Heat

Angela Ferraiolo
Sarah Lawrence College
aferraiolo@gmail.com, aferraiolo@sarahlawrence.edu

Abstract

While the destructive forces of environmental heat are critical, they are often invisible and therefore difficult to acknowledge. This paper describes a computational artwork titled *Heat* which visualizes thermal energy as a locally destructive force. The project is screen-based. Each artwork in the series depicts a system of thermal agents set in a 3D grid that models the absorption of heat. Agents rely on signals from their environment to generate individual thermal conditions. Changes in agent states are rendered as deviations in color, size, and location, on the grid. As the heat in a system rises, agents distort their positions and appearance. This paper describes the design of two of the grids in the series, grids no. 4 and 5.

Project Overview

Fig. 1. *Heat, Grid No. 4*, t_1, 2021, Angela Ferraiolo, digital file from computational system.

Informally known as "global warming," the Anthropocene can be imagined as a kind of accumulating heat, a phenomenon that puts the entire biosphere in peril. Many artists have hypothesized a "blue planet" at risk. But recent observations on global warming describe the distribution of heat as both even and patchy, a result of what Kim Fortun (2012) calls "late industrialism," in which some locations, and some bodies, are more exposed to hazards than others. Social theorists have observed that geographic, economic, ethnographic, and sociological forms of environmental risk imply a new kind of thermal necropolitics (Mbembe 2003), in which heat kills not globally but selectively. These "selective" instances of damage are often local and isolated. As a result, some aspects of the Anthropocene can seem random, formless, harder to discern, or somewhat invisible.

The Grid as Metaphor

One way to describe this kind of scattered danger might be to visualize it as a disruption in a formal pattern at a specific location. This kind of visual strategy would cast the failure of pattern as an aesthetic breakdown as well as a transgression of formal logic. For this artwork, the grid was chosen as a good candidate for algorithmic disruption because of its visual clarity. But grids also have some resonance with the economic strategies of capitalism and post-capitalism.

For many cultural theorists, grids are a fundamental organizing scheme in industrial and information age societies. In one of the first cultural appraisals of the grid, art historian Rosalind Krauss described grids as an emblem of industry, a conceptual structure for standardization and mass production. The grid Krauss wrote, "turns its back on nature." French anthropologist Claude Levi-Strauss saw grids as structures with the ability to state a relationship between the individual and society as a

relationship between the module (or what is contained) and the grid (the container). Art historian Hannah Higgins writes that the distortion of a grid has clear implications: “As much as they [grids] produce opportunities for organization, communication, and control, they also offer occasions for analysis and, where the grid is broken, cultural upheaval and change.”

Here, the evolution of a grid can be interpreted as a system that is changing. The contents and some aspects of the form of a grid can be viewed as features that might mirror states of variation in a system.

Project Design

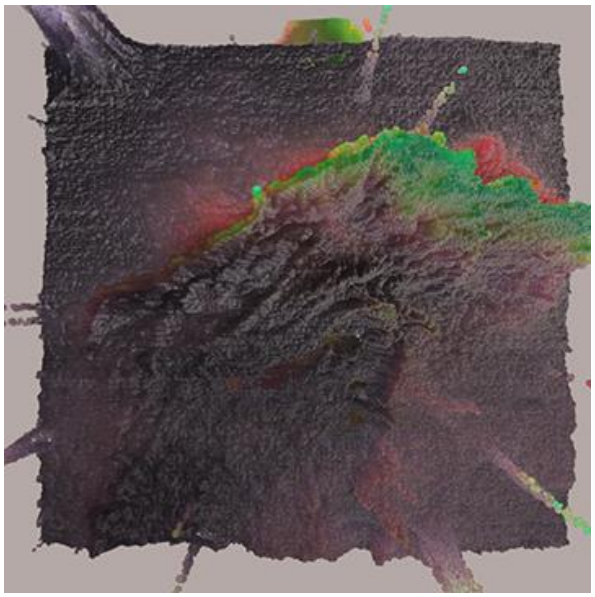

Fig. 2. *Heat, Grid No. 5, t_1*, 2021, Angela Ferraiolo, digital file from computational system.

The grids in these systems are made up of two layers of agents. Each layer is organized on its own network of links. Agents receive system input at regular time steps. As the heat entering a system increases, that “energy” is “absorbed” by agents and reflected as a change in color or x, y, or z location. As a feature of each agent, certain properties can be more or less resistant to heat or, following the project’s design metaphor, more or less at risk for environmental stress. Figures 1 and 2 above represent the output of Grids 4 and 5.

In conclusion, the project Heat consists of a series of grids that were designed to reflect the “patchy” effects of heat as an environmental stress. The design of the project draws on ideas from the art history, sociology, studies of the Anthropocene, political science, and agent based adaptive systems. The motivation for this project was to explore the grid as an adaptive system as an expressive form.

References

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Biographies

Angela Ferraiolo is a visual artist working with adaptive systems, noise, randomness, and generative processes. Her work has been screened internationally including Nabi Art Center (Seoul), SIGGRAPH (Los Angeles), ISEA (Vancouver, Hong Kong), the New York Film Festival (New York), Courtisane Film Festival (Ghent), the Australian Experimental Film Festival (Melbourne), and the International Conference of Generative Art (Rome, Venice). Professionally she has worked for RKO Studios, H20, Westwood Productions, Electronic Arts, and Hansen Literary. She teaches at Sarah Lawrence College where she is the founder of the new genres program in visual arts.