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Research on the Multi-dimensional Impact of Novel Tactile Film Materials on the Gaming Experience of Online Game Players

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Abstract:
Driven by the advent of the digital intelligence era, online games have revolutionized the gaming landscape by immersing players in hyper-realistic digital worlds. This immersion is facilitated through the integration of advanced digital technologies, highly realistic simulations, and innovative tactile film materials. Consequently, the gaming experience has transcended mere sensory stimulation, evolving into a comprehensive aesthetic enjoyment that engages players on multiple levels. During this transformative process, the identities of players, the spatial dimensions of the game roles, and the modalities of experiential engagement have undergone significant shifts and reconstructions. Collectively, these changes have coalesced to form the distinctive digital aesthetic attributes of online games. Focusing on these attributes, this article delineates its research questions across three pivotal dimensions: the reconstruction of player identities, the generative reconfiguration of game spaces, and the aesthetic recalibration of the gaming experience. The reconstruction of identity primarily manifests the fluidity and transformation of identity precipitated by the innovation of the cyborg body. Meanwhile, the reconstruction of the game space delineates the interplay within the virtual-real-supra-real fields. The game experience, in turn, underscores the interrelationship between the physical body and sensory perceptions of game participants. Interpreting these issues elucidates the identity flux between game participants and game characters, clarifies the metamorphosis of game scenarios, and re-examines the relationships of "people and objects," "people and space," and "people and society" in the digital age, thereby underscoring its significant meaning and value. This is crucial for further expanding the theoretical cognitive boundaries of "human-machine relationships" and catalyzing human "chain-like" thinking regarding the real world, virtual spaces, and the symbiotic relationship between humans and machines.

Keywords: online games human-computer interaction novel tactile film materials

INTRODUCTION

Since Kant initiated the exploration of game theory at the end of the 18th century, the connection between human aesthetic experience and games has become a central research topic. Kant's 'Critique of Judgment' [1] introduced the idea of the purposiveness of purposelessness in games. Building on this, Schiller and Spencer proposed the theory of games as a discharge of 'excess energy' from an energy overflow perspective. Gross, however, contended that 'excess nervous energy' is not the true cause of games but merely a conducive condition [2]. He thus revised and supplemented the theory. In his works 'Play of Animals' and 'Play of Man', Gross highlighted the roles of 'inner imitation' and 'instinct' in the aesthetic perception of games, emphasizing the impact of individual physiological and psychological factors. This led to the construction of the theory of inner imitation play. Furthermore, scholars like Sigmund Freud, Jean Piaget, and Lev Vygotsky have contributed to game theory from various angles, including psychoanalysis, psychology, and socio-cultural studies. With the advent of the 21st century and the rapid development of digital technology, game theory has been reinvigorated. Scholars such as Johan Huizinga and N. Katherine Hayles have explored new aspects of human existence, thus expanding the horizons of game theory. As a result, academic research in the field of games has increasingly focused on online games rather than traditional ones.

The continuous update and progress of internet mobile communication technology, centered on traffic interconnection and free communication, have led to the renewal and iteration of many traditional games and have also given rise to numerous new forms of gaming. Online games have emerged as a result. Under the influence of the mobile internet wave, the forms of contemporary games have not only acquired new expressions but have also shifted the game field from physical space to "a non-physical virtual symbolic world constructed with mechanical, standardized symbolic control methods" [3] The new gaming space, characterized by network interaction, on one hand, allows individuals to escape from the narrow and dull work, study, and worldly conflicts, freeing them from daily life to enter a virtual world that offers a new perception and experience different from offline traditional games. This aesthetic experience is not only reflected in the immersion of vision and hearing but also in the new tactile experience created by novel tactile film materials, which makes players feel as if they are physically present in the game scenario. The use of tactile film materials gives items, scenes, and even characters in the game a more realistic texture and tactile feel, further

blurring the boundary between the virtual and the real. When players touch the screen or operate the game controller, they can feel feedback from the game world, which is not only visual or auditory but also conveyed through touch, thereby greatly enhancing the interactivity and immersion of the game. In such a gaming experience, players are no longer mere spectators or participants in the game but have becomepart of the game world, establishing a closer connection with the game scenarios, characters, and other players. Therefore, on the other hand, players transform into aesthetic subjects, fully projecting themselves into the virtual game scenario, transforming from real individuals into intelligent game characters, and completing the identity reshaping of the game participants.

Online games further facilitate the transformation of daily perceptions from merely perceiving and experiencing objects to embodying them, leading to a reconstruction of aesthetic experiences and, in turn, influencing people's value attitudes and expectations of meaning in everyday life. As a social context constructed through digital, technological, and intelligent means, online games not only directly impact real-life activities but also fundamentally alter the nature of contemporary online gaming. The social significance of online games is largely manifested in the new life experiences and cognitive relationships of meaning woven within the internet's virtual space. Therefore, exploring the fate of the "body," "individual," and "intelligent agent" in the digital age can elucidate the virtual era in which humanity exists and the trajectory of the future, providing a new theoretical dimension and growth point for aesthetic studies in the digital age.

INDIVIDUALS, CYBORGS, AND AGENTS: IDENTITY RECONSTITUTION AS GAME PARTICIPANTS

Since ancient times, games have evolved in tandem with the progress of social culture, a development that has continued from primitive societies to modern ones. Games "extend from the earliest origins of culture to the civilized stages we currently inhabit; games accompany culture and permeate it" [4]. They have now become a phenomenon widely present in social life, forming a fundamental form and key component of human life and interaction. In game activities, people not only practice skills, experience entertainment, and achieve relaxation, but also exhibit a close connection between games and the development of intellectual and physical abilities. Many games, through further design and refinement, have evolved into competitive sports with specific rules and clear regulations in practice. In this process, the identity of game participants also changes; they are no longer just individuals passing time, but competitors seeking victory and desiring honor, and even becoming professional athletes with fan bases and societal attention. This reshaping of identity not only reflects the elevated status of games in social culture but also embodies a renewed recognition and affirmation of the value of games.

Traditional Game Stage: Identity Fluidity of Individuals

Gross delineated traditional games into three distinct stages. The initial stage is characterized as the conditioned reflex stage, wherein games manifest as activities that do not necessitate the intervention of self-awareness, representing an automatic, instinctive response to stimuli. Participants in this stage appear oblivious to the fact that they are engaged in a game, perceiving it instead as a straightforward, reflex-based stimulus-response process [5]. The subsequent stage is the instinctive response stage, where individuals diverge from the unconscious play of the first stage and gradually become cognizant of the game concept. However, "all biological activities are largely influenced by inherited instincts at this juncture... When neural energy is in excess and there is no impetus for serious activity, it is the formally inherited instinct that precipitates play" [6]. The more primitive the animal, the purer its instinct; conversely, as the animal's level and status escalate, the more susceptible it becomes to the influences of acquired cognitive structures, experiences, and environmental factors. Certain genetic functions and instinctive roles may be altered, supplanted, or intensified, while other capabilities may remain dormant. Although individuals in the second stage possess the autonomous consciousness to partake in the game, their engagement is predominantly instinct-driven, lacking proactive participation. The third stage is the imitation stage, where Gross posits that game activities at this juncture are typically accompanied by an internal imitation psychological process. This process can enable individuals to derive enhanced pleasure from the game, transforming it into an aesthetic experience that diverges from the preceding stages.

During the process of engaging in traditional games, a distinction exists between humans and animals. Specifically, humans do not undergo a stimulus-response phase akin to that observed in animals. This divergence primarily stems from the fact that human participation in games is not driven by unconscious stimulus-reflex mechanisms, nor is it solely triggered by instinct. Instead, human involvement in games is motivated by a variety of factors: "the release of excess energy after being overenergized, actively seeking practice within the game to prepare for future endeavors, or the pursuit of emotional factors such as pleasure, a sense of identity, achievement, and belonging" [7]. Beyond the motives identified by Gross, contemporary society introduces additional incentives, such as the stimulation of social behavior, the drive of curiosity, and the influence of commercial advertising's popularity effect. Regardless of the underlying motives, within the game, participants can experience not only profound sensory satisfaction but also exhibit heightened aesthetic observation. This form of observation "can manifest

anthropomorphism, with beauty as its sole objective" [7]. Consequently, the purpose of games extends beyond the intense sensory experiences that deliver the ultimate pleasure of the moment; it also encompasses a sense of aesthetic delight. The fundamental motivation for pleasure should not be confined to this ephemeral gratification; the ultimate pursuit in games actually encompasses richer spiritual effects and deeper connotations.

Online Game Stage: Transformation of Player Identity

Although Gross elucidated the transformation of individual identities in traditional games, his analysis was constrained by the historical context and social conditions of his era, focusing predominantly on traditional offline games and neglecting to explore the online games that emerged in the Internet age. Consequently, when examining the characteristics of online games in the digital age, it is imperative to consider their temporal nature, specifically, how technological advancements have shaped human existence and the modalities of gameplay. Building upon Gross's three stages of traditional games and considering the attributes of online games within the digital age context, a novel stage of online games can be introduced here, distinct from reflection, instinct, and imitation—"the stage of schism of consciousness." Given that online games inhabit both the real and virtual worlds, the consciousness of game participants is concurrently present in both realms during gameplay, resulting in a schism of consciousness.

This stage can be elucidated by Carl Gustav Jung's theory, which posits that "the conscious mind or ego-personality, when conjoined with the unconscious personified as anima, engenders a new personality that is a composite of both" [8]. Jung's original intent was to employ the "philosopher's son" from mythology, a metaphor for non-human alien birth, to denote the amalgamation of consciousness and the unconscious in psychology, believing that these two entities coexist within a singular entity as a new personality. The dissociation of consciousness in online games is analogous, stemming from the fission and fusion of consciousness in the real and online worlds, collectively forging a novel state of consciousness for game participants. Thus, applying Jung's concept of the new personality to online games can illuminate the relationship between gamers and their game characters.

Firstly, due to the progressive impact of technology on human development, humanity is gravitating towards a new possibility, namely, "the human being accomplished by technology is a technological phenomenon" [9]. The virtual space created by online games—presented to game participants through the screen as a medium—allows participants to interact with the space via this medium, altering the mode of their participation. Specifically, participants engage in the game through their game characters, thereby achieving a presence in the virtual space. In this manner, participants immerse themselves in the game world, and the virtual world is materialized before their eyes.

Secondly, individuals who partake in games are commonly referred to as players. When players are engaged in the game, their consciousness bifurcates into two parts due to the connectivity of online games: one part resides in the online game world, and the other remains in the real world. If we denote the player's overall consciousness as A, the split consciousnesses are the consciousness A1 in the game world and the consciousness A2 in the real world. Consciousness A1 is the player immersed in the game world constructed by mobile internet, generating images and symbols related to the game through associative mental processes—for instance, imagining oneself as a character in the game. The game character displayed on the PC or mobile screen is the externalized manifestation of the visualized and dynamic image generated internally by the player. The player's consciousness A2 remains in the real world, primarily controlling their body to execute the manipulation and operation of the game character, as illustrated in Figure 1. At this juncture, the player has completed the dissociation of consciousness A, but A1 and A2 are not two unrelated factors; instead, they bridge the two worlds, causing them to influence each other. As Jung noted, his concept of the new personality, which he termed "the Self," refers to the "unification symbol" of the ego and non-ego, subjectivity and objectivity, individuality and collectivity [10]. Applying this to online games implies that although the player's consciousness A1 and A2 appear to be "in" two different worlds, they are interconnected through online games to form the player's overall consciousness A. Consequently, the player "enters a temporarily unique field of activity" [11].

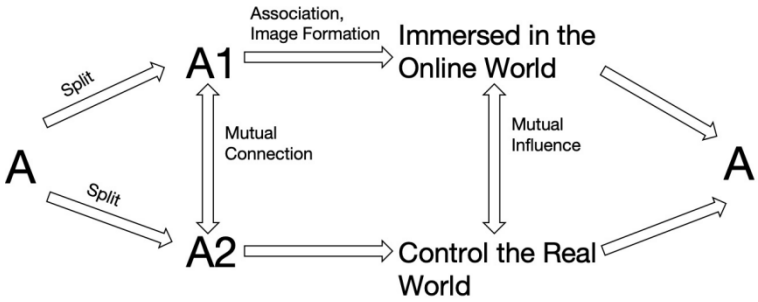

Figure 1. Diagram of consciousness schism in online gaming

The occurrence of "split consciousness" in players is a result of the combined influence of digital technology and the Internet. This can be attributed to two key factors: First, the transformation of the human-machine symbiotic subject. As an innovative concept and technological advancement in the field of digital and intellectual innovation, cyborgs are not only introduced as new subjects within the human-machine symbiosis in online games but also trigger a reconstruction of both consciousness and physical form upon integration with the player's body, resulting in a chimeric being that merges machine and organic components [12]. This extends to the physical realm, as the player's body is no longer entirely their own but becomes part of their real-world physical presence and part of the virtual persona they assume, namely, the game character within the cyber realm. Second, the bidirectional interaction cycle. Throughout the gaming journey, players use interfaces such as mice, keyboards, mobile devices, and gaming controllers to manipulate game characters. While it may seem that the player has complete control over the character's actions, these actions actually guide the player's next steps. For instance, in a game scenario requiring a character to "jump" to advance, the player must use the appropriate keyboard or controller input to perform the "jump" action, thereby progressing the game. As a result, game characters and players together constitute the cyborg body, which serves as a conduit between the cyber world and the physical world, opening a virtual door for players and causing a split in consciousness. One part of the consciousness controls the real body to manipulate the corresponding virtual game character in the cyber world; the other part of the consciousness is immersed in the game character's body in the cyber world. At this point, the cyborg body not only brings the sensations of the cyber world into physical perception but also incorporates the heterogeneous bodily sensations caused by the separation of consciousness and body into subjective consciousness [12].

This reaction of splitting and then reassembling consciousness breaks the traditional dualism of body and mind, presenting a third domain beyond body and mind. The cyber world is precisely the unified domain that fundamentally shares these two, breaking the simplistic division between human and non-human. Hayles suggests that discussing the human/non-human binary opposition has limitations and proposes a distinction between the cognizer and the non-cognizer. On one side are humans and all other forms of life, as well as many technological systems; on the other side are material processes and inanimate objects [13]. From the perspective of the real world, game characters appear to be inanimate "non-humans," but in the game world, they can fly and pass through walls, capable of anything. In the instant the game starts, they are no longer mere inanimate objects but are embedded as intelligent agents into human life, reflecting human life and materializing the world of human imagination. Therefore, "intelligent agents are not only one-dimensional, trusted objects but also subjects that can be invested with human emotions and respond with human emotions and support" [14], the transformation of player identity is shown in Table 1.

Table 1. Transformation of player identity

Game Type	Game Participants	Game Identity
Traditional Games	Animals	Individuals
Traditional Games	Humans	Individual → Players
Online Games	Humans	Individual → Player→ Cyborgs
Online Games	Game Characters	Intelligent Agents

Thirdly, the realm of online gaming provides a fertile ground for identity experimentation among players. A significant allure of online games is their capacity to immerse players in virtual identities that starkly contrast with their real-world personas. Within these virtual ecosystems, players are afforded the liberty to explore and inhabit roles and identities that diverge from their real-world existence, thus engaging in profound identity explorations. For instance, an individual who may be a standard employee in the corporate world can assume a plethora of roles within the gaming sphere, such as a "franchise store manager," "gold miner," "forest elf," "mage," and others. While these roles may remain unattainable in reality, they offer a rich tapestry of

experiences within the gaming universe. Even within a single game, the diversity of available characters allows players to sample a multitude of identities. Such identity experimentation not only fosters a deeper inquiry into self-perception but also aids in enhancing their understanding and acceptance of their multifaceted real-world identities, thereby challenging and enriching their sense of self. Moreover, game characters, acting as the players' "second identity" in the cyber realm, facilitate the achievement of tasks that might be insurmountable in real-life scenarios, thereby showcasing the players' "dual personality." As players are simultaneously engaged in both the virtual and real worlds, this engagement results in a bifurcation into virtual and real selves. On one hand, players can actualize their aspirations and true selves within the virtual gaming environment, while on the other hand, they exert control over game characters and the game world from the vantage point of reality. This process effectively blurs the line between human and non-human entities, with game characters existing as sentient beings within the virtual space-time continuum and simultaneously serving as the avatars of human players in cyberspace, progressively obfuscating the demarcation between the real and the imaginary.Players relish the freedom afforded by the virtual realm, experiencing causal relationships that transcend the constraints of the real world and feeling a sense of empowerment in shaping their destinies. Meanwhile, the intelligent game characters, as conduits of human behavior and cognitive patterns, serve as a bridge linking the real and virtual domains. Within the virtual space, players can liberate themselves from the shackles of reality and delve into diverse identities and life trajectories through the actions and decisions of their game characters. This transformation of identity not only enables players to attain a sense of accomplishment and self-fulfillment within the game but also stimulates their creativity and imagination in their day-to-day lives. Concurrently, the intelligent attributes of game characters bestow upon them a broader spectrum of potential and developmental opportunities, rendering games not merely as instruments of entertainment but also as profound mediums for exploring the essence and future trajectory of humanity.

REALITY, VIRTUALITY, AND HYPERREALITY: SPATIAL RECONFIGURATION AS A GAMING REALM

The Demarcation of Traditional Game Spaces

In the context of traditional games, both animals and humans engage as participants, and irrespective of the game's phase, the venue is invariably situated within the real world. The players' experiences are utterly authentic, concrete, and palpable. On a corporeal plane, individuals fully partake in the amusement afforded by games by mobilizing their sensory and physical faculties, encompassing sight, audition, olfaction, gustation, and tactility, thereby attaining gratification through their senses. Within real-world settings, the sensory apprehension of forms, hues, luminance, and so forth incites associations among game players, thereby stimulating the imagination and influencing the players' internal state, yielding psychological repercussions. This dynamic can engender a profound sense of pleasure, markedly bolstering players' enthusiasm for the game and positively fostering their sustained involvement. As Gross articulated, "When an originally interesting movement becomes visually pleasing, the pleasure is intensified, whereas observing unidirectional, rule-based movements, such as the flow of a turbulent stream or clouds drifting across the sky, yields a diminished degree of pleasure" [15].

For traditional games, whether played in isolation or with the collective participation of several individuals, there are specific constraints regarding the choice of gaming space. It is imperative that the gaming area be distinguished from the everyday milieu, thus the gaming scenario commonly remains separate from the living scenario. For example, routine professional spaces such as offices and meeting rooms are generally not repurposed as venues for gaming. Even areas within the participants' daily lives, such as kitchens and studies, are typically not selected as locations for entertainment activities. In other words, traditional games are usually carried out in an alternative realm that is "separate from reality." Due to the segregation of traditional game scenes, the real world and the game world are distinctly separated. Therefore, traditional games are "performances" that take place within specific temporal and spatial confines, possessing characteristics of isolation and limitation [16]. Within this segregated space, the norms of daily life, legal regulations, and customs are all suspended, while the rules of the game become the dominant force governing the behavior of participants. Although the game space is situated within the real world, it is endowed with a virtual quality, resembling more of a "stage." On this game stage, participants engage in role-playing, embodying someone other than their real-life selves, others, or even another existence [16].

Reconfiguring the Digital Terrain: The Transformation of Online Gaming Environments

Owing to the relentless progression of science and technology, which is characterized by the relentless conquest and expansion of technological capabilities into new spatial domains, as well as the phenomenon of space compression and the transformation of temporal dynamics, the temporal experiences of all players have achieved a state of synchronization. This synchronization has given rise to a global timeline that serves as a universal framework of existence [17]. Consequently, the amalgamation of communication and digital technologies empowers players to freely select game locations and periods across diverse

geographical regions and at varying temporal junctures. This capability leads to a fundamental restructuring of the spatial configurations inherent to online gaming environments.

Firstly, the dissolution of the boundary between reality and virtuality. In online games, players and game characters jointly constitute the participatory entities of the gaming experience. Players become mechanized, while game characters are anthropomorphized. As players and game characters together form a "new body"—cyborgs—this medium transcending physical spatial boundaries truly opens the gateway between the real and the virtual. It allows real players to transform into game characters and enter the cyber world, while game characters also appear in the real world through various devices and media. This interpenetration completely blurs the dividing line between reality and virtuality, integrating players and game characters into a coherent gaming scenario to jointly accomplish game operations. At this juncture, players complete an identity transformation within the virtual space, and game characters become another facet of the player, or rather, the game character is the player's own entity within the cyber world. This transformation of identity breaks the traditional dichotomy of subject-object, with game characters emerging as a second human subject, serving as the player's equivalent in the virtual space-time continuum. Cyborgs epitomize this abstract representation, embodying the totality of reality and virtuality, and becoming a hyperreal existence. As for game scenarios, online games differ from traditional ones; players no longer need to seek specific venues as game settings. They can simply connect to the network and use their devices to engage in gameplay. Even when players are in mobile real-world settings, such as on public transportation, they are not hindered by the choice of venue. The player's ability to choose the timeliness and arbitrariness of gameplay transcends the opposition between life and gaming, allowing living spaces, and even work spaces, to serve as secondary gaming environments. Although players exist in the physical world, their physical "absence" does not affect the progression of the virtual game world or cause interruptions. Thus, the transition from traditional to online gaming scenarios is illustrated in Table 2.

Table 2. Transition dynamics of gaming environments

Game Type	Game Participants	Game Environment
Traditional Games	Animals	Real World
Traditional Games	Humans	Real World →"Stage"
Online Games	Humans	Real World → Cyber World
Online Games	Game Characters	Cyber World → Real World

Secondly, the phenomenon of multifaceted landscape collage emerges. The game world inhabited by players, a product of digital technology, transcends the confines of mere geometric spaces and is more often characterized by human construction, coexisting with a multitude of intelligent agents. "We immerse ourselves in it, and in this manner, the world materializes before us" [18]. Initially, the online game world diverges from Guy Debord's concept of the "society of the spectacle," wherein the game scenes are not simply inverted reflections of the real world, nor are they negations of human life. Instead, they represent a collage of diverse symbols, texts, sounds, and images, reassembling and encoding these elements to craft a varied spatial presentation. Furthermore, the scenes and characters within the game world are rendered using two-dimensional imagery, yet displayed within a three-dimensional space in a seemingly "flattened" manner. This interplay between three-dimensionality and two-dimensionality transcends traditional spatial dimensions, forging a novel visual practice. The cyborg entities of "post-humans" serve as conduits bridging the virtual and real worlds, merging them to create hyper-realistic game environments. The essence of real-world landscapes lies in establishing a sense of separation; in contrast, game scenes exist as worlds that are both present and absent. Through spatial reconciliation, everything is transformed into a spectacle [19]. If we were to employ Guy Debord's "spectacle" to elucidate game scenes, it would be inaccurate to wholly accept the notion that the game's presence conceals the true existence of society. This is because, while the game world may appear as an alienated existence from the real world, constructing a utopian-like illusory realm through simulation, players consciously engage with the game, not conflating game characters with a complete transformation of their own identities. Consequently, the game world is a composite of multiple landscapes, "neither a substitute for the real world, nor an additional adornment to it" [20], but rather a complex ecological tapestry woven from multiple combinations.

Thirdly, the Production of Spatial Culture is a pivotal aspect to consider. Initially, the relationship between the real world and the game world is neither inverted nor merely linearly reactive. Game scenarios assimilate a plethora of cultural elements from the real world, endowing the virtual gaming environment with authentic hues. Real-world elements are mirrored both in society and within the virtual game world. Consequently, as an objective reality, the game "exists in both realms; reality is manifested within the landscape, rendering it genuine" [20]. This implies that real-world factors are seamlessly integrated into the game

world, thereby imbuing the game's landscape with a sense of authenticity. Moreover, the game environment is not an autonomous and exclusive closed space; instead, it amalgamates elements of music, painting, animation, literature, and more, creating a space that is highly inclusive and broadly adaptable [21]. This spatial configuration establishes a novel order of landscape, complete with its own worldview, bestowing each game with a distinctive narrative backdrop and unique character settings. Furthermore, due to "the entirely distinct interactive content among different players, aesthetic experiences, and individual discourses within the same game also vary" [22]. Players can engage in unique developments based on their personal interpretations and gameplay of the same game character, that is, "secondary creation," which possesses cultural self-productivity. For instance, players can "mold faces" (customizing character facial features, skin tone, makeup, etc.) and "change skins" (altering character attire and style), and they can also devise their own terminologies for in-game use. An example is the term "gank," which refers to the act of one or more game characters ambushing, encircling, and eliminating opposing characters within the game, or strategically overpowering opponents through numerical or skill advantages to suppress them, typically involving a smaller group against a larger one, also known as "grabbing people." Players not only employ game-specific terminology on gaming platforms but can also integrate them into real-world social interactions, gradually forming gaming circles, communities, and even game landscapes through circular dissemination, mass communication, and other means. Additionally, the creation of dolls, figurines, and various audio-visual works based on the prototype designs of online games fosters the growth of subcultural groups. These game characters not only become integrated into human social life as game IPs but also reflect the extension of human subjectivity into the virtual realm.

SENSING OBJECTS, EMBODYING OBJECTS, AND EMBODIED OBJECTS: AESTHETIC RESET AS A GAMING EXPERIENCE

Following Marcel Duchamp's act of dubbing a store-bought item "Fountain" and showcasing it as art in 1917, the line between art and daily life has been fundamentally blurred. Art has evolved beyond the narrow scope of pure aestheticism, where "art for art's sake" was the guiding principle, and has started to integrate into the public's collective psyche in myriad ways. This has sparked deep reflection on the separation between art pieces and common objects. As the "ninth art," online games are closely intertwined with the daily experiences of modern individuals. They not only bridge the gap between art and life but also, through the impact of digital technology, transform the gaming experience for players, resulting in an aesthetic renaissance.

The Transformation of Traditional Sensing Methods: From Sensory to Bodily

In traditional games, individuals engage with the tangible "objects" of reality through their sensory faculties, thereby receiving stimulus feedback that caters to their innate playfulness and satisfies their inherent needs. The pleasure derived from the pursuit of aesthetic beauty can evoke vivid fantasies, allowing individuals to surpass the ordinary constraints of daily life. This form of transcendence is akin to a "narcotic," offering an escape from the monotony and distress of everyday existence [23]. As participants in these games, individuals primarily rely on their sensory organs to perceive the gaming environment.

Firstly, individuals utilize their visual system to directly perceive and evaluate elements such as game scenes and props. Visual elements like light, color, and shape enter the individual's visual field as image symbols, generating corresponding stimulus effects. These symbols stimulate associations related to the game's progression within the individual's mind, leading to the recognition and reproduction of the game's content. In this context, vision serves as a medium that connects the individual to the game. Secondly, hearing plays a pivotal role in satisfying the auditory impulses of game participants and significantly enhances their gaming experience. Melodies, rhythms, and even ambient noise can evoke a unique emotional response. Since rhythm embodies the harmonious diversity of beauty, individuals will also generate corresponding associations when they engage with melodies and tones. Imagination freely traverses the individual's mental space, "expressing the deepest emotions of the soul, representing the audible manifestation of the individual's spiritual life" [23]. Thirdly, taste and smell also contribute to stimulating pleasure. On one hand, the presence of actual food and scents as physical entities can directly activate the player's visual, gustatory, and olfactory organs, yielding a sense of pleasure. On the other hand, the virtual simulation of food and environmental scents in games, while not directly impacting the gustatory and olfactory organs, extends the stimulation of taste and smell beyond the consumption of real food to include various synesthetic perceptions of different organs. For instance, players can trigger their imagination by viewing graphically represented flowers, even if they cannot directly smell the fragrance, thus simulating sensory experiences like the scent of flowers and earth. Through this multisensory interaction, players immerse themselves in the game world, achieving a state of unity between body and mind. Additionally, touch is an essential aspect of the gaming experience. Through conscious contact and perception of temperature, one can experience a sense of joy akin to conquest [23], such as through the tactile engagement with game materials like cards and dice, further enhancing the realism and

interactivity of the game. This comprehensive sensory engagement not only enriches the gameplay but also broadens the player's aesthetic experience.

In the realm of perceiving objects, the experience of gameplay extends beyond the previously discussed sensory methods to encompass the kinesthetic perception of bodily organs. Gross categorized playful activities of bodily organs into six distinct types of motor games: pushing games, destructive or analytical games, constructive or synthetic games, endurance games, and catching games [23]. Regardless of whether physical confrontation is involved, these categories of games fall under the umbrella of physical challenge games. This classification is due to the inherent competitive nature of such games, which enable players to undertake challenges by establishing specific game objectives and rules. Participants strive to triumph by employing actions such as jumping, throwing, running, spinning, and dodging, utilizing their bodies as the conduit for the gaming experience. This approach facilitates the most immediate physical sensations. The trajectory of the game progresses in tandem with the physical changes of the participants, and this dynamism induces a pleasurable physical perception among players, thereby culminating in an aesthetic experience.

The Transformation of Sensing in Online Games: From Physical to Embodied

In the context of online gaming, players' physical forms effectively "transcend" the confines of the real world, attaining a form of liberation for their sensory organs. Through the interface of online gaming, the body collaborates with game characters to establish a novel form of presence within the virtual realm. Consequently, perception evolves beyond a mere reaction to external stimuli; it becomes an intricate interplay between the body's presence and its movements relative to the gaming world [24]. While the sensory awareness of the player's physical body may diminish, the sensory engagement with their virtual avatar intensifies. For instance, when a game character is required to execute maneuvers such as spinning or leaping, the player may concurrently experience sensations like vertigo or a sense of weightlessness. In contrast, the tactile experiences associated with manipulating devices like a mouse or keyboard in the real world often become attenuated or are overlooked. This immersive virtual sensation bolsters the player's "sense of presence"—that is, the authentic experience felt within the virtual world, which is mediated through the interplay between the body and the virtual milieu. Contrary to Baudrillard's "apocalyptic" discourse on modern society, which suggests that images and symbols have led to the erasure of genuine social existence and a dilution of individuality, the role of online games in reality is quite the contrary. The embodiment of players within the virtual game world mirrors its essence, representing an extension of the real world's spatial dimensions. Thus, human subjectivity is not eroded but rather amplified within the virtual domain, where players can project their consciousness and physicality into the virtual expanse, engaging in a multitude of ways to manipulate and govern the game world, thereby fortifying their sense of subjectivity within the virtual sphere.

Additionally, the subject of player aesthetics is gradually transitioning from the physical "object" to the virtual "object." The virtualization and landscaped construction of the game world present various images to players in hyper-realistic ways, such as digital signals, surpassing the concepts of "representation" and "re-presentation" of reality. The game world itself constitutes another reality parallel to the real world. Within the game environment, the split between the player's body and consciousness reveals the "absence" of the real world and reflects the "presence" of the virtual world. Firstly, the identity of the player flows and transforms between reality and the virtual, allowing the player to have more possibilities to explore and express themselves in the virtual space. Secondly, the player's bodily expression and social interaction construct their cultural identity and aesthetic experience, using the virtual body of the game character as a carrier of culture, different cultural backgrounds are reflected and communicated through the practice of the body. This virtual experience not only enriches the individual's perceived world but also promotes self-awareness and self-development in the real world. Furthermore, digital technologies have merged the body and technology into a new "techno-sense" [25], this embodiment enhances the player's sensory and bodily perception experience. The body, as a key role in perception and experience, is not a fixed physical existence but a constantly changing set within multiple relationships and environments. In the game world, the player's virtual identity and digital experience are reconstructed in the transformation of the body, opening up new avenues for aesthetic experiences in human-computer interaction.

CONCLUSION

The contemporary socio-cultural environment has witnessed a significant shift, especially influenced by the accelerated expansion of digital and artificial intelligence technologies. This influence has led to innovative trends in the development of games, specifically the incorporation of digital intelligence technologies, which have progressively converted traditional games into online forms. Throughout this evolution, the participant base in games has also diversified, moving from animals and humans to the post-human realm, which is a key feature of online games in the "digital intelligence era."

With the relentless progress of digital technology and the proliferation of media dissemination, dynamic relationships within cyberspace are continuously being established and evolving. Concurrently, online games have undergone a profound virtual metamorphosis. This encompasses the transition of participant identities from individuals and cyborgs to intelligent agents, as well as the transformation of game environments from realistic to virtual and hyper-realistic landscapes. These shifts reflect the profound alterations in online gaming with respect to individual roles, spatial domains, and media formats. Such transformations have significantly influenced the aesthetic experiences of gamers as active participants. As a cutting-edge technological innovation, novel membrane materials, characterized by their distinctive tactile properties, have introduced an enhanced level of immersion to online gaming experiences. These materials not only amplify the tactile feedback that players receive during gameplay but also, through their integration with digital technology, effectively erase the demarcation between the virtual and the real. This allows players to engage with the nuances of the game world in a manner that is increasingly authentic and immersive.

Consequently, a prospective vision is delineated: within a human society propelled by the integration of digital technologies, bridging the virtual and the real, online games are progressively emerging as a paradigm for the formulation of aesthetic principles. They encapsulate the distinctive experiences of virtualized perception, spatialized self-expression, and the self-actualization intrinsic to the digital epoch. This paradigm is founded upon the capacity to surmount the demarcations between the virtual and the tangible realms, showcasing the generative potential of spatial culture. With the profound amalgamation of digital technologies and artistic endeavors, coupled with the ongoing evolution and refinement of advanced membrane material technologies, online games are poised to undergo even more transformative shifts, bestowing unprecedented aesthetic encounters upon players. Ultimately, online games are set to contribute to the establishment of novel aesthetic significance, offering a groundbreaking model for the contouring of societal norms within the digital civilization era.

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