Player Driven Video Games

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# Abstract

This research explores the use of AI-driven systems to create real-time dynamic environments and quests that respond to player decisions. The aim is to enhance interactivity and immersion in game design by integrating procedural content generation and decision-based logic. A Unity-based prototype was developed, where player actions altered the environment and quest outcomes in real time. Data from player sessions was collected and analysed to evaluate system responsiveness and user engagement. The findings suggest that dynamic reactivity can significantly enhance narrative depth and gameplay diversity. This study contributes to the field of procedural and adaptive game design and proposes directions for further research in real-time player-driven content generation.

# Keywords

* Procedural Terrain Generation.
* Player Driven Narrative.
* Dynamic Objectives.
* Unity Game Development.

# Introduction

Modern games increasingly emphasize player agency, yet many rely on static environments and pre-written quests. This project addresses a gap in dynamic, decision-driven game systems by implementing real-time environment and quest changes based on player choices. The aim is to create a more immersive and personalized game experience.

**Research Questions:**

1. What algorithms are most effective for generating quests that respond in real time to player actions?
2. How can player decisions dynamically influence game environments and objectives?
3. What impact does real-time adaptability have on engagement and immersion?

**Hypothesis:**  
Integrating real-time decision-tracking systems into games can increase interactivity and narrative depth by dynamically generating and adapting quests and environments based on player choices.

# Literature Review

**Lopes and Bidarra** [2] highlight the importance of **context-aware PCG**, where the environment changes based not just on randomness but also in response to gameplay context. For example, terrain, lighting, and accessible areas may shift based on player morality or mission choices. Such responsiveness enhances the illusion of agency, reinforcing the connection between player decisions and world state.

Togelius et al. [1] emphasize the role of Search-Based Procedural Content Generation (SBPCG) in adapting content to player behavior. GOAP (Goal-Oriented Action Planning) has been effective in creating believable quest chains that react to world states [2]. Behavior trees and rule-based systems have also been used in adaptive narrative design [3].

Recent studies highlight the use of player modeling and environment feedback loops to dynamically adjust quest objectives, improving engagement and variety. However, most commercial games still rely on predefined storylines, revealing a gap this study aims to address.

# Methodology

A Unity 3D prototype was developed, featuring:

* A **decision-tracking system** (using Boolean flags and Enums)
* An **endless Procedural environment** that is created in real time, with optimization logic.
* A **reactive environment** that changes based on player decisions (e.g., tile maps swap, NPCs change behaviour)
* A very simple **quest generator** that assigns objectives using if-else logic and player state

**Participants** were given around 5 – 10 minutes to play through multiple paths. After gameplay, participants completed a short questioner form assessing immersion and perceived responsiveness.

Data was analysed **qualitatively** (player feedback on immersion and narrative).

# Findings

# Conclusion

This research successfully demonstrated a working prototype where player decisions actively shaped both quests and the environment in real time, specifically the terrain. Results confirm the value of reactive systems in games, particularly for narrative-driven or exploratory genres.

**Limitations:**

* Small scale of the prototype
* Basic AI and quest logic
* Limited testing group

**Future Work:**  
Incorporate a player log system to collect data sets for any player. Expand the narrative space and construct more complex quest generation systems.