

UNIWERSYTET KAZIMIERZA WIELKIEGO
KOLEGIUM IV
INSTYTUT KOMUNIKACJI SPOŁECZNEJ I MEDIÓW

Julia Stocka

98057

**Mechaniki w wybranych grach rytmicznych oraz ich wpływ
na immersję i flow**

Praca licencjacka napisana pod kierunkiem
doktora Miłosza Markockiego

BYDGOSZCZ 2025

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**Mechanics in Selected Rhythm Games and Their Impact
on Immersion and Flow**

Bachelor's thesis written under the supervision of
Doctor Miłosz Markocki

BYDGOSZCZ 2025

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Tu wpisz treść streszczenia pracy. Abstrakt powinien zawierać:

- główny cel pracy
- zastosowane metody badawcze
- najważniejsze wyniki
- główne wnioski

Abstrakt powinien zmieścić się na jednej stronie.

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Introduction

1.1 Objectives

1.2 Methodology

Chapter 2

Beginning of the genre

Before one needs to understand what exactly is behind the term "rhythm game" one needs to understand the history and heritage of the genre. The first game to introduce a gameplay that somehow resembles part of mechanics of contemporary rhythm games is Simon created in 1978 by Ralph Baer and Howard Morrison. In that computer handheld game, the player needs to repeat the sentence in which the buttons light up. The sequence becomes progressively longer, up to the point where a player is unable to repeat it in the right order. There was no background music to it to speak of, so it cannot be considered a fully-fledged rhythm game, but the action of repeating sequences and patterns is a fundamental part of present-day rhythm games genre.



Figure 2.1: Electronic game Simon - It became a massive worldwide success, becoming a pop culture symbol. The game spawned many different releases and imitators with similar or same basic gameplay. [1]

The first rhythm game that can be recognized as such is PaRappa the Rapper (1996) published by Sony Computer Entertainment for PlayStation platform, building

its core gameplay around music. Because of its unique art style, good narrative and catchy soundtrack, the game was well received among the players and critics, listed as one of the best video games ever made several times. [2] This success contributed significantly to the rise in popularity of the genre. In the PaRappa the Rapper gameplay, the player must press correct buttons in response to the rhythm of currently playing track and symbols that appear on the top of the screen. The correct sequence is first performed by a teacher, after which PaRappa needs to respond accordingly. Pressing the correct buttons in accordance to the rhythm results in PaRappa rapping. One can observe the resemblance to aforementioned Simon electronic game — PaRappa built upon this mechanic, adding additional visual and auditory feedback, background music and grading system, setting the stage for further developments of this genre. Especially important was the addition of background music synced with other gameplay elements, making it easier to time the hits correctly. The player's final accuracy is graded from Awful to Cool — this is currently a standard, expected element of every representant of the genre. The score is affected not only by omitted hits, but also less-than-ideal hits - the more accurate the hit, the better the rating.



Figure 2.2: A frame from the PaRappa the Rapper Remastered from 2017 showing the input guide at the top of the screen, grading and scoring system. Remastered was used here as an example, but the original had the exact same mechanics back in 1996. [3]

The release of Beatmania in 1997 by Konami was another milestone in the development of rhythm games genre. To enhance the player's experience with a more immersive input device, the game was introduced to Japanese arcades instead of releasing it on home platforms. Beatmania's arcade cabinet include a special input device

which resemble a DJ console -- it consists of 5 buttons arranged in a piano-like pattern and round pad that mimic a vinyl record.

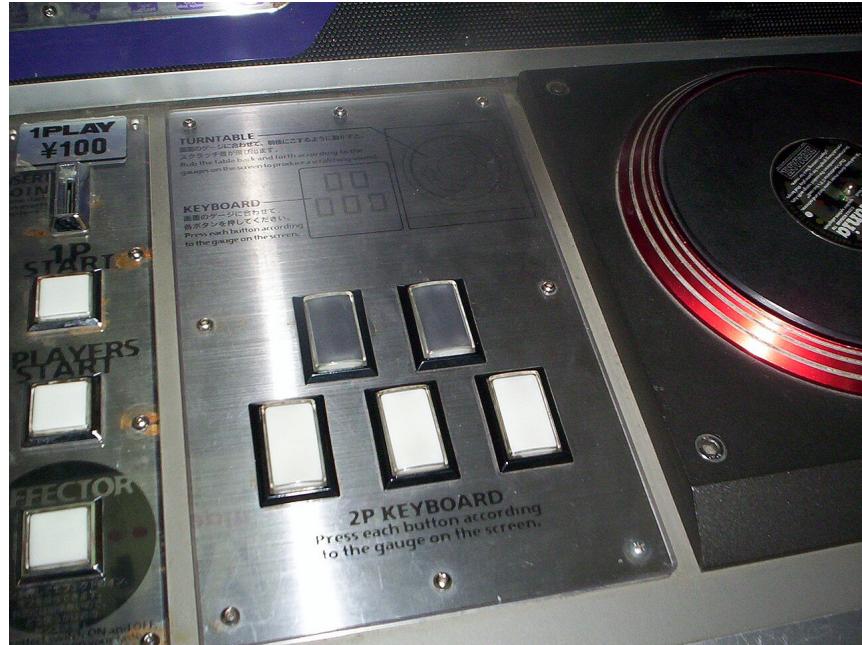


Figure 2.3: A controller of 1st Beatmania arcade release, showing the buttons layout and the turntable. [4]

The gameplay is enclosed on a stage that consists of a vertically-scrolling panel with hit-notes on the sides, music video and audience bar in the middle. The player is supposed to press the buttons and turn the turntable accordingly with the notes that are falling from the top to the bottom of the screen, indicating the time to react when they fall down on the judgement line above illustration of the controller. This is currently known as vertical scrolling rhythm game -- which PaRappa the Rapper could not be considered as such because it showed the input sequences in batches. The game turned out to be a big hit, resulting in Konami putting more effort and resources into Konami's Games and Music Division. Due to the success of Beatmania, this department changed its name to Bemani paying respects to its prior game title. [5] After exploring with more concepts of rhythm games, they came up with another big hit, which was Dance Dance Revolution (1998) -- pioneering title in the rhythm game genre. It adapted the basic concept of vertical scrolling rhythm game to a new form of input. The game is controlled through a dance platform, with the player standing in the middle and pressing the buttons with their feet.

The core gameplay is very akin to beatmania, sans the turntable. The VSRG formula has been adapted to a new type of play with player in standing position, dancing to the upcoming rhythm notes. This small change resulted in an experience

unlike anything before, as following the patterns became even more natural and dancing became a natural result of playing the game properly. The game became an even bigger success than beatmania, achieving worldwide popularity, being an introduction to the rhythm game genre for many players around the world. A major factor in this was definitely a natural connection between its input method and gameplay revolving around dancing.

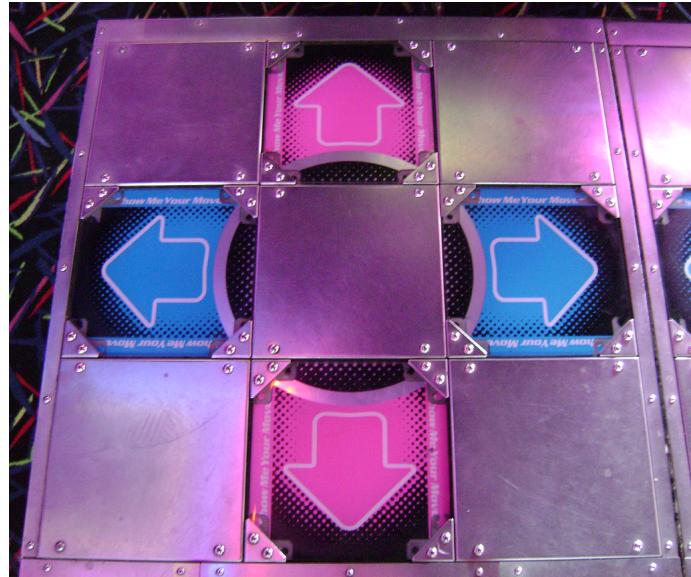


Figure 2.4: A Dance Dance Revolution dance platform. [6]



Figure 2.5: Dance Dance Revolution gameplay, showing previously described gameplay elements such as health bar and hit notes with matching alignment bar - taking a form of note outline. Music video is shown playing in the background. [7]

Taking these games as examples, the core gameplay of all rhythm games is based on performing an action accordingly to the music's rhythm and displayed pattern. It can be defined that a rhythm game is a medium that puts strong emphasis on a player's rhythm sense, coordination and reflexes. Another staple of the medium is often a presence of a custom controller, as demonstrated by beatmania and Dance Dance Revolution. This stays true to this day -- BEMANI is still publishing new installments of those franchises as of 2024, as well as other rhythm games that incorporate all aforementioned mechanics. An example of other immensely popular series featuring such would be Activision's Guitar Hero series that successfully ported the arcade experience onto the living room, bundling the game with the controller starting on the 6th generation of video game consoles.



Figure 2.6: Guitar Hero Metallica PS2 bundle, showing the game disc and plastic guitar controller. [8]

2.1 Further developments

Consecutively, rhythm games were released to both arcades and other platforms, such as home and handheld consoles or PCs. In order to relocate the experience of arcade booths into home, input devices of arcade games were adapted into home versions of dedicated controllers. For example, an open-source project StepMania, which is both a PC game and game engine at the same time, was developed with the purpose of replicating the Dance Dance Revolution experience at home. It can be played with keyboard or dance pads matching the pattern of DDR, or alternatively

following Pump It Up! (Andamiro) controls -- a dance game with 4 buttons placed diagonally and one extra button in the middle.

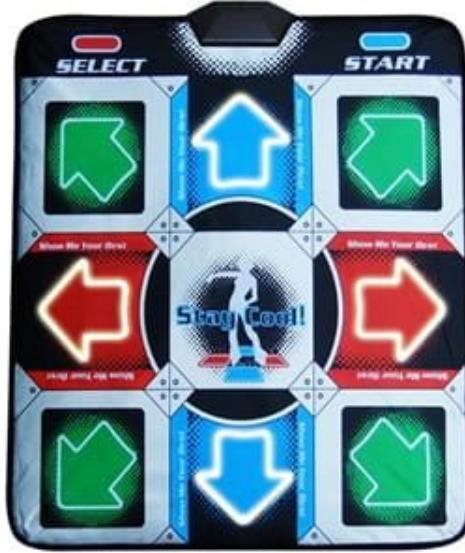


Figure 2.7: A soft dance-pad which can be used to play both DDR and Pump it Up! at home, It can be plugged into a PC or a console. [9]

In the present day, there are many popular PC games that do not require any dedicated controllers or input devices, making it easier to entry the genre with basic gaming setup. Games such as StepMania, osu! or DJMAX, have online scoreboards and online multiplayer modes, that bring players together and create lively communities, making the competitive nature as a natural part of their gameplay and purpose for players.

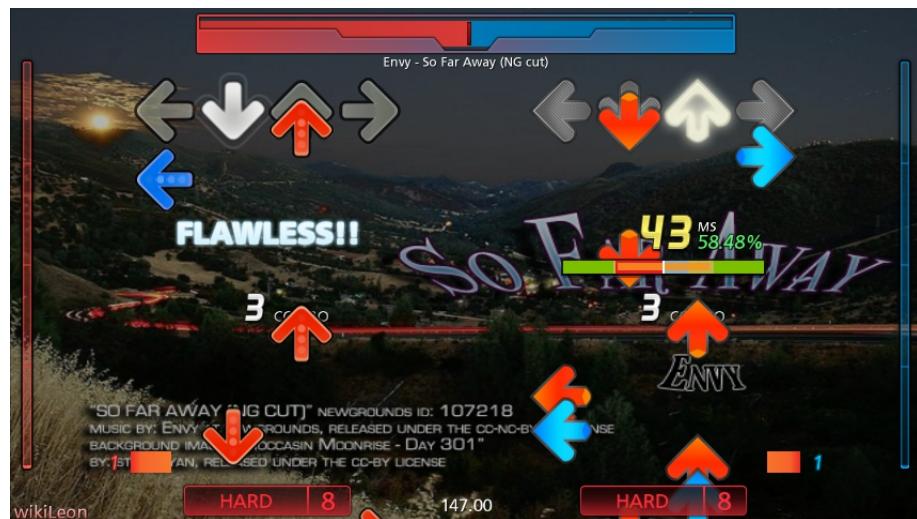


Figure 2.8: StepMania screenshot, showing Multiplayer Mode where 2 players are competing with each other for better score. [10]

The screenshot shows the osu! online leaderboards interface. At the top, there's a green header with the 'osu!' logo and the word 'rankings'. Below it, a dark navigation bar has 'performance' selected. A dropdown menu for 'COUNTRY' is open, showing 'All' as the current filter. The main area is a table of player statistics, with a page number indicator at the top right showing page 1 of 200.

#		Player Name	Accuracy	Play Count	Performance	SS	S	A
#1		mrekk	98.23%	208,542	31,699	64	1,532	2,036
#2		Accolibed	97.81%	332,583	26,942	40	950	2,084
#3		wroclaw	96.88%	99,902	26,202	43	716	1,543
#4		gnahus	99.07%	150,735	25,039	693	3,095	1,480
#5		Detective	97.01%	262,965	24,817	177	3,113	3,474
#6		NINERIK	98.53%	177,969	24,012	203	1,195	1,354
#7		JappaDeKappa	96.99%	154,001	23,891	92	458	1,404
#8		bored yes	97.63%	112,925	23,386	27	663	932
#9		milosz	97.63%	154,756	23,383	59	346	1,002
#10		NyanPotato	95.85%	179,515	23,365	16	435	1,027

Figure 2.9: osu! online leaderboards as of Jan 2025, showing top players performance from around the world. [11]

On the other hand, there are many arcade games that have unique controllers with various forms. One of such arcade game that is worth mentioning is WACCA, developed published by Marvelous which was created in collaboration with HARDCORE TANO*C, released in 2020. The game's user interface is enclosed in a circle, surrounded by a circular, segmented ring panel on the screen edges. The notes are appearing on the center screen, approaching the player through the ring panels. Because it's fun form somehow resembling a washing machine drum, this game stands out from other rhythm game arcades, as it's financially unviable to port to a home console or a PC due to this control and gameplay.



Figure 2.10: Figure 10 WACCA's arcade booth, showing it's unique form and controls. [12]

The genre of rhythm games also has an immense value as educational tool, as showed through the release of Rocksmith by Ubisoft. Instead of using a fake plastic controller, the game allows the player to plug in any real electronic guitar, making it the center point of the game. The game's interface is similar to Guitar Hero's stage, but approaching notes are more specific in order to instruct player what grips and strings are supposed to be used. Due to using a real guitar instead of plastic device, the game was received as great development milestone in the genre, highlighted by the educational value provided by playing on an actual instrument, as creating a digital rhythm game with real instruments as an input device was a notable achievement for the genre. The game is developed to this day in form of Rocksmith+ – a free-to-play title available on PC, monetized through in-app purchases of songs and lessons.

As Fayali Kares stated in his thesis "Playing Music: Design, Theory, and Practice of Music-based Games" [13]:

Overall, rhythm games have changed very little over time. The only changes Harmonix made to the much older Konami games concerned perspective and direct control of the underlying soundtrack. Distinction between rhythm games revolves mostly around the different input devices. From floor mats

in DDR, to turntables or guitars, a variety of interfaces have found their way into the homes of rhythm game fans.

Noteworthy, despite the fact that all rhythm games have similar core gameplay, with the development of technology this genre has been able to expand the player experience through the use of new input devices and unique approach to the gameplay. With the rise of such technologies as virtual reality or touch screens, rhythm game developers have utilized new solutions in order to create new experiences. Because of this, the creativity of game designers is no longer limited as it was in the past.

Chapter 3

Immersion in Rhythm Games

In order to immerse the player onto the game, previously described core gameplay mechanics are further enhanced by visual, auditory and tactile feedback. It is done by using additional hitsounds, visual effects, or in the case of arcade cabintes, through decorations around the cab. Because of it, it is easier for the player to get into the flow state – a state of mind where the player is fully immersed in the game and is able to perform at their best. Additionally, during that state the player obtains the most enjoyment from the performed activity. As Jenova Chen says in his MFA thesis [14]:

"People associate many feelings with "fun": the sense of timelessness, of being at one, of exhilaration, focus, immediacy. All of these are characteristic of "fun".

There is universal agreement that without a dynamic balance between the challenge of an activity and the ability to meet that challenge, fun is something we are definitely not having. Interestingly, making it possible for anyone to find exactly the right amount of challenge to engage with the exact abilities is the only way to access Flow. This means that when work is fun we have created complex, but negotiable challenges, challenges that allow the individual to engage or disengage, to work harder or work safer. [Dekoven DeepFun.com]

At this point, fun can be defined as Flow, a balance of the relationship between challenge and ability."

As the player can adjust the desired difficulty level, it is easy to find the perfect balance between the challenge and player's ability to meeet it. This is the reason why rhythm games are accessible for both begginners and advanced players, who are familiar with the genre already. In both cases, the gameplay and game design provide good conditions for the player to get into the flow state. No matter the skill of the player,

elements of the gameplay, UI and auditory feedback play a crucial part in the immersion and entering the flow state. Described feedback is especially visible in Beat Saber – a Virtual Reality rhythm game, where the player is fully transferred into the game world through VR headset and controllers. The gameplay of Beat Saber tracks the movement of the player’s body and controllers which are held in both hands, requiring the player to slice approaching notes with two swords (controllers) and avoid obstacles by actually moving their body. Upon slicing the notes, the game provides auditory, haptic (using the vibration of controllers) and visual feedback – the sight and sound of the note being cut in half inform that the note had been correctly cut, providing the instant response matching the rhythm of the currently played song. While being surrounded by the game world in VR, the score and combo counter is shown to the player during the gameplay, making it possible to keep track of the performance during gameplay. As every other rhythm game, the player can start by playing easy levels and understand the basic mechanics of the game, grasping its rules through the observation of the outcome and instant feedback. The game’s UI is intuitive – for example, the notes which are approaching the player have an arrow which indicates the required direction of the slice. If this mechanic is too difficult of a beginner, it is possible to turn on the no-fail mode or make the notes possible to slice from all directions. This way, the game is accessible for the most novice players who also need to get used to VR and controllers.



Figure 3.1: Beat Saber – screenshot of the gameplay. The red notes are corresponding to the sword held in the left hand, and the blue ones which correspond to the sword held in the right hand. The arrows placed on the notes are indicating the direction of slicing. [15]

Fares Kayali emphasises this aspect of immersion in his article [16]:

"When designing a game, one must focus on the experience of the player and his or her involvement with the game. Ideally, an immersive game ex-

perience suspends the player in a state of flow. Being immersed and acting in flow with a game world leads the player to a "willing suspension of disbelief", a mental state first described by Samuel Taylor Coleridge (1817) in relation to literature and the reader. It signifies the willingness of the reader (or in this case the player) to "buy into" the prepared fictional world, putting aside rational doubts about its authenticity. The recipient suspends disbelief, diving into the presented world and greatly raising involvement. To enhance this state of immersion, a fictional world must provide a consistent setting that does not disrupt this willing suspension of disbelief."

Through immersing the player fully into the game world by the Virtual Reality, the experience of Beat Saber is more likely to put such rational doubts of the player aside, enhancing the player's focus and commitment to the gameplay. Moreover, the Beat Saber's feedback is satisfying and rewarding, making the world presented in Virtual Reality more consistent with the musical experience.

Another example of such usage of feedback is SOUND VOLTEX – an arcade rhythm game developed and published by BEMANI, featuring an unique controller with four main buttons placed in the middle, two wide buttons placed below main buttons and two knobs placed on the sides of the controller.



Figure 3.2: SOUND VOLTEX Controller – the composition of its controller makes it stand out from other rhythm games cabinets.[17]

Once the player has chosen a track from the list and the difficulty of the chart (song), the game is played on a vertically scrolling road with 6 segments with aforementioned notes that correspond to the physical buttons. The gameplay consists of 3 types of notes: Basic white notes that appear in the middle 4 segments, corresponding to the white buttons; Orange notes which appear beneath white notes and cover 2 middle segments - corresponding to the wide buttons placed on the bottom of the controller; Two lasers marked with vivid colors: Blue (left knob) and pink (right knob) that appear on the outer segments of the road. In order to better understand the game

and distinguish types of notes, the buttons on the controller are signed with names: knobs are named VOL-L (left) and VOL-R (right), names BT-A, BT-B, BT-C, BT-D for white main ones, and FX-L and FX-R names for bottom, wide buttons. Thank to the arrangement of the controller's buttons and vivid colors of notes showed during the gameplay, the player can easily get used to reading the chart and hitting the corresponding buttons. As the note reaches the judgement line (above the representation of the controller), the player can see the accuracy of the hit – the note is judged as CRITICAL, NEAR or MISS. The game also features a lifebar, which goes up as the notes are hit to the rhythm, or decreases if missed. In order to pass the chart the player must exceed the particular level of health bar (which differ from one to another difficulty). If the player is missing too many notes, it causes the song to CRASH, ending the course. Moreover, the buttons of SDVX controller are satisfying to use, as they light up as they light up and give a firm, tactile response with a satisfying "click" upon pressing. On top of that, the modern design of the game's cabinet and controller matches the futuristic aesthetic of the game, presented in the game's gameplay, UI, illustrations and featured music, which includes many genres but revolves mostly around electronic genres. The game's menu features characters in anime-style illustrations, with sci-fi inspired outfits, accessories and hairstyles, matching the futuristic aspects of the game.



Figure 3.3: SOUND VOLTEX – screenshot of the gameplay. The player is required to press the buttons and turn the knobs in the rhythm of the song. In this screenshot, the one can see the blue laser note which requires the player to turn the knob from left to right, which is further followed up by pressing up the orange note and then the white one. [18]

The auditory feedback of SOUND VOLTEX is especially important regarding the immersion of the game. Similarly to beatmania, every hit of the note and following the laser notes are mixing the original version of the song played, providing new experience

from listening to it. As one song usually have few difficulties to play, the same song can have several remixes based on the density of notes to hit. The laser notes are making this experience even more immersive, as the "laser" sound produced by turning the knob is different depending on the direction of the turn and the speed rate. It comes along with the visual feedback of the game, as the whole stage is rotating accordingly to the knobs input. Such aspect is heightened when clearing sharp turns, in which the laser line crosses the road horizontally – such laser notes require the player to turn the knob quickly, producing intense swishing sound effect that comes along with whole 360 degree spin of the scene. On the other hand, long orange notes that requires the player to hold the wide buttons are used to produce a sound effect that resembles a DJ turntable scratch. During the gameplay, the stage also zooms in or out to enhance the particular moments of the song – such as more melodic or build-up parts with many notes to hit. It enhances the player's experience and makes the chart easier to read, as zooming out shows more of the upcoming notes. Adding the haptic feedback which is produced by the controller's buttons, the player can feel as they are acutally performing and remixing the playing song. Such connection of the visual, auditory and haptic feedback, plays a crucial part in immersing the player and evoking the flow state. As the feedback makes the gameplay more satisfying and enhances the rhythm, it is more likely for the player to enter the flow state, while enjoying the game to the fullest. Such experience provides better enviroinment to focus on the play, as the fully immersion makes the game easier to learn and master the player's skills.

As Mihaly Csikszentmihalyi says in his book "Flow: The Psychology of Optimal Experience" [19]:

"As our studies have suggested, the phenomenology of enjoyment has eight major components. When people reflect on how it feels when their experience is most positive, they mention at least one, and often all, of the following. First, the experience usually occurs when we confront tasks we have a chance of completing. Second, we must be able to concentrate on what we are doing. Third and fourth, the concentration is usually possible because the task undertaken has clear goals and provides immediate feedback. Fifth, one acts with a deep but effortless involvement that removes from awareness the worries and frustrations of everyday life. Sixth, enjoyable experiences allow people to exercise a sense of control over their actions. Seventh, concern for the self disappears, yet paradoxically the sense of self emerges stronger after the flow experience is over. Finally, the sense of the duration of time is altered; hours pass by in minutes, and minutes can stretch out to seem like hours. The combination of all these elements causes a sense of deep enjoyment that is so rewarding people feel that expending a great deal of energy is worthwhile simply to be able to feel it."

Analysing aforementioned SOUND VOLTEX mechanics and feedback regarding this quote, it is easy to obseve how the game evokes the flow state. The provided satisfaction from the play is ensured by engaging the player in the task that may be

completed in deep focus state – starting from the ability to choose favorite song and the desired difficulty, followed by the instant feedback and responsible mechanics during the gameplay, ending the course with results, score and the feeling of accomplishment. Such design of the player’s experience provides a great environment that enhances the player’s engagement, supporting the ability to learn and master the game. Taking all of the described elements into the account, it is clear that elements that enhance the immersion are concomitantly evoking the flow state.

Chapter 4

Podsumowanie

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