The Time Machine and the Voodoo Doll: Exploring Customized Computer Game Controllers and Their Influence on the Experience of Play

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Abstract. This paper turns attention towards an overlooked area of research: the customized computer game controller and its influence on the experience of play. Through two experimental design cases of customized game controllers, a time machine and a voodoo doll, we challenge the present theoretical assumptions inherently at play about game controllers: the Heideggerian binary paradigm where computer game controllers are either "visible" or "invisible". Moving beyond this philosophical paradigm, we propose a fresh new theoretical take where customized controllers situate themselves in a third position of being simultaneously "visible" and "invisible". This third position, we discovered, transformed the game controllers into physical game objects. Thus, the customized game controllers belonged to the game world and simultaneously acted as traditional controllers. During play the customized computer game controllers managed to draw attention to themselves without "breaking" immersion. Consequently, the customized game controllers challenged the dominant thinking about game controllers together with the theoretical backdrop on which the predominant conceptions of immersion rest. Following, we challenge the theoretical conditions upon which the present understandings of immersion are erected. Furthermore, we will advance a revitalized comprehension of the *structural pattern* and *process of interaction* between the player, the game controller, and the game world.

Keywords: Customized game controllers · Immersion · Player experience · Ludology · Theory · Design

1 Introduction

We all use game controllers when we play computer games. The setup of keyboard and mouse together with handheld game controllers for the game consoles, PlayStation and Xbox, is known to almost every computer game player on the planet. Even the simulation of joysticks and keyboards on tablets have become familiar to us. When we play games these different game controllers act in more or less the same way. They all

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serve as interfaces and gateways to the game content. Players perceive game controllers in much the same manner: during the experience of play [1, 2], game controllers tend to become "invisible" and "disappear". When we write "invisible" and "disappear", we don't mean that game controllers by some unknown measure suddenly vanish or that their physical attributes are transformed. Instead, "invisible" and "disappear" should be understood in a Heideggerian [3] phenomenological sense. When the controller is seen from this perspective, it can occupy one of two states – either present-at-hand or ready-to-hand [4]. Present-at-hand means that players are fully aware of the controller, it is "visible". The opposite can be said about ready-to-hand. Here, players have no conscious awareness of the controller. The controller has "disappeared", so to speak. Traditionally, this "disappearance" lasts until a failure arises. Normally, such failure constitutes some sort of "break" in the interactive loop [5] between the player and the game i.e. if the keyboard, mouse or traditional console game controller somehow fails to respond during play. When that happens, players become acutely aware of the game controller. Now, the game controller has "moved" from being unseen (ready-to-hand) to being center of attention (present-at-hand). The point is that "invisibility" and "disappearance" point toward a particular process of interaction during play where players shift their attention from the game content to the controller or the other way around. This shift, normally, designate a transition between being out-of-play and in-play [6–9]. Thus, using the words "invisible" and "disappearance", are a way to describe what happens to our perception during gameplay [10, 11]. Notably, how our experience and the direction of our attention shifts during play – between focusing on the game controller and the game content.

Today, we claim, almost every game strives to "suppress" the controller and drive it into the background of the experience of play. Nonetheless, metaphorically speaking, the fictional content of computer games [12] can be said to secretly whisper "incantations" that "magically" make the game controllers disappear from the players perception during play. Players are as resilient to this spell as the stormtroopers are resistant to the Jedi mind trick in the movie *Star Wars Episode IV: A New Hope* [13]. The point being: game controllers are overlooked as venues for novel design approaches and/or as objects for research [14].

This paper attempts to ferry the controller out of its present darkness and bring it into the light of the future. Hence, we explore the computer game controller, especially the customized game controller along with its impact on the experience of play, markedly how the tailor-made game controller influences the player's experience of play – the sensation of immersion. In other words, this study scrutinizes the *structural pattern* as well as the *process of interaction* from the point of view of the custom-built game controller, notably the customized controller and its position in relation to being "out-of-play" and "in-play" [15, 16]. Of special interest, how the conditions for thinking about the concept of immersion is influenced by the presence of a customized game controller: namely a controller that concurrently act both like the traditional game controller and like a game object securely belonging to the fiction of the game. It should be noted, when we write game object, it should be understood as Fullerton defines a game object, which is by its properties, behaviors and relationships [17]. Thus, customized game controllers draw into focus the conditional underpinnings in the way the present research thinks about concept of immersion. Importantly, how the current thinking place emphasis

on addressing immersion from a specific point of view: namely one that focuses on "forgetting" or "suppressing" the medium (i.e. both the game controller and the machine (computer) running the game (program)). This focus place emphasis on the experience of play through the prism of self-awareness or lack hereof. Before we move on, it deserves to be mentioned that the Nintendo Labo [18] is somewhat of an exception controller-wise. The Nintendo Labo offers players the opportunity to build their own game controller by combining sets of cardboard with the Nintendo Switch controllers to create fishing rods, pianos, or houses. However, the Nintendo Labo, in spite of Nintendo's efforts, nowhere near the experiments presented in this article.

Now, before we reach the paragraph on customized game controllers; how they influence the experience of play *and* reshape the *structural pattern* as well as the *process of interaction* between the player, the controller, and the game – not forgetting how the customized controller cast light on the conditions for thinking about immersion – a few methodological considerations are in order.

2 A Few Methodological Considerations

Our examination of how customized controllers influence the experience of play and affect the *structural pattern* as well as *process of interaction* derives from two different projects: *The Time Machine* and *The Voodoo Doll*. Each of these projects involve iterative design processes [17, 19], which created both unique customized game controllers and computer games. The purposes of these projects were to examine and scrutinize how players interacted with game controllers that diverged from the traditional generic game controller setup. Especially, how tailor-made game controllers affected the players' interaction with the computer game and impressed their experience of play. During the development processes, each project underwent numerous play and game tests, which means that our encounters with players did not follow a rigid and linear method design – qualitative questionnaires, quantitative surveys, and so on. Instead the development processes consisted, predominantly, of co-reflecting phenomenological interviews [20] together with a co-designing approach [21] to further qualify the developed artefacts. We also observed players' patterns of interactions, inquired about their experience of play, and investigated their sense of immersion.

In our project, *The Time Machine*, we discovered how an unfamiliar physical and customized game controller successfully inhabited and integrated itself into the fiction of the game world. Of special interest, how players experienced the sensation of holding and interacting with a strange physical object, which acted both as a controller and as a game object critical to the game world. Contrary to our expectations, this setup didn't break the players' sense of immersion. Actually, the opposite happened, the experience of immersion was enhanced, but even more interesting we discovered we had to rethink the condition for thinking about the concept of immersion.

In our second project, *The Voodoo Doll*, we decided to press the envelope and investigate the intricacies involving customized game controllers and their connection with the game world. Here we went even further in our effort to integrate the physical artifact (game controller) into the experience of play. In the project *Voodoo Doll*, the interaction with the game world was changed: now the customized controller became a fully integrated and active part of the fiction of the game world. In essence, project *Voodoo Doll* acted as a "natural" extension as well as a continuation of project *Time Machine*. Given how different these projects impact the structural pattern and process of interaction and how they influence the experience of play, we will walk the reader through their stories of development. This is done in order to ensure that the reader fully understand the projects, the customized game controllers, and their interesting possibilities.

The paragraphs following the descriptions of our two projects will advance reflections of how such tailor-made game controllers also act as physical game objects, and how they affect the overall interaction and influence the experience of play. Finally, we will discuss how these customized controllers challenge the conditions for thinking about the concept of immersion within the study of games.

3 Project Time Machine: An Unconventional Way to Save the World

Project *Time Machine* was inspired by the HBO tv-miniseries *Chernobyl* [22], which is a fictional interpretation portraying the nuclear meltdown in the city of Chernobyl in 1987. The idea behind the project *Time Machine* was simple: to place the player inside a nuclear power plant on the verge of a catastrophic event: nuclear meltdown. The goal of the game is, of course, to prevent the immediate nuclear catastrophe. In order to prevent the devastation from happening, the player has to solve a number of puzzles. To handle the challenges, the player is equipped with a curious device from which a mysterious voice also speaks. The cryptic device is the tailor-made game controller, which the player holds in her hands. The baffling device is also present in the game world (see Fig. 1). Now, the mysterious voice explains that the enigmatic device is indeed a time machine. Followingly the player learns how to operate the time machine.

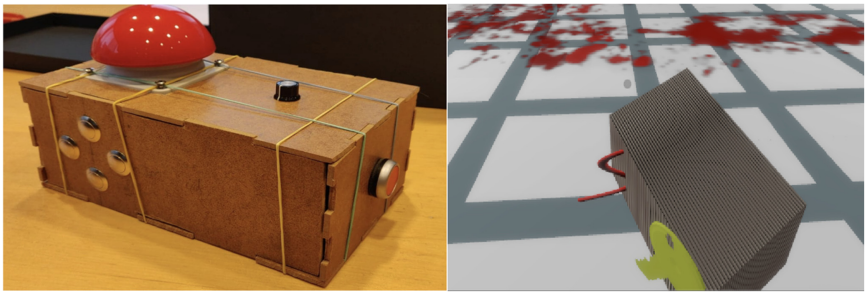

Fig. 1. To the left, a picture of the customized controller: The Time Machine. To the right: the virtual representation of the time machine inside the game world. Notice the big red button – it activates time travel. (Color figure online)

On the top of the time machine, i.e. the customized game controller, next to the big red button is placed a much smaller black knob, which looks like something from a radio from the 1950s. The black knob can be turned into three positions: left equals yesterday, straight ahead signals the present time, but if you turn it to the right you can travel 10 years into the future. This design is aligned with the three possible time periods within the game world.

When the game begins, the player is advised to figure out how to stop the disaster from happening. The player is presented with three options: travel back in time, stay in the present time period or jump ten years into the future. If the player choices to stay in the present time, the player will have approximately 90 s before the powerplant melts down. However, if the player choices to travel one day back in time, she will find the powerplant fully operational with ample time to explore the facility. Of special interest, the solve the puzzle the player has to find a way to the top floor where the executive office is located. However, in this time period the player has limited access to important areas of the powerplant such as the executive office. If, on the other hand, the player chooses to jump 10 years into the future, a very different scenario will greet her. In this future, after the nuclear meltdown has happened, the power plant facility is completely shut down. Additionally, remains of dead bodies lie on the floors of the powerplant and the air is saturated with toxic gasses and the levels of radiation are dangerously high.

3.1 The Functionality of the Time Machine

The main feature of the customized controller is, of cause, time travel. The player configures the time travelling mechanism on the top front of the customized physical controller. When the designated date of arrival is set, the player presses the big red button to activate time travel. Instantaneously, the player is blasted through time to the desired time period.

The action of pressing the big red button triggers an embodied experience [23] of time travel. The sensation of time travel is emphasized by feedback from the game world in the form of screen shake, green circular expanding animations, and intense sound effects. This multi-layered design of feedback follows several polish metrics [24], which contributes to the player's feel of being catapulted through time. The utilized polish metrics bridge the experience of the embodied interaction with the fiction of the game world. Not only did the design of the game apply the aforementioned polish metrics [25], so did the customized game controller. For instance, the sensation of hitting the cartoonishly big red button to activate time travel, contribute to the player's experience of hurling through time. The experience was further empathized by flashing lights of different colors stemming from the game synchronized with a rumbling sound emanating directly from the game controller (see Fig. 2).

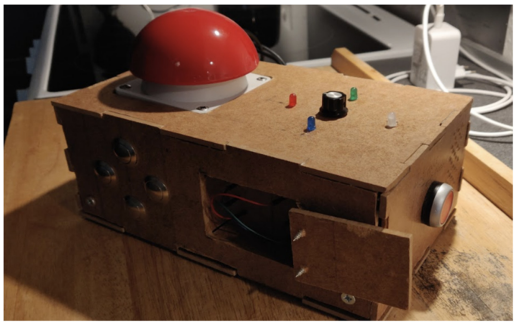

Fig. 2. The figure displays a picture of the time machine. The big red button activates time travel while smaller black rotation button is surrounded by LED lights, which indicate different time periods. (Color figure online)

Of course, the time machine also facilitates traditional game space navigation, thus assisting the player's exploration of the 3D game world. The buttons on the side of the tailor-made controller are used to maneuver the player's action inside the game world.

Additionally, the customized game controller contains and takes part in the puzzles of the game. In the last puzzle, the player encounters a broken elevator, which will take the player to the sought-after executive offices. However, in order to fix the elevator, the player needs a wire. Eventually, the player discovers that there is a secret compartment hidden inside the controller. When the player opens the compartment three colored wires are revealed. Now, the player has to pull out a wire, but, if the if the player pulls out the wrong wire not only will she fail to fix the elevator, she will also cause the time machine to break down and cease functioning (see Fig. 3).

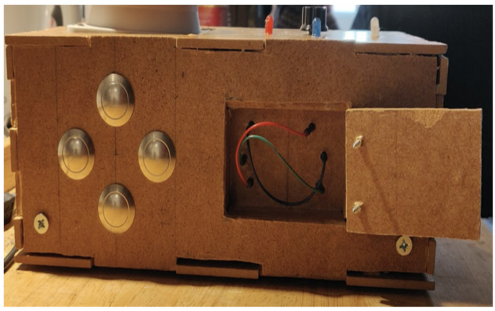

Fig. 3. A picture of the compartment with the hidden wires. The wires are an integral part of a solution to the last in-game puzzle.

Tying the puzzles of the game world together with the player's embodied interaction with the time machine transports the customized controller into the foreground of the experience of play: now the controller becomes "visible". Nonetheless, it could be stipulated that this design run the risk of crippling the immersiveness of the entire game experience. Yet, the opposite is true. We discovered that players found the time machine intriguing; that it contributed and heightened the overall experience of the game.

The tailor-made game controller immediately transported the players into the game world. The players quickly found themselves dwelling in a novel experience where their attention oscillated between the customized game controller and the content of the game world. The time machine and the game world supplemented each other and seamlessly became part of the entire experience of play. The players' shift in focus between the customized game controller and the game content, didn't disrupt their sense of immersion. Passingly, it should be noted, the concept of immersion loosely deals with the experience of some sort of loss of self-awareness during play – this whether or not immersion is thought of as being surrounded by another reality [26]; associated with immediacy of the media [27]; thought in a continuum ranging from immersion, outmersion to meta-outmersion [28]; or resting on micro-involvement highlighting six different dimensions [29, 30], which describes moment-to-moment involvement.

In short: in the project Time Machine a customized game controller acted in direct opposition to the traditional game controller. The customized game controller is "visible", present, and bridges a strange physical object with the vibrant content of the game world. We quickly realized that the tailor-made game controller such as the time machine not only managed to insert itself as an active part of the game world, it also instantiated and elevated the player's experience of the game content.

4 Project Voodoo Doll: Finding Your Way Around Inside a Toy

Project *Voodoo Doll* is inspired by magic as it is performed in diverse religions of Voodoo. The intention of Project *Voodoo Doll* was to create a game experience that used a voodoo doll as game controller to act as an essential and integral part of the game world. The key to mastering the game runs through the player's understanding of the figurative, concrete, and abstract connection between the physical controller and the fictional events and overall design of the game content, especially, acknowledging the voodoo doll as portraying both as game controller *and* as a metaphorical map of the game world.

When the player begins the game, she is handed a physical Voodoo doll, which, initially, does not seem to share any obvious possible patterns of interaction with the game world (see Fig. 4).

Fig. 4. The voodoo doll as game controller and game object.

From a design point of view, the necessary buttons and sensors for interaction are hidden inside the voodoo doll. However, one noticeable element on the Voodoo doll manifest itself by a small light, which shines from the right arm of the doll. The player will have to figure out that the light indicates the current position of the player *inside* the Voodoo doll – inside the game world (i.e. the player has to figure out that the game takes place inside the controller).

The opening scene of the story of the game situates the player in a strange, unknown, and dark place. The player is alone except for a small spirit fragment, which is manifested as a floating blue flame on the screen. The game does not explicitly provide the player with a backstory [31], all that is revealed to the player about this dark bizarre place is that it is a peculiar universe convoluted in mystical, spiritual, and supernatural effects.

When the player progresses through this bizarre dark place, she discovers that the small spirit fragments can be infused with other spirit fragments maturing them into a glowing spirit companion. The spirit fragments also serve as navigational breadcrumbs and for solving puzzles [32].

Early on the player discovers an interesting, but unreachable cave. Followingly, the player will have to learn that squeezing the tailor-made made controller will impact the layout of the game space. For instance, if the player squeezes the doll in the room with the unreachable cave in the ceiling the cave will be lowered in conjunction with the squeezing of the Voodoo doll's limp. Thus, the up and down movement of the cave corresponds to the player's squeezing interaction with the physical voodoo doll.

Afterwards, if the player continues onward, she will arrive at a locked door. Thus, the player has to find a key to the door. Investigating the surroundings will reveal an unreachable key. The key is placed up high. Once again, the player has to explore the intriguing powers of the physical doll in order to discover an ability, which can assist the player in finding a way to get to the key. This time pressing the physical limps of the doll doesn't work it: this action will not suppress space and make the key attainable. Nonetheless, the Voodoo doll holds the solution. But, the player has to shake the physical

voodoo doll, which, in turn, will make the game world shake accordingly. Thus, shaking the voodoo doll will shake lose the key from its place up high (see Fig. 5). The result of shaking the doll is that the key falls to the ground.

Fig. 5. The key is unreachable until the player shakes the Voodoo doll, which consequently shakes the entire room and releases the key

Likewise, the spirit companion can enact various abilities based on its present color. Changing the spirit companion's color opens up new and exciting game mechanics – defined as methods for interaction with the game state [33, 34]. The player shifts the spirit companion's color inside the game world by physically placing a colored piece of paper in front of the physical eyes of the Voodoo doll. Sensors embedded in the voodoo doll will 'read' the color of the paper and alter the spirit companion's color. The ludo-narrative aspect of this correspondence between game world and physical reality is that the voodoo doll is able to "see" the physical colored object.

Moving on. Once the player has found a solution to the puzzles, the player will find herself in a new room, which represents the heart of the physical voodoo doll. Meanwhile, the light that was previously lit up in the right arm of the physical Voodoo doll has turned off. Instead, the light in the region of heart is not ignited.

Fig. 6. The different limbs of the doll represent different rooms in the game world

The room of the voodoo doll's heart functions as a navigational hub and passageway with several doors leading to the adjacent limbs of the voodoo doll: to the head, to the left arm, to the right arm, to the left leg, and finally to the right leg (see Fig. 6).

Furthermore, at the center of the room there is a big furnace: the heart of the voodoo doll. Here, the player can deposit all the collected spirit fragments. When the player deposit spirit fragments the furnace immediately shines brighter, indicating that the voodoo doll is nearing its previous life. Thereby, the brightness of the furnace functions as a 'meter' to measure progression. Important to note, the overall goal of the game is to deposit as many spirit fragments as possible in the furnace. This effort will eventually bring the voodoo doll back to life. When the voodoo doll is awoken, the player, who is currently captured inside the doll, will simultaneously be released from her prison.

4.1 Functionality of the Voodoo Doll

The voodoo doll controller takes an active part in the way the player interacts with the game world. The multiple features and possibilities for interaction assists the player in solving the puzzles of the game. The high-level rule [24] of the game is comprised of the collection of the spirit companions in the game world. The game mechanics [33], on the other hand, are designed to metaphorically mimic the player's physical interaction [35] with the voodoo doll. The metaphorical game mechanics are intended to directly link the voodoo doll with the game world and vice versa. For example, squeezing a limb of the voodoo doll creates an immediate reaction within the game world: the room that shrinks in size when the limb is pinched. Or if the Voodoo doll is being shaken, it prompts an instantaneous reaction in terms of screen shake and the possibility of something happening inside the game world. The corresponding link between interactions with the voodoo doll and the landscape of the game world instantiate a vibrant "dialogue" between the player and content of the game: between what happens to the physical voodoo doll and the events taking place on the screen.

However, the connections between the voodoo doll and the hidden puzzle elements inside the game world needs to be discovered and interpreted in order for the player to progress the game. For example, when the furnace is lit in the room of the doll's heart, the moving mechanical gears in the game world are meant to represent the voodoo doll's heartbeats. Here the player's interpretation is helped by auditory feedback from the physical voodoo doll. For instance, the player is presented with a puzzle where she has to figure out how the varying lengths of the heart beats can be turned into Morse code.

Thus, the voodoo doll transgresses the conventional understanding of game controllers. First and foremost, due to the fact that the voodoo doll looks nothing like a game controller (it looks and feels like a doll as the previous figures have illustrated). Beyond the metaphorical link, the voodoo doll inserts itself into an unorthodox structural pattern of interaction with the game world. This happens, especially, through the said metaphorical correspondence between the player's interactions with the voodoo doll and the associated game mechanics i.e. squeeze the doll to collapse the size of the game space or shaking the doll to loosen a key inside the game world. In spite of how these links intuitively could be thought of as threatening the immersiveness of the experience of play the opposite takes place. The project *Voodoo Doll* does, like Project *Time*

Machine, propel the experience of immersion: the player finds herself intrigued by the metaphorical correspondence between the design of the physical game controller (the voodoo doll), the game mechanics, and the overall game world. The shifting of attention between game controller and game content actually accelerates the immersiveness of experience of play.

5 Towards an Understanding of the Relationship Between Customized Game Controllers, the Player, and the Game World

The traditional generic game controller in the form of keyboard, mouse or game console controller can occupy two different states of being during the experience of play: either "visible", which is what happens when the controller breaks down, cease to respond, and no longer functions or "invisible", which happens when the player's attention is solely focused on the content of the game. In other words, the game controller is inscribed a binary paradigm of being, which is directly inverted by function: either not working or fully functional – of either at the center of the player's attention or a fully "disappeared" thing operating in perfect symmetry with the content of the game (see Fig. 7).

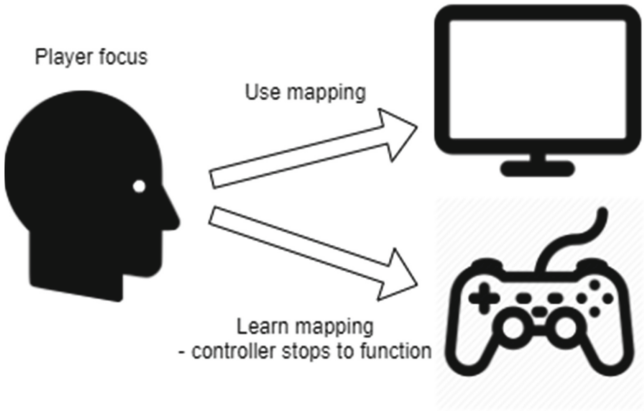

Fig. 7. Illustrates the traditional binary paradigm of the player's attention of the game controller. This model depicts how the player either looks at the controller for references to the layout of inputs (or if the controller stops to function), or fully neglects the controller and focus entirely on the visualizing the game content on the screen.

The relationship between immersion (i.e. the experience of play) within this binary paradigm of understanding game controllers follows a specific pattern. When players are either new to a game or if the controller halts the controller automatically draws attention to itself. However – when the player advances further into the game and develop familiarity with the mapping of the controller inputs in relation to game mechanics – the player's attention gradually shifts away from the controller and hatch onto the game content. So, the "visibility" of the controller decreases parallelly to the player's increased mastering of the controller (lack of attention). Within the traditional binary paradigm, the

relationship between the visibility/invisibility of the controller is linearly proportional with the player's mastering of the interaction of the controller (see Fig. 8).

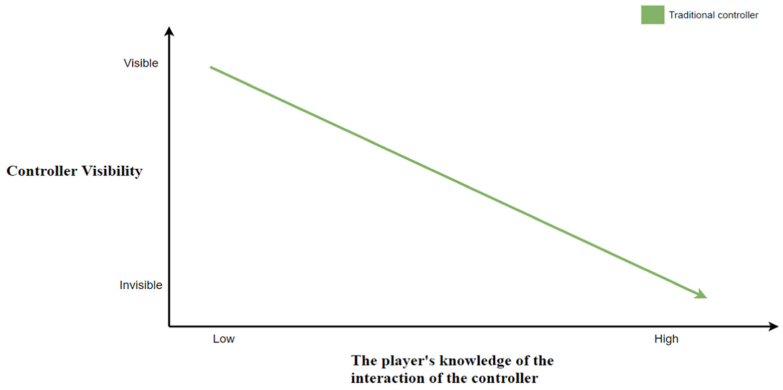

Fig. 8. This figure shows a model, which represents the decreasing "visibility" of the game controller in comparison to the player's increased familiarity with the controller during play.

Interesting, as the controller "disappears" a parallel event takes place: immersion increases. This process links the "disappearance" of the controller with the player's experience of immersion. In general terms, this process highlights, when the player's knowledge of the mapping of the controller bridges the mechanics of the game immersion has the opportunity to take hold. Stated otherwise, the player is becoming progressively more immersed in the game world as a reflection of her increased familiarity with the game controller (see Fig. 9).

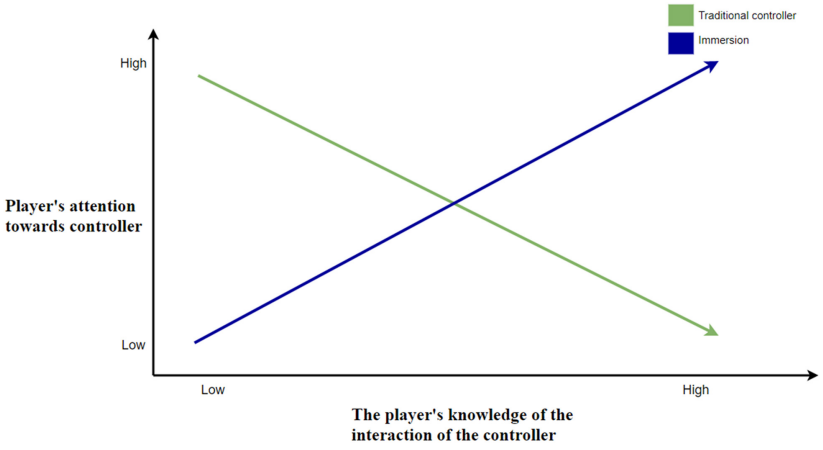

Fig. 9. The traditional binary paradigm of "visibility/invisibility or "appearance/disappearance" of the controller during play directly linked to the experience of immersion.

However, we challenged this traditional binary paradigm in the projects *Time Machine* and *Voodoo Doll*. In those projects, the controller worked in direct opposition to the traditional way of understanding controllers. Here, the customized controllers (a time machine and a voodoo doll) inserted themselves as integral parts of the whole gaming experience.

Players were, in both projects, constantly reminded of the being/status of the controllers. Beyond functioning as controllers, the tailor-made controllers also acted as game objects, which players, on the one hand was inspired to investigate, and on the other hand, strived to master. The Time Machine and the Voodoo Doll require continuous attention alongside the virtual installment of the game. Particularly, the player has to pay attention to the mapping of the inputs and the outputs of the controller and following figure out how they are referenced inside the game world (the metaphorical link between the two). All of this was, of course, presented to the player in incremental steps to mitigate an all too steep learning curve.

Additionally, the player was at no given time given complete knowledge of the game controller – hidden room or unforeseen functions could appear at any time. In spite of these possibilities immersion wasn't disturbed. Nor did the presence of the customized game controller itself and the fact that the player had to pay attention to it, to its functionality, and to learn how it worked disrupt the experience of immersion during play (see Fig. 10).

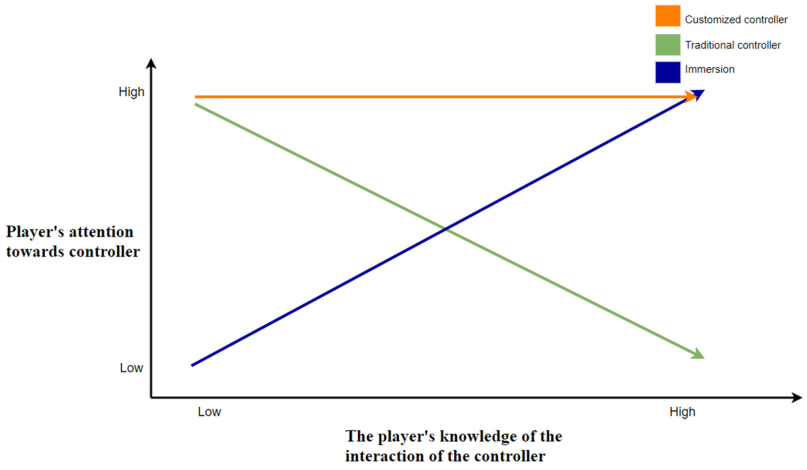

Fig. 10. Shows how immersion tracks in relation to the traditional game controller compared to the customized game controller.

Now, inserting a customized game controller/physical game object into the experience of play not only draw the traditional binary understanding of controllers into the light, it also challenges the conditional underpinnings (i.e. the framework for thinking about) in conceptualizing immersion. Moreover, when a customized controller is applied the traditional *structural pattern* of interaction changes together with the *process of interaction.* The result points towards a new paradigm of interconnectivity between the player,

the game and the controller of the game, and specially, how to grasp the condition for reflecting on immersion (see Fig. 11).

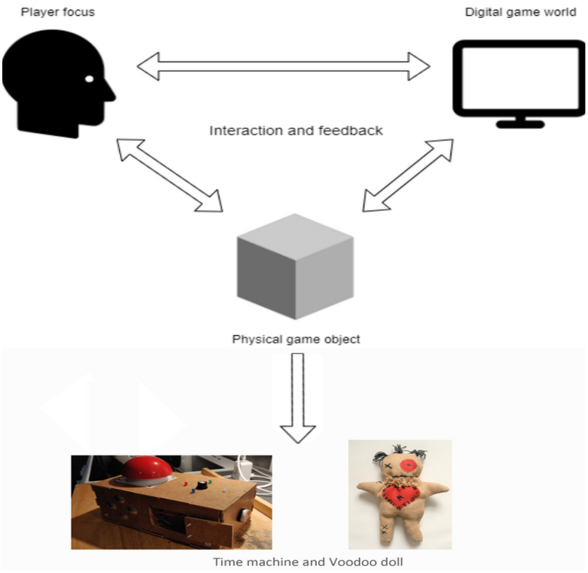

Fig. 11. A model of a tentatively new paradigm of the interconnectivity between the player, the game, and the customized game controller, acting simultaneously both as a physical game object and a controller.

In this paradigm of interconnectivity, the controller intentionally shifts between being either "visible" or "invisible". In the prior and traditional paradigm of interconnectivity, the player would either pay attention to the game content (while the controller became invisible) or focus on the controller (either to learn the layout (its mechanisms) or suffer from defect functionality). In case of the latter, the player would more or less intentional neglect the game content. The result: a languished experience of play.

Within the new paradigm, as advanced in this paper, another relationship between the player, the game controller, and the game content presents itself. Now, the player focuses and shift attention seamlessly between the screen and the controller (which can also be a physical game object, like the time machine and the voodoo doll), all the while both the screen and the object provides visual and auditory feedback to the player about the current game state. Furthermore, the game object and the game content are interconnected: they share information and data while belonging to the same universe of the fiction of the game.

Followingly, the gaming experience can be said to emerge from a tripartite formation of attention: the player, the game content and the customized game controller. Within this tripartite formation, the player *continuously* shift attention between herself, the game content, and how the customized controller works (how to operate and interact with the physical game object) (see Fig. 12).

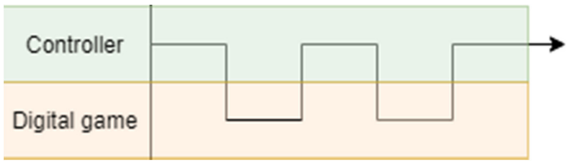

Fig. 12. Within the new paradigm of tailor-made game controllers, the *structural pattern* of interaction between the player, the game, and game controller changes along with the *process of interaction.*

Our findings regarding the difference in the *structural pattern* of interaction between the player, the game, and the controller *and* in the process of playing a game are of special interest. Before, within the old paradigm, the controller was automatically pushed into the background of the experience of play, and the further into the background the controller was positioned the better, especially in regard to the player's sense of immersion. Within this new paradigm the opposite was found to be true. Here, the structural pattern of interaction between the player, the customized controller, and the game content changes significantly. Now, the player's attention moves freely between the customized game controller and game content without disturbing the sensation of immersion during play. Actually, immersion seems to work fine within the confines of this new structural pattern of interaction and the oscillating shift of attention during the process of interaction. So, it seems, the process of interaction changes alongside the transformation in the pattern of interaction. Moreover, neither of these changes seem to negatively impact the creation of immersion or the player's sensation hereof. Instead, the opposite can and have been observed during several play sessions.

The overall consequences of these deep-rooted alterations in the player's interaction and attention, point towards a new way of conceiving the game controller *and* the conditions (i.e. the framework) for thinking about the player's sensation of immersion (see Fig. 13).

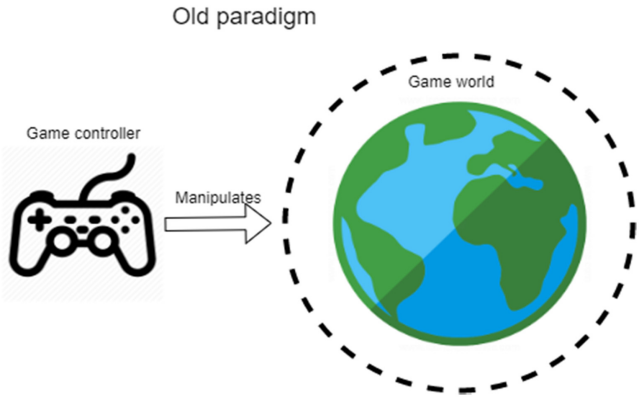

Fig. 13. The old paradigm of the interaction is binary: on the one side the player is positioned while on the other side the controller and game world are placed.

In this new paradigm, the customized controller both act as a game controller and as a game object, which injects the customized controller into the game world. The customized controllers in the projects: The Time Machine and The Voodoo Doll, simultaneously acts as sites for interacting with the game state (i.e. navigation, interaction and so on) *and* as a physical game object to be explored (see Fig. 14).

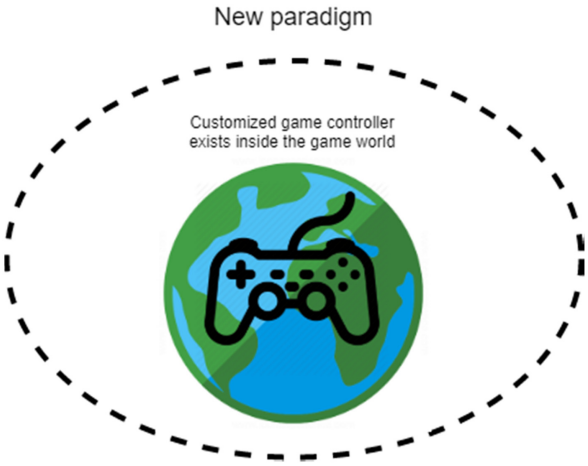

Fig. 14. This model shows how the customized controller is positioned inside the experience of play. The tailor-made controller is a device for interacting with the game state *and* establishes itself as a game object in its own right.

6 Concluding Remarks

In this paper, we have challenged the traditional conditional underpinnings for understanding immersion and the up until now structural pattern of interaction between player, controller and game world. Through the projects *Time Machine* and *Voodoo Doll* we discovered that the conditions for reflecting upon immersion as well as the traditional pattern of interaction rested on a binarily structure: the player was positioned, together with the controller, in opposition to the game world. Implicitly, this structure aims to suppress and subjugate the presence of the game controller. Within this traditional setup game controllers can occupy one of two states: either "visible" or "invisible". Our projects, with their customized game controllers, challenged the traditional formational underpinnings behind the concept of immersion together with the binary paradigm of thinking about the controller and its place within the experience of play.

We aimed to investigate the design possibilities of tailor-made game controllers together with their potential impact on the player's experience of play, especially, how these customized game controllers influenced the player's sensation of immersion during play. We found that customized controllers seamlessly integrate themselves and smoothly inhabit the experience of play. Interestingly, we discovered that the player's use of

the time machine and the voodoo doll didn't disrupt immersion. On the contrary, the customized game controllers fueled the players' experience of immersion. This finding contradicts the implicit design assumptions and way of thinking about not only about controllers, but also in regard to the entire framework for thinking about immersion. Furthermore, we discovered that customized game controllers can act as game objects fully belonging to the game world *and* act as devices for interacting with the game world (i.e. solving puzzles and so on).

Taken together, these findings dispute the traditional binary paradigm of interaction between the player, the controller, and the game. Instead, customized controllers can be inserted as active "participants" in the entire experience of gaming. Moreover, we discovered that customized game controllers established new *structural pattern* of interaction between the player, the game controller, and the game world. This structure also highlighted a different *process of interaction*: now the player's attention oscillates lively between figuring out how to use the customized controller *and* interpreting metaphorical links to the game world: deciphering the mapping between the abilities of the game controller and how it corresponds to the game mechanics of the game world.

We advance the argument that the player's experience of play without difficulty can expand itself to encapsulate a physical game object in the shape of a tailor-made game controller. This argument point towards a new paradigm of thinking about the interaction between the player, the controller, and the game world, especially, the insertion of the customized game controller as an active extension of the game world and effective actor in the experience of the game.

The relationship between the experience of immersion and perception of the controller, as it is implicitly promoted in the traditional paradigm, has now undergone a significant change. Our analysis discovered that the player's sensation of immersion enhances even though the player constantly shifts attention between exploring the customized controller and solving the puzzles of the game world. Followingly, we have highlighted the conditions or underpinnings in the current way of thinking about the concept of immersion, especially, how reflections inherently are tied to the levels of presence of the game controller. Thus, we propose new paradigm of thinking about the concept of immersion *and* the interaction between the player, the controller, and the game world. Within this new paradigm different *structural patterns* of interaction together with varied *processes* of playing intersect with the player's attention and how it seamlessly can oscillate between investigating the customized controller and solving the puzzles of the computer game (see Fig. 15).

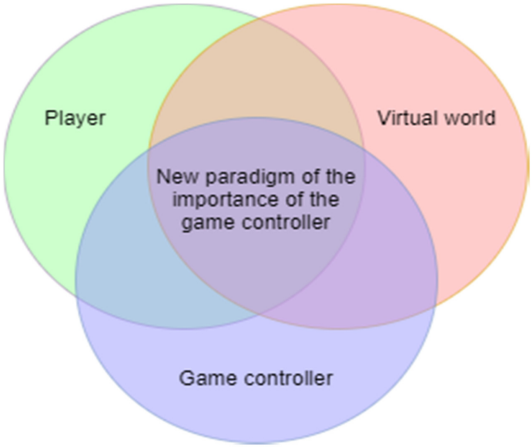

Fig. 15. The insertion of the customized game controller (controller and physical game object) in the center of the experience of play.

Finally, future research could further elaborate on the relationship between the player, the controller, and the game world, and how this tripartite structure impacts the experience of play. The future research could draw attention to another under investigated aspect of computer game play [2], namely, the aspect of rhythm and its influence on the experience of play. A natural point of departure would be to focus on how the rhythm of the player's oscillating attention resonates the rhythm of the design of the game and possibly with the experience of play.

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