparing the text with the video recordings of the two sessions. We marked interventions with various annotations, such as "[...]" for long pauses, "[laughs]" for non-verbal communication or "[overlaps]" when one participant spoke over another.

We then performed the initial coding by analyzing the transcriptions and focusing on the underlying information within the dialogues. This task was performed in Word, with the goal of breaking down the information in as many pieces as possible. Approximately 400 comments were gathered for each transcription. These initial codes were then transferred to an Excel sheet to look for similarities and to try to create more compact codes. After that, the actual coding was performed in Atlas.ti. Interventions were assigned a code that contained the main idea of the dialogue. In this first coding we identified 12 categories and 79 subcategories, which were refined and reduced.

The coding process provided a sense of how themes could be defined, but some ambiguous cases or codes required reassessment to ensure an accurate codification. Transcriptions were read and coded a third time, and codes were extracted and analysed in a separate Excel sheet four times until reaching a clear structure of the data. The analysis concluded with the creation of the coding list, which included themes, categories, and subcategories, accompanied by a definition and illustrative examples (see Table 1). Given the focus of this paper on the barriers dyslexia presents for users engaging with video games, the results and the discussion only address the first two themes, "The implications of dyslexia" and the "Game experience". The third theme, "Access to video games", is analyzed in a forthcoming publication.

Some categories were difficult to delimit. When considering difficulties with controls, we initially created a code related to motor skills. However, only one participant explicitly mentioned coordination, and it was unclear whether the difficulty arose from combining reading with controls or from personal motor skills. Since motor barriers are not a core aspect of cognitive accessibility, and the discussions in both focus groups centered primarily on having clear instructions for controls (in the first group) and the ability to remap them (in the second group), we concluded that the main cognitive difficulty could be remembering the controls, a difficulty that was explicitly mentioned by some of the participants.

Table 1: Coding list

Theme	Category	Subcategories	Definition	Examples (our translation)
The implications of dyslexia	Dyslexia	Diagnosis	Detection of dyslexia, whether in early or later years, and possible related difficulties.	"I was diagnosed at the age of 40".
		Progression	The progression of dyslexia over time and its possible treatment.	"... but now that I'm older, I've also improved a lot in reading".
		Personal perception	Self-concept developed through experiences related to dyslexia.	"I have been dyslexic since I was a child and left school with the idea that I was kind of stupid".
	Context	Educational	Noticeable events in academic contexts in relation to dyslexia.	"I think I started playing more during secondary school, precisely because I wasn't doing very well in class".
		Professional	Noticeable events in work contexts in relation to dyslexia.	"I've improved a lot and, for example, I can see that I also write much better than... colleagues or people I've worked with, you know?"
		Social	Noticeable events in social contexts, whether family or friends, in relation to dyslexia.	"Of course, my friends had enough time, but I didn't. I would make up what I was reading".
The game experience	Video games	Mode	Way of obtaining a video game and context in which it is used.	"Well, in my case, it's Steam reviews, YouTube, or even friends".
		Interest	Engagement with video games as a form of entertainment, including quantity of time spent with them.	"When it comes to video games, zero. I mean, I've never been someone who got hooked on them".
		Playability	Experiences with video games and game genres that were perceived as positive or negative.	"I prefer games that are more about motor skills, not so much cognitive tasks like reading or deep storylines".
		Materiality	Connection between the physical realm of the player and the digital world of the video game.	"Like, if they give you 2 km of text, like, you have to read everything and it's... I can't".
	Barriers	Memory	Features of a video game that need to be memorised, particularly controls.	"The biggest problem I have is with the controller, for example, the PlayStation controller. It tells me 'R2', and there are times when I can't remember where it was".
		Text	Display of content in relation to format, structure, and language.	"Of course, the main problem I've encountered with video games is when there's too much text".
		Rhythm	Expectations of how the player must progress in the game, such as text or audio velocity or the level of difficulty.	"... it kept going every 5 seconds, and I never had enough time to finish reading it and it frustrated me."...

Source: Authors (2025)

With regard to the subcategories of "Context", there was an initial overlap between them and the subcategories in "Video game", because "Social" was used for situations in which participants described experiences with video games in a social context. In the end, we decided to distinguish between "Social", referring to how dyslexia affects a person's life, and "Mode" to refer to whether a video game is played alone or with other people. Furthermore, we considered it appropriate to have separate codes to refer to the gaming platforms and playing contexts ("Mode"), and a different one for specific experiences with video games ("Playability").

It is important to note that the "Playability" code can encompass both positive and negative experiences, making it inherently polarized. The same applies to other codes such as "Personal perception" and "Interest", as they are broad enough to cover a spectrum of beliefs or emotions ranging from positive to negative. In the following section, all codes are discussed with illustrative examples. Direct quotes from participants have been translated from Spanish by the researchers, and to ensure anonymity, participant's names have been replaced with colors.

6. Results

In this section, we present the results of the focus groups. We first explore participants' experiences with dyslexia in their academic, social, and work contexts (first theme) to provide a framework for the barriers they commonly encounter. Then, we describe their experiences with video games to analyze the difficulties they face (second theme).

With regard to the first category, "Dyslexia", many people with this learning difficulty struggle with skills that are heavily required by the education system in their early years. Since neurotypical people are often considered the standard, people with dyslexia frequently perceive themselves as having a problem, especially before receiving a diagnosis. Under the code "Personal perception", participants' self-views were characterized by uncertainty and insecurity, as expressed by **Participant Red**: "I have been dyslexic since I was a child and left school with the idea that I was kind of stupid".

The process of recognizing a deviation from the norm can be either stigmatizing or beneficial, which we categorized under "Diagnosis". Since academic failure can be associated with a variety of difficulties or disorders, the detection of dyslexia should be adequate to avoid a diagnosis that could heavily undermine personal perception, such as labeling someone as having low intelligence. In **Participant Gray**'s words:

> They detected it quite late in my case, they used intelligence tests to figure out what was happening with my grades and so on, and of course, one of the tests was... I had a certain amount of time to complete it. So I didn't have enough time to read the questions. So, of course, I did terribly on the test and it came out that I was deficient, but I just didn't have time to read the things and answer them.

If detected early and adequately, as illustrated in the interventions under "Progression", difficulties associated with dyslexia can be diminished. For example, reading can become a habit that, over time, is perceived as less demanding or frustrating, and people can outgrow their prior conception, as stated by **Participant Orange**:

> Yes, over the years I've developed the habit of reading and I really enjoy it, compared to when I was a child. It could also be influenced by the fact that they detected my dyslexia when I was relatively young, so I can improve progressively.

Dyslexia also has an important impact in the second category, "Context". Early academic experiences, classified under the "Educational" code, cannot be separated from what we defined as the "Social" code, which encompasses how friends perceive and interact with people with dyslexia, or how these people perceive themselves among their friends, along with the role of dyslexia at home and the support of the family. Others serve as mirrors reflecting one's own abilities and flaws. Comparisons are inevitable, as social animals are inherently driven to engage in group dynamics. That means people with dyslexia are bound to find others that make them aware of their difficulties, as observed by **Participat Gray**:

> I mean, I feel much more tired... with my partner, who reads, well, she has some pretty innate abilities, right? But I do notice there's a huge difference. I mean, we're reading menus from the... from the restaurant, and I take maybe twice as long or more, or I don't want to read the menu because I'm tired that day and I tell her to choose instead.

Since dyslexia has a hereditary component, many people have relatives that exemplify how dyslexia can impact someone's life. Family often becomes a link to spaces where the difficulty is examined and discussed, but also, and maybe more importantly, family provides a place to share experiences, as mentioned by **Participant Green**: "… because my son also has dyslexia, dysgraphia, and so I would see myself and think, wow, I might have it too", and **Participant Purple**: "I have an easier time because I do read, but for example, for my sister, who doesn't read at all, it takes a little longer".

Understanding is a fundamental human need, and having someone close who truly comprehends what you are experiencing and empathizes with your emotions can be profoundly reassuring. Consequently, early disruptions, particularly in academic settings, often prompt individuals with dyslexia to reshape negative perceptions into positive attitudes when supported by their families, thereby fostering a sense of self-worth, as highlighted by **Participant Blue**:

> … but, well, in my case, my mother always instilled in me from a young age that the important thing is if you need to dedicate 100 and others need to dedicate 10, then you dedicate 100. In that sense, like, if you need to give more, then you give more. So, that's been my experience with dyslexia.

Thus, academic and social contexts significantly influence how people with dyslexia will navigate future environments, such as the workplace, which is illustrated in the code "Professional". The challenges they overcome during adolescence shape their adult experiences, where difficulties may persist to some extent. However, they often perceive themselves as equal to their peers or even as possessing superior skills, having developed greater resilience and abilities through their efforts, as described by **Participant Red**: "I've always thought that at work I've been well above what I was, I think it's because of the merits I've earned and because in the end, I deserved it, and because of my intelligence and personality", and **Participant Gray**: "I've improved a lot and, for example, I can see that I also write much better than... colleagues or

people I've worked with, you know? In the end, because I've also had to work a lot on my writing".

The presence of dyslexia makes people more vulnerable to situations in which their personal value is at stake, particularly in education, but the support of their inner circle and an early detection set the path to overcome any challenges they might find and to improve their performance at work or related activities, thus making them feel included.

As regards the category "Video games", these audiovisual products provide an escape route from the difficulties and the disruptions that undermine personal perception. They represent a safe space where there are no external judgments. At times, the reality of the digital world is less harmful than the real world, which relates the "Interest" code and is exemplified by **Participant Gray**: "What I've played the most are computer games, and I think I started playing more during secondary school, precisely because I wasn't doing very well in class due to my dyslexia".

As seen in the codes "Mode" and "Playability", the participants enjoy video games that are based on motor skills, such as racing or action games. They also prefer puzzle-solving and simulation games, such as *Candy Crush Saga* (King, 2012) and *Animal Crossing: New Horizons* (Nintendo, 2020). *Candy Crush* is a casual game with no narrative and very simple mechanics that consists of solving different puzzles every time, but with the same rules. The A*nimal Crossing* series is a life simulator with a simple narrative and an intuitive gameplay that involves collecting items and decorating places as main mechanics. Both can be played intermittently, with no harm to the overall comprehension of the video game.

However, participants also have good experiences with more complex video games, such as Role Playing Games (RPGs) or narrative-driven games. One participant enjoys games such as *Baldur's Gate III* (Larian Studios, 2023), which is an RPG that takes more than 60 hours to play, includes more than 10 playable characters and 4 different endings depending on the decisions made. Despite its complexity, the game presents information in a way that is easy to process, as mentioned by **Participant Blue**:

> *Baldur's Gate III*, which recently came out and is very famous, didn't affect me as much, and I think it's because of how they present the information through cinematics. […] If they present it with cinematics, a little bit of text but not much, and they alternate, I think it becomes much more manageable.

Another participant preferred *Horizon Zero Dawn* (Guerrilla Games, 2017), which has a relatively easy-to-follow narrative, with more action than dialogue. This video game exemplifies the successful combination of a compelling narrative and an engaging battle system, creating a dynamic and immersive experience. In the words of **Participant Purple**:

> Also, for example, I really liked *Horizon Zero Dawn*. […] It's very visual, the graphics are amazing, and I really liked that. It takes you through a story... that isn't overly complex and is simple, but it grabs you. I think it's important for it to have that element of action but not boredom, I mean, dynamic, so to speak.

However, sometimes people with dyslexia encounter difficulties while playing, as reflected in the contributions under the "Barriers" category. Some video games might lead to personal

frustration and reinforce the stigma of being different. Playing these games may sometimes underscore the struggles faced in academic settings and further highlight a person's divergence in social contexts, as described by **Participant Gray**: "Playing a game with someone, both of us playing and reading the same thing. That also made me feel a bit uncomfortable because he either went faster or even understood things that I didn't, so it made me frustrated". **Participant Yellow** expresses similar views:

> … and I had all my friends, who were playing [*Pokémon*], having a great time. My brother had all [the games] and played them, and I had them too, but it was like starting one and just reading and reading and reading. And when I was younger, it took me twice as long to read as it does now, and it was like I was just going through it, not understanding the story or what I had to do.

Negative experiences with video games can adversely affect the self-concept, extending the presence of difficulties beyond compulsory settings, like school or the workplace, to situations in which individuals have actively chosen to engage. Regarding the code "Text", the participants experiment frustration with video games that have a heavily text-based narrative. For example, certain *Pokémon* titles (Game Freak, 1996 to date), a turn-based RPG with constant dialogues, are simple but include too much text for them to engage, as reflected in the previous quote. They do not enjoy puzzles based on letters or words, such as those found in *Uncharted 4: A Thief's End* (Naughty Dog, 2016), as stated by **Participant Yellow**: "I was thinking of something that just came to my mind, and it's that, for example, in *Uncharted* there were many mini-games and puzzles, and some of them were about letters and ordering words, and those would frustrate me". They also find it challenging when different stimuli are presented simultaneously to the player, such as certain instructions and dialogues in *Red Dead Redemption 2* (Rockstar San Diego, 2010), as experienced by **Participant Purple**: "The last game I got is *Red Dead Redemption 2*, and one thing that… it doesn't stress me, but it does annoy me, is that, for example, the dialogues happen at the same time as the explanation".

These bad experiences are caused by different barriers, with reading being the most prevalent one. Formatting impacts readability, with inappropriate typography posing significant obstacles. Overall, the cognitive load involved in reading can hinder comprehension and often leads individuals to stop playing, as explained by **Participant Pink**:

> Well, the main reason I don't play is basically this, that when there are many games with a lot of text, I end up getting bored really quickly, because either I don't understand it or I just get bored. So, I just quit the game and don't play anymore, that's basically it.

Many of these barriers could be easily overcome if the game contained accessibility solutions such as text-to-speech technology or the possibility to customize the font. Additionally, the use of easy-to-understand language could improve comprehension and facilitate gameplay, although this approach has yet to be implemented in video games.

Another barrier is present in the code "Memory", which can entail difficulties when dealing with controllers or instructions. On the one hand, key mappings are not consistent across video games, requiring players to memorize a new layout for almost every game. Moreover, the use of

letters to label some keys can be confusing, since they may get mixed up, as stated by **Participant Purple**: "I also have problems with... mixing up letters. I mean, a problem my sister and I have is that, for example, I remember once when instead of 'cedro' (cedar), I read 'cerdo' (pig)". On the other hand, some information that is particularly complex might be hard to evoke, causing erratic or inconsistent actions, as mentioned by **Participant Purple**: "The biggest problem I have is with the controller, for example, the PlayStation controller. It tells me 'R2', and there are times when I can't remember where it is", and **Participant Brown**: "about the controls, I mean, if I have to switch from one game to another, I don't do it because if I'm going to get confused and not know how to move the character, I won't do anything". Existing accessibility features, such as the ability to remap the controls—available in several games, including *The Last of Us Part II* (Naughty Dog, 2020)—can help players with dyslexia overcome these barriers.

As regards the code "Rhythm", participants noted that many video games fail to provide an appropriate pace. Barriers arise when a tutorial is overly direct, to the point where it becomes obvious that it is an instructional guide, or when it is too detached from the diegetic world. At times, the amount of information and the order in which it is presented can also hinder comprehension. Sometimes instructions are not provided in a structured and consistent way, and sometimes too much information is given to the player at once, as described by **Participant Purple**:

> And then when everything is happening at once, I can't focus on the dialogues, on how to run, on where I have to go, you know? The dialogues should be like, while I'm riding the horse, saying, 'Okay, this is how you run,' you know?

The barriers encountered by participants threaten the promise of immersive experiences intrinsic to video games. The code "Materiality" emerges via the controller. Players' agency is often subordinated to the physical aspects of gaming: their role as both actors and observers is mediated through the hardware, which enables them to make an impact. Unsurprisingly, participants prioritize controls, which are the foundation of interaction, the entryway to this other reality. As **Participant Yellow** describes, assigning high importance to the remapping "… because I think it's the easiest way to move from one game to another and not just use one game, but be able to enjoy them all".

Materiality is also present as a coping mechanism. The tendency to embody experiences transforms significant cognitive effort into a physical reality, and it is this perceived reality that hinders their ability to interact with the game, rather than a lack of skill. Thus, texts that could appear appropriate for a neurotypical person are perceived as dense by players with dyslexia, as explained by **Participant Blue**: "… an RPG game of those very overwhelming ones, with texts that are like 2 kilometers long", and **Participant Purple**: "because that's it, those heavy games... The need I have is for it not to feel like a chore, for not having to read 30 pages to know what I need to look for".

The emotional connection between the player and the video game, along with the blurring of boundaries that occurs when the gaming experience becomes truly immersive—when the game transcends reality and the player becomes part of it—may lead players to identify cognitive barriers with physical discomfort, which can be inferred in the following sarcastic comment by

Participant Blue: "No, not that specific font, but it's so good to have a font that doesn't make me feel like shooting myself every time I have to read a text, thank goodness, I'm relieved".

In conclusion, video games can offer contrasting experiences for players with dyslexia. On the one hand, for the participants of this study, they provide a safe space far from academic judgments. On the other hand, these audiovisual products can highlight their challenges, especially when they are not designed considering barriers related to reading or memorization, particularly in fast-paced games. For this reason, it is crucial to promote an accessible game design that offers solutions to help users overcome these obstacles. Features such as the ability to revisit tutorials at any time, hints and clues during gameplay, text-to-speech conversion, customizable text, and remappable controls can facilitate gameplay and immersion for players with dyslexia.

7. Discussion

In this section we examine how the results from this study align with current literature. To begin with, the link the participants established between dyslexia and a low academic performance is widely regarded as one of the main consequences of this learning difficulty (American Psychiatric Association, 2013). Many participants reported feeling stupid or perceiving themselves as having a problem due to an inaccurate diagnosis. Hence, it is important to detect this learning difficulty as soon as possible to prevent future mental health issues.

In fact, many of the participants admitted they had improved their reading skills over time. This could be due to having received an early diagnosis and appropriate training, or because they developed compensatory strategies to meet neurotypical standards. Their improvement may also have been supported by their friends and family, especially considering the evidence that dyslexia is hereditary (Galaburda et al., 2006; Landi & Perdue, 2019; Temple, 2001). Sharing this learning difficulty as a common experience within a family might help people overcome related obstacles.

Among the challenges reported by the participants, the most common was difficulty with reading. Numerous studies have explored the reading barriers that people with dyslexia may encounter in both long and short texts, particularly those with infrequent terminology (Cuetos & Valle, 1988; Hyönä & Olson, 1995; Melby-Lervåg et al., 2012; Wimmer, 1993). The impact of this difficulty becomes evident when we consider that video games require learning through tutorials, feedback, rewards, and more (Guay, 2014). In many modern video games, reading remains essential for progress—it is the primary means of learning how to play. Therefore, if games are considered learning experiences (Juul, 2005), being unable to engage with the reading aspect prevents individuals from fully experiencing what the game has to offer.

A second challenge mentioned by the participants was related to memorization, particularly of controls. As noted earlier, people with dyslexia might find barriers in tasks related to memory (Gathercole et al., 2006; Martinez Perez et al., 2012; Smith-Spark & Fisk, 2007), although these are usually linked to reading. Whether dyslexia might have some effect in memorizing controls is yet to be explored. This challenge might also be related to letter recognition, since most controllers associate certain keys to letters, such as Nintendo Switch's controllers: A, B, X, Y, R, and L. Many people with dyslexia, particularly children, describe difficulties when attempting to identify letters (Giofrè et al., 2019; Stein, 2014; Stein & Walsh, 1997).

Another challenge participants encountered was related to the pace of the game. Fast texts were particularly difficult to follow, which might be related to their attention performance (Brosnan et al., 2002; Buchholz & Aimola Davies, 2008; Gabay et al., 2013; Reiter et al., 2005). It could also be linked to their overall reading ability, as eye-tracking studies have shown that individuals with dyslexia experience slower lexical processing (Hawelka et al., 2010), meaning they require more time to process texts compared to neurotypical readers (Hutzler & Wimmer, 2004). Furthermore, participants reported that an overload of stimuli made it difficult to keep up with a game. Research has shown that persons with dyslexia are more sensitive to auditory distractions than to visual ones (Gabay et al., 2020), which may explain why one of the participants was hesitant to receive different information from both textual and auditory sources simultaneously. It is worth mentioning that, when the different channels—text, audio, or haptic feedback—transmit the same information, participants' ability to perceive it remained unaffected.

All the aforementioned barriers make participants feel frustrated when playing video games. When they struggle to follow the game or fail to understand what the game requires of them, the connection between them and the game is disrupted, leading to a loss of interest in continuing. The crucial issue here is that they do not quit playing because they want to, but because they feel they *have to*, or believe the effort is not worthwhile. This breaks the rule of *free* (Caillois, 2001), which states that the player should be able to play whenever they wish, pause at any moment, and resume at will. The difficulty in engaging with the video game has a negative impact on interaction and undermines the promise of immersion.

In fact, some participants felt so frustrated with certain video games that they chose to stop playing them permanently. Barriers prevented them from understanding the conventions of the game world, thus failing to meet the third condition for immersion (McMahan, 2003). And when the game world is not understood, players may feel that their actions in this other reality are worthless or ineffective, leading them to believe they have no impact on the video game. This breaks the second condition for immersion and ultimately becomes the reason to stop.

Players need to feel that their actions in a video game have a purpose, that they make a difference (Salen & Zimmerman, 2011), as this is how they experience agency. It is through this sense of agency that the video game can be fully embodied and experienced. Barriers disrupt the emotional and psychological state of happiness that is sustained by the paradox of having control (Salen & Zimmerman, 2004), leading both the body and mind of players to disengage. Game accessibility is key to ensure the connection, allowing every player the ability to immerse themselves fully in the video game experience, according to their needs and preferences.

As regards the limitations of the study, the main one is the small size of the sample, which limits its representativeness. Since only nine people participated in the end, results cannot fully reflect the opinion or experiences of all people with dyslexia. It would have been convenient to perform more focus groups, but recruiting challenges, the small scale of the project, and time constraints made it difficult to obtain a higher number of participants. Another limitation is that the study only focused on dyslexia, not considering comorbid difficulties, such as the Attention-Deficit and Hyperactivity Disorder (ADHD), which was present in two participants, or dyscalculia, which a participant had.

Nevertheless, we believe the data collected provides a valuable initial insight into the barriers faced by players with dyslexia when playing video games, which hinder full immersion. This paves the way for future research in which different accessibility solutions can be implemented to overcome these barriers, and reception studies can be carried out with more players with dyslexia, with a view to improving their immersion and gaming experience.

8. Conclusion

Dyslexia is a learning difficulty that affects various aspects of a person's life. While it does not solely determine self-concept, it has an influence over time. During childhood and adolescence, poor academic performance and silent guilt stem from a social framework where comparison with others is inevitable. This affects self-esteem and relational value, giving rise to a personal struggle for a status that is sometimes seen as out of reach for a neurodivergent individual. Thus, people with dyslexia feel compelled to prove their value as they grow and, in fact, often perceive themselves as better workers than their peers. Overcoming challenges becomes a tool to reach normative standards and to gain social validation.

Video games can provide an experience that diminishes vulnerability, but can also be alienating if they are not fully accessible. The normative design of many games often creates barriers: unclear objectives, overly long texts, difficult-to-memorize controls, frenetic progress, overlapping stimuli… The main barriers preventing players with dyslexia from fully immersing themselves in a video game seem to be reading, memorizing information and controls, and keeping up with the pace of the game. Reading was the main challenge the participants mentioned, as the cognitive effort required can hinder comprehension and often lead participants to stop playing. Thus, instead of heavily text-driven games, they preferred action games and those with a faster pace or based on motor skills, such as racing games. Participants also liked puzzle-solving and simulation games, although some of them had also enjoyed more complex video games, such as RPGs or narrative-driven games, if the information was easy to process.

The barriers participants faced led to frustration, breaking the connection between the player and the game, clearly separating the real world from the diegetic one. This disconnection materializes when the controller is set aside. The physical support that forges the experience—that transforms the player into a digital being—is abandoned when the promise of immersion is broken. The main contribution of this study lies in identifying and illustrating the key elements of that disruption. Although limited in scale, the focus groups provided a space for the target audience to both propose and evaluate accessibility strategies. By placing people with dyslexia at the center, the study highlights their role as key stakeholders in the design process of a video game. Thus, the results are valuable from a qualitative perspective, offering insights rooted in the participants' lived experiences and perspectives.

In summary, it is of paramount importance to design games considering the barriers players with dyslexia encounter, and providing solutions that can help overcome them. This may include using easy-to-understand language, incorporating text-to-speech technology, enabling the remapping of controls, allowing access to the tutorial at any time, or providing hints and clues that remind players of what they have to do. The inclusion of these accessibility features would

empower players with dyslexia to interact effectively with the game, allowing them to immerse themselves fully and enjoy the gaming experience.

The next phase of the study will consist of a reception study evaluating the implementation of easy-to-understand language in a video game, presented in both written and audio formats. The ultimate goal is to ensure that video games fulfil their promise of immersion, so that users with dyslexia can access and fully enjoy the embodied experiences these interactive media offer.

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Notes

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Research dataset

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The data from this research, which are not included in this work, may be made available by the author upon request.

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