

# Game Narrative Design: Plant Trivia, World-building and Player Engagement in *Plants vs. Zombies*

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## Abstract

In the *Plants vs. Zombies* universe, plants are not merely weapons for players to overcome obstacles; they are also vivid characters with rich tales. Based on the Environmental Storytelling Theory (Jenkins, 2004), this study mainly examined the variations in the trivia narratives of three plant types and the relationship between the Plant Trivia narratives, world-building, and player engagement in *Plants vs. Zombies*. From the humanistic background, operational logic, and natural environment perspectives, there are significant variations in the trivia narratives among aggressive plants, sacrificial plants, and supportive plants. The Plant Trivia narratives may interact with the *Plants vs. Zombies* world-building through demonstrations of plant images, animations, and player missions. Additionally, players' engagement in non-textual narratives may be enhanced by the Plant Trivia within the *Plants vs. Zombies* world-building. This study may provide some perspectives on the game design of character narratives involving the interaction between textual and non-textual elements in tower defense games.



Full Text Article



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**Keywords:** Game Narrative; World-building; Player Engagement

## 1. Introduction

The game does not constantly attempt to tell a story; rather, it employs story elements to make its rules and mechanics accessible and adaptable (Sengun, 2022). Interpretation should be regarded as the end result that guides the refinement of narrative design (Rivera et al., 2023). As a unity of carefully selected game mechanics, narrative design adheres the story elements in either textual or symbolic/visual form with the aim of fulfilling the desired gaming experience for the players (Koenitz, 2024). Game narratives have been examined from player engagement and meaning-making (Maine, 2017), postcolonial co-production (Lammes & Smale, 2018), formal complexity

and its connection with audience response (Bellini, 2021), emergent narrative and brand co-creation behaviors (Burgess & Jones, 2022). The discourse analytical approach has been applied to studies in game design, including exploratory thematic analysis (Lu et al., 2019), content analysis, and correspondence analysis (Tang & Zhang, 2019).

As a tower defense video game, *Plants vs. Zombies (PvZ)* has received wide acclaim since 2009. Players are required to strategically position a variety of plants to prevent an army of zombies from entering their house and devouring their brains. The game showcases different types of plants, each with distinct capabilities, and several types of zombies, each with their own traits, creating a dynamic gameplay experience. Previous studies on *PvZ* mainly focused on life-and-death educational meaning (Zhang, 2015), in-house pharmacy (Yap et al., 2016), players' behavior (Johannes et al., 2021). World-building involves the development of all the details of the world in which a story occurs, including its history/geography, peoples/races, governments, science/technology, religions, and languages (Heussner et al., 2015). In reality, apart from dialogue and authored missions, most of the game's world-building is concealed (Paterson et al., 2019). However, few studies have delved into the Plant Trivia in *PvZ*, much less its connection to game world-building and player engagement. According to the Environmental Storytelling Theory (Jenkins, 2004), the Plant Trivia may establish the preconditions for an immersive *PvZ* narrative experience in four ways: evoking pre-existing narrative associations; offering a staging ground where narrative events are enacted; embedding narrative information within their mise-en-scene; providing resources for emergent narratives.

This study mainly probed into the game narratives in Plant Trivia of the original version of *PvZ*. As the beginning of the *PvZ* universe, the roles of plants in this version laid the foundations for the subsequent versions. Regarding the five natural battling scenes: day, night, pool, roof and fog, plants are categorized into the following three types based on their functions in community battles, as indicated in Table 1.

Table 1 Classifications of Plants in *PvZ*

Types	General Descriptions	Examples
<b>Aggressive</b>	Directly attack zombies, no self-destroying (unless intentionally bitten by zombies)	<b>Peashooter</b> shoots peas forward. <b>Fume-shroom</b> emits a penetrating spore cloud. <b>Cactus</b> fires spikes.
<b>Sacrificial</b>	Distract, delay, or sacrifice themselves	<b>Cherry Bomb</b> explodes when placed, destroying zombies in a certain area. <b>Wall nut</b> slows down zombies by absorbing damage.
<b>Supportive</b>	Provide energy, coins or weather condition	<b>Sunflower</b> generates sun points for more plants. <b>Lilypad</b> places non-water plants on water.

## 2. Methodology

### 2.1 Tagging Framework

The in-depth content analysis of the Plant Trivia narratives is conducted based on the following Table 2.

Table 2 the Plant Trivia Tagging Framework

Categories	Sub-Categories	Examples
<b>Humanistic Background</b>	Traits & Emotions	<i>Chomper's not resentful, though. He says it's just part of the business.</i>
	Experience & Hobbies	<i>It was a crazed night of forbidden science that brought Twin Sunflower into existence.</i>
	Inter-Plants Relationships	<i>Explode-O-Nut: How could there be anything between us? We are brothers. If you knew what Wall-nut has done for me...</i>
<b>Operational Logic</b>	Game Mechanism	<i>Sun-shroom hates sun. He hates it so much that when it builds up in his system, he spits it out as fast as he can.<sup>1</sup></i>
	Plants Functions	<i>Wall-nut: "People wonder how I feel about getting constantly chewed on by zombies,"</i>
<b>Natural Environment</b>	Environmental Adaptability	<i>Other plants eat light and excrete oxygen; Plantern eats darkness and excretes light.</i>
	Natural Elements Application	<i>Magnetism is a powerful force. Very powerful. Sometimes it scares Magnet-shroom a little.</i>

<sup>1</sup> This can also be seen as a personal trait of Sun-shroom. However, this trivia can reflect the inability of some night plants in the day scene, and thus it is classified into the interpretation of the game mechanism.

## 2.2 Research Questions

This case study managed to address the three questions:

- (1) How do the trivia narratives of aggressive, sacrificial and supportive plants in PvZ vary in humanistic background, operational logic and natural environment?
- (2) How do the Plant Trivia narratives interact with the PvZ world-building, along with related visual elements?
- (3) How do the Plant Trivia narratives contribute to player engagement within the PvZ world-building?

## 3. Results

### 3.1 Variations in the Plant Trivia Narratives between Three Types of Plants

The narrative variations of the Plant Trivia in humanistic background, operational logic and natural environment are respectively demonstrated in Table 3, Table 4 and Table 5.

Table 3 the Plant Trivia Narratives Variations in Humanistic Background

Humanistic Background	Aggressive Plants	Sacrificial Plants	Supportive Plants
Traits & Emotions	Determination; Hidden desire for love <sup>2</sup>	Bravery Self-sacrifice	Contentment & Contemplation <sup>3</sup>
Experience & Hobbies	Combat-oriented Hobbies	Narrating impacts of immediate actions	Focus on oneself <sup>4</sup>
Inter-Plant Relationships	Combined Performance <sup>5</sup>	Close-relationships <sup>6</sup>	Nurturing relationships

<sup>2</sup> Repeater is fierce. He's from the streets. He **doesn't take attitude from anybody**, plant or zombie, and he shoots peas to keep people at a distance. Secretly, though, Repeater **yearns for love**.

<sup>3</sup> Marigold spends a lot of time deciding whether to spit out a silver coin or a gold one. She thinks about it, **weighs the angles**.

<sup>4</sup> Pumpkin hasn't heard from his cousin Renfield lately. Apparently Renfield's a big star, some kind of... what was it... sports hero? Peggle Master? **Pumpkin doesn't really get it**.

<sup>5</sup> Everybody likes and respects Torchwood. They like him for his integrity, for his steadfast friendship, for his ability to greatly maximize pea damage.

<sup>6</sup> "I wanna explode," says Cherry. "No, let's detonate instead!" says his brother, Cherry. **After intense consultation they agree to explodonate**.

Table 4 the Plant Trivia Narratives Variations in Operational Logic

Operational Logic	Aggressive Plants	Sacrificial Plants	Supportive Plants
Game Mechanism	Continuous,ranged attacks <sup>7</sup>	Immediate, high-impact effects	Five scene & Plants restoration <sup>8</sup>
Plants Functions	Descriptions of weapons	Descriptions on attacking processes <sup>9</sup>	Details on resources provided

Table 5 the Plant Trivia Narratives Variations in Natural Environment

Natural Environment	Aggressive Plants	Sacrificial Plants	Supportive Plants
Environmental Adaptability	Few related narratives		Environmental-dependent Performance <sup>10</sup>
Natural Elements Application	Some directly apply natural elements in attack <sup>11</sup>		Directly apply natural elements to support the team <sup>12</sup>

### 3.2 Relationship between the Plant Trivia Narratives and the PvZ World-building

The Plant Trivia narratives are closely interrelated to the overall PvZ world-building through related visual elements like plant images, animations, and player missions. Compared with machinery zombies, plants are not merely weapons for players to overcome obstacles; they are also vivid characters with rich stories in the PvZ universe. Firstly, the Plant Trivia narratives are an

<sup>7</sup> "Who's there?" whispers Scaredy-shroom, voice barely audible. "Go away. I don't want to see anybody. Unless it's the man from the circus." (A certain distance might be necessary for aggressive plants to attack zombies.)

<sup>8</sup> Flower Pot: "I'm a pot for planting. Yet I'm also a plant. HAS YOUR MIND EXPLODED YET?" (Plants cannot be placed directly on the roof. Supportive plants, although not involving ATK, require solar energy for restoration.)

<sup>9</sup> "Zombies are our friends," asserts Hypno-shroom. "They're badly misunderstood creatures who play a valuable role in our ecology. We can and should do more to bring them round to our way of thinking." (Zombies are compelled to attack other zombies, like the mission of plants.)

<sup>10</sup> Why, the life-giving jazzy rhythm of the Earth itself, thumping at a frequency only Sunflower can hear. (Sunflower can generate more sun points during the day than at night.)

<sup>11</sup> Folks often tell Snow Pea how "cool" he is, or exhort him to "chill out." They tell him to "stay frosty." (Snow Pea utilizes ice in attack.)

<sup>12</sup> When Blover was five he got a shiny new birthday cake. Blover made his wish, huffed and puffed, but was able to extinguish only 60% of the candles. Instead of giving up, though, he's used that early defeat as a catalyst to push himself harder ever since. (The wind is utilized by Blover to improve visual clarity.)

impressive reflection of their images, achieving a personification effect. For instance, the helmet of Gatling Pea indicates its military experience. The trip of Spikerock to Europe reflects its extensive exposure to the ground. The “one head with a large head-like growth on the back” of Split Pea vividly portrays its double-directed image. More importantly, some Plant Trivia narratives show a strong contrast between their appearances and dispositions. For example, the spikes of Cactus “believe a spongy heart filled with love and goodwill” beneath its prickly shape. Cattail refuses to “be pigeonholed” despite her cute cat-like appearance. Grave Buster spends hours “volunteering at a local zombie rehabilitation center” although he looks terrifying. Secondly, the Plant Trivia narratives can vividly present the animation effects in the battle scene. For example, Sunflower’s “bouncing to the beat” indicates its body shaking when generating solar energy. The agreement of Cherry and its brother to explode depicts the squeezing between two cherries. Scaredy-shroom’s “Go away. I don’t want to see anybody.” describes its shrinking when zombies approach. Umbrella Leaf’s “SPROING! Woo!” vividly portrays its expanding to bounce back parachute zombies. Thirdly, the Plant Trivia narratives can signify player missions in *PvZ* — pushing zombies away from home by employing multiple plant weapons. For instance, “Everybody likes and respects Torchwood.” could imply Torchwood’s outstanding performance with pea-shooting plants. Also, Garlic’s “advanced Doctorate in Redirection” showcases another significant battling strategy — moving zombies between lines. Additionally, Potato Mine’s “leaving everything to the last minute” indicates that the implementation of Potato mine needs to be early, unlike other seconds-lethal sacrificial plants such as Cherry.

### 3.3 Contributions of the Plant Trivia Narratives to Player Engagement under the *PvZ* World-building

In *PvZ*, the rich Plant Trivia narratives can enhance players’ engagement in zombie battling. Apart from the stereotypical impression of trivial narratives from three types of plants signifying different qualities needed in life, such as bravery represented by aggressive plants, selflessness represented by sacrificial plants, and contentment represented by supportive plants, there are numerous interesting trivial narratives serving as a mirror to modern society, including psychological states, love, self-efficacy, and the human-nature relationship. Regarding the psychological state, the shrinking of Scaredy-shroom when strangers come closer is a vivid manifestation of social phobia. The feeling of “a relaxing back rub” expressed by Wall-nut when constantly being chewed by zombies absurdly describes a numbing mental state under great pressure. Love is also often mentioned in Plant Trivia narratives, such as the worries of Gatling Pea’s parents before their son’s enlistment in the military and Cactus’ longing to hug and be hugged. Although *PvZ* is a tower-defense game, some Plant Trivia narratives may suggest that there is no absolute opposition between plants and zombies. For instance, Hypno-shroom admits the valuable role of zombies in the ecology, and Grave Buster volunteers at a zombie rehabilitation center. Many Plant Trivia Narratives reflect plants’ self-efficacy, like Gloom-shroom’s delight in releasing heavy fumes and Garlic’s enthusiasm for line diversion. Regarding human-nature relationships, the Plant Trivia narratives mainly involve the metabolism of life as indicated by Sunflower’s perception of the “life-giving jazzy rhythm of the earth”; the necessary respect for natural power, such as Magnet-

shroom's trepidation regarding its magnetism; and the high-technology refinement of nature beings, such as the generation of Twin Sunflower.

#### 4. Discussion & Conclusion

In game design, it is crucial to create a world that appears to function genuinely as an internally coherent fictional space (Johnson, 2020). Regarding players' inability to directly communicate with roles in tower defense games like *PvZ*, various trivia narratives from aggressive, sacrificial, and supportive plants serve as a significant channel for players to understand the *PvZ* universe and engage in non-textual narratives by defending their homes in successive battles. At its core, the world-building of *PvZ* is a large system composed of natural elements such as the sun and fog, diverse plant weapons, and battles to eliminate zombies. Out of curiosity for weapons rather than enemies, although zombies may have their own stories, players may tend to focus on the stories of plants. The consistency between the Plant Trivia narratives and the *PvZ* world-building can be demonstrated through previous analysis — variations in the trivia narratives from three types of plants regarding humanistic background, operational logic and natural environment, along with plant images, animations and player missions. Emotional attachment to game characters varies from feeling excited and powerful to feelings of mutual sympathy, care, and concern for the characters' well-being (Bopp et al, 2019). More importantly, although the player cannot choose which plant to represent, under the *PvZ* world-building, the engagement of players in the tower defense may be enhanced through elements of modern society reflected in the Plant Trivia narratives, such as social phobia and respect for nature.

Based on the Environmental Storytelling Theory (Jenkins, 2004), this study mainly adopted the content analysis approach to explore the variations in the trivia narratives of aggressive plants, sacrificial plants and supportive plants, as well as the relationship between the Plant Trivia narratives, world-building and player engagement in *Plants vs. Zombies*. The Plant Trivia in the first season of *PvZ* was tagged with a framework consisting of the humanistic background, operational logic and nature environment, each with several sub-categories. As demonstrated by the tagging results, apart from the predictable variations in accordance with the plants' functions, there were also some distinctive themes in each type of plants, such as the hidden desire for love of aggressive plants, the attacking process of sacrificial plants and the environment-dependent performance of supportive plants. Notably, the game mechanism, inter-plants relationship and the application of natural elements are elaborately indicated in all the three types of plants. The Plant Trivia narratives can be connected to the world-building in *PvZ* through the demonstration of plants' image, animation and player missions. Moreover, the Plant Trivia narratives may draw players into non-textual narratives by indicating common modern social themes, such as love, psychological state, self-efficacy and human-nature relationships. Eventually, the combined effects of Plant trivia narratives and the world-building of *PvZ* may enhance players' engagement in non-textual narratives. Limitations of this case study may involve the absence of experiments to further elaborate a more accurate relationship between player engagement and the world-building of *Plants vs. Zombies*. Additionally, the tagging and analysis of the Plant Trivia may be partially based on the author's subjectivity. This case study probably established connections between textual and non-textual narratives in tower defense games, providing some insights into the narrative design of game

characters. Future studies may focus on the impact of game character narratives on players' emotions.

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## Conflict of Interest

The authors declare no conflict of interest.

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