CHAPTER 6

An Oscillatory Model for Developing Narratives for Serious Games

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ABSTRACT:

Designers often use a scripted approach to developing branching narratives for serious games. In this approach, the designer hand-crafts each dilemma at a low level, presenting these scenarios to the player with fixed branching pathways. However, this can create disconnect and disengagement within the player as the presented choices reflect the designer's intent rather than the player's interpretation of the scenario. On the other hand, a systems-based approach will allow the designer to develop a set of gameplay systems that integrate the game's learning goals as interactive processes. However, this approach is not as sought after due to the difficulties designers face while implementing it into practice due to the requirements of a robust, cohesive gameplay system capable of organically producing dilemmas and scenarios. In this paper, we propose an oscillatory model for systems-based narrative design, which relies on the current understanding of the scripted approach. The oscillatory model goes back and forth between the scripted and systemic approaches to simultaneously build both versions of the game narratives.

KEYWORDS:

Serious game, Systems-based Gameplay, Scripted Play, Systemic Narrative

1 INTRODUCTION

Designing for scripted play is a popular approach for developers of serious games. It commonly uses a branching narrative design, where the designer hand-crafts each individual path to provide a cohesive and more directed experience for the player. However, this approach leads to limited individual branches due to the effort required to develop each path to a similar level of fidelity while confining the player to these limited choices (Formosa et al., 2016; Ryan et al., 2012; Sweetser & Wiles, 2005). Finally, this approach can also create conflict between designer and player intentions, as they may have differing views on how a scenario should be resolved. Therefore, while providing the potential for an immersive narrative (and educational) experience, the scripted design method limits the developer and the player with the number of choices they can offer and interact with. On a fundamental level, this approach misses the value of games as procedural rhetoric, whereby concepts are conveyed through an interactive process (Bogost, 2007; Ryan et al., 2012).

An alternative is to use a systems-based approach for serious games design. In this case, rather than hand-crafting each path, the developer designs a system that is robust enough to accommodate the organic formation of scenarios and decisions. This allows the player to experience more agency and less frequent conflict with the designer while reducing the effort required to develop cutscenes or pre-rendered animations (Formosa et al., 2016; Staines et al., 2019). The systems-based approach, from a pedagogical perspective, enables the designer to embed not only the narrative but also the abstract learning goals associated with the narrative into the interactive processes of the system by inviting the player to play with the system as they gradually discover new patterns and gain proficiency over it (Ryan et al., 2012; Staines et al., 2019). However, due to its inherently abstract nature, it can promote disengagement for the player as they focus more on the outcome of the system rather than the concepts and lessons the serious game is trying to convey (Krcmar & Eden,

2019; Melzer & Holl, 2019). Moreover, designing a robust systems-based game requires the designer to identify a fine-grained model of the real-world system and mould it into a playful toy with which the player can interact. This can further dissuade designers from preferring the systems-based design approach over the scripted one (Sweetser & Wiles, 2005).

As such, in this paper, we propose an iterative, oscillatory model for systemic narrative development that relies on our current understanding of scripted game design to develop the systemic components of the game. This paper will initially provide a breakdown of the two approaches to developing serious game design. They will be further broken down into finer components which affect decision-making not only on a procedural level but also at a semiotic level. Based on this decision-making framework, the paper will present the oscillatory model with an example for each stage.

2 SCRIPTED AND SYSTEMIC PLAY

First, we discuss the scripted and systems-based approaches to designing serious games, which rely on two different approaches to learning.

2.1 SCRIPTED APPROACH

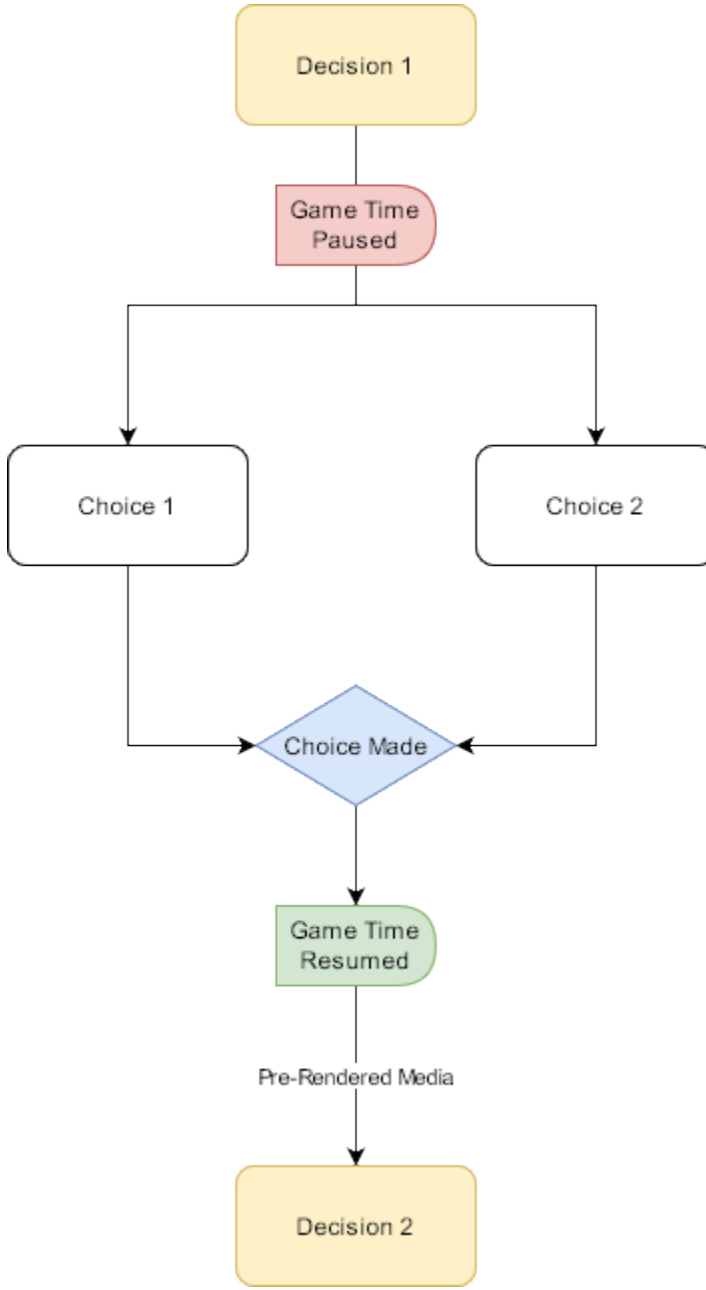

Figure 1: Scripted Approach to Narrative Design

The scripted approach to game design allows the designer to possess complete creative control over the narrative as well as the structure of the play. In the scripted approach, the designer's primary role is to intricately develop every aspect of the game's model to facilitate a consistent experience for the player, although this still will not guarantee that every player will experience the game the same way (Formosa et al., 2016).

As illustrated in Figure 1, branching narrative design techniques are a commonly observed design choice that facilities this approach to game design. In a branching narrative, at each narrative beat, the player is presented with a certain number of hand-crafted choices, which further lead towards the subsequent narrative and so on (Riedl & Young, 2006). As a result, in the scripted version, the designer hand-crafts the narrative structure and critical narrative beats where the player is required to make decisions to progress in the game. The player's role here is to choose an option they broadly agree with and experience the corresponding outcome, which they may or may not agree with. The outcomes of these choices are often in the form of pre-authored or pre-rendered animation as per the designer's desire.

Furthermore, from a pedagogical perspective, previous research associates scripted approaches (or approaches like scripted design) with the behaviourist model. Specifically, the more scripted approaches to game design discourage games to go beyond rote-learning (Ryan et al., 2012; Stieler-Hunt et al., 2014). In the scripted model, when the player is faced with choices, not only does the player experience the narrative through pre-authored media but also passively gains knowledge or concepts the designer was trying to convey.

2.2 SYSTEMS-BASED APPROACH

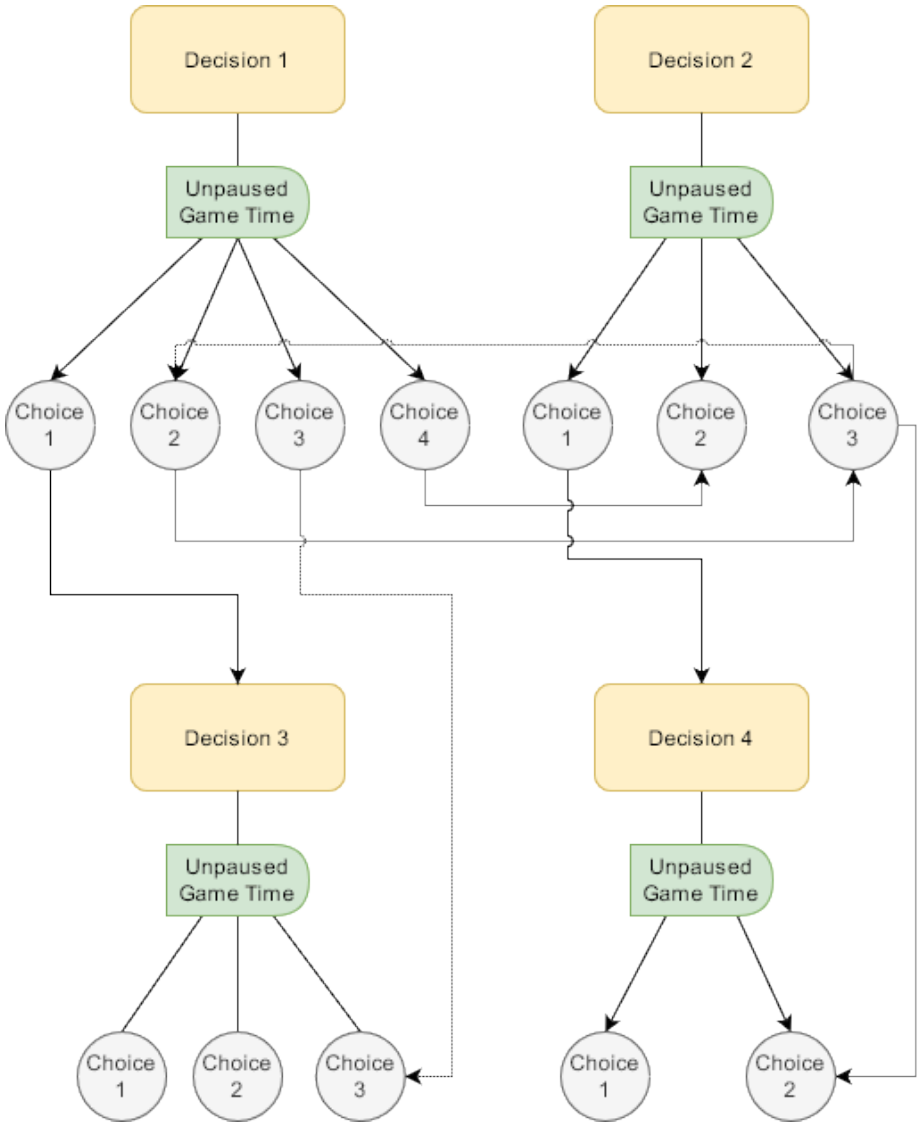

Figure 2: Systems-based Approach

On the other hand, in systemic play, the designer's role is vastly more implicit. Rather than micro-managing the game experience, they are tasked

with developing a robust enough system to facilitate a varied, personalised experience for the player. In this approach, the developer delegates the authorial control to the player by presenting them with a set of systems that interact with both the procedural and semiotic layers of the game.

As seen in Figure 2, in systemic play, the narrative beats are generated because of multiple systems interacting with each other. Following Bogost's procedural rhetoric, this weaves not only the learning goals but also the narrative conflicts within the interactive processes of the game's system (Bogost, 2007). It further allows the player to associate the abstract concepts the developer wants to convey more easily with the rules of the system.

From a learning perspective, prior studies have highlighted the significance of a systems-based approach supporting the player to go beyond rote learning by allowing them to interact with the "play space" composed of different gameplay systems (Klopfer et al., 2009; Ryan et al., 2012; Stieler-Hunt et al., 2014). This active, experiential type of learning allows the player to be involved at a very low level as they interact with the different processes and experience a learning cycle of discovery, generalisation, and experimentation (Ryan et al., 2012; Stieler-Hunt et al., 2014).

To understand both these systems on a more fundamental level, we will further explore how they present choices to the player and how they impact each other on both a procedural and a semiotic level.

2.3 COMPONENTS OF SYSTEMIC AND SCRIPTED METHODS

So far, this paper has covered both discussed design approaches at a relatively abstract conceptual level, defining the scripted approach as limiting agency and the systemic approach supporting it. However, to understand how they affect agency at a lower level, the following section will explore each approach from both a game design and narrative perspective and the distinct factors that determine the degree of scripted and systemic play in a game.

2.3.1 Atomicity of Choices

The atomicity of choices in games relates to the level to which a big decision is granulated into more minor decisions. As such, a game with high or fine-grained atomicity will have decisions granularised into numerous choices that might appear to relate to more negligible outcomes. On the other hand, a game with low or coarse-grained atomicity will have a decision granularised into bigger chunks.

In a narrative game where most of the gameplay is scripted, the branching-narrative decision tree represents the coarse-grained atomicity of choices available to the player. On the other hand, a game designed using systemic methods will possess a much more fine-grained and moment-to-moment decision structure as the player's choices are directly connected to the game systems, which often require multiple low-level micro-decisions.

2.3.2 Aggregation of Choices

The second factor which affects decisions in games is the aggregation of choices, which is the extent to which the outcome of a decision is a result of many smaller, previous micro-decisions (Sicart, 2013). Games with decision trees can fall within a range of high or low aggression, i.e., a game with high aggregation will contain decisions with multiple dependencies relying on each other; on the other hand, zero aggregation will have all the in-game decisions independent and contained from each other.

Game narratives designed using a systemic method allow for higher aggregation of choices as the associating dependencies emerge organically from the defined values contained within the interacting system. However, in the case of scripted narratives, the presented aggregation is lower as the designer needs to manually hand-craft these internal dependencies, locally defining the relationship between each decision (Stang, 2019; Sweetser & Wiles, 2005).

2.3.3 Narratives Beats

A narrative "beat" represents the beads from the "beads-on-a-string"

approach, representing a branch in a narrative where the player is required to perform a choice to navigate the flow of the game (Costikyan, 2007).

In games using scripted play, this narrative beat is typically sign-posted as the game-time comes to a halt while the player is presented with a user-interface containing a set of two to four enumerated choices (Formosa et al., 2016). Upon deciding, the game moves towards the next beat, where the process repeats.

On the other hand, in systemic play, the narrative beat is much more implicit and is the product of different systems interacting with each other. The narrative aspect of the beat is a result of the semiotic layer associated with the system's rules. As a result, the game-time, in this case, keeps moving forward, and it is up to the player to identify the beat and interact with it. In a scenario where the beat goes unidentified (and hence unattended), its consequences are reflected in the future as the player progresses in the game.

2.3.4 Conflict Between Procedural and Semiotic Layer

According to Sicart, games have two dominant layers of abstraction: a) Procedural Layer and b) Semiotic Layer.

The procedural layer constitutes the interaction between the mechanical agents (player and NPC) and the state machine through game mechanics in the form of input-output I/O operations. These operations or actions are conducted on the system's parameters, which in turn modify the state of the game. Some examples of the elements of the procedural layer are experience points, combat systems or resource management systems (Sicart, 2013).

On the other hand, the semiotic layer provides cultural and narrative context to the various procedural elements of the system. This context allows the player to apply their internal values to operations of the state machine, to consider not just the procedural perspective while making decisions (Sicart, 2013).

3 SYSTEMS-BASED NARRATIVE DEVELOPMENT

Based on this theoretical framework and concepts from scripted design, this paper proposes an oscillatory approach to narrative development using a system-based method. In this approach, the narrative is initially designed using a branching paths method to map out the critical decision structure and narrative beats involved in the game.

In this proposed method, the designer will simultaneously develop the scripted and systemic version of the game by going back and forth between the two versions. The core idea is that the game's scripted version follows a coarse-grained, low aggregation decision structure. As a result, multiple micro-decisions are grouped in a larger chunk. Following this, we break this sizeable chunk into smaller micro-decisions and translate them into interactive processes as part of a more extensive gameplay system.

For example, Figure 3 presents an example of a serious game currently undergoing the oscillatory design approach in the context of a larger research programme exploring systemic and scripted design in serious games. In this figure, the flowchart represents the narrative structure of a game where the player plays the role of a system administrator of a small-scale hospital.

As part of the player's day job, they must process emails, log files, and address other activities as part of their daily duties. The yellow entities indicate the narrative beats, while the orange boxes show a scenario followed by choices in red and the subsequent impact of these choices in blue. This structure is more akin to a scripted design method where the atomicity of choices is very coarse-grained, and the outcome of each choice is not necessarily relevant to how future scenarios develop and how the outcomes of these scenarios are determined

In this scenario, there are two junctions where the player can affect the narrative, firstly by choosing how to proceed with the received email and secondly, how to process the ransomware scenario.

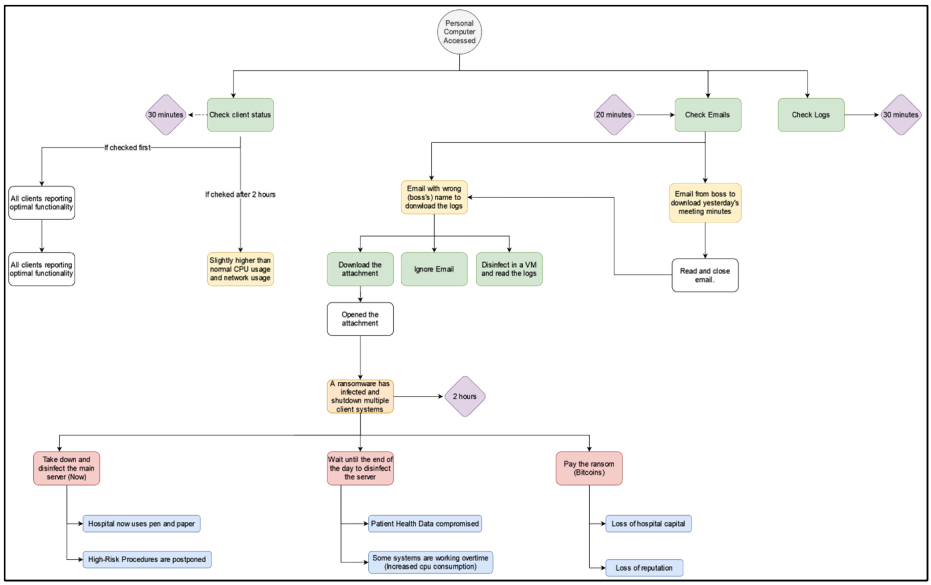

Figure 3: Key Decision Structure and Narrative Beats

There are specific noticeable actions chunked together here, such as automatically downloading and opening the attachment after reading the email or preventing the player from spreading the ransomware after opening the attachment. Furthermore, in the second junction, there are limited choices available to the player.

Another essential aspect presented in the scripted version is the passage of time, as indicated in purple. In this scripted version, the player-character and the player experience time differently. When the player is presented with the choice of checking client machines' status, emails, and logs, each task consumes a pre-determine chunk of in-game time regardless of how much time passes for the player. Similarly, the player can take as much time as needed to deliberate on the choices during the "ransomware" scenario.

To convert this scripted design into a version of the proposed game that supports systemic play, each narrative beat needs to be broken down into a series of actions and events. This translation should be conducted so that a combination of player actions will produce another narrative beat as a product of the system rather than being hand-crafted by the designer.

As such, in the systemic version of the game, the first junction will be broken into smaller actions that the player will carry out as part of a more extensive system. One approach would be integrating these micro-decisions as a resource-management simulation framework. In this design, entities such as “Emails”, “Logs”, and “Meetings”are tasks in the form of cards. The player acts upon these cards, reading, ignoring, or destroying them. In this case, we are taking a more substantial chunk and breaking it down into smaller actions, allowing the player greater agency as now they can choose how and if they want to interact with the tasks. Figure 4 shows a bare-metal representation of the systemic version developed in machinations (Machinations.Io, 2016) using a resource-management systemic design, with the labels for each entity undertext providing a contextual meaning to each entity (or game objects).

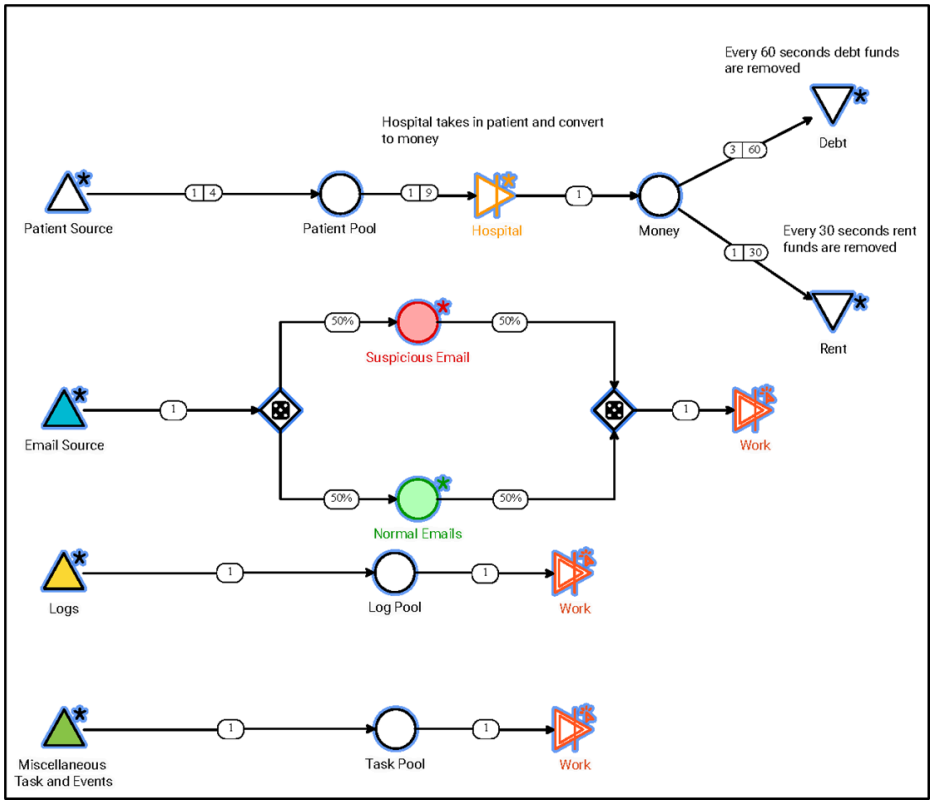

Figure 4: Systemic translation of the scripted version

Naturally, the next step in the process would be to go back to the scripted version and flesh out the next chunk of narrative. Following this, we will go back to the systems-based version to replicate the changes we saw in the example above.

4 DISCUSSION

In this paper, we propose an iterative, oscillatory model of narrative design using a systems-based approach. This model builds upon the work of Bogost's *procedural rhetoric* and Sicart's argument of "friction between the procedural and semiotic layers". By including elements observed in scripted game design narratives, specifically scaffolded narrative beats, this approach integrates these elements as part of a cohesive gameplay

system rather than stopping game time to allow the player to perform a decision. As such, the oscillatory model relies on initially designing a scripted narrative chunk, following which this chunk is broken down into interactive processes of a systems-based model. After integrating the narrative chunk within the system's process, we return to the scripted model and flesh out the next chunk.

As we previously saw, a rough sketch or a flowchart of the scripted version acts as a skeleton to enable the development of the systems-based version. However, at this stage, there still exists the issue of developing a front-end for the systemic model of how the player will interact with the game in real life, i.e., artwork, music, audio-visual effects etc. The primary advantage of this model is that the designer does not have to rely on developing pre-rendered media or flesh out each branching path to maximum fidelity. This ongoing research aims at bridging the gap between scripted and systemic approaches by utilising elements from both methods. To emphasise the advantage of games as an interactive medium, it stresses the systemic component of games by highlighting how the conflict between procedural and semiotic layers could be used in conjunction with the pros of the scripted approach to developing a systems-based narrative.

At the current stage, we aim to apply the model and iterate upon it to develop the serious game presented in the example above. The next step is to develop both the scripted and systemic versions to measure the level of engagement players experience in each case.

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