Well Played Single

The Pleasure of Playing Less

A Study of Incremental Games Through the Lens of *Kittens*

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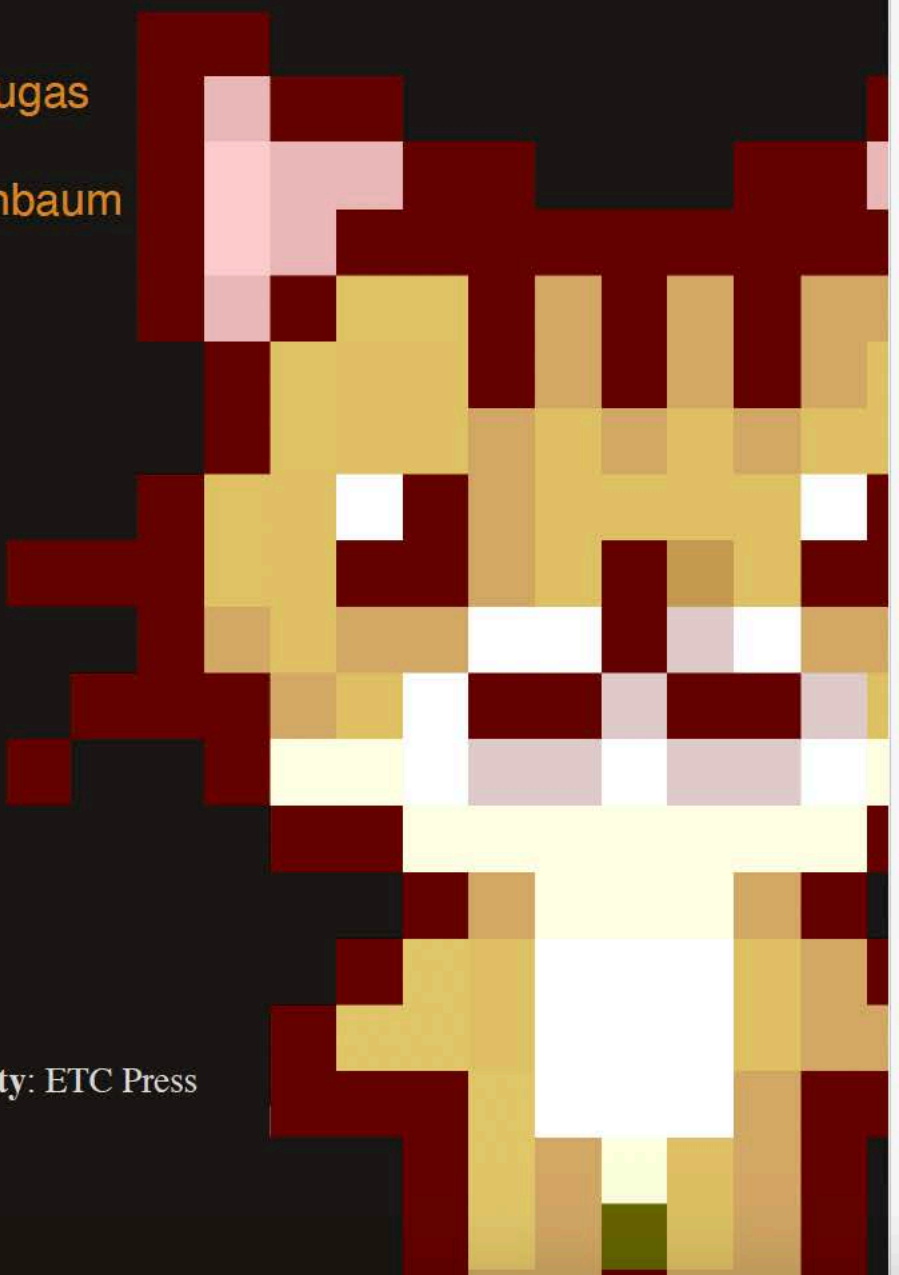

Carnegie Mellon University: ETC Press
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Contents

Introduction

Incremental games (along with, more generally, "idle" or "clicker" games) are a minimalist gaming phenomenon in which the player selects resources to generate, waits for resources to accumulate, then spends resources to automate part or all of the resource generation process (Alharthi, Alsaedi, Toups, Tanenbaum, & Hammer, 2018). Resources usually *accumulate* as long as the game is left running. The majority of the play in incremental games takes place in the background while waiting. Incremental games draw their lineage from Ian Bogost's satirical critique of Facebook games (Bogost, 2010b; Bogost, 2016). They are deceptively simple at first, but reveal impressive depths, including finely tuned reward curves, bottlenecks, plateaus, and economic models. Despite relying heavily on a narrow vocabulary of core interactions – primarily clicking and waiting – these games capture players' attention across months or even years of play (and idle) time.

In this work, we undertake a collective close reading of Bloodrizer's (2014) *Kittens Game* – a self-described "Dark Souls *of incremental gaming*" ("*Kittens*"). *Kittens* is a popular incremental game, with over 400,000 play sessions on Kongregate alone (Kongregate, 2017) and recent mobile apps (Bloodrizer, 2017a). In becoming well played at *Kittens*, we have found that it offers a variety of tensions and trade-offs that engage players in long-term planning.

We explore the pleasure of playing less through our collective experiences with the incremental game *Kittens*. We examine how *Kittens* engages players in what we call "*phases*" that shift player activity from overt action to strategic, long-term planning and resource accumulation. There are two framings of phases: *play phases* that represent changes within each playthrough and *metaphases* that encompass a sequence of complete playthroughs. We draw on techniques of *close reading* and *hermeneutics* (Bizzocchi & Tanenbaum, 2011; Tanenbaum, 2015) to ground our analysis and supplement our individual reflections with an ongoing dialogue among the contributors, resulting in a collective reading that brings multiple points of view to bear. In addition to our collective analysis, readings from individual authors are presented, which express each author's individual reflection.

2 Well Played Single: The Pleasure of Playing Less

We argue that one of the central poetics of incremental games involves incentivizing players to *play less* and *plan more* as they progress through each game's growth curve. Expert players of these games are paradoxically engaged in fewer gameplay activities than novice players: they are devoting less *tactical interaction* to the experience and more *strategic attention*. This is often characterized by a decrease in the micromanagement behaviors that comprise the early play experience and a transition to a long-tail-style (Brynjolfsson, Hu, & Smith, 2006) experience, in which the game is active for long periods, accumulating resources, and the player has minimal involvement. Thus, we might say that these games produce a form of "self-obviating" play (Tomlinson, Norton, Baumer, Pufal, & Raghavan, 2015) in a way that challenges us to reconsider "play" and "fun", or at least relocate them outside of both the formal mechanics of the game and the dynamic player behaviors those systems entail.

We assert that this close reading of *Kittens* is timely, as incremental games are rising in popularity. As of this writing, incremental along with, more generally, idle games have moved from curiosities and parodies into a healthy and growing genre (Deterding, 2016; Keogh & Richardson, 2017; Alharthi et al., 2018). For example, *Clicker Heroes* gained instant popularity, reaching Steam's top ten most played games in 2015. More recently, *Universal Paperclips* (Lantz, 2017), an incremental game in which the player plays as an AI who makes paperclips, gained huge popularity and substantial media attention (Vincent, 2017). While these games began on PCs, a number of well-known incremental games have mobile versions (e.g., *Kittens*, *Cookie Clicker*, *Clicker Heroes*). Born-mobile idle and incremental games are increasing in numbers and gaining popularity. Games like *Idle Minor Tycoon*, *Idle Balls*, and *Idle Flipper* have more than fifty thousand ratings combined in the iOS App Store with an average rating of 4.5 stars. While PC incremental games are driven by mouse clicks, mobile incremental games use tapping as a core interaction, which serve the same in-game function as clicking.

Incrementals also surface a number of issues around the nature of play and the trade-offs games require of their players. In the long term, we expect that incremental games may serve a larger purpose in the research community, forming the basis of experiments, interventions, and game studies. Also, we expect there is value in considering not only designing them in isolation, but also as synergistic to other applications. Using elements of incremental and idle games, including their mechanics and interfaces, in non-game context can influence the design of gamified applications (Lee & Hammer, 2011; Deterding

et al., 2011). The unique characteristics of incremental games have the potential to be used to incentivize long-term motivation and promote desired behaviors. Understanding why players want to play idle games can help designers of other applications to build experiences that motivate users to come back for months and years. Owing to their often extended play times, incremental games can serve as probes to understand players' planning behaviors and motivations to play games in long time scales (Toups, Hamilton, & Alharthi, 2016). Further, designed games can serve as interventions to improve planning behavior. By facilitating not-playing, incremental and idle games open up a number of questions about what player agency is and function as a tool to explore the edges of this space.

To better understand incremental games, we begin with a brief discussion of their design and history. We then describe our method of closely reading *Kittens*. Next, we provide a description of a selection of *Kittens* play phases, and situate these within the larger scope of metaphases. We close with a discussion of how gameplay organizes and reorganizes players' time.

1

Design and History of Idle, Incremental, and Clicker Games

To situate the reader and establish terminology, we develop two major points in this chapter. We first briefly address our prior research on the classification and definition of incremental, idle, and clicker games. Each of these (and other) games are similar in name and game mechanics, so we clarify what each means. We then describe the history of the genre.

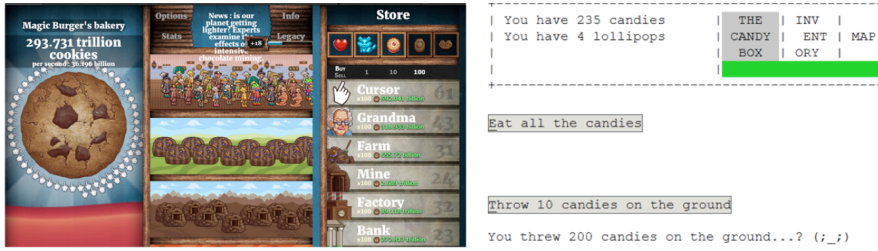

Figure 1. Main game interface in Cookie Clicker (left), and Candy Box 2 (right).

Classification and Definition

Based on our prior work in classifying and defining idle games (Alharthi et al., 2018), we define *idle games* as games that can progress without player interaction for some period of time (and, thus, a superset of incremental games) (e.g., *Factory Idle* (Baldurans, 2016), *Candy Box !* (Aniwey, 2013a), *Candy Box 2* (Aniwey, 2013b)). The majority of the play in idle games takes place in the background while waiting, thus idle games can be also identified as *background games* and *ambient games.* Idle games involve clicking or tapping to set up a game, to generate resources, and to spend resources on upgrades. Idle games feature components of strategy, decision making, long- and short-term planning, and a strong sense of progression (Toups et al., 2016; Pecorella, 2016; Khaliq & Purkiss, 2015). *Incremental games* are games in which a player clicks to

generate resources, then spends resources to automate part, or all, of the clicking process (e.g., *Kittens* (Bloodrizer, 2014), *Cookie Clicker* (Thiennor, 2013)). Over time, resources continue to accumulate as long as the game is left running. Incremental games commonly feature an internal economy. "[Cow] clicker" games (e.g., *Cow Clicker* (Bogost, 2010a))[1] are any in which the player clicks a button for a reward, which is a superset containing incremental games. We describe our framework of idle games in more detail below.

Incremental games are characterized by core mechanics (Salen & Zimmerman 2004) of *clicking* to generate or spend resources and *waiting* for resources to accumulate. One framing for this design is to understand that an occasional reward for a repetitive task serves as a positive reinforcement (Skinner, 1990; Skinner & Ferster, 2015). When the player clicks a button, they gain resources; when waiting, resources accumulate. Players can exchange these resources for in-game benefits, serving as reinforcement. Resource accumulation is rendered visibly. By framing accumulation as a sense of progression (Adams & Dormans, 2012), we can understand the passive acquisition of resources as a reward. Finally, incremental games typically unlock new game elements when sufficient resources have been accumulated. These unlockable elements foster a sense of discovery (Adams & Dormans, 2012).

Idle and incremental games feature a wide range of interactivity, from games that require constant interaction to no interaction at all. Interactivity in idle games can be interpreted not in terms of exclusive categories, but as *degrees* of interactivity along a spectrum, from games that require no interaction other than starting the game to those that require periodic player involvement. While some games sit at a consistent point on the spectrum, a more typical pattern is for different phases of each game to invite different levels of interaction. These three common patterns are *clicker*, *minimalist, and zero-player.* At the higher-interaction end of the spectrum are *clicker* games. These games involve *clicking, rubbing, or tapping as a core mechanic*; damage is caused and/or resources are generated by multiple clicking cycles on an object, which are separated by waiting periods. *Minimalist* games reduce the number of available actions to a small subset of options, either through game mechanics that automate gameplay or gameplay phases that reduce the player interaction (e.g., bottlenecks, plateaus). *Zero-player games* are games that require no player involvement or limited input in the initial step of the game with no influence in gameplay (e.g.,

1. *Cow Clicker* is the origin of "[cow] clicker" as a genre name (Bogost, 2016).

Progress Quest (Fredricksen, 2002), Conway's (1970) *Game of Life*) (Björk & Juul, 2012). These games are ambient in nature, due to the limited interactivity and the ability to leave them open in background, ready for the player to attend to anytime (Keogh & Richardson, 2017). In the current gameplay analysis, we focus expressly on incremental games.

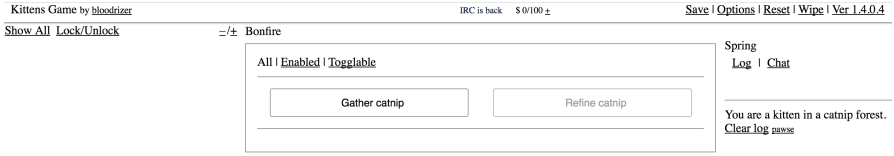

Figure 2. The opening interface of Kittens. Resource information will later appear on the left column; the center column contains the only currently available button: "Gather catnip"; the right column contains the event log and shows the current season ("Spring").

History

A key precursor to incremental games is game bots. *Bots*, or artificially intelligent (AI) agents, are automated computer players that act as if controlled by a human player (Mariusdottir, Bulitko, & Brown, 2015). Games, such as *Angband*[2], are designed for player interaction, but can incorporate an AI player such as *Angband* Borg. In 2002, *Progress Quest* (Fredricksen, 2002), became one of the first zero-player games (Björk & Juul, 2012). In *Progress Quest*, the player sets options for a fantasy avatar. As the player watches, the game plays itself with no interaction, describing how the avatar advances over time. *Ambient Quest*, in 2006, integrated concepts from *Progress Quest* with pervasive play. Pedometer data was used to control avatars in a digital game. While the designers had intended the game to use data generated by players' ordinary activities, with no special game-based interaction, they found that players changed their behavior because of the game (e.g., cheating by shaking the pedometers). Later, Bogost (2010a) released *Cow Clicker* as a satire of prevalent social media games (Bogost, 2016). *Cow Clicker* gave the player a point each time s/he clicked an image of a cartoon cow, limited to one click every 6 hours. The game featured no automation. The game was a hit, despite Bogost's intentions.

2.

Angband is one of many *Rogue*-like games that involve an avatar playing through a 2D, top-down adventure in a procedurally generated world.

The first incremental, by our definition, is *Cookie Clicker* (Thiennor, 2013), which gained instant popularity and pushed the genre into the mainstream (see Figure 1). *Cookie Clicker* offers a smoothly animated, highly graphical interface: the player starts clicking on a cookie image to "bake cookies", at the rate of one cookie per click; cookies are used to buy characters and buildings that increase the automatic cookie production rate. Soon after, *Candy Box !* (Aniwey, 2013a), *Candy Box 2* (Aniwey, 2013b), and *CivClicker* (Colcord, 2013) were released. The *Candy Box* games begin with the player clicking a single button in a browser window to accumulate candy, which is spent on a sword and other gear as the world opens up into an animated role-playing game, with automated candy production as currency. *CivClicker* puts the player in charge of a fictitious civilization and tasks her/him with clicking to generate resources in order to build buildings that automate the process. In 2014, *Kittens* (Bloodrizer, 2014) casts the player as "a kitten in a catnip forest." Through many thousands of clicks and waiting periods, the play proceeds to build a civilization whose technological advancements exceed reality (see Figure 2). Text-based games such as *Kittens* and *Candy Box !* demonstrate that polished graphics are not necessary for the continued development of the form.

Incremental games, in general, revolve around building an economy and accumulating the resources needed to do so. The internal economies of games are commonly based on physical-world economies; for our discussion on game economies in *Kittens*, we build on Adams' (2013) model. Economies are systems in which resources are produced, consumed, allocated, and/or traded. Internal game economies consist of sources, drains, converters, and traders. Throughout our reading of *Kittens*, we will further develop Adams' game economy model. Based on our classification of idle games (Alharthi et al., 2018), *Kittens* is a micromanagement incremental game, in which the player uses multiple resources to build an internal economy. These types of games, in general, feature high interactivity levels, mostly textual interfaces, and slow progression. In micromanagement incremental games, the player is afforded more options and can make more decisions to progress in the game, with multiple advancement vectors.

Most incremental games do not incorporate game over or death conditions, which means that players can keep playing the same instance of the game for as long as desired. However, many of these games include a meta-economy by incorporating a New Game (NG) mechanic (Watar, 2015). NG mechanics reset progress in the game, erasing all current resources and accomplishments

in exchange for bonuses on the next playthrough. The more resets, the faster and richer future games become. For example, in *Kittens*, it is not possible to reach large portions of game content without multiple resets. In our analysis, we therefore include both the game's internal economy and the meta-economy created by the NG mechanics.

Incremental, idle, and clicker games represent an unusual space for game design, one in which players frequently advance the game by *not playing*. As we continue, we examine *Kittens* in detail, to understand the ways in which the game pushes the player to engage and disengage with it to create a long-term experience.

2

A Close Reading of Kittens

To develop a deep understanding of *Kittens*, a collective close reading of the game was performed by the authors. In this chapter, we describe how we approached data collection and analysis. Close readings of games involve careful play and documentation of experiences, followed by analysis, exposing the hidden qualities that make up a game. A close reading of a game can be a useful way to "[understand] the game as a cultural, aesthetic, and practical artifact" (Tanenbaum, 2015, p. 1). A close reading must address issues of indeterminacy (players may have different experiences), scope (there may be more game content than a player can reasonably engage), and stance (maintaining a scholarly and a playful approach simultaneously) (Bizzocchi & Tanenbaum, 2011).

These issues are particularly potent in *Kittens*, where developing a deep understanding requires weeks, months, or years of physical-world time. While, for the most part, players will arrive at the same points in *Kittens* eventually, the paths, as we show, may diverge and converge throughout play, making individual experiences indeterminate. Further, the experiences are interleaved with time away from the game, which is, in effect, still part of play. The extended play times suggest that scope of the experience will be very different for some players. For example, one achievement in the game requires that it be continuously run for 40,000 years of game time, or a little over 370 physical-world days.

We address these challenges by building a collaborative close reading experience of long-term play. Each author invested considerable play time in Kittens (see Figure 3), as well as in other incremental, idle, and clicker games (Alharthi et al., 2018). Inspired by Bizzocchi and Tanenbaum's (2012) close reading of the game *Mass Effect 2*, we developed an approach to data collection in which two authors captured and catalogued significant numbers of

	Toups	Alharthi	Alsaedi	Hammer*	Tanenbaum*
date data recorded	Mar. 24, 2017	Mar. 27, 2017		mid-Feb., 2017	
total years played	9,799	2,561	1,539	~5,000	
resets made	10	5	0	0	~5
total paragon	1,970	230	1	~5	
total clicks	119,483	43,230	18,550	~70,000	~100,000
total kittens	3,555	2,019	613	~500	
kittens dead	278	760	512	0	
buildings constructed	24,899	6,368	827	~10,000	
trades completed	282,267	57,160	613	~30,000	
crafting times	69,999,900	1,004,000	4,538	~30,000	
est. run time (seconds)**	7,839,200	2,048,800	1,231,200	~5,000,000	
est. run time (days)**	90.7	23.7	14.35	~60	

* Detailed save data not available due to hardware failure.
** *Kittens* does not give overall playtime, but total game years played; we calculated these values from total years played, but late-game temporal game mechanics can alter that value without changing run time, so it is not 100% accurate.

Figure 3. A list of game statistics from all authors with an estimated run time of the game.

screenshots of the game. This approach provided us with documentation of the gameplay that supports a deeper analysis of the play phases (see Figure 4). The screenshots were categorized and ordered chronologically by game years and game phases. Along with capturing screenshots at regular intervals, the authors maintained a spreadsheet to record their observations from the play sessions, reflecting on unique moments of play. Further, the team regularly observed, and occasionally participated in, the ancillary online resources for *Kittens* (e.g., its wiki, Reddit, and Arqade pages)[1]. Team members shared experiences and observations in discussion. When perspectives diverged, the team treated the divergence as evidence of the range of indeterminate play experiences possible, and built their analytic models accordingly.

> I lost my game in a computer crash and wasn't able to retrieve my play statistics. At the time, I was angry and frustrated over the loss of my kitten civilization, but I didn't even think about the numbers. Months later, I'm much sadder about the loss of the statistics than the kittens. I kept the game running for a long time without resetting, using scripts, or losing even one kitten. The official game stats could

1. Online resources for Kittens: Wiki: http://bloodrizer.ru/games/kittens/wiki/index.php?page=Buildings, Reddit: https://www.reddit.com/r/kittensgame/, Arqade: http://gaming.stackexchange.com/questions/tagged/kittens-game

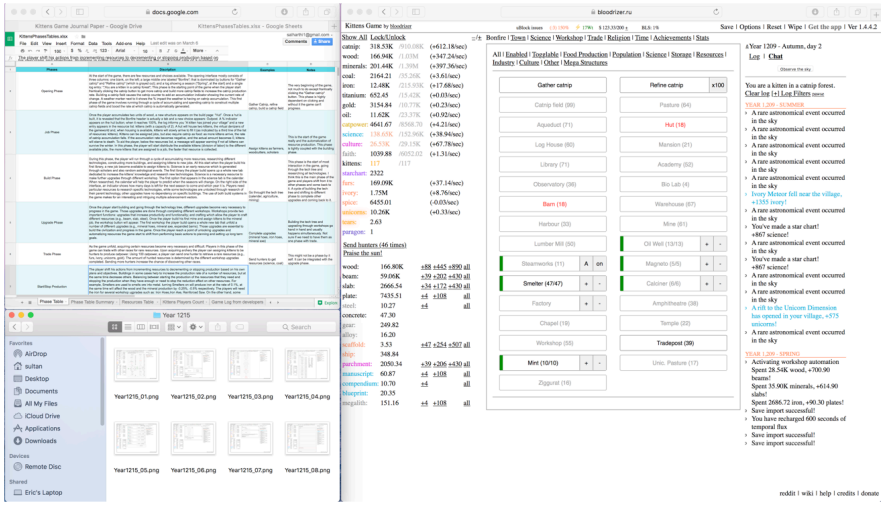

Figure 4. A screenshot of the layout of the computer screen while conducting a close reading of Kittens. The top left is the maintained shared spreadsheet, the left bottom is the folder where all the game screenshots are saved, and the game is on the right.

> have been a marker of that accomplishment, but I missed my chance to capture it. (Hammer)

Based on our close reading, we develop a model of *Kittens* as non-linear sequence of gameplay *phases* (Adams & Dormans, 2012). Gameplay phases exist within the context of *metaphases*, which shape the dynamics of play across multiple playthroughs. Each phase and metaphase represents a change in available game mechanics, with a concomitant change in planning activity, as we demonstrate.

3

Playing Kittens

In this chapter, we provide a close reading of selected early play phases of *Kittens*, with authors' individual reflections on each phase. For later play phases, of which there are many, we provide a summary. Because the game is an eternal work-in-progress, the later phases, especially, are ever-expanding and, thus, hard to capture within the scope of this writing.

We explain game mechanics as we progress. Each phase was chosen because it provides a particular insight into how the game is approached by players, and we focus on the early game because it is easier to render in context. It is worth noting that there are many late-game elements that are beyond the scope of this book that contribute to the depth of play (e.g., unicorns, the details of NG paragon and karma, metaphysics, cryptotheology, Iron Will Mode, achievements, challenges, and the ever-in-development endgame); while the authors have experience with these, they are challenging to explain in manuscript form and would only marginally extend the play patterns we describe.

Note that while we have necessarily chosen an order in which to describe phases, they are nonlinear and may occur simultaneously, as we discovered by comparing experiences across authors. We therefore emphasize the preconditions for each phase and how it begins. Figure 12 lays out the phases along with prerequisite play phases.

Clicker Phase: At the start of the game, there are few resources and choices available (see Figure 5). The clicker phase interface consists of three columns: one blank, on the left; a large middle one labeled "Bonfire" that is dominated by buttons for "Gather catnip" and "Refine catnip" (which is grayed out); and a right-hand column showing a season ("Spring", at the start) with a single log

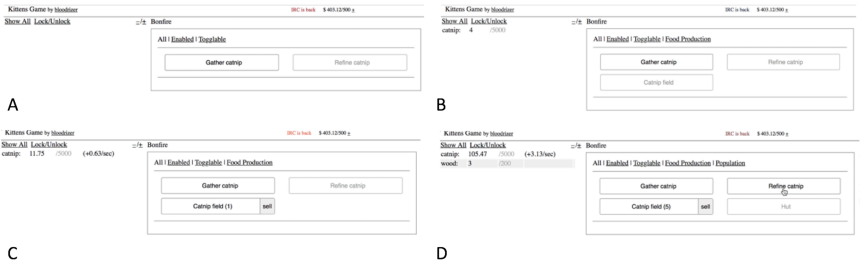

Figure 5. A play sequence for the clicker phase of Kittens, omitting the right column of the interface.
(A) The start of the game with only one available button: "Gather catnip" and a grayed "Refine catnip" button. (B) When catnip is gathered, the game reveals a grayed "Catnip field" button. (C) When 10 units of catnip are gathered, the "Catnip field" button is enabled and a catnip field can be built, which automates catnip production as shown on the resource information on the left. (D) When 100 units of catnip are gathered, the "Refine catnip" button is enabled, and catnip can be refined to wood.

entry: "You are a kitten in a catnip forest." The two main buttons reveal tooltips on mouseover (note that backslashes indicate new lines of text):

> "Gather catnip" button: "Gather some catnip in the forest"
>
> "Refine catnip" button: "Refine catnip into catnip wood \ catnip 100"

Waiting causes the season indicator to slowly progress through a year. Clicking "Gather catnip" causes a catnip resource counter to appear on the left column (with a capacity of 5,000); each click increases this counter by one. Once the player has accumulated three catnip, a grayed "Catnip field" building button appears. Its tooltip reveals:

> "Catnip field" button: "Plant some catnip to grow in the village. Fields have 50% production in Spring and -75% production in Winter \ catnip 10 \ Effects: \ Catnip production: 0.63/sec \ 'Nip as far as the eye can see."

Players may now spend 10 catnip to build a field, which will produce catnip at the rate of 0.63 per second. The tooltip also notes how the current season impacts gameplay. Further, this tooltip is the first of many to include a short quote at the end, which seems to be in the voice of a kitten inhabitant (which do not yet exist, see coming sections).

The player now has more choices: gather catnip, build a catnip field after accumulating enough catnip, or refine catnip after accumulating enough catnip. Each of these tasks is accomplished by clicking a button.

> I started playing and I felt that this game is not going anywhere, I didn't figure it out immediately. At the beginning, I really struggled to balance between catnip production and consumption, and I admit it, I killed the most kittens compared to the other authors. But in my defense, this was part of figuring out how to play the game and I didn't attend to the game often at the beginning. Although, with this unfortunate situation, I earned two achievements, "Winter is Coming" and "You Monster!". (Alharthi)

Automated Production Phase: Building a catnip field starts the automated production phase, and introduces sources to the game. *Sources* are game economy components that generate resources automatically (Adams, 2013). In this case, building a field adds a production rate indicator to the catnip resource counter. Over time, players can increase the catnip production rate in a variety of ways, such as building multiple fields, building other catnip sources (e.g. pastures), and assigning kittens to farm (see next phase). The catnip production rate also varies based on the season, which players cannot control. Mousing over the production rate indicator shows a tooltip that breaks down all sources for accumulation.

While catnip is the first resource to which the automated production phase applies, other game resources follow the same model. For example, producing wood starts by clicking the refine catnip button, which generates one unit of wood per click. Wood production can be automated by assigning kittens to the woodcutter job.

A key component of this phase is the introduction of *buildings* (which can serve different economic functions, but, in this case, are a source). Each additional building improves the production rate by the same amount, but each building is more expensive than the last. The *price ratio* is a value by which the base cost is multiplied to determine the increased cost of each building (Bloodrizer, 2017b)[1]. The general formula for price ratio is:

1. For more details on how price ratio is calculated and more in-depth formulas, see Anthony Pecorellahis blog series *"The Math of Idle Games"* (Pecorella, 2016).

$$cost = base\ price \times (price\ ratio)^{number\ of\ buildings}$$

As an example, the price ratio of catnip fields is 1.12 and the initial cost is 10 catnip: the first costs 10, the second costs 11.2, the third costs 12.5, the 10th costs 27.7, the 100th costs 745,734.5, and so on.

The automated production phase involves a marked decrease in the number of clicks the player makes: it quickly becomes valuable to let a given resource accumulate while idle, then use it to build automated production sources. This is primarily driven by the price ratio dynamic, which means that the fixed amount of catnip generated by a click buys less and less with each additional building.

The value of idling, however, is limited by the available *entities*, which provide capacity to store game resources (Adams, 2013). Resources will continue to accumulate while idling, but only as long as there is available capacity in a relevant entity. When no more capacity remains, produced resources are lost. The total capacity of entities for each resource is shown next to the relevant resource (e.g. in the left column of the screenshots in Figure 5). Most resources that can be automatically generated are associated with capacity-limited entities, while a few exceptions are not.

Taken together with price ratio-driven incentives to idle, resource caps incentivize bursts of play. The game is left to idle while resources accumulate, and then spent down to free up room within storage entities. Just as new sources can be built, entities can be expanded in the building phase (see below).

> It was important for me to balance between the automated production rate of some resources and how they can affect other resources. For example, if I needed to produce more coal to complete my plan, I would turn off the steamworks buildings, because of their effect on the coal production rate, which has a -60% penalty. (Alsaedi)

Jobs Phase: Clicking the "Refine catnip" button converts catnip into wood. In game economies, *converters* change the type of one or more resources at some predefined ratio of exchange (Adams, 2013). This enables players to strategically invest in particular resources and beneficial exchange rates. When first converting catnip to wood, a wood entry is added to the list of resources on the left (with a capacity of 200), which activates the jobs phase. Once the player accumulates two units of wood, a new structure appears on the build page:

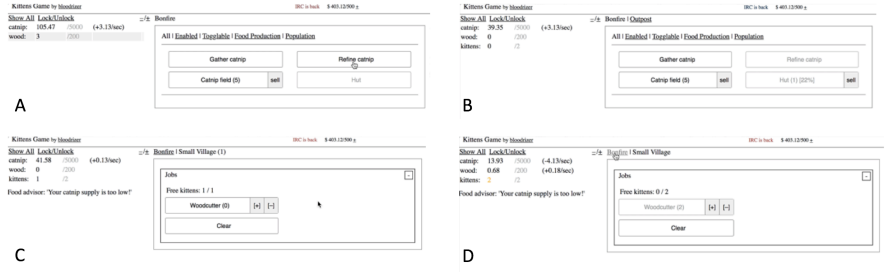

Figure 6. A play sequence for the jobs phase, omitting the right column of the interface. (A) The Hut button is currently available and can be clicked to build the first hut. (B) When a hut is built, a percentage indicator appears on the hut button, when the percentage indicator reaches 100%, a kitten arrives and a Small Village tab appears on the top, next to the Bonfire tab. (C) When the Small Village tab is open, a list of available jobs is shown. (D) Clicking on a job will assign one available kitten to it, which automate the resource that is related to that job.

"Hut". Once a hut is built, it is revealed that the Bonfire header is actually a tab and a new tab appears: "Outpost". A percentage indicator appears on the hut button. When it reaches 100%, the log informs you "A kitten has joined your village" and a new entry appears in the resource list: kittens (with a capacity of 2).

A hut will house two kittens, who are the denizens of the gameworld (see Figure 6). When space is available in a housing entity, kittens will slowly arrive to fill it. Kittens can be assigned jobs, but also require catnip as food: as more kittens arrive, the rate of catnip accumulation falls. In game economies, *drains* remove resources from the game permanently (Adams, 2013). If the accumulation rate becomes negative, and the actual amount becomes zero, kittens will starve to death. Players must make careful decisions and plan efficiently to balance the production and consumption of resources. To aid the player, a warning message will appear if not all kittens can survive the winter (when catnip production will be lowest).

Kittens can be assigned to jobs, each of which increases the production of a resource. Once the player builds their first hut and assigns jobs to kittens, the gameplay patterns shift, as the player can make choices about the desired population and how to allocate production. In addition, gaining a kitten population creates pressure to develop a large enough source of catnip to support all kittens. Because kittens must be kept alive through the winter, the player must look ahead in creating a plan rather than simply reacting to the moment-to-moment game conditions. Finally, kittens become more effective

at a given job the longer they have been assigned to it. This dynamic begins to incentivize long-term planning, since training a new kitten takes time. It also differentiates play styles, as different players can focus on creating kitten populations with very different skill sets.

It is worth noting that the name of the Outpost tab changes in response to population: “Outpost” at 0 kittens, “Small Village” at 1–15, “Village” at 16–30, “Settlement” at 31–50, and so on. Thus, the tab appears with various names in the screenshots. The game wiki refers to this tab as the “Village tab”, which we adopt for the remainder of the book.

> As kittens began to join my village, I found that I cared a surprising amount about their well-being. I didn’t want to lose even one kitten to starvation! Even though it wasn’t the economically optimal decision, I spent time building extra fields and warehouses to give myself a catnip buffer. When writing this book, I was surprised to see how many kittens the other authors had killed, particularly when it didn’t seem to have happened in a reset. If I had accidentally killed even one kitten, I would have immediately quit the game. (Hammer)
>
> I focused very much on catnip production, but not storage, to ensure that production would be ahead of consumption. I worried that, even with a good buffer, a bad winter could spell doom for my population, especially if I wasn’t paying attention. For the record, I only let so many kittens die to get an achievement. (Toups)
>
> I’ve quit the game twice. Both times it was because I didn’t keep my catnip production up enough to withstand a cold winter, and I woke up to hundreds of dead kittens. (Tanenbaum)

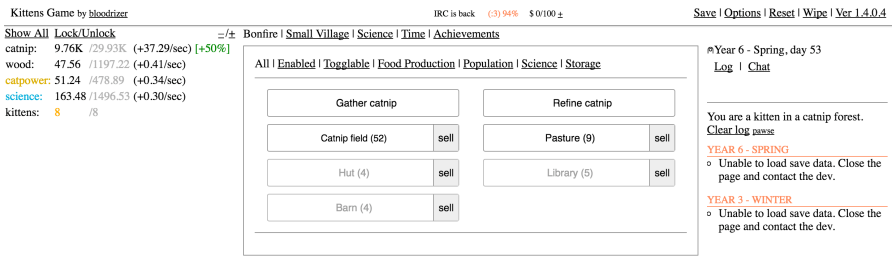

Figure 7. The building phase interface shows the available buildings that can be built and the number of owned buildings. A player can buy and sell the available buildings. Each building is categorized into either Food Production, Population, Science, or Storage.

Building Phase: The building phase is characterized by the ability to create multiple buildings with multiple purposes, opening a range of choices to the player. Buildings are constructed on the Bonfire tab (see Figure 7). As described in the automated production phase, the player is incentivized to alternate between accumulating resources and spending them. When the player has accumulated enough resources of the correct types, they can click to build any of the available buildings. For example, a barn needs a certain amount of wood, while a temple needs slabs, plates, gold, and manuscripts. In return, each building acts as a source, entity, or otherwise affects one or more resources (e.g., creates new jobs). Each unlocked building button (even if a building of that type has not yet been built) provides a tooltip to explain what the building does, what it costs to build, and a breakdown of the time to build it, based on present resource production. This information interface supports the player in planning.

> I always activate the interface option that turns a building button red when it requires more resources than my current storage capacity permits. I am happiest when as many buildings as possible are red, because this reduces the number of tasks I need to keep track of. I see "capped" buildings as evidence that I've maximized my production in a given category, which I find inexplicably comforting. (Tanenbaum)

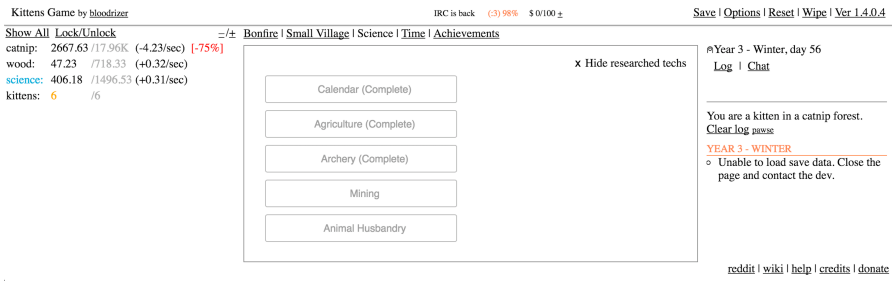

Figure 8. The Science tab at the start of the science phase. Each button represents an upgrade that the player can research. Each upgrade requires one or more resources in order to be researched.

Science Phase: *Technology trees* are a common game mechanic through which the player unlocks sequential upgrades and expands the possibilities for progress (Adams & Dormans, 2012). The *science mechanic* in *Kittens* is one of its multiple technology trees, which affects resource production, unlocks buildings, and allows upgrades to existing buildings[2]. The first technology that becomes available is the calendar. In narrative terms, a calendar enables kittens to track

time; in terms of game mechanics, it adds an indicator to the right column that shows the gameworld day, season, and year.

Science becomes available when the player first builds a library, and is accessible from the Science tab (see Figure 8). Science is an automatable resource and functions like other automatable resources: assigning a kitten to the scholar job produces science; production is affected by the number of science buildings, researched technologies, and random astronomical events; and science can be spent to unlock technologies.

New planning patterns appear in this phase, as there are tradeoffs about which technology to research and when. Some technologies have prerequisites, while others can be researched at any time. In some cases, earlier technologies can make it easier to research others, but players may skip over technologies to advance the game in ways they find valuable (e.g., boosting the capacity of entities to enable more idle time or boosting production to provide immediate value). Additionally, some advanced technologies require non-science resources to unlock, which creates complex dependencies between sources, entities, and technologies.

> Occasionally an "astronomical event" will occur in the game event log. When this occurs, there is a brief window where you can click a button to "observe" the event. Doing so yields a very small amount of science. At one point, early in my play, I found myself obsessively checking this area of the game while idling, waiting for the opportunity to click the button when it appears. It gave me just enough to do that it filled the time that it took to accumulate resources to build the next facility. At some point, I realized that my reaction to this was unhealthy, which prompted me to install a script that would autoclick these events for me. The feeling of liberation that this produced is indescribable. (Tanenbaum)

> I found myself spending most of my play time in the science phase, making upgrades, increasing the science resource capacity, and going through the research tree. After a while, I figured out that I need to balance between all tabs in the game to make significant progress. (Alsaedi)

2.

"technology tree" is a general term, but, in *Kittens*, the Science tab is used to unlock what the game calls "technologies".

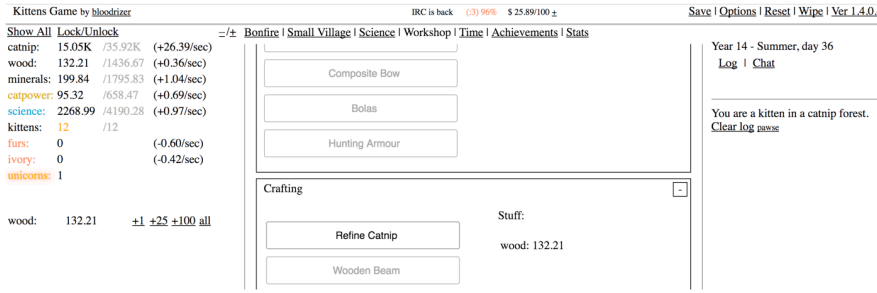

Figure 9. The crafting phase interface under the Workshop tab. Each craftable resource needs one or more resources in order to craft one unit. Each craftable resource has an indicator of the amount available of that resource.

Crafting Phase: The crafting phase enables the player to convert resources into *craftable resources* and unlocks upgrades in the *workshop technology tree*. To begin the crafting phase, the player must have researched the mining technology, built a mine, assigned the miner job to a kitten, and accumulated enough resources to build a workshop. Building the first workshop unlocks the new Workshop tab (see Figure 9), which contains both converter buttons and upgrades.

In *Kittens*, *craftable resources* are those that can only be accessed through a converter. For example, beams cost 175 wood. Wood production can be automated, but beams, at least early in the game, cannot. Building more workshops increases conversion effectiveness by 6%. Craftable resources are needed for more advanced buildings. The gameplay pattern in this phase involves balancing improving converters against improving sources.

The Workshop tab features a technology tree mechanic for *upgrades*, which impact the effectiveness of kittens and buildings. For example, at the start of the workshop and crafting phase, a "Mineral Hoes" upgrade becomes available. When purchased, it gives a 50% boost to the rate at which catnip is automatically generated. Upgrade availability is dependent upon prior upgrades and researched technologies, while purchasing an upgrade typically requires science, craftable resources, or both.

> I found myself paying a lot of attention to the workshop upgrades in the early game, because they were key to boosting production. My upgrade order was dependent on what I needed for my next planned steps. If I was going to need wood, I would get upgrades for woodcutters, if I was going to need minerals, then miners. At the

same time, food production upgrades **always** came first to minimize the chances of a bad winter. (Toups)

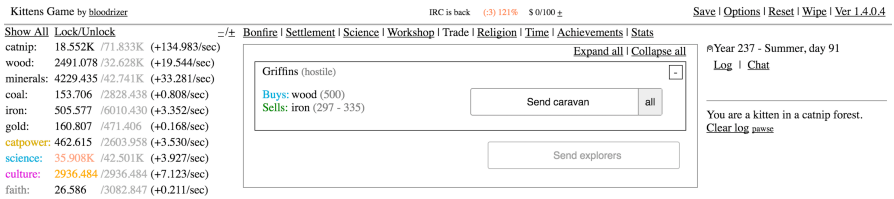

Figure 10. The Trade tab can be used during the hunting phase in order to retrieve rare resources. Each hunt requires a different amount of catpower. In the advance levels of the game, players can send hunters to a number of different races, and in return, the player will get different rare resources.

Hunting Phase: The hunting mechanic is unlocked once the player researches the archery technology and assigns a kitten to the hunter job (Figure 10). Hunters generate the catpower resource, which can be used for hunting and trading. Like other automatable resources, catpower can be accumulated automatically and stored in entities. However, only kittens can serve as sources of catpower. Because buildings can serve only as catpower *storage* entities, the catpower production rate is limited by the size of the player's village.

The hunting mechanic adds a button to the Village tab, as well as a shortcut link on the resources column, which allows the player to hunt. Each hunt costs 100 catpower and produces the *rare resources* furs, ivory, and/or unicorns. In turn, rare resources boost happiness, which improves production. Rare resources are drained by the kitten population. In addition to boosting happiness, the fur resource is essential in later phases, as it can be converted into the craftable resource parchment. Figure 10 demonstrates part of this process. Ivory and unicorns are essential for late-game content, but are beyond the scope of this book.

The hunting mechanic drives consistent player attention, as the furs resource is always being drained and, until late in the game, cannot be automated. Players must use catpower for hunts, then immediately use any furs they desire for crafting parchment and other specialized resources. Only catpower can be accumulated over time and stored in game entities.

The introduction of hunting changed my behavior more than any other game mechanic. I occasionally found myself standing next to the computer, bag packed, ready to leave for the day, waiting for

> catpower to regenerate enough to let me hunt just one more time. The rest of my game resources would be better off if I went home and didn't interact with the game for a few hours, but not this one. (Hammer)

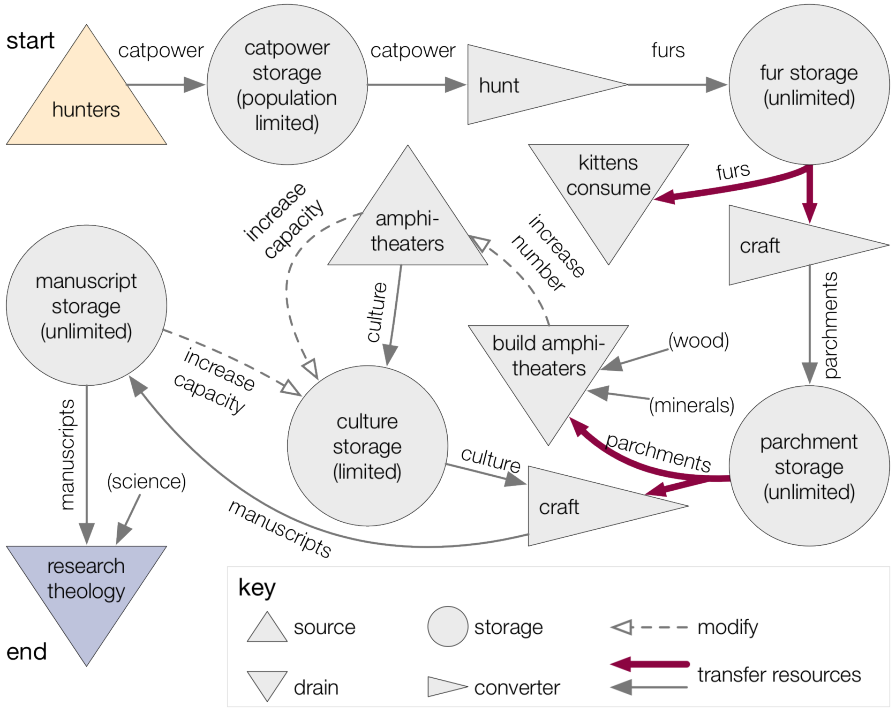

Figure 11. Researching theology process diagram starts with hunters and go through different stages of producing resources, increasing storage space, and converting resources. The red arrows indicate the interlocking system, in which the player needs to optimize resources to avoid a bottleneck situation.

Theology Phase: As the player progresses through the science technology tree, they encounter theology. Researching theology is challenging due to its reliance both on manuscripts and on the culture resource. In the early phases of the game, culture is produced only by the amphitheater building, and is produced at very low rates. Culture, therefore, incentivizes idling. However, manuscripts are made from parchment, which can only be produced through regular interaction with the hunting mechanic (see previous section). In the face of this tension, players must evaluate how often, and for how long, it is valuable for them to play.

The game puts additional pressures on the player's decision by creating an interlocking requirement system. Amphitheaters produce culture and require manuscripts; manuscripts require culture and can be used to build amphitheaters. Figure 11 diagrams the relationships, highlighting the interlocking requirements. Players must optimize their investment in different portions of the interlocking system, for example by deciding when to build amphitheaters to produce culture, and when to build workshops that improve parchment and manuscript conversion rates. Simultaneously, the player must be attentive to ensure hunts are run, and that furs are used for their planned purpose before the kitten population drains them. Once the player researches theology, the game adds a Religion tab and introduces a third technology tree, which focuses on accumulating and spending the faith resource.

> As I started to experience a slow progression in the game, I found that theology was the next big step to take in order to progress further. Theology has some fairly steep requirements, I dedicated a whole day just for it. I set up my phone calendar with reminders to play the game. I had to remind myself to go back to the game and execute my plan, I was afraid I would end up spending resources on other unnecessary upgrades. When the reminder went off, I went through a cycle of crafting more manuscripts, sending hunters to get furs, and improving catpower. When I finally researched theology, I felt for the first time since playing the game a strong sense of accomplishment. (Alharthi)

> Despite the overt narrative of sun-worship, many of the Religion upgrades are based on Christian concepts, such as Templars and Basilica. I was disappointed that even in a catnip forest, Christianity appears to be the norm. If I could have effectively played the game without engaging the theology sub-system, I would have. (Hammer)

> I was turned off by the Religion part of the game, and there is even a special Challenge mode where you play without the Religion component (Atheism Challenge). Unfortunately, the game provides a lot of mechanical incentive to engage with it (production boosts all around), so I haven't yet figured out how to viably play without it. It's telling that it is a Challenge mode! (Toups)

Event Monitoring Phase: Astronomical events occur randomly in the game, which makes a button "Observe the Sky" appear; if the player clicks in time,

they gain a rare starchart resource. Starcharts are needed to progress into the midgame. At the start, starcharts are produced only by monitoring and responding to astronomical events. The observatory building has a small chance of automatically responding to an event and the later SETI workshop upgrade automates it completely.

The event monitoring phase is noteworthy because it marks a time during which the game changes its idle behavior. While random events will eventually accumulate enough starcharts to progress, this phase is completed much faster when the player actively monitors for events to click.

> This was kind of a frustrating part of the game. When I finally got the hang of **not** playing *Kittens*, it asked me to play pretty close attention to it for random events. These events are actually a critical phase of play, blocking you off from reaching any late-mid content until you generate enough starcharts. I was very excited to find the SETI upgrade and, in all of my later playthroughs, it is my main target. (Toups)
>
> I was never short on starcharts, so I never experienced them as a bottleneck. Instead, I enjoyed the astronomical events as a low-key distraction from the often-complicated work of planning my progress. It reminded me of the good old days of the early game, when all I had to do was click. (Hammer)
>
> The event monitoring phase is noteworthy because it marks a time during which the game changes its idle behavior. While random events will eventually accumulate enough starcharts to progress, this phase is completed much faster when the player actively monitors for events to click.

4

Metaphases

Going Beyond One Playthrough

In the previous chapter, we discussed a selection of play phases. However, the NG+ mechanics mean that play phases fit into a larger framing of *metaphases*, which describe the overall trajectory of gameplay across multiple playthroughs. The metaphases are *play*, *bottleneck*, and *reset preparation*; these occur in a repeating loop that concludes with a reset event and a return to the play metaphase. In the play metaphase, players participate in game phases. In the bottleneck metaphase, they find themselves blocked from critical activities, which can lead either back to play or to reset preparation. In the reset preparation metaphase, the player optimizes resources and expends any savings to maximize the benefits of a reset. Finally, the player resets and returns to play (see Figure 12).

Play Metaphase: Most of the player's time is spent in the *play metaphase*, during which s/he engages with the game mechanics of the various play phases described previously. However, *Kittens*' internal game economy is built such that progression within the play phase is harder the more economy components are in play. This difficulty is primarily generated by price ratios, which mean that successive builds of the same building cost more resources, and by entity capacity limits, which set limits to how much of a given resource can be stored.

The player is never forced to leave the play metaphase, as they can leave the game idle for as long as desired. However, the player typically reaches a point at which they can make no further progress given their current game state, but additional game content is still available. For example, the player might reveal an unaffordable new technology or learn from the wiki about game elements that they cannot even unlock. The player may also decide that

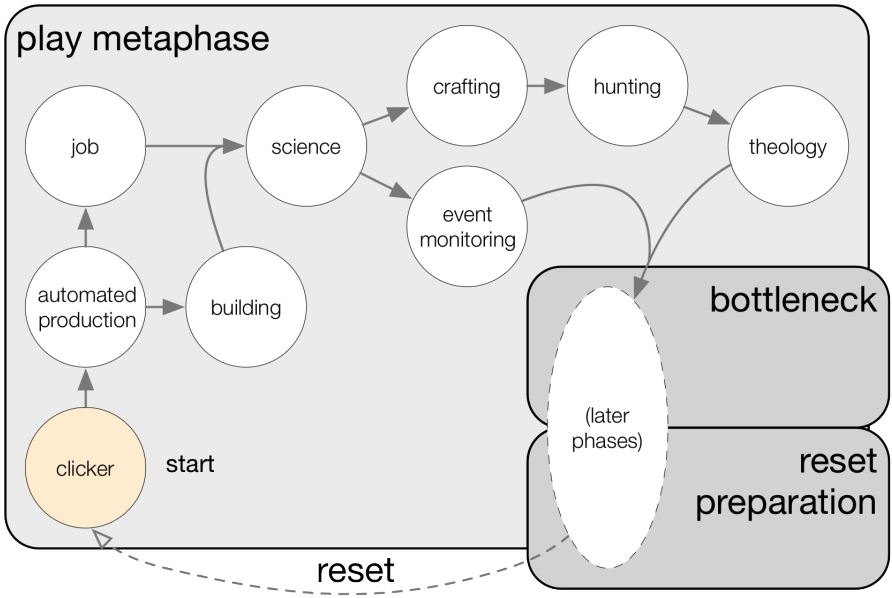

Figure 12. The early game phases along with prerequisite play phases in the context of metaphases. The game starts with the clicker phase and progresses through phases described here and beyond. The player can reset the game, which erases most resources, buildings, and accomplishments, and starts the game again from the clicker phase. However, special resources are carried over between games.

they are impatient with the idle times required to progress, even if they could theoretically move forward. In these and other cases, the player has reached the bottleneck metaphase.

Bottleneck Metaphase: Typically, a bottleneck occurs when the resources needed to accomplish a particular goal exceeds the player's ability to store those resources, patience to accumulate those resources, willingness to accept the tradeoffs required to advance, or all three. For example, each item in the science technology tree requires more science than the previous, so, the player needs to: [1] build science-storing entities (e.g. academies) and [2] generate science at a faster rate (e.g., unlocking workshop upgrades, allocating kittens to the scholar job). Each of these goals impacts and is impacted by other choices. Kittens allocated to scholarship cannot perform other tasks, and building an academy requires resources such as wood and minerals that could be used elsewhere.

Bottlenecks can occur at any phase of the game with resources that are limited by storage space. They also can occur when a player is impatient and does not

want to wait for resources to accumulate. For example, unicorns are not limited by storage space, but it takes a long time to accumulate enough unicorns to purchase unicorn pastures. The game provides visual aids to help the player identify when a bottleneck can be resolved. For example, hovering over a resource's production rate shows how long it will take the resource to reach its cap. Similarly, tooltips on buildings show how long it will take to accumulate the resources required for building. When a resource storage space is insufficient and cannot store more resources, the resource information changes in color. This helps players better understand how long it will take to accumulate enough of a desired resource to take their next action, and evaluate whether they should invest in more rapid production or in increasing their storage space.

> In the later stages of the game, the resources that bottleneck production almost all required me to do some active reallocation of the kitten population into different specialties, in order to craft rare elements, or engage in trades with civilizations that only appear periodically. These end-game activities come with some risks, as it was possible to overextend my civilization while pursuing specialized goals, and then forget to reset the population to a maintenance mode capable of surviving harsh winters. (Tanenbaum)

Throughout the game, players run through a cycle of accumulating resources, reaching resource capacity, and increasing resource and production capacity. In other words, players often encounter bottlenecks, resolve them, and return to play. However, players can also discover that a bottleneck is either *unresolvable* or *unacceptable*. In an unresolvable bottleneck, the cost of an entity that would increase the player's storage capacity is greater than the player's total storage capacity for that resource. The player simply cannot progress. In an unacceptable bottleneck, the wait time to accumulate resources, including the resources needed to accelerate the production process, is unacceptable for the player in question. They may also be unwilling to engage in needed optimizations. These bottlenecks can typically only be resolved with a reset of the game. Once the player makes the decision to reset, the *reset preparation metaphase* begins.

Reset Preparation Metaphase: The reset game mechanic (i.e., NG+) enables the player to restart the game, trading existing buildings and resources for benefits in the next game (see Figure 13). Because the benefit of resetting

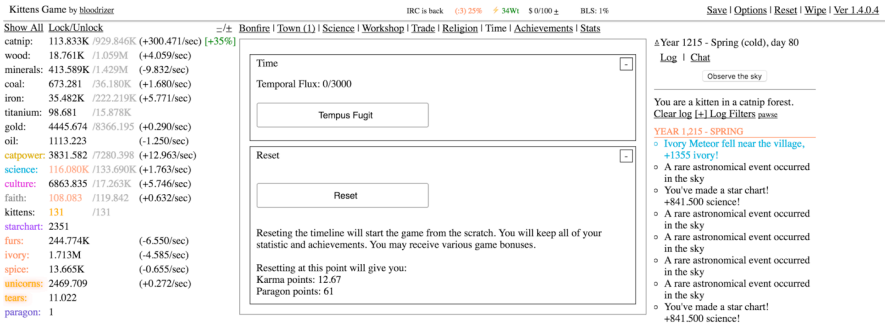

Figure 13. The Time tab, in which the player can reset the game. The game interface shows the amount of karma and paragon points the player will carry with him to the next playthrough after resetting.

is dependent on game state, players may optimize state prior to a reset, maximizing value. For example, the number of kittens in the game at the time of the reset translates into meta-resources such as karma and paragon (see below). Because they are planning to reset, players no longer need to balance kitten population against catnip. Instead, they can maximize purely for kitten numbers and reset the game before winter arrives. Additionally, there are multiple workshop upgrades that allow the player to build cheaper housing for kittens. Each upgrade offers a major increase in number of kittens, so a prime reset time is shortly after purchasing, and fully benefiting from, such an upgrade.

Once the player is fully prepared, they click the reset link, in the upper right of the screen, confirm the choice through a dialog box, and return to the clicker phase.

Resetting: Resetting erases most resources, buildings, and accomplishments, and starts the game again from the beginning (Figure 13). However, special resources are carried over between games, which affect the dynamics of gameplay. The first two special resources available are karma and paragon, both of which depend on the number of kittens in the village at the time of reset. Karma trades kittens for a happiness bonus, while every paragon point increases the production rate of all sources and the storage capacity of all entities by 0.1%. Players may also spend paragon points in a special paragon technology tree, which includes other types of bonuses that persist across resets[1].

1.

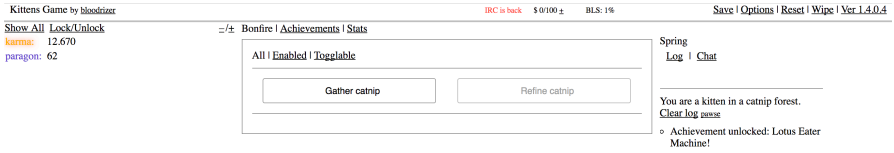

Figure 14. The opening phase after resetting the game, with most resources, buildings, and accomplishments erased and the game start again from the beginning. Resource information on the left column shows the amount of karma and paragon resources available.

Play Metaphase After Reset: After resetting the game for the first time, the game interface will be restored to the original interface with two extra resources: karma and paragon (see Figure 14). The gameplay pattern follows the same pattern as early play, including transitioning from the clicker to the automated production phase. However, because of the bonuses from the reset, players transition between phases more quickly on each successive playthrough and are able to advance through more game content before reaching the bottleneck metaphase.

The game also features other bonuses from the reset option. For example, iron will mode.

Figure 15. This figure shows a full game progression that starts from the beginning of the game (A), to an intermediate level (D), to an advanced level (H). Each player experience moving through these levels differently based on the player's choices and decisions.

5

Playstyles and Playfulness around Kittens

Kittens is played with e e exact same rules, however, these rules mean different things to different people, and those differences contribute to their unique *playstyle*. Playstyle here not only refers to ways in which players manage the in-game resources, but also the "always on" nature of the game and out-of-game resources. Those out-of-game resources include calculating build-orders, reading wikis and forums, waiting for resources to accumulate, and talking with friends about the game. All these elements contribute to the game we play that occurs on the periphery of the actual game, which is referred to as the *metagame* or *paraplay* (Boluk & Lemieux's, 2017; Downs, Vetere, & Howard, 2017). Garfield (2000) defines metagame as "how a game interfaces with life", which is made up of four elements: *what you bring to a game*, *what you take away from a game*, *what happens between games*, and *what happens during a game*. Salen and Zimmerman (2004) combined the different elements of metagames and define it as "the relationship between the game and outside elements, including everything from player attitudes and play styles to social reputations and social contexts in which the game is played." (Zimmerman, 2004, p. 481). In this chapter, we reflect on our playstyle and unpack our individual metagaming practices around *Kittens*.

> I was highly motivated by not losing kittens. If I had lost even one kitten, I would likely have quit the game. The idea of losing all my kittens was also making me reluctant to reset the game, although by the time I stopped playing I was clearly approaching a resource bottleneck. (Hammer)

> My focus was always on not losing kittens (except when I was trying to get all the achievements I thought were achievable; achievements override play sometimes!). This means I always put a lot of focus on farming, because I want that part of the game to run smoothly. I also

> did the Winter Is Coming Challenge specifically because it makes later play throughs have less-harsh winters (and, thus, kittens are less likely to die). With my kittens safe, I otherwise focus on expanding the technology tree. A real key part of this game, for me, is seeing what is new. I would always try to explore the game space without resorting to outside resources, at least not until later in the game. (Toups)

The "always on" nature of *Kittens* and incremental games, in general, raises questions around the boundary between play and non-play. In most digital games, players set aside time and/or space to engage with the game where the game expressly takes attention, sometimes for extended periods of time: players need to step into the *magic circle* of the game. The magic circle here refers to the temporal and intangible bounds of play (Huizinga, 1955). When players switch into and out of a game activity, such as by leaving play to check their email, they are moving in and out of the magic circle. However, in *Kittens*, idling is playing. As long as the game is idling in the background of their daily activity, there is no clear demarcation for when the player is playing or not. Montola et al. describe situations like this in terms of "temporally expanding" the magic circle (Montola, Stenros, & Waern, 2009).

> I found the *Kittens* game quite distracting; often I would want to look at it and think about my plans, or check to see if one of the meters had refilled. I therefore tried to check on them first thing, set up some actions that would take a few hours, and then move on to something else for the remainder of my deep work time. I would sometimes have time to check on my kittens between meetings, particularly if I was holding meetings via Skype in my office. Kittens check-ins replaced time I would otherwise have used to read 1-2 emails – and while it might be less efficient, it was certainly less stressful. (Hammer)

> As I started playing *Kittens*, I realized that having the game running all the time on my laptop was not a good idea. I get tempted to check on the game constantly even though I'm just looking at the interface, waiting for resources to accumulate with no other meaningful choices available, I'm just looking at the numbers go up and planning my next move. (Alharthi)

Success in *Kittens* means spending less time interacting with the game itself and more time waiting – what we call a *play less / plan more* approach to gameplay. During the waiting / idling periods, players interact with the game differently. The metagaming becomes central to the gameplay. Players use a range of techniques to structure the waiting periods between play sessions, during which they are neither clearly playing nor clearly not-playing. Players during these periods are metagaming by moving away from the actual game in order to seek tips from out-of-game resources, plan future moves, or express their joy or frustration from the game.

> I used the official game wiki to understand the next few technologies or workshop items that were not yet unlocked, so I could better predict the impact of investing in the items that were available to me at the time. (Hammer)

> Whenever I'm waiting for resources to accumulate, I usually go to the game official wiki and check what is next, check the Reddit page to see how other players managed to complete the stage of the game I'm in, and then return to the game to continue playing. (Alharthi)

> I used to keep an eye on the official Reddit, mostly to see if there was anything new. Relatedly, I occasionally save and reload the page to see if there's been an update. I eventually opened up to using the official wiki if I got stuck, or if I needed to think about a long-term plan in the late game. In the early game, I almost completely stayed away from the wiki! I wanted to make sure there were no spoiled surprises! (Toups)

> Usually I don't check out-of-game resources during play, I like to explore technologies, workshops resources and depend on the explanation provided in the game. Sometimes, I feel myself stuck at some points and couldn't make progress or confused at some resource that I couldn't figure out how to increase the production for it. So, I will look for more information out of the game such as the official wiki and the Reddit. I will encounter information about other resources too that will affect my play based on the knowledge I gained. Also, I check out of game resources when I want to reset the game to make the most benefits out of the resetting step. (Alsaedi)

Because *Kittens* is typically played on a web browser, in which most of the gameplay involves leaving the game progress by itself with minimum interaction. Players may end up with multiple instances of the same game in different contexts. Each player has his/her own practice around selecting devices and browsers for gameplay, some have multiple instances of the game, others relay on saving and exporting functionality (see Figure 16).

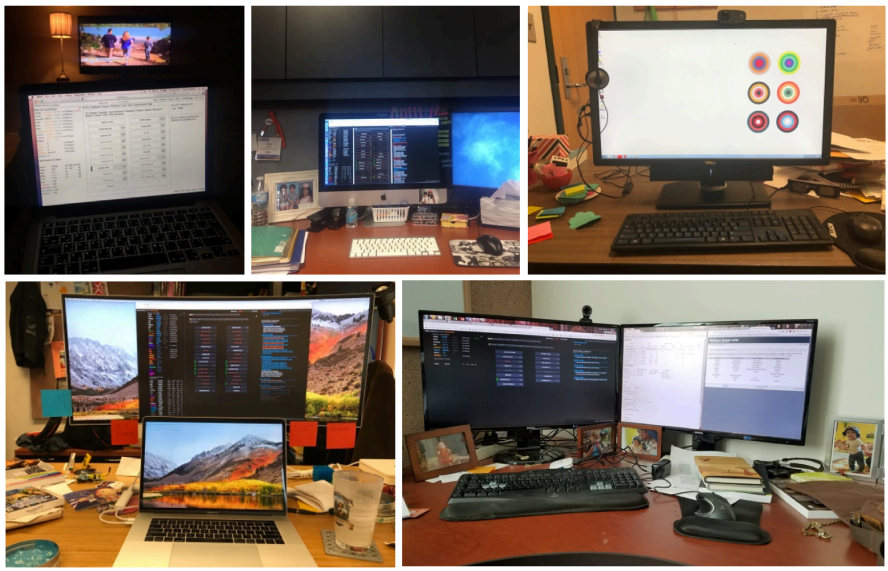

Figure 16. The different ways in which the authors setup the Kittens games on their computers. Although most authors play the game in their office computer, due to the nature of their work, looking into other incremental game player's practices on setting up their games might uncover more insights into the pervasiveness of incremental games.

> I set up a separate browser on one of my two office computers – not just a separate browser window, but an entirely separate browser. I periodically exported my save game, but I was reluctant to use it to move between devices. At first I thought I would play on both my office computers, but I didn't want to move my save game so I just picked one. As it turns out, this was the right call. I had to restart my office computer, so I exported my game before closing the browser. After the restart, it told me that my file was corrupted; I had one previous save that did not work either. I could not retrieve my game. I was highly demotivated and did not want to start playing again. (Hammer)

> Checking on the game became a problem for me. It was easy to set up in the background, but I eventually found myself pulling out my work laptop at home to play a little in the evenings. Around the time I was playing, I also changed my work processes to have multiple user accounts on my computer, enabling me to separate out personal computing from work computing, so I put Kittens on the personal account, which I kept closed while at work. Unfortunately, this meant I was not progressing during the day. The second iteration of using multiple accounts had me create a maintenance account for running processes essential to all of the other accounts (e.g., Dropbox, OneDrive). This became the home for Kittens, and, later, all of the other idle games I keep running. This enables me to keep them in a separate space from normal work and personal activities. The other major change has been a shift to manipulating the very late game after a number of resets. I've gotten the game to a point where I plan to reset again…sometime, but I no longer feel compelled to. Maybe I'll just let it run long enough to finally reach the last star after 30,000+ game years! (Toups)

Although waiting is central to *Kittens* and incremental games in general, it can be cognitively costly when returning to the game. Players must remember plans between sessions, assess the game state upon return, then carry out a plan. Thus, players use different techniques to remember their plans, assist their physical ability to check on the game, and divide their time and attention.

> I did not write down my plans for the game in any form. I remembered them entirely mentally. Typically, I would create a mnemonic related to a resource or to some item in the game. For example, I would often be waiting for a critical resource (e.g. iron) to fill up. I would make a little rhyme or joke about the word iron and the thing I wanted to spend it on. This worked relatively well. Usually I remembered, and if I didn't, I trusted that I could work out the plan again from first principles rather quickly. By this I mean not strategic first principles, but rather from my own sense of what I preferred to buy. I would always look at the workshop or new technologies first, and only then consider buildings; if filling a key resource took more than twelve hours, given my opportunities for actually playing the game, I would build toward reducing that time. By following these basic principles, there were rarely more

> than a few reasonable choices, and once I had it down to those I almost always remembered what I had originally intended. The only complication was when there was a strategic reason not to follow my heuristic principles, e.g. to build a building before a workshop upgrade. Then I really had to work to remember it. In retrospect it's odd that I never even thought about writing my plans down! (Hammer)

> For planning, I really just used my memory. This was fallible, but it never occurred to me to try to store the plans somewhere. I would occasionally go, "Alright, next I need to do X, then Y, then Z" then I'd come back the next day and spend hard-earned resources on the wrong thing and then kick myself. Through this process, I also learned that the "undo" button normally did not do anything. (Toups)

> In order to remember any important plan, I setup a reminder on my phone after the play session and write a short description of what should I do next. I assist the time needed, I set up a timer for the reminder, and when the reminder goes off, I carry out the plan as soon as I can. (Alharthi)

The unique playstyles and individual metagaming practices of the authors show how incremental games players are most likely to observe and attend to the details of the experience differently. This is further caused by the long-term nature of micromanagement incremental games like *Kittens*, in which the game lasts for months and years (Alharthi et al., 2018). Some of us played the game as a "protector" of all kittens, making sure they do not lose any of them, even if that means not progressing further in the game or receiving achievements. Others played the game as "explorers", playing without resorting to outside resources such as the game official wiki to make sure there were no spoiled surprises and to uncover all the aspects of the game by themselves. The authors also used different techniques to keep track of their plans from simply remembering what their plans are and trusting their memory to setting up reminders on their phones. This unique relationship between the "player", "the game", "the outside resources" and the game's "social context" show how incremental games might appeal to different types of players (Salen and Zimmerman, 2004; Yee, 2016).

6

Conclusion

The Pleasures of Playing Less

The play of *Kittens*, when the player is actively engaged, involves balancing the production of multiple resources, creating the opportunity for idle time (e.g., optimizing production, developing storage through entities), identifying optimal idle times (e.g., assessing time until the next build, monitoring for random events), balancing tensions when there are conflicting needs for resources (e.g., the need to make manuscripts), and exploring a slowly expanding possibility space (e.g., opening new tabs, unlocking new technologies). A central challenge in *Kittens* is to balance between production rates, cost, and entity capacity. Early in the game, production rate exceeds costs, but eventually cost becomes excessively high. This exponential growth in costs occurs because the cost of new growth is proportional to current value. In incremental games, this type of growth is used to ensure that player progress slows down with time and balances the game. The time the player must wait to purchase his/her next building or upgrade increases as choices are made in the game, i.e., as the player actively engages in play. This, in turn, makes the player wait longer between switching from being idle to active, thus playing less.

We posit that one of the pleasures of playing less is in planning, both in-game and outside. As the game progresses, the player is called upon to identify priorities that manifest as short- and long-term plans. However, the player's plans must also include their physical ability to check on the game; the player can optimize their build to allow for more or less frequent game interactions, for example by emphasizing resource production or storage entities respectively, but this optimization is limited by the cost ratio increase. Players' plans can also be affected by how long they are willing to wait between interactions. The longer a player waits between interacting with the game, the more they can do

when interacting with it. At the same time, the value of waiting is limited by the resource capacity of game entities. Additionally, waiting can be cognitively costly because players must remember their game plans between play sessions, assess the state of play, and carry those plans out.

Early experience of *Kittens* followed the expected pattern for non-idle games: attempting mastery through extended play. Yet, unlike non-idle games, *paying extended attention to an idle game is to play it poorly*. We often found ourselves developing out-of-game strategies to enforce playing less, such as only playing the game on a particular computer or a particular account. In developing discipline and effective play strategies, in-game decisions that required time and/or cognitive load were put off for more important work (or play) until attention is available; in the meantime, the game would idle. Well-designed idle games do not penalize the player by demanding attention. A player who idles for too long may forgo opportunities to acquire new resources, but typically does not place their existing successes at risk.

Fans of *Kittens* have developed scripts (Bloodrizer, 2017c) to automatically interact with the game on behalf of the player, pushing the notion of playing less to an extreme. At one end of the spectrum, scripts can automatically respond to events or craft resources; at the other end, spreadsheets support planning and making optimal choices about progression (e.g., PoochyEXE, 2015). These scripts reduce the need to track state and, even, play, offering a form of prosthesis. Although scripts are not necessary, they simplify progression. Many of these scripts and spreadsheets are disseminated by the game's developer (e.g., Bloodrizer, 2017c), suggesting that they are understood as a legitimate approach to play.

> I think I might be the only one of my co-authors who gave in and started running the "Kitten Scientists" script. This script allows you to automate building, crafting, trading, hunting, praying, star observation, and more. I resisted installing this for a while (it felt like cheating), but as the game progressed my playstyle evolved away from micro-managing, and it eventually felt like the next natural step in my relationship to the game. With Kitten Scientists installed, my gameplay became more oriented towards fine-tuning the building and crafting thresholds to try and maximize the number of resource "capped" buildings in my interstellar kitten empire. This produced an interesting inversion of the game's progression mechanisms: as I approached a new bottleneck in production, the number of choices

> available to me would steadily decline, until eventually I'd be constrained to only a few valid actions. I experienced this diminishing of choices with a sense of accomplishment, as it signified that I'd maximized the possibilities at that level of the game. Once I'd started down this path, it wasn't long before I was also using player-created calculators to determine optimal build orders for the Unicorn related buildings, and other similarly complex calculations. This further diminished the number of active decisions that I needed to make, and allowed me to focus more closely on meta-play strategies around resetting the game. (Tanenbaum)

Through our close reading of *Kittens*, we have come to identify gameplay as consisting of various metaphases and play phases. Each phase shift modifies available game mechanics and changes the way in which players approach planning in gameplay. As gameplay progresses (e.g., Figure 15), the game tends to need shorter and shorter periods of engagement and longer and longer periods of idle time. In this way, players can optimize how the game fits into their day-to-day lives (Ruffino, 2016).

While many games reward patience and planning, incremental games, like *Kittens*, move these practices from the periphery of game play to the center. In doing so, these games force us to reconsider many aspects of games that have been central to the discourses and debates of game studies. Definitions of "interaction", for instance, have been heavily contested since the earliest days of the field. With a few notable exceptions, such as Zimmerman's four modes of interaction (Zimmerman, 2004), most approaches to interaction emphasize the *actions* of the player as the central unit of analysis (Aarseth, 1997; Crawford, 2003; Juul, 2005; Murray, 1997). As we progressed through the phases of *Kittens*, interactions with the game-as-software-system were spread further apart, while activities like interaction with the game's wikis, online communities, and other support infrastructures became essential.

In *Kittens* the "game" slowly recedes from the player, while the "metagame" becomes more and more central. This shift in player activity and attention also subverts discourses of the "magic circle", as the practices of play more frequently occur outside of the bounded space of the game. In this sense, *Kittens* comes to operate according to logics of *pervasive games* where the notion of the "play session" is subverted, and the possibility for play forever threatens to impinge upon daily life (Montola, Stenros, & Waern, 2009). This pervasiveness can

produce significant pleasure, but it can also become a burden: one of the authors found himself recommending the game via a sort of "reverse psychology" strategy of warning friends and family to avoid *Kittens* at all costs. "This game feels like it was sent back in time from a dystopian future to disrupt our current civilization," he warned a class of graduate students, but then proceeded to open and play the game as part of the ongoing discussion.

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