A Review of Game Design Techniques for Evoking and Managing Curiosity

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Abstract. Curiosity is essential for learning and discovery and is a key motivational factor for playing games. As a complex psychological phenomenon, curiosity has been studied extensively in psychology, education, and other fields, and many theories have been proposed. In the field of game design, many techniques have been developed to evoke players' curiosity. However, there is a gap between theoretical insights and practical application. This paper aims to bridge that divide by providing a comprehensive review of game design techniques for evoking and managing curiosity. We attempt to connect practical game design techniques with curiosity theories to help people understand the psychological mechanism of curiosity in the context of games. Our first contribution is to develop a theoretical framework for systematically categorizing game design techniques for evoking and managing curiosity. Our second contribution is to use this framework to classify and analyze many game design techniques. Our work not only provides a deeper understanding of how curiosity can be managed in games but also provides a framework for game designers to develop new techniques.

Keywords: Curiosity · Game Design · Game Mechanics · Artifacts

1 Introduction

Curiosity, the strong desire to learn about something or seek new experiences, is an integral part of human cognition and essential for learning and discovery. Curiosity is important for game design because it motivates players to engage with the game, leading to a higher level of enjoyment [16]. Researchers in psychology, education, communication, and behavioral science have proposed various theories on the causes and natures of curiosity [1,4,10–12,14,15,17,19,20,24], and some of the theories have been adapted to game design [3,6–8,18,26]. Despite the advances in theoretical studies, there still lacks a comprehensive review of game design techniques that affect players' curiosity. From a game designer's perspective, the key question is, "How to evoke players' curiosity in games?" While theories may offer high-level concepts like "create information gaps" or "create novelty," the existing literature falls short of providing specific, actionable guidance needed for practical implementation. For this reason, a comprehensive

A. L. Brooks (Ed.): ArtsIT 2023, LNICST 565, pp. 111–126, 2024.
https://doi.org/10.1007/978-3-031-55312-7_9

examination of game design techniques can bridge the gap between theoretical concepts and practical applications.

In this paper, we provide a comprehensive review and categorization of game design techniques for evoking and managing curiosity. For this review, we have developed a theoretical framework by integrating and expanding the existing theories on curiosity in games. Based on this framework, we have identified and analyzed a large number of game design techniques that can evoke players' curiosity.

Our work makes two novel contributions. First, we have developed a new framework for categorizing game techniques for curiosity. Specifically, we divide game design tasks into three layers: storytelling, game mechanics, and artifacts. Within each layer, we first categorize game design techniques based on the two primary curiosity motives: deprivation and discovery. We further classify the techniques based on the types of uncertainties or curiosities they evoke. This theoretical framework helps analyze existing game design techniques and can be used as a brainstorming tool for game designers to develop new ideas. This framework may also help people design serious games for learning or for studying human cognition.

Second, this is the most comprehensive review of game design techniques for curiosity compared to previous works. Although many techniques in our study have been well-known in the game design field, they have rarely been analyzed through the lens of curiosity theories. Therefore, we bring a new analytical perspective on these techniques for game designers.

The rest of the paper is organized as follows. In Sect. 2, we briefly review the theories of curiosity and previous works on curiosity in games. In Sect. 3, we present our theoretical framework for classifying curiosity-driven game design techniques. In Sect. 4, we discuss storytelling devices for evoking curiosity. In Sect. 5, we discuss the various game mechanics for evoking and managing curiosity. In Sect. 6, we discuss using game artifacts to evoke curiosity. In Sect. 7, we discuss secondary game design techniques that may change the intensity of curiosity. The last section is the conclusion and future work.

2 Background and Related Work

2.1 Theories of Curiosity

Curiosity is a psychological state characterized by a strong desire to explore, seek information, and learn about the unknown. Many theories about curiosity have been proposed and debated [4,14,15]. These theories provide a foundation for understanding how different game design techniques evoke and manage curiosity.

Loewenstein, et al. [14,15] provide comprehensive reviews of the research on curiosity, focusing on its psychological underpinnings, measurement, dimensionality, and situational determinants. Dubey and Griffiths [4] pointed out that previous theories about curiosity generally fall under two different theoretical approaches: novelty-based theories and complexity theories. The novelty-based theories hypothesize that gaining information to satisfy curiosity brings reward

and pleasure [4,5,12–14,20]. This means that curiosity may also lead many people to seek out irrelevant or negative information [19,20]. These theories suggest that curiosity is a key motivational factor that drives people to keep playing games, despite repeated failures in gameplay. The complexity theories posit that curiosity is caused by an intermediate level of complexity [4,14]. This group of theories is consistent with one of the main game design principles, that a game should be neither too simple nor too complex.

In addition, Dubey and Griffiths [4] and Wojtowicz and Loewenstein [28] have attempted to explain curiosity using economic concepts.

Some researchers have proposed different classifications of curiosity, such as perceptual curiosity, epistemic curiosity, specific curiosity, diversive curiosity, etc. [14]. Some of these classifications have been adapted to game design [26], as discussed in the next subsection. Noordewier and van Dijk [20] argued that how it feels to be curious depends on whether people have a deprivation or discovery motive. We have adopted these two motives as the basis for our classification of curiosity in games.

A relevant question is whether the intensity of curiosity is affected by external stimuli, and several previous works have addressed this question. There is evidence that the intensity of curiosity may be affected by the size of the information gap, the time to close the information gap, and the specificity of the missing information [14,20]. In other words, people tend to experience a higher level of curiosity when they feel close to finding the missing information, when the resolution appears imminent, or when the nature of the missing information is less specific. Markey and Loewenstein [15] observed that, in an educational setting, curiosity increases in supportive environments, when questions are answered effectively, on topics of importance, when information gaps are made salient, and when students are surprised.

Finally, it's important to understand that curiosity is dependent on personality [14,20]. Different people have different levels of tolerance for uncertainty and confusion. People with higher openness and a lower need for structure appreciate novel external stimuli more than people who prefer structure and clarity. As a result, the same game design technique may evoke different levels of curiosity for different players.

2.2 Previous Work on Curiosity in Game Design

To, et al. [26] analyzed the relationship between curiosity and uncertainty [2] in games and proposed a theoretical framework for studying curiosity in game design. At the center of this framework are five types of curiosity: perceptual curiosity, manipulatory curiosity, curiosity about complex or ambiguous, conceptual curiosity, and adjustive reactive curiosity. They point out that while they provide proof of concept, there is a need for systematic work that can reveal patterns and gaps in game design techniques. Specifically, they "believe it is important to collect and catalog existing techniques for curiosity management in games, even if those techniques are not intended by the designers to address curiosity as such." Our work directly addresses this issue.

Costikyan [2] identified nine types of uncertainty that help enhance the enjoyment and engagement of players in games, such as luck-based uncertainty, decision uncertainty, tactical uncertainty, etc. Given the intrinsic link between curiosity and uncertainty, Costikyan's framework significantly influenced the research conducted by To et al. [26] and our current work.

Gomez-Maureira and Kniestedt [7,8] conducted a survey to analyze which game genres and titles invoke curiosity in players. Their results showed that exploration and social simulation games ranked high in triggering curiosity. They identified curiosity-related level design patterns within these genres, such as reaching extreme points, encountering out-of-place elements, and understanding spatial connections. Later, Gomez-Maureira, et al. [9] developed a 3D open-world game to test how these level design patterns affected players' curiosity-driven exploration.

In other related works, Muscat and Duckworth [18] described the design and evaluation of a first-person exploration game and presented six design strategies for creating ambiguous exploration environments that evoke curiosity. Dahabiyeh, et al. [3] showed that curiosity was a key motivator for playing online games despite cybersecurity risks. Power, et al. [23] described a method to measure player uncertainty in games, which is closely related to curiosity.

2.3 Curiosity, Interest, and Suspense

Curiosity, interest, and suspense are often used interchangeably in causal language. Therefore, it is helpful to clarify the differences between them.

According to Hidi and Renninger [10], curiosity and interest share some common characteristics, psychological state, and physiological responses but are not the same. Curiosity is usually short-lived. Once the information gap is closed, the curiosity is over. On the other hand, interest may last a long time. Although curiosity and interest may be triggered by uncertainty, complexity, and novelty, interest may be triggered by factors not associated with curiosity. For example, a person's interest in aviation may be triggered by the heroic story of a pilot. A player's interest in gaming may be triggered by a sense of mastery and elevated social status within the gamer community.

Curiosity and suspense [21,27] are closely associated with uncertainty, but some key differences exist. Suspense is the feeling of anxiety or excitement over what will happen next. Although curiosity is an integral part of suspense, suspense is not necessarily part of curiosity. For example, a player may explore certain parts of the game world for the sake of exploration. This behavior is driven by curiosity but not suspense because there is no anxiety. While suspense is more emotional, curiosity is more intellectual.

3 Theoretical Framework

We have developed a framework to classify game design techniques for evoking and managing curiosity. The framework serves four purposes. First, it helps game

designers look for techniques that evoke and manage curiosity. Second, it helps game designers understand the psychological mechanism behind each technique for evoking or managing curiosity. Third, game designers can use this framework to brainstorm and develop new techniques for evoking and managing curiosity. Fourth, game designers can use this framework to analyze a game through the lens of curiosity, identify the types of curiosity triggered by the game, and decide whether to add more triggers for different types of curiosity.

This framework consists of the following components.

- **Layers.** We group game design techniques by these three layers: **story**, **game mechanics**, and **artifacts** [22]. Such division helps game designers focus on a specific aspect of game design at a time. In addition, stories, mechanics, and artifacts are often handled by different teams. Grouping game design techniques by layers can help different teams focus on their tasks.
- **Motives.** For each layer, we further classify the game design techniques by two curiosity motives: **(information) deprivation** and **discovery** [20]. Each game design technique is aimed at creating a particular curiosity motive.
- **Curiosity triggers.** Each game design technique is connected with one or more curiosity triggers. For the techniques in the deprivation motive group, each trigger is a type of uncertainty. For the techniques in the discovery motive group, each trigger is a type of novelty. We use Costikyan's classification of uncertainty [2] as the basis for our framework. These uncertainties include the following.
  - Luck-based uncertainty
  - Hidden information uncertainty
  - Decision uncertainty
  - Skill uncertainty
  - Strategy uncertainty
  - Environmental uncertainty
  - Metagame uncertainty
  - Tactical uncertainty
  - Social uncertainty
- **Curiosity types.** Each curiosity trigger is then connected with a curiosity type. The connection between a game design technique, the trigger, and the curiosity type reveals how the game design technique triggers curiosity in players. In this framework, we adopt the curiosity types proposed by To, et al. [26].
  - Perceptual curiosity
  - Manipulatory curiosity
  - Curiosity about complex or ambiguous
  - Conceptual curiosity
  - Adjustive-Reactive curiosity

– **Secondary game design techniques.** Secondary game design techniques may not directly evoke curiosity, but they can modulate the intensity of curiosity [14,15,20]. Examples include revealing player progress, strategically dispensing information to adjust informational gaps, or adjusting the complexity of the tasks.

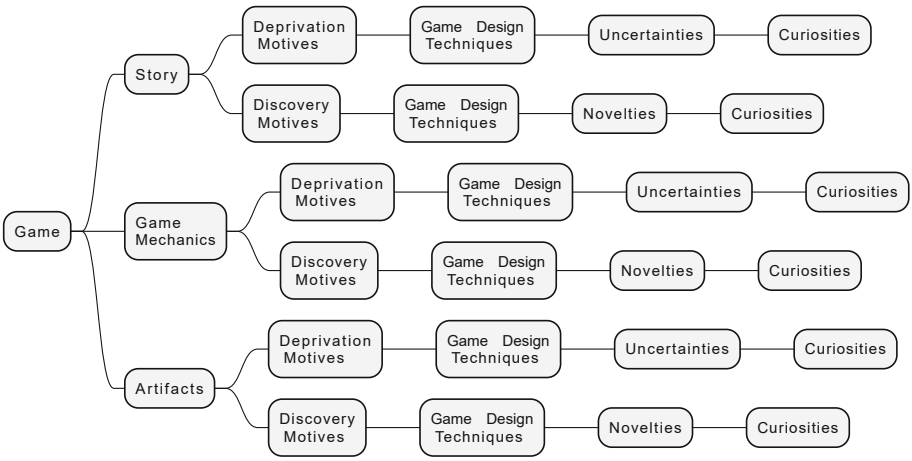


Fig. 1. This figure shows our framework for classifying the game design techniques for evoking curiosity. The secondary design techniques are not included here to keep the picture simple.

Figure 1 shows our framework for classifying the game design techniques for evoking curiosity. This framework allows us to systematically classify various game design techniques and connect them with different curiosity types based on some of the theories discussed earlier. With this framework and the classified techniques, a game designer can ask various questions, such as the following.

– What techniques can I use to evoke perceptual curiosity?
– What kind of curiosity is evoked if I allow users to randomly pick up and play with many game objects?
– How to use the camera to evoke curiosity?
– How to use game mechanics to evoke conceptual curiosity?
– What specific types of curiosity are evoked within this level? How can a broader range of curiosity triggers be incorporated for a more diverse experience?
– Can I develop a novel game design technique based on the mechanism of curiosity?

The discussion below is organized as follows. First, we divide our discussion into three layers: story, game mechanics, and artifact. Within each layer, we

further divide the discussion based on the two curiosity motives: deprivation and discovery. Within each motive group, we list and discuss the game design techniques for evoking curiosity and how each technique triggers a specific type of curiosity. Finally, we discuss how secondary techniques can be used to modulate the intensity of curiosity.

4 The Story Layer

The story layer of a game is similar to the traditional storytelling medium such as film, TV, and literature. Therefore, many conventional storytelling devices can be applied to game storytelling. In this layer, information can be passed to players via cutscenes, dialogues with Non-Player Characters (NPCs), voiceover, and artifacts such as documents, videos, text messages, voice messages, signs, etc.

4.1 Deprivation Motive

Information deprivation [20] means that a player realizes certain information is missing, which is called an information gap [14]. The desire to close the information gap motivates the player to seek the missing information. To create a deprivation motive, game designers must first provide players with partial information, making them aware of the existence of knowledge they currently don't possess. The key questions are how much information should be disclosed to the players and how to present that information. We have identified the following groups of design techniques for evoking curiosity.

- **Forward or backward referencing.** Forward referencing, also called foreshadowing, informs players of a future event, often a significant one, such as a big showdown, a big decision, a big award, etc. Certain NPCs may give players hints about a future or past event. For example, the game may begin with an unresolved conflict between the player and an enemy, with the enemy promising to return for revenge. Or let the player know that a certain NPC possesses some key information.
  Or the designer may adopt a reversal narrative structure [12], where an event is presented at the beginning, and then the story goes back and starts from an earlier time. Other common techniques include flashforwards, flashbacks, an oracle-like figure making predictions, etc.
  Forward or backward referencing creates hidden information uncertainty [2]. The desire to know the details or outcome of future or past events triggers conceptual curiosity [26].
- **Mystery.** Mystery also creates hidden information uncertainty, which triggers conceptual curiosity. Here are some common design techniques.
  - Create a mystery character where the character's identity, history, whereabouts, capability, intention, motivations, or any combination of them is unknown. For example, Andrew Ryan is a mysterious character in BioShock.

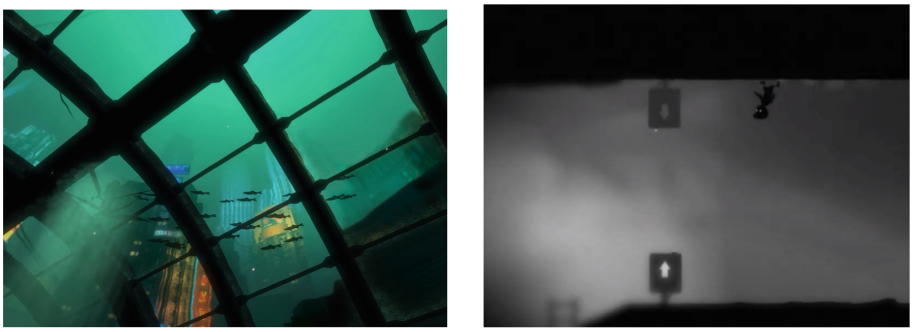
  - Create a mystery object whose characteristics, history, whereabouts, or usage are unknown. For example, Majora's Mask is a mysterious object in The Legend of Zelda: Majora's Mask.
  - Create a mystery event where some details are unknown.
  - Create cryptic messages. For example, the game Fez is filled with mysterious symbols and encrypted languages.
  - Create a locked room mystery. This technique is often used in crime stories where a crime is carried out in a way that seems impossible to explain. We use the term "locked room mystery" to describe any mystery that defies the usual logical explanations.
- **Multiple options.** Providing players with multiple options can create decision uncertainty [2] that triggers curiosity about complex or ambiguous [26]. Here are some common design techniques.
  - Create a branching story and let the player choose which branch to follow. Players will be curious to know what each ending is like if the game has multiple endings, such as in BioShock.
  - Create parallel stories and switch between them. This technique is often used to create cliffhangers that make readers want to know what happens next in the other stories.
  - Create moral dilemmas. For example, in The Witcher 3: Wild Hunt, players need to make decisions often involve moral dilemmas.
  - Use ambiguous language that can be interpreted in different ways. For example, the game Braid often presents texts that are intentionally vague and open to multiple interpretations.
  - Provide contradictory information. For example, in the game Soma, the main character Simon Jarrett is often given contradictory information.

4.2 Discovery Motive

Discovery motives are related to people's desire to attain new knowledge [20]. Based on the curiosity classification by To, et al. [26], this type of conceptual curiosity is triggered by novelty, not by uncertainty. There are many techniques to add novelties to a story, and here are some examples.

- **Create unusual situations and unusual events.** For example, in Japan World Cup, characters ride on pandas, fake horses, and other weird things
- **Create an unusual environment.** For example, BioShock is set in an underwater city (Fig. 2), a very unusual environment.
- **Create unusual characters.** In the game Dropsy, the main character is a clown exploring a strange world with unusual characters.
- **Create surprises.** For example, BioShock Infinite contains a major plot twist.
- **Tell the story from an unusual perspective.** For example, the game Spec Ops: The Line is told from unusual perspectives, as the main character's mental health gradually deteriorates.
- **Use novel narrative structures.** For example, the game Her Story is based on an unusual narrative structure based on found footage.

- **Use non-linear storytelling.** For example, BioShock contains multiple endings.
- **Subvert common tropes.** For example, the game Undertale subverted the common RPG tropes by allowing players to befriend monsters instead of fighting them.



(a) (b)

Fig. 2. a. The underwater city of Rapture in BioShock; b. The reverse-gravity mechanics in Limbo

5 The Game Mechanics Layer

The terms "game mechanics" and "gameplay" are often interchangeable. But we differentiate the two terms as follows. Gameplay is about looking at a game from the player's perspective. Game mechanics is about looking at a game from the game designers' and developers' perspectives. Game mechanics include gameplay and everything a player cannot see or control, including goals, rules, and behavior of game objects. Some games, such as The Last of Us, have substantial story and game mechanics layers. But some games, such as Super Mario Bros and Pacman, focus primarily on the game mechanics layer, with little to no story. Even without a story, there are still many ways to evoke curiosity through game mechanics.

5.1 Deprivation Motive

In the game mechanics layer, deprivation-based curiosities are triggered by the uncertainty and complexity of game mechanics. Here are the common design techniques for evoking curiosity.

- **Information hiding.** Naturally, most games only provide players with partial information about the opponents. If a player does not know when or how the opponent will attack, this creates hidden information uncertainty [2] that triggers conceptual curiosity [26].

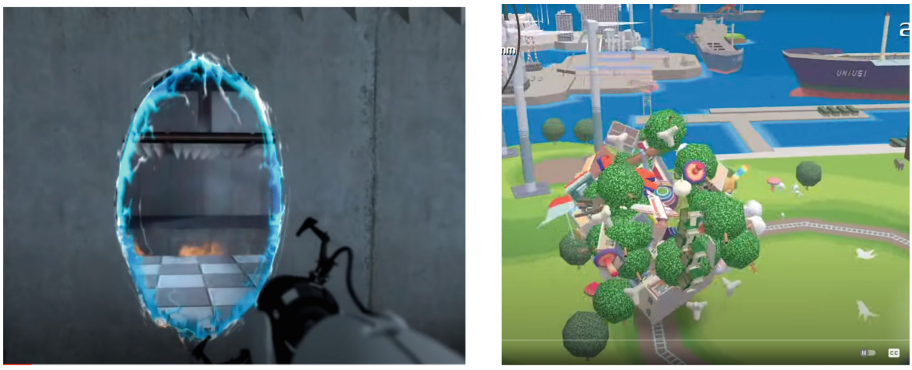
- **Creating moderately complex gameplay.** Complex gameplay can be created by providing players with different weapons or tools, weapon upgrades, or customization. In chess, each player can use 16 pieces to generate enormous gameplay. Game designers can also introduce rules to create complex gameplay. For example, in Shogi (Japanese chess), players can incorporate captured pieces into their own army, resulting in unusually complex gameplay. Giving players many options can also create complex gameplay. The board game Go might look like a simple game with only a single type of piece. But its 19×19 board (and 361 initial options) enables extremely complex gameplay.
  Complex gameplays create decision uncertainty, skill uncertainty, tactical uncertainty, and strategic uncertainty [2] that trigger curiosity about complex and ambiguous [26]. However, it should be noted that curiosity theories suggest that the relationship between curiosity and complexity resembles a reversed U-shaped curve. Very low or very high complexity will lead to diminished curiosity. Therefore, it's important for game designers to tune the complexity of gameplay to evoke a high level of curiosity.
- **Missing objects.** Game designers can introduce treasure hunts or add Easter eggs into a game to create hidden information, uncertainty, and conceptual curiosity.
- **Mysterious objects and opponents.** The game may provide players with mysterious objects, such as mysterious weapons or vehicles (e.g., the gravity-reversing machine in the game Limbo, Fig. 2), where their behavior and purpose are not fully explained. The players need to figure out how to use them to achieve goals. Mysterious objects create hidden information uncertainty that may trigger manipulatory curiosity, conceptual curiosity, adjust-react curiosity, and curiosity about complex and ambiguous [26]. The game may provide weapon lore or backstories to further heighten the mystery and curiosity. Similarly, game designers may also introduce mysterious opponents.
- **Puzzles.** Adding a puzzle to the game is like asking the player a question, which creates conceptual curiosity [14,26].
- **Randomizers**. Randomizers, such as dice, card shuffling, and random pairing of players, make the game unpredictable, creating luck-based uncertainty [2] that triggers conceptual curiosity.

5.2 Discovery Motive

Game mechanics are very effective tools for evoking curiosity via discovery motive because there are many opportunities to introduce novel game mechanics. Novel game mechanics can trigger a variety of curiosities, such as manipulatory curiosity, conceptual curiosity, adjustive-reactive curiosity, and curiosity about complex or ambiguous. This is one of the reasons why many games are fun and addictive. Here are some common techniques for evoking curiosity.

- **Novel weapons or tools.** For example, the Portal Gun (Fig. 3) was a novel tool when the game Portal was released.

- **Novel tactics.** In the game Katamari Damacy, the players are tasked with rolling a sticky ball called Katamari to pick up various objects (Fig. 3), a very unusual tactic at the time. In Miegakure, players can use a fourth spatial dimension to go through a wall (Fig. 4).
- **Novel rules.** Some games introduce new and unusual rules to trigger player curiosity. Some games contain different game modes where the rules are different and sometimes reversed (e.g., Pacman). For example, in a sandbox mode, the normal rules of a game are abandoned or significantly changed. The changing of rules creates a sense of novelty that triggers curiosity.
- **Constructive play.** Constructive play allows players to build characters, objects, or environments. The freedom to create something new fits well with the discovery motive for curiosity.



(a) (b)

Fig. 3. a. The portal gun in Portal; b. The sticky ball in Katamari Damacy

Repeated gameplay is often considered detrimental to curiosity and suspense because the players already know what is going to happen, and the uncertainty is reduced. However, if properly designed, repeated gameplay can be used to enhance curiosity. If the game has a pattern of introducing random and novel mechanics and objects, the repeated gameplay creates expectations for future novelties, just like foreshadowing in storytelling.

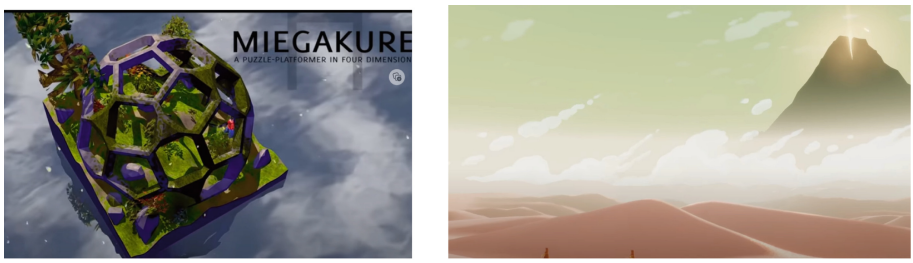
6 The Artifact Layer

The artifact layer includes all the graphical objects, sound, animation, and visual and environmental effects. Artifacts can be used to create both information gaps and novelties.

6.1 Deprivation Motive

Artifacts can be used to direct a player's attention to certain information, creating hidden information uncertainty and environmental uncertainty [2] that trigger conceptual curiosity [26].

- **Clues.** Game designers can use visual and audio clues to provide players with partial information. For example, in The Last Of Us, blood on a wall indicates something bad has happened, triggering conceptual curiosity. Lights and sounds can direct a player's attention to hidden things. In the game Journey, the light in the distance evokes the players' curiosity throughout the game (Fig. 4). Haptic feedback from game controllers can also indicate something is coming. Maps, posters, and signs in the game world can guide players toward an unknown place.
- **Camera control.** A camera can guide a player's attention toward certain intriguing information. The camera framing and angle can hide certain information, creating an information gap. For example, if the camera follows an unknown character from the back, it evokes curiosity about the character's identity. An extremely close shot of an object makes players wonder what the object is like as a whole.
- **Complex or intriguing objects.** Complex or intriguing objects, including intriguing sounds, may evoke curiosity about complex and ambiguous [26]. For example, in the game Control, the main character encounters complex machines and paranormal devices.



(a) (b)

Fig. 4. a. Miegakure includes a fourth spatial dimension. b. The mysterious light in Journey

6.2 Discovery Motive

The artifacts are particularly useful for creating perceptual curiosity, manipulatory curiosity, and adjustive-reactive curiosity [26].

- **Playable objects.** Create objects that players can pick up, manipulate, or play with. Create machines that players can operate. Playable objects, even those irrelevant to gameplay, evoke the players' manipulatory curiosity and adjustive-reactive curiosity.
- **Unusual visual or audio environment.** Create visual or audio novelties to evoke players' perceptual curiosity.
- **Extreme points in an environment.** Geomez-Maureira and Kniestedt [7,8] pointed out that players are often curious about extreme points in an environment, such as the peak of a mountain, and want to reach them.
- **Intriguing spatial connections.** Geomez-Maureira and Kniestedt [7,8] also pointed out that intriguing spatial connections may also evoke perceptual curiosity because of their novelty.

7 Secondary Game Design Techniques

Some game design techniques are not the primary triggers of curiosity, but they can help manage the intensity of curiosity. We call them secondary design techniques. Here are some examples.

- **Gradually reveal more information (hints) to narrow the information gap for the players.** Studies have shown that the intensity of curiosity is elevated when people feel they are close to finding the missing information [14,20].
- **Let players know that the resolution is coming soon.** Curiosity is generally short-lived [10]. The longer it takes to satisfy people's curiosity, the less pleasant they feel [20], and curiosity may turn into anxiety or even annoyance. Therefore, to maintain the intensity of curiosity, it is helpful to remind the players of their progress and promise a quick resolution.
- **Attach higher significance to the missing information.** Markey and Loewenstein [15] found that people displayed higher curiosity on topics of importance. In a game, a significant reward may be attached to finding the missing information, while failing to do so may result in punishment.
- **Show that other people are also interested.** For example, if you show that other people (NPCs) in the game are also pursuing a mystery object or person, the player will be more curious about it.
- **Apply time pressure.** Adding an expiration date to the missing information will elevate the curiosity because the players realize that they will be unable to close the information gap if the missing information (e.g., a document or a witness) is destroyed.
- **Make the missing information more exclusive.** People are generally more curious about information that is only accessible to a selected group. For example, giving access to a piece of information only to privileged members will increase the players' curiosity about it.
- **Insert famous people into the story.** Stein [25] indicated that readers are more curious about famous people than ordinary ones.

- **Insert famous places into the story.** People are curious about famous places that they have not visited. Video games provide an opportunity for people to experience that place in 3D.
- **Appeal to strong emotions.** For example, using an NPC to tell the player that a particular place is very scary or very beautiful will pique the player's curiosity.
- **Sudden change of stimuli.** A sudden change of stimuli can elevate the intensity of curiosity because it creates an additional layer of uncertainty. For example, footstep sounds may evoke curiosity regarding the person's identity. But if the footsteps suddenly stop, it creates additional uncertainty about what this person will do next. Similarly, a mysterious light may evoke curiosity. But when the light is suddenly turned off, the intensity of the curiosity is raised even higher.

8 Conclusion and Future Work

This paper provides a comprehensive review of game design techniques for evoking and managing curiosity, a key motivational factor for players. Despite the advances in curiosity theories for games, there is a missing link between theories and practices, and some game theorists have called for such a comprehensive review. This work is an attempt to address this issue. Our main contribution is to provide a framework for classifying game design techniques for evoking and managing curiosity. We have used this framework to analyze many game design techniques and link them with theoretical concepts. This work helps game designers understand the underlying psychological mechanism for triggering curiosity and provides a systematic approach for creating new curiosity-evoking game design techniques. It may also help people design serious games for learning or for studying human cognition.

Curiosity is an active subject in behavioral science. We will continue to study new theories and experiments and incorporate new findings into our theoretical framework. We also plan to conduct a genre-specific study on game design techniques for curiosity and carry out user studies to validate some of the claims in our theoretical framework.

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