Neurodivergent Pleasures in Game Environmental Design

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EXTENDED ABSTRACT

In contemporary digital games, virtual environments operate as primary interfaces through which players interpret game worlds. Spatial composition, lighting, and affordances can guide attention toward narrative or ludic elements (Livingstone et al. 2016). Digital worlds themselves can act as spatial cues guiding player attention (Ulaş 2014). Structured spatial organization also regulates attention and perceptual load (El-Nasr and Yan 2006; Okie 2006). In this sense, environments are not merely decorative but are procedural apparatus that distribute information and manage focus.

The regulation of cognitive engagement in digital games is particularly relevant when designing products for players with ADHD. Research has repeatedly shown that digital media can reliably capture the attention of neurodivergent individuals through reward-driven stimulation, often mediated by dopaminergic reinforcement mechanisms (Muñoz et al. 2015). This capacity has led to a substantial body of literature focused on problematic gaming digital addiction (Razjouyan et al. 2020), especially in relation to ADHD. Findings indicate that video games can act as a precursor to Gaming Disorder, which appears at higher rates among individuals with ADHD, contributing to poorer academic performance (Hawi and Samaha 2024; Chan and Rabinowitz 2006), attention regulation and increased aggression (Salerno et al. 2022). Far fewer studies examine how game structures support cognitive accessibility for ADHD players.

Due to this gap, this study would conduct a comparative close analysis of early gameplay segments focusing specifically on environmental design as a site of attentional regulation. It should evaluate game capacity to support inclusive environmental design for players with ADHD. Drawing on insights from platform studies, the goal is to situate these recommendations within the technical and aesthetic affordances of Unreal Engine 5, a rapidly adopted platform. SteamDB records an increase from 134 Unreal Engine releases in 2015 to more than 3,300 in 2024 (SteamDB 2025). The engine's technological infrastructure, including material node-based editing and Niagara VFX systems, may shape how visual hierarchy, spatial guidance, and environmental cues are constructed.

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The framework would recognize that game environments must support pleasurable engagement for players with ADHD. Younger players often exhibit accelerated boredom, reduced tolerance for waiting, and a preference for intense stimulation (Masi et al. 2021). While adults have trouble sustaining focus (Okie 2006). These differences underscore the need to disaggregate ADHD into subtypes for design-oriented analysis.

The DSM classification system distinguishes ADHD-HI, ADHD-I, and ADHD-C as clinically meaningful variants (Milich et al. 2001):

- ADHD-HI is commonly associated with impulsivity, rapid attentional shifts, and difficulties in inhibiting responses (Gibbins et al. 2010). Players with this profile may benefit from low-distraction environments with strong attention-grabbing gameplay dynamics.
- ADHD-I is characterized by sluggish cognitive tempo and slowed perceptual processing (Fuermaier et al. 2018). These players may respond better to environments that introduce moderate sensory variation, contrast, or stylistic shifts to counteract cognitive inertia without overwhelming the perceptual field.
- ADHD-C combines these deficits, both to over-stimulation and insufficient signaling**,** requiring environments that balance sequential clarity with salient but non-intrusive visual cues**.**

The analysis should focus selectively on how these subtypes relate to attentional guidance in environmental level design.

Preliminary findings indicate that some colors are easier to process and support attentional engagement, whereas others may either fail to register or overload perceptual channels. This typology distinguishes between slow-processing colors (e.g., blue, yellow, low-saturation hues) and fast-processing colors (e.g., red-greens and high-contrast) (Tannock et al. 2006). Aforementioned classification should provide a basis for analyzing inclusive design strategies by showing how color hierarchies and material cues can support attention and narrative clarity for neurodivergent players.

To further support critical analysis, this research should also integrate game studies research on environmental storytelling. As environments represent a world's past and embed narrative meaning in space, they may anchor the player cognitively (Caracciolo 2025). Curiosity-driven engagement is particularly relevant for players with ADHD-I, who often seek hidden information. Indexical storytelling can support this engagement by embedding narrative fragments into the environment. A small number of cues, such as visual disruptions, or decal-based markers, may be sufficient to attract attention and communicate narrative content (Jenkins 2004; Fernández-Vara 2011).

For ADHD-HI players, different priorities emerge. Environmental stories are less relevant than emergent agency (Cardoso and Carvalhais 2013). Level design should support challenge-reward loops that channel impulsivity into goal-directed play. Mechanisms linked to ludic failure, such as loss of progress, may promote more focus-oriented behavior (Kozyra 2019). From a platform studies perspective, UE5 Blueprint actors can influence player behavior through casting or interface messaging, engaging

with player character variables and actor components. In this view, narrative representation is subsidiary. The core demand is gameplay dynamics that provide instant responses.

The study combines close play with comparative environmental analysis, focusing on how spatial and visual cues guide attention during early gameplay. First, the researcher carries out a series of controlled play sessions across selected 2025 Unreal Engine 5 single-player games. Second, the analysis focuses on roughly the first three hours of play. This phase is typically more constrained by designers and establishes spatial conventions and patterns of attention. It is therefore divided into onboarding, early navigation, and the first more complex spatial challenge. Third, attentional flow is examined through spatial guidance, visual hierarchy (e.g., lighting, color, Niagara VFX), and environmental storytelling cues.

Four single-player titles were identified and initially analyzed:

- *Clair Obscur: Expedition 33* (Sandfall Interactive 2025) – intense visuals, risk overstimulation.
- *The Alters* (11 bit studios 2025) – disruptive cues, high cognitive load.
- *Cronos: The New Dawn* (Bloober Team 2025) – structured signals, guided progression.
- *Keeper* (Double Fine Productions 2025) – dense aesthetics, overwhelming stimuli transitions.

The goal of this study is to critically assess current environments and propose design strategies for improving cognitive accessibility for neurodivergent players. Initial findings suggest attentional guidance is shaped through spatial structuring and visual hierarchy, implemented in Unreal Engine 5 through material design, lighting, and strategic asset placement (Rubino and Power 2008; Penninck and Butler 2024; Ayyildiz 2020). It aims to encourage developers to treat neurodivergent cognition as a design parameter and embed accessibility in environmental design.

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