Empirical Research

Gaming, Virtual Reality – Augmented Reality – Mixed Reality, Multisensorial Attention, Body-Space relation

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Hybrid Postbodies: Corporeal spatial experiences in virtual reality environments

Summary:
This article provides an overview of the on-going empirical research titled *Hybrid Postbodies*[i] that examines questions concerning the body-space relationship through the lenses of virtual reality environments. The spatial experiences in virtual reality environments are reviewed under *corporeal-body conditions*, experimenting with patterns -material, anatomical, biochemical or digital- for an improved, multisensorial and dynamic experience context.

Contemporary body -either as a theoretical construct or as a physical and emotional complex- is not the same as a century ago, not even as it was twenty or ten years ago. Our *hyper-real*, *extended body* is an *artificial-natural* assemblage[1] that communicates the outside reality -through perception- with the inside existence -by *proprioception*-[2]. Therefore, our body is a malleable entity that enables the communication between subjects and objects. In addition, with the emergence of *augmented experiences* -Virtual and Augmented Reality environments-, when the digital layer overlaps the physical environment[3], new *extended encounters* engender complex relations with multisensorial stimuli. In this vein, in performative technology of VEs (virtual environments), the bodies become the ultimate *mediators*, between time, space and perception.

In recent years, novel methodologies to explore the neurobiological bases of mind and behaviour have inspired the fields of architecture[4], planning and urban studies[5], architectural thinking[6], social sciences and the humanities[7] to open toward cognitive neuroscience and, more concretely, to brain imaging. In architecture, new awareness of the complexity of cognitive and emotional processes involved in the daily experience of designed environments has rapidly grown. Suggestions on the role of *embodied cognition* through the mirror neuron system in aesthetic response are taken into account in architectural essays, and neuro-aesthetic theories are being discussed within the field. The lack of expertise on multisensorial appreciation represents a serious limitation in the current design methodology and a *sensory intensification* is demanded in architectural design.[8]

Regarding spatial perception, multisensory attention is a key element in the mediation between

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retrieving information and processing it.[9] Environments with high multisensory inputs can provide a basis for an improved perception, for optimum learning processes and for better storing memories. In turn, the data that a human being perceives, learns and remembers can affect positively on what could be considered as a future stimulus, creating a circle of attention-perception-learning-memory-attention.[10]Thus, attention indicates how the exploratory behaviours are embedded in multiple sensory systems -such as vision, hearing etc.- and neurokinetic systems -such as eye movement, head position, muscle proprioception etc.-[11]

This implies that attention is playing a critical role in perceptual ability, in linguistic expression, and in cognitive and social development. [12] In many cases, developmental disturbances that affect attention -such as autism spectrum disorders [ASD], attention deficit hyperactivity disorder (ADHD), dyslexia, William and Down syndromes- appear to be reversed by the use of multisensory care protocols, where spatial perception becomes more effective, flexible and selective throughout gradual development.[13] The increased attention control is associated with better cognitive and linguistic results.[14]

In this cognitive challenge, the mixed reality environments -VR and AR- present high potential for multisensorial stimuli and so new approaches are changing the tectonics-non-tectonics interrelation, as *augmented healthcare*[15] is steadily providing accurate and instant aid. The immersion in virtual reality environments can be used as a research tool, in order to stimulate the human senses, while a sensation of "being really in place" is surrounding the body, interfering in the sound and visual interaction stimuli, in the overall *embodied perception.* Virtual reality environments offer high concentration of double entities, such as *avatars/bodies*, with physical and digital presence simultaneously. This *multiscape* of modern living is constantly redefined and connected to videogame industry, providing an innovative research opportunity for identifying tangible embodied experiences of novel commitment practices,[16] spatial challenges[17] and cognitive learning[18] of the ludic videogame condition.

Hybrid Postbodies means to inquiry the multisensory integration, operating upon dynamic embodied conditions and corporeal temporalities. The main goal is to conclude to some applicable guidelines on design of virtual reality spaces that can improve the spatial orientation and body perception, through diverse multisensorial stimuli. The main research strategy is an experimental approach: the combination of architecture and cognitive science´s advances offers the solid theoretical framework; the multisensorial attention protocols provide the applied method along with calibrated questionnaires in *body ownership, embodiment*[19] and *proprioception senses*; and the virtual reality environments stand as the application frame -case studies- of the experimentation.

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