Puzzle Is Not a Game! Basic Structures of Challenge

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ABSTRACT

By analyzing ontological differences between two contested concepts, *the puzzle* and *the game*, the paper aims at constructing a structural framework for understanding the videogame and its challenges. The framework is built on three basic challenge structures: *the puzzle*, *the strategic challenge*, and *the kinesthetic challenge*. The argument is that, unlike the latter two, the puzzle cannot constitute a game.

Keywords

puzzle, challenge, philosophy, ontology, dynamics

INTRODUCTION

Drawing from a notion already invoked by Johan Huizinga (1955) and Roger Caillois (1961), Katie Salen and Eric Zimmerman (2003) state that "all kinds of puzzles are games" (81). For Janet Murray (2006) not only is the puzzle a game, but every videogame is also "a procedural puzzle" (198). Jesper Juul (2005) labels puzzles as "a small subset of games" (93), while Aki Järvinen (2007) sees them "as individual games or parts of [games]," depending on the overall system structure (128). As recognized videogame ontologists such as Gonzalo Frasca (2007) and Espen Aarseth (2011) welcome the puzzle to their game concepts as well, it appears fairly justified to conclude that, in game studies, the puzzle is generally considered a game.

Outside game studies, however, the puzzle holds a different position. With the exceptions of Huizinga and Caillois, theorists of games and play tend to exclude the things referred to as 'puzzles' from their fields of research. Consider the following game definitions from the established scholars of psychology (Eric Berne), game theory (Oskar Morgenstern), social sciences (Clark Abt), and play theory (Elliot Avedon & Brian Sutton-Smith):

- "an ongoing series of complementary ulterior transactions progressing to a well-defined, predictable outcome." (Berne 1964, 44)

- [a system in which] each participant is striving for his greatest advantage in situations where the outcome depends not only on his actions alone, nor solely on those of nature, but also on those of other participants" (Morgenstern 1968, 62)

- "an activity among two or more independent decision-makers seeking to achieve their objectives in some limiting context." (Abt 1970, 6)

Proceedings of DiGRA 2013: DeFragging Game Studies.

- “an exercise of voluntary control systems in which there is an opposition between forces, confined by a procedure and rules in order to produce a disequilibrial outcome" (Avedon & Sutton-Smith 1971, 7)

The common factor of all the four definitions gets précised in Hans-Georg Gadamer’s (1960) primal condition for games:

> In order for there to be a game, there always has to be, not necessarily literally another player, but something else with which the player plays and which automatically responds to his move with a countermove. (106)

In Berne’s psychological approach these ‘other players’ surface in transactions of social intercourse; multiple participants construct the foundations of Morgenstern’s strategic game theory; Abt, Avedon, and Sutton-Smith examine games as activities that form of competing or collaborating agents. For future reference, this ambiguous ‘other player’ is named *dynamics*.

All the cited modes of game dynamics clash with the essentially static puzzle structure, be it a crossword, riddle, jigsaw or a mathematical puzzle. To support the observation with one more piece of cross-disciplinary evidence, puzzles can rarely be considered prohibiting the “use of more efficient in favour of less efficient means” (Suits 1978, 54), which seems to be one of the core characteristics of games (cf. Suits 1985).

This paper builds on the above discrepancy in order to advance the ontological understanding of *challenge*—another vital constituent of games—which shall here be defined as “a goal with uncertain outcome” (Malone 1980, 4–5). The titled argument *puzzle is not a game* is presented and defended, yet not in the interest of encouraging terminological debate, but in the interest of revealing structural factors that play significant roles within all ludic phenomena, including games. While the focus is on the videogame, the belief is that the exposed findings apply to all games, as many of the forthcoming examples imply. For this reason, the terms *game* and *videogame* will both be in use.

By showing how most things often discussed under the word ‘puzzle’ lack dynamics, which appears to be essential for most things discussed as ‘games,’ a structural basis for challenge is erected on two cornerstones: *the puzzle* and *the strategic challenge*. The two are distinct in respect to the demands they set for configuration: strategic challenges entail configuring dynamics, whereas puzzles entail configuring statics alone. Dynamics and statics are defined in terms of the determinacy of consequences. In static systems consequences are determinate, whereas in dynamic systems consequences are indeterminate.[1] The framework is completed with a third challenge type, *the kinesthetic challenge*, which may occur in both static and dynamic systems. It is this third challenge that more or less defines the videogame: puzzles and strategic challenges of videogames are normally accompanied with (vicarious) kinesthetic challenges.

The first part of the paper provides a founding survey of the structural differences between puzzles, strategic challenges, and games. The second part elaborates the analysis with an ontological breakdown that is concluded with a treatise of kinesthetic challenges.

PUZZLES, STRATEGIC CHALLENGES, AND GAMES

As an exception in game studies, Chris Crawford maintains a long-standing view of games as structurally distinct systems from puzzles. The distinction is made already in his primal *The Art of Computer Game Design* (1984):

> If the obstacles are passive or static, the challenge is a puzzle or athletic challenge. If they are active or dynamic, if they purposefully respond to the player, the challenge is a game. (13)

While the idea of dynamics as a compulsory game element is not utterly unique to Crawford in contemporary game scholarship (see Parlett 1999; Costikyan 2002; McGonigal 2011), his disciplined division between puzzles, games, and athletic challenges deserves a special mention. For Crawford's recent interest lies more in design issues than ontological questions, his subsequent work (1990; 2003a; 2003b; 2013) does not provide gainful elaborations to the concept. The present undertaking will therefore use Crawford's model as a point of departure in order to develop a fresh demand-based structural framework for understanding videogames and their challenges.

A successful execution of the task requires analyzing two separate structural relations: that between 'puzzles' and 'games' plus that between 'puzzles' and 'athletic challenges.' The former analysis will be the subject of this section, after which it is possible to move to the latter in the next section. The relation between 'games' and 'athletic challenges' bears no importance in this study.

The first issue in need for clarification is Crawford's terminology, nonetheless. While *the puzzle* will naturally retain its original status, his 'games' are replaced with *strategic challenges*, and 'athletic challenges' with *kinesthetic challenges*. In this way, the word *game* can be reserved for systems that consist of one or more of the distinguished three challenge types.

The relation between puzzles and strategic challenges is explained through the notion of *dynamics*. It is fitting to recall the premise: strategic challenges entail configuring dynamics; puzzles entail configuring *statics* alone. The current interest, then, lies in the structural differences between dynamics and statics.

For the purposes of the present study, dynamics and statics are defined in terms of the determinacy[2] of consequences (cf. Pias 2004). In static systems consequences are determinate, whereas in dynamic systems consequences are indeterminate. In accordance with the preceding premise, the systems structure of the puzzle is static and fixed, whereas strategic challenges may emerge in three diverse dynamic system structures:

(S *statics*) Determinate configuration outcome, determinate system state

(D_1 *direct dynamics*) Indeterminate configuration outcome, determinate system state

(D_2 *indirect dynamics*) Determinate configuration outcome, indeterminate system state

(D_3 *total dynamics*) Indeterminate configuration outcome, indeterminate system state

Determinate system state refers to the absence of indeterminate state alterations that are not caused by the (first) player. Determinate configuration outcome refers to the absence of indeterminate effects the (first) player's configuration has on the system state. System state refers to the conditions of the system that are functional in relation to the challenge.

All nonkinesthetic challenges are either puzzles or strategic challenges. Their structures are now explained through well-known games and game challenges. Herein, separating the challenge from the cultural object which it is part of (or which it constructs) cannot be overstressed.

(S) *Static challenge structures (puzzles)*. A jigsaw is a puzzle. The consequences of its configuration are determinate, for fitting puzzle piece A to spot B has always the same outcome: the piece fits or not, and if the piece fits, the system state alters into a more lucid picture. If the piece does not fit, the system state remains the same. The system state is determinate too, as the solver is the only agent capable of affecting it. Static challenge structures are found in crosswords, sudokus, and in many 'fiction puzzles' (Karhulahti 2013) of videogames such as *The Secret of Monkey Island* (Gilbert 1990), *Prince of Persia: The Sands of Time* (Mechner 2003), and *Portal* (Swift 2007).

(D_1) *Directly dynamic challenge structures (strategic challenges)*. Single player dice games and slot machines offer examples of direct dynamics. While the system states of their challenges are determinate as in (S), the indeterminate outcomes of dice rolls and lever pulls results in dynamicity: the player does not know the consequence of her or his configuration. What makes these challenges strategic is the element of decision-making, e.g. the possibility to choose the number of rolled dice in *Yahtzee* (Bradley 1956). If this element is not present, the attainment of the goal depends solely on random factors and the challenge is strategic merely in a nominal sense.

(D_2) *Indirectly dynamic challenge structures (strategic challenges)*. Chess and many other board games without dice-like variables provide textbook examples of indirectly dynamic challenges. As in jigsaws, the outcome of the player's configuration is determinate: moving piece A to spot B always results in the same alteration of system state. Yet in these contexts moving A to B is followed by another state alteration, namely the opponent's (or the system's) response. Note that while chess, as a game, is a dynamic challenge, the final move in chess can be examined as a separate static system—as a puzzle—due to the opponent's inability to respond to checkmate.[3]

(D_3) *Totally dynamic challenge structures (strategic challenges)*. In totally dynamic challenge structures configuration outcomes and system states are both indeterminate. Battles in *Heroes of Might and Magic* (Caneghem 1995) are totally dynamic challenges: there are variables in configuration (damage done by configured units is indeterminate) as well as in state alteration (moves of the opponent are indeterminate).

If games are, among other things, dynamic systems with one or more challenges, a single strategic challenge can constitute a game, as in chess. A game may also include puzzles, but a puzzle can never constitute a game. This reasoning leads to two peculiar structural factors that operate in-between statics and dynamics: *quasi-dynamics* and *semi-dynamics*.

Quasi-dynamics

One should not confuse indeterminacy with variation: variation may also be determinate. Accordingly, a puzzle may include variable components as long as they are determinate. Because variation implies, but does not equal to, dynamics, let this determinate variation be classified as a statically operational challenge factor, as *quasi-dynamics*.

If configuration outcome alters but repeats a determinate pattern, say, a dice roll that systematically produces the numbers from one to six, it functions as a quasi-dynamic factor. Correspondingly, if the system state alters independently of the (first) player but repeats a pattern, say, a computer opponent that has been programmed to systematically switch between two varying responses to the same input, it functions as a quasi-dynamic factor. As long as the two quasi-dynamic factors occur simultaneously, all consequences are determinate and the challenge is a puzzle.

In the turn-based text game *Rematch* (Pontious 2000) the player is trapped in a time-loop that repeats a cycle of nine, meaning that the environment has nine variations that take systematic turns after the player's each input. Challenged with the dilemma of escape, the player can end the cycle with a single command, which however works only in one specific environment of the systematically switching nine. This makes the *outcome* of configuring *Rematch* quasi-dynamic: the correct input is winning only every ninth turn. Although the actual game is finished after successful execution of the correct input, one can imagine a quasi-dynamic *system state* in form of a determinately varying response: in first rounds of the cycle successful executions of the correct input are responded with an identical nine-cycle, whereas in every second round of the cycle successful executions of the correct input result in a closing win. Since this hypothetical system response can also be expressed as an eighteen-cycle of output variation, the case confirms that as long as the varying response is determinate, it cannot be distinguished from any static puzzle structure (S).

In challenges that are not turn-based the structural correspondence between quasi-dynamics and statics is more difficult to see. In the graphic adventure *Feeble Files* (Woodroffe 1997) the player must distract a guard by putting a coke can on the guard's patrol route without getting noticed. The guard follows a determinate patrol route, so the simple solution is to wait until the guard has passed. It is tempting to perceive the moving guard as a factor of a dynamic system state, for its steady movement seems to produce continuously new system states. However, because the guard's dynamic behavior is limited to traversing the predefined patrol route, the alteration of the system state is fully determinate. Since the outcomes of all available configurations the player is provided with (five direct interactions and usable inventory items) are determinate together with the guard's movement, the latter can be reduced to a mere multiplication of determinate configuration outcomes (input unsuccessful when guard present; input successful when guard not present), as in *Rematch*. Successful execution of the solution requires time-critical performance within an altering system state, but the challenge is structurally static—a puzzle.

Semi-dynamics

Despite having dynamic, indeterminate system states, some nonkinesthetic challenges fall closer to the puzzle than to the strategic challenge. This is the case when dynamics are finite, as in ticktacktoe (see Björk & Juul 2012). Let this factor be termed *semi-dynamics*.

Although the indeterminate actions of the second ticktacktoe player add a dynamic element to the system, its structure is solvable because of the finite 3x3 grid (allowing 26,830 possible games to be accurate). After the player has solved the system's structure, its dynamics break down as she or he gains access to optimal play: she or he becomes able to determine the most efficient move in all possible system states. Players who have solved the system, *disavowed players*[4], never lose in ticktacktoe if they play their best.

Because semi-dynamically structured challenges are solvable, they are termed *semi-puzzles* instead of the equally logical alternative ‘semi-strategic challenge.’ The terminological quandary reflects Crawford’s (2003a) objection against the categorization of dynamics. For him, dynamic differences are purely subjective:

> Most of the simpler videogames appear initially to be games, but after some amount of use, the player recognizes the algorithms at work and the activity becomes a puzzle rather than a game. It's all in the perception of the player. (8)

As game theorists have shown long before videogame research (see McKinsey 1952), it is certainly possible to study challenges from the player’s perspective. For most first-time players ticktacktoe appears unquestionably as a strategic challenge. Still, this does not mean that at some point “the activity becomes a puzzle,” as Crawford asserts. An activity (strategic configuration) cannot change into a structure (puzzle). One could reasonably argue for a transformation from strategic configuration to puzzle solving, but because puzzles can often be solved by different means some of which overlap with those used in overcoming strategic challenges (Danesi 2002), distinguishing puzzle solving as a distinct activity from strategic configuration does not seem like a fruitful approach.

A more critical objection against structural challenge analysis could be derived from the quantifiable limits of dynamics. When it comes to chess, for instance, the grid is finite as are the pieces’ movements, but the solution for the game is yet to be discovered. Since that current state of affairs may change along with the exponential growth of computing power, as it happened with checkers, the conclusive number of semi-puzzles remains unknown (and for that matter, will remain as such as long as any philosophical determinism exists). Their ontological ambiguity notwithstanding, semi-puzzles are useful for revealing actual puzzles in games. To spend one more moment with chess, the previously mentioned final moves are only one form of the chess puzzle—situations that can be considered puzzles may actually emerge earlier in the game as well. Any situation at which the player is able to come up with a combination of moves that result in a determinate checkmate can be presented as a chess (or as a mathematical) puzzle.[5]

The same logic operates in *Tetris* (Pajitnov 1984), which does not fit in (S) albeit the everyday reference to it as a puzzle game. Due to the similarities between jigsaw pieces and various compatible game pieces, there is a widespread tendency to consider all piece fitting activities as puzzle solving; and in the same vein, all systems that demand piece fitting as puzzles. This *tetris fallacy* overlooks structural dynamics. In *Tetris* indirect dynamics surface via the repeated delivering of a random tetromino. Whereas in chess there are no right or wrong moves but only less and more efficient strategies until a situation at which the player is able to come up with a determinate checkmate (or in some rare cases, a move for avoiding one), in *Tetris* there are no right or wrong moves before a state at which some moves result in unwinnable situations. As long as *Tetris* provides two or more moves that enable continuing play, the configuring activity is strategic for the consequences of those moves depend on the order in which the dynamic game delivers the next tetromino(s). Overcoming the challenges of *Tetris* (and chess until further notice) is not about finding a solution but about optimization, that is, about executing a strategy.[6]

PUZZLES AS OBJECTS

Rubik’s Cube (Rubik 1980) is a challenge. In the rubric of this paper, that challenge is a puzzle—not a strategic challenge nor a game. A *Rubik’s Cube* can also be an analog material object, but it may appear in a digital form as well. And because a digital *Rubik’s*

Cube poses the same challenge as an analog one, the existential nature of the *Rubik's Cube* puzzle cannot be tied to materiality or to any other form-specific qualities. Is this conclusion valid for all puzzles, or perhaps, for all game challenges? What kind of object *is* the *Rubik's Cube*, then?

The ultimate goal of this section is to show how the existential nature of the puzzle differs from those of other game challenges. The scrutiny commences from the latter question, the answers of which will provide tools that enable exploring the former question.

Because of the widely-recognized structural correspondence between the puzzle and the riddle (Danesi 2002; Montfort 2003; Tronstad 2005; Douglass 2007; Fernández-Vara 2009), philosophical investigations concerning the existence of literary works are taken as the starting point. For current purposes the most gainful contributions in that field come from Roman Ingarden (1973a; 1973b), who considers literary works not as material objects but as immaterial, 'intentional' objects that allow readers to conceive varying realizations of them within constraints set by the text:

> a book is not a literary work of art; it is only a material tool (means) for giving a stable, relatively unchangeable real foundation to a literary work of art and in this way providing the reader with access to it. (1973b, 176)

Because riddles are a literary genre, they fit effortlessly to the concept. A riddle need not be uttered, printed in a book, or presented by other means in order to exist. It is an intentional object in a sense that its defining qualities can be presented in many forms, but *configuring it never depends on the form*. The argument is that this form-independent configuration concerns puzzles in general, but not strategic or kinesthetic challenges.

Puzzles Are Immaterial

Let Ingarden's theory be applied to the *Rubik's Cube*. If the *Rubik's Cube* is an intentional object in the fashion of Ingarden's literary works, configuring it must not depend on its form. The first problem transpires: solving the original *Rubik's Cube* does have a strong physical aspect. As the possibilities of its digitalization and numeration (Kunkle & Cooperman 2007) confirm, this aspect is merely an illusion, however. The same puzzle is configurable in digital and mathematical forms as well.

Despite the fact that not all puzzles are transformable into mathematical formulae—not least the riddle—they do seem to share a common factor that enables examining them as intentional objects. That factor is statics. As long as it is theoretically possible to conceive a challenge as a determinate whole, it is also theoretically possible to solve it without form-related empirical configuration. If the solver of a sudoku or a videogame fiction puzzle is aware of all functional components of the challenge, she or he is also capable of figuring the solution without making actual pen marks or mouse clicks. Unlike in strategic challenges, in puzzles this comprehensive knowledge of functional challenge components is attainable.

In the recent graphic adventure *Machinarium* (Dvorský 2009) the player steers a robot who has been abandoned to a dumping ground. The robot is missing a leg, so the first puzzle of the game is to find a leg. Due to the lack of a limb, the robot is immobile. There are only two configuring options within the reach of the robot's operational capabilities: interacting with a doll and interacting with a rat. Interacting with the rat results in a thought bubble of a doll. Interacting with the doll results in the robot taking the doll. After taking the doll, a new option for configuration appears: giving the doll to the rat. Doing that results in a happy rat. The happy rat fetches a leg for the robot. Puzzle solved.

Machinarium demonstrates how puzzles that are originally presented in a specific semiotic form need not be dependent on it. Since the configuring options are determinate and finite, so is the available information. Hence, the puzzle can also be expressed verbally in its entirety. As the game advances the number of configuring options (information) increases to a degree at which verbal descriptions of puzzles become somewhat space-consuming, but as long as the challenge is static a theoretical possibility of transforming it into immaterial abstract forms remains.[7] For configuring a puzzle is not dependent on the material or semiotic form through which it is presented, figuring puzzle solutions must be considered separate acts from executing puzzle solutions.

The conclusion has substantial ontological consequences, two of which should be mentioned here. Initially, executing a solution does not necessitate figuring the solution. When a riddle blocks progress in a videogame, the player might simply look up the solution from a walkthrough. Executing the correct solution enables further progress in the game. This line of action does not guarantee that the player understands why the particular solution is the correct one, nonetheless. Players can overcome puzzles that have been materialized into videogame challenges without actually solving them.

The second consequence is a logical opposite of the first one: figuring the solution does not necessitate executing it. As Mary Ann Buckles (1985) notes in her pioneering treatment on puzzles of videogames, “the process of solving the puzzles is silent, since it takes place in the reader’s head” (95). This is best explained via the concept of *frail puzzles*. The solver of a frail puzzle is provided with configuring options that can lead to a system state at which a correct solution can no longer be executed. In the text adventure *Zork* (Anderson et al 1980) the player is confronted with a frail puzzle of retrieving a treasure that is sealed inside a mechanical egg. The solution is to give the egg to a skilled thief who is able to pick it open. Trying to open the egg without the thief will wreck the treasure, making the player unable to execute the correct solution thereafter. Yet the broken puzzle may still be solvable; the player might suddenly realize the correct solution even though she or he is no longer able to execute it.[8]

Dynamic challenges like those of the aforementioned chess, checkers, *Yahtzee*, and *Heroes of the Might and Magic* can never be immaterial, intentional objects. Whereas many of their features, from graphics to algorithms, are reducible or even removable, overcoming them always depends on empirical interaction. Dynamics is an empirical phenomenon. Even the extremely immaterial mental chess is reliable on at least one empirically-bound component, the dynamic opponent, without which it does not exist. Consequently, games and strategic challenges are rather processes than objects; or, if they are to be forced into objects, their objectiveness belongs to a class essentially different from that of the immaterial, intentional puzzle.

Puzzles are Nonkinesthetic

It is finally time to take into consideration the third type of game challenge: *the kinesthetic challenge*. At this point the videogame parts from most other games. As a result of its motion-transforming interface, the kinesthetically structured challenges of the videogame are, to be accurate, *vicariously kinesthetic*. Because the relationship between kinesthetics and vicarious kinesthetics is not simple, and because the concern of this paper is mainly for the videogame, the former is left to be studied elsewhere. 'Kinesthetic' is hereafter to be read 'vicariously kinesthetic' when referring to videogames.

Whereas both puzzles and strategic challenges have surfaced, and they still do, in numerous cultural forms outside the videogame, the psychomotor articulation of hand and eye—and its numerous variations from pedals to motion sensitive gaming—can be considered "the point at which [videogames] break with the visual entertainment culture of the last two centuries" (Kirkpatrick 2011, 88). Thus, it is hardly surprising that most of their puzzles and strategic challenges are accompanied with kinesthetic challenges.

In order to be able to talk about kinesthetic videogame challenges, a definition is needed: in kinesthetic challenge the required nontrivial effort is at least partly psychomotor, whereas in nonkinesthetic challenge the required effort is cognitive alone. If altering the input device alters the required nontrivial effort, the nontrivial effort is psychomotor and the challenge is kinesthetic. It is also notable that the psychomotor demands of kinesthetic challenges are not solely 'physical,' as they are commonly referred to, but entail cerebral effort as well. Performing a successful jump pattern in *Super Mario Bros* (Miyamoto & Takashi 1985) is an exertion the execution of which requires both physical and cognitive configuration.

Because of their psychomotor demands, kinesthetic challenges cannot be discussed as immaterial, intentional objects in the manner of puzzles. Like strategic challenges, kinesthetic challenges must always be overcome in an empirically-bound environment. This does not mean that kinesthetic challenges could not be posed together with puzzles. Most puzzles of videogames, in fact, are strongly connected to kinesthetic challenges.

In the reputable puzzle game *Portal* the player's mission is to steer the avatar out of nineteen test chambers with the help of a 'portal gun' that can be used to discharge red and blue surface-attaching 'portals.' Virtual entities, including the avatar, that enter a portal come out from the other. This trick enables numerous puzzles the simplest of which emerge with no kinesthetic add-ons:

> Test 03. This room has a gap, with a red portal on the other side. Shoot a blue portal next to you and go through it. You'll end up on the other side of the gap. (WikiCheats)

This obstruction is a clean puzzle the solution of which requires no kinesthetic execution. The act of pressing 'X' or some other button to discharge a portal as well as the act of walking through it could be executed by any method of input without nontrivial psychomotor exertion—naturally excluding input devices the operations of which are challenges themselves. After a few chambers, however, the puzzles get more complex:

> Test 08. Shoot a portal on the far wall where the pellets hit. After the pellet goes though, you'll have to quickly shoot another portal below the window across the receptor. Now all you have to do is get to the other side. There is a moving platform here, but you'll have to get to it. Shoot a portal near you and go though. You'll be standing on a platform surrounded by goo. Shoot another portal on the ceiling on the other side of the room, above the moving platform. When the platform is in the correct position, go through the portal. (Ibid.)

In this case several nontrivial exertions of kinesthetic effort are required for executing the solution. Performing quick leaps and portal discharges depend on the player's skill of controlling the input device, and switching, say, a console pad to full mouse control would set very different demands on the player.

Manifestly, the point at which an effort turns into nontrivial from trivial (and the challenge becomes kinesthetic) is subjective. For this structural analysis the aspect of subjectivity is not important. Something nonkinesthetic for you may be kinesthetic for me; regardless, kinesthetics and nonkinesthetics remain operational concepts. What is important is the observation that obstructions of videogames can be constructed of plural distinct challenges.

Portal walkthroughs do not fully describe their puzzles, as it was done with *Machinarium*, but they merely provide solutions. After reading a walkthrough the player may have solved the puzzle, but not passed the obstruction that requires *executing* the solution as well. This execution of solution is a distinct operation from puzzle solving. It may or may not be a kinesthetic challenge, and if it is, it cannot be overcome by reading a walkthrough (though one might provide technical aid). Like strategic challenges, kinesthetic challenges are not intentional objects, for which overcoming them is an activity that takes place in an ontic realm different from that of the puzzle. Solving the puzzles of *Portal* and executing their solutions are two distinct activities: the game could be traversed concurrently by two players so that one would solve the puzzles and the other would overcome the kinesthetic challenges by executing the solutions.

In the same way as there are no kinesthetic puzzles but only puzzles with kinesthetic executions, there are neither kinesthetic-strategic challenges but only strategic challenges with kinesthetic executions. This can be illustrated through a notion that is colloquially referred to as 'pausable real-time;' a feature in videogames popularized by the role-playing game *Baldur's Gate* (Ohlen & Muzyka 1998). The game provides strategic challenges in form of conflicts in which players must regulate the actions of one or more avatars in order to achieve desired outcomes. The regulation happens in 'real-time,' that is, without notable delay, so that most of these encounters do set kinesthetic demands on the player. The game state can, nevertheless, be paused at any time so that by pausing the game state frequently the player need not take the kinesthetic challenge. The feature enables distinguishing the strategic challenge from the kinesthetic one. This principle of structural distinction applies to all videogame challenges regardless of whether the player is allowed to switch or reject one or more of the challenges that occur simultaneously.

To conclude, videogames challenge players with puzzles, strategic challenges, and kinesthetic challenges. The challenges are commonly mixed into hybrid obstructions, but they may also occur individually. Some videogame genres have evolved into forms that focus on providing nothing but one type of challenge—turn-based strategy games (strategic challenges) and classic adventure games (puzzles) as the most evident examples—but even within those classes structural pureness is a rarity.[9]

CONCLUSION

The primary goal of the paper was to construct a structural framework for understanding videogames and their challenges. This was done by exploring the differences that separate puzzles from other videogame challenges, and ultimately, from games. The conclusion was that videogame challenges can be examined as distinct systems that are built on three basic structures: statics (puzzles), dynamics (strategic challenges), and kinesthetics (kinesthetic challenges). While the study focused on the videogame, non-videogame examples were given as well. There seems to be no reason why the tripartite structural foundation could not be applied to all games, keeping in mind the potential substructural differences that entail further research.

ACKNOWLEDGMENTS

I would like to thank David Myers and the anonymous reviewer for their constructive comments.

ENDNOTES

1 There is a parallel with determinate and indeterminate consequences and the availability of information. When consequences are determinate, all information concerning the system is available. When consequences are indeterminate, some information concerning the system (state changes) is not available.

2 The concept of determinacy is not unproblematic, as Markku Eskelinen (2012) makes clear: "the user doesn't always know whether two situations are exactly the same. What seems to be a random or at least different reaction to the same action may equally well be a carefully calculated consequence of some minor difference between two situations that has escaped the user. Second, the user may not know whether he acted precisely the same way in two situations that perhaps were identical. Third, the system may vary its response in cycles, but without knowing this from the start or without learning it through his experience (and patience) the user may interpret the system's response to be random when it is not" (39–40). The concepts of 'the implied player' and 'the disavowed player,' which are discussed later on, function as theoretical solutions to some of these problems.

3 How is one to fence *a* challenge from a game? In practical terms, can *Super Mario Bros* be studied as a single challenge? What about one of its levels, or segments of its levels? For there is no definite answer to those questions (cf. Iversen 2010), and for it is ultimately up to the analyzer to draw the line that corresponds to her or his research motives, this paper limits its analysis to the presented basic structures which may not be formally identifiable in every occasion, but which are always identifiable by the subject ad hoc.

4 The disavowed player is used here as an antonym of the implied player, which Aarseth (2007) defines as "a role made for the player by the game, a set of expectations that the player must fulfill for the game to exercise its effect." The implied player is a derivative of the narratological concepts 'implied author' and 'implied reader.' Narratologist Mieke Bal's (1985) notable observation concerning the implied author can be taken as premise when distinguishing between implied and disavowed players: "the implied author is the *result* of investigation of the meaning of the text, and not the *source* of that meaning" (120). Interestingly, if ticktacktoe or any semi-dynamically structured game is to exercise its effect—to be played—the subject must *lack* critical knowledge and skills. Unlike most implied readers of novels and implied players of games, the implied ticktacktoe player is thus actually less cultivated in the activity than the disavowed ticktacktoe player.

5 It should be noted that in colloquial language the term 'chess puzzle' is also used for challenges in which the player must find not the winning but the most efficient moves. Challenges of that type are not considered puzzles here, as in those cases the consequences of configuration remain indeterminate.

6 Crawford (2013, 125) provides an interesting dissection of *Pac-Man* (Iwatani 1980) in which he shows how the game consists of no more than 10^{96} differentiable states. As in *Tetris,* some of these states could be examined as puzzles, no doubt.

7 The argument can be tested with extreme examples like mental jigsaws that confirm the absurdity of hypothetical transformations but do not prove them invalid.

8 The breaking of a frail puzzle leads to a problematic situation at which players, not being able to actualize the key input, cannot verify the correctness of their solution without restoring a previous system state (if this is an option).

9 David Myers has contributed to the generic understanding of the videogame more than any other scholar in the field until today. His semiotic approach (2003) is capable of elucidating some issues that shadow the overlapping demand structures of genres.

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