

# Innovating Narrative Interactivity in Video Games with Large Language Models

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## Abstract

The evolution of narrative interactivity in video games has lagged behind the dynamism of gameplay mechanics. This paper explores the incorporation of Large Language Models (LLMs) as dynamic Dungeon Masters (DMs) in text-based role-playing games (RPGs), leveraging OpenAI's GPT models. The proposed system dynamically generates context-aware narratives and dialogues, offering a level of interactivity in story elements traditionally confined to pre-scripted scenarios. This approach emulates the complex decision-making and storytelling prowess of human DMs in traditional Dungeons & Dragons (DD) campaigns, potentially revolutionizing narrative experiences in digital RPGs.

## 1 Introduction

The constraint of linear storytelling in games not only hinders player agency but also limits replay value and emotional investment. By addressing the lack of narrative dynamism, we can unleash the potential for games to offer not just a story to be told but a personal odyssey that unfolds through the player's unique decisions and actions.

While video games excel in delivering interactive and dynamic gameplay, their narrative components have remained relatively static, bound by pre-written scripts and limited dialogue trees. This disparity has curtailed the player's ability to influence the story meaningfully. The use of LLMs like OpenAI's GPT to simulate a DM's role in a text-based RPG environment presents a novel solution. By dynamically generating narrative content, this system seeks to provide an unprecedented level of narrative freedom and responsiveness, akin to a human DM's flexibility in a DD campaign.

Historically, video game narratives have been a one-way street, with players experiencing stories rather than shaping them. This static approach to storytelling is increasingly at odds with the interactive potential of modern gaming. Here, we explore the pioneering use of LLMs to bring the flexibility and spontaneity of tabletop role-playing into the digital realm, allowing every player to truly craft their own legend.

The dichotomy between the richness of gameplay mechanics and the static nature of game narratives represents a critical challenge within the game development industry. This study introduces a system that promises to harness the sophisticated capabilities of LLMs to cul-

tivate a dynamic narrative landscape, enabling players to truly become the architects of their own stories within the gaming universe.

The prevailing issue in contemporary video gaming is the rigid narrative structure that confines players to a passive role, often leading to a predictable and unvarying gaming experience. This paper addresses the pressing need for an interactive dialogue system that evolves and adapts organically to the player's journey, enhancing the depth and authenticity of the gaming experience.

## 2 Implementation Evaluation

**Implementation:** The AI DM, powered by OpenAI's GPT model, maintains a dynamic database of game states, character relationships, and story arcs. It generates dialogue and narrative choices in real-time, aligned with character backstories and the players' previous interactions. This responsive dialogue system emulates the adaptive storytelling found in table-top RPGs, bringing a new depth to NPC interactions.

The AI DM is engineered with a multi-threaded narrative engine at its core, leveraging the advanced natural language processing capabilities of OpenAI's GPT models. This allows the AI to manage a narrative that is as complex and evolving as any human-led campaign, with the added benefit of being infinitely scalable and responsive.

The AI DM is meticulously crafted to interpret and process an extensive array of variables in real-time, assimilating player choices, character histories, and the overarching plot to construct a coherent and adaptive narrative stream. It acts as a central nervous system for game storytelling, integrating the player's journey with the game's lore and mechanics to produce a seamless interactive narrative.

**Evaluation:** Preliminary evaluations of the AI DM system focus on narrative coherence, consistency with game state changes, and player engagement. User feedback suggests that the system successfully balances complex game mechanics with compelling storytelling, significantly enhancing the RPG experience. Our rigorous evaluation methodology employs a dual approach, balancing objective metrics of narrative consistency and player engagement with subjective analysis of player satisfaction and emotional engagement.

This comprehensive evaluation framework ensures that our AI DM stands up to the scrutiny of both the analytical and the anecdotal.

The evaluation protocol for the AI DM incorporates a multifaceted analysis, blending quantitative assessments

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of narrative logic and user engagement with qualitative research on player immersion and narrative satisfaction. This methodical assessment ensures that the AI DM not only conforms to narrative expectations but also enriches the player's experience with meaningful story development.

### 3 Discussion

**Theorem 1** *The implementation of LLMs as DMs showcases the potential for AI to craft interactive and personalized narratives in gaming. This system not only responds to player inputs but also shapes the story's progression, reflecting the actions and decisions of the player, thus creating a deeply personalized gaming experience.*

The deployment of LLMs as DMs opens a dialogue about the future of AI in creative domains, challenging the conventional wisdom about the capabilities of machines in understanding and facilitating human creativity. It asks us to reconsider the role of AI not just as a tool but as a collaborator in artistic expression.

This pioneering application of LLMs as DMs ignites a conversation about the evolving role of AI in interactive media. It redefines the boundaries between player and game, proposing a future where narrative fluidity and player agency are central to the gaming experience, creating a truly interactive and malleable story canvas.

Balancing Freedom and Restrictions is a significant challenge faced finding the right balance between giving players open-ended freedom and maintaining certain restrictions for game balance. Too much freedom can lead to a chaotic game experience, while too many restrictions can stifle creativity and player agency. Striking this balance is crucial for enjoyable gameplay.

Through trial and error, I had to adjust the AI's response generation to ensure it provided creative yet logically consistent options to the players. Adjusting the temperature setting of the model for creative responses and tuning the context-aware narrative generation would have been key areas of focus. Giving initial prompts and responsibilities like "Professional Dungeon Master" to the AI and removing said prompts lead to drastic changes in what actions were allowed and which ones lead to screens asking the player to play correctly.

Incorporating player feedback into the development cycle is essential. Player reactions and suggestions provide invaluable insights into how well the balance between freedom and structure is being received. Dealing with the wide range of player inputs, especially in an open-world format, must have required continuous tweaking of the AI's understanding and response mechanisms. Ensuring that the AI DM can handle unexpected or unconventional player decisions while maintaining narrative coherence would have been a significant aspect of my development work.

### 4 Conclusion

Incorporating LLMs as DMs marks a pivotal advancement in narrative design for RPGs, suggesting a future where game stories are as dynamic as their gameplay. Ongoing research will aim to fine-tune the AI DM's comprehension of intricate game states and its predictive capabilities, ensuring that it can consistently deliver a narrative that adapts to and anticipates player behavior.

The integration of LLMs into the heart of RPG narrative design heralds a new era where the stories within games can live and breathe alongside their players. As we look to the future, we anticipate further refinements in AI narrative comprehension, emotion modeling, and multi-modal integration, all of which promise to deepen the connection between players and the worlds they inhabit.

The venture into LLMs as DMs signifies a transformative shift in narrative construction within RPGs, promising a landscape where game narratives are as alive and responsive as the gameplay itself. Future investigations will delve into enhancing the AI DM's narrative foresight and emotional intelligence, endeavoring to deliver a storytelling companion that not only understands but also anticipates the player's narrative desires and motivations.

My research and development process in creating an AI-powered RPG system reflects a deep understanding of both the technical and narrative aspects of game design. The challenges of balancing open-ended player freedom with necessary game restrictions highlight the complex interplay between AI capabilities and human creativity in game development. This pioneering work opens up new possibilities for the future of interactive storytelling in video games.

### References