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Block by Block: Minecraft and the Manufacture of Expertise

In her study of 19th century electrical experts, Carolyn Marvin argues that technical expertise is textual, emerging as a function of communities assembling around the production and interpretation of documents. Shot through with power relations, these documents are less about determining efficiencies than they are "a series of arenas for negotiating issues crucial to the conduct of social life" (4).

Minecraft modders have inherited this mode of manufacturing expertise. The Rube Goldberg logic of their contraptions is an allegory for the digital processes that actually drive the game. The textual aspect of their communities is even more complex than that of electrical experts, yet they still manage to invent themselves as an elite. Game studies routinely champions modders and modding as the vanguard of sophisticated gameplay, with little to say in the form of critique.

This paper is an introduction to our ongoing study of the controversies around energy conversion in modded Minecraft games. Marvin's electrical experts only had to contend with AC and DC; Minecraft players have to make sense of a range of simultaneously present and usually incompatible imaginary units of power and their accompanying devices and documents.

Metaphors of Electrical and Mechanical Energy vs Signal Processing

The first "electrical" components came to Minecraft in the summer of 2010, with Alpha release version 1.0.1. A type of mineral called "redstone" could be reduced to dust, which makes a crude conductive "wire" when laid on the ground. Switches, buttons, or pressure plates send a sustained current or a brief pulse through a redstone system to control objects like lights, doors, pistons, and minecarts. More importantly, with the addition of the transistor-like "redstone torch," Mojang opened up Minecraft worlds

to the infinite possibilities of logic circuits and simulated in-world computer hardware of staggering complexity.

Yet despite the use of electrical idioms like "current" and "power" in the game's official discourse, there is very little about redstone that is truly electrical, which may account for why the word "electricity" rarely appears in reference to it. Redstone circuits are not truly carriers of power (that is, energy), but of signals. They enact change in the world by indicating when and where it is supposed to happen, not by generating the physical forces that cause it to happen. Redstone components are not so much electrical as they are electronic.

This distinction between information processing and physical action is utterly lost at the level of Minecraft's implementation of code, because all aspects of the simulated world are reducible to information processing, including those that model physical forces. On a representational level a player may need to push on a minecart to give it momentum, but this event, experienced as purely physical by the player, ultimately comes down to software logic telling the minecart what to do and when. In-game events always need signals to trigger them, but none of them truly need energy to drive them, unless the concept of energy is itself written into the code as a gameplay constraint.

This is where the mods come in.

A collection of initially unrelated mechanical-industrial mods is responsible for introducing the notion of electrical energy as something separate from signal-based redstone "power" in the mind of the player. These mods also draw attention to the fact that both thermodynamic energy and redstone power are distinct from the software logic underlying them—the information processing carried out by the software to simulate a redstone circuit should not be conflated with the information processing tasks performed by the redstone circuit itself.

We are in the process of documenting the many discursive forms that energy takes in various Minecraft mods. They provide ways to store and move energy in a variety of forms, from combustible fuels and electric current to pressurized steam and rotary crankshafts, not to mention the various mystical forces added by magic and supernatural mods. The different logics by which energy works map onto a different set of explanatory metaphors. Our research considers four of these: energy as money (exemplified by the TermalExpansion mod's "Redstone Flux," or RF); as gasoline (exemplified by Railcraft's steam energy system); as volumes of flowing liquid (exemplified by Factorization's "Charge" system); and as more-or-less physically accurate electricity (exemplified by IndustrialCraft 2's "Electrical Units," or EU). The metaphoric nature of this discourse leads to a mismatch between how energy looks to the player and how it actually functions. For example, "steam" really acts like gasoline, and some kinds of "electricity" are like real electric transmission, while others operate more like money transfers. For reasons of time, rather than going into the specifics of the function of each mod we are researching, today we want to emphasize the textual nature of the production of the forms of power that proliferate around them.

Ideology and The Textual Community of Minecraft Energy Design

The different physical metaphors, implementations, and aesthetics of Minecraft energy systems embody a set of ideological game-design values that are in constant tension with one another in mod designer discourse, as this diagram details [see Fig. 1. Ideological tensions in mod design]. This diagram is not a spatial map, in which particulars have specific locations, nor do opposite corners represent mutually exclusive ideologies. Rather, it shows the different directions in which a mod designer may be "pulled." A document titled "Conflicts of Ideas" on the Universal Electricity mod's Github wiki serves as a case in point ("Conflicts").

That mod creators outline their design philosophies at all, never mind on Github, which is the world's largest host for software code development projects, already points to Minecraft modders as a textual community that seek to validate their expertise in part by relying on the tools and trappings of more established expert communities. The "Conflicts of Ideas" document outlines two ongoing debates among modders working on and with the Universal Electricity API: whether energy measurements should be

represented internally as integers or double-precision floating point numbers ("doubles," a data type capable of representing decimal fractions to a high degree of precision); and whether the concept of voltage should be preserved in future versions of the API.

In the first section, the document's authors point out that the use of integers is more computationally efficient (a technical concern), but it makes it impossible to use "micro-units" (values less than 1). Doubles allow for more accurate calculations—especially when dividing numbers—and also make possible the use of small increments, which opens up a greater range of representational possibilities and is particularly crucial to designers who wnat to make claims to scientific realism. However, not only are doubles less computationally efficient; they can also lead to inaccurate calculations when programmers working on different parts of a program round the same figures in different ways or work at different levels of precision.

The latter section of the document hails voltage as a feature that adds more scientific realism to electricity mods. It also allows for the creation of a system of cable and machine tiers, relating to ideological investment in notions of "constraint" and "balance" between game elements as positive features. On the other hand, it makes the code more complex and inefficient (technical concerns), and as a game mechanic it is supposedly too complex for the average player to deal with—or at least, moreso than the average player wants to have to deal with. For this reason, most authors who write mods for Universal Electricity do not even bother to take advantage of its voltage features. This last point embodies an "instrumental" ideology, in which energy infrastructure exists as a means to an end, not for the sake of adding new layers of complexity and challenge.

Narrative and discursive goals also give rise to ideological tensions. The systematic quantification of energy management in Minecraft mods may be a reflection of our own culture's increasing awareness of our energy consumption patterns. However, the idea of introducing energy infrastructure to the Minecraft world also speaks to the game's embedded colonialist/frontier narrative, which is further underscored by the anachronistic theming and aesthetics of some of the mods—Factorization's aura of pioneering

experiments in static electricity, or RotaryCraft's direct invocation of how mills and factories worked in the pre-electric industrial period. The narrative of civilizing the frontier also implies gradual bootstrapping and advancement from primitive systems and hard work towards advanced systems and (supposedly) greater leisure. Simple, easy-to-understand energy frameworks like Redstone Flux may appear to sit squarely in the camp of instrumentalism by providing the most convenient way to "automate all the things," as their motto suggests. But the very idea of automating repetitive menial tasks is also crucial to the ideological underpinnings of industrial-themed mods, and, more generally, of Minecraft itself.
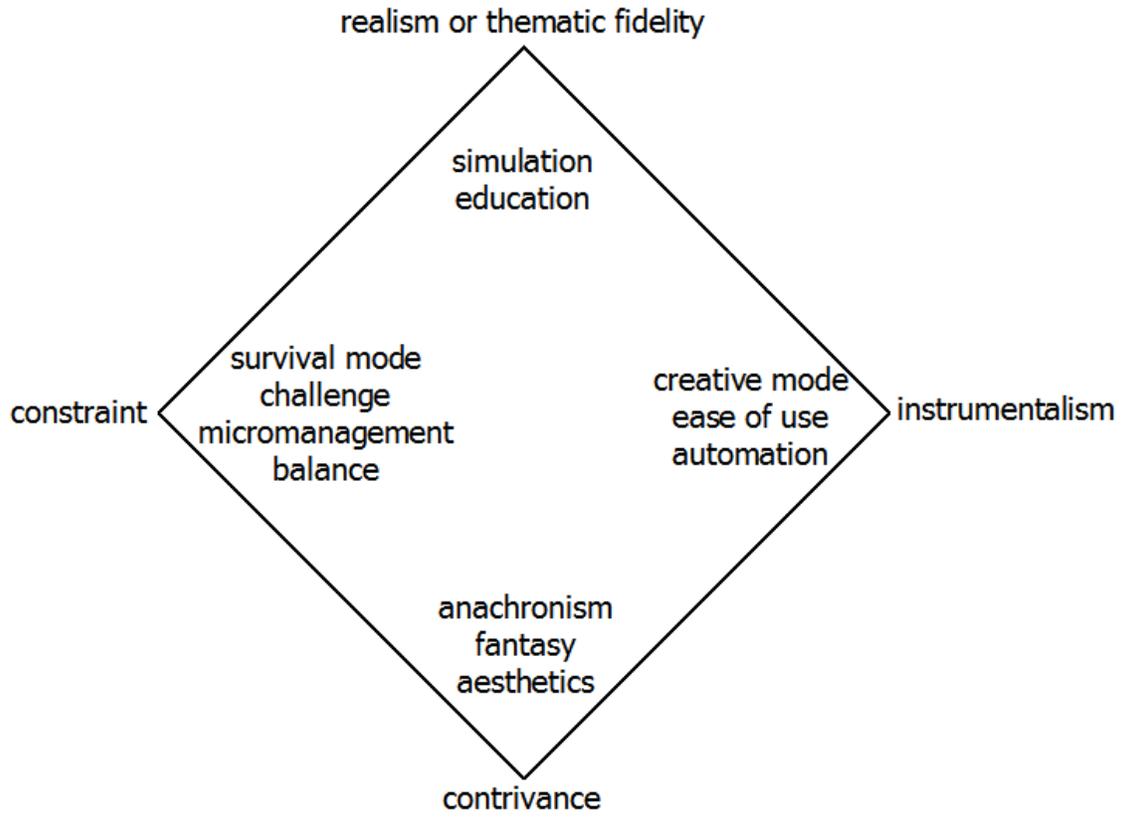
In fact, the question of whether Minecraft's electrical infrastructure should be a mere instrument or a kind of puzzle game in itself is at the heart of the proliferation of energy standards in the game. The very fact that there are costs associated with operating the new industrial machines is already tied up in the discourses of balanced game mechanics and scientific realism. While the virtual space of Minecraft could easily be a world without scarcity, mod designers are apparently compelled to impose the concept of scarcity, not only to create interesting gameplay challenges for the player, or to invoke compelling narratives, but to create complex discourses about their own expertise. By adopting positions in ongoing debates regarding the representational, game-mechanical, and programmatic dimensions of energy mods, they manufacture and render visible new forms of expert knowledge.

Conclusion

The response to the proliferating interest in mods that introduce energy to Minecraft has not been the emergence of a standard, but instead, a series of ever-more elaborate workarounds. Gratuitous complexity breeds more opportunity for the production of expert discourse. What will happen to this burgeoning discursive community after Mojang's infamous purchase by Microsoft in September 2014 remains to be seen, but Microsoft has historically situated itself as the enemy of open-source development models, and has strict regulations around its other gaming-related intellectual property. If it appears, the rumoured development of an official Microsoft Minecraft API may well establish once and for all that the true arbiter of expertise is political economy.

Appendix: Figures

Figure 1: Ideological tensions in mod design

realism or thematic fidelity

simulation
education

constraint

survival mode
challenge
micromanagement
balance

creative mode
ease of use
automation

instrumentalism

anachronism
fantasy
aesthetics

contrivance

Works Cited

Marvin, Carolyn. *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century*. New York: Oxford University Press, 1988.

"Conflicts of Ideas." *Universal Electricity*. GitHub repository, 2013. Web. 3 January 2015. <http://webcache.googleusercontent.com/search?q=cache:https://github.com/Resonant-Engine/Universal-Electricity/wiki/Conflicts-of-Ideas>