

**Accessibility: Optimising Games for the Diverse Needs of Gamers**

**by Henry Taylor 2206046 (Word count: 4388)**

## **Introduction**

For this essay I will be looking at how games can be optimised with respect to accessibility options for players with diverse needs.

The videogame industry has grown into one of the largest entertainment sectors in the world, with more than 3.32 billion people playing games in 2025 (Kumar 2025). This represents roughly 42% of the global population and shows how games now rival film and television in cultural reach. Within this global player base there is huge diversity in age, gender, socioeconomic background, and ability. Estimates suggest that between one-fifth and one-third of players worldwide live with some form of disability that can affect the way they play, see, hear, or interact with games (Power et al. 2019; AbleGamers 2024; Scope n.d.). These figures do not include people with temporary injuries, situational constraints, or undiagnosed conditions, so the real number of players who benefit from accessibility is likely even higher.

Given that a significant percentage of gamers have diverse needs, it makes sense that developers should actively design their games with as many relevant accessibility options as possible. In this essay I examine the extensive Game Accessibility Guidelines, created by a team of developers, accessibility specialists, and academics, which set out basic, intermediate, and advanced recommendations for Motor (control/mobility), Cognitive (thought/memory/processing information), Vision, Hearing, Speech, and General categories (Hamilton et al. 2012–; Hamilton et al. n.d.). When considering accessibility, it is not just about software-level options but also about supporting custom hardware, such as “accessibility controllers”, in order to make games more inclusive for a wider audience.

For my case study I focus on *The Last of Us Part II Remastered*, released on PlayStation 5 in early 2024 and later on PC via Steam, which has been widely praised as one of the most accessible AAA games to date. I draw on articles, reviews, surveys, and academic work to build a clearer picture of the current state of accessibility in games, and to understand how these ideas can inform my own Final Major Project. I have already started researching how to implement my audio radar software plug-in for Unreal Engine and Unity, [REDACTED], my aim is to help level the playing field for deaf and hard-of-hearing players by giving them a visual representation of the audio landscape around them. Through this process I expect to gain a better appreciation of the diverse needs of gamers, and to become a more thoughtful developer in the future.

## Literature Review

### 1 – Scope and Prevalence

Studies conducted by disability charities and advocacy groups repeatedly show that, despite rising awareness, significant barriers to entry still exist. Typical problems include the physical dexterity needed to use standard controllers, small or low-contrast text that makes menus difficult to read, a lack of subtitles or visual cues for deaf or hard-of-hearing players, and limited options to adjust difficulty, timing windows, or input sensitivity (Scope n.d.).

Interestingly, the same research also shows that many players who do not identify as disabled use accessibility features anyway. Remappable controls, subtitle customisation, and options to tone down visual clutter are often turned on simply because they make the game more comfortable or less tiring to play. This reflects the so-called “curb-cut effect”: design changes originally introduced for a minority group end up helping the majority as well. In that sense, accessible design is not an obscure niche but a mainstream quality indicator that improves usability for almost everyone.

Developers and publishers are increasingly recognising that inclusive design is both an ethical responsibility and a business opportunity. Accessible games can reach wider audiences, attract positive coverage, and build long-term goodwill and brand loyalty. Industry bodies such as IGDA’s Accessibility Special Interest Group, together with platform holders like Microsoft and Sony, have helped normalise the expectation that new releases should include at least a basic level of accessibility support. As the demographics of players continue to broaden, the need for systematic, evidence-based accessibility practice becomes harder to ignore.

### 2 – Frameworks and Guidelines Used by Developers

To plan and assess accessibility work, many studios rely on a small set of influential frameworks and standards. The most widely cited is the Game Accessibility Guidelines (GAG), first compiled in 2012 by a group of designers, academics, and accessibility specialists (Hamilton et al. 2012–; Hamilton et al. n.d.). The GAG is organised into basic, intermediate, and advanced tiers across six domains: motor, cognitive, vision, hearing, speech, and general usability. Each guideline is short and practical, for example, “allow remapping of all controls” or “ensure text size is adjustable”, and often accompanied by implementation examples. Because the GAG is both platform-agnostic and freely available, it has become a de facto reference manual for everyone from small indie teams to large AAA studios.

Alongside GAG, developers working on Xbox and Windows titles also use the Xbox Accessibility Guidelines (XAGs), maintained by Microsoft (2023). These differ in emphasis: XAG entries are written to be testable, with clear success/failure criteria, screenshots, and verification steps. This makes them particularly useful for quality

assurance and certification teams. A common pattern in studios is to rely on the GAG at the early design stage, then turn to the XAG during implementation and testing to check that features actually work as intended.

A third framework that is gaining traction is the Accessible Player Experiences (APX) model (Beeston et al. 2018). APX shifts the focus away from lists of features and towards player experiences such as “Clear Feedback”, “No Dead Ends”, and “Predictable Control”. This encourages designers to ask what problem a feature is supposed to solve, rather than just ticking items off a checklist. In practice, APX helps bridge the gap between inclusive design and overall game feel, emphasising empathy, iteration, and playtesting with diverse players. When used together, these three frameworks can form a robust workflow: GAG for idea generation, APX for shaping design intent, and XAG for validation.

## **3 – Effective Practices Across Key Need Areas**

### **3.1 – Motor (Control and Mobility)**

Motor accessibility focuses on players who have limited strength, range of motion, or fine motor control. The feature most frequently highlighted in the literature is full control remapping, which allows any input to be reassigned to a preferred button, key, or device (Game Accessibility Guidelines; TestDevLab 2024). Other important options include adjustable input sensitivity, the ability to switch from “hold” to “toggle” actions, and configurable timing windows for quick-time events.

On the hardware side, progress has been significant. Since the release of Microsoft’s Xbox Adaptive Controller (XAC) in 2018 and Sony’s Access controller in 2023, players have had access to modular hardware with large buttons, paddles, and standardised switch ports (Microsoft Xbox 2018; PlayStation 2023). These devices are designed to integrate with mainstream consoles rather than sit apart from them, enabling players to build custom setups that previously would have required expensive specialist equipment. The popularity of third-party add-on kits from companies such as Logitech and Hori suggests that hardware inclusivity is no longer just a charitable side project, but a recognised commercial market.

### **3.2 – Hearing Accessibility**

For deaf or hard-of-hearing (DHH) players, high-quality subtitles and captions are essential. Research and practice guidelines highlight several best-practice elements: consistent speaker identification, explicit inclusion of non-speech sounds, adjustable font size and colour, and background boxes or opacity controls to maintain sufficient contrast (Maja 2018).

Some games go further. *Fortnite*, for example, includes a visualised sound system that turns audio cues into on-screen indicators showing the direction and intensity of sounds (Epic Games n.d.). This multimodal feedback is valuable not only for DHH

players, but also for anyone playing with low volume or in a noisy environment. Haptic feedback can extend this idea by converting explosions, alerts, or footsteps into vibration patterns, creating redundant sensory channels that reinforce important gameplay information.

My own Final Major Project, an audio radar plug-in, is directly inspired by this approach. By mapping spatial audio into visual glyphs, the aim is to level the sensory field for players who cannot rely on hearing, and to give them a quick, at-a-glance sense of what is happening around their character.

### **3.3 – Vision and Colour Perception**

Players with low vision or colour-vision deficiency (CVD) face a different set of barriers, many of which arise when games rely on colour alone to convey information. Studies by Jamil et al. (2024) and Napoli et al. (2018) show that combining colour with shape, pattern, or clear labels significantly improves recognition speed and reduces cognitive load. Straightforward changes, such as using distinctive symbols on status icons or adding texture to enemy outlines, can remove dependence on hue perception altogether.

Features such as adjustable text size, scalable interfaces, and high-contrast modes are also critical, yet surveys suggest they are not consistently implemented across all genres (Larreina-Morales et al. 2024). One recurring recommendation is to address these issues early during art direction and UI wire-framing, rather than relying on colourblind “filters” bolted on near the end of production.

### **3.4 – Cognitive and Learning Accessibility**

Cognitive accessibility is concerned with how easily players can understand, remember, and process game systems. Helpful practices include clear, staged tutorials; adjustable pacing; optional navigation aids; and mechanics that are forgiving of mistakes. These supports are useful for players with attention-deficit disorders, dyslexia, memory challenges, or processing differences, but they also improve onboarding for almost everyone.

Empirical work suggests that cognitive accessibility is often less consistently addressed than motor or visual support, leaving a noticeable gap (Guzsvinecz et al. 2025). Integrating APX heuristics such as “Predictable Control” and “Clear Feedback” can help designers view cognitive support as part of good game design in general, rather than a specialised extra for a small subset of players.

## **4 – Law, Policy, and Platform Influence**

Very few countries currently enforce comprehensive legal requirements for gameplay accessibility, but several regulatory frameworks have still had a strong influence on practice. In the United States, the 21st Century Communications and Video

Accessibility Act (CVAA) requires that communication functions in games, such as voice and text chat, be accessible to players with disabilities (AbleGamers n.d.; TPGI 2024). This pushed major console manufacturers to implement system-level screen readers, text-to-speech, and captioning, creating a baseline expectation for accessible system menus.

In Europe, the European Accessibility Act (2019) is beginning to extend similar obligations to a wider range of digital services, including entertainment software. While the details are still evolving, the overall direction of travel is clear: accessibility is increasingly seen as a rights issue rather than an optional feature.

Beyond formal law, platform certification probably has the most direct day-to-day impact on developers. Microsoft's XAGs form part of the submission process for Xbox games, while Sony's internal review teams now include dedicated accessibility checks for major releases. This encourages studios to treat accessibility as a core quality-assurance area, on a par with performance, stability, or security testing.

First-party initiatives, such as PlayStation's accessibility accolades and Xbox's Gaming for Everyone campaign, publicly highlight studios that excel in this space, creating both reputational and commercial incentives. Academic commentary increasingly describes these overlapping influences, legal, platform-level, and community-driven, as an emerging governance ecosystem for accessibility (Larreina-Morales et al. 2024).

For developers, the message is fairly straightforward: inclusive design is no longer just a “nice to have”, but a professional standard that needs to be integrated into the production pipeline from the start. Meeting that standard involves not only following guidelines, but also developing an empathetic understanding of player diversity through testing and ongoing iteration with disabled players.

## Case Study

### **The Last of Us Part II Remastered – A Benchmark for Game Accessibility**

When *The Last of Us Part II Remastered* launched on PlayStation 5 in early 2024, and later arrived on PC/Steam, it was praised not only for its narrative and technical quality but also as a new benchmark for accessibility (Game Accessibility Nexus 2024). Building on the already substantial accessibility suite of the original 2020 release, developer Naughty Dog expanded the feature set to include more than sixty customisable options covering motor, cognitive, vision, hearing, and general accessibility needs.

This case study considers how the remaster demonstrates best practice in inclusive design, particularly for players who are blind or visually impaired, deaf or hard of hearing, or who have motor impairments, and how its approach reflects the frameworks discussed earlier, namely the Game Accessibility Guidelines (GAG) and the Accessible Player Experiences (APX) model.

## 1 – Accessibility as Design Philosophy

Rather than bolting on accessibility near the end of development, Naughty Dog appear to have treated it as a core design value. Access-Ability UK (2024) describes the studio's approach as "baked-in": accessibility considerations affected level layout, control schemes, audio mixing, and interface design from early in production. This aligns closely with the APX principle of "No Dead Ends", which aims to prevent any player from hitting a point in the game they cannot progress past due to an accessibility barrier (Beeston et al. 2018).

The remaster includes three major presets, Vision (Figure 1), Hearing (Figure 2), and Motor (Figure 3), that automatically enable a recommended set of options for each category (PlayStation 2024). Players can then tweak individual settings on top of the preset to suit their own preferences. This combination of sensible defaults and deep customisation matches the GAG's advanced recommendation for "full customisation with safe defaults" (Hamilton et al. 2012–).

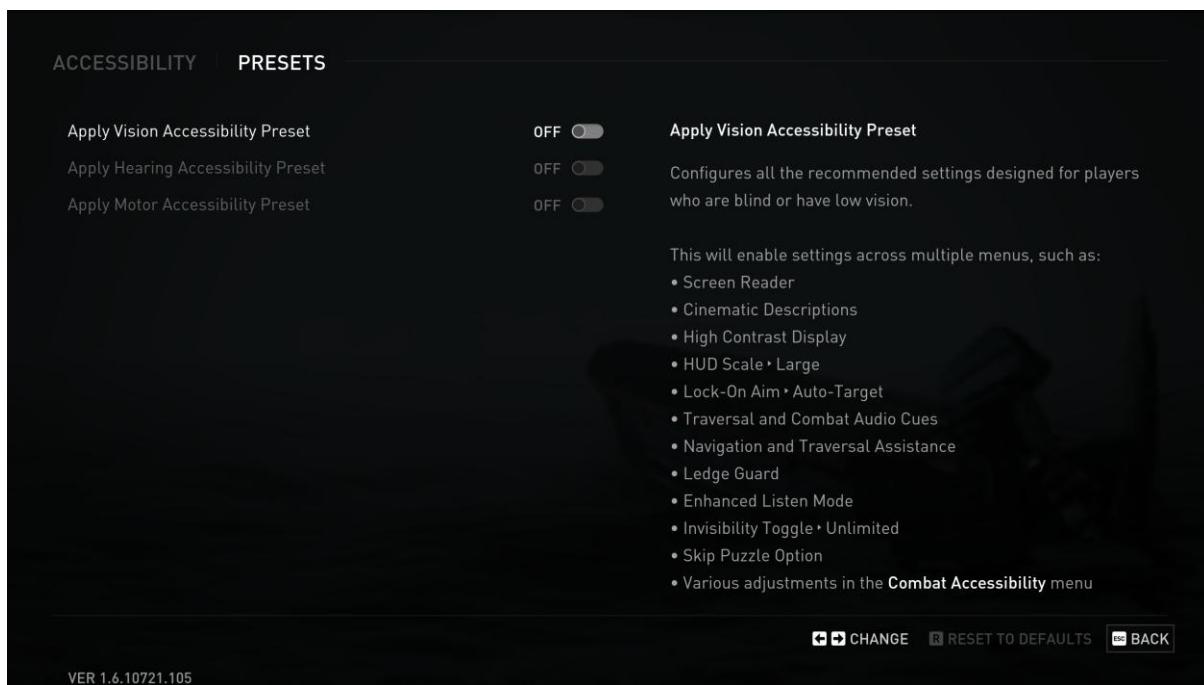


Figure 1: Vision Accessibility Preset Options

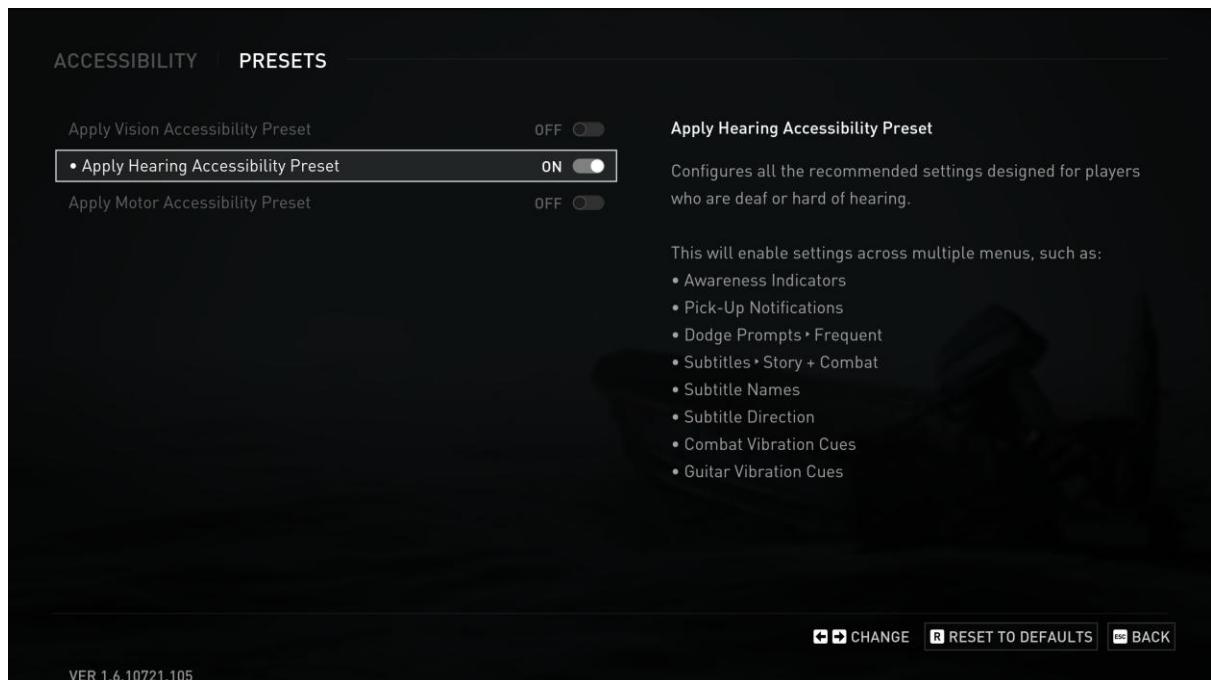


Figure 2: Hearing Accessibility Preset Options

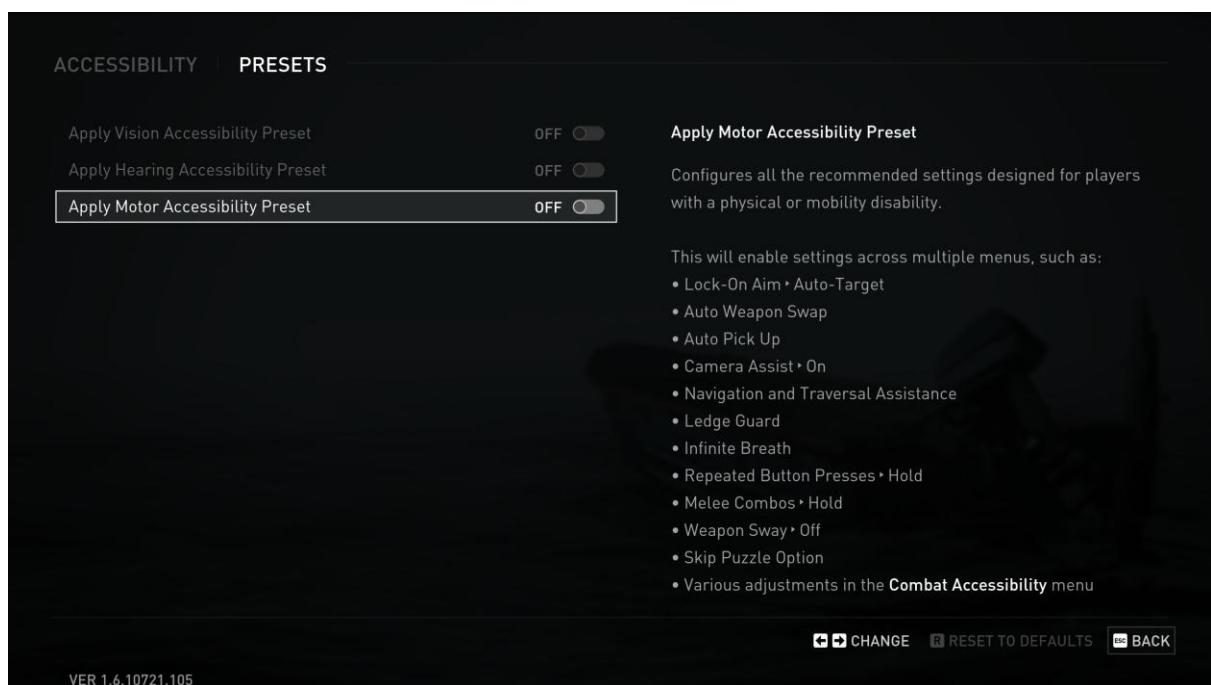


Figure 3: Motor Accessibility Preset Options

## 2 – Accessibility for Blind and Low-Vision Players

The most striking aspect of the remaster is the support it offers blind and low-vision players. Game Accessibility Nexus (2024) refers to it as an “accessibility masterpiece”, pointing to expanded screen-reader support, enhanced navigational audio cues, and

audio-described cinematics. Together, these features make it possible to experience the entire game, including cutscenes, without relying on sight.

The built-in screen reader reads out menus, inventory slots, HUD elements, and button prompts via synthetic speech, allowing blind players to navigate independently. A dedicated navigation assist system lets the player press a button to reorient the camera towards the next objective, guided by directional audio pings. According to the Blind Gaming Club (2024), these audio cues, combined with rich environmental sound design and improved haptic feedback, allow blind players to move through complex environments, engage in stealth and combat, and collect items with confidence. Automatic item pickup further reduces the need for precise positioning, showing how visual and motor accessibility can reinforce one another.

One of the biggest improvements over the 2020 version is the addition of audio descriptions for cinematics. Access-Ability UK (2024) had previously criticised the lack of descriptions for in-engine story moments; the remaster now covers these gaps. As a result, nothing essential in the narrative is lost between sighted and non-sighted play, fulfilling the APX goal of “Clear Feedback” and the GAG guideline that critical information should always be conveyed through more than one sensory channel.

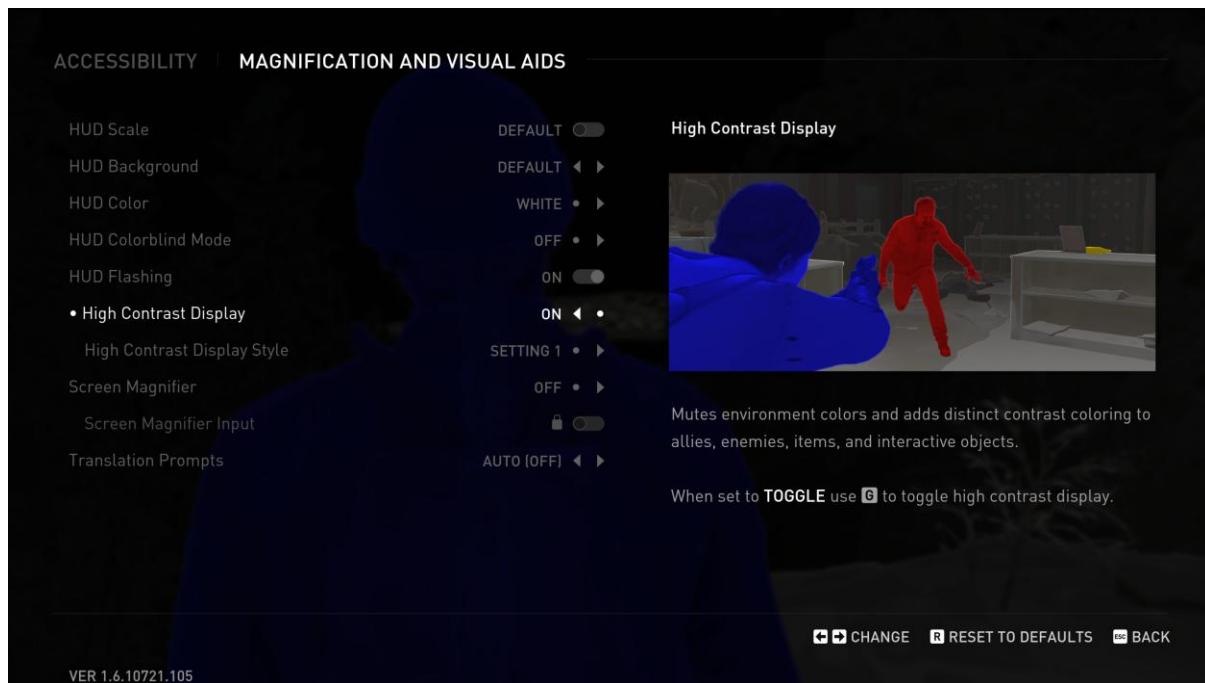


Figure 4: High-Contrast Visual Aid for Low-Vision players



Figure 5: Before High-Contrast



Figure 6: After High-Contrast

### 3 – Accessibility for Deaf and Hard-of-Hearing Players

For deaf and hard-of-hearing (DHH) players, *The Last of Us Part II Remastered* is equally notable. CNET (2024) reports that the game offers a specific hearing preset tuned for DHH users, which automatically turns on enhanced subtitles, visual awareness indicators, and directional sound indicators. These settings can all be adjusted

individually if needed, reflecting the flexible, modular approach recommended by accessibility frameworks.

Leahybaker.com (2024) provides a detailed breakdown of the subtitle options. Players can choose different text sizes, colours for different speakers, and background opacity levels (Figure 7). Subtitles consistently show who is speaking and also include non-speech audio cues such as “[Glass breaking]” or “[Enemy approaching]”, making the soundscape legible even without audio. These choices echo GAG recommendations about describing meaningful non-verbal sounds and providing visual indicators for key audio events (Hamilton et al. n.d.).

On top of this, the game uses subtle on-screen prompts and controller vibrations to signal nearby noises or threats. This redundant sensory feedback helps DHH players make tactical decisions in combat and exploration without needing to hear footsteps or gunfire. PlayStation’s (2024) official materials also highlight in-game tutorials that explain how each feature benefits specific groups, which not only supports disabled players but also educates non-disabled players about different accessibility needs.

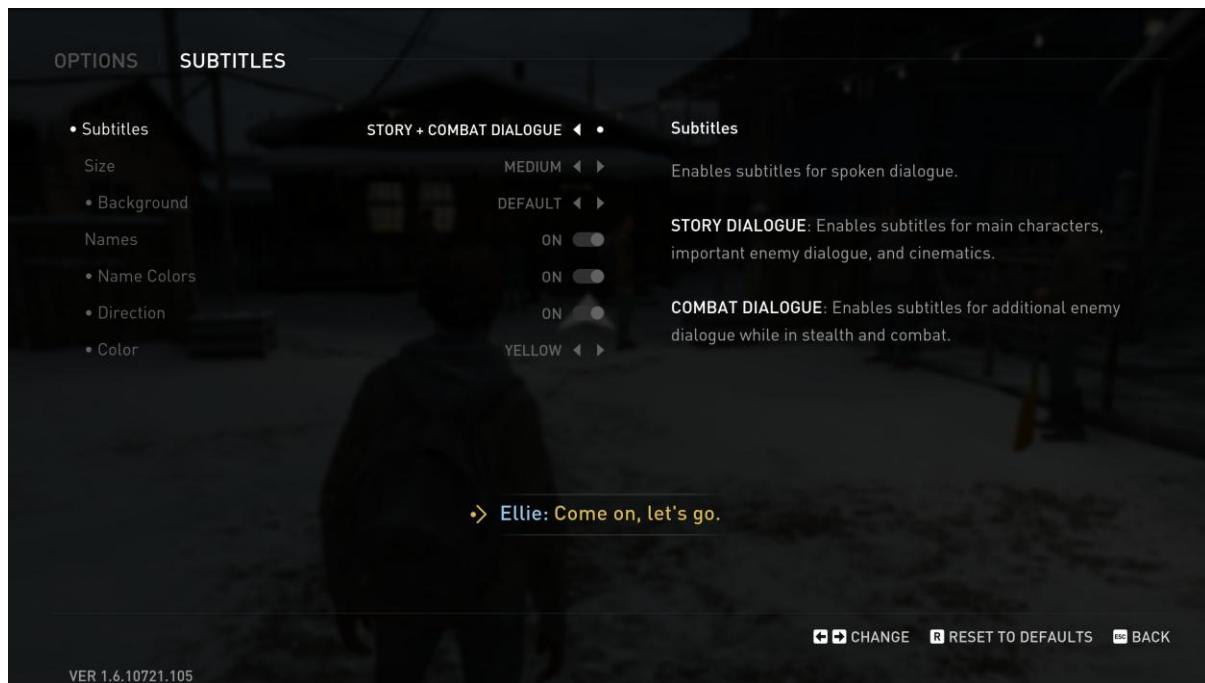


Figure 7: Subtitle settings



Figure 8: Subtitles in action



Figure 9: Directional indicators for points of interest / conversations / story progressing dialogue etc.



Figure 10: Gatekeeping dialogue, literally

#### 4 – Motor Accessibility and Cognitive Considerations

Motor accessibility remains a strong point in the remaster. All inputs can be remapped (Figures 14 and 15), and actions that normally require holding a button can be changed to toggles (PlayStation 2024). Combined with configurable aim assist, camera assistance, and lock-on targeting, these options make combat and traversal more approachable for players with limited mobility or fatigue issues. They closely match the motor-related recommendations outlined in GAG and XAG, and represent a direct application of the general principles discussed in Section 3.

The game also includes a number of features that support cognitive accessibility, an area that is often neglected. Players can slow down puzzle timers, simplify navigation (Figures 11, 12 and 13), and reduce motion blur or camera shake. These adjustments can help those with ADHD, motion sensitivity, or processing differences, and they also give all players more control over how intense or comfortable the experience feels. Collectively, these features show that Naughty Dog recognises accessibility as covering mental and sensory diversity, not just physical disability, and they align with APX ideas around “Predictable Control” and reducing unnecessary cognitive load.

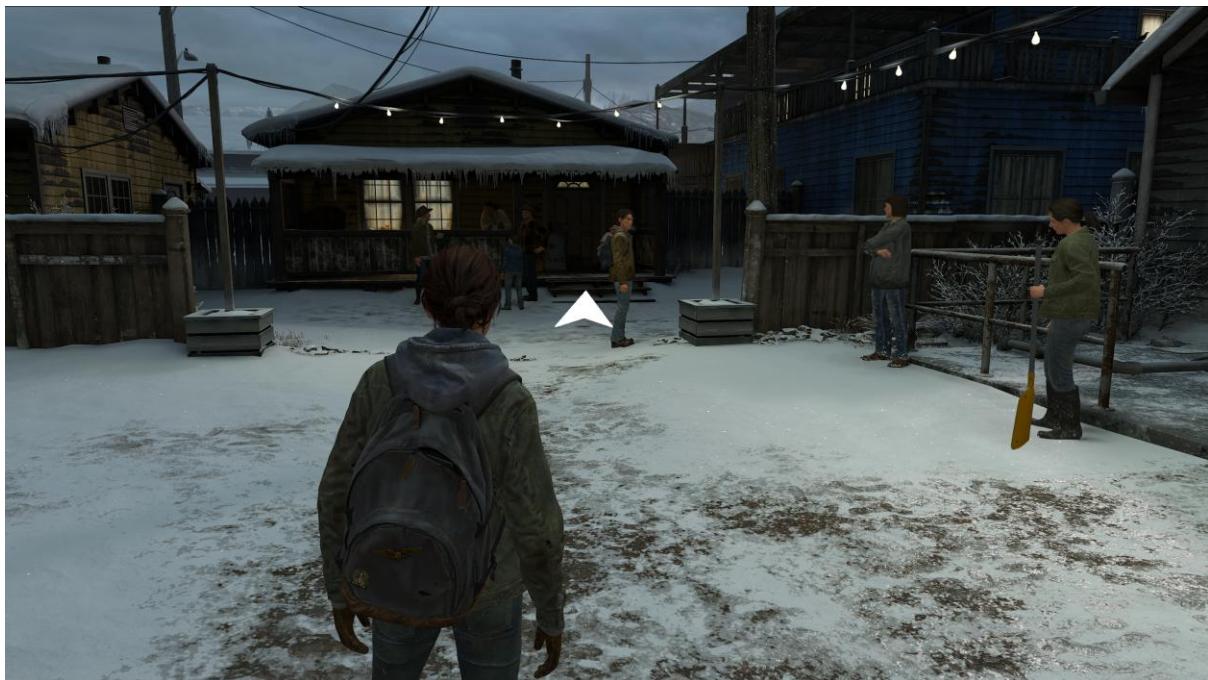


Figure 11: Simplified navigational aids



Figure 12: Highlighted objects for assisted navigation



Figure 13: Pick-ups flash and show button prompts, or they can be set to be picked up automatically

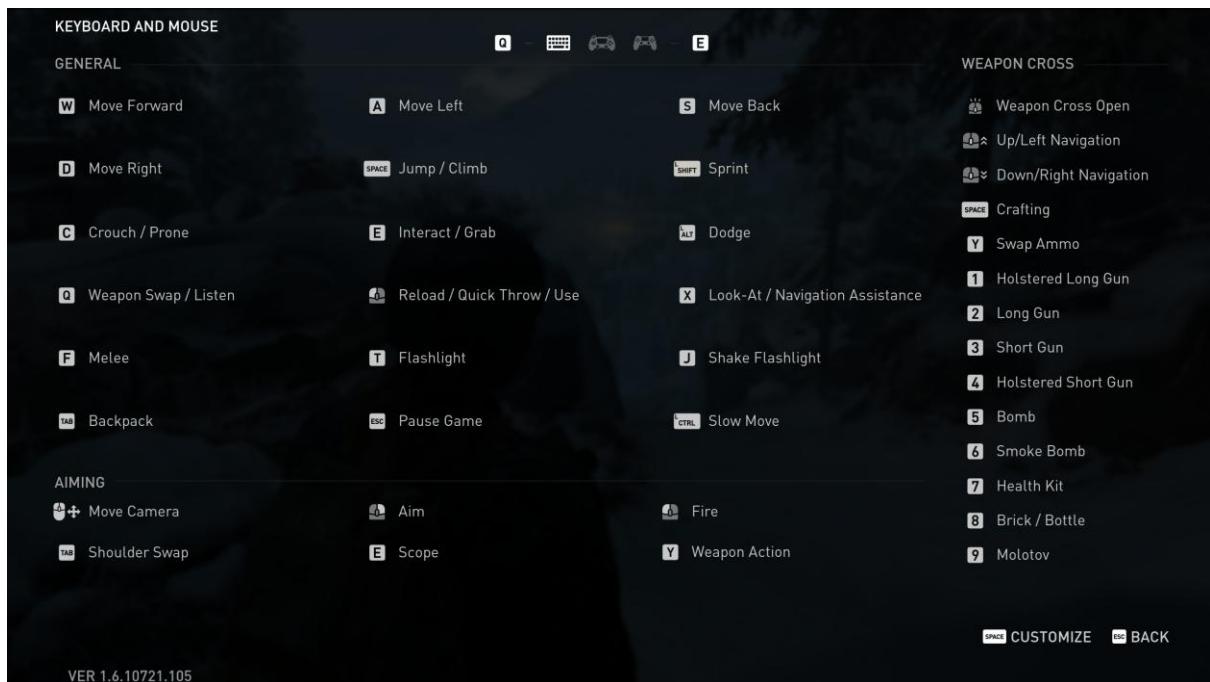


Figure 14: Fully customizable controls for mouse and keyboard

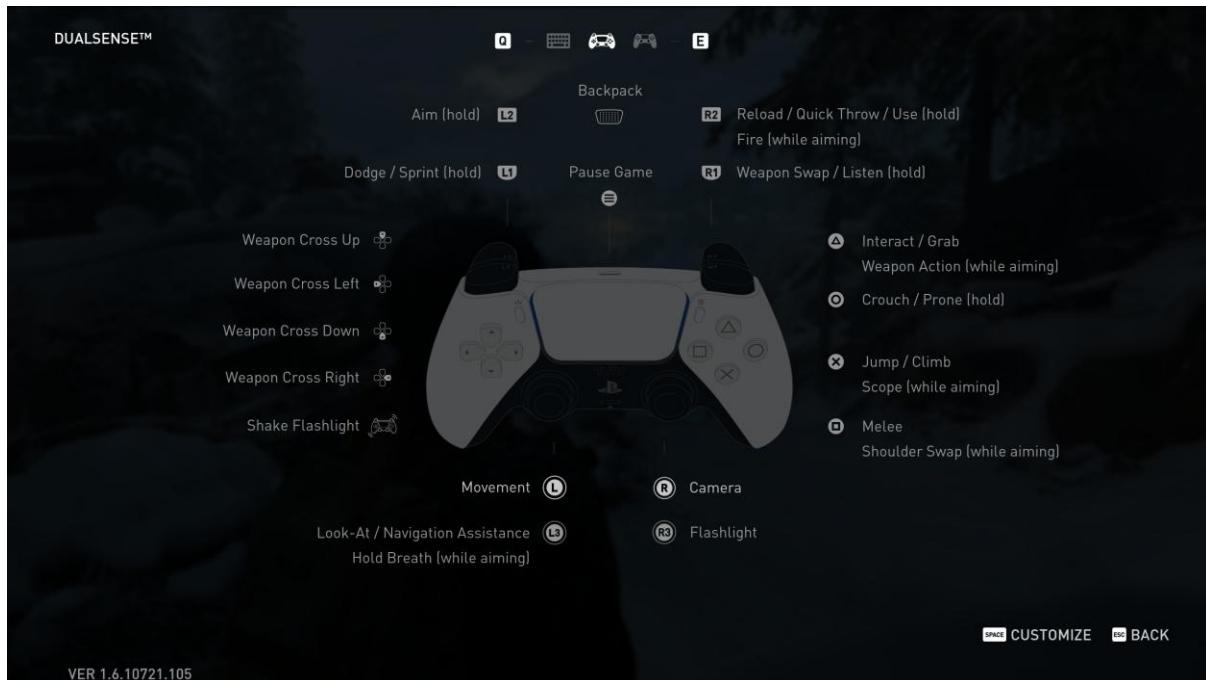


Figure 15: Fully customizable controls for controller (only shows PlayStation controllers, no Xbox or third-party controllers or their inputs/buttons shown in menu)

## 5 – Industry Impact and Critical Reception

Across the accessibility community, *The Last of Us Part II Remastered* has been widely celebrated as a watershed moment. Game Accessibility Nexus (2024) gives the game, an accessibility score of 9.7/10 and notes “no major areas needing improvement”. Access-Ability UK (2024) calls it “one of the most completely accessible AAA experiences to date”. Compared with earlier high-profile titles like *Forza Horizon 5* (2021) and *God of War Ragnarök* (2022), which offered strong options in some areas but did not fully support blind or DHH players, the remaster stands out for its attempt to provide parity of experience across multiple disability categories.

The release of a full-featured PC/Steam version in 2025 is also significant. Console players can lean on first-party hardware support such as Sony’s Access Controller, whereas PC accessibility has often depended on third-party tools and community workarounds. The fact that Naughty Dog’s accessibility systems translated effectively to PC suggests that this style of design is scalable across platforms and can act as a reference model for other studios.

Critics and advocates have also pointed to the cultural impact of the game. By allowing blind and DHH players to share the same emotional beats, plot twists, and tense gameplay sequences as sighted and hearing players, the remaster challenges older assumptions about who games are “for”. It reframes accessibility as an expression of creative empathy rather than a dry technical checklist. This perspective aligns with Larreina-Morales et al. (2024), who argue that inclusive design is increasingly becoming a marker of quality and innovation in contemporary interactive media.

## 6 – Summary

Overall, *The Last of Us Part II Remastered* shows how a major studio can put accessibility frameworks such as GAG, XAG, and APX into practice to create a cohesive, player-centred experience. Its combination of presets, rich audio and visual translations, remappable controls, and thoughtful tutorials stands as an example of best practice for accessible game design in 2025. Crucially, the game goes beyond mere compliance: it aims for equivalence of experience, giving players of different abilities the chance to explore, survive, and emotionally connect with the same narrative world. As such, it has become a key reference point for accessibility researchers and a useful blueprint for developers, including myself, who want to build games that genuinely include everyone.

## Conclusion and Reflection

The aim of this essay was to explore how games can be optimised to meet the diverse accessibility needs of players, and to evaluate how developers can embed inclusive design into their creative and technical practices. Through examining the changing demographics of the global player base, reviewing key accessibility frameworks, and analysing *The Last of Us Part II Remastered* as a case study, it has become clear that accessibility is not a secondary concern but a central part of contemporary game design. The evidence consistently shows that accessibility improves not only the experience of disabled players but also the usability, clarity, and overall quality of games for a much wider audience.

The early sections established that accessibility is a mainstream issue, not a niche one. With up to a third of global players potentially experiencing barriers relating to motor, cognitive, visual, or auditory needs, accessible design directly affects a substantial portion of the gaming community. Moreover, many so-called accessibility features, such as remappable controls, subtitle customisation, scalable interfaces, and alternative input options, are increasingly valued by players without permanent disabilities. This reinforces the idea that accessibility is inherently aligned with good user experience and that the principles which support disabled players tend to benefit everyone.

The examination of frameworks such as the Game Accessibility Guidelines (GAG), the Xbox Accessibility Guidelines (XAG), and the Accessible Player Experiences (APX) model demonstrated that there is now structured, research-informed guidance available to developers. A key insight emerging from this review is that accessibility cannot be solved by adding options late in production. Instead, the most effective results appear when accessibility is considered from the beginning of a project,

influencing early decisions about UI layout, audio mixing, control design, difficulty pacing, and navigation support. The APX model in particular highlights how accessibility and player experience are closely intertwined, encouraging designers to focus on clarity, predictability, and error recovery, principles relevant to all players.

The case study of *The Last of Us Part II Remastered* illustrated what this looks like in practice. Naughty Dog's approach, which integrates presets, full remapping, screen readers, audio descriptions, redundant sensory cues, and flexible difficulty tools, demonstrates a holistic and player-centred understanding of accessibility. Rather than viewing accessibility as an accommodation for a minority of players, the studio treated it as a creative opportunity and a design value. The result is a title in which blind, low-vision, deaf, hard-of-hearing, mobility-impaired, and neurodiverse players are able to engage meaningfully with the story and gameplay. For many reviewers, this represents a benchmark for AAA inclusive design, and the game's reception demonstrates that accessibility and artistic ambition can coexist without compromise.

## Reflection on Practice and Project Development

Engaging with this research has had a direct influence on my own development practice, particularly in relation to my Final Major Project:

[REDACTED] a real-time audio-visualisation plug-in for Unreal Engine and Unity designed to support deaf and hard-of-hearing players. While the project began primarily as a technical exploration, the research undertaken for this essay has reshaped my understanding of what the tool could become and the responsibility that comes with designing for accessibility.

One of the first changes in my thinking is the recognition that clarity must come before stylistic flourishes. Several studies and guidelines emphasise that accessible interfaces rely on legibility, consistency, and predictable behaviour, and this is now informing the design of [REDACTED] visual glyphs. I am placing greater emphasis on shape language, colour redundancy, and contrast modes that account for players with both hearing and visual needs.

Another key influence has been the importance of offering multiple sensory pathways. While [REDACTED] is focused on transforming audio into visual form, the examples seen in *The Last of Us Part II Remastered*, where information is conveyed through a combination of visual prompts, haptics, and audio, have encouraged me to consider haptic cues or screen-edge motion as future expansion options. This reflects the broader principle that accessibility is rarely one-dimensional; players often have intersecting needs.

The literature also reinforced the value of customisation and safe defaults. Naughty Dog's preset system inspired me to plan for several starting configurations, such as "DHH Mode", "Minimal Mode", and "High-Contrast Mode", so users can begin with settings tailored to their needs and then refine them further. This approach echoes the

advanced tier of the GAG framework, which recommends both flexibility and sensible onboarding.

Perhaps the most significant shift in my perspective is the recognition that accessibility is inherently iterative. The most effective solutions arise from playtesting with diverse users, gathering feedback, and refining the design. As such, I intend to schedule iterative testing sessions with players who have varied accessibility requirements. Their insights will be crucial in deciding which visualisation patterns are intuitive and which require adjustment.

Overall, researching accessibility has encouraged me to think of inclusive design not as a limitation but as a creative constraint that can lead to more thoughtful, robust systems. The work of studios like Naughty Dog demonstrates that accessibility can spark new ideas, new UI patterns, and new forms of player engagement. This has motivated me to approach [REDACTED] with a mindset that values empathy, adaptability, and player agency.

## Closing Thoughts

Returning to the original question: How can games be optimised for the diverse needs of gamers? The research suggests a clear conclusion: accessibility must be embedded in the creative process from the outset and maintained as a guiding principle throughout development. The frameworks, case studies, and debates explored in this essay all underline that accessibility is not optional, nor is it merely a set of features. It is a mindset and a commitment to designing for the widest possible range of players.

Reflecting on this has deepened my understanding of my role as a developer. My Final Major Project has evolved from a technical experiment into something with the potential to make a material difference for deaf and hard-of-hearing players. More broadly, this research has shaped how I think about inclusive design across my future work. I expect that the lessons learned here, particularly around empathy, iteration, and user-centred thinking, will continue to influence my professional practice long after this module.

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