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Author(s): Koskimaa, Raine

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NOAH WARDRIP-FRUIIN: *HOW PAC-MAN EATS*. THE MIT PRESS, 2020.

Raine Koskimaa, University of Jyväskylä, raine.koskimaa@jyu.fi

Noah Wardrip-Fruin's new book *How Pac-Man Eats* belongs to the publication series Software Studies. His previous book, *Expressive Processing* (2009) was the first title in the same series. The new book, as the title suggests, is focusing more on games than the previous one. In Wardrip-Fruin's own words, the book "tries to answer two questions: What are the fundamental ways that games work? and How can games be about something?" (p. xiii). Even though these two questions are fundamentally interlinked, it is the meaning part that this book more thoroughly investigates. Drawing on the basis of his earlier book, Wardrip-Fruin takes it as his starting point that "video games are systems-oriented media" (p. xx). From this follows that video games have two key elements: they operate in particular ways, and they are designed to communicate certain things. For him, game researchers too often consider either one of these elements alone, even though they work together and, thus, should be investigated also as a whole. It is exactly this, looking at the "atomic level of connection between video game system and communication, and the player experiences that such connections support," what Wardrip-Fruin aspires to with his new book.

When discussing the ways how games convey meanings, Wardrip-Fruin very strictly focuses on the games-specific communication leaving out how other forms of media can be "about something." This means mainly discarding visual, auditory and textual analysis, and looking only at the ludic dimension of games. This is a surprisingly strict focus, and not many have done this kind of analysis this rigorously before. One might argue that it is artificial to cut out the "artistic layer" of games, as it is very seldom that they would not be contributing to the understanding and interpretation of a game, but it is certainly important to try and improve our understanding of the procedural means available and used in video games. In this, Wardrip-Fruin's project is at the very heart of game studies. On the other hand, in the latter part of the book, he comes to the conclusion that "abstract games, without framing from other artforms, do not communicate their meanings effectively" (p. 204). So games that are trying to be about something generally use the means of other artforms-- language, sound, imagery, tactility--which are not directly addressed in this book (p. 234).

Wardrip-Fruin has an agenda he is promoting by exposing established practices in game design. He wants to open up the field so that it would be possible to make games which would be about

something “more than killing, greed, sport, and the other commonly encountered game themes” (p. 236). For this to happen, novel logics and models need to be developed, and they have to become broadly used and conventionalized before the human experience could be more broadly presented in a game format. This is certainly an aim that is easy to approve, and Wardrip-Fruin manages to provide promising avenues for game design.

Operational logics and Playable Models as the Basis

Operational logics and *playable models* are two basic concepts for Wardrip-Fruin. They are close to, but distinct from, game mechanics and other more often used concepts, but they are important here as they are fundamentally both system and communication at the same time. Operational logics are the foundational elements here, upon which larger procedural representations, playable models, are built.

The basis for Wardrip-Fruin’s take is Joseph C. Osborn’s catalogue of operational logics, which can be combined to a few major families: camera, chance, collision, control, entity-state, game mode, linking, pattern matching, persistence, physics, progression, recombinatory, resource and selection logics. *Collision detection* and *collision handling* are key logics in two-dimensional spatial models, and collision detection, especially, receives extensive attention throughout the book.

Much of the discussion in the book revolves around the two-dimensional spatial model, which has been one of the dominating models in games ever since the early days of *Tennis for Two* (William Higinbotham & Robert Dvorak, 1958) and *Space War!* (Steve Russell & al., 1962), and the beginning of the arcade era with titles like *Pong* (Atari, 1972). The titular game of Wardrip-Fruin’s book, *Pac-Man* (Namco, 1980), however, presents a significant change in the employment of the two-dimensional spatial model. In *Pac-Man*, two elements on screen do not simply hit each other (as in *Pong*, when the ball hits either a pad or a side-line), but *Pac-Man consumed* the dots when colliding with them. Here the spatial model was used to represent something more than just two objects hitting each other, and this, for Wardrip-Fruin, was a beginning of new era in game design, as it opened up and significantly widened the field of what kind of themes could be addressed in video games.

Soon after *Pac-Man*, several clones--Pac-likes, as they are called--appeared. Some of them replaced the dots and ghosts with other themed objects, like cheese and cats; some changed eating or collecting to different action of painting or placing something in a new area (eg. *Make Trax*, Alpha Denshi, 1981). One of the peculiarities of the discussion is that Wardrip-Fruin never mentions the

animation of the Pac-Man character. It does not simply collide with dots, but there is a distinct munching animation where Pac-Man opens and closes a mouth-like feature. Even without the mouth and munching we could think of Pac-Man as consuming the dots, but for the question in the book's title, "How Pac-Man Eats," one cannot really give a satisfying reply without referring to the animation aspect of the character. This is quite a telling example of the artificiality of cutting off the artistic layer of video games when talking about their meanings.

Operational logics and playable models operate in the same field as *game mechanics*, *systems* and *rules*. In comparison, operational logics are more fundamental than game mechanics. Jump mechanics are based on the collision logics working together with some other elements such as movement physics. Different mechanics may employ same operational logics, as collision logics are used in a wide set of mechanics. Based on these differences, Wardrip-Fruin considers that logics cannot be reduced to mechanics, nor mechanics replaced with logics. *Systems* may be used in ways which are close to synonymous with logics (as in "physics system"), but usually systems work on a different level of abstraction than logics.

Whereas operational logics are quite straightforward, and intuitively easy for players to understand and use as parts of game mechanics, playable models are more complex phenomena. They are procedural representations of particular domains, and they need to be more specific and culturally grounded so that they can fulfill their communicative role. And it is here that Wardrip-Fruin has his most serious message. As there are currently only a limited set of well-developed logics and models, including a game narrative model (typically based on connected dialogue trees and quests of an RPG), a model of the player character, a model of space, and a model of combat, that seriously limits game design and what games can be about. We have a well-developed model for spatial relations, but not for the most parts of world and life important for a human experience.

Pushing the communicative boundaries

Investigating various ways to unite computational processes with communicative goals in games is the overarching theme of the book. Wardrip-Fruin's focus is especially on cases which have pushed boundaries to communicate new things through video games, and thus created new opportunities for play. Even though there are several mainstream, blockbuster games discussed, more attention is paid to less-known, smaller games, some of them being student projects. As demonstrated through sample games, there are three main strategies for pushing the communicative boundaries of games. The first approach is *alternative*, where an existing model or logic is used, but the way how it is used

is somehow broadened. In *expansive* approaches, an existing model or logic is used to communicate something new. Expansive approaches include such special cases as *refinement* (where the new communicative role is more specified than the conventional one) and *doubling* (where the first and second communicative roles are totally separated). In *inventive* approaches, a wholly new model or logic is introduced, or, at least, an existing model is implemented in such a novel way that it can be used in a new context.

Wardrip-Fruin uses *Gone Home* as an example of alternative approach to logics and models. *Gone Home* (The Fulbright Company, 2013) is alternative, in that it placed the spatial logic to domestic space not common in games, and it refused to employ the shooting action of the genre. The alternative approach and refusal of genre conventions has rendered *Gone Home* as an “anti-game” for some players. Thanks to *Gone Home* (and other games inspired by it), domestic spaces and queer stories have been gradually normalized within games. This example is a powerful demonstration of the potential of alternative playable models to change culture. In connection to *Gone Home*, there is also discussion on the game genres. Logics and models may be combined in many ways, but they usually appear in certain combinations, and these well-established combinations are recognized as genres.

Expansive approach means giving an additional communicative role for the operational logic or playable model. This may take the form of *refinement*, when a more specific use of certain logic or model is employed. Wardrip-Fruin uses the game *Papers, Please!* (Pope, 2013) as an example of refined *pattern matching* logic. Also, a gas-chamber themed *Tetris* (a thought experiment by Raph Koster), as well as *Layoff* (Tiltfactor, 2009) as reskinned *Bejeweled* (PopCap Games, 2001) are discussed in relation to expansive approach, with emphasis on games as tools for cultural critique.

Inventive approaches are the most demanding way for game designers. One has to tread outside of the well-developed and much used models, and create a wholly new model for some form of activity. Wardrip-Fruin, his colleague Michael Mateas, and their students have made an attempt for modeling social volition in a game project called *Prom Week*. Even with an unfinished game product, the player experiences and feedback proved that their model succeeded in important ways: “Players understood characters’ social volitions enough to work with them, and these desires were portrayed in a way that could actually evoke human empathy” (p. 81). There is an extra challenge in introducing new model for players, who cannot rely on previous experience of such model. On the other hand, coming up with a totally novel model is quite improbable, and this was also the case with *Prom Week*, which had many similarities with *Blood & Laurels* (Emily Short, 2014) set in the power struggles in the Ancient Rome. Despite being very different games in many ways, they still,

according to Wardrip-Fruin, used “similar logics, working with similar structures, to determine and expose character volition” (p. 86).

Passage, Dys4ia, WarioWare as paradigmatic games

Even though there are dozens of games mentioned during the discussion, there are a few games which, obviously, play a more central role. *Pac-Man* is considered important in leading the way for wider themes in video games, and it recurs throughout the book as a trailblazer. At least as much attention Wardrip-Fruin pays to *Passage* (Jason Rohrer, 2007), an indie game done with old school pixel graphics and employing a well-familiar model where the game environment moves around the game-character. There are some nuances, however, which make this game different to its more generic cousins. The player-character changes over time, looking a bit older each time, until it finally dies. This is out of the player’s control and the character dies when its time comes, no matter the player’s decisions. Also, it is possible to meet another character in the game world, and if the two characters meet (that is, collide) they fall in love, and from that point on, they traverse the game world together side by side. This causes complications, and certain passages in the game world are harder, or even impossible, to navigate with two characters instead of a single one. According to Wardrip-Fruin’s interpretation, “through these remappings, movements across and encounters with the game world of *Passage* become representations of movement, choice, and action in life at a level more abstract and profound than the momentary level represented by many games” (p. 7). One may play *Passage* without paying attention, or even noticing, this metaphorical level of meaning, but for an attentive player it opens up a wholly new thematic experience despite the simple appearance of the game. “*Passage* combines its operational logics into a playable model of space that is at once traditional and, simultaneously, expansive--remapping its structures for use as a model of life’s opportunities and choices.” (ibid.) The analysis of *Passage* captures very nicely the main gist of Wardrip-Fruin’s discourse revolving around one or a few operational logics combined, typically highly familiar ones, giving rise to a playable model which somehow expands the limits of what is common in video games (especially those set in two-dimensional spatial model).

It is the nature of operational logics, that they are quite simple ones. That becomes clear with games Wardrip-Fruin uses as his examples. There are titles like *Passage* in which each round lasts five minutes, *Dys4ia* (Anna Anthropy, 2012) which is a succession of varied microgames, and *WarioWare, Inc.: Mega Microgame\$* (Nintendo, 2003) with its selection of very fast and simple microgames. *WarioWare* is presented in the book as a catalogue, if not exhaustive, at least well representative, of operational logics available in two-dimensional spatial model. One might argue, that there are

numerous games dealing with humanely engaging and important topics, games much more complex and richer in detail as those mentioned above. They may borrow some of their meaning creation power from non-ludic features, such as textual narration in the journal of games like *Skyrim* (Bethesda Game Studios, 2011) or *The Witcher 3* (CD Projekt Red, 2015). Wardrip-Fruin is not denying this, but he is arguing, that in most cases there is a more or less serious discrepancy between the meanings created in the non-ludic domain, and the gameplay experience. The story of *The Witcher 3* may evoke ambitious and challenging questions about otherness in relation to the mutant-witchers or the numerous monsters and their marginalized position in the midst of the main population of that world, but in the end, pretty much the only way for the player-character to interact with others is fighting with them. I believe most of players do recognize this discrepancy, but how profoundly it undermines their communicative power is debatable.

As an alternative to borrowing from “other arts,” Wardrip-Fruin considers a series of microgames as a potent approach for communicating a wide range of topics through games. He discusses the game *Dys4ia*, which is series of microgames in alternative and expansive mode, engaging topics related to gender-based harassment and stereotypes. When the topic to be communicated is sliced into smaller sub-topics and these addressed piece-meal in a series of microgames, it is easier to design playable models for each. In relation to *Dys4ia*, Wardrip-Fruin elaborates on *overloading*, which is highly important concept for him even though it is not given such a central position in the book’s disposition. When the doubling strategy is employed, you have two models at play simultaneously, so that the spatial model is comprehensible spatially (the onscreen characters in *Dys4ia*, built on the model of *Pong*, mainly), but also as turn-taking in a conversation. The moment-to-moment action in the gameplay emphasizes the spatial model, but there is also the metaphorical model which gives meaning to the action presented (as verbal harassment in *Dys4ia*), and typically, the metaphorical model gains more strength the further the game proceeds. The player starts to see the immediate gameplay as telling something about the world, and that is considered as the *meaning* of the game. This gradual replacement of the immediate spatial model by the metaphorical model is the essence of overloading. In a series of microgames approach, the designer does not need to try and develop a coherent metaphorical model for a complex spatial model, so it helps to reduce “what needs to be communicated at any particular moment through the overloading of playable models” (170). Discussion on overloading is one of the most interesting parts of the whole book, and something that may prove a fruitful starting point for further discussions, as there is much still to do to better understand the workings of overloading. There seems to be an implicit assumption that the interpretation would be pretty much the same for all players, or, that the metaphorical model is tied

to authorial intention. It would be interesting to empirically test how cultural background affects the interpretation of overloaded game models.

Wardrip-Fruin is aware of the concern that many have about microgames, maybe not seeing them as proper games. He is overcoming this claim by citing Jordan Magnuson who compares microgames to lyric poems, in that they both are short, subjective, bound to metaphor and ambiguous imagery etc. (p. 171). That is, microgames are not only proto-games, but a game type of their own with different ends and means than bigger games. This is a valid point, and it seems that the indie scene, especially, has created an ever-growing corpus of microgames (and also a bit longer minigames), where the “small game” quality, while often a practical requirement, is turned into an aesthetical statement. There is a need for small games, as there is a need for casual games, but one is still left wondering if this back-to-basics type of microgame approach really is the best that games can offer communication-wise.

Making the spatial model

Part 2 of the book is opened by a lengthy discussion on *Tennis for Two*, which shows again Wardrip-Fruin's love for getting to the source of information whenever possible, not relying on second-hand accounts. Even though the media archeological tendencies are not only beneficial for the coherence of the book, these kinds of accounts are highly interesting and informative. Claiming the firstness is always risky business, and there several contenders for the title of the first video game, but Wardrip-Fruin carefully modifies the claim locating the importance of *Tennis for Two* in the history of video games to it being “the first video game with a continuous model of space” and that it “introduced versions of the key operational logics of collision detection and movement physics that are appropriate for building such models” (p. 121).

From *Tennis for Two* Wardrip-Fruin continues to scrutinize *Space War!* and its combat logics, but even more attention is granted to its arcade game version *Computer Space* (Nutting Associates, 1971) in which limitations of technology led to discarding the star in the middle of field with its gravitational pull. *Computer Space* did not succeed well, and its designer Nolan Bushnell has blamed this on the game having been too complicated. Wardrip-Fruin, however, sees the main problem being precisely the lack of gravity, as during the development of *Space War!*, an early version without the gravity was not considered as exciting enough, and the later addition of gravity was already deemed crucial for appeal of the game. Also in *Pong*, a comparable move was made, in that the gravity element of *Tennis for Two* was lifted, but that was done via switching to top-down

perspective, which proved successful. If *Tennis for Two* introduced the playable model of continuous space to video games, *Pong* completed this invention (p. 139). In the media archeological discussion of the mutual relations of *Space War-Computer Space* and *Tennis for Two-Pong*, the logics, and especially playable models, provide a handy conceptual framework to pinpoint their crucial similarities and differences. On the other hand, the detailed historical account creates a bit of a digression in the book.

Even though the book as a whole is not told as a historical account of inventive use of graphical logics and the playable models they supported, there is still a strong historical take. Wardrip-Fruin wants to understand and explicate how certain expansions took place, how the logics have been used, and how specific models of space were created (p. 140). In this story, the video game *Adventure* (1979, by Robinett for Atari VCS) and *Pac-Man* served to expand the spatial logic of early video games in such a way that the new playable models became conventionalized. *Adventure* used collision detection for several new functions: to create walls that limit navigation; for picking up objects; for simple puzzles (collision, while holding an object) and for simple combat (collision, while holding a sword) (p. 145). In the arcade, *Pac-Man* communicated eating (147). It might well be, that these two games did initiate these kinds of playable logics, but the vague historization does not adequately establish it. It is easy to believe that they helped these new uses become familiar, and later conventional to the extent that they no longer required explanation, but pinpointing specific decisive moments does not establish a convincing historical account of this development yet. In any case, it has become naturalized part of video games, that collision may represent any kind of physical interaction, and *Pac-Man* and *Adventure* certainly have a significant role here.

Agency

One more topic discussed by Wardrip-Fruin is the question of agency in games. He describes his own experience in playing *GTA IV* (Rockstar, 2008), where he felt betrayed by the game when it first encouraged him to adopt a role-playing type of relation to the main character, but ultimately, led to a situation where he was forced to discard his own aspirations as the game only offered one option to proceed, to kill one of his close acquaintances: "And at the moment I am forced to execute Vlad or stop making progress, the sense that I am playing my own version of Niko is lost. I never go any further with *GTA IV*" (p. 93). Wardrip-Fruin locates the reason for his disappointment to an agency mismatch, which is conditioned by the nature of the game's models and logics. On the one hand, it is a question how the models and logics can't support such story and experience the game purports to be about, but it is also forceful demonstration of how the models and logics in a game sets up limits

to possibilities of subversive play. To feel that we have agency in certain situation, requires a certain freedom of responses, but this is only possible if we have suitable logics and models available. This often considerably limits also the possibilities of critical play.

Agency is an important aspect not only as an extension of logics and models, but also as an element in the meaning making process by the player. I think this aspect of agency could have been addressed more systematically in the book. There are genuinely valuable and insightful points on agency, and Wardrip-Fruin goes as far as stating that much of the power and popularity of games where models and logics suit well the central activity rises from the potential to provide agency. The issue of agency, however, is clearly subordinated to models and logics in Wardrip-Fruin's approach.

Conclusion

The book would have benefited from stronger editorial hand. The intended audience seems to vary from the very fresh undergraduates to highly specialized game historians and theorists. Another challenge is that the procession of the argumentation is frequently interrupted by digressions (Chapter "Six Questions about Logics and Models" being a prime example). Lengthy discussion on game generators has an air of being more like scaffolding necessary for Wardrip-Fruin to develop his own thinking and not so much advancing the discussion on the logics and models.

And then, bracketing the artistic elements is a considerable limitation, which is mostly justified by the need to understand the fundamental operations of logics and models as clearly as possible. But still, when considering how games "can be about something," the chosen tight scope simply is not fully satisfying. It is one thing to make a strategic choice of focusing on models and logics in order to analyze their specific properties, but wholly a different thing to assume that players in practice would make such demarcations. This kind of move is, at least, implied and it is also visible in how Wardrip-Fruin treats William Huber's claim that "the basis of the player's engagement with the digital game is the interpretation of a stream of signs," to which he says that "such a framing leaves no space for talking about the operations of the game system" (p. 111). Wouldn't it be wholly viable to assume, that the interpretation may be based on the understanding, that the "stream of signs" is produced by "operations of the game system"? This understanding may be incomplete on the specifics of the operations, but one could take it as prerequisite for playable models to be able to communicate things.

These concerns aside, Wardrip-Fruin has written a book which makes a significant contribution to game studies and game design. Based on the concepts of game logics and playable models, he

manages to develop “a vocabulary for thinking about elements that are simultaneously process-oriented, communication-oriented, and play-oriented” (p. 111). It is easy to agree with Wardrip-Fruin, that we need to talk about, and understand, how games function as systems and how this relates to how they communicate things. It is not quite as obvious that his suggestion of focusing on operational logics and playable models inevitably make this connection visible or even obvious. Rather, the well formulated analyses of Wardrip-Fruin hide the considerable interpretational work required to reveal those connections. There is, however, much value in his rigorous attempt to see the generalizable elements in the way how games function, and how they signify. I believe this book makes game logics and playable models household items, without which it is hard to do in game studies from now on.

Raine Koskimaa is a Professor of Contemporary Culture Studies at the University of Jyväskylä and Vice Director of the Finnish Centre of Excellence in Game Culture Studies. Koskimaa has published widely, especially on game cultures and digital literature, and his writings have been translated to several languages. His current research interests are eSports, and games and transmedia.

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