Otogarden: Exploring Musical Improvisation in Video Games

Oliva, Costantino

2022

COSTANTINO OLIVA AND ARI POUTIAINEN

Otogarden

Exploring Musical Improvisation in Video Games

ABSTRACT In this article we present ludomusicological research associated with the development of the video game *Otogarden*. Players of *Otogarden* are able to repeat short musical phrases through the use of a loop mechanic, juxtaposing sounds extemporaneously. By using the methodology of research through design, *Otogarden* addresses aesthetic and design issues related to musical participation in video games. Specifically, this article argues that video games, a contemporary venue for technologically augmented musicking, can allow access to novel forms of musical improvisation. In fact, while video games afford a remarkable variety of musicking, examples related to musical improvisation remain underexplored, with popular games favoring score-based interactions, as established by titles such as *Guitar Hero* or *Rock Band.* In similar examples, music is presented as a task to be completed, mediated by prerecorded compositions and simplified notations. Notable exceptions, such as the experimental game *Electroplankton*, have been criticized specifically for their lack of composition-oriented functionalities, seemingly neglecting the inherent value of improvisatory musical practices in video games.

   Otogarden challenges this understanding of a "music game" by focusing on the largely untapped potential of musical improvisation, "an activity of enormous complexity and sophistication, or the simplest and most direct expression."[1] In order to gain feedback on *Otogarden*'s special characteristics, we held a playtesting session with a sample of university students (N=21) with a special interest in music and music education. We collected research data from this session in the form of a survey. Analysis reveals different manifested perspectives, offering players novel creative opportunities. In addition, the game has surprising potential as a music-education tool. We conclude that it is possible to deliberately stimulate players' perspective on the game in an improvisatory musical direction, making evident the extemporaneous musical possibilities connected with digital game engagement.   KEYWORDS musical improvisation, game design, ludomusicology, research through design, improvisation, music education

MUSICAL IMPROVISATION IN VIDEO GAMES

Otogarden (Oliva, Mighty Box, 2021) (Figure 1) is a music game informed and inspired by ludomusicological research, and it is intended to explore and make manifest aspects related to musical improvisation in video games. Without a doubt, improvisation is among the most fascinating approaches of musical expression. While the genre of music games has long been popular, with commercially available examples exploring a variety of possible musical interactions and situations, improvisation remains a seldom-applied musicking modality. This article contributes to this particular field, discussing

1. Derek Bailey, *Improvisation: Its Nature and Practice in Music* (Boston: Da Capo Press, 1993), 84.

FIGURE 1. Otogarden illustration (author: Fabrizio Calì).

Otogarden as well as general issues related to musical improvisation within the context of video games. In addition, the game is addressed in regard to its application in an educational context.

Most notably, *Guitar Hero* (Harmonix/RedOctane, 2005) and *Rock Band* (Harmonix, 2007) have been instrumental in establishing a paradigm of musical interaction, involving the use of dedicated input devices and game mechanics rewarding the skillful execution of popular rock songs. In these games, the onscreen visuals are prominently occupied by a simplified notation inspired by guitar tablature,[2] which is continuously scrolling in tight synchronization with the backing musical track. While this format is comparable to other examples, such as *Taiko no Tatsujin* (Bandai Namco, 2001) or *Dance Dance Revolution* (Konami, Bemani, 1998), it should be noted that the music game genre is not at all understandable as homogeneous. For example, *Rhythm Heaven* (Nintendo, 2008) features an intense rhythmic interaction, where players are requested to recognize musical cues and react accordingly by tapping on the Nintendo DS touchscreen. The game features a number of ironic, comical vignettes but does not feature semblances of notation; the audiovisual synchronization is instead established between musical cues and animations of numerous characters. Players can use the visuals to appropriately time their input; the dynamic nature of the visuals can underline cues in a more or less explicit manner, rendering timekeeping efforts to various degrees of difficulty. Somewhat similarly, *Thumper* (Drool, 2016) does not display a discernible musical notation. In this example, players control a beetle-like creature as it speeds through a track. Obstacles can be overcome by providing accurate and timely button sequences, which are prompted by visual and aural cues (Figure 2).

---

2. Nicole Biamonte, "Musical Representation in the Video Games Guitar Hero and Rock Band," in *Pop-Culture Pedagogy in the Music Classroom: Teaching Tools from American Idol to YouTube*, ed. N. Biamonte (Lanham, MD: Scarecrow, 2011), 136.
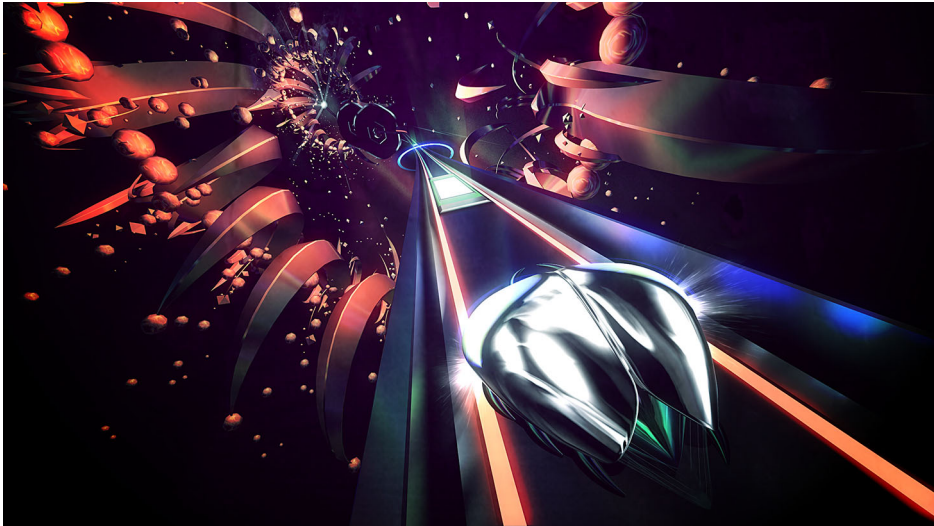
FIGURE 2. Thumper gameplay.

All these examples, despite their diversity, are commonly grouped together as music games. Arguably, they all sport an "intimate and reactive musical bond,"[3] in that input and audio are tightly synchronized. Moreover, they also connect musical engagement with positive game states; in other words, players' activities are assessed in real time, connecting rhythmically correct input with positively rewarded outcomes by the game system. In this regard, *Guitar Hero*, *Rhythm Heaven*, and *Thumper* all belong to a category of music games "in which the player is [either] right or wrong."[4] The games do not emphasize extemporaneous musical activities; instead, they reward accurate performances and a significant understanding of certain complex patterns and sequences. Moreover, these examples all feature canonic characteristics of games, most notably clearly stated winning conditions. Game designers, however, have long experimented with different formats, creatively challenging traditional understandings of games. These "nongames," while largely situated within the context of video games and making use of their conventions and tropes, do not necessarily implement winning conditions or other game-like features. Jesper Juul situates this phenomenon within contemporary independent games and their design trends and objectives, noting how the general expectations toward games have rapidly changed.[5] In previously published research, Juul had in fact formulated a definition, the Classic Game Model, which identifies certain necessary features that should be present in games, including "variable, quantifiable outcomes

3. Mark Grimshaw, Tan Siu-Lan, and Scott D. Lipscomb, "Playing with Sound: The Role of Music and Sound Effects in Gaming," in *The Psychology of Music in Multimedia*, ed. S. Tan, A. Cohen, S. Lipscomb and R. Kendall (Oxford, England: Oxford University Press, 2013), 291.

4. Anahid Kassabian and Freya Jarman, "Game and Play in Music Video Games," in *Ludomusicology: Approaches to Video Game Music*, ed. M. Kamp, T. Summers and M. Sweeney (Sheffield, England: Equinox, 2016), 123.

5. Jesper Juul, *Handmade Pixels: Independent Video Games and the Quest for Authenticity* (Cambridge, MA: MIT Press, 2019), 224.

[that] are assigned different values, some positive and some negative."[6] However, he later acknowledged that these particular features are effectively not necessarily present in contemporary examples of games, and are actually challenged by independent, experimental game designers: "When I made this definition in 2003, I described a model that was dominant at a particular moment in time, and this made it useful for noticing when our conception of *game* changes. . . . By now, whole subgenres . . . go beyond the classic model."[7] Similarly, Espen Aarseth and Gordon Calleja argue that "the phenomenon of games is not a formally definable set but a historically constructed notion."[8] The research effort articulated and documented in this article can be situated within this discourse, aiming to identify and challenge contemporary cultural expectations toward the musical engagement possible with video games. As noted, video games often seem to focus on rather prescriptive forms of musical engagement, with musical improvisation remaining a fairly underexplored musical modality within this context.

Granted, it is important to note that the diversity of musicking afforded by video games at large is remarkable;[9] for example, in-game interactions frequently afford the manipulation of musical fragments through the use of adaptive or generative musical systems. As noted by Tim Summers with reference to *The Legend of Zelda: Ocarina of Time* (Nintendo, 1998), dynamic music systems might not render obvious the relation between in-game actions and sonic output:

> The music for Hyrule Field responds to Link's location, his actions and the nearby enemies. In doing so, it binds together geography, character, events and the player (who is ultimately responsible for Link's location and actions). The music programming does not make obvious precisely how it responds to the game action, unlike elsewhere in the game, when musical reactions are immediate. Players may not notice that the segments of the cue sound in an indeterminate order. The variation for the "danger" music is most likely to be identified by players, because of the ear-catching dissonance, but the relationship between Link's movement and the reflective tags is less immediately apparent.[10]

In similar examples, players' activities during gameplay are fundamentally involved in the manipulation of the musical contents, determining, for example, the dynamic juxtaposition of two different compositions according to a change in the location of the player's avatar on the map. Even if such players' activities might not be intended to determine certain musical or acoustic outputs (i.e., the players' motivation is not to trigger a different

---

6. Jesper Juul, *Half-Real: Video Games between Real Rules and Fictional Worlds* (Cambridge, MA: MIT Press, 2003), 36.

7. Juul, *Handmade Pixels*, 224.

8. Espen Aarseth and Gordon Calleja, "The Word Game: The Ontology of an Indefinable Object," in *Proceedings of the 10th International Conference on the Foundations of Video Games (FDG 2015)*, June 22–25, 2015, Pacific Grove, CA, USA, 2.

9. Christopher Small, *Musicking: The Meaning of Performing and Listening* (Middletown, CT: Wesleyan University Press, 1998); Costantino Oliva, "Musicking with Digital Games" (PhD diss., University of Malta, 2019, accessed May 9, 2021, https://www.um.edu.mt/library/oar/handle/123456789/62365.

10. Tim Summers, *The Legend of Zelda: Ocarina of Time – A Game Music Companion* (Bristol, UK: Intellect, 2020), 102.

musical accompaniment), they nonetheless have a tangible impact on the resulting musical output, due to the mechanical characteristics of such systems.[11]

In the video game examples discussed so far, from *Guitar Hero* to *The Legend of Zelda: Ocarina of Time*, players manipulate, reconstruct, and interact to different degrees with musical materials during engagement with video games. This form of engagement is here understood as ergodic musicking,[12] a theoretical construct intended to synthesize previous research related to ergodicity and musicking. In the previously mentioned video game examples, players' activities are in fact twofold: on one hand, they can be understood as examples of ergodic efforts, compatible with Aarseth's cybertext framework.[13] As noted by Aarseth and Calleja, players materially intervene on the cybermedia object during engagement with it, manipulating its mechanical system to traverse and reconfigure it accordingly.[14] The process is not only cognitive, but it also amounts to a tangible intervention, as it materially restructures the medium and is "required to allow the reader to traverse the text."[15] On the other hand, the activities also involve varied degrees of musical value, echoing Christopher Small's seminal concept of musicking. Small identifies his center of inquiry within diverse forms of musical participation: performing, listening, practicing, composing, dancing, or even simply attending musical events, are all valid examples of musicking.[16] As explicitly asked by Leigh Landy: "Yet, is it not true that . . . the computer game also form[s] new ways of musicking?"[17] Ergodic musicking directly addresses this question:

> The intersection of ergodic effort and musicking practices manifested in digital games generates a new musicking form: ergodic musicking. Ergodic musicking is identified as a modern form of musicking, capable of deconstructing established musical roles such as composing, improvising, or dancing. Ergodic musicking, however, is not just a mixture of previous forms: it is instead a unique musicking.[18]

Ergodic musicking applies to the very diverse forms of musical engagement possible and practiced with video games, and it can be inscribed within the larger frame of technologically mediated musicking, or transmusicking.[19] While similar technologically mediated musical engagements are not central to Small's original discussion, Tarja Rautiainen-Keskustalo noted that "nowadays, when the musical experience is inescapably a technological experience (Beer 2010), the mediated aspect in musicking cannot be

11. Costantino Oliva, "On the Ontological Status of Musical Actions in Digital Games," in *Proceedings of the 11th International Philosophy of Computer Games Conference*, 2017, accessed May 9, 2021, https://www.um.edu.mt/library/oar/handle/123456789/36221.

12. Oliva, "Musicking with Digital Games", 160–94.

13. Espen Aarseth, *Cybertext* (Baltimore, MD: John Hopkins University Press, 1997).

14. Aarseth and Calleja, "Word Game."

15. Aarseth, *Cybertext*, 1.

16. Small, *Musicking*, 9.

17. Leigh Landy, *Understanding the Art of Sound Organization* (Cambridge, MA: MIT Press, 2007), 8.

18. Oliva, "Musicking with Digital Games," 11.

19. David Borgo, "Musicking on the Shores of Multiplicity and Complexity," *Parallax* 13 no. 4 (2007).

ignored."[20] Video games occupy a central role in mediating musicking: as previously noted, dynamic and generative approaches increasingly involve musical content in the ongoing cybernetic exchange between players and video games, producing musical results that fit specific ludic situations in a nonlinear fashion. This degree of unpredictability, however, does not seem to often emphasize explicit modalities of musical improvisation.

On that note, Anahid Kassabian and Freya Jarman have argued that "sandbox" play, considered as an exploratory and open-ended form of engagement, is found in cybermedia,[21] such as Mike Oldfield's *Tres Lunas* (Oldfield Interactive Ltd., 2002) or Brian Eno and Peter Chilvers's *Scape* (Opal Limited, 2012). These apps, which arguably afford ergodic musicking and playful engagement, offer expressive modalities pertinent to an improvisational approach to musical engagement, considering that the manipulation of included musical elements produces changeable results. This genre of musically oriented cybermedia includes a few other examples; for the sake of this article, we consider one specific case as particularly relevant for the research conducted through the development of *Otogarden*: the Nintendo DS game *Electroplankton* (Nintendo, 2005).

ELECTROPLANKTON AND THE PERILS OF IMPROVISATION

Probably more than any other example, *Electroplankton* directly engaged with the topic of musical improvisation in video games, generating an interesting discussion regarding the expectations toward musical engagement in this context. The game is the work of the multitalented creator Toshio Iwai; with a career starting in the early 1980s, Iwai is arguably best known as a practicing media artist, although his works also include video games, television productions, illustrations, and electronic instrument designs. Published in 2005, *Electroplankton* served as a *trait d'union* between Iwai's artwork and video games. As reported by Erkki Huhtamo, "Iwai once surprised me by stating that *Electroplankton* was his version of Duchamp's *Boite en Valise* (1941). After some reflection it made sense: the tiny game cartridge indeed contained many aspects of his career as a 'miniature museum.'"[22] In fact, *Electroplankton* collects various pieces of art previously presented in gallery settings and then adapts them for the Nintendo DS console. For example, one of the minigames included, *Luminaria*, is a modified version of *Composition on the Table* (1999) (Figure 3), an artwork that originally included interactive projections.

In *Luminaria*, players can touch a number of arrows on a grid on the touchscreen. The arrows direct the path of four different plankton-like creatures, which in turn trigger a piano note sound every time an arrow is reached. The plankton move at their own speed, generating a cascade of piano notes; players cannot stop this from happening but have the possibility to orient the musical juxtapositions by changing their direction. Once

20. Tarja Rautiainen-Keskustalo, "Embodiment through Digital Intangibility: Infrastructures of Musicking." *Journal of New Music Research* 50, no. 2 (2021), 2.

21. Kassabian and Jarman, "Game and Play in Music Video Games," 123.

22. Erkki Huhtamo, "Art in the Rear-View Mirror," in *A Companion to Digital Art*, ed. C. Paul (Hoboken, NJ: Wiley, 2016), 92.
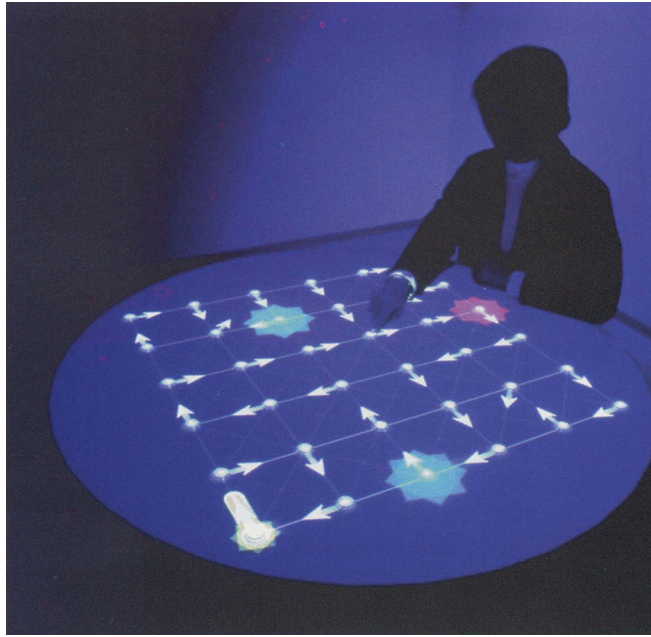
FIGURE 3. Toshio Iwai's "Composition on the Table." (Source: *ACM SIGGRAPH Art Show Archives*, https://digitalartarchive.siggraph.org/artwork/toshio-iwai-composition-on-the-table-no-1-push-no-2-twist-no-3-turn-no-4-slide/, accessed April 13, 2022).

the mechanics of *Luminaria* are grasped, different techniques can be explored; for example, it is possible to create a recursive path for the plankton, generating a musical loop of sorts. There is no end state in *Luminaria*; players are able to perform as they please, although the particular design constraints imposed by Iwai make it quite arduous to accomplish specific configurations or other self-set objectives. *Electroplankton* condenses Iwai's long interest in video games and musical improvisation. Similar topics had already been explored by Iwai in *Otocky* (ASCII Corporation, 1987), "an improvisatory music-themed *shoot'em up*."[23] Crucially, in both *Electroplankton* and *Otocky* "the ergodic musicking in action is not finalized toward composing music,"[24] but instead it remains extemporaneous and volatile. There is no possibility to record or save the performance, or to use it as the basis for further elaboration. Also, *Electroplankton* does not include explicit challenges or end states, compatible with the experimental game design practices mentioned by Juul. In this regard, Iwai's experimental ethos had long predated contemporary independent games. In an interview in 2006, Iwai states: "[I] always wanted to create creative software played on the game platforms other than game software. This concept has not changed since *Otocky* right through to *Electroplankton*."[25] Karen Collins

23. Roger Moseley and Aya Saiki, "Nintendo's Art of Musical Play," in *Music in Video Games: Studying Play*, ed. K. J. Donnelly, William Gibbons, and Neil Lerner (New York: Routledge, 2014), 59.
24. Oliva, "Musicking with Digital Games," 219.
25. Adam Riley, "C3 Exclusive Interview | Toshio Iwai on Nintendo, Wii . . . and Musical Fish!," Cubed3, August 17, 2006, http://www.cubed3.com/news/5724/1/c3-exclusive-interview-toshio-iwai-on-nintendo-wii-and-musical-fish.html (accessed November 20, 2021).

confirms this point: "with no set objectives, rewards or in-game narratives, [*Otocky*, *Electroplankton*] and similar interactive tools—while sold and marketed in the games industry—are arguably not games, but rather musical toys that use game interfaces."[26]

Collins correctly situates *Electroplankton* within the context of video games while also noting its lack of traditional game-like features. In fact, *Electroplankton*'s critical reception underlined certain aspects related to what is expected in music games by critics at large. In his meta review of *Electroplankton*, Pilchmair compiled various reviews touching upon the absence of a save function in the game, understood as a tool that could have made composing and arranging possible.[27] A review published by the popular website IGN states: "It's audiovisual art. That's the game's intention and it does it well. For the experience, though, the designer missed a few good opportunities, like save functionality."[28] Iwai elaborates on the topic in an interview: "I wanted players to enjoy *Electroplankton* extemporarily and viscerally, and I thought if the save function was added, the software would become more like a tool. I did not want a play style where players have to open additional menus or windows, or have to input file names to save."[29]

While Iwai's design objectives focused on one particular form of "visceral" musicking experience, the reviews compiled by Pilchmair arguably embed an underlying set of desirable qualities, which video games seem to be expected to feature. Specifically, the demand for a save function embeds a utilitarian approach, whereas extemporaneous performances should be directed toward the production of new works; such compositions are also expected to be stored and possibly further manipulated at a later stage. While this perspective is not at all problematic in itself, and indeed viable in many different examples, it does not, however, recognize the multifaceted, complex nature of musical improvisation in general. In fact, musical improvisation can, of course, exist as a fully realized musical form in itself and not only as a means to produce new compositions. In this regard, Derek Bailey has prominently debated how "saving" or transcribing improvised musical performances in order to render them accessible to others can be unsatisfactory, noting how "transcription might help to establish matters to do with style or material used but those elements which are peculiar to improvisation cannot be documented in this way."[30] Omitting the save function also aligns with Keith Johnstone's acknowledged definition of improvisation (within theater art) as an action and a situation in which the improviser is "walking backwards. He sees where he has been, but he pays no attention to the future."[31] Three decades later Gary Peters described an improvised creative act in

26. Karen Collins, "An Introduction to Procedural Generated Music in Games," *Contemporary Music Review* 28, no. 1 (2009): 7.

27. Martin Pilchmair, "Electroplankton Revisited: A Meta-Review," *Eludamos, Journal for Computer Game Culture*, 1 no. 1 (2007), https://www.eludamos.org/index.php/eludamos/article/view/vol1no1-8/15 (accessed November 24, 2021).

28. Craig Harris, "Electroplankton Review," IGN, January 11, 2006, modified November 24, 2018, https://www.ign.com/articles/2006/01/11/electroplankton (accessed November 20, 2021).

29. Riley, "Toshio Iwai on Nintendo."

30. Bailey, *Improvisation*, 15.

31. Keith Johnstone, *Impro: Improvisation and Theatre* (London: Faber and Faber, 1979), 116.

terms of a willed future past, as "flying backwards into the future."[32] In this respect, indeed any "saving" could be seen as a violent grounding of an airborne, playful creative act.

Musical improvisation remains an underexplored modality in the otherwise rich palette of musicking available and practiced within the context of video games. The purpose of *Otogarden* is to explore and propose new venues for implementation of the improvisatory practices in this context, and it seeks to address the perceived expectations related to video game musicking articulated earlier, offering players a stand-alone experience for their own aesthetic musical development. A game including improvisation can also produce fresh potential as a music-education tool.

FRAMING OTOGARDEN

Otogarden is a single-player game released on January 14, 2021, being available on a free-to-play basis on the website http://otogarden.com. Developed with the Unity engine, the game has been released as a downloadable application for MacOS and Windows computers; also, thanks to a dedicated Unity WebGL release, which allows Unity content to run in web browsers, the game is available as a web application. Although it is possible that this latter version of the game might perform less efficiently, as it is more affected by the hardware specifications of the end user, it does make the game compatible with a variety of operating systems. Moreover, *Otogarden* supports commonly available ASCII keyboards, as well as dedicated gamepads (or game controllers). The players are informed through in-game menus that game controllers and headphones are recommended, although the game remains playable and functional without them.

In *Otogarden*, players take control of a *kappa*, a creature from Japanese folklore. The kappa wanders in a relatively small garden; navigable in its entirety in a few seconds, the space includes trees, a pond, and a couple of patches of flowers and vegetables. The sections are connected via a wooden pathway. The setting has been designed to present a calm, relaxed environment (Figure 4).

Players can freely wander through the garden, as they will encounter no major opposition to their movements. In doing so, they are likely to quickly discover the garden's musical possibilities. Whenever the kappa makes contact with one of the garden's prominent features (these being the aforementioned patches of vegetation, trees, pond, and pathway), a musical sound is triggered. In fact, the game features sound samples mostly related to acoustic and relatively traditional Japanese instruments. Samples from variously sized *taiko* drums are associated with the trees and vegetable patches; flowers are connected with the more contained sound of *mokusho* woodblocks; and splashing through the pond triggers the sound of a *shakuhachi* flute. Moreover, each step of the pathway plays a single note from a xylophone.

The game features relatively simple controls: players can move and run, as is commonplace in video games of various styles and genres. However, players can also push

---

32. Gary Peters, *The Philosophy of Improvisation* (Chicago: University of Chicago Press, 2009), 5.

FIGURE 4. Otogarden.

a key on their input devices to trigger a loop game mechanic. In that case, keeping the button pushed will effectively "record" the players' movements, reproducing them immediately as the button is released. The loop generates a "ghost" of the kappa, so to speak, which continues to repeat its movements. While the length of the loop is set at a duration of eight seconds, there is no limit to the number of possible concurrent loops; players can therefore choose to juxtapose a few longer loops or numerous shorter ones. The garden elements that trigger sounds are arranged at a certain distance from each other, so as to render possible juxtaposing loops with all the available sounds, provided that players are committed to making a concerted effort and running with a rather specific purpose. In any case, such acoustic juxtapositions last for just a few seconds, considering the relatively short loop length. The game has no "end state" or discernible conclusion, and players are free to play as long as they deem appropriate.

METHODOLOGY AND THE SEMIOTIC LAYER

As mentioned, *Otogarden* was designed and developed for research purposes. The methodology employed is largely situated within the paradigm of "research through design" (RtD), which "has been used for over 20 years within the design community as a distinct term to describe practice-based inquiry that generates transferable knowledge."[33] In recent years, a similar research methodology has been applied within digital game studies, generating different examples and results.

33. Abigail C. Durrant, John Vines, Jayne Wallace, and Joyce S. R. Yee, "Research through Design: Twenty-First Century Makers and Materialities," *Design Issues* 33, no. 3 (2017), 3.

Typically design research starts with open-ended research aims or open research questions, rather than a specific hypothesis to be tested. This is a deliberate choice as designers often describe their practice as "problem framing rather than problem solving" (Schön, 1983) and is a practice that requires reflection, leading to an emergence of understanding throughout the design process. This contrasts greatly with the more traditional positivist methodologies used by many researchers considering games; which place most value on quantifiable outcomes (Nacke, et al., 2009).[34]

In addition, Rilla Khaled, Jonathan Lessard, and Pippin Barr acknowledge that "there is a widely shared (though not always explicit) recognition that making an actual game or testable prototype is useful to materialize the design questions, aesthetic issues, or technical problems that are being addressed by the research."[35] Among the qualities attributed to applied game design research, the authors also consider the augmented possibilities these artifacts offer to generate discussion: "In on-line forums such as Twitter, publications such as RPS and Polygon, and platforms such as itch.io, the designed artefact becomes ever more important as a material argument: designers may not be able to have face-to-face conversation with the public, but the public can download and play their games to form and reflect on their opinions. . . . Knowledge simultaneously exists in the thing and in the articulation of the thing."[36] Commenting on similar methodologies, Gualeni argues: "Self-reflexive videogames are videogames designed to materialize critical and/or satirical perspectives on the ways in which videogames themselves are designed, played, sold, manipulated, experienced, and understood as social objects."[37]

As mentioned earlier, *Otogarden* constitutes a novel application of RtD and self-reflexive methodologies to music-oriented video games, offering an informed take on aesthetic issues related to canonically accepted forms of ergodic musicking in video games. Therefore, the design choices made reflect, and are oriented toward, these intentions.

Otogarden has been conceived to ideally participate in the larger discourse surrounding video games by being situated within their context and culture. In that regard, the game has been loosely inspired by non-music-oriented video games, implementing visual-style tropes and the design conventions of popular contemporary titles, such as *Animal Crossing: New Horizons* (Nintendo, 2020) and *Untitled Goose Game* (House House, 2019). While these examples are substantially different in nature, determining different objectives and player experiences, they have been taken in consideration for their visual similarities. In fact, they both use an aerial perspective, either top-down or quasi-isometric, offering a relatively wide viewpoint of the game world and of the player avatar's immediate surroundings. Also, they are set in a scenario resembling a small town,

34. Paul Colton and Alan Hook, "Game Design Research through Game Design Practice," in *Game Design Research: An Introduction to Theory & Practice*, ed. Petri Lankoski and Jussi Holopainen (Pittsburgh, PA: ETC, 2017), 171–72.

35. Rilla Khaled, Jonathan Lessard, and Pippin Barr, "Documenting Trajectories in Design Space: A Methodology for Applied Game Design Research," in *Proceedings of FDG18: Foundations of Video Games 2018*, August 7–10, 2018, Malmöü, Sweden, 1, https://doi.org/10.1145/3235765.3235767 (accessed April 25, 2022).

36. Khaled, Lessard, and Barr, "Documenting Trajectories in Design Space," 3.

37. Stefano Gualeni, "Self-Reflexive Videogames: Observations and Corollaries on Virtual Worlds as Philosophical Artifacts," *GAME: The Italian Journal of Game Studies* 5, no. 1 (2016): 11.

featuring greenery and relaxing atmospheres. While *Animal Crossing: New Horizons* features an array of anthropomorphic characters, *Untitled Goose Game* instead stars a pesky (if not downright "horrible," as emphasized by the game's website) but otherwise conventional goose, keeping up a theme of animal or animal-like playing characters.

These (largely visual) elements constitute the representational frame, or semiotic layer, of the two examples. This aspect is sometimes referred to as a "sign": "the sign will here refer to the general sense of one or more systems of signification, whether this is alpha-numeric text, imagery or sound or other expression types. Our concept of sign . . . refers to the interpretable, 'surface' representational elements that players read/observe in order to be able to use/play the game."[38] As noted by Steve Swink, this element is connected with video games' functionalities, and it is manipulated by game designers to influence players' perspectives: "The game's representation and treatment change player expectations about the behavior, movement and interactions of game objects."[39] Design decisions were informed and influenced by these concepts, as we will now elaborate.

As mentioned, *Otogarden* is set in a loosely described Japanese context. Its main character is a kappa, an imaginary creature typical of Japanese folklore. Kappas are described as "green and amphibious like a frog, but with a shell like a turtle and the ability to walk upright like a monkey: a combination of perfectly natural traits combined in an unnatural, unfamiliar way."[40] They pertain to the larger category of *yokai*, "a supernatural being or phenomenon beyond our daily life and common understanding, including a ghost, goblin, monster, phantom, demon, apparition, specter, and so on. It also represents an important aspect of Japanese culture from ancient times to today; therefore, '*yokai* studies' is a popular established academic field in various disciplines."[41] Yokai were often traditionally present in picture scrolls depicting the "*hyakkiyagyō* (alter-natively pronounced *hyakkiyakō*), which can be translated as "night procession of one hundred oni" . . . a carnivalesque topsy-turvy parade in which all manner of creatures and objects danced riotously, musically, through the streets."[42] While the *hyakkiyagyō* picture scrolls feature a "tension between the fearful and the comic,"[43] it also notably associates musicality with playfulness. Yokai, including kappa, are also often depicted in contem-porary media, as, for example, in the popular mixed-media franchise *Yo-Kai Watch*, which spans several iterations of anime, manga, toys, and video games. Suzuki denotes this "transmedia expansion" of yokai "not as an expression of Japanese cultural tradition, but as an outcome of transmedia adaptation practices (known as 'media mix' in Japan) in

38. Aarseth and Calleja, "Word Game," 7.

39. Steve Swink, *Game Feel: A Game Designer's Guide to Virtual Sensation* (Boca Raton, FL: Taylor & Francis, 2009), 100.

40. Michael Dylan Foster, *The Book of Yokai: Mysterious Creatures of Japanese Folklore* (Oakland: University of California Press, 2015), 88.

41. Masaaki Morishita, "From Eerie to Endearing: Yokai in the Arts of Japan," *Museum Worlds* 4, no. 1 (2016): 234.

42. Foster, *Book of Yokai*, 17.

43. Foster, *Book of Yokai*, 17.

the modern period by creators, media companies, and other social agents."[44] In recent years, the media mix has become increasingly centered around video games. For example, the aforementioned *Taiko no Tatsujin* determines an original, musical "ludo mix," juxtaposing traditional and modern musickings and repertoires.[45] On a similar note, Michael Foster describes a continuity between "traditional" and modern manifestations of different yokai:

> A tengu [a particularly popular yokai], for example, might be the protagonist of a Kamakura-period setsuwa, be portrayed visually in a Muromachi-period picture scroll, be discussed orally in a local legend, and appear in a video game or anime series. We cannot say that any of these is the "true" or "original" tengu. They are versions of each other—the same but different—and it is the tengu's ability to thrive within diverse genres and media environments, to perform simultaneously on multiple platforms, that makes it such a vital yōkai even today.[46]

In that regard, *Otogarden* can be positioned within the long tradition that combines yokai and what Foster calls a "ludic mode":

> It is also clear that even though yōkai may be strange and interstitial, they are not always scary: they are also about play, or the "ludic mode." In fact yōkai are often produced through playfulness. . . . For all the spookiness they may educe, yōkai are also fun. And this levity is one key to their longevity and versatility: if the zone of uncertainty allows limitless possibilities and unbridled imagination, then it is a space of experimentation and play and ultimately of creation.[47]

Through its semiotic system, *Otogarden* ideally embeds these values with the intention of communicating to players the playful, experimental, and creative modalities associated with yokai. The kappa, a water creature, is here implemented for its characteristic (monkey-like, to a degree) cheekiness, as it is often described as an impertinent trickster creature. It is fitting for this supernatural being to generate "ghosts" of sorts: as players navigate the game, they learn to use the loop game mechanics to spawn a number of copies of the kappa's movement patterns. Such phenomena, however, have no intention to determine spooky situations; they instead direct the aforementioned values of creativity and experimentation toward musical engagement, providing a compatible semiotic layer for the aesthetic issue at hand. The intention of *Otogarden* is in fact to provide a space for an explorative, playful style of ergodic musicking. In a compatible manner with the design methodology illustrated by Swink,[48] the semiotic layer is used in *Otogarden* to subtly orientate and situate players' musical engagement. In any case, game designers ultimately have no control of players' activities, much less so on their

44. Shige (SJ) Suzuki, "Yōkai Monsters at Large: Mizuki Shigeru's Manga, Transmedia Practices, and (Lack of) Cultural Politics," *International Journal of Communication* 13 (2019): 2199.

45. Costantino Oliva, "The Musical Ludo Mix of Taiko no Tatsujin," ToDiGRA 5, no. 2 (2021), 131–60, https://doi.org/10.26503/todigra.v5i2.118 (accessed April 25, 2022).

46. Foster, *Book of Yokai*, 92.

47. Foster, *Book of Yokai*, 91.

48. Swink, *Game Feel*.

predisposition toward a given digital game. The next section will therefore discuss aspects related to player engagement in *Otogarden*.

OTOGARDEN AND PLAYER EXPERIENCE

Otogarden does not immediately refer to musical scenarios. The garden's visual elements have no reference to recognizable musical situations; in general, the kappa is not normally associated with musical values or elements. As mentioned earlier, distinctively musical sounds have been included in the game, aiming for a loose but consistent reference to a Japanese context. The overall semiotic layer of *Otogarden*, therefore, is effectively not connected with musical improvisation; the actual emergence of improvisatory practices is left to the player's tangible intervention. This is unlike previously mentioned examples, such as *Guitar Hero*, which structures a tight connection between its sign system and the afforded (and very much directed) musicking. *Guitar Hero* famously depicts a live rock show, emphasizing not only the inherently musical scenario being portrayed but also embedding certain rhetorics of technically proficient, infallible rock guitar "heroes." By contrast, the musical affordances of *Otogarden* are only loosely suggested and are effectively left to the individual player's interpretation. The game includes no announced pedagogical aspect or target. It is not designed for formal (music) education per se. As musical sounds are encountered, the generally playful and non-intimidating environment is designed to invite exploration and free-form sonic juxtaposition. That being said, it is important to remark that players' interventions in video games are always, to varying degrees, not solely mandated by the functionalities of the game object but subject to the individual player's personal skills, preferences, and idiosyncrasies. As noted by Aarseth and Calleja, the individual player's perspective ultimately determines and grounds the multifaceted possibilities of video games during actual engagement:

> The objects we call digital games are not games in and of themselves. They are software applications that are designed to afford one or several simultaneous game perspectives. . . . What makes any of these systems such is, ultimately, the subjective ludic perspective taken on it.[49]

The possible perspectives will likely be multifaceted, nuanced, and non-totalizing; the subjective perspective does not exclude other possible orientations that are not immediately or strictly ludic. In this regard, Stenros synthesizes the rich and varied history of play studies, expanding on Michael Apter and Mihaly Csikszentmihalyi,[50] identifying two different mindsets through which gameplay-like activities may be approached: *telic* and *paratelic*.

---

49. Aarseth and Calleja, "Word Game," 5–6.
50. Michael J. Apter, "A Structural-Phenomenology of Play," in *Adult Play: A Reversal Theory Approach*, ed. J. H. Kerr and Michael. J. Apter (Amsterdam: Swets & Zeitlinger, 1991); Mihaly Csikszentmihalyi, *Beyond Boredom and Anxiety: Experiencing Flow in Work and Play*, 25th anniv. ed. (San Francisco: Jossey-Bass, 2000).

Telic is a serious mindset, where the activity is engaged in for a purpose. Paratelic (cf. Csikszentmihalyi's autotelic) is a playful state, and engaging in the activity is itself the goal (or, as in games, a goal is adopted in the service of the activity). Other characteristics of the paratelic mindset include emphasis on immediate gratification, spontaneity, freedom, willingness to experiment, disposition toward make-believe, and the tendency to prolong the activity if possible.[51]

Otogarden's design is compatible with largely paratelic forms of engagement, whereas the long-term objectives typical of the telic mindset are not embedded in the game. A telic attitude would in fact be "future-oriented, aiming at the pleasure of achieving a goal at a later moment in time,"[52] thus distant from the explicitly goal-less nature of *Otogarden*. With that said, adoption of telic or paratelic mindsets is not mutually exclusive, as it is possible to oscillate between them to varying degrees. *Otogarden* is thus closer to the design objectives of toys or of playgrounds, which arguably afford primarily free-form playfulness; it is entirely possible, however, for different ludic perspectives to emerge even in these cases. A playground, for example, can be interpreted as an obstacle course to be completed in the shortest possible time, using the ludic affordances of the designed objects as props for a telic form of play.

While engagement with *Otogarden* has arguably paratelic, free-form affordances, the game also embeds significant design constraints, directing user engagement toward the realization of a relatively limited range of possibilities. As mentioned, the game employs a "loop" game mechanic, which players can use to replicate their latest movements. The loop is set at the relatively short length of eight seconds. This span of time has roughly been measured during development and playtesting as the appropriate amount necessary to move the kappa character from one extremity of the garden to the other, rendering it theoretically possible to juxtapose all the sounds present in the garden, even if for just a few seconds. Crucially, though, it is also not enough to, for example, produce lengthier loops that could favor a more spectatorial or contemplative player perspective. This designed constraint has proven to constitute a particularly evident limitation, which is an aspect that was also remarked on in our subsequent playtest (which we discuss in a later section of this article). However, this somewhat constricting design choice is rooted in a well-established design paradigm established by Donald Norman, who notes how constraints are used by designers "to guide the actions" of the users.[53] Specifically, the time constraint posed on the loop length is compatible with what Norman calls physical constraints, as it belongs to the mechanical system of the cybermedium: "With the proper use of physical constraints, there should be only a limited number of possible actions—or, at least, desired actions can be made obvious, usually by being especially

51. Jaakko Stenros, "Behind Games: Playful Mindsets and Transformative Practices," in *The Gameful World: Approaches, Issues, Applications*, ed. Steffen P. Walz and Sebastian Deterding (Cambridge, MA: MIT, 2014), 201.

52. Jaakko Stenros, "Playfulness, Play, and Games: A Constructionist Ludology Approach" (PhD diss., Tampere University, 2015), 66.

53. Donald Norman, *The Design of Everyday Things (Revised & Expanded Edition)* (New York: Basic Books, 2013), 67.

salient."[54] In our case, the desired action was to encourage players to actively use the running game mechanic to achieve desired sonic results. Appropriate use of the mechanic can be rewarding for players willing to deliberately run through the garden, mixing the available sounds into extemporaneous, ephemeral improvisations. As our playtest reveals, this aspect is indeed limiting for certain players aiming to manifest different perspectives in the cybermedia.

While being compatible with the basic design paradigms illustrated by Norman, *Otogarden* has also been directly influenced by Umberto Eco's seminal "work in movement" concept, a larger class of aesthetic objects that includes musical artifacts.

> The "work in movement" is the possibility of numerous different personal interventions, but it is not an amorphous invitation to indiscriminate participation. The invitation offers the performer the opportunity for an oriented insertion into something which always remains the world intended by the author.[55]

In this regard, engagement with *Otogarden* can be described as an "oriented insertion," with the design constraints limiting the players' possibility space to manifest the "world intended by the author," so to speak. Moreover, the players' intervention, albeit constrained by the mechanical system of *Otogarden*, manifests a shifting, varying perspective, with all the nuances of different possible interpretations.

While the open work concept has been previously considered in relation to playful-oriented musical software systems,[56] Eco originally addressed the larger field of experimental and indeterminate compositional practices. This aspect is also relevant to contextualize engagement with *Otogarden* as "improvisatory" in nature. Michael Nyman notes:

> With a score like Cardew's *Treatise* (1963–6) aural recognizability is both impossible and irrelevant since the (non-musical) graphic symbols it contains have no meaning attached to them but "are to be interpreted in the context of their role in the whole". The performer may choose to realize for example, as a circle, some sort of circular sound, movement or gesture . . . each performer is invited by the absence of rules to make personal correlations of sight to sound.[57]

The "openness" described in this example of indeterminate composition is typical of what George Lewis calls "performer choice systems," which he critically inscribes within a "Eurological" tradition.[58] While acknowledging the specificities of this current of

54. Norman, *Design of Everyday Things*, 125.

55. Umberto Eco, *The Open Work* (Cambridge, MA: Harvard University Press, 1989), 19.

56. Andrew Dolphin, "A Portfolio of Original Compositions" (PhD diss., Queen's University Belfast, 2011), https://pure.qub.ac.uk/en/studentTheses/a-portfolio-of-original-compositions-andrew-dolphin (accessed February 10, 2022).

57. Michael Nyman, *Experimental Music: Cage and Beyond*, 2nd ed. (Cambridge, MA: Harvard University Press, 1999), 9–10.

58. George E. Lewis, "Improvised Music after 1950: Afrological and Eurological Perspectives," *Black Music Research Journal* 16, no. 1 (1996), 91–122.

musical works, Lewis, "who has deep experience across these ostensibly separate categories [indeterminacy and improvisation], rejects the notion of a partition between them."[59]

> It should be axiomatic that, both in our musical and in our human, everyday-life improvisations, we interact with our environment, navigating through time, place, and situation, both creating and discovering form. On the face of it, this interactive, form-giving process appears to take root and flower freely, in many kinds of music, both with and without preexisting rules and regulations.[60]

This latter understanding of "improvisative musicality refers to social and cultural location and is theorized here as historically emergent rather than ethnically essential,"[61] and is critical of "ad hoc formalisms" toward possible definitions of improvisatory practices.[62] It is within this shifting, culturally informed understanding of improvisation that *Otogarden* aims to be situated, combining open work, ergodic musicking practices and technologically augmented forms of musical improvisation.

PLAYTESTING *OTOGARDEN*

Otogarden was developed in roughly twelve months at the University of Malta, during which numerous informal playtest sessions were held at different stages of completion. These early sessions were largely intended to gather data on the game's functionalities and to flag possible stability issues on the software side. An extensive playtest was conducted using the release version of the game. We structured this test within the theoretical framework discussed so far, aiming to clarify the nature of the players' oriented insertions and their perspectives on the game. This applied methodology constitutes an expansion of previously debated RtD efforts, which as mentioned do not normally put most of their value in quantifiable outcomes. However, the structured playtest session also revealed what players can or could do with *Otogarden*. Essentially, the test was designed for gathering tangible data about the nature of players' interactions.

Within game studies, the Game Experience Questionnaire (GEQ) has been used in the past to gather information related to players' in-game activities.[63] Critical considerations related to its application have been accounted for in *Otogarden*'s playtest.[64] In fact, while *Otogarden* can be loosely understood as a digital game, its focus remains, of course, on musical participation and expression; moreover, the game does not actually include several traditional game components, which are accounted for in the GEQ (namely

59. Jennie Gottschalk, *Experimental Music Since 1970* (New York: Bloomsbury Academic, 2016), 189.

60. Lewis, "Improvised Music after 1950," 117.

61. Lewis, "Improvised Music after 1950," 93.

62. Lewis, "Improvised Music after 1950," 116.

63. Karolien Poels, Yvonne De Kort, and Wijnand IJsselsteijn, *D3.3: Game Experience Questionnaire: Development of a Self-Report Measure to Assess the Psychological Impact of Digital Games* (Eindhoven, Netherlands: Technische Universiteit Eindhoven, 2007).

64. Effie L.-C. Law, Florian Brühlmann, and Elisa D. Mekler, "Systematic Review and Validation of the Game Experience Questionnaire (GEQ)—Implications for Citation and Reporting Practice," in *CHI PLAY '18: Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play*, October 2018, https://dl.acm.org/doi/10.1145/3242671.3242683 (accessed April 25, 2022).

a winning/losing condition). With regard to its musical nature, *Otogarden* shares similarities with other interactive musical systems, particularly those offering an improvisational musicking mode of interaction. Previous research suggests that exploratory, improvisational forms of musicking with interactive musical systems foster positive, desirable user engagement, including increased willingness "to explore more musical expressions."[65] While *Otogarden* should most likely not be understood as a "musical interface" *tout court* due to its game-like features, it also intends to explore a rather particular and scarcely practiced form of improvisational ergodic musicking. With these considerations in mind, our playtesting and survey (conducted in fall 2021) aimed to corroborate the aesthetic issues and design motivation that *Otogarden* is intended to manifest and render tangible, while detailing perspectives manifested by players during their interactions.

We conducted the fall 2021 *Otogarden* playtesting in a focus group consisting of student teachers of the Faculty of Educational Science at the University of Helsinki (Finland).[66] The playtesting was assigned to the students of a course called Musical Knowledge (*Musiikkitieto*, 5 study points), which begins this student group's optional, two-term minor subject studies program. The program consists of five courses (altogether 25 study points) that focus on music, music pedagogy, and music education in both theory and practice. This means that our twenty-one playtesting participants were students who had a special and personal interest and background in music and who potentially wished to be engaged in music education in their future careers as elementary or kindergarten teachers. This particular Musical Knowledge course also featured a special assignment, which had a focus on musical looping and repeatedly engaged students' creative skills (e.g., as real-time composition). Many of the students had earlier studied the fundamentals of improvisation in other courses by the same teacher. It can thus be said that these students had already encountered musical improvisation in an accessible and tangible format. Presumably, the most indiscernible and indefinite aspects of the topic were demystified. In that sense, the context provided by the Musical Knowledge course is relevant for the playtest. Participants had in fact already been introduced to musical improvisation and technological forms of musicking, and therefore their potential player perspectives were considered as particularly well-informed, compatible with the research scope of *Otogarden*. As mentioned, the RtD methodology applied in *Otogarden* intends to manifest and frame design issues, participating in the ongoing academic research of ludomusicology at large, but also to generate awareness of such issues within a broader public.[67] The results of the test and the inputs received from participants were

65. Yongmeng Wu and Nick Bryan-Kinns, "Musicking with an Interactive Musical System: The Effects of Task Motivation and User Interface Mode on Non-Musicians' Creative Engagement," *International Journal of Human-Computer Studies* 122 (2019): 72, https://doi.org/10.1016/j.ijhcs.2018.07.009 (accessed November 24, 2021).

66. For information on the system of teacher education in Finland, see the introduction of Seija Karppinen, Ari Poutiainen, Seija Kairavuori, Sinikka Rusanen, and Kauko Komulainen, "ImproStory: Social Improvisation and Storytelling in Arts and Skills Subjects in Teacher Education," *International Journal of Education and the Arts* 19, no. 9 (2018): 1–24, https://doi.org/10.18113/P8ijea1909 (accessed April 25, 2022).

67. Khaled, Lessard, and Barr, "Documenting Trajectories in Design Space," 3.

therefore framed within these considerations, understanding this group of testers for their specific context and musical background.

The twenty-one students first played *Otogarden* and then reflected on their experiences. In order to increase the coherence of the playtesting, we requested them to use only the game's keyboard controls, assuming that not all participants had access to a game controller. We presumed that a similar restriction would be necessary if the game were tested in any classroom setting. This playtesting was introduced as an ungraded course assignment. Although students' playtesting and survey submission were obligatory, they could choose whether their survey submission was or was not included as a part of the research data of our study (see Appendix 1). Despite this option, all students agreed for their submission to be included in our research data. We could thus say that we succeeded in reaching a maximum response rate (100 percent), but in the context of an obligatory course assignment this rate naturally cannot convey any statistical meaning.

After playing the game for two weeks (in September 2021), we asked the students to answer our digital survey (in October 2021). We developed the survey ad hoc, with questions entailing responses, which were either open-ended or based on a five-point Likert scale. The survey thus had both quantitative and qualitative elements. We asked the participants to especially reflect on *Otogarden*'s specific purposes and characteristics. Below we summarize our reading of the survey results. In quotations, we refer to the twenty-one participants as anonymized abbreviations P1 to P21. We encouraged them to use English in their submissions but naturally allowed Finnish (the mother tongue of most students in this group) as well. In the end, only four participants submitted in Finnish.

We include only English in our quotations. This means that any potentially quoted Finnish submission appears as our English translation. Occasionally we had to make clarifications or minor corrections to the students' English. Such remarks or additions are indicated with brackets. The survey data exists only in our (the authors') possession for the personal data protection of the participants.

While basic demographic information was collected, *Otogarden* is not specifically targeted to any particular age group, gender, or nationality. Practical reasons (e.g., time and logistic limitations) led us to test the game with Finnish university students. The test was approved by the Faculty of Educational Sciences of the University of Helsinki.

"PAINTING OF SOUNDS"

We next summarize our analysis of the survey.

Most of the participants (81 percent) were under thirty years old, with almost half of them (48 percent) being between twenty and twenty-four years old. According to our survey's optional and liberal inquiry about gender, five of the participants (24 percent) were male, the rest being female.

Roughly a third of the participants (29 percent) reported that they could not produce aesthetically pleasing output with the game, while three of them (14 percent) could not quite decide if they did or did not. Consequently, slightly more than half of the group (57

percent) agreed that their output was pleasing. It thus seems that about half of the test players found *Otogarden* to be an inspiring playground, as they regarded their acoustic output positively. This potentially indicates that our playtesters understood that this game was not designed for producing conventional songs, for example, but for a different form of musicking. Participant P17 expressed this realization neatly: "Music output was random, but it was more of a 'painting of sounds' than actual music."

The majority of the players (seventeen players, 81 percent) recognized their creative effort as improvisation. Only two participants disagreed in this respect, and two could not decide whether they agreed or disagreed. We may then conclude that this game did not prevent or halt these players' musical inventiveness but quickly appeared to them as a tool which they could make personal use of. However, it is important at this stage to reiterate that we cannot generalize this positive conclusion since, as mentioned before, our group of playtesters was somewhat unique. The group consisted of educated individuals who had been exposed to various types of musical improvisation and for whom this kind of musical output had already been demystified to some extent. In addition, it should be noted here that improvisation is mentioned several times (as a goal, as content, and as a way of working) in the Finnish National Core Curriculum for Basic Education, especially in regard to school music education.[68] Thus our playtester group was essentially aware of this form of musical expression as a formal curriculum requirement as well.

To avoid possible bias in our data, we asked the students to use only keyboard controls when playing the game. While the game is actually recommended to be played with a gamepad, we assumed that not all participants had access to this particular input device. We cannot be sure if the students followed this inquiry obediently or not. If they did, their survey submissions suggest that 52 percent of them considered the controls to be constraining, while the rest did not. This result was very much influenced by the different sensitivity between regular ASCII keyboards and controllers equipped with thumbsticks. *Otogarden* has in fact been designed with a thumbstick in mind, "a more sensitive and expressive input than a . . . button,"[69] in order to achieve natural mapping. The thumbstick affords players the possibility to orientate the kappa in a 360-degree range, while a keyboard limits the motion to eight possible fixed directions. Our playtesters were therefore substantially limited in their movements (like any player choosing to play *Otogarden* with keyboard controls).

The survey also tackled *Otogarden*'s principal game mechanic: the loop. As mentioned, it was already anticipated that players might desire the chance to make a longer loop. One participant (P19) reflected on this matter directly and constructively:

> I could have more control of the loops, I would have been able to make more music and enjoy the game more. Also, if I could control the character/the view with my mouse instead of a keyboard, that would make it [i.e., controlling] more intuitive.

---

68. See "Perusopetuksen opetussuunnitelman perusteet 2014 [National Core Curriculum for Basic Education 2014]," Opetushallitus [Finnish National Agency for Education], https://www.oph.fi/fi/koulutus-ja-tutkinnot/perusopetuksen-opetussuunnitelman-perusteet (accessed November 30, 2021).

69. Swink, *Game Feel*, 89.

Several other participants' views were aligned with this. It is true that the game functions are considerably easier to access and the auditory output potentially more pleasing when players use controllers equipped with a thumbstick.

As the first extensive open-ended question, we asked "What do you think of the main character and game scenario?" This question was intended to gather information about the game's semiotic layer. Our playtesters typically saw the kappa as being cute and amiable, and the garden pleasant and clear. One participant (P3) summarized this briefly: "I really like the game scenario and graphics. It is fresh, colorful and it creates a magical atmosphere." Several others shared the view. *Otogarden*'s general "Japanese influences" provided, for example, a "nice and calm atmosphere" (P7), or they created a "safe place," where nothing was "scary" or "unpleasant" (P21). Even if the connection with Japanese folklore was not explicitly mentioned, one participant (P8) noted that the ambience was akin to a "fairytale." Another participant (P4) wished to emphasize that it was important that the character was "neutral" and not as easily recognizable as a distinct anthropomorphized animal, such as "a cat or a dog, for example." This particular aspect was also underlined by a previously mentioned participant (P3), who noticed that the main character "doesn't drag [i.e., draw] too much attention." The main character, the kappa, is not overly detailed but only indicates references to the previously mentioned vast cultural background pertaining to yokai. The character is not embedded in any sort of discernible narrative frame. The playtesters were therefore able to positively connect with *Otogarden*'s sign system, which in accordance with previously mentioned game design theory can orientate "player expectations about the behavior, movement and interactions of game objects."[70] According to our survey, the yokai associations in *Otogarden* created a framework that seemed to grant positive experimentation within a loosely described magical atmosphere.

In the survey, 38 percent of our playtesters claimed that they employed the game's five different sounds equally. When asked to choose a sound that they found especially appealing, the xylophone and shakuhachi were the most favored. The large or small taiko drums or mokusho woodblocks pleased only a small minority. Consequently, 62 percent of the participants noticed that there were zones in the game (e.g., the pond, which produces the shakuhachi sound) to which they were more attached than other zones. In regard to sounds and zones, one participant (P19) made a positive point about *Otogarden*'s intentionally arrhythmical aspect:

> The pond and flower patch were very satisfying. I feel like the rhythm "didn't matter"
> so I felt more in control of the process. Also the small taiko drums sounded very
> pleasing and the flute very interesting.

In our survey, we also inquired what characteristics (if any) the participants would associate with the game setting, garden, and creature. In a straightforward manner, one participant listed in this regard "peacefulness, relaxation and adventure" (P2), while another (P6) added "nature, relaxation, purity, innocence." In one submission (P9), it

70. Swink, *Game Feel*, 85.

was first agreed that the semiotic layer was obviously related to Japan "but aside from that [it delivered] a sense of childlike wonder." Another participant's (P19) response presented somewhat deeper contextual contemplation by making a positive comment on *Otogarden*'s potential or implied spiritual, artistic, and perhaps even philosophical content:

> [A] Japanese garden comes to mind, and the [S]hinto religion, where I believe every natural element has its own spirits. I liked the idea of the "ghosts" of the character in the loops [i.e., the "ghosts" that appear after the main character in the loop mode]; they reminded me of different times, past and present and future together.

It thus seems that the game's semiotic system is successful beyond the designers' intentions: a player might associate larger spiritual concepts with the game despite its relatively small size. While *Otogarden* does not contain any religious references, the scantly detailed connections between the kappa and its surroundings in *Otogarden* afford different possible interpretations. They allowed participants to project their own understanding and knowledge of the situation.

The playtest session was also used to gather information regarding *Otogarden*'s possible application in an educational context. We knew in advance that members of our selected playtesting group were deeply interested in pedagogy and education, and we decided to extend our survey to these areas as well. Since we could not hypothesize what kind of responses *Otogarden* would raise in this respect, we agreed to start with the simple question "How this game could be applied in school or kindergarten education?" in order to collect input, rather than confirm or disprove any hypotheses. This question was designed for this particular playtesting group, as the educational aspects were not the focus of the *Otogarden* project at large. The submissions we gathered here surpassed our expectations: our inquiry about pedagogical and educational aspects obviously engaged the participants by employing their specialized knowledge and creativity.

Fundamentals of musical improvisation can be taught in several different ways. When the fundamentals are introduced and taught to young pupils (e.g., at the elementary school), educators may start by guiding pupils to rhythmically or melodically vary a previously learned melody. Other popular approaches to simple improvised melody construction typically apply pentatonic scales, (church) modes, four-note patterns, or chord tones.[71] These approaches, however, call for musical and instrumental performance skills of some level. Therefore educators may search for and develop even easier and simpler approaches to absolute-beginner-level improvisation instruction. Within our playtesting, nine participants (P1, P3–6, P8, P12, P15, and P20) recognized the game as an easily applicable tool for teaching improvisation. They seemed to warmly embrace this potential. According to one participant (P6), this game highlighted aspects that often are seen as missing in more conventional and formal music education:

---

71. See for example Ari Poutiainen, "Jazz syntyy soittamalla: Käytännön ideoita rytmimusiikin ja improvisoinnin opiskeluun [Jazz Is Born by Playing: Practical Ideas for Studying Popular Music and Improvisation]," in *Musiikkikasvattaja: kohti reflektiivistä käytäntöä* [*Music Educator: Towards the Reflective Practice*], ed. Marja-Leena Juntunen, Hanna Nikkanen, and Heidi Westerlund (Jyväskylä, Finland: PS-kustannus, 2013), 592–609.

> I believe the game is a fun way to learn that music is so much more than just sheet music, time signatures and other "rules," and that you can be as creative as you want when it comes to enjoying music and musicality.

Another one (P12) approached the same matter in a more straightforward way by stating that "the game could really help kids learn that there's no right or wrong and to really be creative." One participant (P15) added another creative layer by suggesting that the game "can be used as a metaphor that the pupils are in their own garden when creating music." In this case, the game appeared to provide a significant impulse to produce original and fresh pedagogical thinking, offering a ponderable suggestion on how teachers could present the game to pupils. One participant (P1) identified the game as an especially safe ground for creative music-making since "you don't have to make up the sounds, you just have to make the song and you have a safe environment to do that... you don't think it as an improvisation practice." Consequently, the game was seen as a tool for composing or introducing fundamental aspects of composing (P4, P10, and P20). In regard to younger and less experienced pupils (e.g., five to eight years old, essentially depending on pupils' musical background and experience) the game could function as a platform for creating soundscapes or learning what a soundscape is (P16, P18, and P 21).

We conclude our summary of the research data analysis by noting that the game was also seen as applicable for teaching basic computer skills (P12), musical intervals (P4), storytelling (P16 and P21), new sounds, timbres and listening (P2, P3, P4, P6, and P13), and mindfulness (P6). The game was even recognized as an instrument for live musical performance (P6, P8, and P17) or a model for producing music in real life (P19).

The survey concluded by asking if the game could stimulate any transferable musical learning and skills (e.g., skills of performing music in rhythm, composing melodies or beats, comprehending music theory). While the majority was sure that this game did stimulate or at least conveyed such potential, there also were also some contrasting opinions: 10 percent of the participants stated that this game could not stimulate anything transferable, and 14 percent could not be sure. Although most participants appeared to be very supportive toward the game, this relatively small game with limitations received some constructive criticism. Since the game does not suggest or instruct how to achieve any particular musical output or form of expression, its lack of musical goals, limits, and guidance was essentially seen as a severe limitation. One participant (P15) briefly summarized these critiques by concluding that the game "does not seem like a music learning application. It is more of a 'messing around with sounds'-type of game. With additional content (levels, etc.) the game might have more depth." If music education would be limited to, for example, teaching and learning to sing songs and play tunes, *Otogarden* indeed does not offer much in this respect.

Despite these criticisms, we could summarize from our survey that *Otogarden*'s reception was mostly positive: the game functions flawlessly, it is easily learned, and attachment to it is often formed quickly. Participants favorably connected with mostly paratelic forms of play, showing meaningful engagement with explorative, improvisatory ergodic musicking. The semiotic layer of the game was described in positive terms, favoring the

emergence of evocative connections with yokai. The resulting player perspectives can be considered particularly musically oriented, with the auditory output described as pleasing at least, if not exciting. In regard to musical improvisation, *Otogarden* can effectively suggest, introduce, and potentially also teach musical expression and creativity.

CONCLUSIONS

This article has presented the design and development of *Otogarden*, a music game that focuses on free-form, semi-structured musical improvisation. The game design was informed by a set of critical considerations related to the status of musical improvisation within video games, stemming from previous research based on ergodic musicking,[72] here understood as musical forms of participation happening during actual engagement with video games. Applying the RtD methodology, the game takes a self-reflexive stance on such issues and celebrates improvisation as an underexplored musicking modality. *Otogarden* proposes a possible application of improvisation within the context of a relatively short and contained game example. Our study corroborates its open-ended research aims with a playtest featuring a selected group of music education students.

Musical improvisation has been discussed as a musicking modality practiced within game-like cybermedia, but it is still relatively marginal and rarely directly acknowledged. While previous research suggests that improvisational musicking with interactive musical systems can augment the possibilities for "musical expressions,"[73] such understanding is conspicuously missing from current ludomusicological research. Likewise, commercially available video games have established a paradigm of desirable musical interaction, largely involving the slavish execution of prerecorded songs, thus excluding improvisation as a viable modality. Examples of explicitly explorative and improvisational games, which notably include Toshio Iwai's *Electroplankton*, have also specifically been criticized for their lack of save functions and compositionally oriented features. *Otogarden* seeks to make these issues evident by offering a distinct improvisational musicking modality and taking paratelic player perspectives into account.

Otogarden's design was also informed by game studies and game design research. In particular, the sign system of the game refers to a Japanese setting, featuring sound samples from traditional instruments, while also starring a yokai—a kappa, a fantastical creature typical of Japanese folklore. This particular character has been selected to connect with the playful and ludic characteristics of yokai, which inhabit, within the Japanese context, "a space of experimentation and play and ultimately of creation."[74] The reference is therefore particularly apt to inform and orientate players' interactions,[75] facilitating an explorative perspective toward the game. Moreover, it also aims to position *Otogarden* as an aesthetic object: the game is available to the general public, and it is intended to be playable and potentially appealing outside of a strictly research-oriented context.

72. Oliva, "Musicking with Video Games."
73. Wu and Bryan-Kinns, "Musicking with an Interactive Musical System," 72.
74. Foster, *Book of Yokai*, 91.
75. Swink, *Game Feel*, 85.

In this latter regard, *Otogarden* is also a fairly novel application of RtD methodologies in ludomusicological research, prioritizing open-ended research questions and fostering meta-reflection. We believe this approach can potentially be applied to other aspects pertaining to the study of sound and music in video games, and it is not exclusively tied to the particular topic tackled within the present article (musical improvisation).

The resulting game perspectives possibly actualized by players have been theoretically framed as oriented insertions into an aesthetic object, which present distinct design constraints, ideally connecting *Otogarden* with Eco's poetics of the open work.[76] This theoretical framing has also been supported and corroborated with an extensive playtest, which investigated players' responses. In this test, a group of music education students (N=21) first played the game and then reported their experiences in a digital survey. We collected mainly positive reactions, for example, on player experience and the semiotic layer of the game. We naturally received some criticism as well, for example, on game features (e.g., the loop length, keyboard controls). However, most of this criticism was anticipated in the game design stage and did not appear to be that alarming. The playtest session and the subsequent survey were an expansion to already established game design research practices. Rather than selecting a neutral group of participants, the test was situated within a music education context, which crucially featured a significant component of technologically driven musical improvisation. The testers were therefore able to manifest a particularly well-informed game perspective. While the playtest session largely confirmed initial hypotheses and previous research related to improvisational forms of musicking with interactive musical systems,[77] it also emphasized the diversity of possible player perspectives. While *Otogarden* presents distinct game design constraints, future research should potentially investigate different forms of improvisational ergodic musicking. Experimentation with different affordances and game mechanics, as well as alterations to the rigid constraints of *Otogarden*, could potentially foster a more varied set of player perspectives, including those more keen to compositionally oriented practices.

When *Otogarden* was created, the designer did not focus on any potential pedagogical content or aspects. No educational intentions were involved in the design process. Yet our testing with the especially pedagogically motivated player group indicates that this game fast sparked players' pedagogical imaginations. In this respect, we hope that our study will provide an encouraging example to other pedagogical game design initiatives. It seems that connecting ludomusicological and pedagogical/educational game research grants fascinating possibilities. ∎

ARI POUTIAINEN, reader in musicology, works as an associate professor of music education at the University of Helsinki (Finland). His research focus has recently been on music education, improvisation, violin technique, jazz history, and pedagogy. Poutiainen is also an established jazz violinist, composer, and educator.

COSTANTINO OLIVA is a lecturer and course coordinator at the Institute of Digital Games, University of Malta. His research focuses on musical participation in digital games, analyzing the musical value of players' diverse engagement forms. Costantino has also participated in game development projects funded by international institutions, including the Danske Filmskole, the Malta Arts Fund, and the University of Antwerp.

76. Eco, *Open Work*, 19; Norman, *Design of Everyday Things*, 125.
77. Wu and Bryan-Kinns, "Musicking with an Interactive Musical System," 72.

BIBLIOGRAPHY

Aarseth, Espen. *Cybertext*. Baltimore, MD: John Hopkins University Press, 1997.

Aarseth, Espen, and Gordon Calleja. "The Word Game: The Ontology of an Indefinable Object." In *Proceedings of the 10th International Conference on the Foundations of Digital Games (FDG 2015)*, June 22–25, 2015, Pacific Grove, CA, USA.

Apter, Michael J. "A Structural-Phenomenology of Play." In *Adult Play: A Reversal Theory Approach*, edited by J. H. Kerr and Michael. J. Apter, 13–30. Amsterdam: Swets & Zeitlinger, 1991.

Bailey, Derek. *Improvisation: Its Nature and Practice in Music*. Boston: Da Capo, 1993.

Beer, David. "Mobile Music, Coded Objects and Everyday Spaces." *Mobilities* 5, no. 1 (2010): 469–84.

Berliner, Paul F. *Thinking in Jazz: The Infinite Art of Improvisation*. Chicago: University of Chicago Press, 1994.

Biamonte, Nicole. "Musical Representation in the Video Games Guitar Hero and Rock Band." In *Pop-Culture Pedagogy in the Music Classroom: Teaching Tools from American Idol to YouTube,* edited by Nicole Biamonte, 133–47. Lanham, MD: Scarecrow, 2011.

Blacking, John. *A Common Sense View of All Music*. Cambridge, MA: Cambridge University Press, 1987.

Blacking, John. *How Musical Is Man? Washington*, DC: University of Washington Press, 1973.

Borgo, David. "Musicking on the Shores of Multiplicity and Complexity." *Parallax* 13 no. 4 (2007): 92–107.

Collins, Karen. "An Introduction to The Participatory and Non-Linear Aspects of Video Games Audio." In *Essays on Sound and Vision*, edited by John Richardson and Stan Hawkins, 263–98. Helsinki: Helsinki University Press, 2007.

Collins, Karen. "An Introduction to Procedural Generated Music in Games." *Contemporary Music Review* 28, no.1 (2009): 5–15.

Collins, Karen. *Playing with Sound: A Theory of Interacting with Sound and Music in Video Games*. Cambridge, MA: MIT Press, 2013.

Csikszentmihalyi, Mihaly. *Beyond Boredom and Anxiety: Experiencing Flow in Work and Play. 25th anniversary ed*. San Francisco, CA: Jossey-Bass, 2000.

Dolphin, Andrew. "A Portfolio of Original Compositions (Andrew Dolphin)." PhD dissertation, Queen's University Belfast, 2011. Accessed February 10, 2022. https://pure.qub.ac.uk/en/studentTheses/a-portfolio-of-original-compositions-andrew-dolphin.

Durrant, Abigail C., John Vines, Jayne Wallace, and Joyce S. R. Yee, "Research through Design: Twenty-First Century Makers and Materialities." *Design Issues* 33, no. 3 (2017): 3–10.

Eco, Umberto. *The Open Work*. Cambridge, MA: Harvard University Press, 1989.

Foster, Michael Dylan. *The Book of Yokai: Mysterious Creatures of Japanese Folklore*. Oakland: University of California Press, 2015.

Gottschalk, Jennie. *Experimental Music since 1970*. New York: Bloomsbury Academic, 2016.

Grimshaw, Mark, Siu-Lan, Tan, and Scott D. Lipscomb. "Playing with Sound: The Role of Music and Sound Effects in Gaming." In *The Psychology of Music in Multimedia,* edited by Siu-Lan Tan, Annabel J. Cohen, Scott D. Lipscomb, and Roger A. Kendall, 289–314. Oxford, England: Oxford University Press, 2013.

Gualeni, Stefano. "Self-Reflexive Videogames: Observations and Corollaries on Virtual Worlds as Philosophical Artifacts." *GAME: The Italian Journal of Game Studies* 5, no. 1 (2016): 11–20.

Harris, Craig. "Electroplankton Review." IGN, January 11, 2006, modified November 24, 2018. Accessed November 20, 2021. https://www.ign.com/articles/2006/01/11/electroplankton

Huhtamo, Erkki. "Art in the Rear-View Mirror." In *A Companion to Digital Art*, edited by Christiane Paul, 69–102. Hoboken, NJ: Wiley, 2016.

Johnstone, Keith. *Impro: Improvisation and Theatre*. London: Faber and Faber, 1979.

Juul, Jesper. *Half-Real: Video Games between Real Rules and Fictional Worlds*. Cambridge, MA: MIT Press, 2003.

Juul, Jesper. *Handmade Pixels: Independent Video Games and the Quest for Authenticity*. Cambridge, MA: MIT Press, 2019.

Kaae, Jesper. "Theoretical Approaches to Composing Dynamic Music for Video Games." In *From Pac-Man to Pop Music: Interactive Audio in Games and New Media*, edited by Karen Collins, 75–92. Farnham, England: Ashgate, 2008.

Karppinen, Seija, Ari Poutiainen, Seija Kairavuori, Sinikka Rusanen, and Kauko Komulainen. "ImproStory: Social Improvisation and Storytelling in Arts and Skills Subjects in Teacher Education." *International Journal of Education and the Arts* 19, no. 9 (2018): 1–24. Accessed April 25, 2022. https://doi.org/10.18113/P8ijea1909.

Kassabian, Anahid, and Freya Jarman. "Game and Play in Music Video Games." In *Ludomusicology: Approaches to Video Game Music*, edited by Michiel Kamp, Tim Summers, and Mark Sweeney, 116–32. Sheffield, England: Equinox, 2016.

Khaled, Rilla, Jonathan Lessard, and Pippin Barr. "Documenting Trajectories in Design Space: A Methodology for Applied Game Design Research." In *Proceedings of FDG18: Foundations of Digital Games 2018,* August 2018, Malmoü, Sweden. Accessed April 25, 2022. https://doi.org/10.1145/3235765.3235767.

Law, Effie L.-C., Florian Brühlmann, and Elisa D. Mekler. "Systematic Review and Validation of the Game Experience Questionnaire (GEQ)—Implications for Citation and Reporting Practice." In *CHI PLAY '18: Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play*, October 2018, 257–70. Accessed April 25, 2022. https://dl.acm.org/doi/10.1145/3242671.3242683.

Landy, Leigh. *Understanding the Art of Sound Organization*. Cambridge, MA: MIT Press, 2007.

Lewis, George E. "Improvised Music after 1950: Afrological and Eurological Perspectives." *Black Music Research Journal* 16, no. 1 (1996), 91–122.

Morishita, Masaaki. "From Eerie to Endearing: Yokai in the Arts of Japan." *Museum Worlds* 4, no. 1 (2016): 234–35.

Moseley, Roger, and Aya Saiki. "Music, History, and Progress in Sid Meier's *Civilization IV*." In *Music in Video Games: Studying Play*, edited by K. J. Donnelly, William Gibbons, and Neil Lerner, 166–82. New York: Routledge, 2014.

Nyman, Michael. *Experimental Music: Cage and Beyond*. 2nd ed. Cambridge, MA: Harvard University Press, 1999.

Oliva, Costantino. "On the Ontological Status of Musical Actions in Digital Games." In *Proceedings of the 11th International Philosophy of Computer Games Conference*, November/December 2017, Krakow, Poland. Accessed May 9, 2021. https://www.um.edu.mt/library/oar/handle/123456789/36221.

Oliva, Costantino. "Musicking with Digital Games." PhD dissertation, University of Malta, 2019. Accessed May 9, 2021. https://www.um.edu.mt/library/oar/handle/123456789/62365.

Oliva, Costantino. "The Musical Ludo Mix of Taiko no Tatsujin." *ToDiGRA* 5, no. 2 (2021), 131–60. Accessed April 25, 2022. https://doi.org/10.26503/todigra.v5i2.118.

Opetushallitus [Finnish National Agency for Education]. "Perusopetuksen opetussuunnitelman perusteet 2014 [National Core Curriculum for Basic Education 2014]." Accessed November 30, 2021. https://www.oph.fi/fi/koulutus-ja-tutkinnot/perusopetuksen-opetussuunnitelman-perusteet.

Peters, Gary. *The Philosophy of Improvisation*. Chicago: University of Chicago Press, 2009.

Pilchmair, Martin. "Electroplankton Revisited: A Meta-Review." *Eludamos, Journal for Computer Game Culture*, 1 no. 1 (2007). Accessed November 24, 2021. https://www.eludamos.org/index.php/eludamos/article/view/vol1no1-8/15.

Poels, Karolien, Yvonne De Kort, and Wijnand IJsselsteijn. *D3.3: Game Experience Questionnaire: Development of a Self-Report Measure to Assess the Psychological Impact of Digital Games*. Eindhoven, Netherlands: Technische Universiteit Eindhoven, 2007.

Poutiainen, Ari. "Jazz syntyy soittamalla: Käytännön ideoita rytmimusiikin ja improvisoinnin opiskeluun [Jazz Is Born by Playing: Practical Ideas for Studying Popular Music and Improvisation]." In *Musiikkikasvattaja: kohti reflektiivistä käytäntöä* [*Music Educator: Towards the Reflective Practice*], edited by Marja-Leena Juntunen, Hanna Nikkanen, and Heidi Westerlund, 592–609. Jyväskylä, Finland: PS-kustannus, 2013.

Rautiainen-Keskustalo, Tarja. "Embodiment through Digital Intangibility: Infrastructures of Musicking." *Journal of New Music Research* 50, no. 2 (March 2021): 1–8.

Small, Christopher. *Musicking: The Meaning of Performing and Listening*. Middletown, CT: Wesleyan University Press, 1998.

Schöun, Donald A. *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books, 1983.

Summers, Tim. *The Legend of Zelda: Ocarina of Time—A Game Music Companion*. Bristol, England: Intellect, 2020.

Suzuki, Shige (SJ). "Yōkai Monsters at Large: Mizuki Shigeru's Manga, Transmedia Practices, and (Lack of) Cultural Politics." *International Journal of Communication* 13 (2019): 2199–2215.

Swink, Steve. *Game Feel: A Game Designer's Guide to Virtual Sensation*. Boca Raton, FL: Taylor & Francis, 2009.

Wu, Yongmeng, and Nick Bryan-Kinns. "Musicking with an Interactive Musical System: The Effects of Task Motivation and User Interface Mode on Non-musicians' Creative Engagement." *International Journal of Human-Computer Studies* 122 (2019): 61–77. Accessed November 24, 2021. https://doi.org/10.1016/j.ijhcs.2018.07.009.

VIDEO GAMES

Animal Crossing: New Horizons. Nintendo EPD/Nintendo. 2020. PAL/English, Nintendo Switch.

Dance Dance Revolution. Konami, Bemani/Konmai. 1998. Japanese, Arcade.

Electroplankton. indieszero/Nintendo. 2005. English, Nintendo DS.

Guitar Hero. Harmonix/RedOctane. 2005. PAL/English, PlayStation 4.

The Legend of Zelda: Ocarina of Time. Nintendo EAD/Nintendo. 1998. PAL/English, Nintendo 64.

The Legend of Zelda: Breath of the Wild. Nintendo EPD/Nintendo. 2017. PAL/English, Nintendo Switch.

Otocky. Scitron, Art SEDIC/ASCII Corporation. 1987. NTSC-J/Japanese, Famicom Disk System.

Otogarden. Costantino Oliva, Mighty Box. 2021. English, web browser, MacOS, Windows.

Rez. United Game Artists/Sega. 2001. PAL/English, PlayStation 2.

Rhythm Heaven. Nintendo SPD, TNX Music Recordings/Nintendo. 2008. English, Nintendo DS.

Rock Band. Harmonix/MTV Games. 2007. PAL/English, PlayStation 4.

Scape. Opal Limited. 2012. PAL/English, iPad.

Super Mario Bros. Nintendo R&D4/Nintendo. 1985. PAL/English, Nintendo Entertainment System.

Taiko no Tatsujin. Bandai Namco. 2001. Japanese, Arcade.

Thumper. Drool. 2016. PAL/English, PlayStation 4.

Tres Lunas. Oldfield Interactive Ltd. 2002. PAL/English, Windows.

Untitled Goose Game. House House/Panic. 2019. PAL/English, PlayStation 4.

ARTWORKS

Cardew, Cornelius. *Treatise*. Leipzig: Edition Peters, 1967.

Duchamp, Marcel. *The Box in a Valise De-luxe Edition No. II*. Edinburgh: Scottish National Gallery of Modern Art, 1941.

Iwai, Toshio. *Composition on the Table*. Tokyo: ICC Intercommunication Center, 1999. Accessed April 25, 2022. https://www.ntticc.or.jp/en/archive/works/composition-on-the-table/

Otogarden survey

This digital survey is a part of an academic game and music education research conducted by **Dr. Costantino Oliva (Institute of Digital Games/University of Malta)** and **Dr. Ari Poutiainen (Faculty of Educational Sciences/University of Helsinki), which will apply students' anonymous survey responses** (i.e. reactions and replies to the open-ended questions) **in forthcoming academic research publications** and presentations on musical gaming and improvisation.

Your participation in this research would be much appreciated. Participation is however voluntary. If you do not wish your responses to become a part of the research data, tick a box in the following "Participation [Osallistuminen]" section.

If you feel comfortable in writing **English, please use this language.** The contents of your responses is only meaningful, not the quality of your language! If you however prefer to use Finnish or Swedish, this is naturally accepted as well. The Finnish translations of the survey questions and texts appear in brackets.

Participation [Osallistuminen]

I do not wish my responses to become a part of the research data. [En halua, että vastaukseni ovat osa tutkimusaineistoa.]

Participants information [Tietoja vastaajista]

1. Please indicate your age group. If you do not wish to indicate any age group information, apply "No response". [Kerro mihin ikäryhmään kuulut. Jos et halua kertoa ikäryhmääsi, valitse "Ei vastausta".]

Younger than 20 years [Nuorempi kuin 20 vuotta]
20–24 years [20–24 vuotta]
25–29 years [25–29 vuotta]
30–34 years [30–34 vuotta]
35 or older [35 tai vanhempi]
No response [Ei vastausta]

2. Please indicate your gender. Apply a wording that you prefer. If you do not wish to indicate any information, apply "No response". [Kerro sukupuolesi. Käytä parhaaksi katsomaasi määritelmää. Jos et halua antaa tietoa, vastaa "Ei vastausta".]

Playing experience [Pelikokemus]

1. Please share shortly your impressions and experiences on the game and process of learning to play and apply it. [Kerro lyhyesti pelikokemuksestasi ja pelin synnyttämistä vaikutelmista. Kerro pelin opettelusta ja käyttämisestä.]

2. Were you actively pursuing musical sequences that you found to be aesthetically pleasing? [Tuotitko tai pystyitkö tuottamaan aktiivisesti musiikillisia jaksoja, jotka olivat mielestäsi esteettisesti miellyttäviä?]

Yes, I strongly agree. [Ehdottomasti kyllä.]
Yes, I agree. [Kyllä.]
I cannot decide. [En osaa sanoa.]
No, I disagree. [En.]
No, I strongly disagree. [Ehdottomasti en.]

3. How would you describe your musical output? [Miten kuvailisit tuottamaasi soivaa musiikillista lopputulosta?]

4. Do you recognize what you did as improvisation? [Oliko tekemäsi mielestäsi improvisointia?]

Yes, I strongly agree. [Ehdottamasti kyllä.]
Yes, I agree. [Kyllä.]
I cannot decide. [En osaa sanoa.]
No, I disagree. [Ei.]
No, I strongly disagree. [Ehdottomasti ei.]

5. Did you feel constrained by the game controls? [Rajoittivatko pelin ohjaimet tai ohjauskomennot pelaamistasi?]

No, I did not feel constrained by the controls. [Ei, ohjaimet tai ohjauskomment eivät rajoittaneet pelaamistani.]
Yes, I felt constrained by the controls. [Kyllä, ohjaimet tai ohjauskomennot rajoittivat pelaamistani.]
If you felt constrained, please elaborate on the game controls below. [Jos ohjaimet tai ohjauskomennot rajoittivat pelaamistasi, kerro tästä vapaasti lisää.]

Game [Peli]

1. What do you think of the main character and game scenario? [Mitä mieltä olet pelin päähahmosta ja tapahtumaympäristöstä?]

2. The sounds are samples from Japanese instruments. Did you use all equally or have preferences? Please indicate. [Soitinäänet ovat japanilaisten soitinten samplejä. Käytitkö kaikkia tasapuolisesti vai suositko tiettyjä? Valitse alla.]

I used all sounds equally. [Käytin kaikkia soitinvaihtoehtoja tasapuolisesti.]
Shakuhachi flute (pond) [Shakuhachi-huilu (lampi)]
Large taiko drums (trees) [Suuret taiko-rummut (puut)]
Small taiko drums (vegetable patch) [Pienet taiko-rummut (kasvimaa)]
Mokusho woodblocks (flowers patch) [Mokusho-woodblockit (kukkakenttä)]
Xylophone (wooden pathways) [Ksylofoni (puisista askelmista koostuvat polut)]

3. Were there any zones in the garden you indulged more in? [Oliko pelissä alueita, joita oli erityisen miellyttävä käyttää?]

Yes [Kyllä]
No [Ei]

If you were indulged by particular zones in the garden, please elaborate below. [Jos pelissä oli muita miellyttävämpiä alueita, kerro niistä.]

4. What characteristics would you associate with the game setting, garden and creature (if any)? [Minkälaisia asioita yhdistäisit pelin asetelmaan, puutarhaan ja hahmoon?]

Education [Kasvatus ja opettaminen]

1. How this game could be applied in school or Kindergarten education? Please submit any ideas and suggestions. [Miten peliä voitaisiin hyödyntää koulussa tai päiväkodissa? Ideoi vapaasti ehdotuksia tai sovellutuksia.]

2. In your opinion, does the game stimulate transferable musical learning and skills? [Tuottaako peli mielestäsi musiikillista oppimista ja siirrettäviä musiikillisia taitoja?]

Free word [Vapaa sana]

If you wish to write more on the game and your experiences, please use the box below. Thanks in advance. [Halutessasi voit vielä kertoa lisää pelistä, pelikokemuksistasi tms. alla. Kiitokset etukäteen.]

Many thanks for your participation! [Suuret kiitokset siitä, että osallistuit!]

Dr. Costantino Oliva
Institute of Digital Games
University of Malta

Dr. Ari Poutiainen
Faculty of Educational Sciences
University of Helsinki