future internet

Article

The Player as Author: Exploring the Effects of Mobile Gaming and the Location-Aware Interface on Storytelling

Ben S. Bunting, Jr. *, Jacob Hughes and Tim Hetland

English Department, College of Liberal Arts, Washington State University, 202 Avery Hall, Pullman, WA 99164, USA; E-Mails: j.alden.hughes@gmail.com (J.H.), timhetland@gmail.com (T.H.)

* Author to whom correspondence should be addressed; E-Mail: locke456@gmail.com; Tel.: +1-330-309-9983.

Abstract: The mobile internet expands the immersive potential of storytelling by introducing electronic games powered by portable, location-aware interfaces. Mobile gaming has become the latest iteration in a decades-long evolution of electronic games that seek to empower the player not just as an avatar in a gameworld but also as a co-author of that gameworld, alongside the game's original designers. Location-aware interfaces allow players to implicate places in the physical world as part of their gameworld (and *vice versa*) for the first time. In addition to empowering the player as a co-author in the process of constructing a compelling gameworld, then, mobile games eschew linear narrative structures in favor of a cooperative storytelling process that is reliant in part on the player's experience of place. While such an author-player "worldmaking" approach to storytelling is not new, mobile games evolve the process beyond what has yet been possible within the technical and physical constraints of the traditional video gaming format. Location-aware interfaces allow mobile games to extend the worldmaking process beyond the screen and into the physical world, co-opting the player's sensory experiences of real-world places as potential storytelling tools. In our essay, we theorize the unique storytelling potential of mobile games while describing our experience attempting to harness that potential through the design and implementation of our hybrid-reality game *University of Death*.

Keywords: mobile technologies; location-aware interfaces; hybrid-reality games; mobile games; video games; narratology; ludology; storytelling

1. Introduction

You've trailed the killer through fields, across rivers and under bridges, from downtown to the edge of town, his taunting voice echoing in your head the entire way...and now, finally, he's made a mistake. It's a minor one, as mistakes go, but you've been able to follow an errant word, spoken in jest, to new evidence deep in the university's library. And now you have him. "It's only a matter of time," you think to yourself as you rush out the front doors of the library and toward your car, "soon I'll track him down and then he'll have to *tell me what really happened to my son". There's no escape for the monster this time. Reaching the parking lot, you drop heavily into the seat of your car, the exhaustion of hours of non-stop, hurried walking spreading through your legs at the sudden reprieve. You turn the key in the ignition, flip on the headlights, and roll out of the lot, pointing the car in the direction indicated by the killer's final message...and your stomach growls. Exasperated, you realize that you forgot to stop at the grocery after getting off work* again. *There's no food in the house, and you know that you really should try to cook something healthy tonight. You've been eating too much fast food lately and you don't want it to become a habit. With a heavy sigh, you fold up the killer's last taunting note and shut down your GPS unit. You'll have to pick up the chase when the weekend rolls around...*

What we've just described is a hypothetical player's experience of our hybrid-reality game (HRG) *University of Death*. Mobile gaming researcher Adriana de Souza e Silva defines HRGs as games that "employ mobile technologies and GPS devices as tools for transforming physical spaces into interactive game boards" [1], and *University of Death* (*UoD*) achieves this transformation by mapping a number of GPS-powered *ludic* challenges onto the geography of the actual city of Pullman, Washington. From a *ludic* perspective, *UoD* is half scavenger hunt and half puzzle game: players travel across the city, following clues and GPS coordinates to a series of story-caches [2]. In addition to providing them with the next location in the sequence, each successive story-cache presents players with another piece of a larger murder-mystery puzzle that they must eventually solve in order to complete the story and "win". In this sense, *UoD* is certainly a game; however, it is also an experiment in storytelling. In creating *UoD*, we wanted to do more than just make a "game board" out of the city of Pullman: we also wanted to use the medium of hybrid-reality gaming to explore the unique opportunities that the mobile internet affords storytellers.

While this essay is not focused on *University of Death,* it does build upon our experiences creating that HRG in order to interrogate the larger theoretical issues inherent in storytelling through mobile gaming. Ultimately, we argue that the mobile internet expands the immersive potential of in-game storytelling in new directions by enabling the creation of games powered by portable, location-aware interfaces. We believe that the mobile gaming format [3] has thus become the latest iteration in a decades-long evolution of digital games of various platforms that seek to empower the player not just as an avatar in a gameworld but also as a co-author of that gameworld, alongside the gamemaker(s). Like video games before them, then, mobile games eschew storytelling *via* traditional linear narrative structures in favor of a nonlinear, cooperative storytelling process. Unlike video games, though, mobile games are uniquely able to extend this cooperative storytelling process into the physical world through the use of location-aware interfaces, enabling the achievement of a new level of player immersion. In mobile games like *UoD*, players are encouraged to implicate places in the physical world as part of their gameworld, while also overlaying elements of the gameworld onto the physical world. This

interplay makes the process of storytelling reliant in part on the player's experience of place; at the same time, however, it also alters the experience of place, forcing the engagement into a kind of liminal space that is neither fully the "real" world nor fully the "game" world [4].

While a cooperative author-player approach to in-game storytelling is certainly not new, mobile games evolve the process beyond what was previously possible within the technical and physical constraints of the traditional video gaming format. By extending the game beyond the screen and into the physical world, these games co-opt the player's sensory experiences of real-world places as potential storytelling tools, mixing the physical and virtual to create immersive hybrid gameworlds. Here, we theorize the unique storytelling potential of mobile games by situating them in the context of previous gaming formats' attempts at storytelling. Through this approach, we will show the differences between storytelling from within the narrativist paradigm necessitated by the limits placed on audience interactivity by books and films and storytelling through more interactive means made possible by digital games in general. Then, specifically, we will discuss how mobile games are the most recent evolution of digital games' quest to present an immersive experience to the player. Finally, we will describe our own experience trying to harness the storytelling potential of the mobile internet through the design and implementation of our HRG, *University of Death*.

2. Narratology, Ludology, and the Narrativist Paradigm

To gain an understanding of what digital gaming–and thus mobile gaming–truly brings to the storytelling process, we must first dispel a narrativist-dominated misunderstanding. The question, "Is there a game-story?" [5], asked game scholar Janet Murray at the onset of her essay "From Game-Story to Cyberdrama", has been central to the field of game studies since the publication of Murray's own *Hamlet On The Holodeck: The Future of Narrative in Cyberspace* in 1998, and has since become an important issue in gaming culture at large. Can games tell stories? Certainly─despite some games presenting more compelling cases than others─it can be argued that digital games do in fact almost always present a narrative to the player. Yet, the way in which digital game stories are told have the potential to be fundamentally different from the way that old media such as books and film tell *their* stories. To explicate the unique type of storytelling made available by the medium of digital games, we must first situate such storytelling on the far end of a spectrum that begins with traditional, linear narratives, well beyond the bounds of what many critics would deem worthy of calling "a story". In doing so, we suggest that the question game scholars and gamers should *really* be asking is not "Can games tell stories?" but instead "What stories can games tell that other media cannot?"

Since their initial rise in popularity in the mid-1970s, digital games have straddled the line between story and game, forcing scholars, critics, and players alike to question definitional boundaries previously thought solid. Traditionally, "stories" have been linear narratives that have an audience and a teller, while "games" have been about a player exercising his/her agency within a set of rules to dictate their game-story [6] howsoever they desire. Video gaming enabled a melding of the two by introducing computers to the process. This melding began slowly. With early game consoles such as the Atari 2600, the computer's only role was that of gamemaster: it was able to efficiently and effectively process players' actions within complex *ludic* rulesets, allowing humans to play games without having to worry about enforcing the rules of those games at the same time. With the

combination of technological advancements and consumer demand, however, mass produced video games have since evolved into audiovisual feasts obsessed with mimicking the expressive medium of film, largely without regard for the important distinction between game-story and narrative. For two decades now, digital game designers have been awkwardly welding the player's agency to tell his/her own game-story to agency-less narratives—often exposition doled out between gameplay sessions through movie-like cutscenes—in an attempt to evoke the storytelling power of other, older media. Even today, nobody seems to know quite how to explicate or classify this forced, unnatural pairing, and as a result the narratology/ludology debate rages, with neither side describing a satisfying role for storytelling through gaming, and both sides ultimately doing more harm than good in the attempt.

The narratology/ludology debate originally arose from the reductive question "Can games tell stories?": narratologists prize story and representation in games while ludologists value rule structures. The debate between these two camps was originally concerned with how to critically approach video games–either as an expressive medium or not–specifically, but it has since extended to other computer-driven *ludic* experiences such as mobile games. Though a middle ground between these two extremist positions is certainly clearer now than it was a decade ago, thanks in large part to the critical synthesis work performed by Jesper Juul and Henry Jenkins, among others, even these game/story hybrid peacemakers have ended up reifying a simplistic conflation of "narrative" and "story" through the positions they espouse.

Narratologists—often Neo-Aristotelians such as Janet Murray and Michael Mateas—argue that the video game is an expressive medium and should be regarded as "cyberdrama," a term coined by Murray [5]. She believes that "Games are always stories, even abstract games such as checkers or Tetris, which are about winning and losing, casting the player as the opponent-battling or environment-battling hero" [5]. Murray goes on to argue that stories—essential modes of cultural transmission and expression—adapt to social and technological transmissions. Technology and culture are inextricably linked, and so too are the modes of its transmission and expression via storytelling, which leads her to conclude that "Computers are a new medium to express the changing cultural needs of stories" [5]. This is not to say, however, that Murray assumes that the theoretical practices applied to books and film can blindly apply to "cyberdrama". She points out that "just as there is no reason to think of mystery novels or role-playing games as merely versions of chess, there is no reason to think of the new forms of storytelling as extensions of filmmaking or board games, though they may include elements of all of these" [5]. Rather, she sees the connections between video games, books, and film as "overlapping", that cyberdrama recombines and reorganizes the ways in which narrative, spectacle, and gameplay interact. For narratologists, games *can* tell stories, but those stories cannot move beyond the constraints of traditional narrative formats in any significant way; instead, they can only build on the tradition that already exists.

In their turn, ludologists uphold narrative as the end-all-be-all of storytelling. This is less important to them, though, than insisting that there is no shared quality between game and story in the first place. Ludologist Markku Eskelinen argues that gaming is a "configurative practice" (as opposed to an interpretive one) where "the gaming situation" is a "combination of means, rules, equipment, and manipulative action" [7]. In regard to the position of narratologists, he notes that, "if I throw a ball at you, I don't expect you to drop it and wait until it starts telling stories" [7]. Eskelinen's colleague Espen Aarseth goes so far as to pose that "games are older than human culture, since even animals play

games" [8]. Since games are activities that even animals can participate in (though one is apt to wonder how they can understand the rules), he regards them as self-sufficient, rather than "'textual'" [8]. Essentially, Aarseth implies that the specialized kinds of knowledge necessary for understanding a novel aren't necessary for understanding a game (again assuming that a rulebook isn't needed): "You don't need to have played poker or ludo to understand chess, and knowledge of roulette will not help you to understand Russian roulette" [8]. Both narratologists and ludologists occupy extreme ends on a theoretical spectrum that rarely seem to overlap in an intellectually useful way.

We believe that neither narratologists or ludologists—whether of scholarly or popular bent—have generated a useful classification of digital games as a storytelling medium because both schools of thought argue their respective views from within the same narrativist paradigm, one that equates "narrative" with "story". Implicitly insisting that stories can *only* be told through a linear, largely non-interactive narrative discounts by default the central quality of games that give them such potential to tell new kinds of stories: player agency within the gameworld.

For our purposes, "story" should be considered a blanket term of which "narrative" is only one type of (potentially) many. Another such type is made possible through the player-gamemaker interactivity inherent in digital games. Unlike the one-way quasi-interactivity that exists between a book or film and its *audience*–the audience can "interact" with the static format of the narrative to a degree, but that interactivity is limited to variations among audience members in how the medium is phenomenologically received and then interpreted—game *players* directly affect the construction of their gameworld and in turn that gameworld influences the course of the player's own game-story. Of course, to be effective, this interactivity must be acknowledged by the gamemaker and incorporated in the game's storytelling process—thus far in the brief history of digital games, a rare occurrence.

Murray refers to this new form of story when she argues that "in a postmodern world…everyday experience has come to seem increasingly gamelike, and we are aware of the constructed nature of all our narratives" [5]. Effectively, the semiotic domain of gaming systems is becoming increasingly integrated with other non-*ludic* systems. Thus, neither narratology nor ludology can dominate as the prevalent theoretical perspective in critically evaluating any form of digital gaming. Essentially, the collisions between the physical and the virtual instigated by the mobile internet is merely the beginning of what will grow to be a much larger trend in gaming, and in life in general. Thus, to privilege narrative over game—or *vice versa*—to continue to indulge the conflation of "narrative" and "story", only serves to neuter a broad range of important critical perspectives.

3. Worldmaking: How the Player Writes the Game-Story

Better understanding such non-narrativist perspectives allows us to better recognize—and thus better utilize—the new storytelling techniques enabled by the mobile internet. One particularly useful perspective that exists outside of the narrativist paradigm is the theory of "worldmaking" described by game designer Tadhg Kelly on his blog *What Games Are* [9]. In a post titled "Worldmakers", Kelly begins arguing for the necessity of a non-narrativist paradigm of digital game storytelling by positing that "For a long time, video games have tried to appeal to players in terms of their game character and their inner hero. But outside the walls of the development studio, the publisher, and the academic, nobody cares" [10]. Many gamemakers' fixation on the need to create believable avatars and

characters for the player to relate to comes from the narrativist desire to generate convincing, character-driven drama within gameworlds. This fixation is reinforced by narratologist (and, less directly, ludologist) scholarship, gamers' expectations, and—most importantly—the overwhelming primacy of thousands of years of narrative-based storytelling media. On its face, this seems like a fair assumption: people enjoy drama in books and films, why not in digital games? Because, as Kelly argues, the drama that drives the appeal of traditional, narrative-based storytelling is actually impossible to engender using the format of the digital game, hence the oft-voiced though misdirected ludologist's complaint that "games can't tell stories".

"The inevitability and success of struggle in drama is built on the powerlessness of the audience," Kelly explains, "Comedy, tragedy, and other kinds of drama flow from the empathy of watching things unfold without *agency*" [11]. In digital games, a player's agency is generally expressed through an avatar, and how that avatar can and cannot translate the player's decisions and actions into the space of the gameworld. However, Kelly believes that the focus of storytelling in such games should *not* be the player's avatar–due to the impossibility of creating believable, character-driven drama in a storytelling format that prizes player agency—but should instead be the gameworld itself. "Forget the *person*", he says, "The art of game design is all about the *place*" [10].

In Kelly's model of storytelling, the tension between the player's enactment of their agency *via* an avatar and the constraints put on that agency by the rules of the gameworld—the place—generates a drama analogue different from narrative drama in origin but similar in effect. The outcome of the struggle between player agency and *ludic* gameworld enables a form of storytelling that is shared between player and gamemaker, where both parties have their role to fulfill. This struggle generates the game-story of the player playing through the game, but it is also, in a sense, a form of place-construction: the gamemaker programs the gameworld into existence, but the player's actions within that world are what actually help to evolve it beyond its original creation state. Thus, "worldmaking" is a cooperative process, one that must be initiated by the gamemaker during the game's design phase—through the creation of a compelling gameworld that enables player agency but also limits it in constructive ways—and continued by the player through his/her willingness to be an active participant in the storytelling process rather than a passive audience member who simply mashes buttons to get to the next cutscene.

Kelly explains worldmaking further by claiming that "The game gives you agency to step into a world. You have control of your agency, which functions as an extension of you and nothing more, but the world is not in your control. Like a Dali painting the world is that artistic canvass [sic] that the player can take or leave" [11]. The gamemaker's role is to create a canvas upon which all players' various game-stories can be told. Most important is that players are free to write their own destinies—through their avatar—to a degree, but that agency must be importantly limited by *ludic* rules, since games are "pointless without goals, tasks, and things to do—even if those things are self-directed or game-directed. You need structure, learning opportunities and easily interpreted patterns before you can let yourself imagine and become invested" [10]. We believe that this tension between player agency and game rules is the genesis of immersion in digital gaming. In their essay "Fundamental Components of the Gameplay Experience: Analyzing Immersion", game designers Laura Ermi and Frans Mäyrä define immersion by contrasting it with absorption, where the latter is "directing attention to an experience that is brought to mind" and the former is "becoming physically or virtually a part of the experience itself" [12]. We would tweak this definition to suggest that mobile

gaming is unique in that it gives storytellers the opportunity to make players "part of the experience itself" both physically *and* virtually at once: worldmaking, when done right, creates experiences that can reach new heights of player immersion.

Ultimately, Kelly's model of worldmaking allows us to jettison digital gaming's counterproductive obsession with recreating traditional narrative and its attendant drama by suggesting a storytelling model in which the story of import is the nonlinear, non-narrative unfolding of a player's experience of a gameworld as it is co-created by the gamemaker and the player. While the worldmaking model has certainly not seen widespread critical or popular acceptance yet, its efficacy is nonetheless borne out by the success of video games like *Half-Life 2* and *Prince of Persia: The Sands of Time*, games whose creators implicitly acknowledge the worldmaking paradigm of storytelling through their design choices [13]. For example, despite having a rather traditionally linear background narrative, *Half-Life 2* tells that narrative in parallel with the player's actions in a way that is concerned with immersing the player in the gameworld as opposed to casting him/her as a character in that narrative. From the player's perspective, in such a game each is dependent on the other: gameplay informs the game's story and the story informs the gameworld that the player inhabits. In *Half-Life 2*, the narrative may be linear, but the world is not. Such games are successful because the gamemakers have sold the experience of exploring an entire virtual world to the player—the thin linear narrative that underlies that experience is just a minor detail in comparison. Kelly's worldmaking, with its focus on (virtual) place-building, extends naturally into the locative-aware realm of the mobile internet. In fact, the importance of the player's interaction with the gameworld to storytelling is perhaps *more* obvious as it is expressed through mobile gaming than through traditional video games. The truth of Kelly's assertion that game design should be about place is even harder to deny when it is applied to mobile games that require the player to interact not only with virtual places, but also physical ones. Consider as an example of this the HRG *Songs of North*, as it is described in the essay "Play in Hybrid Reality: Alternative Approaches to Game Design" by the game's co-creators Frans Mäyrä and Petri Lankoski.

Songs of North was one of our greatest influences while we were creating *UoD*—as will become clear later in this essay—in part because of its direct acknowledgment of the importance of the player's experience of place to mobile game storytelling. *Songs* is a fantasy-themed HRG that takes place simultaneously in the city of Tampere, Finland and on a fictional plane where the player can "hear spirits, see them in their magic drums (mobile phones), and influence them by casting spells using their magic drum" [14]. The game achieves this melding of worlds in large part through the use of in-game audio played over mobile phones, giving players clues on where to head next in Tampere through sound cues. Mäyrä and Lankoski describe the role of sound in *Songs* thus:

A sequence of game might include a player walking the (real) streets of Tampere with the mobile phone in her pocket, the game client switched on, and the phone sounds turned on to high volume. Passing a local cemetery, whispering and howling (of the invisible, in-game spirits) might suddenly start drawing her attention to the game. The game client would detect the players' real location and give her sound clues of what is taking place in the fictional counterpart of the cemetery [14].

In *Songs*, GSM cell positioning technology allows the game to assign gameworld content (in this case, the keening of spirits) to game-appropriate locations in the physical world (the cemetery). The player's movement throughout Tampere directly contributes to the construction of the gameworld and the player's experience of it.

Mäyrä and Lankoski were primarily interested in creating an HRG that would "integrate some aspects of the game world with the real environment" [14], and this goal led to what they call a "three-world model" of HRG design [14], made up of the "spirit world" (the virtual, fictional setting of *Songs*), the physical world (Tampere), and the "mixed world" (the virtual-physical hybrid gameworld). In this model, the mixed world "includes information from both other layers of gaming reality, to the degree these various aspects contribute to the hybrid reality gameplay and gaming experience" [14]. For instance, someone playing *Songs* can interact with other players in the physical world through their mobile phone. That interaction might result in the revealing of an in-game artifact located in the spirit world. The mixed world result might be the player traveling on foot to the physical location of that virtual artifact in Tampere and the artifact then being loaded into their spirit world inventory on their mobile phone, perhaps unlocking a new spell or ability they can use to make further progress in the game. In this way, *Songs* is an excellent example of how mobile games can implicate the physical world in the creation of a compelling gameworld.

It is perhaps a testament to the immersive quality of hybrid gameworlds like the one in *Songs* that gamemakers need to make sure that they are not *too* convincing in their creation of a mixed world. While designing *Songs*, Mäyrä and Lankoski were careful to not blur the lines between the physical world and the spirit world too far, as many of the game's early players expressed "caution [...] when they were faced with a gaming concept that had potential to extend everywhere in their lives and included positioning of players while their game client was on, even if they were not actively engaged in gameplay during the moment" [14]. This raises an interesting concern that is perhaps unique to mobile games: virtual, purely programmed gameworlds must obey the gamemaker's coding. The physical world, though, is of course not subject to the same programmability. Thus, by presenting gameworlds that are a synthesis of the virtual and the physical, gamemakers are surrendering part of their ability to impart rules to the game. While playing a game like *Songs*, there is nothing to stop the player from leaving Tampere completely, for instance, or from even experiencing unexpected, real-world physical harm as a result of moving about the city in the ways that the game demands.

Implicating the physical world in the worldmaking process of an HRG, then, has unique disadvantages as well as the advantages we've already described. While games like *Songs* and *UoD* can effectively build immersion by presenting hybrid worlds constructed in part by the player's experience of place, the gamemaker's inability to fully mediate the player's interaction with that place keeps HRGs from being constrained to a coherent "magic circle" [15] in the way that traditional video games are.

The difficulty here is maintaining immersion in games that take place against the background of the "real" world, which cast the player's physical body and phenomenological experiences as direct inputs into the worldmaking process. According to De Souza e Silva and her colleague Daniel Sutko, one of the important features of HRGs is that they expand Huizinga's magic circle [16]; we would suggest instead that mobile gaming *breaks* Huizinga's magic circle [17]. In the past, the magic circle has been understood as restricting gameworlds both spatially and temporally, but mobile games dissolve such boundaries by extending the process of worldmaking into the physical world, where time does not stop and the player's movement must sometimes occur for reasons that arise outside the gameworld.

Take for example more recent mobile applications like SCVNR or Spy am I. Both of these game applications place game layers over the real world in order to not fully dictate a user's experience, but

to structure that experience and to use that experience to contextualize the real world. In other words, by breaking the magic circle, mobile games do not only allow users the freedom to move in and out of fictional and real worlds, but often require it. In SCVNGR, users complete digital challenges in real world environments in order to receive virtual, and sometimes, physical rewards. But SCVNGR, like other locative mobile games, does not ask the user to stay in the gameworld or to maintain the boundaries of the magic circle, but instead to question those boundaries and fluidly move in and out of the gameworld.

Having addressed the generation of immersion as mobile gameworlds' greatest strength and maintenance of that immersion as its biggest problem in the process of their own game design, Mäyrä and Lankoski suggest an alternative to Huizinga's magic circle by adapting the "frame" concept from Goffman's *Frame Analysis*. They posit the idea of game "frames" because, as they explain: "The concept of the magic circle is useful for pointing out the qualitative changes that play engenders, but the magic circle easily leads one to study games in isolation" [14], a reductive move especially when applied to mobile games that implicate the player's experience of the physical world as part of the worldmaking process. "In reality," they continue, "games and play are not limited within any precisely definable borders" [14]. This viewpoint leads them to *Songs of North*'s "three-world model" as described above.

As Mäyrä and Lankoski point out, Huizinga's circle is not a functional model for the kind of worldmaking enabled by the mobile internet. Such hybrid gameworlds and their rules can be superseded by the unpredictability of the physical world outside the game, since the rules of the physical world—of course—cannot be ignored. This unpredictability makes the design, employment, and utilization of an HRG's interface—the device which mediates the player's interaction with the gameworld—of utmost importace.

4. Interface and Immersion

While choice of interface certainly affects the player's experience of worldmaking in traditional video games, that effect is wholly dependent on a given game controller's ease of use (or lack thereof). In mobile gaming, however, the interface necessarily becomes an extension of the gameworld's rules, not just determining effective "play control", but actually dictating what the player can and can't contribute to the worldmaking process. Essentially, the mobile interface is a part of the gameworld itself, not just the tool players use to interact with and control their avatar within the gameworld. The mobile gaming interface is the means by which the gamemaker defines the way(s) in which the player can navigate the melding of the physical and virtual dimensions of the gameworld.

When a gameworld extends into the physical world, where *ludic* rules are unenforceable and where even those with the most honest intentions can be drawn out of the game at any time by a myriad of circumstances beyond the gamemaker's control, the interface is the physical link that makes player agency in the mixed world possible, but it is also what determines the boundaries of that agency. At the same time, this interface describes the degree to which the player's embodied experience of the physical world effects the game's virtual dimension. The interface of a mobile game, then, is the key to that game's ability to present an immersive worldmaking experience, much more so than in previous types of digital games. In designing the interface of a mobile game, gamemakers must walk a fine line

between allowing the player enough agency so that he/she feels like a part of the worldmaking process and allowing the player so much freedom that they are able to "break" the game. For an illustrative example of such game-breaking, consider the interface of a proto-HRG of sorts, the book series *Choose Your Own Adventure*.

Though not a mobile game *per se*, the *Choose Your Own Adventure* (*CYOA*) series is part of a genre known as "gamebooks", printed texts that aim to meld the experience of reading a book with the experience of playing a game *via* a unique interface in much the same way that *Songs* and *UoD* try to create a mixed world from the physical and the virtual using a mobile phone. The first *CYOA* title was published in 1979—coincident with an increase in the popularity of console video gaming due in large part to the release of the Atari 2600 in 1977—and the popularity of gamebooks was at its highest in the 1980s, during which time *CYOA*'s audience would have also been discovering the Nintendo Entertainment System and the Sega Genesis. However, because of its choice of interface, the *CYOA* series had problems navigating hybrid storytelling. In this case, the interface—the book itself—was not technologically sophisticated enough to enforce the rules of its own game. While kids who played *Super Mario Bros.* found that no matter what they tried, Mario could ultimately only jump so high and run so fast, kids who played *CYOA* found that they could simply read through all the outcomes of the books' branching-path narratives without following the rules if they so chose. Part of the fun of any game is gaining success *within* the rules, but within a poorly hybridized gameworld, this impulse battles the impulse to simply "read through" to the end of the story as if it is a linear narrative. It is the job of the interface—whether it be the pages of a book, an NES controller and a television screen, or a mobile phone–to mediate this battle so as to avoid the loss of the player's immersion in the process of worldmaking. Design of interface is key when it comes to hybrid-reality gaming, but too simplistic of an interface allows the player to bypass the rules of the game (as in *CYOA*), while an overbearing interface can make the player too aware of the virtual world at the expense of the believability of the mixed world (as Mäyrä and Lankoski considered when designing *Songs*). Rather than maximizing player agency or gamemaker control, then, the goal of interface design in mobile games should be an interface that utilizes the tension between rules and player agency to generate and maintain immersion as digitalgaming's analogue to traditional narrative-driven drama. Ultimately, we believe that the most fundamental way in which digital games have changed storytelling is by shifting a story's *raison d'etre* from the creation of drama to the generation and maintenance of immersion, and in mobile gaming, this immersion is created first and foremost by the player's utilization of an interface that seeks to transform his/her regular experience of the physical world into a hybridized worldmaking experience bounded by *ludic* rules. Immersion—understood in this context as the feeling engendered by a successful mixture of player agency and limitations on that agency by the enforcement of *ludic* rules through the implementation of a locative-aware, mobile interface—should be the ultimate goal of storytelling through mobile games that seek to create compelling gameworlds co-authored by the player and the gamemaker.

Yet immersion, as important as it is to the player's worldmaking experience, is hard to willfully achieve. Even we are a bit guilty ourselves of avoiding this issue: though we describe at length *what* immersion is—the result of a productive tension between player agency and the rules of a gameworld that results from the process of worldmaking—we provide no explanation of *how* to generate it. Fortunately, Mäyrä and another of his *Songs* co-creators Laura Ermi make steps in this direction in their essay "Fundamental Components of the Gameplay Experience: Analysing Immersion".

Drawing on a number of psychological, sociological, and theoretical studies of digital gaming, Mäyrä and Ermi contend that immersion can be better understood if it is broken up into three types through what they call the "SCI-model": sensory, challenge-based, and imaginative. This model is based in the idea that "the essence of a game is rooted in its interactive nature, and there is no game without a player" [12], echoing the player/gameworld dynamic at the heart of successful worldmaking, and thus paralleling our exploration of immersion in mobile gaming comfortably. Mäyrä and Ermi point out that "the concept of immersion is widely used in discussing digital games and gameplay experiences", yet "Players, designers and researchers use it as well, but often in an unspecified and vague way without clearly stating to what kind of experiences or phenomena it actually refers to" [12]. The result of this lack of clarity is that "It is often taken for granted that a bigger screen and a better quality of audio equal greater immersion" [12] when it comes to digital gaming. Mäyrä and Ermi's SCI-model is in fact a response to this bias, constructed in part to argue that while sensory immersion is in fact an important part of a player's experience, it is only a part.

Mäyrä and Lankoski describe a heavy focus on sensory immersion *only* in games as a "device-centric" approach to design, and explain that "Players need to take an active role in order to become engaged with a game. This kind of immersion cannot be created through offerings of advanced video and audio spectacles—even if spectacular graphics are likely to capture gamers' initial attention" [14]. They go on to provide the (non-digital) example of a crossword puzzle as a response to Salen and Zimmerman's idea of the immersive fallacy [18], asking "what would be the 'illusionary, simulated reality' of a crossword puzzle into which its players become 'sensually transported'?" [14]. The SCI-model that results from this questioning fits provides a constructive way of thinking about immersion in mobile games that by necessity do not take place in front of a big, high-definition screen with crystal-clear audio.

The first type of immersion that Mäyrä and Ermi discuss is in fact sensory immersion, an important (if often overstressed) dimension in the SCI-model. Key to this dimension is the face that "Large screens close to the player's face and powerful sounds easily overpower the sensory information coming from the real world, and the player becomes entirely focused on the game world and its stimuli" [12]. Described this way, sensory immersion sounds almost like a method of dragging the player into the magic circle by force. In mobile gaming, however, sensory immersion is a much less violent proposition: when in a hybrid gameworld, the player is, by default, immersed in half of that world (the physical dimension) as an extension of his/her embodied existence. This is the draw of mobile games that we described at the onset of this essay: they implicate sensory experiences the player *would have anyway* as part of the worldmaking process, making sensory immersion relatively easy to achieve.

Mäyrä and Ermi describe challenge-based immersion as "at its most powerful when one is able to achieve a satisfying balance of challenges and abilities" [12]. No less important in mobile games than in video games, challenge-based immersion is also no easier to engender in this newer medium. In a hybrid gameworld, challenges might be both virtual (in-game puzzles, riddles, or other manipulations of the interface) and physical (traversing the length of the city during rush hour) at the same time. Challenge-based immersion in mobile gaming is potentially hard to control from the gamemaker's perspective because of the ever-present possibility of intrusions by the "real" world.

Imaginitive immersion is the process by which "one becomes absorbed with the stories and the world, or begins to feel for or identify with a game character" [12]. Mäyrä and Ermi's description here skates dangerous close to the drama-based narrativist paradigm that we and Kelly reject through the use of the worldmaking model of storytelling, yet there is still certainly a place for imagination in the process of immersing a player in the worldmaking process. Imagination is necessary for the player to willingly bridge the gap between the virtual and physical dimensions of the gameworld; that is to say, without imaginative immersion, players of a mobile game like *Songs* or *UoD* would be unwilling to engage fully with the mixed world that such games present.

The SCI-model helps to suggest various ways in which a mobile game-player's worldmaking experience—as mediated through a locative-aware interface—can be made more immersive. Mäyrä and Ermi's work draws some conclusions about how best to maximize (enjoyable) tension between player agency and *ludic* rules, ultimately providing a way for us to talk about how we attempted to achieve player immersion–as the fundamental goal of storytelling through worldmaking—through the design of *UoD*.

5. *University of Death*: An Exemplum

Throughout this essay's previous sections, we traced a theoretical line of argument that began with the juxtaposition of narrative and worldmaking as different approaches to storytelling necessitated by different media. We then argued that worldmaking, a format of storytelling unique to digital games, was reliant in part on player agency and–more specifically, in the special case of mobile games—the player's experience of place. Finally, we concluded that the player's immersion in the worldmaking process is dependent on the tension between his/her agency and the gameworld's rules, and that this tension is mediated by a mobile game's interface. In this final section, we will show how we addressed each of these steps as we designed *University of Death*.

Throughout the winter of 2009, the three of us worked together to design and implement *University of Death* in the city of Pullman, Washington. It was our goal to create a compelling worldmaking experience for the player that could be powered by any GPS-ready device and that generated all three types of immersion as described by Mäyrä and Ermi's SCI-model. Our gameworld was created with the understanding that the player should have a large part in generating the story that took place within it.

UoD's story, described simply, is a film-noir-style murder mystery set in two different time periods: the story's "present" and three years into its "past". The player experiences this story directly by moving through the city of Pullman and seeing the physical world through the eyes of three different virtual characters. Through the use of these different perspectives, we attempted to achieve the melding of storytelling and *ludic* play that enables worldmaking. By suggesting that the player assume three different avatars [19] at different points in the game, we presented various perspectives on the gameworld while simultaneously requiring the player to complete *ludic* tasks appropriate to the personality of each avatar. Each of the three avatars are "playable", and the player is expected to take on the characteristics of their chosen character in order to succeed at *UoD*'s *ludic* challenges. As a direct result of completing these challenges, the player is able to flesh out more details of the gameworld, directly tying storytelling to *ludic* performance in a way that is meant to blur the lines between the two. The player can only discover the conclusion of the overall story by completing the

game, and the answers to the *ludic* challenges only become clear by understanding the story, its characters, and their motivations.

Each avatar has a distinct role in the gameworld, and these roles lead each character to the story's conclusion along different paths. In fact, each path was designed to branch towards multiple conclusions, allowing players to make *ludic* choices along the way based on how much effort they want to put into exploring the city of Pullman and on how they choose to best embody their current avatar's actions and morality within the gameworld. Players that take more complex paths through the city and are able to piece together more clues from the story are rewarded in turn with more details of the gameworld, details that flesh out the motivations of not only their chosen avatar, but also other characters in the story, including the two other characters they might (we hoped) later choose to embody on their next play-through of *UoD*.

Specifically, the three avatars that the player can choose from are a detective, a journalist, and a victim of the killer who functions as the antagonist of the story. If the player chooses to embody the detective character, then throughout the game they will have to exhibit the stereotypical traits of a detective to succeed. Much of the detective's path through the game is made up of *ludic* tasks such as putting clues together and drawing logical conclusions from known evidence. If the player chooses to embody the journalist character, they are expected to exhibit researching skills similar to those that a college-aged journalism student might have to have in order to succeed. In this guise, the player's *ludic* challenges might involve doing research in the university library. The path of the victim is (perhaps appropriately) more linear, as his route to the story's conclusion is mostly determined by events beyond his control [20]. In each case, though, the player's choice of character effects not only their own experience of the story, but also their physical actions within the gameworld.

As is appropriate for a worldmaking approach to storytelling, *UoD*'s players are not just expected to imagine themselves in their chosen avatar's role, they are required to physically act as they imagine their avatar would act. At the same time, though, *UoD* considers the importance of individual player choice to the worldmaking process: at many points in the story, the player is required to make a choice based on what action they think is most consonant with their embodiment of their chosen character. These moral or ethical decisions move their engagement with the gameworld from answering the question "what would a detective do?" to "what *should* a detective do?" They then act out their answer within the gameworld. *UoD* deviates from the typical "morality scale" dynamic employed by many traditional video games (in which your moral choices within the gameworld change only your *ludic* experience) [21]. Instead, choices you make in the physical world as a player change the gameworld itself. For example, during the detective's path, the story branches often according to a combination of the player's responses to philosophical choices and his/her success at solving skill-based problems. If the player succeeds at following the "right" trail, the change in the gameworld is—consistent with the assumed qualities of a detective character—that you discover more information, which in turn effects your understanding of the gameworld.

Here, we believe *UoD* models Kelly's idea of worldmaking effectively in the fact that how each player experiences the gameworld depends on changes in the amount of information the player has about the gameworld's events as they occur. So, for example, by the end of the victim's path, the victim gets killed (surprise!) by the antagonist no matter which story branches the player takes; however, depending on the choices the player makes while moving through the gameworld, the victim

either dies knowing who his killer is, or he dies without this being revealed. Knowing the identity of the killer (or not) is information that then inflects the player's experience of embodying the detective or the journalist on a later visit to the gameworld of *UoD*.

This dynamic not only superficially adds to the "replay value" of *UoD*, but also has the interesting effect of allowing players to experience the same gameworld from many perspectives without a need for the gamemakers to introduce radical changes in the events that occur. Thus, we were able to introduce small details in each branch of the story that are consistent with other small details in other parts of the story without introducing the kinds of continuity problems that often pop up in "morality scale"-based games. In addition, by rewarding those who successfully navigate *UoD*'s *ludic* challenges with more details of the gameworld instead of points or achievement badges or other such ephemeralities, we reinforce the idea that story and game are one and the same, rather than separate entities fighting for dominance over the same experience. Experiencing *UoD* from the viewpoints of different characters works both as a storytelling technique and a *ludic* challenge, allowing players to function as worldmakers, directing the story through their in-game actions within the bounds of rules that we chose to implement. Said rules are enforced, in large part, by the intentionally limited game interface provided to players.

In an attempt to produce a gameworld that mapped fictional storytelling onto a real space, the game interface is comprised of both analog artifacts and location-aware technology. Players use the GPS device of their choice to locate story-caches around Pullman that contain more information about the gameworld in addition to coordinates or directions to the next successive cache. As the purpose of this device was only to allow the player to follow coordinates, the player's interaction with the gameworld did not alter significantly if they chose to use a mobile phone as opposed to, say, a traditional GPS receiving unit. Often upon arriving at these locations, players also discover physical artifacts and props related to the gameworld, making *UoD* rare among HRGs in the extent to which the gameworld "crosses over" into the physical world [22]. While our game interface is not necessarily technologically advanced—not even to the level of the one used in *Songs*—we believe that in a sense this actually allows players to more directly experience the melding of the physical and the virtual in *UoD*'s gameworld by affording them more agency within the gameworld.

With *UoD*, we chose to eschew a more complex interface for the simple reason that we believe that an "always-on" gameworld is actually damaging to the player's willingness to accept a worldmaking experience. There is no active feedback through a GPS unit, and so when the player chooses to stop thinking about the gameworld, they effective "leave" the gameworld. In *UoD*, once the player no longer chooses to embody their chosen character, he or she cannot be drawn into the gameworld again until they decide to pick up where they left off. We believe that this was the best way to address the boundaries of *UoD*'s gameworld in relation to the city of Pullman: rather than making the player beholden to a more demanding interface that required attention at inopportune times, we wanted the players to enter the gameworld only when they themselves wanted to once again embody their chosen characters and in worldmaking.

Minimal though it is, *UoD*'s interface serves to implicate the physical world in the telling of the game's story. The exposition found by the player in each story-cache is placed so that it has an intimate relationship with the location in which it is found by the player, enabling him/her to have the opportunity to interact with the real city of Pullman through physical acts which were in turn

convincingly filtered through the lens of a fictional story. When an in-game character talks about the specific features of a location, then, such a rushing creek or road overpass, the player will find themselves experiencing those same features at the cache location. At times, this connection is heightened even further by the online availability of game-related audio, made available to the player through his/her mobile phone. For example, at one point in the game, for example, a story-cache located alongside train tracks features the sound of a passing train in the background of one character's expository voice-over. Through this melding of the physical and the virtual we attempted to create a convincing illusion that–within the game at least—the two were one. To reach this goal, it was necessary that the player remain fully immersed in the gameworld while playing *UoD*. As theorized above, this requires a careful balance of player agency (in this case encouraged in large part by *UoD*'s minimal inteface) and the game's rules (in this case enforced in large part by those very same limitations). Looking at *UoD* through the lens of Mäyrä and Ermi's SCI-model of immersion is an effective way to talk about certain features of *UoD* and how those features were designed to encourage a player's immersion in the gameworld.

UoD, like most games, is most obviously immersive on a sensory level. Embodying the detective, the player is constantly egged on by streaming audio clips of the killer's voice, taunting his every step. As the journalist, the player encounters newspaper clippings regarding the case she is investigating. As the victim, the player finds a number of items at various crime scenes that they can physically handle which relate to the case. In addition, the fact that *UoD*'s story implicates real locales in the city of Pullman means that the experience of moving through various places in the city inflects the story with sensory details that don't need to be spelled out directly in the exposition.

We also took imaginative immersion into consideration. This sort of immersion is illustrated most clearly in our choices of story-cache locations. Each location corresponds with the action of the story in some way, with the intent being that these correspondences will result in the player making imaginative—and thus immersive—connections. For example, the site of the final "showdown" for the detective is located in a high, lonely hill on the edge of town. The walk to this spot is already strangely unsettling, and is made even more so to a player who is participating in *UoD*'s gameworld while undertaking said walk. As another example of imaginative immersion, much of the victim's path in the game is spent revisiting old murder scenes: areas in Pullman that are "off the map," so to speak, in which murders could have conceivably taken place in the real world. When the player, as the journalist, chooses to meet with the detective, the meeting takes place on a rooftop, hidden away from plain sight, where the player might expect such a meeting to actually take place.

Though *UoD* is designed to be immersive both imaginatively and from a sensory perspective, we were most interested in making it immersive from the "challenge-based" standpoint. In pursuit of this goal, we had very little to work with in terms of raw materials. With only a GPS unit and scattered story-caches as our interface, the player could not be provided with *ludic* challenges or information directly through technological means. The primary things with which we could challenge players were the physical world and the printed word. Most simply, *UoD* has a built-in level of challenge simply by requiring the player to geocache. Each story-cache, whether one follows coordinates or not—some story-caches are found by means other than through provided GPS coordinates—is difficult to find in and of itself because each one is hidden under bushes or behind signs, *etc*. Another, more subtle layer of difficulty adds to the game's potential for immersion in the form of each character's branching-path narrative.

The challenge-based immersion presented through the structure of the branching story is perhaps best exemplified by the detective's path. As the detective, at one point players have the opportunity to follow a set of GPS coordinates to a location which is telegraphed as being a nonproductive lead. If the player chooses to follow the "better" (read: more complicated) lead instead, they are not given coordinates, merely a location—a bathroom—where the next clue can be found. This raises a few interesting questions: will the player investigate a public bathroom for clues? Is a female player willing to enter a men's bathroom in order to advance the story? This is perhaps not a "challenge" as the word is traditionally understood in gaming, but being presented with the choice—and presumably following through in carrying out the more difficult task—will make the player feel more connected to the game world, as they see that their actions have consequences both in the gameworld and in the real world. Similarly, in another instance, the player is given the opportunity to either follow coordinates—again, the "straight" path—or to search for a cache after only being given the name of a building and a cardinal direction. The challenge here lies in the willingness of the player to explore the interior of a building in public, added to the plain fact that the cache itself is very hard to find. A third and final example is the location of the final story-cache for the detective's path, which is located in an area that runs up against private property. The actual land that the player must traverse is public and thus they don't have to trespass to locate the cache, but the area is forbidding enough that certain players may simply choose to take a safer route to an easier ending. In each of these cases, as well as many more throughout the game, we believe that immersion is most strongly developed by the challenging *ludic* elements that force players to solve clues and move in difficult ways through real-world places in order to locate the next part of the puzzle. Ultimately, *UoD* demonstrates ways in which a mobile gaming experience can immerse the player in a gameworld according to all three of Mäyrä and Ermi's types of immersion.

Generation of immersion is one thing, however, and maintenance of that immersion is quite another. During the implementation stage of our design, we ran into a bit of difficulty in maintaining immersion—a situation parodied by this essay's introduction. This difficulty arose from the simple physical scale of our setting. Our game required that the player move through Pullman, a nine square-mile city, and story-cache locations could be within a couple hundred yards of each other, or the player could be required to travel miles to make progress within the game. As we ourselves walked the routes of the characters' paths during the implementation phase of the game, placing the story-caches and checking for continuity of story, we realized that despite the work we had done in implicating convincing real-world locations within the gameworld, immersion in that gameworld might well be lost as the player traveled long distances between locations.

How does hybrid worldmaking entice a player to remain imaginatively in the gameworld when the real world is so close by and constantly competing for his or her attention? The biggest problem facing *UoD* was a problem that faces many other mobile games, a problem that is not easily solved: when the gameworld includes the physical world as its "game board," how can a player be expected to keep the gameworld and the real world separate in his/ her mind? Many games like *UoD* tout their use of the real world as "game board" as a selling point, much as we have above, and yet if the real world becomes too prominent, the player's immersion in the gameworld is broken.

We attempted to deal with this conundrum most directly by addressing what exactly the player would be doing while moving from one story-cache to another. Because the artifacts, exposition, and

clues found in each location had to remain in their story-cache after a player was through at a location—so that they could be found as if for the first time by other players later—during the movement towards the next location a player would have no physical artifact to carry with them to reinforce the idea that they are in fact participating in *UoD*'s gameworld other than any notes that they had taken themselves. A player could write down the necessary clues and/or GPS coordinates from a given story-cache, but the physical documents that accompany many of the story-caches, the actual artifacts "from" the gameworld, had to remain at their specific site for later players to rediscover. For us, this meant that in order for there to be maintenance of immersion between sites, players would have to participate in physical tasks throughout.

In order to address this problem of immersion-breaking but necessary movement, we developed a number of haptic tasks for players to participate in. The first task was simply holding the GPS interface and trying to link up to a specific set of coordinates. The players had to record each set of coordinates and then try to get to them by using their GPS device in a manner similar to a scavenger hunt. This is admittedly an obvious detail, but the player's reliance on printed coordinates is important in that it mitigates the ability of the players to have their GPS-related tasks automated, which would be possible were the story-caches registered on a site like Geocaching.com. More significantly, in many cases no coordinates are provided, and the player has to instead interpret clues in order to determine the location of the next cache. In each of these cases, the player is at least doing *something ludic* while they are moving from story-cache to story-cache: trying to solve the next puzzle.

The second haptic task we developed to create a continuity of immersion was to ask players to log on to the *UoD* website and interact with web content. This could be done either through a computer or a mobile phone. Some of the content required that players search various websites, do research on a library website to find certain materials, or listen to mp3s that might give up clues. Each of these online activities was designed to be done in-between story-caches and was a required activity for the players to be able to make sense of the next story-cache. If a player skipped out on the in-between haptic activities, they would still be able to finish the game, but without the same level of success and without the same depth of understanding of the story.

Lastly, in order to move between some of the story-caches, players were required to check their character's email, reading materials placed in dummy accounts in the names of *UoD*'s various characters created through Google's Gmail service. While we provided the username and password of each character, it was the job of the player to log on to the various accounts and survey the materials there.

In each of the tasks above our goal was to maintain the player's immersion in the gameworld during transition stages of the story. None of our solutions were ideal, and it seems that despite *UoD*'s successes as an immersive worldmaking experience powered by a unique, hybrid gameworld made possible by mobile technology, it also replicates mobile gaming's biggest problem. That is to say, by breaking gaming out of the magic circle and blurring the lines between gameworlds and the real world, mobile games have put themselves in a constant struggle with that real world for the player's attention. While traditional worldmaking experiences like video games present a clearly demarcated—and indeed, frequently audiovisually overwhelming—gameworld that a player is either clearly "in" or "out" of at any given time, games like *UoD* and *Songs* are less clear about this distinction, and thus constantly run the risk of losing their unique level of player immersion as a result. In this sense, we have found that mobile gaming's biggest strength is also its biggest (potential) shortcoming.

Acknowledgments

References and Notes

1. Delacruz, G.; De Souza e Silva, A. Hybrid Reality Games Reframed. *Games Cult.* **2006**, *1:3*, 231–251.

2. We use the term "story-cache" throughout to indicate that the physical caches the player finds throughout *UoD* are related to the containers used by geocachers, but at the same time are significantly different in terms of content and purpose. Our story-caches do not contain a log book, nor do they encourage the trading of items among players. Instead, they only contain bits of *UoD*'s narrative and often instructions for finding the next story-cache. This discouragement of the social aspect of geocaching is meant to avoid the disruption of the player's immersion in *UoD*'s gameworld that might result if they stumble upon artifacts left by previous players that are not consonant with the gameworld.

3. For the purposes of this essay, "mobile games" refers *only* to games that rely on a portable, location-aware interface. This label purposely excludes popular games like *Angry Birds* that, while technically played on mobile devices, have more in common with traditional video games than with HRGs like *UoD* that intentionally utilize the unique functionality of mobile devices, including the allowance of the user's mobility in the physical world.

4. This is one of the primary reasons why we chose to call our project an HRG as opposed to an ARG (alternate reality game), which (for example) Jane McGonigal describes in her book *Reality is Broken* as being an anitescapist game taking place firmly within the boundaries of the real world.

5. Murray, J. From Game-Story to Cyberdrama. In *First Person*; Wardrip-Fruin, N., Harrigan, P., Eds.; The MIT Press: Cambridge, MA, USA, 2004; pp. 2–11.

6. We use the term "game-story" here to refer to the experience of a playing a game as opposed to the game's "story". As differentiated from the linear, agency-less narrative that often runs parallel to a player's experience in a gameworld, the game-story is the story of an individual's success or failure within the gameworld's rules. For example, the narrative, the "story" of *Super Mario Bros.* –such as it is–involves Mario and Luigi's attempt to rescue Princess Toadstool from King Koopa. The *game-story* of *Super Mario Bros.*, though, is unique in details for every player and tells of their interactions with the gameworld's environment, characters, and obstacles as those interactions relate to the game's rules – its victory states and fail states.

7. Eskelinen, M. Towards Computer Game Studies. In *First Person*; Wardrip-Fruin, N., Harrigan, P., Eds.; The MIT Press: Cambridge, MA, USA, 2004; pp. 36–44.

8. Aarseth, E. Genre Trouble: Narrativism and the Art of Simulation. In *First Person*; Wardrip-Fruin, N., Harrigan, P., Eds.; The MIT Press: Cambridge, MA, USA, 2004; 45–55.

9. Kelly's work as it appears on his blog is in the process of being compiled and published as a book, also titled *What Games Are*.

10. Kelly, T. Worldmakers. In *What Games Are*. Available online: http://whatgamesare.com (accessed 15 November 2011).

11. Kelly, T. Cars, Dolls and Video Games. In *What Games Are.* http://whatgamesare.com (accessed 15 November 2011).

12. Ermi, L.; Mäyrä, F. Fundamental Components of the Gameplay Experience: Analysing Immersion. In *Proceedings of the Digital Games Research Association Conference*, Vancouver, BC, Canada, June 2006; pp. 14–27.

13. For an enlightening example of a game designer acknowledging the different priorities of narrativist storytelling and worldmaking storytelling, see Jordan Mechner's "postmortem" article on *Prince of Persia: The Sands of Time*, "*The Sands of Time*: Crafting a Video Game Story".

14. Mäyrä, F.; Lankoski, P. Play in Hybrid Reality: Alternative Approaches to Game Design. In *Digital Cityscapes*; De Souza e Silva, A., Sutko, D., Eds.; Peter Lang Publishing: Bern, Gemany, 2009; pp. 129–147.

15. In his 1938 text *Homo Ludens*, Johan Huizinga argues that "play is distinct from 'ordinary' life both as to locality and duration" [9]. To demarcate this separation, he introduces the concept of "the magic circle", a temporal and spatial playground where the game exists separate from "ordinary life" [10]. This playground's borders are then established by the game's rules.

16. De Souza e Silva, A.; Sutko, D. Introduction. In *Digital Cityscapes*; De Souza e Silva, A., Sutko, D., Eds.; Peter Lang Publishing: Bern, Gemany, 2009; pp. 1–17.

17. Huizinga, J. *Homo Ludens*; Beacon Press: Boston, MA, USA, 1955.

18. For a full discussion of the immersive fallacy, see Salen and Zimmerman's book *Rules of Play: Game Design Fundamentals*.

19. Our game had no visual representation of the player's virtual self, so "avatar" here is expanded a bit beyond its usual usage to indicate the various perspectives the player would be expected to take on while playing as different characters at different points in the game.

20. As mentioned above, there were two timelines at play in *UoD*'s story: the "present" and three years before that present. The victim's path took place in the past, and so from the very beginning of the game, his death is a foregone conclusion. The player was made aware of this while they were selecting their avatar.

21. Consider BioWare's *Knights of the Old Republic* series and Lionhead Studios' *Fable* series as oft-touted examples of this dynamic.

22. As an example, one of the story-caches actually contained the favorite toy of one of the murder victims, a toy that would have been mentioned previously during the player's journey to that particular cache.