Build It to Understand It: Ludology Meets Narratology in Game Design Space

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ABSTRACT
Building experimental games offers an alternative methodology for researching and understanding games, beyond what can be understood by playing and studying existing games alone. Through a simultaneous process of research and artmaking in the construction of the interactive drama *Façade*, new theoretical and design insights into several game studies questions were realized, including the hotly debated question of ludology vs. narratology. This paper describes some of the ways that building games can inform researchers about what game scholarship should be focused on and why, and ways that building games can offer new perspectives on existing forms and genres.

Keywords
ludology, narratology, agency, games, design space, wicked problems

INTRODUCTION
A primary goal of the emerging field of game studies is to understand the form and structure of games: what are the features of games, how are these features organized, in what ways do they combine to create different types of games. Usually this means analyzing games that have already been built. By constructing taxonomies and morphologies of existing games, researchers can map out game design spaces, identify the boundaries of game design, and help delineate which interactive experiences are and are not games.

The process of understanding the form and structure of games can include identifying and characterizing features of games that are pleasurable and rewarding to players. In this way, game studies can play an important role in informing the development of new games. For example, one such pleasurable feature of games is *agency* [26] – meaning the player has actual, perceptible effects on the virtual world – a term beginning to be used by practicing game designers [14].

Of course, some game scholars may have no intention to contribute to the design process of new games; they are studying games purely for the sake of understanding them. Yet it is possible that a deeper understanding of the form and structure of games could become a useful set of tools for game designers, even offering prescriptive arguments, at least indirectly, for what features make games successful, or are feasible to implement.

However if game studies is limited to analyzing existing games and design spaces, it can be problematic to imagine or theorize about potential game features outside of these design spaces. Models about the nature of games and their features run the risk of being incomplete or wrong, simply because certain design spaces have not yet been explored. Further, it may be risky to "wait" for commercial game developers to venture into unexplored design territory to serve as fodder for game studies research, because developers' motivations are heavily biased by economic and marketing concerns. That is, certain regions of design space may get little or no exploration if they don't result in money-making AAA titles.

In this paper we argue that building games, informed by the analysis of previous games, can play a key role in game studies. Building games within *already* sampled regions of design space provides a more complete understanding of these regions, without relying on only what commercial game developers happen to provide. Building games that explore *new* regions of design space helps uncover game forms that commercial developers have not yet ventured into, and allows us to directly experiment with some of the more vexing questions in game studies, helping the field avoid making taxonomic and prescriptive errors.

A STALLED DEBATE

Among the current open questions in game studies, we are concerned in particular about the present state of the ludology vs. narratology debate, that is, the long-debated conundrum: can gameplay and narrative combine, and to what extent do games and narrative overlap? Currently among game scholars, often referred to as ludologists, there is a sense of fatigue or malaise about this question [13, 12], or claims that the debate never took place [10]. The debate has been sterile, primarily abandoned with no satisfactory progress. While it seems ludologists have largely retreated from "radical" positions they may have held – the extreme position being that games, in their purest form, have nothing at all to do with narrative – we fear that the status-quo position is only marginally different.

Our concern is that ludologists believe that games are uniquely agency-rich experiences, and while games can include narrative, explicit in-game narrative can at best only play a superficial role, e.g., as a largely linear layer on top pure gameplay. If pushed, a common ludological position may be that narrative is fundamentally incompatible with agency, a primary pleasure of games, and therefore is inherently less fundamental to the game experience. Based solely on the unsuccessful efforts to date of game developers to build agency-rich narratives, this is not an entirely unreasonable conclusion for ludologists to draw [2].

Player agency lies at the heart of the tension between games and narrative, and it is precisely here where building experimental, agency-oriented games is especially adept at resolving this tension. In the design and engineering of *Façade* [22, 23, 24, 25], we explicitly wanted to push on the question of the compatibility of agency and narrative. This meant both creating an architecture that affords the authoring of non-linear, player-responsive narrative performed in

real-time, and implementing a small but complete, high agency *interactive drama* within that architecture.

Here we present *Façade* as a case study of building a game that more deeply explores agency and narrative, and discuss how it responds to ludological arguments on this topic. Following this, based on our experimental results we will attempt to draw more general lessons about what building games can offer game studies.

BUILD IT TO UNDERSTAND IT

To focus *Façade* on the core of the ludology vs. narratology debate, it was important that it have enough of the requisite characteristics of games *and* drama to be considered both.

Like contemporary games, *Façade* is set in a simulated world with real-time 3D animation and sound, and offers the player a first-person, continuous, direct-interaction interface, with unconstrained navigation and ability to pick up and use objects. More importantly, as in successful games, the player is intended to have a high degree of agency. A player has agency when she can form intentions with respect to the experience, take action with respect to those intentions, and interpret responses in terms of the action and intentions; i.e., when she has actual, perceptible effects on the virtual world. Player agency can be further classified into local agency and global agency. Local agency means that the player is able to see immediate, clear reactions to her interaction. Global agency means that the long-term sequence of events experienced by the player is strongly determined by player interaction; that is, what the player does in the moment should strongly influence which significant events or plot points occur in the future. Also, as in games, the player should be able to discern the underlying rules of the simulation, and have the option to pursue winnable conditions, achieved through the use of agency-oriented action.

Like drama, particularly theatrical drama about personal relationships such as *Who's Afraid of Virginia Woolf?* [3], *Façade* uses unconstrained natural language and emotional gesture as a primary mode of expression for all characters, including the player. Rather than being about saving the world, fighting monsters or rescuing princesses, the story is about the emotional entanglements of human relationships, specifically about the dissolution of a marriage. There is unity of time and space – all action takes place in an apartment – and the overall event structure is modulated to align to a well-formed Aristotelian tension arc, i.e. inciting incident, rising tension, crisis, climax, and denouement, independent of the details of exactly what events occur in any one run-through of the experience.

Narrative Incompatibility?

Before describing the nature of *Façade*'s game design and system architecture, it is useful to further describe the debate over agency and narrative as we understand it. Those who argue against games with narrative agency point to a supposed predetermined or predestined nature of narrative – that strong narrative structures have complex sequences of cause and effect, complex character relationships and sequences of character interactions. Since player interaction can at any moment disrupt this narrative structure, the only way to maintain the structure is to remove or severely limit the player's ability to affect the structure. This effectively eliminates global agency, forcing the player down a predetermined path. Thus, ludologists may argue that narrative must inevitably mean a diminishment in player agency, and cannot be an integral part of high

agency game design. That is, narrative cannot operate at the heart of a game; at best it can be a relatively simple layer above the core gameplay action.

Furthermore, some ludologists argue that narrative is fundamentally inconsistent with interaction, since for them, narrative refers to a completed temporal structure, while interaction refers to a potential temporal structure – the trace produced by interaction. A pro-story response is that interactive stories should not contain a single completed story line, but rather a potential story space, where the trace of any one player experience carves a particular story trajectory through this space. A ludological response to this may be to claim that such a story system is technically impossible, as it would require better-than-human generative AI to build [1, 11].

"Head games": simultaneous game and narrative

Because the mechanics of game agency are well understood and reasonably straightforward to implement, today's most pleasurable high agency interactive experiences are games. Player moves such as running, jumping or shooting, playing a card, or moving a pawn directly cause scores, stats, levels or abstract game-piece configurations to change. (Simulations of physical environments and resource-bound systems have more complex state, but can still be represented numerically in understood ways.) However to date, a high agency interactive story has yet to be built. Existing game design and technology approaches, that focus on the feedback loop between player interaction and relatively simple numeric state, seem inappropriate for modeling the player's effect on *story structure*, whose complex global constraints seem much richer than can be captured by a set of numeric counters or game pieces.

Our solution to this long-time conundrum is to recast interactions within a story world in terms of abstract *social games*. At a high level, these games are organized around a numeric "score", such as the affinity between a character and the player. However, unlike traditional games in which there is a fairly direct connection between player interaction (e.g. pushing a button to fire a gun) and score state (e.g. a decrease in the health of a monster), in our social games several levels of abstraction may separate atomic player interactions from changes in social "score". Instead of jumping over obstacles or firing a gun, in *Façade* players fire off a variety of *discourse acts* in natural language, such as agreement, disagreement, praise, criticism, flirtation and provocation. While these discourse acts will generate immediate reactions from the characters, it may take story-context-specific patterns of discourse acts to influence the social game score. Further, the score is not communicated to the player via numbers or sliders, but rather via enriched, theatrically dramatic performance.

As a friend invited over for drinks at a make-or-break moment in the collapsing marriage of the protagonists Grace and Trip, the player in *Façade* unwittingly becomes an antagonist of sorts, forced by Grace and Trip into playing psychological "head games" with them [4]. During the first part of the story, Grace and Trip interpret all of the player's discourse acts in terms of a zero-sum *affinity game* that determines whose side Trip and Grace currently believe the player to be on. Simultaneously, the *hot-button game* is occurring, in which the player can trigger incendiary topics such as sex or divorce, progressing through tiers to gain more character and backstory information, and if pushed too far on a topic, affinity reversals. The second part of the story is organized around the *therapy game*, where the player is (purposefully or not) potentially increasing each characters' degree of self-realization about their own problems, represented internally as a series of counters. Additionally, the system keeps track of the overall story

tension level, which is affected by player moves in the various social games. Every change in each game's state is performed by Grace and Trip in emotionally expressive, dramatic ways, ultimately progressing to one of several endings customized to the particular details of the history of actions of the player. On the whole, because their attitudes, levels of self-awareness, and overall tension are regularly progressing, the experience takes on the form and aesthetic of a loosely-plotted domestic drama.

Figure 1. Grace and Trip in *Façade*, viewed from the player's first-person perspective.

Note that in one important way, *Façade* has the potential to violate a key characteristic of good drama: well-formed-ness. Normally *Façade's* drama manager regularly propels the action forward to enact a dramatically paced, if loosely-plotted, tension arc. In the event that the player acts wildly uncooperatively or crazily, Grace and Trip will attempt to cover up and retain the integrity of the dramatic arc. However, if the player persists in acting overly inappropriately, for believability's sake Grace and Trip are forced to give up and throw the player out of the apartment, ruining the drama, ending it prematurely. This reaction from the drama manager is necessary for true player agency – if players are given an interface with the expressive freedom to ruin the experience, they should be free to do so if they wish.

Richness Through Coherent Intermixing
Even with a design solution in hand for resolving the tension between game and story, an organizing principle is required to break away from the constraints of traditional branching narrative structures, to avoid the combinatorial explosion that occurs with complex causal event chains [8]. Our approach to this in *Façade* is twofold: first, we divide the narrative into *multiple fronts of progression*, often causally independent, only occasionally interdependent. Second, we build a variety of *narrative sequencers* to sequence these multiple narrative progressions. These sequencers operate in parallel and can coherently intermix their performances with one another.

These narrative sequencers, and the necessary supporting infrastructure to expressively perform real-time drama and offer players a naturalistic interface to participate, are parts of a hierarchy of heterogeneous layers of *Façade's* software architecture, listed here from the bottom up:
- procedural and keyframe animation in a non-photorealistic rendering style, first-person user interface using keyboard to speak and navigate, mouse to gesture and use objects
- library of low-level reactive behaviors, e.g., emoting, speaking, gesturing, walking

- long-term autonomous behaviors, e.g., fixing drinks, nervously fiddling with a toy
- joint dialog behaviors (jdb) – coordinated performance of individual pieces of dialog and action, e.g., a line of dialog where Grace accuses Trip of being hypocritical
- natural language processing – convert player's typed text into one or more of ~30 discourse acts, e.g., "nice photo" becomes the discourse acts *ReferTo Italy* and *Praise*
- beats – collections of jdbs focused on narrative goal, e.g. over the course of a minute, at Trip's objection, Grace tries to get the player to disparage their new furniture
- mix-in progressions – short progressions of jdbs designed to mix in to beats at any time, e.g., Trip interjects a response to the player's mention of sex
- discourse management – in order to react to player dialog or action, choose a jdb to integrate into the current performance, based on the current discourse context
- drama management – regularly choose from among a collection of beats, each annotated with preconditions and effects on story tension, to match an overall tension arc

We do not have the space here to further describe *Façade's* implementation; we ask the reader to refer to our recent papers on structuring content, reactive behavior and natural language processing [23, 24, 25].

Preliminary Evaluation

As of this writing, weeks before *Façade* is to be released to the general public, formal user studies of playing *Façade* are just beginning [15]. For now we can offer our own brief analysis informed by anecdotal evidence based on talking to and reading the dialog traces of dozens of beta-testers.

During the production of *Façade*, within our "limited" authoring effort (beyond the building of the architecture, *Façade* required ~3 person years of just authoring, which is more than a typical art/research project but far less than a typical game industry project) we made the tradeoff to support a significant degree of local agency, which in the end came at the expense of global agency. Combined with the reality that the time required to design and author narrative behaviors is substantial, only 27 beats were created in the end, resulting is far lower global agency than we initially hoped for. This points to the need for more generative systems in the future, to achieve more significant global agency in the narrative.

Further, creating a loose, sparsely-plotted story afforded greater local agency, but provided fewer opportunities for global agency. However the richness of content variation, and the at least moderate degree of global agency achieved, does encourage replay.

A major challenge we encountered, that we believe *Façade* falls short on, is always clearly communicating the state of the social games to the player. With traditional games, it is straightforward to tell players the game state: display a numeric score, or show the character physically at a higher platform, or display the current arrangement of game pieces. But when the "game" is ostensibly happening inside of the characters' heads, and if we intend to maintain a theatrical, performative aesthetic (and not display internal feelings via stats and slider bars, a la *The Sims*), it becomes a significant challenge. In our estimation *Façade* succeeds better at communicating the state of the simpler affinity and hot-button games than the more complex therapy game.

Informed by the above experiment, we will next try to understand what building games can offer game studies.

EXPLORING DESIGN SPACE

In any design field it is common to conceptualize built artifacts, whether they are buildings, consumer appliances, or games, as residing in a design space. Every point in design space represents a specific design, including the features and design decisions that compose that design. For the game design space, each point in the space represents a specific game and the specific set of design decisions for that game. Not all points in a design space are of equal value. There are of course many more bad points in design space than there are good ones; if this were not the case, design would be easy.

Design space does not have a nice, uniform structure, making it difficult to explore. The term "space" may conjure in the reader's mind an image of a nice, simple Euclidian space, like the 3-dimensional space that we inhabit. If the game design space had a similar, simple structure, then there would be some relatively small set of completely independent design decisions that would form the axes (the basis vectors) of the space. Design would merely consist of tuning each of these independent knobs to "dial in" different points in design space. In reality design decisions are rarely independent, exist at many different levels of granularity, and take on heterogeneous discrete values.

To make matters even more complicated, the set of all possible design decisions is not defined in advance. Innovative games often innovate by discovering new design decisions and game features that open up a new, previously unknown region in design space. If one were inclined to build a formal model of the game design space, rather than looking like the more uniform spatial structures studied in mathematics, it would look like the search spaces studied in AI, in which a heterogeneous collection of operators (each operator corresponds to a possible design decision) modifies a search state (the search state would represent the design so far), with the added complexity that the system can dynamically invent new operators (AM and Eurisko [17, 18] are classic examples of such a program). But for our purposes in this paper, we're not interested in formally defining the notion of design space, but rather in using the intuitive notion of design space, as it is understood in design science [28], to clarify the role of building games within game studies.

Wicked Problems

Game design is an instance of what Rittel and Weber termed "wicked problems" [27]. For wicked problems, any attempt to create a solution changes the understanding of the problem. That is, the definition of the problem and proposed solutions mutually define each other. (Tame problems, on the other hand, have well-defined problem statements and solution criteria.) Rittel and Weber identify a number of features of wicked problems, including:

- *There is no definitive statement of a wicked problem.* In fact, you do not really understand what problem you were attempting to solve until you have a solution. In game design one may start out with a "problem statement" like "Create a game in which you roll a sticky ball around and pick up stuff" or "Create a game in which you're an unwitting guest at a couple's marital meltdown", but these statements in no way specify well-defined problems. It is only when the game has been built that the real design problem to which the game is a solution is understood.

- *Wicked problems have no stopping rule*. Since there is no well-defined problem, there are no well-defined criteria for having solved the problem. In game design, the process ends when time and/or monetary resources are exhausted, in which case designers make whatever compromises and features cuts are necessary in order to ship the game, or when the game is considered "good enough" given the resources spent, or when the game is cancelled (the organizational reality changes).
- *Solutions to wicked problems are not correct/incorrect but rather better/worse or good enough/not good enough*. Since there is no well-defined problem statement nor stopping rule, there is no way to define a correct solution. Solutions can only be compared relative to each other (better/worse) or relative to a social or economic context (good enough/not good enough). In game design this often means that a new game is judged relative to previous, similar games. This also points to the importance of frequent and early playtesting; in the absence of formal criteria, relative judgments of different designs can only be made empirically.
- *Every wicked problem is essentially unique*. There are no predefined classes of solutions that can be applied to specific wicked problems. There may be heuristics or rules of thumb that help a designer to navigate the design space, but defining the problem and solution as a whole is a unique design challenge. In game design this means that every game presents unique design challenges. Only if a game were essentially a complete copy of a previous game would the problem be tame rather than wicked.
- *There is no immediate nor ultimate test of a solution to a wicked problem*. Solutions to wicked problems generate unforeseen consequences; it is impossible to know ahead of time what all the consequences of a solution will be, nor to know when all the consequences have played out. In game design this means that any specific game can change the nature of the game design space by changing audience expectations, by having unexpected cultural ramifications, and by expanding or changing the notion of what constitutes a game.

For a wicked problem such as game design, exploring design space consists of navigating the complex relationships and constraints among individual design features, while at the same discovering or inventing new features and approaches that expand the design space. All existing games form tiny islands of partially understood regions of design space; all around these islands lies a vast ocean of unexplored potential design space waiting to be brought into existence through the invention of new features and approaches, and mapped out through the hard empirical work of exploring a variety of designs.

Like any craft practice, game design makes use of rules of thumb, case studies, and best practices as a way to manage the complexity of local regions of design space. One of the roles of game studies can be to help map game design space, to develop tools, analyses and languages for navigating this space. Work on game design languages [6, 7], whether based on rules [9], design patterns [5, 16], or the identification of ontological design categories [30], are examples of game studies work that attempt to provide local maps of design space through a principled reflection over previous designs. While such work is valuable, the wicked nature of the game design problem requires that the construction of experimental games play a significant role in mapping game design space. Specifically, making games is required to discover new regions in design

space, to understand the relationship between the game architecture and design space, and to probe the local islands that have already been partially explored through previous designs.

Exploring New Regions in Design Space

By the wicked nature of game design, there are no theoretical frameworks that allow one to formally pose and answer game design problems. To return to the ludology vs. narratology debate, given the game design problem "Create an interactive story in which the player experiences both local and global agency", there exists no theoretical framework that allows one to formally define the problem and solution criteria, determine whether the problem has a solution or not, and, if it does have a solution, generate a description of the solution. Rather, the search for a solution to this problem is simultaneously a search for a problem definition. In this case, the heart of the difficulty defining the problem lies in defining what is meant by "story" and "agency" (and the closely related term "interaction"). While it may be tempting to provide *a priori* definitions of story and interactivity, and from these conclude that interactive story is impossible, or conversely to argue that all games are symbolic narratives or potential narratives (in the sense of being tellable)[1], both positions fail to provide insight into the underlying design space. The first brute impossibility result denies the wicked nature of game design, while the second, permissive notion of narrative makes all games already interactive stories, denying that there is a design problem to be solved.

Alternatively, one might attempt a non-design answer to the ludology vs. narratology debate through an empirical investigation of the relationship between narrative and agency in existing game designs. Certainly from such an investigation one might conclude that narrative, when it exists, is always a linear or quasi-linear structure superimposed on top of gameplay, as described earlier. But of course such an analysis is based only on the tiny islands of design space that have been partially sampled by existing games. The study of existing games tells you little about the vast, unexplored regions of this space. Normative analyses of game design problems which are based solely on *a priori* theoretical frameworks or on an empirical analysis of existing game designs run the risk of being proven wrong tomorrow by a game that samples a previously unexplored region of design space. Theoretical and empirical analyses certainly provide the designer with useful approaches, techniques and vocabulary for thinking about the design problem. But such analyses can never be strongly normative. The only way to explore new regions of design space is to make things. In our case, building *Façade* samples a new point in design space that combines high-agency gameplay and story by structuring interaction around real-time, language-based social games, managing multiple, hierarchically overlapping progressions, and communicating game state via rich, dramatic performance. As a wicked problem, only by actually trying to build an interactive drama could we have ever identified this design region.

The Relationship Between Design and Architecture

There is sometimes a tendency in game design to consider the design activity as separable from implementation. However, a full understanding of the design space requires understanding the relationship between authorship and the game architecture. The technical realities of game

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[1] These characterizations are caricatures of strong ludological and narratological positions.

architectures help structure the complex relationships and tradeoffs in the design space. Any paper-and-pencil design assumes a game architecture – that there will be, for example, mechanisms for putting objects and characters on the screen, for describing and rendering 3D levels, or for animating complex fighting moves. Even more importantly than representation, the game architecture structures the game's detailed response to player interaction. That is, the architecture structures the game's decision-making logic, and thus structures the possible gameplay mechanics available to the designer. Thus the game AI itself becomes a design resource, not a mere "implementation detail"; the AI architecture provides the language for thinking about game behavior [19]. The architecture becomes the medium within which the designer writes the game by providing authorial affordances that support the designer in expressing her design intentions [20].

When an architecture supports a game concept, its affordances will structure the local design space in such a way as to facilitate the designer's search through this space. The architecture will make it easy for the designer to explore meaningfully different design variations while automatically taking care of many of the details. When an architecture doesn't support the game concept, the designer will find herself constantly fighting against the architecture; the architecture won't provide the designer control over appropriate details while simultaneously forcing the designer to manually author details she doesn't care about, making design variations difficult to express.

Industry attempts to create interactive stories have made use of existing game architectures. Their failure to create high-agency interactive stories results from the poor affordances existing architectures offer for stories. Blank page attempts to design high-agency story run into a brick wall as soon as you try to actually implement the design. Without a design and architecture mutually constraining each other, attempts to design for "character" or "plot progression" are doomed to failure precisely because existing game architectures don't provide authorial support for these concepts. As a result, narrative is commonly reduced to a linear overlay on top of the actual game mechanics.

We were able to build *Façade* precisely because our design effort was "total" in the sense that we simultaneously designed story-and-character-based interaction mechanics as well as an architecture to support these mechanics. By building a game AI in which character behavior, the mixing of multiple character behaviors, and story progression are first-class concepts, our design and architecture co-evolved to provide local structure for this point in design space. Since technical and conceptual problems in the game design space are inextricably intertwined, exploring new regions of design space requires architectural exploration through building experimental games.

Mapping Existing Design Regions

Understanding the design implications of even existing game architectures requires a procedurally literate analysis [21]. Playing games (surface observation) doesn't allow one to fully map out the local design space even for highly-sampled regions of design space. Much of the design space structure is embodied in the architecture. For example, Wolff [29] provides an architectural analysis of visual representation in Atari 2600 games, an analysis that would be impossible to achieve by only looking at the surface details of the games. Deeper understanding of already sampled regions of design space, such as Atari 2600 games, requires setting oneself

new (wicked) design problems and solving them within the constraints of an existing architecture. Making experimental games is necessary not only for exploring new regions in design space, but can facilitate the analysis of already highly-sampled regions of the space.

CONCLUSIONS

The process of building the interactive drama *Façade*, with the explicit goal to explore new ways to deconstruct the potential events of a dramatic narrative into small grained-size pieces, annotated to allow the system to dynamically mix and sequence the pieces in response to player interaction, has helped us understand that there do in fact exist narrative structures that allow for both local and global agency, that can offer a satisfying dramatic experience for players. Our playable results, albeit in need of further refinement, suggest that ludologists' possible assumptions about the compatibility of narrative with agency, including the technical impossibility of generative story systems, are overreaching and premature.

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