Between chaos and story: how to combine the author's idea and algorithmic randomness in modern narrative design

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ABSTRACT

Game worlds are expanding in scale, yet the pursuit of vast environments often conflicts with the need for deep, personal narratives. This study addresses the dilemma of combining carefully constructed scenarios with procedurally generated landscapes, quests, and events. While games like Hades (Supergiant Games 2020) and Dwarf Fortress (Bay 12 Games 2022) demonstrate successful integration, these remain the exception rather than the rule. This paper proposes a systemic framework—the «Anchors and Ornaments» model—to weave authorial narrative into the algorithmic fabric of games. Through a comparative analysis of successful design techniques, we demonstrate that the conflict between narrative and procedure can be reconsidered as a design tension rather than a strict opposition; the true challenge lies in designing narrative systems where the author defines rules, emotions, and conflicts, while the algorithm acts as a co-author. The proposed model provides designers with practical tools to create games that achieve both scale and depth

Keywords

procedural narrative, narrative design, emergent storytelling, game systems, procedural generation, story sifting

INTRODUCTION

The 2022 Steam release of Dwarf Fortress marked a significant milestone, proving that a complex, twenty-year-old simulation could captivate a mass audience, even surpassing major commercial titles in popularity. The appeal of such games lies in the stories that emerge from the player's encounter with a ruthless, procedurally generated system. Paradoxically, the motto "losing is fun" reflects a deep truth: players seek experiences that are meaningful, not just opportunities to win.

However, this success highlights a fundamental challenge in modern game design: as we grant algorithms more freedom to generate thousands of planets or endless dungeon variations, maintaining the thread of the author's vision becomes increasingly difficult. Traditional narrative methods—linear scenarios, cutscenes, and fixed dialogues—frequently conflict with the unpredictable nature of procedural worlds.

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The central problem addressed in this study is how to maintain emotional depth, semantic coherence, and authorial intent in a world where every element is subject to algorithmic change. We argue that the solution does not lie in creating smarter generators, but in rethinking the nature of game storytelling itself. We must shift our perspective from viewing a story as a static "thing" to conceptualizing it as a dynamic system. By defining narrative design as the architecture of conditions under which stories arise, we can bridge the gap between authorial control and procedural freedom.

The problem we are investigating is formulated as follows: How can we maintain emotional depth, semantic coherence, and authorial intent in a game world where every element can be changed by an algorithm? This is not a technical issue, but a design issue. The answer lies not in creating smarter generators, but in rethinking the very nature of game storytelling. We need to stop thinking of story as a "thing" and start thinking of it as a system.
Before delving into the analysis, it is important to define the conceptual framework. By narrative design, we mean not just writing texts, but designing the conditions under which a story arises in the player's interaction with game systems. Procedural generation is a method of creating content algorithmically, in real time, or at game launch, as opposed to manual assembly. Emergent storytelling is a phenomenon in which a story is not written in advance, but arises on the fly from a combination of game mechanics and player actions (Cartlidge 2024).

Approach	Description	Examples	Strengths	Limitations
Linear Narrative within a Procedural World	A fixed storyline unfolding within a partially or fully procedurally generated environment	*No Man's Sky* (main storyline)	Clear dramatic structure; emotional direction; strong authorial control	Possible dissonance between world logic and scripted events; limited adaptability
Modular Narrative	The story is assembled from pre-authored narrative blocks activated according to systemic conditions	*Hades*	Flexibility; high replayability; adaptation to player progression	Difficulty maintaining a coherent emotional arc; risk of fragmentation
Emergent Narrative	Narrative arises from systemic interactions without a predefined storyline	*Dwarf Fortress*, *RimWorld*	Unique playthroughs; deep systemic immersion	Structural unpredictability; limited authorial control over themes and climaxes
Hybrid Approach	Combination of fixed narrative "anchors" with procedurally varied context and events	*Returnal*, *Dead Cells*	Balance between dramatic control and variability; structured unpredictability	High design and balancing complexity

Table 1: Typology of Narrative Approaches in Procedural Games

Modern research on interactive digital narrative (IDN) highlights that understanding these approaches requires going beyond traditional media theories. As noted by

Hartmut Koenitz, a leading researcher in the field, "the interactive aspect of IDN transforms the audience into participants and allows exploring alternative perspectives and actions within a single artifact" (Koenitz 2025, p. 3). This transformation of the role of the player from a passive consumer to an active collaborator is key to understanding how procedural narrative systems .
Now that we have outlined the problem field, let's turn to the theoretical foundations that will help us find a solution.

This study contributes to the field of interactive digital narrative by addressing a gap between existing concepts such as procedural authorship and emergent narrative. While prior frameworks emphasize either the author's role in defining narrative potential or the system's capacity to generate stories, they often lack a clear structural distinction between stable and variable narrative elements. This allows for a more precise articulation of how authorial intent can be preserved within dynamic systems.

THEORETICAL FRAMEWORK: FROM STORY TO NARRATIVE SYSTEM

The classical notion of the author as the sole creator of story does not fit well with the nature of procedural generation. Modern researchers propose the concept of co-authorship, where the developer creates not a story, but the rules by which stories can arise. This idea goes back to Janet Murray's work on "procedural authorship," the art of creating narrative potentials rather than stories, and is being further developed in the context of generative technologies (Koenitz 2025).
In the context of procedural generation, this means that a designer should think in terms of systems, not texts. Instead of writing a dialogue for a specific meeting, he writes a system that generates dialogues relevant to the context. Instead of creating a sequence of events, he creates mechanisms that generate events that are meaningful within the game world. As Koenitz emphasizes, this transformation requires a new conceptual language: "Multidimensional representations make IDN a means to present complex issues" (Koenitz 2025, p. 4), which is especially relevant in an era when traditional narrative media are showing their limitations.

Unlike static forms of media, where the audience is passively guided down a single predetermined path, these systemic frameworks allow players to actively probe the boundaries of a game's world. This shift means that a player's unique interactions and emergent choices become an integral part of the storytelling fabric, generating deeply personalized emotional arcs. Consequently, the narrative designer's primary challenge evolves from predicting every possible dialogue branch to building robust, reactive logic that can gracefully weave narrative meaning out of unexpected algorithmic outputs. Ultimately, this symbiotic relationship between carefully crafted authorial parameters and dynamic procedural variations opens the door to interactive experiences that are both infinitely replayable and emotionally resonant.
Furthermore, this systemic approach requires designers to anticipate not just what the player will do, but how the algorithm might interpret those actions within the established story logic. By treating the game engine as a collaborative partner, creators can foster a sense of "co-authorship" that makes every player's journey feel uniquely tailored yet narratively grounded. This evolution ultimately shifts the focus of narrative design from fixed storytelling to the creation of a living, breathing possibility space where meaning is discovered through play.

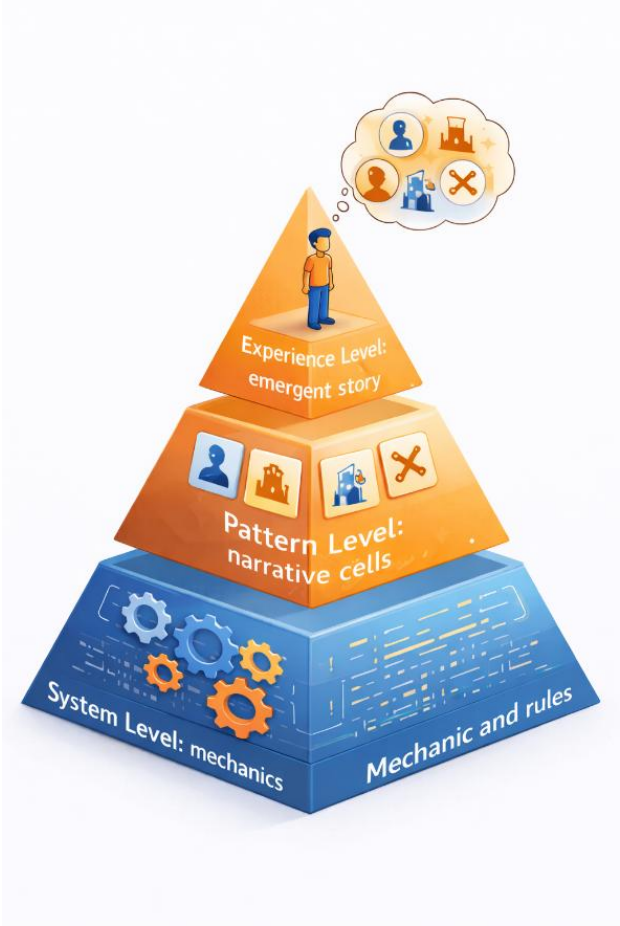

Figure 1: Three levels of narrative design in procedural games.

THE CONCEPT OF "STORY SIFTING"

One of the most promising approaches to solving our problem is the concept of "story sifting", which has received significant development in recent years. Researchers from the University of Southampton have developed a system of event rules that support composable patterns -building blocks that allow constructing higher-level stories from lower levels (Lyu, Millard, & Gibbins 2025).

The essence of the approach is as follows: instead of generating a story directly, the system generates a huge number of potentially significant events, and then "sifts" them, selecting those that correspond to certain narrative patterns. As the researchers write, "an event-driven approach to rules can effectively support composite patterns, ultimately allowing for the curation of more complex emergent narrative stories" (Lyu et al. 2025, p. 1).

This metaphor fundamentally changes the role of the designer. The author ceases to be a "builder" and becomes an "architect of the sieve" - he designs the criteria by which the system will select and arrange events in meaningful sequences.

CHALLENGES AND LIMITATIONS OF THE PROCEDURAL NARRATIVE

Despite its theoretical appeal, the procedural narrative faces serious challenges. It is important to understand that generative approaches, including modern large language models, are not yet able to completely replace humans in narrative design. Research shows that "although generative AI tools can be a great help in IDN design, they are not yet able to replace a human narrative designer" (Koenitz 2025, p. 2). The strengths of modern generative models lie in the field of ideas and training, as well as in production under the guidance of an experienced designer.

This observation is critically important: it shows that simple automation is not enough. Additional mechanisms are needed to ensure semantic coherence and emotional resonance. This is where anchor structures come to the rescue -elements that remain stable regardless of procedural variations. In the next section, we will analyze how successful games implement this principle in practice.

RESEARCH METHODOLOGY

This study employs a qualitative comparative case study methodology to analyze different approaches to integrating narrative and procedural generation in digital games.

Case Selection Criteria

The selected cases were chosen based on the following criteria:

1. Representation of distinct narrative approaches (modular, emergent, hybrid)
2. Documented academic analysis in recent literature (2022–2026)
3. Industry relevance and demonstrated impact on narrative design practices

Based on these criteria, the following games were selected:

Hades — modular narrative system
Dwarf Fortress — emergent narrative system
No Man's Sky — hybrid narrative system

Analytical Framework

The analysis is structured around the proposed "Anchors and Ornaments" model, focusing on:

Identification of stable narrative elements (anchors)
Identification of variable procedural elements (ornaments)
Examination of their interaction within each system

Research Procedure

The study follows a three-step analytical process:

1. **Structural Analysis**
   Examination of narrative architecture and systemic mechanics in each case
2. **Element Classification**
   Identification and categorization of anchors and ornaments
3. **Comparative Synthesis**
   Cross-case comparison to identify recurring patterns and design principles

Additionally, the analysis is informed by recent research on procedural narrative systems and composable patterns (Lyu et al. 2025).

RESULTS AND DISCUSSION: THE ANATOMY OF SUCCESSFUL SOLUTIONS

Hades is often referred to as a "roglike in which you want to die." This paradox is explained by the fact that death in the game does not interrupt the narrative, but

becomes an integral part of it. The Pakkan and Akin study (2025) shows how the developers managed to fit the narrative into the cyclical structure of the genre.
The key discovery is that the dialogues in Hades are not tied to locations, but to progress and events. The characters comment not only on the current race, but also on previous attempts, the number of enemies killed, and the weapons used. This creates the illusion that they remember the player and react to his actions. According to the researchers, "the gameplay remains continuous thanks to dialogues that respond to the player's decisions, justification and integration of death into the story, as well as brief, concise and unobtrusive narrative segments" (Pakkan & Akin 2025, p. 45).

Design Aspect	Traditional Approach	Sift-Oriented Approach
Role of the Author	Creator and controller of a linear story	Architect of the selection system (“sieve”), defining rules and criteria of narrative relevance
Relation to Content	Content is manually authored and fixed in advance	Content is system-generated and filtered according to predefined conditions
Narrative Unit	Scene, dialogue, predefined episode	Event, interaction pattern, configuration of states
Control of Coherence	Direct: the author governs sequence and causal connections	Indirect: coherence emerges through filtering criteria and structural constraints
Tool Support	Linear scripting tools, traditional narrative editors	Composable patterns, modular structures, and filtering mechanisms (Lyu et al., 2025)

Table 2: Mechanisms of Narrative Integration in *Hades*.

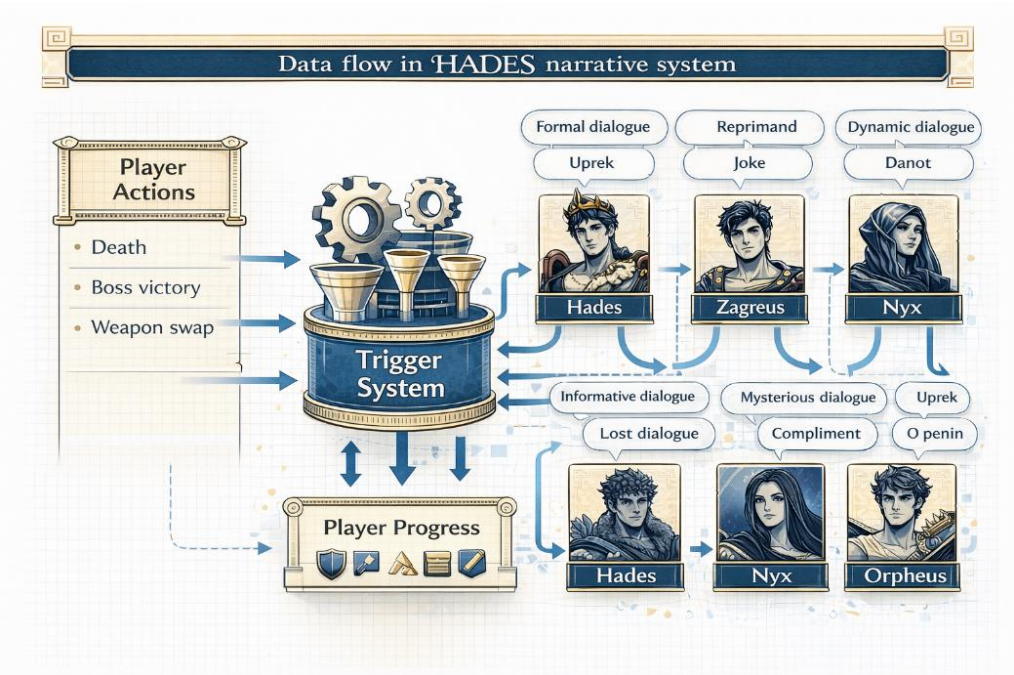

Figure 2: Architecture of the Hades narrative system.

If Hades is a carefully constructed narrative machine, then Dwarf Fortress is a chaotic, unpredictable story generator, where the author's intention is almost dissolved in system complexity. Nevertheless, as James Cartlidge (2024) convincingly shows, the game makes deep existential sense.

Kartlij interprets Dwarf Fortress through the prism of existentialism: the game constantly reminds the player of finiteness (death of dwarves, fall of forts), absurdity (senseless catastrophes) and the need to create meaning on their own. This is not a story written by the author, but a story that arises from the very process of the game. As the researcher writes, "Dwarf Fortress can be interpreted as a game about three aspects of the existential tension of human existence that make our lives difficult and disturbing, but which must be faced if we want to have a full, happy, meaningful life" (Cartlidge 2024, p. 221).
The key mechanism here is system depth. Tarn Adams, the creator of the game, formulated the goal of development as "a simulation of narratively interesting aspects of existence" (quoted by Cartlidge 2024, p. 222). By 2016, they estimated their readiness at 42%. This figure is important not in itself, but as an indication of a principled position: the developers of Dwarf Fortress do not write stories, they create conditions under which stories can happen.

The latest research in the field of procedural narrative generation offers specific technical solutions for the approaches described above. A team of researchers from the University of Southampton has developed a system of event rules that allows you to create composable patterns for emergent narratives (Lyu et al. 2025).
Their approach demonstrates how low-level events in a simulation can trigger higher-level patterns, which then return to the simulation and can trigger further patterns. The researchers conducted stability and scalability tests, showing that "the system remains stable throughout time" even with an increase in the number of agents and the size of the map (Lyu et al. 2025, p. 5). This is an important technical achievement that paves the way for the practical implementation of complex emergent narratives in commercial games.

EXPERIMENTAL VALIDATION: PROCEDURAL NARRATIVE AND PLAYER ENGAGEMENT

It is important to back up the theoretical model with empirical data. A large-scale study by Jensen, Haeun, and Hendricks (2025) examined the effects of various types of procedural narrative on player engagement and cognitive performance. 240 people participated in the experiment, divided into three groups:

- Group 1: games with a fully procedural narrative
- Group 2: games with semi-procedural narrative (hybrid approach)
- Group 3: games with traditional static narrative

The results showed that the group with a fully procedural narrative demonstrated the highest levels of engagement and cognitive performance, especially in knowledge retention and problem solving (Jensen et al. 2025, p. 1). The researchers conclude that "the integration of procedural generation into narrative design offers a promising path to improve the design of educational games, contributing to a more deeper engagement and more effective learning ."
However, the authors note an important detail: the success of the procedural narrative critically depended on the presence of "semantic anchors" that helped players navigate the generated content. The better the central themes and characters were worked out, the more effective the procedural generation worked.

THE "ANCHORS AND ORNAMENTS" MODEL: SYNTHESIS OF APPROACHES

Based on the analysis, we propose our own model for narrative design in procedural games. The Anchors & Ornaments Model divides all narrative elements into two classes. Anchors are stable, author-controlled elements that provide semantic integrity and emotional resonance.
These include:

- Central characters with fixed characters and development arcs
- Key plot twists (they should happen in any procedural variation)
- Emotional climaxes
- Relational dynamics (relationships between characters)

For the practical implementation of the described approaches, tools are needed that allow designers to design narrative systems, and not just write texts. Research in the field of composable patterns shows that event-based rule systems can effectively support the creation of complex emergent narratives (Lyu et al. 2025).
It is important to note that, as Kenitz (2025) emphasizes, modern generative tools can be "a great help in IDN design," but they do not replace humans. Their strength lies in "providing results that can be used for ideas and training, and in some cases also for production under the guidance of an experienced designer" (Koenitz 2025, p. 2). This means that the future of narrative design lies with hybrid approaches, where a person and an algorithm work in tandem.

CONCLUSION

This study sought to address the challenge of combining authorial intent with algorithmic randomness in procedural games. The analysis of successful cases, such as Hades and Dwarf Fortress, alongside recent research developments in composable patterns and event-oriented systems, yields several key conclusions.
First, the perceived conflict between narrative and procedure can be effectively reconciled. A primary challenge lies in navigating the balance between rigidity and flexibility, control and freedom, and traditional text versus dynamic systems. Successful games do not strictly favor one side but rather cultivate a dynamic equilibrium.
Second, achieving this balance requires a paradigm shift from designing linear stories to architecting comprehensive narrative systems. Designers must operate utilizing anchors (stable, author-controlled elements) and ornaments (variable, procedurally generated elements). The "Anchors and Ornaments" model proposed in this paper provides a practical framework for this methodology. Crucially, this model explicitly separates itself from broadly theoretical concepts of emergent narrative by providing designers with a concrete, operational mechanism that bridges the gap between high procedural variability and curated emotional pacing, solidifying its distinct scientific contribution.
Third, recent empirical research supports the notion that procedural narratives can match or even exceed traditional narratives in fostering engagement and cognitive effectiveness, provided that semantic anchors are present (Jensen et al. 2025). Furthermore, technical advancements in composable patterns demonstrate the stability and scalability of such systems (Lyu et al. 2025). Finally, despite the increasing power of algorithmic approaches, human designers remain indispensable. Generative tools function as sophisticated assistants that expand a designer's capabilities, but

they cannot replace the necessity of a central authorial vision and emotional intelligence (Koenitz 2025)

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