

The Applications of Game Tutorials and Implicit Guidance in Learning Theories of Psychology

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Abstract: With the rapid development of the gaming industry, beginner tutorials have become a crucial component of game design. Both explicit tutorials and implicit guidance help players quickly learn game mechanics and enhance the overall gaming experience. This paper explores the application of psychological learning theories in game tutorials and implicit guidance, specifically focusing on the connectionism, behaviorism, cognitivism, constructivism, humanism, and gestalt learning theories. Through case studies of games, such as *Super Mario Bros* and *Fruit Ninja*, this paper demonstrates how different learning theories are integrated into game design to promote players' understanding of gameplay. Finally, the paper points out that game designers can integrate multiple learning theories into the design of tutorials and implicit guidance, and analyzes the application of various learning theories in the games *League of Legends* and *Where Winds Meet*. With advancements in technology, it is foreseeable that the gaming industry will continue to grow, and gamification design will be increasingly applied across various sectors. For designers, strategically applying these theories to promote player engagement, improve learning effectiveness, and enhance gaming experiences is of paramount importance.

Keywords: Game, tutorial, guidance, psychology learning theory

1. Introduction

In recent years, the gaming industry has been developing rapidly and has become an important part of the digital economy. Various types of games have emerged, not only computer games but also mobile games and VR games are booming. According to the *2024 Global Games Market Report* released by Newzoo, the global games market will generate \$187.7 billion in revenue in 2024, a 2.1% year-on-year growth. The number of paid game players will increase by 5.0%, reaching 1.5 billion, and the total number of players worldwide will reach 3.42 billion, a 4.5% year-on-year growth [1]. AI technology in gaming is maturing, enriching NPC interactions, and enhancing the player experience. The integration of new technologies has opened up fresh development opportunities, signaling the industry's shift toward a more immersive and intelligent phase. In addition, traditional games like card games or board games remain popular leisure activities. In other industries, such as education and software development, gamification has become deeply integrated, influencing professional workflows. Research on games has shown increasing value, and how to help new players quickly learn how to play games is a challenge every game designer faces. Designing a tutorial for games is a good solution to this problem.

A tutorial refers to any component in a digital game that is designed to teach players how to play [2]. Tutorials are commonly used in game design, typically appearing early to help players get started, though they may also appear later as players unlock new content. Since the 1980s, tutorials—either implicit or explicit—have been included in early game scenes, though guidance was mostly provided through external manuals at the time. With the increasing complexity of video games after the 1990s, the importance of tutorials grew. Today, most modern commercial games include tutorials unless the gameplay is extremely simple [3]. Tutorials can be implicit, integrated into the main gameplay, or explicit, separate from the main game and focused solely on teaching. Implicit tutorials use low-risk levels to guide players while tracking progress, whereas explicit ones don't affect game progress [4]. Game tutorials or implicit guidance have become an important part of games. They allow players to quickly learn game mechanics, master gameplay, and carry the information and meaning that game designers aim to convey [2]. Furthermore, the presence of tutorials also enhances the player's game experience and increases playtime [5]. Game tutorials and implicit guidance as an educational system within the game, designed to facilitate player learning. They often apply many psychological learning theories. This paper will introduce several such theories, and using case studies of existing game tutorials or implicit guidance, demonstrate how these theories are applied in games, offering valuable insights for game designers.

2. The Applications of Different Psychological Learning Theories

2.1. Connectionist Learning Theory

Thorndike referred to the connection between sensory impressions and action impulses as a "connection," marking the first formal attempt to link sensory events with behavior. He not only focused on the stimulus conditions and action tendencies but also on the factors that link stimuli and responses, believing that they were connected by neural connections. His theory, known as the connectionism, posited that these connections were neural links between stimuli (S) and responses (R) [6]. Thorndike, through research on animal learning behavior, proposed the trial-and-error learning theory. This theory holds that the essence of learning is to establish a connection between certain situations and specific responses through "trial" attempts. In this process, individuals make many mistakes, and through feedback from the environment, they abandon incorrect attempts and retain correct ones, thereby establishing the right connections. This process is learning [7].

In the game *Super Mario Bros*, there is no explicit tutorial designed, but players learn by trial and error. For example, they will discover that the game character can only move to the right, which points them in the direction of progress. Touching coins earns points, but touching the moving poison mushrooms results in death. Players must control the character to move forward or jump. As the game progresses, new items and traps, such as golden mushrooms, turtles, or carnivorous plants, appear. Through continued trial and error, players interact with these elements and discover which ones are beneficial and which are harmful. This type of learning is also applied in *Fruit Ninja*, where players first attempt to slice fruits. However, when bombs appear, slicing a bomb leads to death. At this point, players understand the game mechanic: only fruits can be sliced, and bombs must be avoided. This trial-and-error feedback process, which helps players grasp the correct gameplay, is a typical application of the connectionism learning theory in game tutorial design.

2.2. Behaviorist Learning Theory

Behaviorism shares some similarities with connectionism, focuses on the relationship between stimulus and response, believing that learning occurs by establishing connections between them. However, behaviorism emphasizes shaping human behavior through the environment, particularly through repeated stimulus-response pairings to enhance memory and learning. Pavlov, a famous

biologist, studied digestive glands in animals, primarily dogs, and introduced the concept of “conditional reflex”, later known as “classical conditioning”. He applied objective methods to study psychological phenomena scientifically, emphasizing the unity of psychology and physiology and opposing the separation of mental and physiological aspects. Pavlov identified two conditions for forming a conditioned reflex: the unconditioned reflex (e.g., the natural physiological response of increased saliva when food is placed in the mouth, which requires no learning) and the conditioned reflex. The sound of an assistant’s footsteps initially had no inherent connection to the dog's increased saliva, but after repeated pairing with the food, the sound alone eventually triggered the same response, turning the neutral stimulus into a conditioned one. Classical conditioning involves establishing a connection between the conditioned and unconditioned stimulus [7].

An example of classical conditioning applied in gaming is the VR fitness game *Bodycombat*, which uses the principle of conditioned reflex for game guidance. In the game, players encounter various obstacles flying toward them. Based on daily life experience, when an obstacle approaches, people tend to dodge or hit it. The game connects this life experience to create a conditioned reflex, encouraging players to react accordingly. By presenting obstacles from different directions and in varying quantities, the game strengthens this stimulus, thus promoting the players' fitness.

In the late 1930s, behaviorist psychologist B.F. Skinner developed the "Skinner Box" to study animal behavior. From his research, Skinner identified two types of learning: respondent behavior, triggered by a stimulus (similar to classical conditioning), and operant behavior, which is spontaneous and driven by the organism's actions. Most human behaviors in daily life are operant behaviors. A key factor in shaping behavior is the outcome that follows it, known as reinforcement. Reinforcement can be positive or negative. Positive reinforcement occurs when an environmental stimulus increases the likelihood of a behavior response. Negative reinforcement occurs when a stimulus is removed from the environment, also increasing the likelihood of a behavior response [7]. Reinforcement is defined as a consequence that increases the likelihood of a response, whereas punishment refers to an event that decreases the tendency to make a particular response [8].

Many games apply Skinner's theory. For example, in *Animal Crossing*, the focus is on the enjoyment of exploration and creativity rather than strict competition. The game's reward system, such as receiving new furniture, clothing, and DIY recipes, is designed to be particularly rich and appealing. Every time players complete a task or achieve something, they receive a corresponding reward. This positive reinforcement significantly enhances the players' gaming experience, providing a sense of satisfaction and encouraging further exploration. On the other hand, in *Player Unknown's Battlegrounds* (PUBG), players who cheat are punished by having their rank and points reset, losing their in-game rewards and rankings, facing short-term account bans, and, in severe cases, being permanently banned. The game company uses these punitive measures to reduce cheating, guiding players to play the game normally and create a fair gaming environment.

2.3. Cognitive Learning Theory

Unlike behaviorist psychologists, cognitivist psychologists argue that studying complex human behavior requires attention not only to observable behaviors but also to the intermediate processes between stimulus and response. They emphasize that learning is an internal psychological process, focusing on the cognitive activities involved. The information-processing theory in cognitivism compares learners to information processors similar to computers. Information is encoded in sensory memory, and perception and attention determine which information will be retained in working memory for further use. In working memory, executive processes manage the flow of information and integrate new information with knowledge from long-term memory. Information that has been thoroughly processed and connected becomes part of long-term memory, and when reactivated, it becomes part of working memory again [9]. This theory emphasizes how information is received

from the external environment and processed, understood, and remembered to complete the learning process, positing that learners are active participants rather than passive recipients.

Many games use implicit tutorials that rely on visual or auditory information to guide players. A special serious game called *A Blind Legend* features a blind knight as the protagonist, with no visuals in the game. Players can only navigate by asking the daughter for directions to determine when to move forward, backward, turn, or jump. In *Where Winds Meet*, chests are placed near clues to attract players to approach and discover them.

Mayer, from the perspective of modern information processing theory and cognitive composite theory, pointed out that learners' ability to process information (referred to here as working memory) is limited. An excessive amount of information may lead to cognitive overload. The learning process involves three types of cognitive processing: the first is extraneous processing, where learners are distracted by irrelevant content (e.g., being attracted by scenery unrelated to learning); the second is essential processing, where learners select or organize text and images in working memory at a lower level; and the third is generative processing, where learners organize and integrate selected information at a higher level, transforming it into meaningful material or knowledge [10]. Therefore, in the design of game tutorials, it is important to minimize extraneous processing, manage essential processing, and promote generative processing. Many games avoid cognitive overload by breaking down complex content into smaller parts or through phased learning, gradually increasing difficulty to facilitate learning. For example, in puzzle series games like *Rusty Lake* and *Paper Bride*, the game usually has multiple scenes, and players can only progress to the next scene once the current task is completed. Phased learning is also widely used in RPG games. For example, in *The Legend of Sword and Fairy*, although the game does not have an obvious tutorial system, players gradually master the gameplay as they progress through the story, leveling up and acquiring higher-level combat skills to face boss fights in each phase.

Another psychologist, Albert Bandura, believed that an organism's responses are influenced by the behavior of others that they observe. This process is called observational learning. He proposed the social cognitive learning theory, which suggests that personal behavior and the environment interact and influence each other. A person's cognition and behavior affect the environment, while the environment in turn affects the person's cognition and behavior. People learn by observing the behavior of others and the consequences of that behavior, imitating others to acquire new knowledge and skills. The developer of *League of Legends*, Riot Games, regularly holds global gaming tournaments, where many players can improve their competitive skills by watching and imitating the precise operations of top players. In *Boom Beach*, there is a video replay function that allows players to watch battle replays of themselves and others, learning strategies such as troop composition and route choices. Additionally, common board games like Go rely heavily on imitating others' game strategies during the early stages of learning.

2.4. Constructivist Learning Theory

Since the 1980s, with growing recognition of Piaget's cognitive development theory and Vygotsky's sociocultural theory, constructivism has become the dominant paradigm in learning theory. Constructivism acknowledges the significant impact of cognition but argues that knowledge is not something pre-existing, waiting to be discovered. Instead, it is created by the learner through interpreting the surrounding environment. Constructivism views the learner as the constructor of knowledge, rather than a purely passive recipient of education [10]. Piaget proposed the theory of assimilation, accommodation, and equilibrium. Assimilation refers to the process where an individual integrates information received from the environment into existing mental schemas, while accommodation occurs when information cannot be assimilated and thus requires the creation of a new schema. As people learn about the world around them, they continually use assimilation and

accommodation to reach equilibrium. Piaget believed that the interaction between assimilation and accommodation spans an individual's entire life, with this interaction developing as individuals' understanding of how to navigate the social world becomes increasingly complex [11].

In the game *Candy Crush Saga*, the principles of assimilation and accommodation are applied. As the game's difficulty increases, new power-ups are introduced to match the player's abilities. The process by which players adapt to these new power-ups is accommodation, while when these power-ups reappear, the process becomes one of assimilation. Players continuously maintain a balance between these two processes.

Another constructivist psychologist, Vygotsky, introduced the concept of the zone of proximal development (ZPD). When students can complete tasks on their own, they are in the actual development zone (ZAD), where there is nothing new to learn. The ZPD requires adult or peer assistance, as students are unable to complete the tasks without help. The ZPD represents the gap between the tasks that learners can do independently and those they can do with help [12]. This learning theory is also applied in many games. For example, in *Fantasy Westward Journey*, the master-apprentice system allows lower-level players to learn from higher-level players by completing a series of tasks together, allowing them to quickly grasp gameplay and strategies. In another card game, *Inscription*, the player's "opponent" initially acts as a "mentor" who interacts with the player, gradually teaching them the rules of the game through card battles. Players can freely explore new strategies based on the gameplay and cards they obtain, and the strengthening of different cards will directly influence their future strategies.

2.5. Humanistic Learning Theory

Abraham Maslow is the founder of humanistic psychology, and his most representative theory is the Hierarchy of Needs, which includes five categories: physiological needs, safety needs, social needs, esteem needs, and self-actualization needs. When a person's lower-level needs are met, they will develop toward higher psychological needs. These needs drive individuals to continuously achieve their expectations, from basic material satisfaction to spiritual self-transcendence [13]. *The Sims* series of games is a typical example of the application of humanistic theory. This series is an open-world sandbox game where players can create various simulated characters according to their preferences, each with unique appearances, personalities, and aspirations. There are no predefined game objectives; instead, players control the virtual characters and the implicit guidance in the game prompts players to fulfill their needs and desires, planning a perfect life for them. Players can freely choose the life trajectories of their characters, experience different lifestyles, and independently plan their learning and development.

2.6. Gestalt Learning Theory – Insight Learning

Gestalt psychologist Köhler believed that learning is an individual's insight into a situation and their relationship to it, using their own wisdom and understanding, rather than the accumulation of actions or blind trial and error. In insight learning, what the individual learns is not a specific link between stimulus and response, but a cognitive relationship between means and ends [7]. In the game *Moncage*, players rotate cubes to combine items from different scenes, creating new items. Every time a combination is successfully made, the player experiences a sense of insight.

3. Conclusion

This paper introduces the application of different psychological learning theories in game tutorials and implicit guidance through examples. However, due to the vast size of the gaming market, the number of cases presented in the paper is limited, and it does not explore the differences in efficiency

between various learning theories in helping players learn game mechanics and gameplay. In a study on VR games, Kao et al. found that the game type is an important factor to consider when designing tutorial modality. In simpler VR games, the influence of the tutorial modality is minimal. However, in more complex VR games, the tutorial mode significantly affects players' learning performance and game engagement [14]. Furthermore, this paper does not compare the impact of explicit versus implicit tutorials on players' learning outcomes.

In the game design process, designers can often apply multiple learning theories simultaneously to create beginner tutorials and implicit guidance. For example, in *League of Legends*, in addition to utilizing social cognitive learning theory, behaviorist learning theory is also employed. In custom game modes, players can choose any hero to battle against or face off with AI opponents, learning each hero's combat methods through continuous attempts and feedback. In *Where Winds Meet*, a large number of visual, auditory, and textual cues guide players to progress through the game. Moreover, players' actions influence the development of the game world, reflecting characteristics of constructivist theory. Players can also explore and learn content they are interested in (such as combat, outdoor exploration, and building), earning various badges, which demonstrates the application of humanistic theory. Furthermore, all of the games mentioned in this paper can be found on public video platforms, where a wealth of gameplay experience is shared. Professional gamers' videos or livestreams directly promote social learning among players. As technology continues to evolve, it is foreseeable that the gaming industry will continue to flourish, and gamification will be applied in more fields. It is hoped that designers will better utilize various learning theories in the game design process to enhance players' gaming experiences.

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