- Game & AI Case Study -
Middle-earth: Shadow of War

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Abstract

This case study is about Middle-earth: Shadow of War, the second game, made by developer Monolith Productions, to feature an AI system called *the Nemesis System*. It is a system that empowers enemy AI to help create emergent events and stories that make every user's experience unique. The key feature of the system is that enemies "*will remember the player whether from a previous battle or killing their ally*"[1] and this is what makes the Middle-earth games stand out to players, amongst other action-adventure games. This dynamic story-line is shaped by a "*multitude of player choices, different outcomes, and AI agents in the game*"[2] and it creates as well as raises "*the personal stakes dramatically*"[3].

1. Introduction

We will be exploring how the Nemesis System procedurally generates enemy characters, along with traits and personalities, to facilitate dynamic and interesting user-experiences - by looking at game guides, system analyses and other papers on this AI method. We will also look at the effects of patenting this system had on its legacy.

2. Background

Middle-earth: Shadow of War is an open-world action-adventure game. This game, as well as its predecessor, Middle-earth: Shadow of Mordor, is based on the works of J. R. R. Tolkien (specifically, sharing a continuity with the Lord of The Rings books), and both games (as well as Monolith's upcoming Wonder Woman game) feature a patented Nemesis System. The player controls a character called Talion (who is attached to a spirit named Celebrimbor) as they journey through Middle-earth.

3. AI Method - Nemesis System

The Nemesis System generates unique Orc enemies throughout the game, assigning them distinct looks, traits, and personalities. "Every Orc enemy is procedurally generated using the Nemesis System and they populate the regions you explore"[3] When players encounter and interact with them, they evolve, gaining promotions and new abilities, creating personalised and dynamic gameplay experiences. This system tracks player interactions, ensuring that Orcs remember previous encounters, making battles feel dynamic.
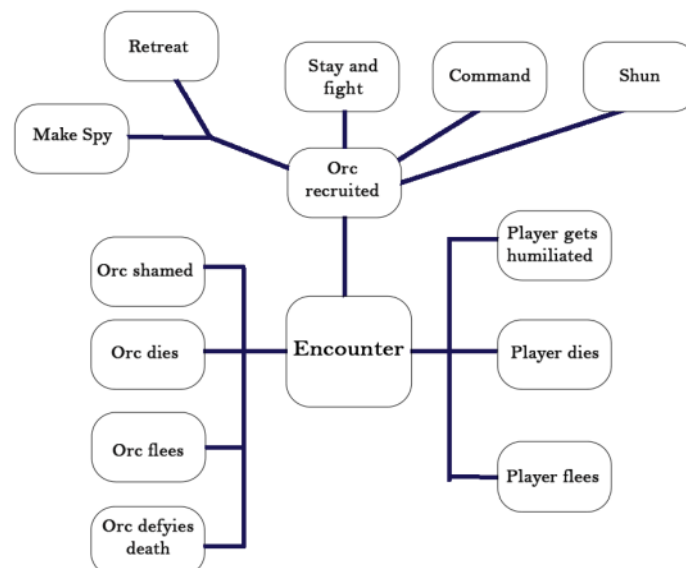

Figure 1: *Visual diagram summarising all outcomes to a given encounter powered by the Nemesis System - image sourced from undergraduate students' (S. Magnusson, E. Hage and I. Parosu) GD Bachelor Thesis at Uppsala Universitet[2].*

Combat

Orcs are organised into a hierarchy, from Grunts, Captains, War chiefs, and Overlords, which can "rise through the ranks by killing you or all other Orcs"[3] making them stronger and more challenging.

This system in return also creates a dynamic world. As you interact with these enemies, their characteristics evolve based on player actions. For example, injuring or cutting off an Orcs limb, " tells the system to go through and look at all of the different possible reactions that could happen"[4] based on that event. "The Nemesis System looks at multiple data points from past fights"[4] and therefore the injured Orc will then either be given a stump, prosthetic, or a related voice line in future encounters.

As the game is played, time progresses accordingly either as through completing missions or player death. This process ensures a constant influx of new orcs, and if all positions in a region are filled they will start challenging each other for those spots. any fallen orc captains are replaced with new ones.

Recruitment

Recruitment plays a vital role in the nemesis system, where players can dominate and recruit orcs to build an army. To recruit, players must first weaken and break an Orc Captain who is "of equal or lower level"[3]. Once recruited, these Orcs can serve various strategic roles such as aiding players in battle, assassinating enemy Captains, or acting as bodyguards. The nemesis system implements the ability for orcs to remember and react according to player action, thus affecting their loyalty, as well as their strength.

Other Emergent Narrative Elements

Figure 2: An in-game screenshot showcasing the player (Talion) standing in-front of his recruitments

There are both **system driven** and **player driven** emergent events within Shadow of War. Some of the system driven events include "ambush, betrayal, and cheating death"[2]. Meanwhile, the player driven events require the player to choose to seek out or interact with, such as the discovery of hidden orcs, Fight Pits, or completing Nemesis Missions.

Loyalty

"Just as an Orc can betray their kind, your brainwashed Orcs can also betray you"[3] This is irrespective of captains and war chiefs who remain loyal, unless faced with unlikely events or glitches. Your average Orc's loyalty is dependent on your actions as their leader. Positive actions such as "killing enemies in front of your friendly captains" "saving friendly captains from bleeding out"[7] as well as taking your followers on missions and interacting with them contributes towards their loyalty. Should a player act in a negative manner and "repeatedly attack and hurt an allied follower"[6], "failing to enact vengeance after a captain kills you" "calling upon your bodyguard too often or too rarely"[7] will have a counteractive effect, therefore building up towards your betrayal.

Missions and Performance

Throughout the world, there will be Nemesis events involving Orc Captains competing for power in which the player can choose to intervene. Player actions will shape not only the outcome of the battle but also generate varying objectives from "duels" to "ambushes"[3]

Should a player have recruited Orc captains as allies, they are then able to "command them to engage on Nemesis Missions"[9]. Once Orcs have been sent into their respective missions, their performance will be determined by the players actions, and whether they chose to intervene. Players are able to aid their allies in the majority of the missions, except for Fight Pits.

The Fight Pits and Cheating Death

Fight Pits serve as a way for Orcs to gain glory and prove their strength through battle. They are also used for levelling up and specific gameplay strategies such as for an Orc to become a "bodyguard to a war chief"[3]. Should they die in battle, the majority of the time they are gone for good. However, there is a chance that enemies "may cheat death and turn traitor due to resentment"[8] thus attacking the player.

Certain enemies that harness the ability to cheat death take these past battles into consideration, either coming back stronger or weaker because of it. They can harbour "scars or disfigurements from previous battles" [10] Their wounds not only affect their appearance but also how they behave when players approach them in future.

4. Ethical Concerns: Patent on a game mechanic.

Mechanics and systems are the building blocks of games and are quite often reused, copied, or improved upon by other games. Like most technologies, video games build upon what came before, and the complexity and polish of video game mechanics are cumulative, over time. However, despite this, there are a few cases where companies have tried (and sometimes succeeded) to patent a game mechanic. One example is Namco Ltd's (now-expired) patent on loading screen mini-games - which led to decades of games with boring loading screens, where player's just watched a progress bar, spinning icon or repeating animation while they waited. Another example is Warner Bros' patent on the Nemesis System. While it is perfectly legal to patent systems like the Nemesis System, patents on video game mechanics and systems are "antithetical to gameplay innovation"[5].

5. Conclusions

The core idea of the Nemesis System was to facilitate "interactive storytelling, and emergent narrative"[2] and when looking at all the different aforementioned aspects of this system, as well as player feedback online, it is clear to see that the system succeeds in this endeavour. Through the various combat encounters, recruitment opportunities, emergent events, emergent outcomes to encounters all work together to create emergent narratives that make each player's experience different from others. This is one of the most innovative game systems in recent years. However, the ethical concerns due the system being patented lessens the impact and legacy a system could have had since it "heavily discourages creatives from exploring"[5] ways of creating even better systems that create emergent narratives and dynamic stories.

References

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