Roguelife:
Digital Death in Videogames and Its Design Consequences

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Chapter One: Introduction

I.A Overview

At the Game Developers Conference (GDC) in 2015, Tom Cadwell, Head of Design at Riot Games - the company that developed *League of Legends*, one of the most played videogames in the world[1] - offered an insightful talk on "The Untapped Potential of Roguelikes."[2] This talk at GDC, the largest videogame developers conference in the world,[3] signals the importance of a genre that is sometimes overlooked by non-afficiados. Roguelikes are a genre of games with an array of increasingly influential features - including *permadeath*, which is the central subject of this investigation. As a simplified introduction to the concept, permadeath, or permanent death, is an unusually consequential model of player character in-game death. Through this thesis, I built an experimental game to analyze the impact of roguelike permadeath on player experiences.

Cadwell argues, "roguelikes have ... under appreciated design lessons," that he believes can and should "be applied elsewhere."[4] In his talk, he drew several key design protocols from roguelikes which he suggests offer a model for better game design. His assemblage of roguelike design protocols offers a useful lens on the roguelike genre, from a developer's perspective. As a contribution of this thesis, I shall complement this with another model of the roguelike genre, synthesized from player perspectives. To understand the genre, it helps to consider both its construction and its interpretation. Critically, Cadwell suggests roguelike features inspire exceptional engagement. Leveraging sociological, game studies, and game design approaches, I

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[1] 100 million monthly players in 2016.
Paul Tassi, *'League of Legends Monthly Players* (Forbes, 2016).
[2] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
[3] GDC, *What is the Game Developers Conference* (GDC, 2019).
[4] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).

have assembled an understanding of the defining roguelike features before constructing a novel roguelike to enable comparison of an otherwise roguelike game with and without permadeath.

To detail that process, I constructed a multifaceted theoretical framework to inform my investigation of the roguelike genre and its atypical model of death. I built six roguelike games to better understand the genre - and to practice effective roguelike feature implementation. I use the final, novel, roguelike as a tool to enable a revealing pilot user study comparing an otherwise parallel game experience with and without permadeath. Because a small sample size was expected, this study was not aimed at establishing generalizations. Still, the pilot study does indicate roguelike permadeath may improve player perceptions of play - this is a valuable area for further study. In this pilot study, players rated the final novel game, *Sunk Cost*, as more engaging, more fun, and more full of quality content when it included permadeath. Roguelike consequential death may have positive consequences for players.

I.B Motivations

Popular cultural media such as videogames deserve serious scholarly exploration. In *Convergence Culture*, media scholar Henry Jenkins argues persuasively that "collective meaning-making within popular culture is starting to change the ways religion, education, law, politics, advertising, and even the military operate."[5] Major sociotechnical[6] institutions are regularly reshaped by popular culture. In *Textual Poachers: Television Fans and Participatory Culture*, Jenkins rightly reminds us "popular texts" merit "the same degree of attention and

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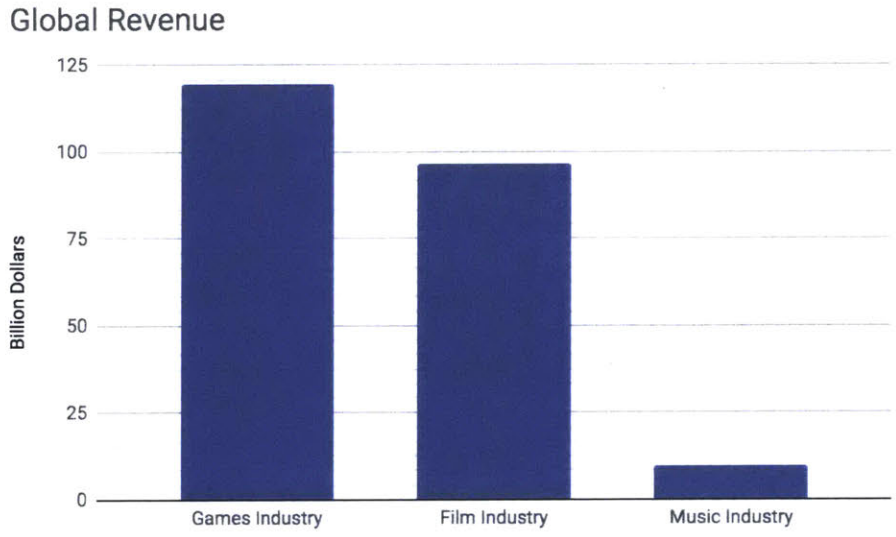
[5] Henry Jenkins, *Convergence Culture* (New York University Press, 2006), 4.
[6] Systems shaped by interaction between technological infrastructure and human behavior.
Mark S. Ackerman, *The Intellectual Challenge of CSCW: The Gap Between Social Requirements and Technical Feasibility* (Massachusetts Institute of Technology).
Wikipedia, *Sociotechnical Systems* (Wikipedia, 2019).

appreciation as canonical texts. Reading practices (close scrutiny, elaborate exegesis, repeated and prolonged rereading, etc.) acceptable in confronting a work of 'serious merit'" also apply when considering the "texts of mass culture."[7] If we accept that popular culture merits consideration, games should be particularly focal.

Within pop culture, videogames are *especially* popular. "Digital games and interactive media" generated "$119.6 billion in 2018."[8] To place that staggering number in context: the film industry generated $96.8 billion,[9] and the music industry generated $9.8 billion.[10] Last year, the games industry generated more revenue than the film and music industries combined.



Participation also provides evidence of videogames' undeniable popularity. According to Pew Research Center, almost all American teens play videogames. "Fully 97% of [American] teens ages 12-17 play computer, web, portable, or console games… [and] 50% of teens played games

[7] Henry Jenkins, *Textual Poachers* (Routledge, 1992), 17.
[8] Dean Takahashi, *SuperData* (VentureBeat, 2019).
[9] Chris Ortman, *New Report* (MPAA, 2019).
MPAA, *2018 THEME Report* (MPAA, 2019).
[10] RIAA, *Music Industry Revenue Report* (RIAA, 2019).

'yesterday'."[11] Even with almost all teens playing, the average player is "34 years old."[12] An impressive portion of adults must also play. With such broad audiences, videogames are far from mere child's play. And player communities show fewer gender divergences than some enduring stereotypes suggest: women are 45% of players.[13] Across demographics, videogames are much too popular to be ignored.

Among videogames, the roguelike game genre is becoming increasingly influential. Again, revenue lends evidence. During 2018, *Fortnite* - a competitive multiplayer Battle Royale game - earned $2.4 billion[14]. *Fortnite* earned the "most annual revenue of any game in history".[15] During my interview with Tom Cadwell, he suggested "Battle Royales are absolutely roguelike... We believe that to be canon here [at Riot Games]... You go through the intellectual arguments you'll get to that conclusion, it is the case."[16] I chose to consider his claim by analyzing *Fortnite* according to the roguelike features covered in Chapter Two. As he suggests, *Fortnite* is a roguelike game.[17] The highest earning video game in the world, across history, is a roguelike. Because successful designs are often imitated, roguelike features are being woven into a number of other major videogames. Across 2018, *Call of Duty: Black Ops 4*, *Battlefield V*, *Grand Theft Auto Online*, *Dota 2*, and *Counter-Strike: Global Offensive* each added roguelike (battle royale) modes in the wake of *Fortnite*'s success. With some nuance,[18] each of these

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[11] Pew, *Teens, Video Games and Civics* (Pew, 2008).
[12] ESA, *Essential Facts 2018* (ESA, 2018).
[13] ESA, *Essential Facts 2018* (ESA, 2018).
[14] Rory Young, *Fortnite Annual Revenue* (GameRant, 2019).
[15] Rory Young, *Fortnite Annual Revenue* (GameRant, 2019).
[16] James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[17] See Appendix C.
[18] *Dota 2*'s battle royale mode, "The Underhollow," hides permadeath behind additional ritual after impermanent death - as a dead player is only permanently dead after an opposing team enacts a twenty second ritual on their body, or kills both of their teammates - but this remains an implementation of permadeath. In any session of play, any characters not on the winning team will (eventually) be permanently killed.

games includes the Developer Protocol and Player Synthesis roguelike features defined in Chapter Three. These videogames now each have roguelike modes. The roguelike genre is actively reshaping the videogames industry. As a result, so too is its model of death.

I.C Contributions

This investigation of roguelike permadeath unfolds across five chapters. Following this Introduction chapter, Chapter Two establishes a theoretical framework exploring related scholarship, and outlining my critical methods. With that framework presented, in Chapter Three, I define the roguelike genre and its defining features - such as permadeath - before discussing the design and development of related roguelikes. Within that section, I survey 100 popular videogames to reveal that death is a regular subject within videogames. To illustrate that game developers take death seriously, I conservatively estimate the amount Tom Cadwell's company, Riot Games, invested in rendering death in *League of Legends*. I scanned the first 200 "Top Selling" roguelike videogames on Steam (a major digital marketplace) for in-game videos or screenshots to confirm that historical definitions of roguelike features no longer describe roguelike videogames well.[19] After reviewing a history of the genre's demarcation, I establish two complementary roguelike definitions - one representing a modern developer perspective, and another representing my synthesis of contemporary player perspectives of the roguelike genre. I then craft six iterative roguelike or roguelite[20] games to explore implementation of the defining features according to my Developer Protocol and Player Synthesis definitions of the genre. I refine the final game, *Sunk Cost* into an effective user study tool by adding control modes and

[19] Steam, *Top Selling Roguelikes on Steam* (Steam, 2018).
[20] See Appendix D.

player data recording. In Chapter Four, I use the final novel roguelike as a tool to enable a revealing pilot user study comparing an otherwise parallel videogame experience with and without permadeath. The findings suggest roguelike permadeath may simultaneously improve player perceptions of the game even while shortening actual session playtime. In Chapter Five, I review these user study findings in dialogue with my interviews of major roguelike developers Tom Cadwell and Justin Ma. In a roguelike context, permadeath may suit player expectations well.

Chapter Two: Theoretical Framework

II.A Methodology

This investigation builds atop existing research from several fields, primarily game studies, game design, and sociology. Game studies - in dialogue with cognitive linguistics - informs the importance of death in games. My application of sociological methods further evidences that importance. Game studies also reveals the complexity of genre in games, and the merit of interdisciplinary work. My own work relies on both game design and sociology, because games can be effectively approached from both developer and player perspectives. Working as a designer offers firsthand insight, which can compliment sociological work observing and recording developers, players, games, and play.

To explore permadeath, I considered building an experimental tool by modifying (or modding) existing roguelikes, but the process of designing roguelike games firsthand offered a more comprehensive understanding of the related mechanisms. Similarly, I considered observing players playing existing roguelikes to gain insight into the impact of permadeath, but comparison would be difficult as games with permadeath do not often offer truly comparable versions without it. Among the rare few videogames - such as *Diablo II*, and *Diablo III* - that offer modes both with and without permadeath, switching models of death explicitly involves several other simultaneous changes. Switching to *Diablo III*'s "Hardcore" mode also prevents that character from accessing the trade or stash systems, and changes their titles, name display, and character selection screen animations.[21] These simultaneous changes add noise: any experiential differences observed could stem from those secondary changes. Also, the expected playtime for

[21] Diablo Wiki, *Hardcore* (Diablo Wiki, 2019).

those products tends to be cripplingly long. As illustrated throughout this thesis, designing a custom experimental videogame - with game studies knowledge, and game design and sociological methods - effectively enables research into roguelike permadeath.

II.A.1 Game Studies

Game studies, the scholarly study of games, also known as ludology, is a comparatively young field. For decades, scholars from a range of disciplines have done work now recognized as game studies, but the notion of the study of games as a field unto itself emerged only recently. Games scholar Bonnie Ruberg, summarizes the field well: "Though some of the early texts that have become foundational for game studies come from the early- and mid-twentieth century, game studies as an academic field got started in the 1990's."[22] Dutch historian Johan Huizinga's *Homo Ludens: a Study of the Play Element of Culture*, released first in 1944, shares some of the earliest foundational work addressing games and play as the central subject matter.[23] In part due to the field's youth, in the modern context, game studies is almost inherently interdisciplinary. "While there are doctoral programs that allow students to tailor their education toward games, there are no institutions yet that offer a dedicated, games-focused Ph.D."[24] As a result, fully credentialed games studies scholars must emerge from other programs, before applying their training to the productive investigation of play. Existing scholarly works defining games and game genres critically inform this thesis.

II.A.1.a Defining Games

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[22] Bo Ruberg, *Getting a Game Studies PhD* (OurGlassLake, 2019).
[23] Johan Huizinga, *Homo Ludens: A Study of the Play-Element in Culture* (Martino Publishing, 2014).
[24] Bo Ruberg, *Getting a Game Studies PhD* (OurGlassLake, 2019).

By most scholarly definitions, games must allow loss. While these definitions remain far from perfect - as many ignore or exclude less structured forms of play - they still offer a useful general understanding. According to sociologist Roger Caillois, games must be "uncertain."[25] This assertion requires games include discernibly varied outcomes. Because these distinct outcomes can be compared and evaluated, games can be won or lost. E.M. Avedon and Brian Sutton Smith define games as producers of "disequilibrial outcome[s]."[26] By that model, players arriving upon the preferred side of an uneven distribution have won; their counterparts have lost. David Kelley defines games as "rules that specify an object to be attained."[27] Those who attain the pursued object have won; those who do not have lost. Salen and Zimmerman argue games must result in a "quantifiable outcome."[28] To be quantifiable, the results must be differentiable. As with Caillois, clear results can be judged as either victories or defeats. According to Suits, games are "directed towards bringing about a specific state of affairs."[29] The resulting state of affairs generally marks some players as having won, and some as having lost. Jesper Juul, in synthesizing the preceding models, describes games as necessitating a "Valorization of the outcome," in which some "outcomes [wins] are better than others [losses]."[30] Scholarly consensus regularly suggests loss is a necessary possibility of play. This game studies pattern, in dialogue with cognitive linguistic research discussed below, motivates my focus on virtual death in play.

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[25] Roger Caillois, *Man, Play, and Games* (The Free Press, 1961).
[26] E.M. Avedon and Brian Sutton-Smith, *The Study of Games* (John Wiley & Sons Inc., 1981).
[27] David Kelley, *The Art of Reasoning* (W. W. Nortan & Company, 1988).
[28] Katie Salen and Erik Zimmerman, *Rules of Play* (MIT Press, 2003).
[29] Bernard Suits, *The Grasshopper* (University of Toronto Press, 1978).
[30] Jesper Juul, *Heart of Gameness* (2003).

Cognitive linguists suggest death and loss are linguistically, and therefore conceptually, intimately interrelated. In *Metaphors We Live By*, George Lakoff and Mark Johnson illustrate the notion of conceptual metaphors: "the metaphor is not merely the words we use - it is in our very concept."[31] How we describe an idea actively (and circularly) shapes how we understand it. In *More than Cool Reason: A Field Guide to Poetic Metaphor*, George Lakoff and Mark Turner share several exemplary conceptual metaphors surrounding death, such as "Death is Departure" and "Death is Going to a Final Destination," which inspire related later work.[32] In "Conceptual Metaphors of Death," Kali Carrigan assembles a broad survey of modern conceptual metaphors surrounding the specific subject of death.[33] Two central metaphors, "Death is the End,"[34] and "Death is Loss,"[35] commonly apply within videogames. Because player (avatar) death often justifies and informs the end of play, "Death is the End" and "Death is Loss" can become redundantly aligned in play. Conceptually, death is often an ending, "understanding death in terms of finality, is... a convenient way to organize the complexity of life on a continuum".[36] Lakoff and Johnson suggest we often conceptually simplify complex subjects into linear sequences of events. This pattern of simplifying complexities into linear event logs comfortably suits both life and play. Considering death as loss, if life is a valued object, death can also be described as "the loss of this precious possession".[37] This conceptual metaphor is especially relevant, because:

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[31] George Lakoff and Mark Johnson, *Metaphors We Live By* (The University of Chicago Press, 1980), 5.
[32] George Lakoff and Mark Turner, *More than Cool Reason: A Field Guide to Poetic Metaphor* (The University of Chicago Press, 1989).
[33] Kali Carrigan, *Conceptual Metaphors of Death* (Aarhus University, 2017).
[34] Kali Carrigan, *Conceptual Metaphors of Death* (Aarhus University, 2017), 10-12.
[35] Kali Carrigan, *Conceptual Metaphors of Death* (Aarhus University, 2017), 12-14.
[36] Kali Carrigan, *Conceptual Metaphors of Death* (Aarhus University, 2017), 10.
George Lakoff, *Fire, Women, and Dangerous Things* (The University of Chicago Press, 1990), 275.
[37] Kali Carrigan, *Conceptual Metaphors of Death* (Aarhus University, 2017), 12.

> loss... implicitly portends that the object, although misplaced, may be eventually found again. This vagueness, or ambiguity, as to the permanence of death, is a crucial aspect of the euphemistic language of death, and has been posited to 'reinforce our denial by tending to present the dead as if they still existed.'[38]

Questions about the *permanence* of death offer enduring and critical tensions within our language, our thinking, and our videogames. As a result, permadeath is a rich subject to explore.

Because games require the possibility of loss, and loss and death are closely interwoven concepts, it seems fair to expect games may often involve death. By surveying one hundred popular videogames, I confirmed this expectation: videogames regularly simulate death. Using sociological content analysis methods outlined later in this chapter, I analyzed Ranker's "Top 100 Games of All Time"[39] and coded them as either *deathless* or *deathly*. For this coding, my methodology was simple: any videogame with both a lethal context, and an implicit or explicit health system, was labeled *deathly*. Any videogame without either of those requirements was labeled *deathless*. Of those Top 100 videogames,[40] 99 were labeled deathly. The only deathless videogame in that listing was *Tetris* (1989). An impressive number of videogames foreground death as a subject.

The importance of death as a subject in games is further suggested by studio spending clues. In many videogames, death is so focal that artists and animators spend hours just on death animations. According to AnimatorIsland, game animators expect to finish "5-10 seconds [of animation] per day, or 25-50 seconds a week."[41] In Riot Games' *League of Legends*, Zed is a

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[38] Kali Carrigan, *Conceptual Metaphors of Death* (Aarhus University, 2017), 13.
[39] See Appendix B.
[40] See Appendix B.
[41] J.K. Riki, *How Fast Should You Animate?* (Animator Island, 2013).

shadowy assassin - and a popular playable character. Zed's default death animation takes 6 seconds.[42] That's just over one half, to just over one full days work. At the time this calculation was made, there were 142 playable characters in *League of Legends*. Each character can have dozens of alternative art versions. Even entirely ignoring those variants (because many only slightly modify default animations), that's between 85.2 and 170.4 animator days of work. Riot Games Animators earn an average of $93,000 per year.[43] If a Riot Games animator takes no vacations, they work around 251 days.[44] At these rates, Riot Games pays that animator around $370.51 per day. That means Riot Games plausibly spent between $32,000 and $63,000 on *player death animations alone*. This is just one illustration of how videogame studios regularly invest in rendering death.

Games studies scholars suggest games require loss. Cognitive linguists reveal that loss and death are often synonymous, and that considerations of death's permanence are enduring tensions within human thought. These patterns together offer insight into the popularity of death as a subject in play which my sociological survey of popular games reveals. Industry data suggests that game studios take the subject of virtual death seriously. Death in play is a worthy subject of study. This is why when considering roguelike features to interrogate, I choose to focus on permadeath.

II.A.1.b Defining Genres

To explore a genre's features, we must first define the boundaries of that genre. Tensions regarding genre categorization are well documented in videogames. Nick Caldwell highlights a

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[42] WretchedOutkasts, *Zed Death Animation* (YouTube, 2012).
[43] GlassDoor, *Riot Games Animator Salaries* (GlassDoor, 2018).
[44] *Working Days 2018* (TodaysDate, 2018).

tension specific to genre categorization in videogames: "different genres of game, even different subgenres of game, deployed such diverse representational strategies as to make general claims seem untenable. . . . Games might share some basic purpose—to entertain—but each new game that appeared on my screen could well have been in a different medium, or a different language, altogether"[45]. Thomas H. Apperley argues this "crucial problem" stems from videogames' medium defining feature: "interactivity - the way in which the game is played, rather than watched - is a nonrepresentational feature common to all video games".[46] Because videogames are co-constructed when experienced, classical "representational characteristics" often used to group genres in other media prove problematic. Major media scholars - such as Stuart Hall,[47] Umberto Eco,[48] and Henry Jenkins[49] - indicate media may be modified (or co-constructed) through interpretation. Building on Espen Aarseth's notion of ergodicity - the idea that "non-trivial effort is required to allow the reader to traverse the text"[50] - Apperley advocates for a more player experience focused understanding of game genres. This call to action intentionally echoes Jesper Juul's claim: "Using other media as starting points, we may learn many things ... but relying too heavily on existing theories will make us forget what makes games games: Such as rules, goals, player activity, the projection of the player's actions into the game world, the way the game defines the possible actions of the player. It is the unique parts that we need to study now."[51] Videogames - and videogame genres - must be understood on their own terms. To

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[45] Thomas H. Apperley, *Genre and Game Studies* (Simulation & Gaming, 2006), 6.
[46] Thomas H. Apperley, *Genre and Game Studies* (Simulation & Gaming, 2006), 7.
[47] Stuart Hall and David Morley, *Essential Essays: Foundations of Cultural Studies & Identity and Diaspora* (Duke University Press, 2018).
[48] Umberto Eco, *Interpretation and Overinterpretation* (Cambridge University Press, 1992).
[49] Henry Jenkins, *Textual Poachers* (Routledge, 1992).
[50] Thomas H. Apperley, *Genre and Game Studies* (Simulation & Gaming, 2006), 7.
[51] Jesper Juul, *Games Telling Stories?* (Game Studies, 2001).

understand videogames on their own terms, game studies scholar and game designer Tracy Fullerton suggests scholars (and designers, and developers) should take a playcentric approach - centering players. "Understanding and designing for that player experience, no matter what," should always be the "focus".[52] Computer scientist and literary artist Nick Montfort effectively demonstrates approaching a genre on its own terms in his investigation of interactive fiction, another classic genre of games, in *Twisty Little Passages: An Approach to Interactive Fiction.*[53] Pursuing Montfort's example, I include a brief history of the roguelike genre before assembling a definition of the genre - and its defining features - in Chapter Three.

II.B Methods

My construction of *Sunk Cost*, and its use as an experimental tool depends upon a number of methods from game design and sociology, discussed below. As foreshadowed in this chapter's discussion of game studies interdisciplinary norms, I too am an interdisciplinary scholar. I have trained with both game design and sociological approaches. These backgrounds together enable my approach to game studies.

II.B.1 Game Design

The construction of the *Sunk Cost* involves the use of several critical game design methods: iterative design and playtesting, paper prototyping and software prototyping.

II.B.1.a Iterative Design and Playtesting

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[52] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014), 1.
[53] Nick Montfort, *Twisty Little Passages* (MIT Press, 2003).

To craft this experimental roguelike game, I applied iterative design. Iterative design is a central practice in modern software development, including videogames, and in game development, including non-digital games . Katie Salen and Eric Zimmerman, Bruce Shelley, Tracy Fullerton, and Jesse Schell all testify to the merits of iterative design and development. According to Katie Salen and Eric Zimmerman,

> Iterative design is a play-based design process. Emphasizing playtesting and prototyping, iterative design is a method in which design decisions are made based on the experience of playing a game while it is in development... a rough version of the game is rapidly prototyped as early in the design process as possible. This prototype... begins to define its fundamental rules and core mechanics... This prototype is played, evaluated, adjusted, and played again, allowing the designer or design team to base decisions on the successive iterations or versions of the game. *Iterative design is a cyclic process that alternates between prototyping, playtesting, evaluation, and refinement.* [Emphasis added.][54]

The iterative design methodology encourages quickly (and repeatedly) prototyping, playtesting, evaluating, and adjusting the game experiences. Prototyping is the process of creating a draft of the game system which can be tested. Specific prototyping methods are discussed in the next subsection. Testing games through play is known as playtesting. Salen and Zimmerman are far from the only advocates for this iterative approach to game design and development. "We are certainly not the first to use this term or the design methodology it represents, but our experience has shown that it is an invaluable tool."[55] Iterative design is widely practiced.

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[54] Katie Salen and Erik Zimmerman, *Rules of Play* (MIT Press, 2003), 11.
[55] Katie Salen and Erik Zimmerman, *Rules of Play* (MIT Press, 2003), 11.

Designer Bruce Shelley shares a similar conceptualization of the iterative design and development approach:

> We prototyped as quickly as we could. When the game is playable we test, fix, retest, and so on in a process we call design by playing... Features that are fun are enhanced and polished; those that are troublesome are dropped. We plan up front based on our best ideas, but the design by playing process ensures that the game is fun when finished. I believe that extensive testing for gameplay is crucial to making fun games.[56]

Iterative design and development has been known by many names - including 'design by play' - and is 'crucial' to game quality. Shelley's quote, documented above, emerged from Tracy Fullerton's interview and practice driven research.

In *Game Design Workshop: A Playcentric Approach to Creating Innovative Games*, Tracy Fullerton details the iterative (or 'playcentric') approach extensively in dialogue with other major scholars, designers, and developers - including Zimmerman, and Shelley. Fullerton explains that designers and developers should:

> design, test, and evaluate the results over and over again throughout the development of your game, each time improving upon the gameplay or features, until the player experience meets your criteria. Iteration is deeply important to the playcentric process... from initial conception through the final quality assurance testing.[57]

In addition to describing the iterative process, she adds a note on criteria for completion, or design goals. Iterative design works towards specific criteria.

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[56] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014).
[57] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014).

Jesse Schell restates the case firmly, while acknowledging the difficulty of 'closing the loop'. "The process of game design and development is necessarily iterative, or looping. It is impossible to accurately plan how many loops it is really going to take before your game ... is 'good enough.'"[58] Framing iteration as a loop, Schell describes it as a necessary rule:

> The Rule of the Loop: The more times you test and improve your design, the better your game will be... it is an absolute truth... There are no exceptions to the Rule of the Loop. You will try, at times in your career, to rationalize it away, to convince yourself that 'this time, the design is so good, we don't have to test and improve,' or 'we really have no choice — we'll have to hope for the best,' and you will suffer for it each time.[59]

Iteration is necessary, and projects will suffer when iteration is skipped. He summarizes that underlying tension with momentum. Because the design can always improve,

> the work is never finished — only abandoned. The important thing is to make sure you get enough loops in to produce a game you are proud of before you've used up the entire development budget... The principles of iteration described here might sound special to game design, but they are not. Gradual, evolutionary development is the key to any kind of design.[60]

External constraints (development budget, as an example) will often close the loop in practice, so designers and developers should loop as many times as possible before that point. While games can always be further improved, iterating fast, and recognizing 'good enough' during iteration is key.

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[58] Jesse Schell, *The Art of Game Design* (CRC Press, 2015), 93-94.
[59] Jesse Schell, *The Art of Game Design* (CRC Press, 2015), 93-94.
[60] Jesse Schell, *The Art of Game Design* (CRC Press, 2015), 111.

II.B.1.b Paper Prototyping and Software Prototyping

Paper prototyping is a design practice that fits well within rapid iteration because its high speed and low cost. Schell motivates the use of paper prototypes well:

> Your goal is to loop as usefully and as frequently as possible... you can prototype your fancy videogame idea as a simple board game, or what we sometimes call a paper prototype. Why do this? Because you can make board games fast, and often capture the same gameplay. This lets you spot problems sooner[61]

Complex videogames can often be prototyped in much simpler forms - including as tabletop games. 'Tabletop games' is a catchall term for board games, card games, and related hybrid physical game formats. The 'tabletop' term was popularized by Wil Wheaton and Felicia Day in their gaming web series "TableTop." Four seasons of this series were released through "Geek and Sundry" - a YouTube channel with over two million subscribers at the time of this writing.[62] Because tabletop games can be drafted and altered simply and cheaply, they empower rapid iteration.

Paper prototypes do have limitations. Fullerton illustrates this by discussing a genre of videogames (first person shooters) that can resist simple paper prototyping. Sometimes, a paper prototype "will fail to capture the essence of the game's player experience"; even in those cases, a paper prototype may offer insight into related design questions.[63] Designer Nikita Mikros suggests: "Even if the whole game cannot be modeled this way, isolated parts can often be playtested and designed using this process."[64] Fullerton confirms, a "game can have many

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[61] Jesse Schell, *The Art of Game Design: A Book of Lenses* (CRC Press, 2015), 104-105.
[62] Geek and Sundry, *TableTop* (YouTube, 2012).
[63] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014), 181.
[64] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014), 220.

different prototypes, each addressing different questions about the design. A paper prototype is well suited to some questions … while not being suited to others."[65] As a result, "while a paper prototype of a digital system has limitations, it is still quite valuable to the design process."[66] Though some design questions are answered poorly on the tabletop, many others can be answered through simple paper prototypes.

When paper prototypes will not serve, some design questions are better answered through software prototypes. "There are times when one cannot really get a feel for a game without a software prototype. Additionally, some game prototypes are just simpler to implement with software."[67] In some cases, "a physical/paper prototype would be more difficult to construct than a software prototype."[68] Some feature or system designs are best tested digitally. Still, "the creation of any software prototyping tools should be carefully considered due to the costly and time consuming nature of writing software."[69] Paper and software prototypes are complementary tools that both have roles to play in the iterative design and development process.

To summarize the preceding sketch of the iterative methodology, games should be prototyped, playtested, evaluated, and revised. The iterative methodology has many names. Prototypes can be drafted in either physical or software forms. Evaluation requires criteria. The cycle can repeat endlessly, so designers must decide when good enough is good enough. Iterative design shaped my development of this thesis' central contribution, *Sunk Cost*.

This thesis is critically informed by this iterative methodology because game development is a route towards a fuller comprehension of game design. According to Salen and

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[65] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014), 181.
[66] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014), 181.
[67] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014), 220.
[68] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014), 220.
[69] Tracy Fullerton, *Game Design Workshop* (CRC Press, 2014), 221.

Zimmerman, studying "game design… cannot consist purely of a theoretical approach to games… designers learn best through the process of design, by directly experiencing the things they make. Therefore… [study] must involve the creation of games." Crafting games critically benefits the scholarly investigation of games. For this research into roguelike permadeath, making roguelikes (and related hybrids[70]) offers valuable insight into the roguelike genre, and its component features such as permadeath. Those designer insights (revealed through this iterative methodology) are discussed in Chapter Three.

II.B.2 Sociology

My research is informed by sociological techniques. Semi-structured interview, content analysis, participant observation, and survey methods are each leveraged actively within this thesis.

II.B.2.a Semi-Structured Interview

Semi-structured interview is a classic sociological method. It affords researchers an ability to adjust an investigative conversation to more closely follow the threads a speaker shares. The inclusion of structure allows questions to more consistently address intended questions, but the improvisatory space formally included within this technique allows investigators to better learn from subjects on their own terms.

I applied this sociological method during interviews with two monumental roguelike developers, Tom Cadwell and Justin Ma. Tom Cadwell, mentioned above, is the Head Designer

[70] See Appendix D.

of Riot Games. While *League of Legends* is not fully roguelike, it draws explicit inspiration from the genre, and has included two more fully roguelike game modes ("ARAM," and "Odyssey"), one of which ("ARAM") remains permanently available. Cadwell shared the GDC talk on roguelikes - mentioned in the introduction - that inspired my interest in this genre. Tom Cadwell generously made an hour of time via Google Hangouts to answer a host of my follow up questions about his claims about the genre. Philip Tan, a guiding games scholar here at MIT built the social bridge that enabled that semi-structured interview. Justin Ma is one of the two central developers behind *Faster Than Light* (*FTL*) - an exceptionally successful modern roguelike.[71] Tom Cadwell himself lists *FTL* as exemplary.[72] Speaking openly, *FTL* served as a guiding beacon for *Sunk Cost*. I met Justin Ma after his latest talk at the Game Developers Conference (2019), and he also graciously shared time both in person and online to answer semi-structured interview questions. These interviews allowed me to access two influential developer's perspectives directly. These dialogues with genre champions strengthened my understanding of the roguelike genre - which empowered my ability to interrogate roguelike permadeath.

II.B.2.b Content Analysis, Participant Observation, and Survey

Content analysis, participant observation, and survey methods enable my player-centric thesis investigation. Investigating roguelike permadeath requires methods for approaching games and players scientifically. Content analysis informs my definition of the roguelike genre in Chapter Three. It also informs evaluation of my prototypes during the iterative development of *Sunk Cost* in that same chapter. Content analysis also enables evaluation of key elements of the

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[71] Ranker, *The Best Roguelike Games of All Time* (Ranker, 2019).
Softonic, *Best Roguelikes on Steam* (Softonic, 2019).
[72] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).

findings of my pilot user study in Chapter Four. Game design playtesting techniques echo sociological participant observation practices. My approach to playtesting - used throughout iterative design - is informed by my training with participant observation. The experimental design *Sunk Cost* is developed to enable is built around this practice. Participant observation is at the heart of the (iterative) playtesting introduced above and discussed further in Chapter Three, and the pilot user study discussed in Chapter Four. Participant observation enables recording of the qualitative half of this pilot user study. Survey offers much of the quantitative half of *Sunk Cost*'s pilot user study. These techniques (and player interviews) together allow *Sunk Cost* to reveal the impact of permadeath.

Chapter Three: Roguelike Design and Development

III.A Defining Roguelikes

As indicated in Chapter Two, defining videogame genres is no trivial task. As with Nick Montfort's investigation of the interactive fiction game genre, defining roguelike videogames requires an awareness of genre history.

III.A.1 Early Definitions

Remembering the cognitive linguistic notion that language reflects and shapes thought, roguelike games are implicitly (and sometimes explicitly) games like *Rogue* (1980),[73] the namesake original roguelike. Interestingly, as an illustration of the complexity of genre and the importance of historical context, *Rogue* is not actually the earliest roguelike.[74] Still, it is explicitly the game around which the player community defined the genre's key features. By recognizing the historical evolution of the genre, we can see how the characteristic that make something 'like' the original genre standard bearer have evolved dramatically over the years. This evolution is indicated below.

III.A.1.a USENET Formalization (1993)

Just over a decade after *Rogue*'s creation, the roguelike genre is first conceptualized in 1993,[75] by fans on USENET. Santiago Zapata summarizes the genres' USENET history (and evolution) well. USENET was "a worldwide distributed discussion system available on

[73] David L. Craddock, *Dungeons of Doom* (2016).
[74] See Appendix A.
[75] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).

computers,"[76] often understood as a "precursor to forums".[77] Community member Andrew Solovay sends the initial post: "I would like to propose formally that a new hierarchy be created... [to] contain groups dedicated to discussion of rogue-type games."[78] He shares an initial outline of the shared features:

> These games share the following characteristics:
>
> - They are character-based; that is, the game generally presents a map of the current playing area, with different characters representing the player, opponents, objects, etc. Text is a secondary element at most. This is in contradistinction to other, 'text-based' adventure games, such as *Adventure*, *Zork* (a.k.a., *Dungeon*), etc.
> - They are very portable. The games are usually written in a high-level langauge [sic], and as noted, they use character graphics; this makes them easy to port to various architectures (mainframes, workstations, and different types of personal computers). As a result, they don't fit into any of the comp.sys.*.games groups, which are machine-specific.[79]

Another participant, Aliza R. Panitz, propels this argument by confirming the "intrinsic similarities of all these games."[80] In that moment, these games referred to *Rogue*, *Hack* and *Nethack*, *Moria*, and *Angband*.[81] Another poster introduces the genre name that took hold: "Perhaps, since 'rogue' [sic] is the granddaddy of these games, the hierarchy ought to be called... roguelike".[82] Solovay agrees: "'roguelike' seems to me much superior. It describes all

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[76] *Usenet* (Wikipedia, 2019).
[77] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[78] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[79] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[80] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[81] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[82] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).

the games in the proposed hierarchy, and no other games. The one thing all these games have in common is that they're descended from 'rogue', [sic] and have a basically rogue-style interface." [83] Though contested, 'games like *Rogue*' remains one of the most enduring explanations of the roguelike genre.

During these player community dialogues, echoing broader scholarly debates about defining games by look or feel, the importance of roguelike interface is critically questioned. David Seal observes, "I realise that some of these games have acquired somewhat more sophisticated interfaces than ASCII graphics."[84] ASCII is shorthand for the American Standard Code for Information Interchange; ASCII display roughly translates to the use of keyboard characters to represent all in-game art. He continues, "At least in the ones I've seen, this is simply a matter of substituting coloured ASCII characters or small graphical images for the original plain ASCII characters, and the game still *feels* very much like [Emphasis added.]" a roguelike.[85] Springboarding from Seal's emphasis on feel, Tom O. Breton suggests, "some attempts to enumerate these [roguelike] features have failed (IE, 'ascii,' 'dungeon,' etc.) But for any of them you can look at the screen and say 'Duzzn't dat remind ya of rogue?' They don't each have every common feature, but they form a reasonable grouping."[86] In the USENET fan dialogues, debates about the genre - its naming, its meaning, and its membership continued for years.

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[83] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[84] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[85] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[86] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).

Aliza R. Panitz was elected to moderate the community forum, and to formalize the FAQ (frequently asked questions) to introduce new members into the community. This involved outlining the contemporary understanding of the genre:

> Although the common features of rogue and its many descendants are 'obvious' to many people, they are difficult to describe in simple terms. All of the games mentioned below are single-user, fantasy role-playing computer games, generally set in a dungeon, run with a simple graphic interface. In all of the games, the player controls a single character, who roams around getting more powerful, in order to fulfill a difficult quest.
>
> Sword-and-sorcery rule the day.
>
> Logistically, they're all free games; executables, and generally sources, are available by FTP.[87]

Besides descending from Rogue, for many players almost none of the USENET defining features hold the same salience today. Still, the USENET roguelike community laid important groundwork for future definitions and debates.

III.A.1.b The Berlin Interpretation

The first Roguelike Development Conference (RDC) (2008) established the Berlin Interpretation, attempting a more formal genre definition. The Berlin Interpretation explicitly (and controversially) marks the term roguelike as "a genre, not merely 'like-rogue'."[88] Here, the roguelike genre is defined inclusively as videogames with a plurality of features from RDC canon original roguelikes — "*ADOM*, *Angband*, *Crawl*, *Nethack*, and *Rogue*."[89] The RDC's

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[87] Santiago Zapata, *On the Historical Origin of the 'Roguelike' Term* (2017).
[88] RogueBasin, *Berlin Interpretation* (RogueBasin, 2013).
[89] RogueBasin, *Berlin Interpretation* (RogueBasin, 2013).

Berlin Interpretation offers lists of both high and low priority defining features which are named (but not explored) here. According to the Berlin Interpretation, roguelikes are primarily defined by "random environment generation," "permadeath," "turn-based," "non-modal," "complexity," "resource management," "hack'n'slash," "exploration and discovery".[90] They are also (less significantly) defined by "single player character," "monsters are similar to players," "tactical challenge," "ASCII display," "Dungeons," and "Numbers".[91] This definition is usable, because of one key qualifier: "missing some points does not mean the game is not a roguelike. Likewise, possessing some points does not mean the game is a roguelike... The purpose of the definition is for the roguelike community to better understand what the community is studying. It is not to place constraints on developers or games."[92] Even the RDC's relatively rigid definition remains somewhat fluid - likely out of necessity due to the surrounding debates.

Even so, this more fixed definition of roguelikes drew backlash from many in the roguelike development and player communities, largely because of the genre's complex evolution across the last few decades. One landmark developer, Darren Grey, authors the unsubtly titled response, "Screw the Berlin Interpretation".[93] He returns to the overarching scholarly debate over look and feel on genre in videogames; he argues the RDC's qualifying points are irresponsibly outdated: ASCII display especially. While this once innovative display was key to early canon roguelikes, the overwhelming majority of modern roguelikes do not use ASCII display. Steam, the largest digital computer game distribution platform,[94] demonstrates

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[90] RogueBasin, *Berlin Interpretation* (RogueBasin, 2013).
[91] RogueBasin, *Berlin Interpretation* (RogueBasin, 2013).
[92] RogueBasin, *Berlin Interpretation* (RogueBasin, 2013).
[93] Darren Grey, *Screw the Berlin Interpretation* (2013).
[94] *Steam (Software)* (Wikipedia, 2018).

this clearly. In the top 200 "popular… rogue-likes"[95] on Steam I could find *none* that were strictly ASCII displayed. Because this set is biased by popularity, we should not assume there are no purely ASCII rendered roguelikes on Steam, but it is still an important indication of what most modern players seek when they seek roguelikes. To confirm that this dearth of ASCII only content was not a result of the platform, I dove (much) deeper into Steam's catalogue of roguelikes to find an ASCII only homage to the original Hack.[96] Even Steam's version of *ADOM*, one of RDC's canon [ASCII] roguelikes, now includes an option for more modern graphical rendering. The prioritization of roguelike genre defining features has evolved considerably.

III.A.2 Modern Construction

Both of those critical early definitions of the roguelike genre had their appeals, advocates, and critics. They both suggest key features. But, in the modern context, the key features developers and players referenced are almost unrecognizable. Beyond all being present in *Rogue*, modern interpretations of the genre are very dissimilar. While "genre purists"[97] may hold on strictly to historical canon features (such as ASCII art), language is negotiated, and the key contributions *Rogue* made are described and prioritized differently by many modern developers and players as demonstrated below.

III.A.2.a Developer Perspective: Developer Protocol Model

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[95] See Appendix B.
[96] *Nethack: Legacy* (Steam, 2018).
[97] James Bowie Wilson, *Interview with Tom Cadwell* (2018).

In his 2015 Game Developers Conference (GDC) talk on roguelikes, Tom Cadwell introduces a concise vernacular definition of the genre, before explicating design patterns and protocols that roguelikes afford for designers and developers. That second description gives us a revealing model of the genre from a developer's perspective. After transcribing and interpreting this *Developer Protocol* model of roguelikes, I return to and modify that first vernacular model of the roguelike genre through player testimony to assemble a complementary player perspective on the genre. The construction of a developer and player perspective on the genre allows a more complete outline of defining roguelike features.

Tom Cadwell opens his GDC lecture with an informal definition:

> "First I'll give my definition of a roguelike... There's a bunch of different definitions, and I just want to present my perspective so there's general alignment in the talk... The original roguelike is of course, *Rogue*, which I guess is implicitly a roguelike... These were pretty hardcore games... These games were notorious for their really high difficulty, for permadeath, their limited (or no) saving ability."[98]

Cadwell casually defines roguelikes as videogames like Rogue, with high difficulty and permadeath. Analyzing roguelikes, Cadwell explicitly does not bother to "go over ALL the roguelike patterns," just the "interesting" ones.[99] We will return to this summary when considering contemporary player perspectives. Interestingly, by avoiding Berlin Interpretation exhaustivity, this more focused definition aligns better with modern player interpretations of the roguelike genre.

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[98] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
[99] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).

Tom Cadwell then shares a set of five genre defining design protocols central to roguelike videogames. These five features are not exclusive to roguelikes, but the genre expresses each especially well. Each of the features reinforces the others, and they all serve centrally to support Random Parallel Learning, which I describe as the keystone protocol. Those features are expanded through the table below.

Keystone Protocol:

Random Parallel Learning (RPL)[100]
What it is: When players can follow their curiosity freely, they feel more fulfilled. When videogames enable this play experience, they offer Random Parallel Learning. - 'Random', because it is player directed, and players can be unpredictable. - 'Parallel', because in any moment, there are several adjacent systems players can choose to investigate - sometimes simultaneously. - 'Learning', because gaining and demonstrating deeper comprehension is (inherently) satisfying. Roguelikes readily offer Random Parallel Learning. Many genres demand mastery of specific skills along a predefined path. To unlock the next level, you *must* first 'clear this jump', or 'defeat that boss'. Roguelikes instead (often through procedural content generation) encourage players to learn about and experiment with a diverse range of tools and challenges in a comparatively unconstrained way. Roguelikes offer a breadth of systems to openly explore. This is perhaps the keystone feature - each of the other four roguelike protocols serve this one. *How to support it:* - Implement the following four features: the resulting experience should encourage Random Parallel Learning.

Complimentary Roguelike Protocols:

[100] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
James Bowie Wilson, *Interview with Tom Cadwell* (2018).

Hero or Zero (HoZ)[101]
What it is: Hero or Zero describes the critical combination of sharp in session progression and sharp in session consequences (especially permadeath). In roguelikes, players often start play in dire straights, and through permadeath, can always be driven back. As a result, even minor ascensions or successes feel hard fought and fantastic. Herculean work feels heroic. Through rarity, major victories are made especially memorable. This pattern supports Random Parallel Learning. "Because failure's the default, players ... remember the high points."[102] Tangible contrast between 'Zero' and 'Hero' is thrilling. *How to support it:* - Emphasize contrast between (common) lows and (rare) highs. - Frame high points as exceptional.
Diverse Tools and Making Do (DTMD)[103]

What it is:
Roguelikes typically offer players a great range of options, and also, a great range of challenges. As a result, the tools selected will often confront challenges for which they are imperfect. As long as imperfect tools still offer any chance of success, this productive friction can encourage player creativity and experimentation. This pattern supports Random Parallel Learning.
 	
Each tool should be great in certain situations (in service of 'Hero' moments), but weak enough elsewhere to justify other tools. If there are a hundred tools at hand, but one is always better than the others, there is only one tool.
 	
How to support it:
- Enable and encourage improvisation.
  - Provide challenges with multiple solutions.
  - Ensure tools are diverse, powerful, and limited.

Competing Objectives and Strategic Commitment (COSC)[104]
What it is:

[101] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[102] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[103] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[104] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
James Bowie Wilson, *Interview with Tom Cadwell* (2018).

Pursuing goals should come at a cost. Roguelikes routinely offer competing objectives that test player priorities. Sid Meier calls good games a "series of interesting choices."[105] Dilemmas are inherently interesting choices. When long and short term goals run at odds, players are given a chance to reflect on what they value most in the face of uncertainty. Through the productive friction of Diverse Tools and Making Do, they are also often tempted to reconsider. Challenging choices encourage strategic judgement and self expression. This pattern serves Random Parallel Learning. Roguelikes showcase compelling dilemmas. *How to support it:* - Clarify choice costs and benefits. - Offer tempting options. - Offer an uncertain future.
Variety not Random (VnR)[106]
What it is: Variety often builds from randomness, but "variety is superior to randomness."[107] While randomness is critically involved in procedural content generation, it is counterbalanced through curation. Randomness should be curated to prevent "lame, or boring, or impossibly hard" variations. Through curation, the varied content players experience will reward investigation. This patterns supports Random Parallel Learning. *How to support it:* - Curate random procedures.

III.A.2.b Player Perspectives: Player Synthesis Model

Through secondary content analysis of player comments about roguelikes, I craft a *Player Synthesis* model of the roguelike genre to complement the *Developer Protocol* model communicated above, because players do not often describe roguelike videogames in terms of features like Random Parallel Learning. Cadwell's casual shorthand definition offers a more resonant springboard, though it omits procedural content generation, which is regularly referenced by players. Swimming through roguelike player posts on threads in digital forums and

[105] Sid Meier, *Interesting Decisions* (GDC, 2012).
[106] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[107] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
James Bowie Wilson, *Interview with Tom Cadwell* (2018).

marketplaces, again and again, difficulty, procedural content generation, and permadeath are described. These three features are defined in the table below.

High Difficulty (HD)
What it is: High difficulty is a comparatively subjective quality, but if most players feel the game is difficult, it is highly difficult. If most players do not expect to win, it is likely highly difficult.
Procedural Content Generation (PCG)[108]
What it is: Procedural content generation "simply means that content is generated following a formal procedure."[109] PCG can apply to a "whole spectrum of game content types."[110]
Permadeath (P)[111]
What it is: Permadeath is permanent death. When a player character is killed, they are permanently lost. Related records (save files) may be obliterated. Players must start gameplay anew from the beginning.

These features were identified by investigating the features players center in their evaluation of the roguelike genre. To discover this, I scanned the first several pages of player reviews for several roguelike games on Steam. Several players share illustrative comments on the Steam videogame marketplace reviewing videogames player identified as "Rogue-like," such as *Chance of Rain*, *FTL*, and *Darkest Dungeon*. Many highlight difficulty or permadeath. Smaench's comment highlights satisfying difficulty, "The best possible balance between 'how did I survive that?' and 'how did that kill me?'."[112] Willwaukee highlights both, "Even on Easy

[108] *Procedural Generation* (Wikipedia, 2018).
[109] Gillian Smith, *An Analog History of Procedural Content Generation.*
[110] Mark Hendrikx et al., *Procedural Content Generation for Games: A Survey.*
[111] *Permadeath* (Wikipedia, 2018).
[112] Smaench, *Risk of Rain* (Steam, 2019).

mode, you'll probably lose your first several games."[113] Numbersphere also highlights difficulty: "As a rogue-like, *Risk of Rain* can be very unforgiving."[114] Omegon shares a vivid illustration of *FTL*'s permadeath:

> "Attack some bandits; Die.
>
> Go to save someone from a slave ship; Die.
>
> Wait a moment to collect some fuel; Die.
>
> Forget to restore oxygen to the ship; Die.
>
> Let the campfire at the back of the ship alone; Die.
>
> Don't get out of the solar flare in time; Die."[115]

Playerjjj also highlights both difficulty and permadeath.

"Everyone burned to death. Then everyone suffocated to death. Then, a few runs later, everyone

> was burned, suffocated, and blasted to death... Giant spiders ate my crew, strange monoliths evaporated them, and asteroids turned them into fine, dehydrated powders drifting through the void... Then I started getting better. I stayed away from the spiders, I vented the oxygen out of burning rooms, rather than sending a single hapless insectoid to fight the flames. And then, one glorious day, after so much blood, sweat, and tears, I destroyed the rebel flagship and won the game... That was 40 hours in... I'm 450 hours in, and still banging out a game every week or two".[116]

Others promote procedural content generation. GatoDelFuego says, "[*Risk of Rain*] blooms into three hours of continuous fun. It's never the same, so you're always chasing that next perfect

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[113] Willwaukee, *FTL: Faster Than Light* (Steam, 2019).
[114] Numbersphere, *Risk of Rain* (Steam, 2019).
[115] Omegon, *FTL: Faster Than Light* (Steam, 2019).
[116] Playerjjj, *FTL: Faster Than Light* (Steam, 2019).

run."[117] Great Tribulation claims "every playthrough is unique and different."[118] Another player names the technical process more explicitly, "On a run by run basis the game can vary through its great use of procedural generation of the galaxy you have to run through."[119] Some players highlight all three features simultaneously.

"FTL is a game that is frustrating to no end, but is still addictive… because of the different ships and equipment you come across each time, and no two playthroughs are the same. This is a game where at first, your success will be up to the rng[120] gods… The final boss battle is brutally punishing and especially when you don't have repair bases near you. It can be frustrating to invest an hour or so just to get game over. That's right when you die that's it, you have to start again."[121]

Another promptly highlights all three features while sharing advice for other players approaching the genre:

"Be engrossed. Be engaged. Be aware: eventually, all that story and atmosphere you're enjoying will chain-crit[122] your favorite character out of existence and likely talk some wicked trash in the process… it's this moment of 'fun despite being screwed by RNG'[123] that we must each strive to keep in mind… Just shrug it off and move on… I still enjoyed the game immensely and continued to be drawn back to see what new horror it conceived or how it would make me laugh… When [*Darkest Dungeon*] starts getting to you, take

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[117] GatoDelFuego, *FTL: Faster Than Light* (Steam, 2019).
[118] Great Tribulations, *Risk of Rain* (Steam, 2019).
[119] TerinHD, *FTL: Faster Than Light* (Steam, 2019).
[120] RNG is an acronym for Random Number Generator - a computational system which generates random numbers within software.
[121] Icy Dead People, *FTL: Faster Than Light* (Steam, 2019).
[122] "Chain-crit" is a shorthand for consecutive critical hits, or several exceptionally damaging attacks received one after the other.
[123] As above, RNG is shorthand for Random Number Generation.

advantage of the fact that it's a video game, not a job. Step away for a bit and come back later."[124]

I consider this player's notes on laughter and stepping away in Chapters Four and Five. Within this thesis, I name my synthesis of player definitions the *Player Synthesis* model of roguelikes. Contemporary players regularly highlight three roguelike genre defining features: high difficulty, procedural content generation, and permadeath. That third roguelike Player Synthesis feature, permadeath, is the central subject of this thesis.

III.B Developing Roguelike[s] for Research

III.B.1 Preceding Prototypes

The initial five games, detailed in Appendix E, offered a series of lessons which informed my construction of *Sunk Cost*. The first game suggested permadeath may help communicate failure's impact and import - even when aesthetic or thematic choices do not emphasize that conceptual metaphor. The first and second games together suggested that more dire thematic and aesthetic tones better prepared players to expect death, but also that features from other genres may muddy player expectations for the role of death. Games one and two also included elements from interactive fiction, but when players interpreted those experiences primarily as interactive fiction games, the roguelike features (permadeath and procedural content generation especially) seemed to betray their expectations. When implementing permadeath, developers must be mindful to keep player expectations clear. Games three through five suggest after a certain point, Variety not Random and procedural content generation may be easier to

[124] Zer0, *Darkest Dungeon* (Steam, 2019).

rebalance digitally than physically. This development pattern encouraged me to craft the sixth game, *Sunk Cost*, as a software prototype rather than a paper prototype.

Experiments with paper prototypes highlighted a related tension: because tabletop games are often categorized differently, players are still negotiating whether or not there are roguelike board games.[125] Even if later iterations of games three and four (*CollabCrash* and *Wayfinder*) expressed each roguelike feature (from this investigation's Developer Protocol and Player Synthesis models) effectively, in future research, even significant findings drawn from a tabletop roguelike may not generalize easily to the broader roguelike game genre that some players interpret as categorically exclusive to videogames. For me to explore the roguelike genre in a less contested format, it helps to develop the experimental tool as a videogame.

III.B.2 Sunk Cost

With the lessons gathered across several iterations of the preceding games, I began development of the final project, *Sunk Cost*. I developed it without competing genre features which could derail appropriate player expectations. I crafted it to make loss and death feel natural in context. Through software prototyping, I implemented it as a videogame to enable faster late stage revisions, and to empower its ability to allow the following research (and future research) to speak more suggestively about the roguelike genre. While *Sunk Cost* evolved continuously up until the user study, three snapshots - shared below - highlight particularly important phase changes. The *Version One* marked the moment when *Sunk Cost* existed as a minimum viable product (MVP) roguelike game. With the addition of alternate, selectable

[125] Carl Frodge, *Are there any Roguelike board games?* (BoardGameGeek, 2014).
Michael Bacon, *Roguelike - like board game?* (VideoGameGeek, 2017).

models of death, *Version Two* enabled *Sunk Cost* to serve as an MVP experimental tool for the comparison of an otherwise roguelike experience with and without permadeath. *Version Three* refined that skeletal MVP into a better game, and a better experimental tool. Snapshots of those stages are shared below, including their key changes, followed by my reflections on the overarching development process.

III.B.2.a *Sunk Cost Version One*
Description: *Sunk Cost* is a novel roguelike game in which players are captains of a desperate pirate ship, surrounded by a hostile fleet. "Captain! We're surrounded and we're out of ammunition. The only weighty, ammo-worthy material left is the loot… Every shot will cost us."[126]
Developer Protocol Features: RPL: yes. HoZ: yes. DTMD: barely. COSC: yes. VnR: barely.
Player Synthesis Features: HD: yes. PCG: barely. P: yes.
External Contributors: Art: - Nokobot, "Colonial Ship Asset Pack".



III.B.2.b Reflections on *Version One*

[126] James Bowie Wilson, *Sunk Cost* (2018).

In *Version One* of *Sunk Cost*, I built an MVP version of all Developer Protocol and Player Synthesis roguelike features. This version was not an MVP of the intended experimental tool because it did not include a mode without permadeath.

Random Parallel Learning was realized through *Sunk Cost*'s core game mechanics, and the fairly unconstrained format of play - players did not need to master any specific system to begin to experiment with another. Players could explore movement dynamics, wealth collection, combat systems, the level layout, enemy logic and interactions, and a host of related systems, as their interests directed.

Hero or Zero and high difficulty are simultaneously indicated through narrative and gameplay starting conditions. The opening text suggests players start in dangerous water, poorly equipped. After whatever offscreen heist exhausted their cannonballs, players begin the game with 200,000 coins. When struck by enemy ammunition, players lose 20,000 coins. When striking out with their own improvised ammunition, they spend 20,000 coins. Whether lost or spent, players begin the game exactly ten shots from mutiny and death. This immediate proximity to death helps to set player expectations appropriately.

Proximity to death, and complimentary cues also prepare players for permadeath. When players expect to lose, they typically seemed less maddened by the process. Perhaps when it is predictable, failure is not so frustrating. There must be some hope for success to justify trying, but beyond that point, an expectation of failure served players well. Cues that communicate enduring consequences also ease introductions to permadeath. Enemy cannonballs, player coin cannonballs, and sunk ships all remain visible below the water for quite some time. If not for performance limitations, those cues would each endure eternally during play. Similarly, a system

where player shots leave recollectable residue loot in the water permanently,[127] reinforced a message. In *Sunk Cost*, when something happens, the consequences endure. In earlier games, permadeath sometimes betrayed player expectations - especially in genre hybrids like *OKTactics* and *Silver Tongue*. Here in *Sunk Cost* though, through cues of permanence, player permadeath does not betray expectations.

The central shot spending dilemma introduced above also directly enacts Competing Objectives and Strategic Commitment. Time and time again, players must decide if they are willing to gamble their health towards in game progress. If players can land their shots (and dodge their opponents), they can make back their spending with coins to spare. If they cannot, they rapidly find themselves closer to death. Because salvaging enemy ships (and recovering loot residue) requires maneuvering, players must trust they can dodge enemy shots long enough to claim their reward in context. That tactical gamble offers exciting challenge.

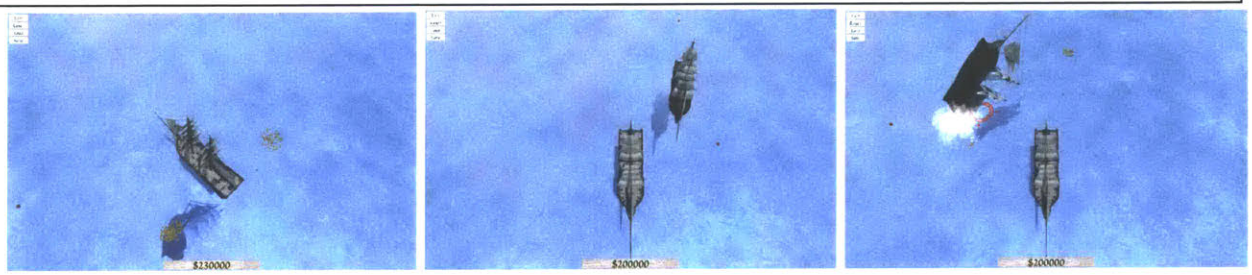
Diverse Tools and Making Do is only lightly implemented in this version. This version of *Sunk Cost* would benefit from more diverse tools, and more reasons to experiment with those other tools. Centrally, players can move, and shoot, and collect - these are their primary tools. Each of these tools allow players to address *Sunk Cost*'s primary threats - enemy cannonballs - in varying ways. Though movement is often the right tool to avoid damage, when enough enemy cannonballs are in the local air, you cannot always avoid them all. In those situations, collecting nearby loot may enable you to balance for those losses. Similarly, shooting allows players to embody the 'best defense is a strong offense' logic: if you can sink enemy ships before they fire, you are (at least briefly) safe from threat. The most important problem can be solved in a range

[127] Until recovery. By sailing atop residue loot, the loot is reclaimed for 10,000 coins. This recovery mechanic introduces loot acquisition to newer players (who have missed shots, but not yet sunk enemy ships).

of ways, with tools which have different ideal use cases. But, other important problems have only one solution. Player poverty can only be addressed by sinking and looting enemy ships, with one, static weapon. This limited range of inputs leaves iterative room for improvement.

Finally, Variety not Random is superficially implemented through shallow procedural content generation (PCG). Within *Sunk Cost*, PCG is primarily expressed in enemy placement and behavior, and secondarily in the clouds and fog which roll along the water.[128] I do not expect the aesthetic PCG to effectively realize Variety not Random, but the PCG dynamics handling enemies do create at least some memorably varied moments. The game feels tangibly different when players are surrounded by threats are on all sides, as compared to fewer threats on one side, as compared to a brief absence of threats. Still, in *Version One*, gameplay is not varied enough.

III.B.2.c *Sunk Cost Version Two*
Key Changes: - Added a manual save (and load) system which could be toggled on or off from within the game's development engine. *Sunk Cost* could now compare a (Player Synthesis) roguelike with permadeath, against an otherwise comparable hybrid without permadeath. *Sunk Cost* was now a working minimum viable product.
Developer Protocol Features: RPL: yes. HoZ: yes. DTMD: barely. COSC: yes. VnR: barely.
Player Synthesis Features: HD: yes. PCG: barely. P: yes/no.



[128] Mark Hendrikx et al., *Procedural Content Generation for Games: A Survey*.

III.B.2.d Reflections on *Version Two*

With an acceptable, if barebones, roguelike (according to both developer and player models), *Version One* was *almost* an MVP. To serve its intended purpose - to compare an otherwise parallel roguelike with and without permadeath - though, it still needed a control. It needed an implementation of a typical model of death. *Version Two* added that required element.

A great many videogames model death as a brief delay through save systems. In many games, when you die, you reload from a nearby save file, and try again. So, *Sunk Cost Version Two* added a manual save system - where players can press a button to save, and press a button to load that save. Within *Sunk Cost*'s development engine, now, the mode could be switched between versions with and without permadeath. Thanks to the addition of a save system, *Version Two* enables the comparison of permadeath to a more typical convention. Unfortunately, *Version Two* - like *Version One* - still lacked effective implementations of Diverse Tools and Making Do, Variety not Random, and procedural content generation. Additional changes were required, so I built *Version Three.*

III.B.2.e *Sunk Cost Version Three*
Key Changes: - 1) Added several key elements to strengthen implementation of Developer Protocol and Player Synthesis features - such as additional weapon systems, and weapon upgrade systems, and procedural level generation. - 2) Built elements to enhance user study. - 3) Balanced (still high) difficulty towards user study conditions - where all players are new players.
Developer Protocol Features: RPL: yes. HoZ: yes. DTMD: yes. COSC: yes. VnR: yes.
Player Synthesis Features: HD: yes. PCG: yes. P: yes/no.

Additional External Contributors:
Art:
- Manufactura K4, "Rock and Boulders 2 Asset Pack".

Audio:
- Katie Adelson, "Drunken Sailor - Instrumental Fiddle Sea Shanty".
- Vurca, "Running Gear".
- Nebyoolae, "Gear Clink".

III.B.2.f Reflections on *Version Three*

Shifting from a barebones MVP to a more polished final contribution involved an odyssey. To share the compressed highlights, I reinforce the core features according to both roguelike models; I weave in additional components to strengthen the user study; and I rebalance difficulty (slightly) for the user study context.

In *Versions One and Two*, for the Developer Protocol model, Diverse Tools and Making Do, and Variety not Random are barely implemented; for the Player Synthesis model, Procedural Content Generation (PCG) is shallow. *Version Three* needed more tools, more variety, and more procedural generation.

So I added a variety of distinct weapons which can be unlocked and upgraded, and PCG level generation. The additional weapon systems improved implementation of more roguelike features than was anticipated. There are now three distinct weapons, each of which has radically different limits and appeals. Each of these weapons can be unlocked or upgraded three times,

changing their cooldowns, ranges, shot sizes, and sometimes number of shots. With more distinct (and evolving) weapon options, players have more diverse tools, which profoundly improves *Sunk Cost*'s implementation of Diverse Tools and Making Do. Unlocks and upgrades involve musical and visual ceremonies which contribute to Hero or Zero, and the ramping power those moments afford also reinforces Hero or Zero. With a full deck of upgraded weapons, players are leagues beyond the rough hewn and under equipped ship they start (or with permadeath, restart) on. Weapon unlocks and upgrades are selected through PCG when players collect treasure chests, which now sometimes appear (in addition to more typical loot) when enemies are sunk. When an enemy ship sinks, there is a small chance it leaves Treasure behind. Collecting Treasure can sometimes demand crossing into the line of fire, which creates additional tactical challenges for players - in service of Competing Objectives and Strategic Commitment. When collected, Treasure is procedurally salvaged into a new or improved weapon system. The PCG involved in this upgrade system is simple,[129] but it contributes critically to *Version Three*'s Variety not Random. The updated weapons systems critically strengthen Hero or Zero, Diverse Tools and Making Do, Competing Objectives and Strategic Commitment, and Variety not Random. Because of feature interplay within and across roguelike models, improving one roguelike feature can simultaneously improve implementation of several other features. Roguelike features compliment each other brilliantly.

In *Version Three*, the local environment is now also generated through procedural content generation (PCG). Working towards *Version Three*, experiments with fully random

[129] The script chooses one of the three weapons not already upgraded to the maximum rank, and if it is already unlocked, upgrades that weapon by one rank. If the weapon has not been unlocked, it is instead unlocked and set to rank one. As weapons are upgraded, several of their features - shot size, shot count, shot cooldown, shot range - may improve.

environmental generation sometimes created unplayable experiences - which would obstruct useful user study. Rather than randomly generating environmental elements such as pillars or cliffs randomly, after several revisions, *Version Three* selects one of four versions of ten sections of the map, and positions them (with a random rotation) in place. This allows for a diversity of generated levels, without showcasing any unplayable iterations. For Variety not Random, as Cadwell suggested,[130] variety is best served when randomness is controlled. By curating results - enacting Variety not Random more fully through refined PCG - gameplay is improved.

Sunk Cost Version Three also includes additional elements added specifically to serve the user study. Across each session, this version of *Sunk Cost* records and displays loads of coded metadata - total heroes sunk (HS), total enemies sunk (ES), total upgrades gained for each weapon - the Bill Broadside, Coin Cannon, and Money Mortar (BB, CC, MM), total shots fired (SF), and total wealth gathered (WG). *Sunk Cost Version Two* has two models of death: permadeath and a manual save system. *Sunk Cost Version Three* adds a third: an automatic save system, also known as a checkpoint system. In this implementation of the checkpoint system, every 30 seconds, the game checks player conditions: if players are not about to die, it saves progress. Because *Sunk Cost* occurs on a single level and player location on the map is largely unrelated to their progress through the game, I used progress through time rather than space to drive the checkpoint death system. *Version Three* includes three distinct models of death. After testing my user study methodology, the selection system mentioned below was modified to exclude the manual save system to manage experimental scale. I chose checkpoint save over manual save as an experimental control because manual save requires players to work through

[130] James Bowie Wilson, *Interview with Tom Cadwell* (2018).

additional interfaces to benefit from the system. If players do not learn (or choose) to save, manual save operates much like permadeath. The checkpoint model of death, though, offers experiential contrast without burdening players with required mastery of additional systems.

Version Three also adds a system to automatically select the game's model of death each session to avoid researcher bias. To examine the impact of permadeath on player perceptions in this experimental game, I built *Sunk Cost* to automatically select a model of death - permadeath, or checkpoint. With distinct and comparable models of death implemented in *Sunk Cost*, randomizing mode selection should minimize bias when determining which users play each version of the game.

Finally, while still decisively difficult, *Sunk Cost Version Three* is balanced slightly more towards newer players. *Version One* and *Version Two* include a dexterity based cannon firing minigame, where power and arc are modified by how long you charge the shot. This felt exciting for more experienced players like myself, but frustrating for many new players. Because *Sunk Cost* is built for user study, where each player must be new, *Version Three* cut that additional minigame. Similarly, *Version One* and *Version Two* include another pattern that *Version Three* omits. In the earlier versions, as players gain wealth, their ship slows to increase challenge for demonstrably skilled or experienced players. This pattern, while interesting for some especially skilled players, slightly undercuts Hero or Zero. If you are simultaneously weakened as you gain power, the difference between empowered and initial players is reduced. This works against Hero or Zero, so it is not included in *Sunk Cost Version Three*. The game was rebalanced towards the user study context.

III.B.3 Iterative Design Process Reflections

Perhaps ironically, to reflect on *Sunk Cost*, my most successful development experiment and experimental tool within the roguelike genre, I must first revisit the most memorable failure along the way, *Game Two: Silver Tongue*.[131] After repeatedly facing player frustrations over difficulty and permadeath in *Silver Tongue*, I pondered core gameplay fun at length. During informal playtests of *Silver Tongue* — which could easily be lost within two minutes — two players chose not to bother trying again after their first deaths. Because the user study participation must be voluntary, the game must be fun enough for the vast majority of players to choose to play again and again. Death only impacts play profoundly if players choose to play again after death. That more than a single player decided losing another two minutes was not worthwhile testified to *Silver Tongue*'s poor realization, and also highlighted a key experimental challenge, detailed below.

Throughout each roguelike or roguelite's[132] design process, I was already aware of a default need for player satisfaction. If the game is generally unengaging, how much can any model of death legibly move the needle? Would the user tests address permadeath in roguelikes or roguelites,[133] or just permadeath in bad games? Unfortunately, in *Silver Tongue*, I dove far below unengaging. As mentioned, two players had spent less than five minutes in play: and still decided against trying again. That is abysmal. Beyond raising questions of the legitimacy of comparison across models of death, catastrophic engagement prevented *any* comparison at all. To compare versions of the game's model of death, a decisive majority of players had to choose to continue playing after their first death. In the formal playtest (or user study) context, if players

[131] See Appendix E.
[132] See Appendix D.
[133] See Appendix D.

abandon play after the first death, each model of death is experientially almost identical. While knowing all progress was or was not lost could inform the decision to continue play, in practice, differences in 'death' are primarily differences in the handling of rebirth. Players must consistently choose to try again. So, the game's core gameplay must be intrinsically rewarding. As a brutal puzzle, *Silver Tongue* lacked internal reward. Considering Jesse Schell's "The Art of Game Design," for *Sunk Cost*, I decided to follow his "Build the Toy First" recommendation.[134] To make an engaging game, start with a compelling interaction.

I also channelled Tracy Fullerton's parallel lessons on satisfying core gameplay loops. Considering *Silver Tongue*'s memorable failure, I revisited and reconsidered my favorite roguelikes - especially *Faster than Light* (*FTL*). I find ship combat intrinsically rewarding. The notion of solving puzzles (in games, combat is typically a puzzle of one shape or another) on a ship - a steerable home - shares such exciting promise. Effective intrinsic rewards depend on player preferences and values, but if one person feels something, odds are, there are other folks who feel similarly. Drawing inspiration from *FTL*, I chose to design *Sunk Cost* around naval combat.

Thematically, I swapped *FTL*'s space combat for waterbound combat, and reframed players as pirates surrounded by a vengeful fleet. Pirates offer mighty popular icons, and also allowed a playful nod to the fact that I pirated or raided *FTL* for satisfying roguelike core gameplay. *FTL* includes seven significantly different weapon types - lasers, ions, beams, missiles, bombs, flak, and crystal. Building a system that effectively houses seven satisfying weapon types takes a great deal of time and polish. I choose to implement three instead.

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[134] Jesse Schell, *The Art of Game Design* (CRC Press, 2015), 106.

Remembering iterative external pressures discussed in Chapter Two, I cut development scale wherever I could to allow more time for testing and writing.

Three weapons felt markedly more tool diverse than two, but also allowed each to have obviously different roles. When experimenting with four, or five weapons, the differences became increasingly subtle, and refining (and exaggerating differences between) those additional systems promised to ruin development timelines. So, I chose to draw primarily from *FTL*'s laser, flak, and beam weapons. *FTL* includes several other weapons, but I cut most through a process of elimination. Crystal is a custom weapon unique to a specific race - which would add an uncomfortable procedural rhetoric and balloon scale - without adding much value. Crystal weapons in *FTL* feel like only minimally modified lasers. I cut that reference quickly. Missiles and bombs are limited ammo weapons, which required a more granular loot system, and an inventory - again inflating scale. I eliminated those options too. Ions were the last option to go - stunning weapons *are* interesting. But, stunning weapons also extend gameplay, and require complimentary weapons to achieve player goals. A stunned enemy must still be destroyed by other weapons. Shorter gameplay improved iteration speed towards a higher quality *Version Three*, and also directly improved the user study by increasing the practical number of deaths players were willing to endure before returning to their already busy lives. So, I selected the final three weapon type references - laser, flak, and beam weapons. To fit the improvisatory pirate premise, my implementations were framed as a Coin Cannon, Bill Broadside, and Money Mortar.

To build the toy first for *Version One*, I needed all core features up and running. Three weapons - while mighty helpful for a serious implementation of roguelike Variety not Random -

was not a core requirement. Instead, I needed basic Coin Cannons firing; PCG enemy ships appearing, sailing, and firing; player and enemy ships recognizing and reacting to damage and death; and a clearly displayed health system. The theme offered an opportunity to quitely critique American capitalist norms: health is measured in wealth. This feels plausible for pirate perspectives (a wealthy pirate must be doing well), but this procedural rhetoric also aligns with problematic American perspectives. By American Calvinist ideologies, those who prosper deserve to. I hoped by placing that concept in a challenging (roguelike) context, in a more distant (pirate) skin, that logic would appear more gross on its face. I may have underestimated how deeply entrenched those perspectives are for many. During user study interviews, some players argued the game's rules echoed the real world well.

Chasing dilemma - a key to Competing Objectives and Strategic Commitment - the basic Coin Cannon sapped your wealth with each shot. As indicated in the premise introduced in *Version One*, players are captains of a ship with no ammunition. To defeat rivals, they must launch their loot as ammunition, permanently losing some in the process. While I had not expected this interpretation, some players read this patterns as an argument that doing violence onto others is also self-destructive. While a beautiful thought, in *Sunk Cost*, violence remains the only path towards total victory. For future drafts, I would love to add appropriate features (and balance) for stealth to offer winning options - as a few entrepreneurial or especially ethical players attempted.

Because of prior experience with stealth games, I choose to avoid pursuing stealth game mechanics within my limited development timeline. In intermediate game development classes at USC, I had built stealth games, so I had a sense of the scale of those challenges. Stealth games

require the creation and communication of markedly more complex enemy behavioral patterns. For my already oversized thesis, I chose to avoid that additional challenges. For future iterations of *Sunk Cost*, stealth would be a wonderful player strategy to support.

PCG Treasure and Loot being discoverable outside of combat outcomes could also contribute well to a non-violent mode. I had intended to add discoverable environmental Treasure and Loot (capitalized here for clarity) to the game's PCG map generation, but that required much larger infrastructure changes than PCG enemy Treasure and Loot drops. Building from *Version One* to *Version Three*, I had already built PCG Loot drops, so adding parallel Treasure drops was no catastrophic change.

Unfortunately, *Version Three*'s realization of PCG level design - in pursuit of Variety not Random - discussed above, made discoverable Treasure impractical for my development timeline. When modifying the PCG level generation system for *Version Three*, I added curated enemy creation locations - named fleet beacons - to each version of the ten subsections of the map. Fleet beacons were glowing red dots floating atop the water that sometimes generated enemies. I found this PCG method of enemy creation effective, but the fleet beacons obstructed parallel placement of Treasure in the environment. Even in early iterations of PCG, I found a few layers of simple randomness could readily render impressively diverse outcomes. By curating those simple underlying processes, the top level complex outcomes became consistently more effective. But, to follow revised enemy PCG for Treasure would require Treasure beacons, which - though cool - would compete for space with fleet beacons. The arena's limited physical layout's possibility space was already stuffed to the brim. Covering the map with more unexplained markers would not serve players well. Beyond a fixed tutorial Treasure that always

appears beside the player's ship at the start of the game, adding discoverable Treasure to map (to enable nonviolent strategies and reward geographical exploration) will have to wait for future iterations.[135]

While many of the choices within the design of *Sunk Cost* are outlined here or within the version reflections above, there was one critical challenging shift that I do not discuss elsewhere in my thesis. After (foolishly) updating Unity early this Spring, I found *Version Two* was made dysfunctional by newly deprecated and unsupported code. Initial attempts to replace all the broken code and resulting assets were not successful enough. So, rather than diving further into debugging, I chose to reimplement the entire project in the new version of Unity while iterating towards *Version Three*. This compulsory second pass motivated several of the productive changes mentioned in reflections for *Version Three* above, and many others not mentioned in detail in this thesis. As an illustrative example, when implementing the visualization of the water's surface the second time, I chose a much more desaturated blue in order to draw attention more directly to the focal gameplay elements. This helped players notice more of the key features such as enemy shots, and loot. Many of these changes - informed by the earlier versions - may not have been pursued without the motivational kick my Unity version update error shared. As a less necessary illustrative change, I added simple PCG rendering of clouds shifting over the choppy water's surface. That sort of polish takes time, and rarely receives conscious appreciation, but *Version Three*'s comparative quality emerged patiently from care and consideration woven in throughout the project's design and development. A large error (updating Unity engine software) offered an excellent challenge, which resulted in an improved final build.

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[135] Perhaps 'X marks the spot' Xs on interactable islands?

Considering the overall evolution of *Sunk Cost*'s design across versions, while I can see productive paths towards future improvement, the iterative methodology informed by sociological considerations enabled the productive investigation of the roguelike genre and permadeath. Considering future *Sunk Cost* design improvements, allowing creative players to succeed nonviolently - through stealth dynamics, and discoverable PCG environmental Treasure or Loot - would offer wonderful additional variety. Expanding the environmental PCG from *Version Three*'s single level PCG towards a continuously generated (multilevel) system would profoundly strengthen *Sunk Cost*'s realization of PCG. While each of the roguelike features can be always be better implemented, I would prioritize doubling down on Variety not Random, and PCG. Gathering feedback from expert designers would further benefit the realization of these roguelike features. Running the game at scale would allow findings from the pilot study shared below to speak with significance. Still, *Sunk Cost Version Three* enables the initial exploration of roguelike permadeath, as demonstrated in Chapter Four.

Chapter Four: Pilot User Study

Sunk Cost, this thesis's central, novel, experimental videogame, was used as a research testbed for this pilot user study investigating the impact of permadeath on player experiences. Throughout this Chapter, study participants are also described as users or players. We will briefly cover the hypotheses, and methodology, before diving into key findings. Statistical significance was not expected or pursued - this pilot study is mean to confirm that *Sunk Cost* can enable user study. Statistical significance would be a lovely pursuit for future research.

IV.A Hypotheses

During his talk at Game Developers Conference (2015), Tom Cadwell suggested roguelikes "drive… long term engagement."[136] This informed hypothesis 1. During our follow up interview, I asked him to explain how he interprets engagement. He suggested that the amount of time spent playing is an especially useful indicator, though the quality of that time is the critical factor.[137] This informed hypotheses 2 and 3. During our interview, Cadwell also suggested roguelikes may encourage players to experiment with more of the content.[138] This informed hypothesis 4. Because player discussions online so often highlighted the difficulty of the genre, and because permadeath destroys in game progress, I also expected permadeath to increase perceptions of difficulty. This informed hypothesis 5. With stakes so high, I expected players to battle more desperately to avoid death. This informed hypothesis 6.

1. Permadeath increases user engagement ratings.
2. Permadeath increases user perceptions of fun.

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[136] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
[137] James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[138] James Bowie Wilson, *Interview with Tom Cadwell* (2018).

3. Permadeath increases user playtime.
4. Permadeath improves user perceptions of content.
5. Permadeath increases user perceptions of difficulty.
6. Permadeath discourages user deaths.
    a. Permadeath decreases the number of deaths.
    b. Permadeath extends lifespans.

IV.B Experimental Methods

The sociological methods discussed in Chapter Two informed these specific experimental methods.

IV.B.1 Sample Selection

Users were selected either conveniently or through snowballing. The final sample size included ten participants. To avoid bias from stereotype threat,[139] player demographic information was collected through survey[140] only *after* all other data collection. This sample of participants was atypically diverse. Discussing race or ethnicity, compared to national demographics,[141] this sample skewed towards Black and Asian participants. Among occupations, students were overrepresented. This sample's gender distribution - six men, three women, one nonconforming participant - approximates industry demographics. As mentioned in Chapter One, in 2018, 45% of players are women.[142] This sample's participant ages - ranging from 20 to 76 -

[139] Michael Inzlicht and Toni Schmader, *Stereotype Threat: Theory, Process, and Application* (Oxford University Press 2011).
[140] See Appendix K.
[141] United States Census, *American Community Survey* (United States Census, 2017).
[142] ESA, *Essential Facts 2018* (ESA, 2018).

tilted just above industry average.[143] While the average player is 34,[144] this sample's average age was 34.3.

IV.B.2 User Study Structure

Users signed consent forms[145] before playing *Sunk Cost*. They were given a Controls sheet[146] to introduce them to the game. During sessions, gameplay footage was recorded alongside player audio. Following playtesting conventions, users were asked to talk aloud while playing to offer greater insight into their perspective. Whenever users stopped playing, they were given a validated self-reported Engagement Survey[147] - the User Engagement Scale (UES)[148] - drawn from the International Journal for Human Computer Studies. Users then completed a game Experience Survey.[149] Both of these surveys use 5 point Likert scale questions, prompting replies from "Strongly Disagree" (1) to "Strongly Agree" (5) for each question. Players then shared brief semi-structured interviews.[150] Finally, users completed an open ended demographic survey.[151]

IV.B.3 Data Cleaning

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[143] ESA, *Essential Facts 2018* (ESA, 2018).
[144] ESA, *Essential Facts 2018* (ESA, 2018).
[145] See Appendix F.
[146] See Appendix G.
[147] See Appendix H.
[148] Heather L. O'Brien, Paul Cairns, Mark Hall, *Measuring User Engagement* (Human-Computer Studies, 2018).
[149] See Appendix I.
[150] See Appendix J.
[151] See Appendix K.

The raw data was cleaned and anomyzed. Prior to cleaning, the audio recording of one participant interviews was corrupted.[152] Happily, because that corruption was discovered quickly, the player and I managed to rerecord a replacement interview that same day. Prior to cleaning, survey values and in game metadata (player deaths, enemy deaths, wealth collected, weapons unlocked, etc.) were entered into Google Sheets. Coarse survey data was arranged and compressed systematically. Engagement surveys were cleaned following validated recommendations[153] - related responses were compressed into more concise values, and those were again compressed into a final Engagement score. The Experience survey responses underwent a similar process. The following items - CH.2, CH.3, CO.2, CO.4, F.2, CF.2, CF.3, V.2, V.3 - were reverse coded. Items in each subscale (CH - Challenge, CO - Content, F - Fun, CF - Confidence, V - Vulnerability) were summed and divided by the number of items. Key elements of that resulting data is shared below, within "Findings."

IV.C Initial Findings

These results were tested for significance at 95%, and 90% confidence, but because of small sample size and large standard deviations between diverse individual player responses, no statistical significance was found at either level. Still, *Sunk Cost*'s design worked in collaboration with sociological methods to successfully measure the (qualitative and quantitative) impact of roguelike permadeath within this sample. This pilot user study demonstrates that *Sunk Cost* can be used to test the impact of permadeath on player experiences.

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[152] As an Apple Support agent reluctantly expressed, "[the recording] became unresponsive due to some issue that it came across and that issue could be anything."
[153] Heather L. O'Brien, Paul Cairns, Mark Hall, *Measuring User Engagement* (Human-Computer Studies, 2018).

Engagement Survey
Average Engagement
3.616666667
Roguelike Average Engagement
3.666666667
Checkpoint Average Engagement
3.5

Experience Survey				
Average Fun	Average Challenge	Average Content	Average Confidence	Average Vulnerability
4.15	3.775	2.6	2.175	1.95
Roguelike Average Fun	Roguelike Average Challenge	Roguelike Average Content	Roguelike Average Confidence	Roguelike Average Vulnerability
4.428571429	3.607142857	2.642857143	2.285714286	1.714285714
Checkpoint Average Fun	Checkpoint Average Challenge	Checkpoint Average Content	Checkpoint Average Confidence	Checkpoint Average Vulnerability
3.5	4.166666667	2.5	1.916666667	2.5

Game Recorded Metadata		
Average Deaths	Average Wealth Gathered	Average Kills
7.5	789748.6	20
Roguelike Average Deaths	Roguelike Average Wealth Gathered	Roguelike Average Kills
4.428571429	518952.8571	10.71428571
Checkpoint Average Deaths	Checkpoint Average Wealth Gathered	Checkpoint Average Kills
14.66666667	1421605.333	41.66666667

Game Recorded Metadata		

Average Shots Fired	Average Upgrades	Average Playtime
55.9	6	11.66333333
Roguelike Average Shots Fired	**Roguelike Average Upgrades**	**Roguelike Playtime**
45.14285714	5.428571429	9.802380952
Checkpoint Average Shots Fired	**Checkpoint Average Upgrades**	**Checkpoint Playtime**
81	7.333333333	16.00555556

Average Lifespan	Average Wealth/Minute	Average Kills/Death
1.555111111	67712.08345	2.666666667
Roguelike Lifespan	**Roguelike Wealth/Minute**	**Roguelike Kills/Death**
2.21344086	52941.51081	2.419354839
Checkpoint Lifespan	**Checkpoint Wealth/Minute**	**Checkpoint Kills/Death**
1.091287879	88819.49323	2.840909091

1. Permadeath increases user engagement ratings.

No Finding.

Within this sample, *Sunk Cost*'s Average Engagement was rated negligibly higher when playing the version with roguelike permadeath. Engagement was drawn formally from player responses to the Engagement Survey. On average, when playing with checkpoints, the game's Engagement was rated 3.50; when playing with permadeath, the game's Engagement was rated 3.67. Players who experienced *Sunk Cost* with permadeath perceived the game as minimally more engaging.

2. Permadeath increases user perceptions of fun.

True.

Within this sample, *Sunk Cost*'s Average Fun was rated higher when playing the version with roguelike permadeath. Fun was drawn from player responses (F.1, and F.2) in the Experience Survey. On average, when playing with checkpoints, the game's Fun was rated 3.50; when playing with permadeath, the game's Fun was rated 4.43. Players who experienced *Sunk Cost* with permadeath perceived the game as more fun.

3. Permadeath increases user playtime.

False.

Within this sample, *Sunk Cost*'s Average Playtime was shorter when playing the version with roguelike permadeath. Playtime was drawn from gameplay footage. When playing with checkpoints, Playtime averaged 16.01 minutes; when playing with permadeath, Playtime averaged 9.80 minutes. Players who experienced *Sunk Cost* with permadeath ended play sooner.

4. Permadeath improves user perceptions of content.

No Finding.

Within this sample, *Sunk Cost*'s Average Content was rated minimally higher when playing the version with roguelike permadeath. The Content rating was an average of ratings of both the quantity of content (CO.1, CO.2), and quality of content (CO.3, CO.4). On average, when playing with checkpoints, the game's Content was rated 2.50; when playing with permadeath, the game's Content was rated 2.64. Players who experienced *Sunk Cost* with permadeath believed the game had negligibly better (quantity and quality) content.

5. Permadeath increases user perceptions of difficulty.

False.

Within this sample, *Sunk Cost*'s Average Challenge was rated lower when playing the version with roguelike permadeath. Challenge was drawn formally from player responses (CH.1, CH.2, CH.3, CH.4) in the Experience Survey. On average, when playing with checkpoints, the game's Challenge was rated 4.17; when playing with permadeath, the game's Challenge was rated 3.61. Players who experienced *Sunk Cost* with permadeath perceived the game as less challenging.

6. Permadeath discourages user deaths.

    a. Permadeath decreases deaths.

True.

Within this sample, *Sunk Cost*'s Average Deaths were lower when playing the version with roguelike permadeath. Death counts were drawn from gameplay metadata. On average, when playing with checkpoints, players died 14.67 times; when playing with permadeath, players died 4.43 times. Players who experienced *Sunk Cost* with permadeath, died less.

    b. Permadeath increases lifespans.

True.

Within this sample, *Sunk Cost*'s Average Lifespans were longer when playing the version with roguelike permadeath. Lifespans were drawn from gameplay metadata. On average, when playing with checkpoints, player lives lasted 1.09 minutes; when playing with permadeath,

player lives lasted 2.21 minutes. Players who experienced *Sunk Cost* with permadeath, lived longer.

IV.C.1 Qualitative Observations

Quantitative findings can be importantly complemented by qualitative observations. When players played *Sunk Cost Version Three* in checkpoint mode (without permadeath), I noticed players groaned more. Even during observation, it felt like some of these players were having less fun in the face of the game's high difficulty. I wondered if that difference in vocalization might reflect a gender bias, because during these playtests men groaned or grunted more in general, and all players playing *Sunk Cost* without permadeath were male-identified. But, even when comparing recordings of the three male participants playing with permadeath against those recordings of the three male participants playing without permadeath, players playing without permadeath groaned more. In a memorable checkpoint session, the player laughed on their first death, but progressively groaned more and more as they encountered later deaths. They seemed to become increasingly annoyed with themselves (and the game) as the game continued to challenge them. They audibly lost patience across deaths (their volume increased), though after mastering a new technique,[154] the following death was met once more with laughter. Many of the following deaths though, again evoked groans. "I'm feeling a little frustrated." It seemed as though players often expected to achieve better results on future lives - especially when they started from recent checkpoints rather than the very start of the game. It would be interesting to test Confidence and Vulnerability both before and after play, rather than only after the playtest. While the quantitative data indicates players who expected and needed to

[154] They managed to successfully sink an enemy ship with their Bill Broadside - a weapon they'd previously struggled to use - before dying.

win more had less fun, and that players who played with checkpoints needed to win more, it is unclear in this sample if death mode selection modified player expectations or needs. Adding a parallel Confidence (CF.1, CF.2, CF.3, CF.4) and Vulnerability (V.1, V.2, V.3, V.4) pretest would enable additional insight. If permadeath moderates player expectations of victory, as some designers suggest,[155] that may drive permadeath's appeal.

Across both modes, checkpoint and permadeath, many players laughed when confronted with death. Laughter - especially in the face of death - may be a coping mechanism, though it could also be a sincere euphoric expression. Players who rated the game more positively seemed to laugh more during their playtests. Permadeath players generally laughed more. But, as with groans above, directionality is unclear. Perhaps these players laughed more because they were having more fun, or perhaps they had more fun because they were laughing more. Permadeath may benefit from players leveraging laughter as a coping mechanism. To isolate the impact of permadeath in play, it may help to also (separately) stress test players to enable analysts to control samples for preferred defense mechanisms such as laughter. Qualitative methods can and should critically complement quantitative research.

[155] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
James Bowie Wilson, *Interview with Tom Cadwell* (2018).

Chapter Five: Conclusions

V.A Discussion

Through the development of the six roguelite[156] and roguelike projects covered in Chapter Three, the importance of expectation management presented itself again and again. Tom Cadwell suggests managing expectations is a critical part of preparing players for roguelike dynamics. Roguelike developers should set an expectation of failure. "Make it really clear to players: winning is not the default, or even the common case."[157] The expectation of failure can be encouraged through cues. In *Sunk Cost*, I used the narrative text, and limited starting wealth to immediately reveal player proximity to death. Foreshadowing permadeath, the core improvised ammunition system that lowers your wealth and leaves collectible loot after any singular players 'click' simultaneously communicates danger and permanence, which obviously fits the subject. Highlighting cues, Cadwell highlights how videogames in the battle royales genre often have a hundred players. This is an exemplary indicator that any one player will not win. Among a hundred competitors, the odds that any player will be the last one standing is immediately understood as very low. Losing a battle royale game rarely feels like a betrayal of expectations. In well designed roguelikes, death feels expected.

By priming players for failure, roguelikes can push players outside of their comfort zones to offer enjoyable new novelty.[158] Ideally, players are "made comfortable outside of [their] comfort zone[s]."[159] The user study data supported this claim. When players expected to lose, death and failure frustrated them less. *Sunk Cost*'s high average Engagement (3.62) and Fun

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[156] See Appendix D.
[157] James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[158] James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[159] James Bowie Wilson, *Interview with Tom Cadwell* (2018).

(4.15) scores arrived beside low average Confidence (2.18) and Vulnerability (1.95) scores. Because players did not need to win (low Vulnerability), and did not expect to win (low Confidence), they typically enjoyed their experiences (high Engagement and Fun). Similarly, the player who marked themselves the most Vulnerable (4.25) - needing to win, and hating to lose - also rated their experience with *Sunk Cost* (engagement, fun, content, etc.) the most negatively. The more effectively the game indicates winning is not likely, the better.

During our interview, Justin Ma also shared additional suggestions. "Making the earliest stages of the game interesting and full of variety is important as that's the section most people will see the most often."[160] Opening on an interesting and varied scene - which also sets expectations well - is an excellent goal for designers and developers to pursue when preparing players for roguelike permadeath. Ma also suggests having "minor goals for each playthrough can help soften the blow of a loss. It can be something like unlocked content, different starting situations or a goal for the next run."[161] One player sampled in the user study also shared that they would enjoy a minor quest system. They hoped that might guide them to new experiences. "If there's something you feel you need to do every game to have a higher chance of success, the game will become more boring as players are essentially forced to repeat uninteresting content." [162] Cadwell and Ma both repeatedly highlight the importance of offering players novel experiences.

In the pilot study, roguelike permadeath increased player perceptions of Engagement, and Fun, and Content. This is a promising initial result. It would be fascinating to learn if permadeath brightens player perceptions in broader, general contexts.

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[160] James Bowie Wilson, *Interview with Justin Ma* (2019).
[161] James Bowie Wilson, *Interview with Justin Ma* (2019).
[162] James Bowie Wilson, *Interview with Justin Ma* (2019).

It is interesting that my hypothesis for improved engagement aligning with lengthened playtime did not hold within the pilot study. Cadwell suggests "Playtime is a proxy [for engagement]. Playtime is the best easy... measurement for how engaging a game is" - though it should be informed by the "richness of those memories," and the resulting "human fulfillment." [163] Together, quantity and quality may offer a "true measurement of engagement."[164] In this experimental context though, playtime does not effectively serve as a proxy for engagement.

Perhaps it is an issue of execution. Justin Ma suggests permadeath "risks making players bounce off your game faster. If they feel the process of starting over isn't worth it, they might never see the rest of your game's content."[165] "Bounce off"[166] is a shorthand for the pattern where players decide restarting a game is not worth it, and leave. Had I interviewed Ma before designing the user study's semi-structured interview questions, I would have liked to have asked players 'does restarting the game feel worthwhile?' In Ma's comment, 'worth it' seems to refer to hope. Checking the pilot sample's metadata and survey scores, lower Confidence did not translate to shorter playtimes. Bounce off is not likely the cause of reduced playtime in this study.

If shorter playtime is not an issue of "bounce off,"[167] it could be an issue of endurance. Ma also argues "[permadeath] adds a constant low amount of tension, even in more mundane situations."[168] Remembering player body language during playtests, players playing with roguelike permadeath seemed to sit more stiffly upright upon realizing the consequences of

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[163] James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[164] James Bowie Wilson, *Interview with Tom Cadwell* (2018).
[165] James Bowie Wilson, *Interview with Justin Ma* (2019).
[166] James Bowie Wilson, *Interview with Justin Ma* (2019).
[167] James Bowie Wilson, *Interview with Justin Ma* (2019).
[168] James Bowie Wilson, *Interview with Justin Ma* (2019).

death. Many seemed to play more cautiously, spending more time evaluating new elements on screen before interacting with them. They took fewer shots (45 total shots to 81 total shots). On average, with typically worse gear (5.43 total upgrades to 7.33 total upgrades), players confronting permadeath survived around twice as long (2.21 to 1.09 minutes). Through permadeath's raised stakes, perhaps players played more actively, and were worn out faster. I found a player quote on a roguelike fan forum which speaks eloquently towards that tension surrounding permadeath. Describing roguelike gameplay, Justin Nation shares that,

> I find their sometimes infrequent rewards to be far more meaningful. If you're able to clear a run and be even somewhat successful, despite all of of the obstacles that have been thrown in your way, it is far more exhilarating to me because I've really had to earn it. That's not to say that games you've invested time in and complete can't be similarly rewarding but I've also completed my fair share of titles where the end was a bit ho-hum because the journey hadn't made me invest much to get there. I can't think of any roguelike I've beaten where *I wasn't on pins and needles the whole time.* Even among the games I've never finished or rarely finish that tension as you inch closer and closer builds and, for me, even losing there is a thrill I don't often get in other "normal" games... At the end of the day, I suppose, you're inevitably going to either "get" roguelikes and love them or they'll likely be seen as nothing but horrible aggravation factories put on this planet to punish you. They're a type of game that is, no doubt, a lot more stick

than carrot but when you're wired to rise to challenges put in front of you rather than shy away they can be very appealing. [Emphasis added.][169]

Playing 'on pins and needles' may create both additional excitement – and additional tension. Perhaps proactive permadeath play is both more engaging, and more exhausting.

V.B Future Work

As discussed in Chapter Three, *Sunk Cost* can be further improved as a game, as a roguelike, and as a research tool. As covered in Chapter Two, all games can always be improved. *Sunk Cost* would benefit from further iteration on the depth of its PCG: the level is generated only at the start of a separate life (not including loading the same life from a checkpoint), but a better version could generate new content continuously as players explore. Rather than dueling endless waves of enemy ships within a single "claustrophobic"[170] arena, players could proceed from ocean region to ocean region. Perhaps exploring diverse climates - such as marshlands, reefs, deltas, straights, or open water - with unique local challenges such as glaciers and whirlpools. This ideal would require additional assets, and expanded PCG scripts, creating additional development challenges, but those types of challenges have been solved before - by *Rogue* itself, and many other games since. As Cadwell asserts, the best roguelikes showcase incredible variety, and therefore exciting novelty.[171] Expanded environmental PCG would profoundly benefit Variety not Random.

Relatedly, with enhanced enemy PCG, enemy ships could employ more complex tools and strategies. This could drive more player creativity and Random Parallel Learning. In *Version*

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[169] Justin Nation, *Why I Love Roguelikes* (2017).
[170] A player's description of their instance of the game's default, rocky local environment.
[171] James Bowie Wilson, *Interview with Tom Cadwell* (2018).

Three, *all* enemy ships have two health points and an upgraded variation of the player's Broadside Barrage. If enemy ships instead came in a range of shapes and sizes, with diverse attacks (weapons), defenses (health and armor values), and behaviors, *Sunk Cost* would be wildly better for it. Through improved enemy PCG, the project's Diverse Tools and Making Do could be further improved through the addition of yet more compelling challenges.

As discussed in Chapter Three, supporting player creativity and exploration through the addition of stealth mechanics and environmental rewards would also improve *Sunk Cost*. That addition would simultaneously improve Variety not Random and the Developer Protocol's keystone feature, Random Parallel Learning, well. Many of the improvements sketched above would simultaneously improve several adjacent features, because *roguelike features support each other*.

For researchers considering applying a similar methodology, during development, gathering prototype critiques from expert roguelike developers would likely expedite iterative improvements. Even across only two years of roguelike design experiments, I could offer my previous self a wealth of advice. Imagine the steering major roguelike developers could provide.

As the game improves, so too does its use as an experimental tool. This could be reinforced by improving the surrounding sociological methods. Convenient sampling, while convenient, may bias player responses. Especially when the game's developer is also the researcher running the playtest. Running playtests with a researcher on site unrelated to the game's development would likely enable more wholehearted player critiques. Also, as discussed in Chapter Four, adding pretests to could enable greater insight to be drawn from participant

observation. This would also expand the amount of time required for each session, but the greater information revealed may justify its additional processing time.

In all cases, a larger sample size would be invaluable moving forward. With either the current tool and methodology in hand, or refined iterations of both or either, a larger sample size would enable generalizable discoveries. While this thesis, and its central project *Sunk Cost*, confirms that an experimental tool can be built to investigate roguelike permadeath, it would be wonderful to discover the significant impacts on play that roguelike permadeath creates.

V.C Concluding Reflections

Videogames are monumental within popular culture. Thanks in part to the battle royale subgenre's recent financial successes, roguelikes are reshaping modern videogames. Games studies scholars suggest games require loss. Cognitive linguists have revealed that loss and death are intimately interrelated. As illustrated by my survey of popular game deathliness, it seems lively play often occurs in dialogue with our notions of mortality. Effective game developers already place a premium on the subject of death. As roguelike genre features spread, the impact of permadeath will bear increasing weight on player experiences.

Roguelikes offer a remarkably counterintuitive model of death. In the popular imagination, games are often understood as frivolous escapist larks, entirely divorced from reality or consequence. Roguelike permadeath flies in the face of that understanding. In roguelikes, playful death is not transient. Instead, these deaths are made eternal. As a result, virtual lives experienced prior to permadeath may be made more enduring. Even minor victories

earned en route to that almost inevitable "Final Destination"[172] may be more fondly cemented in memory.

Returning to scholarly definitions of games, the importance of permadeath in roguelike games confirms that games require loss. However, in other models of death in videogames, death is a delay, not an end. In many projects, any player will eventually win if they play long enough. The only system maintaining the true possibility of loss in a great many games is our limited (real) lifespans. Roguelikes though, demand players confront and accept the very real possibility they may *never* win. These players must be willing to face that permanent void, that infinite uncertainty, and smile or even laugh. Their willingness to greet the challenges with aplomb suggests these players are likely also well equipped to enjoy life, both in and outside of games.

Reflecting on the lessons revealed during iterative game design offers insight into how players are prepared to confront permanent death in play. In roguelike videogames, several complementary Developer Protocol roguelike features undeniably help: Hero or Zero, Diverse Tools and Making Do, Competing Objectives and Strategic Commitment, and Variety not Random, all in pursuit of Random Parallel Learning. By enabling experiential contrast, breadth and improvisation, dilemma and dedication, and procedural variety, players are empowered to follow their bliss.

Iterative experiments with roguelike prototypes though, suggests not all audiences are well-served by Developer Protocol or Player Synthesis features. Completionist players expecting to exhaust a game's content, or folks desperately in need of a win may find themselves sorely out of place. Permadeath, procedural content generation, and high difficulty do not typically massage

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[172] George Lakoff and Mark Turner, *More than Cool Reason: A Field Guide to Poetic Metaphor* (The University of Chicago Press, 1989).

egos. Using the experimental tool and methodology shared here, or improved iterations down the road, further research into the distinct impacts of roguelike features on diverse audiences would offer critical next steps. Important questions remain. Does player comfort with death in play have any relationship to their perspective on mortality in life? How are play patterns shaped by social and cultural backgrounds?

To predict and interpret the impact of permadeath, game design and sociology should be applied in concert. This thesis' experimental roguelike, *Sunk Cost*, and its complementary user study tools and methods, can be refined and applied at scale to offer critical insight. This pilot study suggests permadeath may truly support some players' pursuit of bliss. Permadeath may even expedite its discovery. Shifting from abstract to concrete impacts, if players are having more fun in less time, as the pilot study suggests, permadeath may more efficiently entertain players. Some game revenue streams - based on advertising - may lose ground in these videogames. Still, if players can find more joy in shorter sessions of play, permadeath may profoundly serve player interests. Through Uses and Gratifications theory, many media scholars suggest users select media to meet certain needs.[173] If roguelikes meet those needs faster, the spread of permadeath may benefit many audiences. The needs videogames serve for players are likely as diverse as their audiences, so the merit of roguelike features will depend on their players' purposes and preferences. Still, roguelike permadeath already has an undeniable place in videogames. If the results suggested by the research on permadeath here bear out at scale, with shorter play durations and more fun working hand-in-hand, a grim model of digital death may promise a bright future.

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[173] Lynn H Turner and Richard L West, *Introducing Communication Theory: Analysis and Application* (McGraw-Hill Education, 2017).

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Appendix A

In truth, *Rogue* is not the first roguelike. The first game now categorized as a roguelike, was Don Worth's *Beneath Apple Manor* (*BAM*) - released in 1978.[174] But, *Rogue* developed independently, and achieved markedly more widespread reach likely because of differences in distribution methods. *Rogue* was accessed through Arpanet (an early networking tool) by thousands of college students, while *BAM* was distributed by hand to local shops and mail fulfillment.[175] Because many in *Rogue*'s larger player audience were inspired to create related projects, when the resulting 'roguelike' genre was being shaped, *BAM* was not known to the canon, while Rogue was known intimately. *Rogue* was the genre defining game that later developers and players knew. Distribution can have critical impacts. Though not truly the first *roguelike*, *Rogue* was the genre defining game to introduce roguelike features - such as procedural content generation and permadeath - to the vast majority of audiences.

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[174] David L. Craddock, *Dungeon Hacks* (2015).
[175] Dan Carreker, *The Game Developer's Dictionary* (2012).
David L. Craddock, *Dungeon Hacks* (2015).
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Appendix B

Recorded from Ranker's "The 100+ Best Video Games of All Time, Ranked by Fans,"[176] Tuesday, April 30th, 2019, at 10:40pm:

1. *The Legend of Zelda: Ocarina of Time* (1998)
2. *The Elder Scrolls V: Skyrim* (2011)
3. *Super Mario Bros. 3* (1988)
4. *Super Mario World* (1990)
5. *Super Mario 64* (1996)
6. *Grand Theft Auto: San Andreas* (2004)
7. *Super Mario Bros.* (1985)
8. *The Legend of Zelda: A Link to the Past* (1991)
9. *Red Dead Redemption* (2010)
10. *Final Fantasy VII* (1997)
11. *Tetris* (1989)
12. *The Last of Us* (2013)
13. *Pokemon Red Version* (1998)
14. *Mass Effect 2* (2010)
15. *Chrono Trigger* (1995)
16. *GoldenEye 007* (1997)
17. *Fallout 3* (2008)

[176] Ranker, *Best Video Games* (Ranker, 2019).

18. *Mario Kart 64* (1996)

19. *BioShock* (2007)

20. *Grand Theft Auto V* (2013)

21. *Resident Evil 4* (2005)

22. *Half-Life 2* (2004)

23. *Portal* (2007)

24. *Super Smash Bros. Melee* (2001)

25. *The Witcher 3: Wild Hunt* (2014)

26. *Batman: Arkham City* (2011)

27. *Star Wars: Knights of the Old Republic* (2003)

28. *The Elder Scrolls IV: Oblivion* (2006)

29. *Fallout: New Vegas* (2010)

30. *The Legend of Zelda* (2012)

31. *Grand Theft Auto: Vice City* (2002)

32. *Portal 2* (2011)

33. *Minecraft* (2009)

34. *Halo: Combat Evolved* (2001)

35. *Batman: Arkham Asylum* (2009)

36. *Grand Theft Auto IV* (2008)

37. *Donkey Kong Country* (1994)

38. *Mass Effect* (2007)

39. *Super Mario Kart* (1992)

40. *Doom* (1993)

41. *Uncharted 2: Among Thieves* (2009)

42. *Assassin's Creed II* (2009)

43. *Super Smash Bros.* (1999)

44. *God of War* (2005)

45. *Super Metroid* (1994)

46. *Street Fighter II* (1992)

47. *Pokemon Gold Version* (2000)

48. *Metal Gear Solid* (1998)

49. *Sonic the Hedgehog* (1991)

50. *Halo 3* (2007)

51. *Mortal Kombat* (1992)

52. *The Legend of Zelda: Majora's Mask* (2000)

53. *Shadow of the Colossus* (2005)

54. *Grand Theft Auto III* (2003)

55. *Star Wars: Battlefront II* (2005)

56. *Half-Life* (1998)

57. *Super Smash Bros. Brawl* (2008)

58. *Call of Duty 4: Modern Warfare* (2007)

59. *Super Mario Galaxy* (2007)

60. *Diablo II* (2012)

61. *Kingdom Hearts* (2002)

62. *The Legend of Zelda: The Wind Waker* (2002)

63. *Final Fantasy X* (2001)

64. *Call of Duty: Modern Warfare 2* (2009)

65. *Pac-Man* (1980)

66. *World of Warcraft* (2004)

67. *Pokemon Yellow: Special Pikachu Edition* (1998)

68. *Halo 2* (2002)

69. *Final Fantasy VI* (1994)

70. *Mass Effect 3* (2012)

71. *The Sims* (2000)

72. *Resident Evil* (1996)

73. *Metroid Prime* (2002)

74. *The Elder Scrolls III: Morrowind* (2002)

75. *Age of Empires* (1997)

76. *The Legend of Zelda: Twilight Princess* (2006)

77. *Super Mario Bros. 2* (1988)

78. *Kingdom Hearts II* (2005)

79. *BioShock Infinite* (2013)

80. *Dark Souls* (2011)

81. *Castlevania: Symphony of the Night* (1997)

82. *Star Fox 64* (1997)

83. *Crash Bandicoot* (1996)

84. *Silent Hill 2* (2001)

85. *God of War 3* (2010)

86. *Contra* (1987)

87. *Metal Gear Solid 3: Snake Eater* (2004)

88. *Borderlands 2* (2012)

89. *Dragon Age: Origins* (2009)

90. *Final Fantasy IX* (2000)

91. *Resident Evil 2* (1998)

92. *Sonic the Hedgehog 2* (1992)

93. *StarCraft* (1998)

94. *God of War II* (2007)

95. *Age of Empires II: The Age of Kings* (1999)

96. *Silent Hill* (2006)

97. *Uncharted 3: Drake's Deception* (2011)

98. *Mario Kart Wii* (2008)

99. *Fallout 4* (2015)

100. *Tomb Raider* (1996)

Appendix C

Fortnite includes each of the roguelike Developer Protocol features: Random Parallel Learning (RPL), Hero or Zero (HoZ), Diverse Tools and Making Do (DTMD), Competing Objectives and Strategic Commitment (COSC), and Variety not Random (VnR). Considering Random Parallel Learning, there are a host of dynamic skills to master within play - such as movement, dodging, positioning, shooting, collecting, building, predicting - which can be practiced as players desire. Checking for Diverse Tools and Making Do, There are a wealth of powerful weapons to gather with diverse ideal use cases. These stockpiles of resources often become deadly hotspots, which will doom many competing players, but empower the survivors, enabling Hero or Zero. In each session, stockpiled assets are found at distinct points across the map, following a procedure, showcasing a selection of an incredibly broad range of gear, in service of Variety not Random. Variety not Random is further reinforced through player confrontations with diverse competitor strategies, and through the deadly storm which procedurally pushes surviving players together across a shrinking fraction of the map as the game continues towards its climax. Roguelike Developer Protocol features are all clearly present within *Fortnite*.

Relatedly, *Fortnite* also showcases each of the roguelike Player Synthesis features: high difficulty, procedural content generation (PCG), and permadeath. In Solo mode, with one hundred players and one winner in each game, the overwhelming majority of players will not win. This creates obvious high difficulty, as only the top player in any hundred will win. As indicated when detailing *Fortnite*'s Variety not Random, *Fortnite* includes loads of procedural content generation. Each of the many resource stockpiles are placed and filled through PCG, and

the murderous storm is scaled and directed through PCG. Finally, *Fortnite* includes permadeath. Players who die cannot reload from a save file or checkpoint to try again. After dying, players can and will never win that match. They must start entirely anew, on a yet unrealized map, among a fresh collection of one hundred competitors. *Fortnite* is roguelike, whether considering Developer Protocol or Player Synthesis defining features.

Appendix D

Some games are almost roguelike, but stray far enough from the core genre to feel peripheral. These games are described as roguelite games. Some of the prototype games developed during this thesis did not include all Developer Protocol and Player Synthesis features of the genre, so these could be interpreted as roguelite games. There are a variety of related terms for roguelike genre adjacent games which are not discussed elsewhere within this thesis, but are sometimes useful. Alice O'Connor describes roguelike adjacent games as "roguelikelikes."[177] Tom Cadwell suggests we talk about these videogames – "which are predominantly roguelike" but "have replaced the core combat engine" or comparable features "with something [else]" – as "modern hybrid roguelikes."[178] While many developers[179] and players[180] mark *Faster than Light* (*FTL*) as an incredibly successful modern roguelike game, Justin Ma, one of its two central creators, "generally" describes his [own] team's work as a "Roguelite or Rogueish."[181] The contested genre boundaries are well demonstrated by *FTL*'s page on the Steam store. The official marketing summary of the game describes *FTL* as a "spaceship simulation roguelike-like," while the most popular "user-defined tags for this product" is "Rogue-like."[182] For the purposes of this writing, roguelite stands in for roguelikelikes, modern hybrid roguelikes, and any similar phrases for roguelike adjacent games.

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[177] Alice O'Connor, *A Roguelikelike* (RockPaperShotgun, 2015).
Anecdotally, this term already has at least some traction. Within the last year, I heard a Computer Science Professor at the University of Wisconsin-Madison mention a favorite roguelikelike in casual conversation.
[178] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
[179] Tom Cadwell, *The Untapped Potential of Roguelikes* (GDC, 2015).
[180] Ranker, *The Best Roguelike Games of All Time* (Ranker, 2019).
Softonic, *Best Roguelikes on Steam* (Softonic, 2019).
[181] James Bowie Wilson, *Interview with Justin Ma* (2018).
[182] Steam, *FTL: Faster Than Light* (Steam, 2019).

Appendix E

Game One: *OKTactics*
Description: *OKTactics* is a fusion of a dating simulator and a roguelike tactical role playing game, in which players play as minor celebrities who must fend off local fans during a date. "You have a date tonight! Both of you are somewhat-well-known internet celebrities, however, so your loyal fans won't stop pestering you! Try to get to know your date better by talking to them… while keeping your fans at arm's length. (You love your fans, but now is NOT the time.)"[183]
Developer Protocol Features: RPL: yes. HoZ: barely. DTMD: yes. COSC: yes. VnR: barely.
Player Synthesis Features: HD: yes. PCG: yes. P: yes.

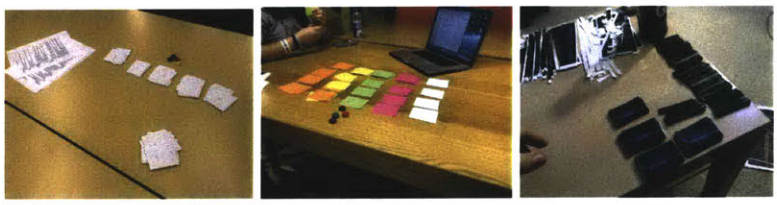
Teammates: Pablo José Ortiz-Lampier, Seth N. Hetu.

Game Two: *Silver Tongue*
Description: *Silver Tongue*, is a card game about a frail advisor to a dying Monarch, who must help determine which of the Monarch's awful heirs will claim the throne, through sharp wit, silver tongue, and poisoned blade
Developer Protocol Features: RPL: yes. HoZ: yes. DTMD: yes. COSC: yes. VnR: barely.
Player Synthesis Features: HD: yes. PCG: yes. P: yes.

[183] James Bowie Wilson, *OKTactics!* (LudumDare, 2018).

Game Three: *CollabCrash*
Description: *CollabCrash* a multiplayer roguelike board game about a soldier, medic, and scientist collaborating in the face of disaster. After your spaceship crashes on a hostile planet, players must band together to explore and endure a harsh world to repair their fractured ship and escape.
Developer Protocol Features: RPL: yes. HoZ: barely. DTMD: yes. COSC: yes. VnR: yes.
Player Synthesis Features: HD: yes. PCG: yes.[184] P: yes.

Teammates: Jasmine McGhee, Carrie Laber-Smith.

Game Four: *Wayfinder*
Description: *Wayfinder* is a tabletop multiplayer navigational card game, in which players play as Polynesian wayfinders, following and sharing stories of the stars to find a way across the ocean, and then a way back home.
Developer Protocol Features: RPL: yes. HoZ: yes. DTMD: yes. COSC: yes. VnR: yes.
Player Synthesis Features: HD: yes. PCG: yes.[185] P: no.


[184] Gillian Smith, *An Analog History of Procedural Content Generation.*
[185] Gillian Smith, *An Analog History of Procedural Content Generation.*

Teammates: Pablo Villalobos, Jasmine McGhee, Carrie Laber-Smith.

Game Five: *Warm Tracks*
Description: *Warm Tracks* is a procedural exploration game. "Out in the forest, you can hear your [dog] raising a mild ruckus - the little rascal's gotten lost! Explore the local wilderness to find and guide your good little doggo back home… After all, a home's not a home without good company."[186]
Developer Protocol Features: RPL: barely. HoZ: barely. DTMD: no. COSC: no. VnR: somewhat.
Player Synthesis Features: HD: no. PCG: yes. P: no.


[186] James Bowie Wilson, *Warm Tracks* (2019).

Appendix F

CONSENT TO PARTICIPATE IN NON-BIOMEDICAL RESEARCH

Exploring the Impact of Distinct Models of Failure on Game Experiences

You have been asked to participate in a research study conducted by James Bowie Wilson, CMS/W M.S. student, and supervised by D. Fox Harrell, Professor of Digital Media & Artificial Intelligence, in the Imagination, Computation, and Expression (ICE) Laboratory at the Massachusetts Institute of Technology (M.I.T.). The results will contribute to ongoing thesis research.

You were selected as a possible participant in this study because you are able to hear audio and see visual input and are English-speaking, which is required for participation in this study You should read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate.

The information below provides a summary of the research. Your participation in this research is voluntary and you can withdraw at any time.

- **Purpose**

This study explores how differences in gameplay models of failure change player perceptions of surrounding game experiences.

- **Study Procedures**

Participants will play a version of an experimental game. They will then complete three surveys and a brief interview.

- **Risks & Potential Discomfort**

No risks or discomfort is expected.

.

You should read the information below, and ask questions about anything you do not understand before deciding whether or not to participate.

- **PARTICIPATION AND WITHDRAWAL**

Your participation in this study is completely voluntary and you are free to choose whether to be in it or not. If you choose to be in this study, you may subsequently withdraw from it at any time without penalty or consequences of any kind. The investigator may withdraw you from this research if circumstances arise.

- **PURPOSE OF THE STUDY**

This study explores how differences in gameplay models of failure change player perceptions of surrounding game experiences.

- **PROCEDURES**

If you volunteer to participate in this study, we would ask you to do the following things:

1. You will be asked to fill out required consent forms.
2. You will play a version of our experimental game for as long as you'd like. Video footage and in-game data will be recorded.
3. You will complete two related post-assessment surveys.
4. You will engage in a brief semi-structured interview about your thoughts and feelings towards the game experience with the researcher. The interview will be recorded.
5. You will complete a final post-assessment survey.
5. You can ask any questions you have about the study and will be dismissed afterwards.

You may end your participation in the study at any time.

- **POTENTIAL RISKS AND DISCOMFORTS**

During the gameplay components of the research, no risks or discomforts are expected for participants. If at any point, you feel uncomfortable, please let the researcher know.

During the survey and interview components of the research, based on your personal comfort with the subject matter, you may decide at any time you do not wish to answer certain questions or continue with the interview.

- **POTENTIAL BENEFITS**

Participants may experience joy or excitement during gameplay. This study may also inform the design of future games.

- **PAYMENT FOR PARTICIPATION**

There will be no compensation for participation in this study.

- **PRIVACY AND CONFIDENTIALITY**

Any information obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. In addition, your information may be reviewed by authorized MIT representatives to ensure compliance with MIT policies and procedures.

Your activities during this study will be audio- and videotaped. By participating in this study, you are granting your consent for these recordings to be taken. We plan to use unique numerical identifiers appended with the gender of the speaker to the recordings.

- Who will have access to the data?

Only members of the research team, and the thesis committee, will have access to these recordings for research purposes.

- **Where will the data be stored and how will it be secured?**
  The data will be stored using encrypted cloud storage (Google Drive, Dropbox).
- **What will happen to the data when the study is completed?**
  The data will be used indefinitely for research purposes.

• IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact:

- Principal Investigator:		
James Bowie Wilson	jamesbw@mit.edu	(608)395-9478
- Faculty Sponsor:		
Fox Harrell	fox.harrell@mit.edu	(617)253-3599
- Thesis Committee:		
Fox Harrell	fox.harrell@mit.edu	(617)253-3599
Nick Montfort	nickm@nickm.com	(617)253-3599

• EMERGENCY CARE AND COMPENSATION FOR INJURY

If you feel you have suffered an injury, which may include emotional trauma, as a result of participating in this study, please contact the person in charge of the study as soon as possible.

In the event you suffer such an injury, M.I.T. may provide itself, or arrange for the provision of, emergency transport or medical treatment, including emergency treatment and follow-up care, as needed, or reimbursement for such medical services. M.I.T. does not provide any other form of compensation for injury. In any case, neither the offer to provide medical assistance, nor the actual provision of medical services shall be considered an admission of fault or acceptance of liability. Questions regarding this policy may be directed to MIT's Insurance Office, (617) 253-2823. Your insurance carrier may be billed for the cost of emergency transport or medical treatment, if such services are determined not to be directly related to your participation in this study.

• RIGHTS OF RESEARCH SUBJECTS

You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you feel you have been treated unfairly, or you have questions regarding your rights as a research subject, you may contact the Chairman of the Committee on the Use of Humans as Experimental Subjects, M.I.T., Room E25-143B, 77 Massachusetts Ave, Cambridge, MA 02139, phone 1-617-253 6787.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____
Name of Subject

_____
Name of Legal Representative (if applicable)

_____ _____
Signature of Subject Date

_____ _____
Legal Representative (if applicable) Date

SIGNATURE OF PERSON OBTAINING INFORMED CONSENT

In my judgment the subject is voluntarily and knowingly giving informed consent and possesses the legal capacity to give informed consent to participate in this research study.

James Bowie Wilson
Name of Person Obtaining Informed Consent

James Bowie Wilson 04/17/2019
Signature of Person Obtaining Informed Consent Date

Appendix G

Controls

Introduction:
Captain! We're surrounded, and we're out of ammunition. The only weighty, ammo-worthy material left is the loot… Every shot will cost us.
Land those shots precisely on the local fleet, salvage their wrecks, and there may well be enough booty left to cover our debts after this is all said and done…

Goal: Collect 500,000 Coins!

Target Note: Enemy ships can endure two of your shots. When sunk, they release loot, or treasure.

Input:
- Use "W," "A," "S," and "D" to move.
- "Click" to launch an improvised loot ball from your equipped weapon.
- Use "Q" and "E" to switch between unlocked weapons.

Weapon Types:
For players, there are three types of improvised weapons, Coin Cannons (CC), Money Mortars (MM), and Bill Broadsides (BB). Each type can be unlocked, and upgraded repeatedly, by gathering treasure from the environment or sunk enemy ships.

CC: Fire a single aimed shot horizontally, which will splash down at the indicated point. Your shot velocity is determined by the distance from your ship, so try aiming beyond your target for maximum effectiveness.

MM: Fire a single aimed shot vertically, which will splash down at the indicated point, bypassing cover, after a brief delay. Because of the vertical trajectory, try to place your marker where you predict your target will be after that brief delay.

BB: Fire a barrage of fixed shots horizontally which will splash down at their respective indicated points.

Health, Wealth, and Danger:
In this game, your wealth is your health. If you drop below 0 loot, your desperate crew will mutiny.
Enemy ships drop loot (or treasure) into the adjacent water.
Each shot you fire launches some of your loot into the water, which brings you closer to mutiny, so be sure to recollect whatever loot you can.
You will also automatically lose loot (to repairs) whenever enemy ships strike your ship with their cannonballs.

Appendix H

Engagement Survey

Please answer each of the questions below. Please be as open and honest as you can; there are no right or wrong answers. If you have any questions, please let someone on the research team know.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3	4	5
I lost myself in this experience.					
The time I spent using this game just slipped away.					
I was absorbed in this experience.					
I felt frustrated while using this game.					
I found this game confusing to use.					
Using this game was taxing.					
This game was attractive.					
This game was aesthetically appealing.					
This game appealed to my senses.					
Using this game was worthwhile.					
My experience was rewarding.					
I felt interested in this experience.					

Appendix I

Game Experience Survey

Please answer each of the questions below. Please be as open and honest as you can; there are no right or wrong answers. If you have any questions, please let someone on the research team know.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3	4	5
CH.1 This game was difficult.					
CH.2 The game was not difficult.					
CH.3 The game was easy.					
CH.4 The game was not easy.					
CO.1 The game included lots of content.					
CO.2 The game did not include lots of content.					
CO.3 The game included interesting content.					
CO.4 The game did not include interesting content.					
F.1 The game was fun.					
F.2 The game was not fun.					
CF.1 I expected to win the game.					
CF.2 I did not expect to win the game.					
CF.3 I expected to lose the game.					
CF.4 I did not expect to lose the game.					

V.1 Winning is important.					
V.2 Winning is not important.					
V.3 Losing is okay.					
V.4 Losing is not okay.					

Appendix J

Player Semi-Structured Interview Questions

//Experience Questions
Did you win?
Why do you feel that you did/ did not win?

Did you lose?
Why do you feel that you did/ did not lose?

Did you die?
Why do you feel that you did/ did not die?

What were your favorite moments in play?

What were the most exciting moments in play?

What were the most frustrating moments in play?

What were the most confusing moments in play?

What have you learned about the world of this game?

What is true within this virtual world?

How does it compare to the real world?

If you could change anything, how would you improve the game?

//Identity Questions.
Do you play games?

How often?

Are you a gamer?

Are you a game developer?

Can you think of game genres?

If yes, what are a few of your favorite game genres? Why those genres?

What are a few of your favorite games? Why those games?

Why are they your favorite games?

How often and how much do you play those games?

What are a few of your least favorite games? Why those games?

When did you last play those games?

//Genre Questions.
Have you heard of Roguelike games?

What would you guess a Roguelike game is?

Have you played a Roguelike game before?

If yes:
Can you name a few Roguelike games?
What are the common features of Roguelike games?

If no, or uncertain:
Roguelikes are often understood as difficult games with PCG and permadeath.

Have you heard of PCG?
Can you name a few games with PCG?

Have you heard of permadeath?
Can you name a few games with permadeath?

Is this game a Roguelike?
Why, or why not?

Appendix K

Demographic Survey

Please answer each of the questions below. Please be as open and honest as you can; there are no right or wrong answers. If you have any questions, please let someone on the research team know.

Your Email Address:

Your First Name:

Your Last Name:

Your Age:

Your Gender:

Your Race and/or Ethnicity:

Your Nationality:

Your Occupation:

Your Highest Level of Education Completed: