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**WORKING WITH
ALGORITHMS: PLANS
AND MESS**

Cellular automata are computer programs that emulate biological life processes. Following a set of simple rules, they activate and deactivate cells on a grid according to the states of adjacent cells. Since its publication in *Scientific American* in 1970, John Conway's *Game of Life* has become the paradigmatic rule set for cellular automata: cells with fewer than two or more than three neighbors die, live cells with two or three neighbors persist, while dead cells with exactly three neighbors come to life. Conway's game takes its name from the variety of complex patterns it generates from these rules (Conway called them "genetic laws"), which govern the birth and death of multicellular "organisms." Enthusiasts of the game collect interesting patterns like lepidopterists collect butterflies, meticulously categorizing and naming them. The bestiaries of the *Game of Life* are filled with gliders and puffers, beehive and agars — distinctive patterns that flicker and glide across gridded terrain.

Emerging around the same time as the personal computer, Conway's game shares in some of computing's founding myths: its animals are pure information, digital constellations in a featureless, discrete environment. When cells die, they vanish without a trace. Though billed as a diverting "mathematical game," Conway's *Game of Life* makes an argument about the connection between life in the world and the logic of computing. Because the lives of its organisms are completely determined by the initial state of the board, the *Game of Life* is often called "zero-player," suggesting that this "game" is not really a game at all: it is an algorithm.

Kai Franz's *History of One Organism* (25 × 33) is nominally another instantiation of Conway's game, setting the grid with a wooden board and white paint. Yet, as with the game itself, small variations in the program produce dramatic effects. Cellular automata are typically

assumed to be essentially symbolic, indifferent to material details: the *Game of Life* is the same whether it is worked out on Go boards, on typewritten sheets of paper, or in the memory and glowing phosphor of a personal computer. In his *History*, Franz has devised a material system that challenges this assumption. Made from spoonfuls of paint, dead cells do not disappear, but rather dry out, becoming the ground for future generations. This simple variation dramatically changes the game: the evanescent flickering of digital forms is replaced by the slow and irregular accumulation of paint. The resulting painting/sculpture provides a compelling meditation on the translations between plans and actions, programs and their execution, and abstract and material systems, themes which resonate throughout Franz's oeuvre.

Up close, *History of One Organism* (25 × 33) appears to be a strangely eroded landscape. Valleys suggest the ancient flow of water between cracked, sun-bleached hills. Empty cells are still visible, their boundaries marked with pencil and encroached on by their overflowing neighbors. Above, Franz methodically drips paint, equipped with a plastic spoon and a hundred-page PDF file (see pp. 36–37). Each page of the file depicts a successive generation of the game, indicating currently active cells, which Franz marks with spoonfuls of paint. A running tally at the bottom of the page counts how many cells have existed up to this point — by the end there will have been more than ten thousand. It is a time-consuming process, replicating the patterns from the digital plan across the already irregular surface of the board. As the cells dry, they start to look like sand dollars, skeletal and white.

Franz knows the fates of his cells long before they occur: all generations are precisely entailed by the configuration of cells on the first page and the set of genetic laws that govern their development. By the 50th generation, a block



of four cells has held steady, growing into a pronounced hill near the top of the board. Within a few generations, a wave from the south will collide with the block, knocking it out of existence. In the PDF the cells simply vanish, but in the *longue durée* of the painted board the hill remains, a monument to past generations. *History* is a history in that it sediments action, bearing traces that the information-theoretic version of the game forgets.

What is the relationship between the parched landscape of *History of One Organism* (25 × 33) and its digital blueprint? A simple determinism, taking the work as merely the execution of a plan, is obviously insufficient to capture the aleatory flow of paint which exceeds cell boundaries, rolling down the sides of accumulated hills and into open fissures. It is tempting to claim that the difference between

History of One Organism (25 × 33) in paint and *History of One Organism* (25 × 33) in prototypic PDF is simply the difference between the analog and the digital: the former messy and continuous, the latter tidy and discrete. Franz's painted "pixels" are unruly ones. If the *Game of Life* on a computer screen reflects life in its complexly patterned rises and falls, *History of One Organism* (25 × 33) seems to reflect life in its intractability and mess.

But a focus on the features of artifacts risks obscuring the dynamic center of Franz's work more generally: interactions and translations between a variety of generative systems. *History of One Organism* (25 × 33) is not only an artifact of a particular symbolic machinery — it also emerges from the material interactions of paint, board, gravitation, and the artist's own body. In the title of another of his pieces engaged with cellular automata, Franz draws attention to the biological externalities of symbolic systems. *6.46 kg Oxygen, 13.09 kg Carbon, 7.20 kg Hydrogen, 2.28 kg Nitrogen, 1.44 kg Calcium, 0.72 kg Phosphorus, 0.24 kg Potassium, 27 Hours, 43 Minutes, 16,486 Beats* (see pp. 40–43) bears in its title and form a record of human labor — an inventory of the elements in the artist's body, the time taken to produce it, and the number of hammer beats which struck the generations of cellular automata into a metal sheet. The sheet has curled in on itself under the stress of the beating, making later strikes more and more difficult, inserting itself into the work of translation from plan to action. The ultimate work not only exceeds the description of the plan, but also reaches back and interferes with it.

The interplay of abstract and mechanical systems is even more apparent in Franz's recent *Plopp Series* (see Section #2, p. 112ff), produced by a modified plote, which "prints" CAD drawings in sand and resin, producing strange objects that recall spilled paint, alien physiologies, or futuristic desert architectures.

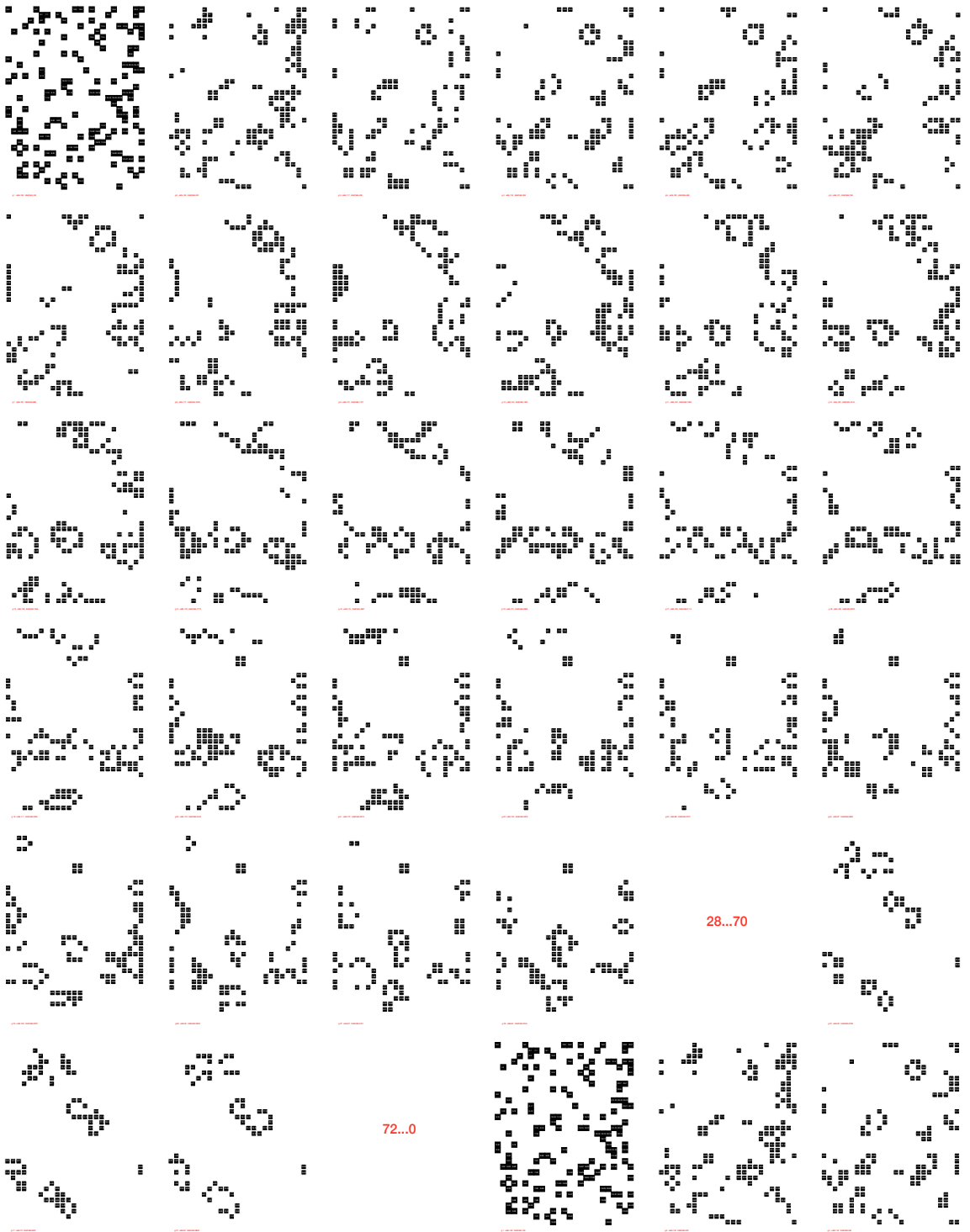




These artifacts are the offspring of two markedly different systems: the abstract plan embodied in the computer's memory, a set of dense concentric circles set on a colored grid, and Franz's jury-rigged *Plopper*, a printer modified to "print" from a tube of sand and a plastic cup of resin. The gap between the *Plopper's* appearance and Franz's formal name for it — *Dual-Axis Precision Deposition System* — marks a space between the meticulously planned action of the engineer and the ad hoc assembly of the *bricoleur*, from which Franz's strange artifacts emerge. The artist's collaboration with symbolic and material systems is at once precise and messy, digital and analog, planned and accidental. Set next to each other, the CAD drawing and the dried resin appear nearly unrelated (see pp. 144–145); a contrast of clean lines and wet flows coated in sand. The *Plopps* only faintly recall the "precision" of the *Plopper*, their criss-crossed lines evoking the path of the print head. When the same pattern is printed at a variety of scales, the properties of sand and resin seem to take over, coalescing according to a system all their own.

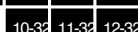
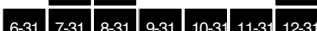
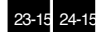
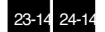
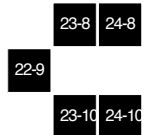
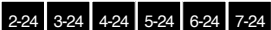
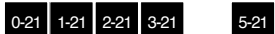
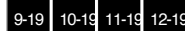
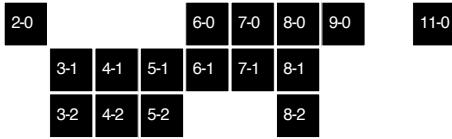
If the program, instantiated in symbolic arrangements and mechanical devices, is inadequate to the final artifact, so too are these curious objects inadequate to their plans. *3D Scan of Untitled Plopp No. 81 (1:100)* (see pp. 130–131) returns the artifact to the symbolic world of computer representation, but we never recover the austere simplicity of the original. Instead, we return to landscape, the raster lines of computer vision sketching out hills and valleys of uncertain scale. These works draw attention to the imperfections of mediation, not only in our inability to faithfully execute plans, but in artifacts' inability to bear the whole story of their creation. Emerging from lived practices of translation, Franz's work bears in physical form the dissonances and interrelations of symbolic and material systems.

In spite of itself, Conway's *Game of Life* seems to emphasize the *differences* between life on the screen and life in the world. Rather than revealing all life as information-theoretic, the game's deterministic patterns seem to contrast with the swerves of material existence. As algorithms bear more and more influence on the contemporary world, an overly simplistic line of critique takes this contrast for granted: to critique rigid algorithms, we should return to organic flows. Franz's work toys with this assumption. Pieces like *History of One Organism (25 × 33)*, the *Plopp Series*, and *6.46 kg Oxygen, 13.09 kg Carbon, 7.20 kg Hydrogen, 2.28 kg Nitrogen, 1.44 kg Calcium, 0.72 kg Phosphorus, 0.24 kg Potassium, 27 Hours, 43 Minutes, 16,486 Beats* reveal the myriad ways in which abstract and material machineries rely on each other. These artifacts emerge from a space formerly neglected, in the gap between plans and actions, at the interface of precise intentions and messy enactments. They are a valuable reminder of the tangled relationship between symbol and material, the complex lives of algorithms and plans, and the unpredictable generativity of abstraction. In their enigmatic form, Franz's pieces question the logic of separating material life from the formal plans of computation, instead providing a glimpse of what it might mean to work *with* algorithms.



Instructions for **History of One Organism**
 (25 × 33), 2010, generated by computer
 simulation (generation 0–72)

Exerpt from the *Game of Life* simulation,
 PDF instructions, generation 21



g.21 cells.121 totalCells.2574

