# Assessing Empathy Across Game Fidelity Levels: A Case Study of 3D and Text-Based Versions of *Brukel*

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## ABSTRACT

This study investigates how different levels of game fidelity impact player empathy. To examine the impact of video game fidelity on empathy outcomes, a high-fidelity 3D version of Brukel, a critically recognized 3D video game, was compared with a low-fidelity text-based adaptation. Forty-two participants were recruited for a between-subjects study, and empathy was measured using the State Empathy Scale. In comparing the two versions of the game, the results indicate limited evidence for equivalence in affective and associative empathy and moderate evidence for equivalence in cognitive empathy. These findings suggest that developers creating empathy-focused games may achieve similar outcomes regardless of the visual fidelity of their game – text-based game creation software such as Twine may offer a cost-effective and time-efficient alternative to 3D development. This holds significant potential for expanding the accessibility of creating and testing empathy-driven games, particularly for independent developers or those with limited resources. In addition, it highlights the potential of using Twine as a prototyping tool for empathy in video games.

## Keywords

Game Fidelity, Empathy in Games, Gaminiscing Game, Text-based Game

## INTRODUCTION

Empathy, the ability to understand and share the feelings of others, plays a critical role in human connection and social interaction (Ioannidou and Konstantikaki 2008). Video games, particularly those centered around storytelling, offer unique opportunities for players to engage with narratives that foster emotional connections. A growing body of research examines empathy across various game formats, such as using VR games to foster empathy for individuals with chronic pain (Tong et al. 2020) and role-playing 3D games to extend player empathy from gameplay to community settings (Gordon and Steven 2011).

Given the potential of games to offer players the opportunity to better understand and share the feelings of others, there is substantial social relevance into leveraging the technology to potentially reduce prejudice and conflict in our highly digitized and often divided society. However, there is limited research on the elements of games

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and the criteria that they need to meet to foster empathic outcomes. We argue that such research is necessary and important as developing immersive and emotionally engaging games presents several layers of challenge.

Creating commercial 3D games today often requires a significant temporal and financial investment, whereas text-based games have the potential to be more accessible and cost-effective as an alternative. Although studies have examined the impact of game fidelity on player experience (Chan et al. 2023, Gerling et al. 2013, Sim et al. 2013), the comparative effectiveness between fidelity levels in fostering empathy remains underexplored. This raises the question of whether lower-fidelity, text-based designs might limit, enhance, or produce similar levels of empathic outcomes compared to more visually complex 3D environments.

This study aims to explore this research gap with a case study using *Brukel* (Lifelong Games 2019)–a 3D narrative video game that follows the real-life recorded oral history of a survivor of the World War II occupation of Belgium (Khalili-Mahani et al. 2020). For this study, a text-based version of *Brukel* was developed using Twine, an interactive fiction development tool, to explore the influence of visual fidelity on empathic outcomes. Specifically, this exploratory study aims to answer one primary research question: can a text-based version of a commercial 3D video game elicit similar empathic outcomes to the original 3D video game?

## RELATED WORK

### Empathy in Game

Krznaric (2015, 11) states that "empathy involves stepping into someone's shoes, gaining an understanding of their feelings… and perspectives…, and using that understanding to guide our actions". Ioannidou and Konstantikaki (2008) emphasize that empathy is a learned ability that helps us connect and communicate with one another. In addition to its general definition, empathy is viewed as a multidimensional concept across disciplines (Decety & Jackson 2004, Hoffman 1977, Preston & De Waal, 2002, Shen 2010). While empathy can be influenced by both general traits and specific situations, this research focuses on the latter—state empathy, as defined by Shen (2010). Shen's definition of state empathy as "a process through which the recipients comprehend, process, and are influenced by persuasive media messages" aligns with this research focus on players' emotional responses to different versions of *Brukel*. To further contextualize the emotional range explored in this study, Jarrett's (2021) empathy spectrum provides a framework for understanding different forms of empathetic engagement, from basic emotional contagion to deeper processes such as cognitive understanding, affective resonance, and ultimately compassion. This study adopted Shen's three components of state empathy to guide the analysis: cognitive empathy, affective empathy, and associative empathy. These three components fall in Jerrett's (2021) spectrum of empathy, with cognitive and affective empathy aligning with the middle range of the spectrum and associative empathy bridging toward the higher-end experience of compassion. As the three components of state empathy are defined by Shen (2010, 506-507):

- "Cognitive empathy refers to perspective-taking and involves recognizing, comprehending, and adopting another person's point of view."
- "Affective empathy refers to the activation and experience of affective reactions to others' experiences and/or expressions of emotions."

- Associative empathy "can be individuals' vicarious experience of what [other people] experience."

Scholars such as Ruberg (2020) have rightly critiqued empathy games for their potential to flatten complex identities into simplified, consumable experiences, particularly for privileged audiences. In response to such concerns, we argue that designers of games like *Brukel* carry an ethical responsibility to represent their subjects with care and nuance. This includes portraying the full complexity of individuals' identities and avoiding the overdramatization of isolated elements for emotional effect. Belman and Flanagan (2010) similarly caution that empathy is not an inherent outcome of gameplay as they discuss how games are uniquely well-suited for fostering empathy due to their immersive nature, allowing players to adopt the perspectives of others. As empathy-driven games encourage players to inhabit viewpoints they may not encounter in real life, such games provide a platform for exploring complex social and emotional themes.

*Depression Quest* (The Quinnspiracy 2013), a text-based game created with Twine, situates players in the role of a student struggling with depression, conveying the challenges and helplessness of this experience through narrative choices. Researchers, such as Salter (2016), have discussed this game in relation to its ability to foster empathy outcomes. Yet, notable 3D high fidelity games have also been used for their empathetic potential. *That Dragon, Cancer* (Numinous Games 2016), a 3D game developed with the Unity engine, tells the deeply personal story of the Green family's journey through the illness and eventual loss of their child, Joel (Schott 2017). This game has been used for empathy training in medical schools, with O'Hern et al. (2020) reporting a significant increase in empathy scores among medical students who played the game. Despite significant differences in format—from simple text-based interactions to complex 3D environments—both games effectively engage players with complex emotional experiences, demonstrating that powerful narratives can transcend medium fidelity.

While high-fidelity graphics and VR environments can enhance sensory immersion, Roettl and Terlutter (2018) suggest that narrative depth often plays a more significant role in fostering empathy than visual quality. Their research, comparing a VR game, a stereoscopic game, and a 2D game, indicated that while fidelity contributes to visual appeal and physical immersion, it does not necessarily enhance the emotional response of a narrative.

Although prior research has explored the role of narrative in building empathy, the influence of different fidelity levels on state empathy remains underexplored. This study addresses this gap by comparing the empathic response of players between a high-fidelity 3D version and a text-based adaptation of *Brukel*.

## Twine as a Prototyping Tool

As an open-source freeware tool, Twine has been widely adopted for creating narrative-driven text-based games, especially those focusing on personal stories and individual's struggles. As previously mentioned, and as an example, *Depression Quest* was developed and released as a Twine game. Yet, many other critically acclaimed narrative games were first prototyped with Twine. *That Dragon, Cancer* is one such case, where a pivotal hospital scene was first created in Twine, before the game was turned into a Unity project[1]. In addition, *You Must Be 18 or Older to Enter* (Seemingly

Pointless 2017) was also first created and tested in Twine before being remade and expanded upon in Game Maker Studio–*18 Or Older Prototype* (James Earl Cox III 2015). Lastly, even *Brukel* was first written and tested in Twine (*Gaminiscing 101: Recording My Grandmother's Childhood Memories to Turn Them into a Video Game* 2019). However, the game's narrative had changed substantially during its 3D development, rendering the original version unsuitable to study comparative empathy outcomes. This is later discussed in the limitations and discussion section.

Given how Twine allows developers to create and gauge player responses quickly and affordably (Friedhoff 2013) and how it possesses a low barrier to entry for creating nonlinear, branching stories (Letonsaari 2019), it is understandable that game designers use Twine as a prototyping tool. That said, there is no literature discussing methods for retaining empathy when converting low fidelity text-based games to larger higher fidelity projects.

# METHODOLOGY

## Two Versions of *Brukel*

This study utilizes *Brukel*, a narrative-driven, 3D historical video game based on real-life WWII memories. It allows players to immerse themselves in the perspective of the main character, Bae, as they experience the events she lived through. (*Brukel* Game 2024). Through authentic voice recordings and visual recreations of past events, the game shares a lived story that aims to deeply resonate with players.

Selecting *Brukel* allowed this research to leverage an existing, and critically recognized, narrative game while collaborating directly with the developer to ensure the Twine adaptation faithfully represented key story beats, visual cues, and interactive mechanics from the 3D version. In addition, the developer of *Brukel* created a custom menu for the original 3D game that allowed the players and researchers to select either the tutorial or one of two scenes used in this study. The text-based version was a Twine-based recreation of these scenes, created specifically to facilitate comparisons between a minimal text-based format and a visually rich 3D format. By testing isolated scenes from the commercial game, this study was able to control content that the participants were exposed to, reducing unwanted extra content that could distract or influence outcomes.

## Converting *Brukel* into a Text-based Game

Through developing a low-fidelity adaptation of *Brukel*, this study aimed to retain the emotional and narrative intent of the original high-fidelity 3D in a text-based format developed using the Twine engine. This reverse-engineering of *Brukel* adapted visual and spatial elements into descriptive, interactive text. Key components, such as environmental context and critical player interactions, were translated into text descriptions and hyperlink-based choices that matched the interaction options present in the 3D version. In addition, the narrator's voice and key sound effects were retained and implemented to match the 3D version as closely as possible.

The Twine adaptation began as a simplified vertical slice, designed to informally test if it resonated with the research team. Feedback from the creator of *Brukel* highlighted discrepancies between the intended narrative experience and the captured details, necessitating a discussion to distinguish between author's intent and

the phenomenological experience of playing *Brukel*. Agreeing that we were aiming to capture the experience of the released 3D game, in text-based form, rather than the idealized version of what could be achieved through the low-fidelity format, the development direction became clear, and the next iteration was created. Several playthroughs of *Brukel* were also recorded and analyzed to ensure that all interactive elements were covered, focusing on key features that defined the scenes.

With the foundation in place and a clear direction, subsequent iterations of the text-based version were guided by the DDE framework (Walk, Görlich and Barrett 2017). More specifically, this study specifically aimed to create a text-based Experience by providing similar Dynamics. For example, solving object and photography-based puzzles and reliving someone's memories through interaction with the environment, all while listening to their authentic recollection–despite having to recreate the underlying Design in a relatively different medium.

Feedback from informal third-party playtesting revealed that certain interactions were more explicitly presented in the Twine version, enhancing players' awareness of elements they had previously overlooked within the 3D version. This underscored the potential of simplified formats like Twine to heighten specific key interactions. To accommodate this, some unessential elements were removed from the modified 3D version that was used for testing. While the Twine version could have omitted non-consequential interactions–such as opening and shutting window shades–the modified 3D version of *Brukel* has limited interactive objects so retaining interactivity felt crucial to capturing the essence of the 3D experience. After these adjustments, the only major difference between the two versions was the absence of physical exploration within each room, as each room was presented as a standalone Twine page, highlighting key landmarks as hyperlinks to be clicked, instead of objects to be walked to.

## Study Design and Participants

To explore whether a text-based version of a commercial 3D game can elicit similar empathic outcomes as the original 3D game, a between-subjects study was conducted involving 42 participants. These participants were recruited through institutional mailing lists and physical flyers that were posted on university bulletin boards. The participant pool included 14 females, 27 males, and 1 non-binary individual. Upon completing the experiment, each participant was compensated with a $10 gift card and a Steam code for the full version of *Brukel*. The gaming experience varied between participants. 4 participants reported never playing video games, 10 participants rarely played, 9 played at least once per month, 11 played at least once per week, and 8 played daily. All data were anonymized, and responses were securely stored to ensure participant confidentiality. The study followed ethical guidelines for protecting participant privacy and their rights as specified by the university's Institutional Review Board (IRB).

Participants were randomly assigned to play either the text-based version or the modified 3D version of *Brukel*. Each participant began by completing a tutorial of their assigned version to familiarize them with that version's control scheme and to introduce them to the game's settings. On average, the tutorial took approximately 2 minutes to complete. Following the tutorial, participants played their assigned version of the game. The average gameplay duration was about 6 minutes and 49 seconds. After completing the game, each participant answered a questionnaire to assess their

| | |
|---|---|
| **Cognitive Empathy** | I can see the character's point of view. |
| | I recognize the character's situation. |
| | I can understand what the character was going through in the message. |
| | The character's reactions to the situation are understandable. |
| **Affective Empathy** | The character's emotions are genuine. |
| | I experienced the same emotions as the character when watching this message. |
| | I was in a similar emotional state as the character when watching this message. |
| | I can feel the character's emotions. |
| **Associative Empathy** | When watching the message, I was fully absorbed. |
| | I can relate to what the character was going through in the message. |
| | I can identify with the situation described in the message. |
| | I can identify with the characters in the message. |

**Table 1:** List of 12 items from the State Empathy Scale used in this study, originally adapted from Shen (2010).

empathy. To measure empathy, this research used the State Empathy Scale developed by Shen (2010), which assesses empathy across three key dimensions: cognitive empathy, associative empathy, and affective empathy.

These dimensions were measured using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) across 12 items presented in Table 1. For data analysis, both frequentist and non-frequentist analyses were conducted. Frequentist analysis included independent sample t-tests to compare empathy scores between participants who played the text-based and 3D versions and equivalence testing to evaluate the similarity of empathy scores between the two versions. Non-frequentist analysis included the Two One-Sided Test (TOST) to further evaluate equivalency in empathy scores between the two game versions.

## RESULT

### Frequentist Analysis

In the first analysis, independent samples t-tests were used to test if there were significant differences between the means for each group as they were reported for all three categories (result also shown in Table 2):

- Cognitive Empathy: For cognitive empathy, the means indicated that responses ranged from "somewhat agreed" to "agreed" that the game resulted in cognitive empathy for both the text-based condition (M = 5.816, SD = 0.726) and the 3D condition (M = 5.826, SD = 0.676), with the 3D condition slightly exceeding the text-based condition by 0.17% in relation to the used scale range. However, a t-test indicated that there was no significant difference between both conditions ($t(40) = -0.048$, p = n.s.).
- Associative Empathy: For associative empathy, players somewhat agreed that the game demonstrated associative empathy both the text-based condition (M = 4.974, SD = 1.160) and the 3D (M = 4.728, SD = 1.172) condition, with the text-based condition being 4.10% higher. However, again, the t-test indicated that there was no significant difference between both conditions for associative empathy ($t(40) = 0.678$, p = n.s.).

| | Descriptive Statistics | | T-Test | | |
|---|---|---|---|---|---|
| | Text Base | 3D Condition | Frequentist Analysis | TOST Analysis for ΔL | TOST Analysis for ΔU |
| Cognitive | M = 5.816, SD = 0.726 | M = 5.826, SD = 0.676 | $t(40) = -0.048$, p = n.s. | $t(40) = -1.015$, p = 0.158 | $t(40) = 0.920$, p = 0.182 |
| Associative | M = 4.974, SD = 1.160 | M = 4.728, SD = 1.172 | $t(40) = 0.678$, p = n.s. | $t(40) = -0.289$, p = 0.387 | $t(40) = 1.646$, p = 0.054 |
| Affective | M = 5.237, SD = 0.937 | M = 5.022, SD = 1.017 | $t(40) = 0.707$, p = n.s. | $t(40) = -0.261$, p = 0.398 | $t(40) = 1.674$, p = 0.051 |

**Table 2:** Descriptive statistics (means and standard deviations) for cognitive, associative, and affective empathy in the Text Base and 3D Condition, and results from frequentist analysis and TOST equivalence testing for both ΔL and ΔU.

- Affective Empathy: Lastly, for affective empathy, players again somewhat agreed that the game demonstrated affective empathy for both the text-based condition (M = 5.237, SD = 0.937) and the 3D (M = 5.022, SD = 1.017) condition, with the text-based condition being 3.58% higher. However, there was no significant difference between both conditions for affective empathy measures ($t(40) = 0.707$, p = n.s.).

In conclusion, the descriptive statistics indicate that both conditions were seen as capable of facilitating cognitive empathy, while affective and associative empathy were less pronounced. In comparing the text-based and 3D versions of the game, independent samples t-tests suggest that there is no significantly different response for participants who played either version.

Despite the previous result indicating a non-significant main effect, the conditions cannot be concluded as equivalent. To make a more confident claim about the comparability of the text-based and 3D responses, or the lack of a significant difference between them, additional analyses were performed, specifically statistical equivalence tests, using the TOST procedure (Schuirmann 1987).

This method involves specifying an upper equivalence bound (ΔU) and a lower equivalence bound (-ΔL). The two null hypotheses are:

- H01: $\Delta \leq -\Delta L$ (the difference is less than or equal to the lower bound, and therefore outside of the equivalency bounds)
- H02: $\Delta \geq \Delta U$ (the difference is greater than or equal to the upper bound)

Both H01 and H02 must be rejected to reject the hypotheses of nonequivalence, as this would mean that the observed effect size (Δ) falls within the range $-\Delta L < \Delta < \Delta U$, indicating that the effect size is within the predefined equivalence bounds. Thus, we can conclude that the two groups are equivalent (Lakens 2017).

The equivalence region (Δ) is specified as between -0.3 and 0.3 in Cohen's d units to exclude the presence of a practically significant effect size at the Cohen's D 0.3 level. This means the observed effect size (Δ) falls within the range $-\Delta L < \Delta < \Delta U$, indicating that the effect size is within the predefined equivalence bounds. Thus, it can be concluded that the two groups are equivalent (Lakens 2017). The equivalence region (Δ) is specified between -0.3 and 0.3 in Cohen's d units to exclude the presence of a practically significant effect size at the Cohen's D 0.3 level (Lakens 2017).

For cognitive empathy, TOST analysis showed non-significant results against ΔL ($t(40) = -1.015$, p = 0.158) and ΔU ($t(40) = 0.920$, p = 0.182). For associative empathy, TOST

analysis showed non-significant results against ΔL ($t$(40) = -0.289, p = 0.387) and marginal significance against ΔU ($t$(40) = 1.646, p = 0.054). The overall equivalence test remains non-significant as only one side (ΔU) showed marginally significant. Similarly, for affective empathy, TOST analysis yielded non-significant results against ΔL ($t$(40) = -0.261, p = 0.398) and marginally significant results against ΔU ($t$(40) = 1.674, p = 0.051). The overall test remains non-significant, failing to reject the hypothesis. Overall, the equivalence tests for the three dimensions are non-significant. Therefore, the alternative hypothesis is not rejected, and the null hypothesis that suggests non-equivalency remains.

## Non-frequentist Analysis

Given that the traditional two-sided t-test did not allow rejection of non-equivalency, it was not possible to conclude that both conditions had the same empathy level for the participants. At the same time, the results from the Two One-Sided Tests (TOST) for equivalence also failed to reach significance across all three dimensions, preventing the rejection of the null hypothesis of equivalence between the groups. Therefore, no strong conclusions can be drawn from the analyses above.

Bayesian indirect equivalence testing was applied to assess the potential equivalence between conditions. Under this approach, prior beliefs were modeled, where the null hypothesis (H0) posits an equivalence between the text-based and 3D conditions, and the alternative hypothesis (H1) suggests non-equivalence. This test was conducted to assess whether the effect size ($\delta$), defined as the difference between the two groups across dimensions, fell within a pre-specified equivalence interval.A Cauchy prior distribution with a scale parameter was adopted of 0.707 for $\delta$, as recommended by best practices (Wagenmakers 2018) and implemented in JASP. The equivalence region (I) was defined as the interval from -0.05 to 0.05, reflecting the range of effect sizes considered practically equivalent (Lakens 2017).

For cognitive empathy, the Bayesian analysis yielded a $BF\in\notin$ of 3.663, suggesting moderate evidence favoring equivalence. In contrast, for affective empathy, the $BF\in\notin$ indicated that the data were 2.919 times more likely to fall within the equivalence region, providing anecdotal evidence in favor of equivalence. Similarly, for associative empathy, the $BF\in$ supported equivalence with a factor of 2.971. These findings suggest that, while the evidence is limited, it is stronger for cognitive empathy, and the data generally favors the hypothesis that the text-based and 3D versions show equivalent outcomes across all three dimensions assessed. These findings offer valuable guidance for future game design, indicating that games that focus more on cognitive empathy may be more likely to achieve similar results with either text-based or 3D design.

# DISCUSSION

The findings of this study suggest that low-fidelity, text-based adaptations may evoke cognitive empathy at levels comparable to their higher fidelity counterparts. This is significant as it challenges the assumption that high-fidelity graphics are necessary for creating impactful, empathy-driven experiences. While enhanced visual realism can deepen sensory immersion, this study suggests that narrative depth and interactive structure may have a stronger influence on cognitive forms of empathy. This aligns with prior research, such as that by Roettl and Terlutter (2018), which suggests that

narrative engagement can often transcend visual fidelity in generating empathic responses.

However, these results reveal limited evidence for equivalence in affective and associative empathy dimensions, indicating that they might be more sensitive to the visual and sensory features of game design. This highlights the importance of carefully considering which dimension of empathy a developer chooses to evoke when deciding the fidelity and development software for a video game. For instance, while text-based formats may support the perspective-taking aspects of cognitive empathy, richer sensory details might be necessary to evoke associative and affective empathetic responses.

Nonetheless, the cognitive empathy equivalence observed in both versions of *Brukel* suggests that narrative-driven gameplay can remain impactful even in a lower fidelity, text-based format. This supports Twine's potential as a valuable tool for prototyping games that aim to facilitate state empathy for its players. By enabling developers to rapidly prototype and test narrative effectiveness in Twine, it is possible to refine emotional elements before committing to full 3D production.

## Implications for Prototyping and Game Development

The implications of this study are particularly relevant for developers working within budget constraints and those focused on empathetic narratives. The data suggests that Twine can be an accessible, cost-effective tool that allows developers to experiment with empathy-driven design and iterate on narrative elements more easily than in a high-fidelity game engine.

Similar to previous studies by Hoffman (2017) and Salter (2016) that analyzed the Twine game *Depression Quest*, this study should encourage developers aiming to create empathy-driven games to use Twine for more than just a preliminary prototype. If narrative engagement and empathy outcomes remain consistent across fidelities, a text-based Twine adaptation could serve as a final format, eliminating the need for more costly 3D development. In addition, Twine's accessibility and low technical requirements make it a powerful tool for achieving impactful storytelling, democratizing access to video game creation, and allowing for quick adjustments. This approach allows creators to focus on narrative depth and player interaction as primary drivers of cognitive empathy.

## Limitations

This study has several limitations that impact the generalizability of its findings. First, it relies on a single video game, *Brukel*, which falls within the niche genre of gaminiscing—a type of video game focused on personal memory preservation (Ebrahimi et al. 2023). This genre, with its emphasis on narrative immersion and emotional exploration, may naturally support empathy-driven player experiences more effectively than other game types. Narrative and gaminiscing games often prioritize storytelling over action-oriented mechanics, and the findings may not apply to games where narrative depth is not the primary focus.

Second, this study utilized a reverse-prototyping approach by adapting an existing 3D game into a low-fidelity text-based game, rather than the aforementioned Twine-to-3D workflow. This method enabled the examination of whether a critically well-

recognized 3D game's emotional impact could be replicated in a simplified form. while retaining the mirrored elements between the two versions. This approach also reduced the work necessary for adaptation – while the process of adapting from 3D to interactive fiction presented its own set of challenges, it did not require the creation of 3D assets, 3D spaces, nor the interaction systems to accompany them. However, because of that research choice, this study does not address or suggest a pipeline for developers when scaling a text-based prototype into a high-fidelity 3D version; nor does it address any means of preserving empathy for that conversion process. As such, this study does not capture the iterative development processes involved in transitioning from Twine to 3D.

Third, for practical and control reasons, this study only exposed participants to limited parts of *Brukel*. It takes time for players to become familiar with others – to grow to know them and to more deeply empathize with them. The participants in this study played a brief tutorial of *Brukel* along with two very specific scenes. The average time a participant was exposed to *Brukel* was less than 10 minutes. It would likely benefit future studies if participants were able to spend more time with the characters. Furthermore, participants experienced only one version of the game in this study, limiting opportunities for direct comparison. Additionally, the study relied solely on quantitative measures, which may not fully capture players' emotional experiences or perspectives. Future work can consider adopting a within-subjects design and integrating qualitative methods to understand how empathy emerges and changes during gameplay.

Another limitation is *Brukel's* specific cultural and historical setting. As *Brukel* is based on memories of the occupation of Belgium during World War II, the narrative may resonate differently with players of different familiarities with European history, as well as players of varying cultural backgrounds. This context may limit this study's applicability across cultures. In addition, while both versions of *Brukel* contained English subtitles, the narrator of *Brukel* tells her story in Dutch, a language foreign to the participants – also in both versions. Further studies with games set in varied historical and cultural settings and spoken in players' native languages would help clarify whether empathy outcomes are influenced by narrative familiarity or universality and to what degree.

Finally, the sample population was small and drawn from a single United States university, introducing demographic constraints. Expanding the study from 42 participants to include a broader, more diverse and international participant base would enhance the generalizability of the findings, providing insight into how empathy outcomes may vary across different age groups, cultural backgrounds, and gaming preferences.

## Future Research Directions

This study represents a first step toward understanding empathy across 3D and text-based fidelity, and it reinforces the need for further exploration of fidelity's effect on empathy in video games. Beginning with a Twine game that fosters empathy in players, researchers could iteratively refine and adapt the game into a 3D version. Following the approach of this study, researchers could then measure whether empathy outcomes in text-based games could be transferred into 3D adaptations, providing valuable insights into Twine's effectiveness as an early-stage tool for

empathy-testing. A collection of such studies would be invaluable as a resource for emotion-oriented game design.

Additionally, future studies could investigate empathy-driven narratives across diverse game genres, such as RPGs, branching visual novels, and adventure games, to determine whether Twine prototypes are effective in genres where the narrative structure and player agency differ. Branching storylines and character-driven choices, in particular, may interact with fidelity differently than linear narratives like those in *Brukel*, offering insights into how genre affects empathy across fidelities.

Expanding the research to include games with varied cultural and historical settings would also be beneficial. By examining empathy outcomes across games set in multiple contexts, researchers can explore whether certain themes or historical periods resonate more universally or if cultural familiarity affects players' state empathy. This line of inquiry could inform best practices for designing empathy-driven games with global audiences in mind.

Future studies could involve a longitudinal study to obtain more comprehensive findings, as empathy often develops and deepens over time. Participants could engage with multiple gameplay sessions, allowing researchers to examine how empathy emerges, persists, or shifts with repeated exposure. By collecting and comparing responses across sessions, researchers could also identify when and how fidelity most significantly influences emotional engagement.

Lastly, this study invites reflection on what constitutes the distinct identity of a "game" and its player experience. The 3D and text-based versions of *Brukel* raise questions about game identity: does a low-fidelity adaptation of a 3D game remain the same game, or does it become a distinct entity? As mentioned in the introduction, an alternative version of *Brukel* was first created in Twine. Yet, that version remains drastically different from the commercial 3D version in its narrative and tone. Even so, is it more *Brukel* than the newer Twine version created for this study? Future research could explore players' perceptions of adapted games, assessing whether they view different versions as complementary experiences or as individual works with unique emotional and experiential qualities. Understanding these boundaries could help prevent maladaptation between fidelities.

## CONCLUSION

The findings from this case study show that high-fidelity graphics may not be essential for fostering empathy in narrative-driven games. By comparing the 3D version of *Brukel* with a low-fidelity interactive fiction adaptation in Twine, limited evidence was observed for equivalence in both affective and associative empathy dimensions, while moderate evidence was found for equivalence in cognitive empathy. This suggests that while certain emotional responses may vary between formats, cognitive empathy could be effectively elicited regardless of visual fidelity.

These results have implications for developers working within budget or resource constraints. The accessibility of tools like Twine allows developers to create and test narrative-driven prototypes for emotional impact before committing to high-cost 3D development. This study supports Twine's ability as a powerful narrative prototyping tool while also reinforcing its use as a practical format for final products when cognitive empathy is a core design goal.

In conclusion, this research highlights the potential of text-based formats like Twine for achieving empathy-driven experiences. Developers focusing on empathy and narrative do not need to rely on high-fidelity visuals. This study contributes to ongoing discussions about game fidelity, prototyping, and the broadening scope of empathic game design.

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## ENDNOTES

1 Ryan Green, direct message to the author via X (formerly Twitter), December 5, 2024.