The Matter of Design in Videogames

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Abstract
What is videogame matter? This essay examines the matter of videogames in relationship to architectural design, and advances a definition that videogame matter is: meta, modular, indexical, and distributive. These attributes support an argument that the materiality of the videogame has a markedly different set of properties than the matter of the physical world. A definition of videogame matter is critical to understanding the value of design within virtual environments, which then aids architects and designers utilizing the immersive environments of the videogame for representation, design and collaboration.

1. Introduction

The real is produced from miniaturised units, from matrices, memory banks and command models – and with these it can be reproduced an indefinite number of times. It no longer has to be rational, since it is no longer measured against some ideal or negative instance. It is nothing more than operational. In fact, since it is no longer enveloped by an imaginary, it is no longer real at all. It is hyperreal, the product of an irradiating synthesis of combinatory models in a hyperspace without atmosphere. Jean Baudrillard, Simulations.¹

This essay begins in a space without atmosphere. In this space, if atmosphere were to exist, it would need to be constructed. Equally, if matter were present, it would need to be designed. This is the space of the videogame: a contemporary technology that presents matter and atmosphere purely for experience - and it is the information of experience - that shapes this space. Philosopher Bernard Steigler says information is not immaterial; rather it is a ‘transitional state of matter’.² Therefore videogames can be understood as systems of transitional matter that migrate experience between physical and digital realms, real and virtual spaces, and from user(s) to system. The hyperreal matter of the videogame is not the matter that we know from the real world – it is designed quite differently.

In this essay I examine the matter of videogames in connection to architectural design. The videogame becomes an increasingly important technology as more people inhabit virtual environments for recreation and work. However the value of architectural design in these environments is not clearly defined. Rather than study the spatial and architectural qualities of videogames this essay promotes an examination of the matter that constitute these worlds; what are these synthetic environments made of? First, this essay outlines connections between architecture and videogame space, and the technological association between designers and the mechanism of the videogame. Secondly, I outline a series of attributes that define videogame matter: meta, modular, indexical, and distributive. Thirdly, I present a series of projects that engage in the relationship between architecture and videogame space to further elaborate the earlier established definition of matter.
2. Architecture and the videogame
Architects are advancing the use of videogames within the architectural discipline. For example the publication *Space Time Play* presents a comprehensive survey of architects working with videogames, and an extensive review of videogame titles of interest to designers and architects alike. Videogame theorists considering the spatiality of videogames suggest that the spaces of videogames are best understood as allegories of space. Also, for videogame designers the primary role of architecture - in a game - is to support game-play with secondary roles of allusion and atmosphere. Whether understood from the perspective of a creative discipline, by theoretical examination, or in the production of game titles, videogames are replete with spatial qualities and therefore are complex spaces for inquiry. This complexity is confounded by the ubiquitous term videogame, which combines a range of media types and terminology associated with real-time digital environments: computer games, massive multiple online environments, synthetic worlds, first person shooters, virtual environments etc.

In this essay the term videogame refers to contemporary videogame technologies that allow users to experience - through first or third person views - agency within space. Architectural projects incorporating videogames are usually modifications of existing videogame titles. Developers of game titles (for example: Epic’s Unreal Tournament, Valve’s Half-Life 2 etc) enable user communities to generate content for their platforms by supplying tools to modify and create environments. When a videogame is repurposed for an architectural project it explicitly couples an architectural design with its associated videogame technology. This rewards the architectural potentials of the repurposed technology but diminishes design critique. In this situation design has built-in obsolescence as videogame matter depreciates at the rate of Moore’s law.

Videogame environments have predetermined matter-models defined by the developers of the game title. For example Linden Lab’s Second Life and Epic’s Unreal Tournament III both allow users to modify and create environments, but have completely different systems to deliver and experience materiality. The user has agency to redefine space, but limited potential to affect the matter within the environment. Therefore any consideration of matter within videogames has to acknowledge this technological condition; that the mechanism of the videogame is a system designed prior to its architectural appropriation and therefore its matter is pre-engineered.

3. Attributes of matter
I have isolated a four attributes to define the matter of the videogame: meta, modular, indexical, and distributive. These attributes are platform independent and make connections between matter, videogame technologies and the screen based experience of digital materiality.

Firstly, matter in the videogame should be considered as meta-matter, indicating that it is an abstraction from real matter. A similar condition exists in contemporary architecture where the algorithmic simulation of matter creates a substitute materiality. This architectural meta-matter then becomes machine readable for the direct manipulation of physical matter through machine tooling, robotics and other manufacturing processes. However matter in the videogame has no further translation to become real. It’s pure experience is through the videogame and in that sense this matter is Baudrillard’s hyper-real.

Secondly, videogame matter is modular, and is derived from an object paradigm. This is best explained by understanding the structure of the code that drives the technology of the
videogame - object oriented programming (OOP). With OOP discrete units of programming logic are encapsulated in ‘objects’. Light, sound, geometry, even physics are all designed as specific types of videogame objects. Since attributes of the objects are alterable and parameterized, objects can change state allowing for endless variation. videogame matter and its modularity create a recombinant concept of materiality built from atoms of logic.

Thirdly, the appearance of videogame matter is an index of its rendering technology. Triangular polygons are the geometric building blocks of synthetic worlds - all topologies within videogame environments descend into faceted geometries. This is the requirement of the rendering engines that synthesis software and hardware capabilities, and translate scene graphs of geometry into 60 frames of imagery per second. Although the surface of any form is a collection of triangular facets, a series of surface effects enliven these planar elements, to seem anything but reductive. For example texture mapping (applying imagery onto the surface), bump mapping and advanced techniques of normal and parallax mapping. videogame matter has a visual indexicality that is tied to each videogame engine and their developer's intellectual property. Unique bindings of geometry and projective representational techniques mean the collapse from digital space to screen-space is indexical.

Fourth, and finally, the telos of videogame matter is that it is distributive. It is meta, modular, indexical and distributed to be experienced - synchronously or asynchronously - by one or many. Distributive matter can be generated client side (at the node), server side (centralized), or a combination of both. Being distributive raises a novel relationship between matter and its ownership and access. Matter becomes connected to digital rights management (DRM). When one purchases a videogame title or enters into an End User Licensing Agreement (EULA), one is agreeing to respect the intellectual property of this distributable and synthetic matter.

4. Videogame Architecture(s)

Having outlined four attributes of digital matter, I now present a series of projects developed to question the relationship between architecture and videogame space, including the use of videogame environments in design studios. These projects are presented to contextualize the definition of videogame matter.

4.1. Meta spaces, beta places

With the Meta Island Beta project I examine a relationship between physical space and digital space, specifically connecting a gallery installation to a transforming videogame environment. Meta Island Beta (Figure 1) presents an island as a space prior to identity; based on Wu Cheng’en’s 1590s tale Journey to the West (commonly known as Monkey). Islands in the digital and synthetic environments of videogames, are geographies without geology, ultimately located in the flatness of an infinite ocean, where the meta-concepts of gameplay and virtual inhabitation inform the silhouette, undulation and edge of the land form.
Meta Island Beta presents a landscape sculpture with embedded electronics that senses the light levels of the gallery space, and drives a videogame environment, that presents an island sitting on the horizon of a virtual ocean. This island is constituted of 1024 individually addressable modular cells, which are constantly reconfiguring and reforming themselves in response to the light levels of the gallery. This videogame environment is custom built using the programming language Python and the Panda3D game engine.

Every five minutes a new island is created through a series of formative meta processes. Firstly, initial formation - the island is given a mathematical distribution (Gaussian) with a series of peaks informed by the information transmitted from the light sensors. Secondly, erosion - the island form is eroded utilising an algorithm to simulate hydraulic and atmospheric erosion. Finally, vegetation - the erosion process redistributes simulated soil deposits, and where soil is of sufficient depth and above the water line, peach trees (Monkey King gained immortality from the Peaches of Heaven) are planted onto the surface of the island. During a day around 288 beta islands are generated by the installation, each unique and derived from a combination of physical and digital processes.

4.2. FPS Architecture
Concrete Falls - A Thousand Lines of Sight examines the relationship between architecture, landscape and the space of the videogame (Figure 2). It presents an architecture realized for videogame environments and promotes architectures that are formally defined by the activity of the game space. By using trajectories, sightlines and boundary defenses as design generators, this project creates an architectural memorialization of the First Person Shooter (FPS) videogame genre.

Fragments of Berlin’s historical border are re-enacted as a site of enquiry: a place of the oppositional and defensive gaze. Like the tourist climbing the viewing towers of the old West, the lust for the gaze motivates the viewer to ascend and see over the wall. In A Thousand Lines of Sight two self similar tower-walls, placed symmetrically on either side of the border, gaze at each other as part of a novel architectural assemblage.
This project explores the concept of a solid/void model that carves the activity of the game space into the architecture. Matter becomes mutable to game play. The architecture has been developed parametrically allowing the serially deforming ramp to be reconfigured in shape and character. A thousand lines of sight are distributed on three trajectories that travel up the ramp replicating the FPS positions of crouching, standing and jumping. The solid/void model makes salient the effect of carving out the lines of sight and is archaeologically reminiscent of a fortress or bunker. Texture baking techniques are used to give each surface in the game environment complex lighting effects - allowing the light to filter through the apertures into the interior of the tower-wall. For this project the Unreal Tournament game environment allowed for the detailed surface textures and complex geometries to be experienced within a real-time environment. In its static form, as if arrested by Medusa’s gaze, the resultant architecture provides a memorial to the interaction of the game-space.

4.3. Atomistic constructions
In recent years I have been directing digital design studios using Linden Lab’s Second Life as a design context for architecture and interior design students (Figure 3). Second Life presents a persistent virtual world where inhabitants can create, exchange and even sell objects. For designers Second Life offers a robust platform to experiment within a persistent collaborative online design space.
In Second Life designers use a set of tools to create their virtual designs directly in the environment. These tools are limited when compared to typical architectural software, but guarantee that all modeling is compatible with the environment. Objects created are called a **prims** (short for **primitives**), and through a combination of prims designers can achieve more complicated spatial compositions. Second Life embraces the concept of atomistic construction for user generated content, where simple - easy to generate - objects can be used in combination to create complexity. The matter of Second Life is highly distributive. Located server-side all objects and spaces are streamed to the client when required. Second Life is less sophisticated in its rendering of space when compared to other videogame technologies. This is because as a technology Second Life’s success is based on the efficient delivery of its distributive environments, and allowing as many people to access these spaces, with minimal computer specifications and across a series of operating systems.

**5. Coda**

The experience of materiality through the videogame is intrinsically shaped by the mechanics of the videogame. I would argue, extending Steigler’s idea that information is matter in transition, that the videogame offers a unique experience of matter by coupling information with energy. Ironically the synthetic worlds of the videogame require the physical world mechanisms of computers, networks and servers. A critique of digital matter is not just about the phenomenon of the videogame in architectural design, however, the more we migrate to persistent online environments the more we engage an economics of design where digital matter has real world implications.

The further we invest in the space of the videogame, be it online worlds, massively multiplayer environments, or multi-user educational spaces, we need to understand that digital matter has an associated cost. I have articulated the concept of videogame matter to better understand the material qualities of synthetic environments. If we consider the matter of the videogame as meta, modular, indexical, and distributive, then we engage in a matter-model that is unique to the technological conditions these synthetic worlds. The unique combinations of matter, form and interaction availed in the space of the videogame will lead to new formulations of architecture; however an architecture whose matter is always in transition.

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6 Jack M. Balkin defines this as the third kind of freedom within virtual worlds - the freedom to design together - where both players and developers build and enhance the game space together. The first two freedoms are: Freedom to Play (players ability to participate in the world), and Freedom to Design (developers ability to plan and maintain a virtual world). From Balkin, J.M., Law and Liberty in Virtual Worlds. in The State of Play. (New York: New York University Press, 2006) 86.
