When should assistance in Games be emphasised?

GDEV60001 GAMES DEVELOPMENT PROJECT

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Contents

Abstract

This dissertation discusses the impact that visible and invisible assistance mechanics have on player experience, perceived skill, and difficulty in a 3D platformer. In forms such as mechanics-Coyote Time, input buffering, and visual guidance, assistance can either subtly support players or explicitly direct them, which influences engagement, autonomy, and satisfaction.

A literature review identified how assistance has been implemented historically, effects from the perspective of psychology and motivations, and its applicability to various types of players, seeing beyond and differentiating amongst Achievers, Explorers, Socialisers, and Killers, explaining how these types may react to assistance. To study the effects of assistance quantitatively and qualitatively, an artefact of a 3D platform game has been designed and coded in three different versions: No Assistance, Invisible Assistance, and Visible Assistance, which participants play-tested.

The results from the playtest show that Invisible Assistance always positively affected the player experience and perception of skill level. It also ensured that challenge and autonomy were maintained. No Assistance had a similar effect on skilled players but was detrimental for others. Visible Assistance had a smaller effect on the perception of difficulty and cost of failure but was associated with highly polarising results, where some players felt empowered and others felt the game was over-directed and less engaging.

These results indicate that assistance should often be implemented with consideration of player autonomy, competence, and cognitive load. Invisible assistance is more effective for improving responsiveness without reducing perceived achievement, while visible assistance must be optional, situational, and well-balanced for player engagement. This study demonstrates that good assistance mechanics are important for player experiences, not based on the general ease of the game or the problem to be solved, per se, but by the thoughtful consideration of the concept in whole.

Introduction

During development, developers must strike a delicate balance between facilitating player engagement with the mechanics of the game and providing excessive support. Modern games include hidden mechanics designed to make gameplay smoother and more intuitive. These subtly correct player errors, offer extra leniency in timing or aiming, or adjust difficulty behind the scenes through various means. The reason for doing this is simple, to make the player feel skilled and empowered.

However, this raises an integral question: when does player assistance stop enhancing the experience and start detracting from it? It is equally important to consider the circumstances under which these mechanics should remain hidden, and when they should be directly communicated to the player. To elaborate, a clear example of explicit player assistance can be found in the Mario Kart Series, with the Smart Steering feature. This system automatically guides the player's kart away from hazards and prevents them from going off-road, making the experience smoother and less frustrating for new players, especially at higher speeds (Allegra Frank, 2017). Crucially, this mechanic is visible and obvious, the player can see when it is on or off very clearly, as with this feature enabled an antenna is placed on the player's vehicle, and they can make the deliberate choice to disable it.

This transparency is key. By allowing players to turn Steer Assist off, the game creates space for skill expression, allowing players to go off road. Advanced players can take riskier lines, discover off-road shortcuts, and feel greater mastery. The mechanic serves its purpose without patronizing the player. The player would also feel a degree of mastery when they learn how to control their vehicle without the use of Steer Assist. However, this invites an interesting thought experiment: If the game never told

players about Steer Assist, would they still enjoy the experience as much? Would they feel cheated if they later discovered their “clean turns” were partially automated? This is where visibility and trust in design become central. What if the player wanted to take off-road shortcuts, but could not because they were not aware of the Steer Assist?

Contrast that with a hidden form of assistance commonly used in platformers: Coyote Time. This mechanic allows players to jump after stepping off a platform within a limited time window, named after the classic cartoon trope, where the character runs off a cliff, continuing to run and defy character, before realizing he is in mid-air and falling. Despite how common place it is in games, Coyote Time is rarely mentioned in them, yet it dramatically improves how fair and responsive a platformer feels. It makes players believe they just barely made that last jump, when the game was designed to give them a small safety net. The magic of this feature lies in its invisibility. If implemented correctly, the player never notices it. They simply feel skilled and in control. Yet, if the timing window is too long, the illusion breaks. Too short, and it becomes useless.

Steer Assist and Coyote Time serve the same purpose: they make the player feel competent, confident, and capable. Yet they approach that goal in vastly diverse ways. One through transparency, the other through invisibility.

The broader question becomes: When is it better to hide the assistance, and when is it better to show it? Once players realize what is going on, too much invisible help can lead to frustration, they may feel cheated rather than supported and become frustrated trying to increase their skills while trying to work around hidden systems. Too little assistance, however, can alienate newcomers or make a game feel needlessly punishing.

Aims and Objectives

The purpose of this study is to determine a threshold for when assistance should be visible versus when it should be invisible, and how that impacts player satisfaction and skill development.

This will be accomplished by first conducting a literature review, establishing what assistance is, how it has been used in games throughout the years, how it is being used in games now and why, and how assistance effects different players. Additionally, an artefact will be developed to gauge how players react to specific assistance mechanics. This artefact will be in the form of a bare bones 3D platformer, with only simple platforming mechanics. Once this is developed, there will be two additional versions of the artefact developed, one with assistance mechanics included but hidden from the player, and the other with assistance mechanics included but explicitly shown to the player. A playtest will then be conducted, with the player playing through the three versions of the artefact, starting with the one with no assistance mechanics. The second one will be randomised between the versions with invisible or visible assistance, with the third being the one they have not played yet. Afterwards, they will fill out a questionnaire asking them their opinions on the different versions of the artefact, with a mix of quantitative and qualitive questions. My objectives are as follows:

1. Perform an extensive review of literature in this area.
2. Develop and playtest three different versions of a 3D platformer artefact to evaluate how visible and hidden assistance mechanics effect player satisfaction and perceived skill.
3. Evaluate how the visibility of assistance mechanics affects player engagement, skill development, and overall satisfaction.
4. Determine guidelines or thresholds for when assistance mechanics should be visible or hidden to enhance the player experience.

Literature Review

What is assistance?

The Merriam-Webster dictionary (2025) defines assistance as "the act of helping or assisting someone or the help supplied." At its simplest, assistance can be described as the act of providing help or support to someone to help them complete a given task more effectively than they would be able to do so independently. This section will examine how assistance is defined in general contexts before narrowing down to focus on assistance in games, how designers use it, and how it shapes the user's experience.

The context in which assistance is provided, however, can change just what that assistance is significantly. In an educational context, assistance may take the form of scaffolding. Scaffolding is a form of assistance where the teacher provides structured support, guiding learners through specific tasks until they can complete them independently (van de Pol, J., Volman, M. & Beishuizen, J., 2010). A practical example of this would be a math teacher initially solving algebra problems step-by-step with the class, then gradually asking them to complete parts of the problem by themselves, before moving to having solve problems entirely on their own. In healthcare, it may involve physical or technological aids that enable patients to complete tasks that would otherwise be difficult or impossible due to certain ailments (Hughes, A.M., Burridge, J.H., Demain, S.H. et al, 2014). To illustrate, stroke rehabilitation patients often use robotic exoskeletons or assistive devices to help them practice walking or performing certain movements, providing support and guidance as patients regain strength and coordination whilst preventing further injury.

When looking at assistance under the context of game design, this principle of assistance is incredibly broad, including any mechanic, system or feature that supports the player in the exploration of the game's world and its mechanics. This can include the explicit systems one would expect tutorials, checkpoints, difficulty levels. However, as stated earlier in this report, this includes hidden systems that subtly support the player, the most common occurrence being the use of Coyote Time in most platformers.

Assistance in games is not about completely removing this difficulty, but managing and refining it, giving the player the resources to effectively overcome a challenge without impeding on their expectations and skill level. When designed well, the more implicit assistance provides support in a way that allows the player to feel skilled and competent whilst offering meaningful challenges. For example, the aforementioned Coyote Time, as well as aim assist in shooters are a prime example of this, giving the player subtle support that prevents minor errors or disadvantages gained from how they are playing the game, such as with a controller as opposed to keyboard and mouse, from becoming failures, keeping the flow of the game smooth and enjoyable (Schell, J., 2019).

There are many mechanics included in games to assist the player, even if they may not realise it. For example, Coyote Time is a mechanic included within platformers to help the player make last minute jumps by still allowing them to jump within a limited time period after leaving any given platform, (Fasterholdt, M., Pichlmair M., 2016), even if this time window is as miniscule as 0.08 seconds This improves responsiveness and mitigates frustration from narrowly missing a jump.

Similarly, Aim Assist is a mechanic included within shooter games that help the player make their shots. This is done through a few techniques: Bullet Magnetism, where bullets "bend" towards the closest target within a specific range. Target Lock, where the crosshairs, a reticle on the screen showing where you are aiming, of the player move automatically to the closest target, often on a critical area, such as the head, once within a specific range. Area Cursor, which makes the hitbox of a target wider. Sticky Targets, working by having the crosshair stick to a target once within a specific range. Target Gravity, making it so that the player's crosshair is subtly "pulled" towards any given target, making it easier to aim at the target than it is than aiming away from it (Vicencio-Moriera, R., Mandryk, R., Gutwin, C., Bateman, S., 2014.) This is only enabled for players using controller to level

the playing field with players using a mouse and keyboard, as they often have a greater advantage over controller users (Bratu, C., 2023).

Navigation aids also function as assistance mechanics. For example, minimaps are a common assistance mechanic found in many games, placing a small map, typically in the corner of the screen, providing the player a condensed, real-time view of their surroundings, aiding in navigation and awareness of what is in the player's surroundings. Designers often will also incorporate map indicators on these, such as icons for items or enemies, to give the player further information on what is in these surroundings. Objective markers are another assistance mechanic made to aid a player's navigation. These are markers, typically overlaying the player's UI guiding the player towards their current goals, preventing them from getting lost and preventing unwanted aimless wandering. (Zagata, K., Medyńska-Gulij, B. 2023).

MDA: A Formal approach to Game Design and Game Research (Hunicke, R., leblanc, M., Zubek, R. 2004) notes that player experience is shaped how mechanics, dynamics, and aesthetics interweave, and in this case, assistance can be understood as a mechanic that influences these dynamics to sustain engagement and enjoyment. Art of Game Design (Schell, J., 2019) talks about balancing this assistance; if something is too easy, a player is likely to seek out a different activity that is more rewarding, and if something is too difficult and frustrating, the player is once again likely to seek out a different activity that is more achievable and rewarding.

Whilst assistance in games is often framed as something that provides support to players so they can overcome challenges, some papers suggest that the effectiveness of the support depends on the alignment between game mechanics, rewards, and player motivation. Game Mechanic Alignment Theory (Green, M. C., Khalifa, A., Bontrager, P., Canaan, R., & Togelius, J., 2021), is a framework that proposes mapping mechanics along two axes: the Systemic axes, which ranges from Systemic Penalties to Systemic Rewards, and the Agential axes, which ranges from Agential Disincentives to Agential Incentives. The mechanic is plotted along the axis from Systemic Penalties to Systemic rewards, where the game punishes or rewards the player, and on the Agential Disincentives to Agential Incentives, for whether the player wants that reward. By plotting mechanics using this axis, designers can evaluate whether any given mechanic is aligned, meaning that it supports the intended outcome and is likely to be used by players, or misaligned, where the systemic incentives and player motivations are in conflict.

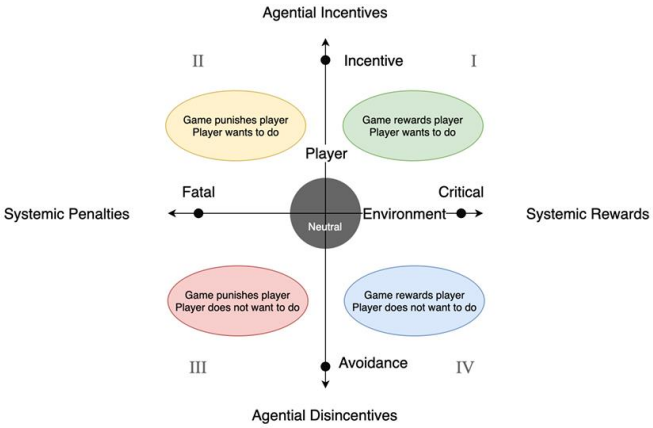

Figure 1 - Game Mechanic Alignment Axis

In the figure above, you can see the axis that the Game Mechanic Alignment theory proposes, with one axis being Systemic Rewards vs Penalties where the game either punishes or rewards the player, and the other being Agential Incentives vs Agential Disincentives, where the player either wants it or does not.

This framework offers a lens through which we can look at assistance to help us understand how effective they are for the player. For example, Coyote Time or Aim Assist would be considered highly aligned, as they provide systemic benefits, helping mitigate any minor errors from the player whilst matching the player's motivation: jumping off the platform, or shooting the enemy. On the opposite end, poorly communicated or counterintuitive assistance may be misaligned. For example, overly descriptive tutorials or intrusive hints that take away from the player experimenting with the game's mechanics, whilst providing systemic benefits by helping the player figure out the game's mechanics, may fall on the Agential Disincentive axes, as it intrudes on the player finding out the solution to a puzzle themselves. There may also be times where aligned assistance mechanics become misaligned, stopping the player from doing something they may want to. For example, whilst the Steering Assist mechanic is aligned, correcting the player's driving to stop them from going offroad, there may be instances where it becomes misaligned when the player intentionally tries to go offroad, perhaps to take a shortcut, but stops them from doing so, potentially leading to frustration or disengagement.

This framework helps designs move beyond the simple notion of helping players whilst designing assistance by conceptualizing assistance in terms of mechanic alignment. They can instead evaluate how assistance aligns with the player's goals and system incentives, identifying where support enhances player engagement and where it may undermine the intended experience or detract from a player's actions. This complements other frameworks by providing a player-centric approach, emphasizing that effective mechanics (and assistance) depends not only on what the system can do, but how the players perceive, value, and interact with these systems.

Ultimately, understanding assistance, which refers to any form of help that enables someone to do a task more effectively, can be difficult just to how broad it can be. In games, this encompasses many things: tutorials, checkpoints, minimaps, aim assist, etc. Some shape player experience by smoothing over small errors from player input and some influence the games' dynamics and aesthetics. Assistance requires a delicate balance, too much can make a game trivial and not fun, and too little leads to frustration.

Assistance through the years

Throughout the years, the way games are designed has changed, with more focus being put on making the player feel skilled and empowered. As game developers experimented and more games came out, certain mechanics and design choices became the gold standard. The same goes for assistance in games. This section is going to delve into the history of Assistance in Games, looking at early implementations within games, as well as outside of games, comparing how it was implemented then to how such assistance is implemented today.

In the early era of gaming, assistance inside games was often implicit, often due to hardware limitations. The first level of Super Mario Bros, World 1-1 is widely regarded as one of the most famous and iconic levels in video game history and has been widely referenced. Designed by Shigeru Miyamoto, the level itself functions as an implicit tutorial, as was common within the openings of other NES games made at the time, forcing players to explore the game mechanics by themselves before they could advance. For instance, players very quickly encounter an enemy - a dangerous Goomba, only able to get past this enemy by employing a key mechanic before they can advance: jumping. Otherwise, they touch the Goomba and get sent back a short distance before being given the chance to try again. Additional mechanics, such as enemy behaviour and how they interact with the game world, are introduced throughout the remainder of the level through gameplay rather than tutorials explicitly telling them how it works. This approach allows players to experiment and explore at their own pace, fostering a sense of skill development and discovery, as success is achieved through playing the game and understanding the rules of it, rather than being outright told. This improves their experience, making the level fun for both experienced players and inexperienced players (Cao, S., Liu, F. 2022).

Before the widespread use of in-game tutorials, game manuals were the biggest form of explicit assistance for players. These manuals were often an essential tool to understand how a game worked, conveying the rules, controls, and objectives of a game, offering essential information for the player to navigate a game's various challenges. Alongside game manuals, players would often rely on strategy guides as a form of explicit assistance. These strategy guides, which were made by outside companies, were much more in-depth than manuals, providing detailed explanations of game systems, enemy behaviours, level layouts, secrets within those levels, and optimal strategies for beating the game's challenges.

Figure 2 - A page from bradygames' Kingdom Hearts Strategy Guide, showing how to navigate the Monstro Level

A prominent example of this can be seen in Kingdom Hearts, released in 2002. In Kingdom Hearts, certain levels are notoriously maze-like, with players having to navigate a series of twisting passages whilst fighting enemies and avoiding hazards, with no knowledge on where the current goal is and how to get to it. Even when the game provides implicit assistance for this, such as in the Monstro level, where passages that lead the player to the current goal will flash green, the game calls no attention to this or implies that it is the way to the current goal. As a result, players may struggle to locate objectives or understand the sequence of objectives to advance. As seen in the figure above, showing a page from bradygames' Kingdom Hearts strategy guide, helping the player navigate the Monstro level, strategy Guides for Kingdom Hearts alleviated this, offering detailed step-by-step instructions, maps, and advice for dealing with difficult enemies or bosses, and directed players throughout the difficult-to-navigate Monstro level. In the pre-internet era, this ensured that players could still experience the gameplay and story without becoming frustrated by obscure design decisions (Burghardt, M., Tiepmar, J., 2021)

Unlike modern integrated tutorials, these manuals and strategy guides were external; players had to proactively consult them, creating a more self-directed learning process, only engaging with the assistance when they wanted to. This also encouraged players to share tips and strategies with friends or online forums, creating a sense of community and collaboration with other players.

The transition from 2D to 3D gaming introduced new challenges from the addition of an extra axis. As environments became more open and complex, simple level design could no longer guide the player. This led to the standardization of navigational assistance, with Grand Theft Auto III popularizing the mini map, allowing the player to easily navigate a 3D city without having to memorise street layouts. Minimaps are now commonplace in games, helping players orient themselves and plan their movement throughout the game world (Zagata, K., Medyńska-Gulij, B. 2023). Assassin's Creed introduced the "Viewpoint" mechanic which explicitly revealed points of interest in the surrounding area on the map as map indicators, removing the ambiguity of exploration and guiding players towards fun activities in the area. This mechanic is a gold standard in many open world games nowadays, having been nicknamed by gamers to be the "Ubisoft Tower." These mechanics are useful, but directly explicit. They help guide players to the fun parts of the game and mitigate any frustration that may arise from navigating the world in a 3D space but take away from the fun of discovering these things without any assistance, especially in the case of the viewpoint mechanic, whilst Minimaps may actually hinder players from developing deeper spatial knowledge of the game world (Khan, N., Rahman, A., 2017).

Simultaneously, hidden assistance mechanics were starting to be implemented in games. The release of Halo: Combat Evolved in 2001 implemented Aim Assist. Whilst existing in games before its release, it was implemented in such a way that it became the gold standard in the industry. Unlike the visible minimaps and map indicators, this assistance was designed to be felt but not noticed or seen. It allowed players to feel skilled, like a spartan super soldier, attributing the success to their own actions and not the game's interference.

Where Assistance is used & why

In the modern day, whilst there not being a specific standard for how to implement it, assistance in games has become more common and conventional. One of the reasons for this becoming so widespread is due to the increasing mechanical complexity of games. Many games are so ambitious, presenting players with expansive worlds, layered systems, and multiple concurrent objectives. Assistance mechanics have become integral to implement, as to not have players experience confusion, cognitive overload or interruptions to immersion or flow.

This fact is supported by several studies proving that humans draw upon a lot of prior knowledge to effectively navigate or learn the rules of new games. For instance, Dubey et al. (2018) have demonstrated such that when video games are modified in a way that things such as object recognizability or visual consistency, players' performance degrades significantly, and sometimes completion times increase manifold. Such findings evidence that human capability for playing complicated games relies heavily on several standard visual, spatial, and conceptual things they have grown used to through playing the game, rather than on pure reflexes or trial-and-error procedures.

Many games nowadays operate within long-term engagement models such as open-world exploration, progression-based systems, and live-service models, where a player may drop out early due to the complexity of the games' systems. From a design perspective, this early loss of a player is significant. Assistance helps maintain interest in the early game by supporting players as they learn. A recent example of this comes from Epic Games' Fortnite, which has been criticised for the large skill gap created from its building mechanic, where the player can place a wall, ramp, roof, or floor. Whilst this already comes with some assistance, such as grid-based snapping, mastering this system is complex and is overwhelming early on, with the player having to memorise four different buttons to select each piece. Further complicating this mechanic is the edit feature, which allows the player to modify their builds using a 3x3 grid and change the shape of the piece depending on the shape they drew, changing a wall to have a door or window, a floor to have a hole, a roof to have one of its corners raised. Having to remember all this can be frustrating and lead to cognitive overload, having to

remember the placement of the button for the piece they want to place, the placement for the edit button and all the various edits they can make to the piece, all amid a fast-paced battle royale scenario. This creates a substantial skill-gap, with experienced players being able to easily overpower newcomers. This can lead to the player either quitting the game or switching to a mode without building in it, which, whilst it keeps the player's attention, leads to the player not engaging with this mechanic and not developing proficiency with one of the game's defining mechanics.

Recently, Fortnite has introduced two assistance mechanics to help with this: Simple Build and Simple Edit. Simple Edit simplifies editing to modifying the piece based on where the player is looking at on the piece when activating edit. For example, if the player is looking at the middle of a wall, it will edit to have a window, or if looking at the top corner of a wall, it will edit the wall to remove that corner. This reduces the complexity, with the player not having to memorise all the different shapes and reduces the number of button presses needed to edit, with the simple edit mechanic no longer needing a confirmation button as the player is not drawing any sort of shape to edit it. This mechanic is also a toggleable feature, with the more complex version of editing being able to access, which gives the player more control over the edits but does not create a massive skill gap. This allows players who are already familiar with editing to keep doing it how they like, and for new players to slowly develop their skill with it, once they are comfortable with the Simple Edit, they can either continue using it or further develop their skill by disabling Simple Edit.

Simple Build is much simpler, with building now being reduced from four buttons to two buttons. One button for placing a wall, and the other placing a floor, ramp, or roof, depending on where the player is looking when the button is pressed. A floor being placed if looking straight, a ramp being placed if looking slightly up or down, and a roof being placed if looking fully up. This reduces the amount of button presses needed to engage with the mechanic. Much like Simple Edit, Simple Build is a toggleable feature, allowing players to access the more complex version and have more control over the pieces they build, satisfying experienced players and allowing new players to once again develop their skill with the mechanic when they feel comfortable.

The risk of inexperienced players becoming overwhelmed can be mediated as game complexity increases by incorporating adaptive or supportive mechanics that scaffold gameplay. Adaptive scaffolding is shown to offer improvements in performance, regulation of cognitive load, and enhanced engagement in educational or serious games, and thus also in entertainment games. For example, a 2024 randomized controlled trial found that dynamically adapting support based on players' interaction data improved both learning outcomes and subjective experience in a game-based training environment. (Faber, T.J.E., Dankbaar, M.E.W., van den Broek, W.W. et al., 2024.)

Outside of implementing assistance mechanics to aid all players, the implementation of accessibility features has made it so that people who may have had difficulty playing games before due to certain disabilities, such as vision, hearing, or motor disabilities. These are mechanics implemented to assist players in complete a given task than they would have been able to do so independently, fitting the definition of an assistance mechanic. The Last of Us Part 2 by Naughty Dog implemented a wide range of accessibility features, offering:

- Control and Input Customization
    - Players can fully remap all commands, adjust hold and tap inputs. Additionally, they can use alternate control schemes to accommodate different physical abilities.
- Camera & Targeting Assistance
    - Camera assist, lock-on aim, and arc-throw lock-on help players aim and orient the camera, with adjustable strength and targeting options to match skill levels and preferences.
- Automatic Gameplay Support

    - Features such as auto weapon swap and auto pick-up reduce the need for rapid inputs or multitasking, simplifying resource management in combat scenarios.
- Visual Adjustments
    - HUD scale, colour customization, high contrast display, screen magnifier, and text-to-speech options allow players with visual impairments to access in-game information more effectively.
- Navigation & Traversal Assistance
    - Enhanced listen mode, traversal assistance, ledge guard, infinite breath, and puzzle-skipping options help players navigate the game world and avoid unintended obstacles.
- Combat Assistance & Difficulty Tweaks
    - Options to reduce enemy accuracy or perception, enable slow motion while aiming, improve dodging, and provide invisibility while prone make combat more manageable for a range of abilities.
- Audio Cues & Vibration Feedback
    - Audio cues for combat and traversal, prompting different cues for various combat and traversal elements. Additionally has vibration feedback for hard-of-hearing.

These examples are a broad summary; The Last of Us Part 2 has 92 different accessibility features, allowing players to customise how the game plays to their liking, even using some of the accessibility features if they are not disabled, but for the use it provides, such as making collecting things easier. This illustrates the breadth of assistance mechanics available in modern games, showing how thoughtful design can make complex gameplay accessible to a wide audience without compromising the player experience.

Another prominent example of overt assistance comes from Nintendo's Super Mario 3D Land, released in 2011. Mario 3D Land has the Golden Leaf, a power-up that only appears after the player dies in a specific section of a level five consecutive times. Upon appearing, the player can collect this power-up to gain permanent invincibility and a glide for the remainder of the level. Because the assistance is tied to repeated failure, skilled players are never exposed to this, ensuring that the intended challenge remains for those who do not need the help. Furthermore, for those who do keep failing a specific section, the Golden Leaf is a power-up that must be activated by hitting a block and then collecting the leaf that comes out of it. The player must make the decision to activate the assistance. This preserves player agency, as they can easily choose to ignore the power-up and continue attempting the level with their own skill.

Contrastingly, Nintendo's New Super Mario Bros Wii, released in 2009, has the Super Guide feature. While the Golden Leaf assists the player with overcoming difficult obstacles, the Super Guide, which appears after eight consecutive deaths, allows an AI-controlled character to complete the level for the player. Whilst it still respects player agency by acting as an opt-in feature, the Super Guide completely erases any sense of challenge, moving from Visible Assistance into the realm of Gameplay Automation; a total surrender of player agency.

More recently, the emerging research on game accessibility has put a finer point on the need for game design that accommodates a great diversity of cognitive, sensory, and motor differences. For example, a recent literature review of cognitive accessibility in video games argues that interactive media place greater demands on cognition than passive media, which increases the importance of various accessibility features, such as simplified controls, flexible input options, and clear, easy-to-follow UI, for inclusivity. (Oliva-Zamora, M.Á., Mangiron, C., 2025)

An example of this comes from Dynamic Difficulty Adjustment, a sophisticated and often controversial form of assistance in modern games. Emerging research notes that player ability is not a fixed trait and instead is a fluid characteristic that fluctuates based on the situation and challenge presented to

the player. Dynamic Difficulty Adjustment systems address this by algorithmically modifying game parameters, such as enemy health, damage output, or resource drop rates in real-time, based on the player's performance. As Hunicke (2005) argues, the technical case for Dynamic Difficulty Adjustment is centred on maintaining the flow of a game. By subtly lowering the difficulty when a player struggles, making enemies' slightly easier to kill or giving them just the thing they need, frustration is prevented. Conversely, when a player is excelling, the difficulty can be adjusted, preventing a player from clearing a challenge too easily and preventing boredom. However, this implementation raises significant questions regarding player agency.

The primary tension lies in whether secret interference undermines the legitimacy of a player's success. If a player is struggling, dying to a boss multiple times, and DDA kicks in, would the player perceive this victory as unearned if they knew about it? Looking at DDA through the lens of Game Mechanic Alignment theory, it sits in a precarious position. While providing a Systemic Reward by allowing the player to progress, if the player values mastery over success it can become an Agential Disincentive. The magic of assistance often relies on its invisibility, making players believe they are more skilled than they truly are. DDA, however operates on a much larger scale than a simple timing window. When a DDA system makes a deliberate choice to alter the core challenge of the game without the player's consent, it risks becoming patronizing. Some developers argue that DDA should be an optional toggle or a disclosed feature. This preserves the player's autonomy, allowing them to choose between a pure challenge, or a dynamically assisted experience that ensures they can finish the story without much, or too little, difficulty.

Assistance for Different Players

While assistance mechanics are often discussed in general terms, their function and effectiveness changes drastically depending on who is interacting with the game. Individual players are unique in their goals, expectations, skill levels, cognitive capabilities, and emotional states with which they enter the play experience. As such, the question is not whether assistance is good or bad overall, but rather for whom does a given kind of assistance augment or detract from the experience. Being able to understand this variation is key to determining when assistance should be visible, where and when it should remain obscure, and when it should be configurable or entirely discretionary.

One of the most cited approaches to classifying player motivations is Bartle's (1996) taxonomy of player types: Achievers, Explorers, Socialisers, and Killers. Even in the modern day, the basic idea that players have different preferences regarding rewards and valuation of experiences is still helpful for modern game design analysis. Note that these are not categorically inflexible groups but mere tendencies or preferences representing the ways players may react to various aid mechanisms.

Achievers

Achievers are motivated by measurable progress, mastery, and optimization. They love improving at something, conquering challenges, and attaining efficiency. For them, assistance is a double-edged sword. Mechanisms like Coyote Time or input buffering usually fit well with Achiever motivations since they facilitate precision without undermining the sense of mastery, as players still attribute success to their own skill, even when the game has softened the edges of failure.

However, assistance that visibly interferes with challenge-such as overly prescriptive tutorials, automatic traversal features, or aggressive aim assist-can conflict with an Achiever's desire to earn competence; in Game Mechanic Alignment terms, this places the mechanic into systemic reward but agential disincentive. Achievers may feel that visible help reduces the legitimacy of their accomplishments. Many games address this through optional toggles or settings that let players opt out of visible support, preserving challenge while still enabling accessibility for others. The inclusion of visible indicators, such as the Smart Steering antenna in Mario Kart, also helps maintain transparency by signalling when assistance is active, protecting the sense of fairness central to Achiever motivation.

Explorers

Explorers value curiosity, discovery, and experimentation. They prefer mechanics that expand their agency or that encourage playful interaction with systems. For these players, certain forms of assistance, especially those which reveal too much, can remove mystery, reduce satisfaction, and collapse the sense of discovery that drives their engagement.

Explicit navigation like objective markers, icon-filled minimaps, or waypoint arrows can accidentally fast-track exploration, guiding players down an optimal path when they might otherwise find their own way into the world. For Explorers, hidden help is often better. Subtle systems, such as slightly exaggerated geometry for climbable surfaces, or enemy telegraphing that subtly supports player learning can enable exploration without dictating its terms.

The challenge for designers, then, is to fashion optional or tunable systems that assist free-roaming players without dazzling those who like a little more guidance.

Socialisers

Socialisers engage most deeply with games that foster cooperation, communication, or communal experiences. Assistance for these players operates on both individual and social levels. On the individual side, accessible and supportive systems ensure that Socialisers with varying skill levels can participate together. Visible assistance, especially in cooperative games, is often far more acceptable and even beneficial, since it allows for group play and reduces disparities between players. Features such as shared quest tracking, simplified movement mechanics, or automatic item sharing minimize friction and keep the group aligned.

Hidden assistance can also improve the social dynamic by subtly smoothing out the experience without drawing a spotlight to ability gaps. For example, the Left 4 Dead AI director adjusts the pacing, enemy spawns, and item placement dependant on how the team is performing. If a group struggles, it reduces enemy numbers or provides more health packs; if the team is performing well, it takes that away, increasing enemy numbers and not providing as many health packs.

Killers

Killers emphasize dominating the other players, and this makes assistance especially sensitive. In competitive contexts, assistance, especially visible assistance, becomes strongly intertwined with perceptions of fairness. Poorly tuned or misunderstood hidden aim assist can create mistrust between input groups, but being open about the use of such assistance can preserve fairness but risks stigmatizing certain players.

Competitive aid thus needs careful calibration by designers around the axes of fairness, transparency, and differences between platforms. Fortnite's recent addition of Simple Build and Simple Edit illustrates one such modern attitude: providing inexperienced players with tools that simplify high-skill mechanics while retaining an option to master those skills. Because these are optional and do not strictly outperform traditional methods, they retain competitive integrity while still supporting player learning.

While Bartle's taxonomy is useful to conceptualise motivation, it does not consider other important variations, such as prior experience, capacity for cognitive load, motor skills, and/or sensory limitations. Recent research on accessibility has underlined the fact that ability is not a fixed but a fluid characteristic in a continuum across different people and situations (Hunicke, R., 2005). The function of assistive mechanics thus varies according to the needs of a player:

- Novices benefit from visible instructions, simplified controls, and adaptive scaffolding that help them achieve early success and build confidence.
- Expert players often favour hidden guidance that supports flow without overt interference.

- Gamers with cognitive or sensory differences benefit from in-game, explicit, granular options like visual contrast modes and simplified UI layouts can help.
- Players with motor impairments may require remappable controls, input forgiveness, or automatic traversal features.

This is a variation that underscores a particularly critical point: help is seldom one-size-fits-all. Today, designers strive for personalisation, the ability of players to adapt the degree of help to their own needs and wishes. Games such as The Last of Us Part II show how this is done: by providing various tunable assistance mechanics, it is possible to support players whatever their motivation or ability.

Another critical aspect to consider is the emotional resonance that occurs with players receiving assistance. Some find that explicit aid is encouraging and bolstering, yet others may find it patronizing or objectionable. Hidden assistance preserves a sense of immersion and agency but, when later revealed to the player, may give way to feelings of betrayal or lessened accomplishment.

Thus, emotional design considerations revolve around:

- Esteem
    - Does the player feel confident that their performance rests within their control?
- Autonomy
    - Does the assistance respect their control?
- Competence
    - Does this make them feel skilled, not carried?
- Relatedness
    - In multiplayer, does it help them participate without stigma?

These psychological needs resonate with Self-Determination Theory (Ryan, R. M., Deci, E. L., 2000) supporting the notion that help should support autonomy and competence to elevate player satisfaction. Assistance for different players is then a matter not of a single design but of flexible, transparent, and aligned systems that reward diverse motivations and competencies.

Research Methodologies

Since the nature of the study benefits from both objective data and subjective interpretation, this research will employ methods to collect quantitative and qualitive data. The feedback form from the artefact playtest with answers on a numerical scale will collect the quantitative data will show quantifiable trends in players' perceptions of skill, difficulty, and enjoyment across the three versions of the artefact. At the same time, open-ended questions in the same feedback form will result in qualitative data that will give a deeper understanding of why the player felt a particular way for each version of the artefact. This will enable the investigation of perceptions, feelings, and preferences of the artefact that cannot be fully captured by numerical scores alone.

Convenience sampling will be used to recruit participants as it makes no difference who plays through the versions of the artefact and completes the feedback form. This will include people with a variety of experiences and backgrounds, including peers and university students. 10-20 participants will be the target sample size. This is not a cap, though, and it would be welcomed if more than twenty volunteers could be recruited, as this would expand the study's findings.

The primary material used in this research will be the artefact; a 3D platformer specifically designed for the purpose, created with the popular game engine Unity. A selection of the game engine for this specific solution will be discussed further. The artefact will be the primary source of experimentation. A well-controlled environment for isolating the effects of different types of assistance on players. Although the engine of choice for this study, the artefact could theoretically be created using another engine, such as Unreal Engine or Godot, without impairing the experience, physics, or associated

mechanics. As indicated, this goes to show that the focus of this study is the relation of the players' perception and how they interact with the assistance mechanics.

Three distinct versions of the artefact will be developed to compare player experiences under different levels of assistance:

- Version 1 - No Assistance
    - This is the most basic version of the artefact, only including basic platforming mechanics, such as moving the character and jumping. There is no type of assistance offered. Players must completely depend on their skills and knowledge.
- Version 2 - Hidden Assistance
    - The changes in this version include the addition of invisible assistance mechanics, such as Input Buffering and Coyote Time. These mechanics are intended to enhance skill expression and player confidence without altering the perceived difficulty.
- Version 3 - Visible Assistance
    - This version consists of the same assistance mechanics as Version 2, with the addition of others that are explicitly visible to the user. The new mechanics that may be part of this version include the addition of an objective marker, landing indicators, and a safety net. This version is meant to investigate the effects of the explicitly visible support on user perceptions of skill, fun, and difficulty.

Participants will play all three versions of the artefact, with each participant playing versions in a different order. The participant will not be aware of the differences between each version. These sessions will require a computer with a keyboard and mouse or controller and will take place in a quiet environment to ensure consistency. These sessions do not need to take place on campus and can be done anywhere.

After finishing all three versions of the artefact, users will fill out a questionnaire that is meant to get both quantitative and qualitative feedback. This questionnaire was developed partially based on the Game Experience Questionnaire (Ijsselsteijn, W. A., de Kort, Y. A. W., & Poels, K, 2013). It asks each participant's perceived skill, enjoyment, and difficulty for each version of the artefact on a scale from 1-10. After each number rating, there is an open-ended question that asks participants to describe why they felt that way, collecting a mix of qualitative and quantitative data. This approach allows the study to quantify the differences in player perception and provide detailed explanations on the quantitative data, capturing nuances that data would miss.

Ethical considerations are also central to this study. To protect any participants involved, all participants will be provided with an information sheet and consent form before the study begins. The information sheet will explain the purpose of the study, what participation entails, their rights, the risks or benefits of taking part, how their data will be processed, how to withdraw from the study and what will happen to the results of the study. Participation will be voluntary, and individuals may withdraw at any time without providing a reason. No personally identifiable information will be collected, and all data will be stored securely and anonymised during analysis and reporting.

Results and Analysis

This section will dive into the results and findings of the questionnaire discussed in the "Research and Methodologies" section, overviewing the findings of the playtest, before diving into a discussion. As the questionnaire is comprised of 3 sets of 6 repetitive questions, asking each player how they found each version of the playtest from a scale of 1-10 in terms of how much fun they had, how difficult they found it, and how skilful they felt. On this scale 1 means they did not feel skilful, did not have fun, and found it easy, with 10 meaning they felt very skilful, had a lot of fun, and found it very hard respectively. The data is compiled here in graphs, but the raw data can be found in Appendix 2. The questionnaire itself can be found in Appendix 1.

Player Skill Perception

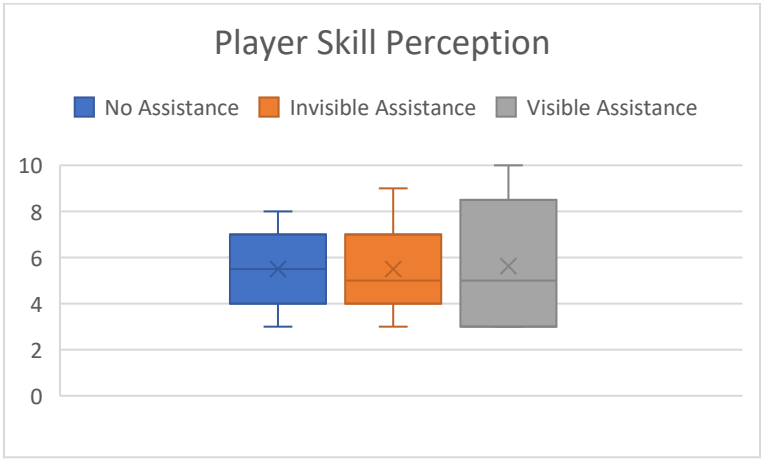

Figure 3 – A Box and Whisker graph summarizing the Skill Perception for each version of the artefact, showing the centre, spread and outliers.

Overview of Results for Skill Perception

As seen above in Figure 3, participants perceived skill ratings across all three versions of the artefact were similar. Marked by a cross in the graph, No Assistance and Invisible Assistance had the same average perceived score of 5.5, with Visible Assistance having a slightly higher average score of 5.63. The distribution of scores shows a similar trend, with No Assistance and Invisible Assistance showing the same range of scores, from 4 to 7. Visible Assistance, however, showed a wider spread, ranging from 3 to 8.5, with a single outlier scoring the maximum value of 10.

Discussion

Qualitative responses showed that lower skill ratings in the No Assistance version were due to difficulties in movement control, particularly with the jump. Additionally, some players found navigation unclear, leading to backtracking. Some players also stated issues with camera control, overall making the artefact feel awkward to player. Those who gave higher skill ratings cited that it was rewarding to figure out how the platforming functioned with the weight of the character and that the lack of direction made them feel like they had to find the goal on their own, generally enjoying the satisfaction of overcoming challenges independently.

In the version of the artefact with Invisible Assistance, participants commonly described improved skill perception, citing the improved jump control making the artefact more enjoyable to play and giving a greater sense of skill expression, needing more precise actuation of the space bar, making them feel more capable. However, a few participants reported feeling less skilled, referencing that the increased

control reduced the challenge slightly as in the version with No Assistance, they had to commit to a jump whenever they pressed space, with one player saying “

Much of the difference in perception of skill between the version of the artefact with No Assistance and Invisible Assistance comes from the jump control: the No Assistance version introduces much improved jump control, with Input Buffering, where if the player attempts to jump again before they hit the ground, the input is stored for a short time, and if they hit the ground during this time, the player will automatically jump again. Coyote Time, where the player is allowed to jump for a short amount of time after falling or walking off a platform. Anti-Gravity Apex and Speedy Apex, where at the apex of a player’s jump – the highest point – gravity is temporarily reduced and the player’s speed is increased. Clamp Fall Speed, where the fall speed has a max speed, allowing players to easier control their character when falling. Early Fall, where the player can start falling earlier in a jump by letting go of the jump button. Whilst most of the responses describe the improved jump control, most of them don’t describe or take note of these individual mechanics, except for Early Fall, with one player going into depth describing how much more skilful it made them feel. This aligns with Fasterholdt and Pichlmair’s (2016) discussion of Coyote Time as an invisible assistance mechanic that enhances perceived fairness, as although players reported the improved jump control, they often described Early Fall as the reason for why, rarely identifying the other mechanics that improved the jump control. This suggests that the illusion of mastery was preserved, despite the many lines of code that went into improving the jump.

For the artefact with Visible Assistance, participants who reported lower skill perception all described the presence of explicit visual guidance made them feel overly directed, always being shown where they should go and where the danger was. One participant stated that they felt that all they had to do to win was follow the visual indicators. However, those who felt more skilful tended to give much higher scores than the other versions, the participants citing that the landing indicator and hazard visibility made them feel more confident when completing jumps. Visible Assistance was a much more polarizing experience in terms of player’s skill perception: players either felt much more skilled, giving high ratings and higher praises, or giving lower ratings and harsher criticism.

To summarize, perceived skill ratings were similar across all versions. No Assistance was generally rated as the most difficult version, with a lack of control and unclear navigation. Invisible Assistance was commonly described as making the players feel more skilful thanks to the improved jump control offering greater skill expression. Visible Assistance showed a wider range of responses, with those who felt skilful feeling empowered, and those who didn’t found the Visible Assistance features made things far too easy.

Player Fun Perception

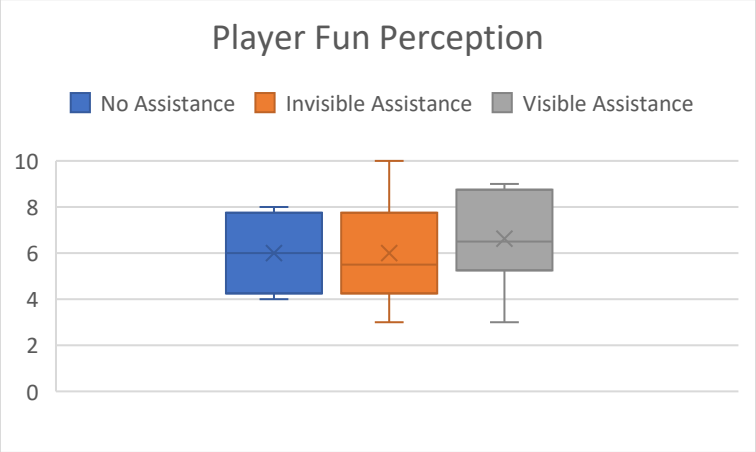

Figure 4 – A Box and Whisker graph summarizing the Fun Perception for each version of the artefact, showing the centre, spread and outliers.

Overview of Results for Fun Perception

As shown in Figure 4, participants' fun perception varied across the three versions of the artefact. Like player's skill perception, No Assistance and Invisible Assistance share the same average score of 6.0, shown by the cross in the graph. Visible Assistance, once again, had a higher average score of 6.625. No Assistance has a relatively moderate spread, ranging from 4 to 8. Invisible Assistance, however, displays a wider range from 3 to 10, with a single outlier at 10. Visible Assistance showed the most difference, with scores ranging from 3 to 9.

Discussion

With No Assistance, participants who reported having more fun appreciated the challenge of figuring out the platforming mechanics independently, appreciating the sense of exploration and overcoming obstacles on their own, with the level allowing them to gradually build experience and experience rewarding moments. Participants frequently noted that the level design was often a contributing factor to their enjoyment, with the difficulty of the level slowly increasing as their skill and understanding of the mechanics did. Meanwhile, players who reported a lower fun perception cited the controls feeling awkward, with frequent mentions of the jump not feeling as intuitive as the other versions of the artefact.

In Invisible Assistance, all participants who noted a high fun perception described the improved jump as heightening their experience, as it was fun to discover how it worked, making it more engaging, intuitive and predictable. One player, who gave the highest score of 10, reported feeling a greater sense of autonomy, being able to engage more with the presented platforming challenges, as well as being able to explore the environment in a much more responsive manner. Those who reported a lower score noted that the sudden switch-up was frustrating to get used to, as they had grown accustomed to tapping the jump button and not holding it. One participant noted that the lack of checkpoints from the Visible Assistance version of the artefact soured their experience, despite enjoying the improved jump controls.

These findings reflect Schell's (2019) assertion that engagement depends on balancing difficulty with what a player is capable of. Participants who reported higher enjoyment in the No Assistance version seemed to experience a sense of flow, with the gradual increase in difficulty matching the player's skill development.

When it comes to Visible Assistance, many players who voted high in terms of how much fun they had described that the added safety-net feature contributed to enjoyment. The visual indicators, such as the goal waypoint, yellow markings and visible safety-net made the game feel more polished, fair, and

aesthetically appealing. The reduced frustration and clearer navigation were much appreciated, allowing players to focus better on exploration and success without repeated failures. In stark contrast, participants with lower ratings reported that the additional visual cues and safety mechanisms reduced the sense of challenge and engagement, with one player who approached this version as their final version finding the goal waypoint redundant after multiple playthroughs. A different player stated that they found themselves wishing they could turn off the new features, as they had already formed knowledge of the level through the previous levels, whilst finding the safety net a useful feature that they wished was provided earlier on.

Summarizing, fun perception varied across the three version. The challenge, sense of discovering the mechanics, and gradually increasing difficulty through the level design helped players enjoy the No Assistance version of the artefact, with the less intuitive control of the jump dragging it down. Invisible Assistance increased this enjoyment through the more engaging and predictable jump mechanics, giving players a greater sense of autonomy, though some were frustrated by adapting to the new controls, as well as the lack of the safety net. Visible Assistance was polarising, with some players enjoying the clearer navigation, visual indicators and reduced frustration through the safety net, while others felt the additional guidance was sometimes redundant, reducing challenge and engagement.

Player Difficulty Perception

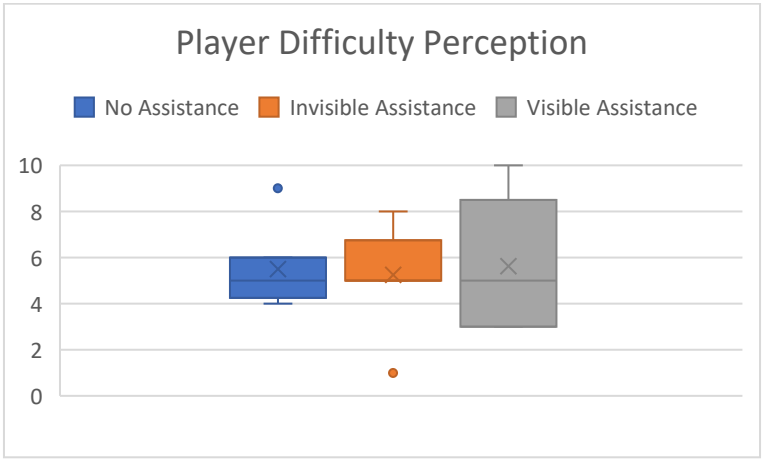

Figure 5 – A Box and Whisker graph summarizing the Difficulty Perception for each version of the artefact, showing the centre, spread and outliers.

Overview of Results for Skill Perception

Much like with the participant's' fun and skill perception, the perceived difficulty ratings once again remain consistent in their averages across the three versions of the artefact. Marked by a cross in the graph, No Assistance had an average rating of 5.5. Breaking the trend, Invisible Assistance has a different average score from No Assistance, with an average rating of 5.25, being perceived as the least difficult on average. Visible Assistance has the highest average score of 5.63. This time, different from skill and fun and perception, the player's spread of experience with difficulty is quite distinct for each version. No Assistance shows a concentrated range from 4 to 6, with a single high outlier reaching a score of 9. The distribution for Invisible Assistance is slightly broader, with scores falling between 5 and 6.75, though featuring a significantly low outlier with a score of 1. Visible Assistance displays the widest spread of all, with scores ranging from 3 to 10, indicating a highly polarized perception of difficulty when explicit guidance was provided.

Discussion

Building on the data from Figure 5, the qualitative data for the No Assistance version highlights that players who found this version difficult cited the floaty nature of the jump, as the trajectory and arc was difficult to coordinate and felt disproportionate to their input. Furthermore, the lack of landing indicator and backtracking after failing a jump contributed to a sense of frustration that elevated the perceived difficulty. Those who found this version less difficult noted that, after overcoming the initial learning curve of the games' mechanics found the level to be "satisfyingly arranged", noting that while the level required active thought, the level design made the experience feel flowy and manageable as opposed to difficult.

Although the level design was not conceived as form of assistance throughout the development of the artefact, it can function as a form of implicit assistance for players. Effective level design can guide players with proper pacing and a gradual introduction of mechanics. For example, Half-Life, developed by Valve, is widely praised for its level design, particularly in its early levels. This is due to how the levels carefully scaffold player learning by introducing mechanics incrementally and embedding tutorials naturally into the game design. As described in educational contexts (van de Pol et al., 2010), structured progression can reduce perceived difficulty by supporting gradual skill progression. Participants who overcame the initial learning curve reported the experience as manageable rather than difficult, suggesting that perceived difficulty is affected not only by mechanics but by pacing and structural guidance through level design.

In the Invisible Assistance version, participants who gave a higher difficulty rating explained their score due to increased mechanical demand and the mental load required to manage the new jump controls, with this version requiring a lot more timing and mindful thought when it came to the platforming challenges. For some participants, while the more controlled length of jumps added an enjoyable dimension of difficulty, the specific gravity scaling made estimating landing points challenging and according to one participant, felt "almost ill-paced and intrusive on the flow of play." On the other hand, those who found this version less challenging, including the participant who provided the low outlier of 1, attributed their success to the more precise control afforded by the variable jump height. These players felt that the improved jump was more gradual and required less committal, leading to them feeling that it was significantly less difficult than the No Assistance version.

Although unexpected that the improved jump control was a small factor for increased difficulty, it's important to note that this is due to the increased cognitive load; players already need to manage pressing the space bar and manoeuvring the character to land in the place they want, but with Early Fall, they also need to take into account when they let go of the jump button, as doing that will make it so that the player falls early, affecting where they land. Although some players may appreciate the increased challenge – when considering assistance, it's important to take note that cognitive load from assistance features may make things more challenging instead of easier.

For the Visible Assistance version, participants who reported low difficulty scores cited the explicit visual guidance and the removal of punishment or failure from the safety-net mechanic. These participants explained that the yellow markings, visible safety-nets and landing indicator provided such clear communication that the game required significantly less effort and problem-solving. Many participants noted that the safety-net mechanic made the experience smoother and more forgiving as it reduced the need for backtracking upon making a mistake. One participant complained that everything felt "spelt out", making the game less engaging and that they could put in less effort than the other versions of the artefact. Those who gave a higher difficulty rating generally viewed these features as a positive aid, rather than something that entirely removed challenge. These participants appreciated the guided pointers and the clear objective, noting that the visual aids made the level much easier to follow through and beat. One player particularly enjoyed the addition of the landing

indicator, explaining that it made the level easier to navigate and mentioned the lack of it as a negative for the fun and skill perception of the other versions of the artefact.

These findings align with Schell's (2019) assertion that perceived difficulty emerges when there is a mismatch between challenge and player skill. For participants who struggled with the floaty trajectory and lack of landing feedback, the artefact exceeded their mechanical understanding, increasing perceived difficulty. However, once players internalised the jump physics, the level was described as "flowy and manageable," suggesting that implicit scaffolding through level pacing eventually restored challenge–skill balance.

In summary, the perception of difficulty across the three versions was balanced between mechanical control with the safety net, and environmental feedback with the yellow markings and goal waypoint, alongside just how visible the safety net was. The difficulty in No Assistance was rooted in primarily in the floaty and unpredictable jump mechanic, creating a steep learning curve that felt satisfying for some but tedious for others. Invisible Assistance shifted this difficulty towards timing and precision, offering more autonomy and being seen as less committal, with a few finding the new gravity scaling intrusive to the flow of play. Visible Assistance proved to be the least difficult but most polarizing, as the explicit visual indicators and safety-net mechanic removed the risk of failure and the need for problem-solving.

Conclusion

In summary, this investigation highlights several important findings. To start, Invisible Assistance and No Assistance, whilst people's opinions on them differed, they produced relatively consistent results. Differences were gradual, not extreme: players who gave lower ratings for their perception of skill, fun and difficulty still had positive things to say about it. Invisible Assistance often improved perceived skill, and No Assistance worked well for skilled players, but increased frustration for others, though players never felt as if it was pointless. Resultingly, it can be concluded that invisible assistance provides the most stable enhancement to the player experience.

Visible Assistance, however, was highly polarising for the player's perception of Skill, Fun and Difficulty, reaching extreme ends of the score ratings. Some players were significantly more skilled and confident, praising the polish and mechanics introduced in this version of the artefact. Others felt over-directed and less engaged. Difficulty perception dropped sharply, reporting the lowest scores across the three versions of the artefact. It did its job effectively, reducing uncertainty and the punishment for failure, at the cost of player engagement, undermining the perceived challenge and diminishing the sense of success for some players.

Assistance doesn't just reduce difficulty or make things easier; something intended to help the player and give them more control may accidentally increase cognitive load, giving them more things to consider. Although this can make a player more engaged by increasing the challenge, it gives the opposite of the intended result of making things easier for the player. Assistance, when visible, can alter a player's received autonomy: many players complained when discussing the Visible Assistance version of the artefact that the game felt blatant for them, the game telling them exactly where to jump and when. Whilst some players appreciated this, it made players who didn't like this version already like it even less. Additionally, assistance changes failure cost. The safety-net mechanic made it so that failure meant nothing compared to the other two versions. Where a player previously had to spend more time walking back to the start of the obstacles and redoing them, they now were simply put back on the platform and given another chance immediately. Whilst this decreased downtime and increased engagement by preventing repetition, this meant that there was barely any actual challenge, influencing how earned success feels.

These findings suggest that the threshold for when assistance mechanics should be visible or hidden to enhance the player experience appears to be about whether assistance preserves perceived competence and autonomy while maintaining meaningful challenge.

Invisible assistance works best when improving player responsiveness, subtly correcting inputs and remaining unnoticed. It needs to align with player intention and avoid introducing mechanics that disrupts the natural rhythm of play. This preserves a player's perceived skill and maintains flow, supporting player engagement without making a player feel like their success was unearned. Designers must be cautious that mechanics do not become perceptive or intrusive. For example, whilst Early Fall was a net positive and enjoyed by players, it did not fill its purpose of an assistance mechanic; it allowed the player further input, but it did not remain unnoticed and disrupted the rhythm of play through cognitive overload.

Contrastingly, Visible Assistance works most effectively when used to reduce difficulty, rather than eliminating it altogether. Players need to be able to keep their autonomy, as visible assistance that over-directs the player undermines that autonomy, and as a result, diminishes the satisfaction from overcoming a challenge themselves: if a player is told when to jump and where to land, their job has been done for them, what would be the point of playing the game? However, clear communication and reduced visibility can bolster player confidence for those who need it. The polarised responses observed in this study suggest that visible assistance should be carefully calibrated and not overused.

Summarizing, the thresholds for when assistance should be invisible or visible are as follows:

- Assistance should remain invisible when its purpose is to align the game's physical response with the player's intent. This preserves the illusion of mastery, allowing players to attribute success to their own skill rather than the system.
- Assistance should be visible when the player's prior knowledge or "spatial reasoning" is insufficient to progress. Explicit visual guidance, such as high-contrast markings (yellow paint) or maps, acts as "scaffolding" that guides inexperienced players until they develop the proficiency to play independently.
- Assistance must be visible and toggleable when it significantly alters the game's difficulty or "cost of failure". Making these features, such as checkpoints, ensures that players do not feel their success is "illegitimate" or that the game is "over-directed".

While visibility is a factor, the determining factor for successful assistance is its alignment with player autonomy and the preservation of the 'illusion of mastery'. The threshold between visible and assistance is not defined by the help provided or the amount of it, but by how that help interacts with a player's competence, autonomy, cognitive load and perceived legitimacy of success. Assistance is best when it supports a player's mastery without replacing it, reducing frustration without removing meaningful challenge. It should never increase frustration and interfere with decision making, guiding without dictating. Assistance that does interfere, while useful for some players, should be adjustable or toggleable for those that do not need it.

Recommendations

Based on this investigation, some recommendations on the implementation of assistance mechanics in game development can be provided. Firstly, designers must prioritize invisible assistance when seeking to improve the experience without undermining autonomy. As observed in the study, subtle mechanics such as input buffering, coyote time, and variable jump height heighten the perception of skill and control without undermining engagement. However, it is essential that the assistance aligns with the intentions of the player to avoid the addition of cognitive complexity. Secondly, the implementation of visible assistance should be implemented carefully. Although it was effective in eliminating uncertainty and frustration, it induced a lot of frustration. Therefore, visible assistance systems should, where possible, be implemented in such a manner that they are: optional or toggleable, gradually introduced, and framed as support rather than instruction. Allowing players to "opt-in" to obvious forms of guidance might help to preserve autonomy while not preventing accessibility. Another factor to be considered is the necessity to preserve some form of uncertainty or decision-making to provide inherent challenge. There is additionally the factor of failure cost. The safety-net mechanic clearly reduced frustration levels, although this also reduced levels of perceived challenge for players.

References

Frank, A. (2017) *Mario Kart 8 Deluxe makes the game steer for you by default.* Available at: https://www.polygon.com/2017/4/28/15475694/mario-kart-8-deluxe-turn-off-smart-steering/ - Accessed 26th October 2025.

Ijsselsteijn, W. A., de Kort, Y. A. W., & Poels, K. (2013). *The Game Experience Questionnaire.* Available at: https://pure.tue.nl/ws/files/21666907/Game_Experience_Questionnaire_English.pdf - Accessed 1st November 2025.

Ryan, R. M. & Deci, E. L. (2000) - *Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being.*

Https://www.selfdeterminationtheory.org/SDT/documents/2000_ryandeci_SDT.pdf - Accessed 6th November 2025.

Van de Pol, J., Volman, M. & Beishuizen, J. (2010). *Scaffolding in Teacher–Student Interaction: A Decade of Research*. Available at: https://doi.org/10.1007/s10648-010-9127-6 - Accessed 7th November 2025.

Hughes, AM., Burridge, J.H., Demain, S.H. et al. (2014). *Translation of evidence-based Assistive Technologies into stroke rehabilitation: users' perceptions of the barriers and opportunities.* Available at: https://doi.org/10.1186/1472-6963-14-124 - Accessed 9th November 2025.

Hunicke, R., leblanc, M., and Zubek, R. (2004) *MDA: A Formal Approach to Game Design and Game Research.* Available at: https://users.cs.northwestern.edu/~hunicke/MDA.pdf - Accessed 9th November 2025

Schell, J. (2019). *Art of Game Design.* Available at: https://www.inventoridigiochi.it/wp-content/uploads/2020/07/art-of-game-design.pdf - Accessed 9th November 2025.

Zagata, K. & Medyńska-Gulij, B. (2023) *Mini-map design features as a navigation aid in the virtual geographical space based on video games.* Available at: https://www.mdpi.com/2220-9964/12/2/58 - Accessed 10th November 2025.

Green, M. C., Khalifa, A., Bontrager, P., Canaan, R., & Togelius, J. (2021) *Game Mechanic Alignment Theory.* Available at: https://arxiv.org/pdf/2102.10247v1 - Accessed 10th November 2025.

Fasterholdt, M., Pichlmair M. (2016) *You Say Jump, I say How High? Operationalising the Game Feel of Jumping*. Available at: https://dl.digra.org/index.php/dl/article/download/771/771/768 - Accessed 15th November 2025.

Vicencio-Moriera, R., Mandryk, R., Gutwin, C., Bateman, S. (2014). *The Effectiveness (or Lack Thereof) of Aim-Assist Techniques in First-Person Shooter Games.* Available at: https://rodrigov.ca/wp-content/uploads/2016/03/aim-assist-camerareadychi2014-v8-final.pdf - Accessed 15th November 2025.

Bratu, C. (2023) - *Which Input Method is more Efficient – A Comparison between Mouse and Controller.* Available at: https://hci.rwth-aachen.de/publications/bratu2023.pdf - Accessed 15th November 2025.

Zhang, Y. (2025) - *The Applications of Game Tutorials and Implicit Guidance in Learning Theories of Psychology*. Available at: www.ewadirect.com/proceedings/ace/article/view/21384/pdf - Accessed 17th November 2025.

Cao, S., Liu, F. (2022) - *Learning to play: understanding in-game tutorials with a pilot study on implicit tutorials.* Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC9676530/pdf/main.pdf - Accessed 17th November 2025.

Burghardt, M., Tiepmar, J. (2021) - *The Game Walkthrough Corpus (GWTC) – A Resource for the Analysis of Textual Game Descriptions.* Available at: https://openhumanitiesdata.metajnl.com/articles/34/files/submission/proof/34-1-611-1-10-20210714.pdf?Utm_source - Accessed 17th November 2025.

Khan, N., Rahman, A. (2017) - *Rethinking the Mini-map: A Navigational Aid to Support Spatial Learning in Urban Game Environments.* Available at: https://nkhan2.github.io/papers/khan2017minimap.pdf - Accessed 17th November 2025.

Rachit D., Pulkit A., Deepak P., Tom G., Alexei E. (2018) - Investigating Human Priors for Playing Video Games. Available at: https://proceedings.mlr.press/v80/dubey18a/dubey18a.pdf - Accessed 26th November 2025.

Faber, T.J.E., Dankbaar, M.E.W., van den Broek, W.W. et al. (2024.) - *Effects of adaptive scaffolding on performance, cognitive load, and engagement in game-based learning: a randomized controlled trial.* Available at: https://doi.org/10.1186/s12909-024-05698-3 - Accessed 27th November 2025.

Oliva-Zamora, M.Á., Mangiron, C. - *How to create video games with cognitive accessibility features: a literature review of recommendations.* Available at: https://doi.org/10.1007/s10209-025-01231-5 - Accessed 27th November 2025.

Bartle, R.A. (1996). *Hearts, clubs, diamonds, spades: Players who suit muds*. Available at: https://www.researchgate.net/publication/247190693_Hearts_clubs_diamonds_spades_Players_who_suit_muds - Accessed 6th December 2025.

Hunicke, R., (2005) - *The case for dynamic difficulty adjustment in games*. Available at: https://www.researchgate.net/publication/220982524_The_case_for_dynamic_difficulty_adjustment_in_games - Accessed 6th December 2025.

Appendices

Appendix 1 – Questionnaire

Administered via Microsoft Forms.

The questions are specifically formatted to ask the player what version of the artefact they were playing without knowing which version they were playing. Triangle is the version of the artefact with no assistance. Square is the version of the artefact with invisible assistance. Circle is the version with visible assistance.

Question 1: On a scale from 1-10 (with 1 being not at all, and 10 being very), how skilful did you feel whilst playing the version of the game labelled triangle?

Question 2: Please explain why you selected the number you did, why/why not did you feel skilful playing the version of the game labelled triangle?

Question 3: On a scale from 1-10 (with 1 being not at all, and 10 being very), On a scale from 1-10 (with 1 being not at all, and 10 being very), how much fun did you have whilst playing the version of the game labelled triangle?

Question 4: Please explain why you selected the number you did, why/why not did you have fun playing the version of the game labelled triangle?

Question 5: On a scale from 1-10 (with 1 being not at all, and 10 being very), On a scale from 1-10 (with 1 being not at all, and 10 being very), how hard did you find the version of the game labelled triangle?

Question 6: Please explain why you selected the number you did, why/why not did you find the version of the game labelled triangle hard?

Question 7: On a scale from 1–10 (with 1 being not at all and 10 being very), how skilful did you feel whilst playing the version of the game labelled square?

Question 8: Please explain why you selected the number you did. Why or why not did you feel skilful playing the version of the game labelled square?

Question 9: On a scale from 1–10 (with 1 being not at all and 10 being very), how much fun did you have whilst playing the version of the game labelled square?

Question 10: Please explain why you selected the number you did. Why or why not did you have fun playing the version of the game labelled square?

Question 11: On a scale from 1–10 (with 1 being not at all and 10 being very), how hard did you find the version of the game labelled square?

Question 12: Please explain why you selected the number you did. Why or why not did you find the version of the game labelled square hard?

Question 13: On a scale from 1–10 (with 1 being not at all and 10 being very), how skilful did you feel whilst playing the version of the game labelled circle?
Question 14: Please explain why you selected the number you did. Why or why not did you feel skilful playing the version of the game labelled circle?
Question 15: On a scale from 1–10 (with 1 being not at all and 10 being very), how much fun did you have whilst playing the version of the game labelled circle?
Question 16: Please explain why you selected the number you did. Why or why not did you have fun playing the version of the game labelled circle?
Question 17: On a scale from 1–10 (with 1 being not at all and 10 being very), how hard did you find the version of the game labelled circle?
Question 18: Please explain why you selected the number you did. Why or why not did you find the version of the game labelled circle hard?

Appendix 2 – Questionnaire Results

2.1.1 – Quantitative No Assistance Results

Participant	Fun Rating	Difficulty Rating	Skill Rating
1	5	5	3
2	5	7	8
3	5	4	5
4	8	9	9
5	1	3	6
6	5	3	6
7	7	10	9
8	6	6	7

2.1.2 – Qualitative No Assistance Results

Participant 1

Skill Explanation: “Triangle had consistent gravity which felt like it had less player control than the other two.”

Fun Explanation: “Triangle was a generic platformer level and felt like such.”

Difficulty Explanation: “Jumps were easy most of the time, but some in the balloon portion did feel very close.”

Participant 2

Skill Explanation: “I couldn't fully get to grips with the controls, which made platforming awkward.”

Fun Explanation: “I enjoyed the platforming and the level design, but the controls made it difficult to properly navigate it.”

Difficulty Explanation: “I didn't find the game to be challenging, but the controls did make it a little frustrating at times.”

Participant 3

Skill Explanation: “It was cool to figure out how the platforming functioned in the triangle version, it was rewarding to figure out even if i kept fallling off of things and messing up jumps”

Fun Explanation: “Figuring out the mechanics was fun, even though i was lost at first it eventually culminated in the game being quite fun with the parkour and having to use the nose/beak of the character i played to make jumps i wouldnt be able to otherwise”

Difficulty Explanation: “there were areas specifically the large jump and one of the balloon jumps i got stuck at for a bit but once i figured out that i was supposed to use the beak and that even at the lower platform i could reach the balloon to make the jump i managed to clear it without much more issue. At first it was difficult to make some jumps because i hadnt realised the beak made you stick onto walls but after that it wasnt so bad.”

Participant 4

Skill Explanation: “The jumping feels good when pressed, I DO like that I can move myself freely while falling down or while gravity does it's thing, making it relatively easier to get to the other platforms, however on some platforms I won't get a chance to fully go through with an input as there'll be a mini micro fall in between when I'm about to jump.”

Fun Explanation: “A solid platforming experience prototype, and quite fun to get the timings down! With enough polish later on, the jank can get ironed out!”

Difficulty Explanation: “Not too hard, a pretty good start for what's to come! With only the physics working against me sometimes, but once I found out the timing, it can feel quite flowy!”

Participant 5

Skill Explanation: “I found that the lack of visual representation of directions in the Triangle section create a moderately confusing experience as some sections of the stages visually clumped together and so I ended up making mistakes that resulted in me having to backtrack which had made me wish that there were a clearer communication of direction given to me as a player so I could avoid making mistakes attributable to the environment.“

Fun Explanation: “Another reason for my dissatisfaction within section Triangle is partially rooted in the difference seen within the jump mechanic featured in the Triangle experience when compared to the more intuitive iteration featured in stages Square and Circle, I found the differing heights you could achieve being relevant to the actuation force applied to the spacebar to be much more enjoyable as the experience feels much more responsive to your input as the player. However, as someone who has a lifelong experience with video games, I feel as though this is relevant to my previously-developed skills and assisted intervention could be utilised to aid a less-experienced player to ensure they also have a positive experience with the game by providing a basic understanding of a weighted jump sooner than later. “

Difficulty Explanation: “My reasoning for awarding the Triangle portion a six stems from the much more floaty nature of the jump mechanic affecting my performance whilst playing through the stage when compared to Square and Circle parts respectively. I found that it made it somewhat difficult to coordinate movement when crossing each of the platforms due to the height of the jump being disproportionate to the weight applied via the spacebar, which had meant that it had taken a higher number of attempts to cross the platforms and successfully complete the stage when compared to my performance in the other iterations of the stage.”

Participant 6

Skill Explanation: “I felt more skilled because I was challenged trying to find out how to get to the goal on my own.”

Fun Explanation: “I enjoyed myself because I was learning the mechanics for the first time! Understanding how the balloons worked is very satisfying!”

Difficulty Explanation: “I found it the hardest because falling would mean having to manually walk back -- which is a bit tedious, and there's also the fact that it's very unclear where you will be falling after doing a jump. Not to mention the jumping feeling very hard to predict with its trajectory.”

Participant 7

Skill Explanation: “Movement and model felt decently weighted, but the collision model ran into issues many times, with the character clipping providing issues with certain elements, not aided by camera motion feeling a little sluggish and poorly matching with the claustrophobic level design. Additionally, in the earlier levels, it was a tad unintuitive to figure out motion as the character could not jump while moving forwards. Otherwise, knowledge of other 3D platformer games helped a lot in beating it, and the first phases were broadly straightforward. This was continued into the latter levels, with the quirks of the engine and motion model being familiarised, the difficulty gradient enabled me to gain the skills necessary to beat the more complicated levels with ease. In the "balloons" section, the introduction of a new mechanic changed this, with a new dimension being added. At first, it felt really quite unintuitive, with the activation conditions not feeling obvious. My first attempts to figure out the system failed, with the instinctual response being to jump to activate them. Within the first few attempts, it began to be obvious that this was the wrong approach, and within a couple minutes it was figured out and beaten in a single attempt it was beaten.”

Fun Explanation: “On the front of puzzle design, the difficulty gradient was very well put together, with early phases working perfectly to introduce the player to the feel of the model. Then, it effectively built in difficulty, with the latter level designs very well exploiting the extremes of what

can be achieved, with elements testing the player's awareness of their surroundings and knowledge of how far or how high their character can jump, feeling immensely satisfying when it succeeds. This was aided by the tight feeling of passages, but would have fully paid off given a fuller camera control. Lastly, the "balloons" phase of the level was interesting structurally and from a gameplay perspective, as when the player believes they've mastered the control through the prior level's difficulty,"

Difficulty Explanation: "The last phase before the balloons section felt satisfyingly arranged, and required active thought and effort to figure out. This resulted in it feeling difficult, but being beaten within a couple of attempts, resulting in a satisfying experience."

Participant 8

Skill Explanation: "Unity default movement (what I'm assuming the movement is) is rough, no preservation of momentum when jumping and character so fast for small platforms
Constantly clipping on edges, slowing movement (sometimes useful because it slowed my fall)
Overall felt at war with the basic movement system and the camera. Still there was some room for skill expression with the choices you could make at certain points, although I tended to make conservative guesses Balloons also felt underpolished? (i.e final section with floating platforms I avoided the balloon jump over the large height) Final bit with the flag and having to clip over felt janky, like I didn't deserve the clear? It was only barely not clearable with a jump so it made me feel a bit small"

Fun Explanation: "No visuals besides generic unity assets
I enjoyed learning what I had to do though. Balloons were nice in this version. Some progression, although it felt it ended early after the balloon room? was expecting another mechanic"

Difficulty Explanation: "Struggled a bit in the first pit room, especially with clipping against the walls, and the high player speed on the platforms, I think I fell three or four times?
Same number of times in the balloon room, had more space to breathe there though
Felt at war with the controls but that was the only threat in a game of static platforms
Moments of choice gave me a sense of being able to reduce the difficulty"

2.2.1 – Quantitative Invisible Assistance Results

Participant	Fun Rating	Difficulty Rating	Skill Rating
1	5	5	5
2	5	5	5
3	7	6	5
4	4	4	8
5	9	10	1
6	7	8	5
7	4	7	7
8	3	3	6

2.2.2 – Qualitative Invisible Assistance Results

Participant 1

Skill Explanation: “Square's jump control made it feel like I had more options than I did in triangle.”

Fun Explanation: “Square's jump control made it a little more engaging than Triangle. I could either hold down space for every jump or I could control my jumps to fit the distance to intentionally give myself a little more difficulty.”

Difficulty Explanation: “Square's jump control made it feel like I was putting in slightly more effort into what I was doing in triangle.”

Participant 2

Skill Explanation: “The improved controls added to the improved skill level, but the removed drop shadow held it back a bit.”

Fun Explanation: “The lack of checkpoints made failure much more frustrating as I had to walk all the way back to the start of a platforming challenge to retry it, which felt needlessly time-consuming.

Difficulty Explanation: “I did not find this version any more difficult than the triangle version.”

Participant 3

Skill Explanation: “The Jumps having added weight compared to Triangle made me feel like i was more accomplished when making jumps because it was harder when you had to hold the jump button to make jumps, it did make me miss a jump when i hadnt realised i had to hold down the jump.”

Fun Explanation: “it was the same stuff generally as triangle and i had fun figuring the stuff out largely however it was fun to mess around with the way the jumps functioned in square.”

Difficulty Explanation: “the changed jump made it a bit more difficult to make jumps, but other than that i didnt have too much trouble, i only really struggled with the spiral climb part and the last balloon jump because i tried to skip a platform and missed the balloon”

Participant 4

Skill Explanation: “It felt like the gravity and physics were TUGGING at me for each jump, and I had to be even MORE mindful of my timing.”

Fun Explanation: “Was a bit frustrating ngl, mostly cause of having to get use to holding space for a more consistent jump rather than a light tap from triangle. Also the TUGGING.”

Difficulty Explanation: “Definitely a lot more timing involved with this one, and a lot more thought on the player's side to be more mindful of the timing of each jump with each tug and when to properly navigate!”

Participant 5

Skill Explanation: “The weighted jump allowed for a more substantial expression of my skill as the player, requiring a much more precise actuation of the spacebar.”

Fun Explanation: “I found the Square section to be much more enjoyable as the environment encouraged an intuitive experience where as the player you are able to explore the environment in a much more responsive manner, which provided a heightened sense of autonomy when engaging with the platforming challenges presented.“

Difficulty Explanation: “I found the Square section to be much more enjoyable as the environment encouraged an intuitive experience where as the player you are able to explore the environment in a much more responsive manner, which provided a heightened sense of autonomy when engaging with the platforming challenges presented. “

Participant 6

Skill Explanation: “I believe that I feel less skilled because the jumping felt easier to control -- unlike in the first one where I had to commit to my jump whenever I would press space.”

Fun Explanation: “I had the most fun here because I was able to bring over the skills I had from the previous version -- but with a more predictable jump arc -- where I'm being picked up off the ground gradually.”

Difficulty Explanation: “This was significantly less difficult because the jumping is more gradual and less commital in comparison to the previous version.”

Participant 7

Skill Explanation: “The collision issues were exacerbated, with elements completely unable to slide vertically, with the collisions triggering even when climbing up or down angled elements. The controlled length of jumps did provide a more interesting skill curve and some additional weight, but the problems with the engine hindered most benefits. Given additional development time, it could be improved. Additionally, the balloon system was even less intuitive and difficult to use, but once decoded, it felt significantly more challenging.”

Fun Explanation: “The experience with level structure was broadly the same, working well to introduce the feeling and weight of the movement. However, the collision issues did impact the enjoyability more than last time, alongside the gravity scaling feeling too intense and causing a stilted and difficult to use motion model. However, this is equalled by the weight of the challenge increasing and feeling more satisfying once complete and aiding playtime.”

Difficulty Explanation: “The controlled length of jumps did aid in adding a new dimension of difficulty in an enjoyable way, requiring the player focus more about the specifics of their location and speed, but the gravity scale did make estimating where the character would land challenging, and almost felt ill-paced and intrusive on the flow of play.”

Participant 8

Skill Explanation: “Felt even more at war with the controls, no reason to fast fall in such a static game so I just held space for as long as possible. Felt more skilled in the sense I knew what was

coming and where I needed to go, but the floatiness didn't make me feel skilled as more having a plaster placed over my frustations. I got through the first section much faster. Balloons do not interact nicely with fast falling, in my opinion. Like I have to hold space as I fall onto the balloon, and not release? Because if I jump right into it I don't get enough height and having it released at any point loses progress so quickly? Made me feel a bit stupid for failing at the first balloon jump 10s of times when the rest of it I had learnt what to do with the balloons and was nowhere as hard Avoided using the balloons when I could because I just didn't trust them I think I noticed that you couldn't not clip over the final flag ledge when playing this version, despite the extra height you could get"

Fun Explanation: "I think the frustration with the first balloon just soured my mood of this game, although it was fun to experience the differences and to speed through some parts of the game (and when I couldn't speed through that was when I was upset). Floatiness was a lil fun but fast falling when I shouldn't angered me a lil"

Difficulty Explanation: "Balloons were harder, but I found the earlier section much easier? Floatiness didn't feel as massive a reduction in difficulty and just complicated some mechanics more, and I made the same choices as I did the previous version. Overall cancelled out??"

2.3.1 – Quantitative Visible Assistance Results

Participant	Fun Rating	Difficulty Rating	Skill Rating
1	3	3	2
2	7	8	5
3	4	5	1
4	9	9	5
5	3	6	2
6	3	6	1
7	10	9	4
8	6	7	3

2.3.2 – Qualitative Visible Assistance Results

Participant 1

Skill Explanation: "With the yellows and reds, everything felt blatant and spelt out."

Fun Explanation: "Ultimately, it was the same game as square, but the yellows and reds made it feel less engaging."

Difficulty Explanation: "Everything felt spelt out, which made it less engaging and felt like I could put in less effort than the other two versions."

Participant 2

Skill Explanation: "The improved controls and drop shadow made me feel more skilful, but the yellow paint did not have any particular effect on this."

Fun Explanation: “The game was much less frustrating due to the improved controls, added checkpoints and use of colour to add contrast and break up the level to make it both easier and nicer to look at.”

Difficulty Explanation: “The drop shadow and improved controls made it much easier to navigate the level and beat the game.”

Participant 3

Skill Explanation: “the yellow markings on the jumps to tell me what to do and the circle below me showing where id land made things simple so i just had to follow it to win, although the added red zones that i presume are death zones did make me think carefully before jumping because i didnt wanna fall and it made me feel better about making the jumps that i was guided to”

Fun Explanation: “the red zones, potentially danger zones did make this one fun in a way because there was danger and i couldnt freely fail so when i made a jump i felt relieved and like i succeeded triumphing over the danger below”

Difficulty Explanation: “i didnt fail any of the jumps and the red zones didnt impede me in any way so i didnt feel it was really that difficult”

Participant 4

Skill Explanation: “Really well polished, felt more precise in where I was going thanks to the goal marker, and the little circle beneath the capsule, I can know exactly when, where, and why I wasn't able to jump from a certain point, where I would land, and when to execute the movement! Also those yellow blocks help with guidance! ESPECIALLY on the balloon part!”

Fun Explanation: “The new polish and features adds a lot more of a "clean" and "refined" edge that makes the game feeling more fair and less hassle like, feels complete!”

Difficulty Explanation: “Easier to follow through, a lot more guided pointers in the direction you're supposed to be going, and a more clear objective of what you're endpoint is!”

Participant 5

Skill Explanation: “Having an assisted visual representation of where my end goal as a player was a much appreciated improvement when provided, however I feel as though it were too explicit in it's presentation with the concise measurement of how far away you were from the goal post. This had made my ability to navigate the stage based on my previous experience somewhat redundant as it was provided once I had already done two complete playthroughs of the stages previously.”

Fun Explanation: “As I'd previously mentioned, the later assistance provided when navigating the stage was somewhat redundant by the time it had been provided and I found myself wishing I were able to turn it off during the third replay as expectations had been formed by my previous experiences with the game. However, I found the assistance provided when falling into a red area to be a pleasant addition and wish that it were provided earlier on.”

Difficulty Explanation: “Being given the assisted yellow steps alongside the return to your last point when falling into a red area, the stage had provided practical visual communication, as well as fostered a forgiving experience for me as a player who made a handful of mistakes when navigating

the course. A blend of slightly less visual aid and possibly a life system as seen in other popular platformer titles could make this an excellent experience for all players through reasonable assistance. “

Participant 6

Skill Explanation: “It was borderline effortless -- I was shown EXACTLY where to go at all times -- the checkpoints I believe should've been a core feature for all of them”

Fun Explanation: “I felt it was fun because of checkpoints and it was way more straightforward due to me being able to clearly tell every single time without failure by looking for yellow rectangles.”

Difficulty Explanation: “It was very difficult to find myself being lost -- a simple glance at the screen with the colors told me where to go and not to go, and it took away problem solving from me.”

Participant 7

Skill Explanation: “The level of visual information helped me a lot, as it was less straining to consider where the character was in relation to obstacles. Also, the featuring of the red zone automatically returning to the last used platform greatly aided with remaining focused and keeping the gameplay enjoyable”

Fun Explanation: The inclusion of a goal signifier and the automatic return definitely added to the enjoyability of this game, aiding in reminding the player of the goal and subsequently aiding focus and enjoyment. Furthermore, the inclusion of coloured areas enabled easier understanding and aided playability and subsequently enjoyment. However, I believe that when scaled to a full size game, it would potentially be more enjoyable to lower the number of checkpoints and help reinforce the level of challenge to certain elements.”

Difficulty Explanation: “While it might be a product of having greater experience with the motion mechanics after the last trial, this gameplay experience felt a lot smoother. This was enabled largely by that, the visual instructions and the automatic respawn facility, meaning that once a difficult section was completed, it didn't have to be repeated. This resulted in this build being the only one I completed without any repetition.”

Participant 8

Skill Explanation: “I had been through this version with the same physics so it was the same gameplay experience Yellow paint was funny as someone who recognised it from the meme, but it was a lil condescending. Shadows helped ground me in the environment so that did make me feel better at navigating around the platforms (I'm aware of how shadows greatly benefit players in 3D platformers, especially in an environment as grey as this game)”

Fun Explanation: “After all the versions, seeing the visual additions cheered me up. Flag was a lil unserious (there's no reason for it, for someone who already knows the rooms). It's just nice to see flair, even if I didn't benefit from most additions. And even though the balloons were still the same, I knew they were coming and what I needed to do, so it didn't jar me so much. imo the uselessness of the red pits made me laugh as someone who already knew you shouldn't go there”

Difficulty Explanation: “Speediest clear of them all, I knew everything that was coming and the black shadow made me feel more confident. Yellow ledges and red pits didn't do much to change the difficulty, although I still clipped a bit and fell once in the first pit room? So only the base friction existed.”