What Starfish Know: Situating Autonomous Systems in a Generative Art Practice

Assistant Prof. Chad M. Eby, BA, MA, MFA
School of Art & Visual Studies, University of Kentucky, Lexington, U.S.A.
chadeby.studio
e-mail: chad.eby@uky.edu

Abstract

art making systems are often considered central to a notion of generative art. But these heterogeneous indirect production methods encompass a wide range of complexity, agential sophistication and relative autonomy—and may be engaged with by an artist from an array of positions. In a 2018 paper, "The Machines Wave Back," this researcher defined a classificatory taxonomic system to categorize autonomous art making systems, and to begin to characterize the shared power dynamics within these systems between rules structures and artists. Part of this effort involved developing a graphic a starfish plot to visualize these systems and their relationships. The current paper invokes the starfish as a broader metaphor to investigate a more personal and evaluative meditation of working within an autonomous art making system, and on that peculiar space at the tip of the starfish's legs: the possible and preferred relationships between artist and rules structure, considering questions of voice, vision, intention, discovery and joy.

Introduction

In a 2018 paper titled "The Machines Wave Back"—that title being a nod to James Bridle's essay that introduced his vision of the New Aesthetic [1]—I laid out a taxonomic scheme to classify Autonomous Art-making Systems (AAS), understood as generative partnerships between artists and rules structures [2]. The purpose was not only to categorize and compare existing works of art and design, but also to think more broadly about the dynamics of generative practices.

This scheme borrows a conceptual structure from the world of software development to posit five types of activity (rendered as primitive operations or "verbs") such systems undertake, including gather, alter, generate, curate and distribute. These terms describe operations on heterogenous array of potential components of an artwork which could include such things as pixels, words, sounds, algorithms, found objects, spatial coordinates or virtually anything at all that could comprise a high- or low-level component of an artwork, up to and including (perhaps recursively) the entire

artwork itself. It is important to stress that although rules structures may be encoded in a programming language to be executed by digital computers, this is not a necessary condition: creating a hexagram of the *I-Ching* counts as a fully autonomous rules structure in a generate operation even if the outcome is arrived at by flipping coins or casting yarrow stalks rather than by software running on a digital computer.

Within the scope of the five verbs there is consideration for representing the relative degree of autonomy exercised in each operation by the artist and the autonomous system from none, to some, to full. These comparative pairings do not represent zero sum games. It is possible that neither the artist nor the system exercises any autonomy in a given verb (if, for instance, there is no application of that particular verb in a piece) or it may be that both the artist and the rules system have full autonomy (if the decisions of each do not impinge on the other). Taken together, these pairings suggest the contours of the relationship between the artist and the rules structure—a topic that was inadequately explored in the previous paper.

Finally, there is the matter of the scope of agential sophistication of the rules structure of the art making system within each primitive operation. This measure ranges from a sophistication level of 0, a list of prohibitive rules that arguably do not rise to the level of generative art [3], to a sophistication level of 5, where a rules structure may define its own goals as well as the criteria for meeting them. This measure of agential sophistication exists only for the rules structure as it is assumed that the artist within the system possesses perfect agency.

Before speaking further to relationships between artists and autonomous art-making rules structures, it is first necessary to more clearly define the five primitive operations expressed by the model. These operations are not expressed with a time component and so may occur serially or in parallel, linearly or recursively: the operations are meant only to capture the domain of activity. They are analogous to a signal chain in audio production, a set of operations that eventually yield a mixdown.

A *gather* operation is one that aggregates elements, composite objects or even other rules structures into something like a collection. It is somewhat difficult to conceptualize a gather operation without some attendant curation, but I believe a distinction may be drawn, for instance, between a raw grab-all-you-can scenario and a more curatorial filter-then-grab activity; in the former situation one will gather whatever is available without specifying characteristics beyond bare presence. This sort of procedure is especially conducive to discovery and surprise.

In an *alter* operation, the aim is to transform one or more elements or objects. These operations range from simple direct substitutions of elements to variously complex spatial or chromatic transformations all the way to deep simulations (or actualities) of biological growth and mutation.

The *generate* function is perhaps the most critical component in an autonomous art system if one is to consider the output (or process) of a system “generative art.” Elements, objects, rules and rules structures may be brought into being through a vast range of techniques from basic chance

operations to extremely sophisticated evolutionary solvers. These generative solvers may also have co-operations so that they generate through a routine of multiple alter-and-curate moves, iteratively mutating elements and then checking for fitness to some criteria.

Curate operations encompass notions of discrimination, phronesis or judgement. At the lowest end of agential sophistication, a rules structure within an autonomous art making system performs a curate operation by acting as a basic seine or filter: it excludes certain elements from objects or objects from sets. In addition to acting as a terminal operator to decide whether to preserve output, curation may also be employed as a classifier to split sets into categories and sub-categories for further operations.

Possibly the least sexy of operations, some method to *distribute* results is nonetheless critical to garnering an audience for the artwork—although distribution is often not explicitly included as part of the artwork as this sort of operation is generally considered a post-process. However, digital distribution methods aligning with digital generative methods may change this situation.

While this model attempts to describe the combinations of relationships between an artist and her chosen or invented rules structure, it does not explicitly explore the emotional or ludic qualities of those relationships, nor even begin to evaluate the various value propositions inherent in them—particularly in their multitude of permutations. It is also in no way meant to be a totalizing model, but rather a first cut at a conceptual framework. The remainder of this present essay will be to begin to consider some of these questions within this framework.

Relationships

There are myriad reasons an artist might take up a relationship with a rules structure within an autonomous art making system.

One potentially large, if obvious, advantage to working with a rules structure that can be operationalized as a machine-executed algorithm is that the pace and scale of exploration may be vastly increased through automation. High speed application of a rules structure makes high volume or repetitive tasks achievable for an individual artist and can expand the scope of what is possible. Manually applying rules structures, such as performing Conway's cellular automata game of life in a gym with soda cans and stop-motion animation are severely constrained when compared to the possibilities afforded by the application of even rather modest computational power and pixel-based displays.

For an artist, one of the critical (if sometimes overlooked) functions of a sketch is to externalize thoughts as visual artifacts so as to initiate and sustain a dialogue with herself. This is both for reasons of precision of expression—since it is easy to gloss over details in the work when it is still only in the mind—and as a feedback loop for exploration, discovery and elaboration.

An autonomous rules structure with adjustable parameters may serve much the same function as a traditional sketch, not only in concretizing and clarifying an artist's intention, but especially in creating an observe-adjust-observe feedback loop that has value as a vehicle to more deeply engage with the grain of an artwork.

I have long entertained the notion that working “alone,” with a less-than-perfectly-stable self, over time could form the basis for a theory of collaboration: the person I am in this moment is not self-identical to the person who earlier externalized thought or feeling through writing, drawing or recording. The radical version of this theory would contend that any work not able to be executed instantaneously (that is, all work) would then be a sort of collaboration through the feedback and reflection with an externalized artifact of a previous self. One aspect of working within an autonomous system, especially those with a rules structure with substantial generative characteristics, is the pleasure of surprising results that manifest even when the artist or designer has carefully crafted the rules structure. Even more delightful is when the initial surprise of an outcome turns to recognition of the self in the work; more on this shortly

Even without the more radical take, invented rules structures may provide a particularly rich example of a more interactive second self with which an artist may collaborate. Re-identifying with a construct of a former self, externalized through the expression of a rules structure, is one of the potentially ludic dimensions of working within an autonomous art system. John Cage once asserted: “I use my work to change myself.” [4]

Of course, there can be downsides to working with (or worse, using) rules structures for the contemporary artist.

There is an inherent tension in working within an autonomous art system between totalizing control by the artist, which tends to tamp down generative benefits and preclude surprises, and too little investment or involvement in the rules system by the artist. This lack of “skin in the game" may produce a high yield of surprising and/or novel outcomes but can also cast doubt on the necessity of the role of the artist (or at least any particular artist) in the process at all. Leaning too hard on an algorithmic rules structure, especially one not designed (or even well-understood) by the artist may produce outcomes that, if not coupled with an aggressive artist-led curation operation, will be blandly generic. Arbitrary rules may not always advance an artist’s vision.

In a related issue, rules structures have the potential to unintentionally blunt the expression of an artist's particular voice (gained through lived experience) by lacking grain fine enough to fully interface with artistic intention. In this case, the rules structure may level and smooth outcomes in a way that elides the subtle contours of intention. I relate this situation to the inevitably lossy digital quantization of analogue signals that invariably sculpts slopes into stairsteps, blindly discarding everything under the curve.

Finally, there is the potential problem of being seduced by the ease, virtuosity, or simple monkey-brain pleasure at the appearance of the complexly unexpected that may spring from poking a sophisticated rules structure. The resulting dopamine hit may drastically erode conceptual underpinnings and result in a race to the shiniest.

It would be futile to list all possible configurations of relationships between artists and rules structures within an autonomous art-making system. Instead I would like to suggest some common and not-so-common possibilities as a

jumping-off point to seed further discussions.

Perhaps the most common (and straightforward) relationship between an artist and a rules structure in an autonomous art making system is one of a high-autonomy generate operation for the rules structure combined by a high-autonomy curate operation by the artist, either serially or interleaved in parallel. In this scenario, the artist first chooses or creates a rules structure that generates candidate elements, objects or rules, and then the artist judges the fitness of the outcomes of that operation for distribution. This condition encompasses a great many works of what are called generative art and may be represented as rs.generate⇢a.curate.

A second curation stage could be added as rs.generate¬⇢rs.curate⇢a.curate in which the rules structure makes a preliminary fitness pass over the generated outcome before the output is passed to the artist for final curation. Or, the artist generates objects that are altered by a rules system and passed back to the artist for curation: a.generate⇢rs.alter⇢a.curate.

But there are also many less apparent relationships that may be performed. In a sort of crowd-sourcing scenario, a rules structure (rs1) could distribute elements to a second rules structure (rs2) for an alter operation (perhaps performed by a mechanical Turk) and the gathered results are then curated by the artist: rs1.distribute⇢rs2.alter⇢rs1.gather⇢a.curate.

It is worth considering the prevalence of a curate stage performed by the artist at the tail of these examples and note some of the differences in ability between current rules structures and artists. Perhaps the broadest difference is that living artists are, by accident of necessity, extreme generalists. Rules structures, by contrast, are equally extreme specialists that are often created to perform a single task.

The strength of rules structures is that they are, especially when formulated as code for execution on digital computing machinery, swift, tireless, relentlessly precise, and can reliably exhaust a task space without becoming distracted, bored or resentful. Even if not created as executable code, rules structures can bring consistency and focus to a task when enacted or performed by a human artist.

The strength of human artists, on the hand, is the their embodied, lived experience in the world. Such experience in the individual—and in the species—enables astonishingly sophisticated acts of phronesis and fine distinction, but also allows for sensitive, intuitive, abductive and unplanned (but fully justified) leaps, including improbable but poetic connections made across the full range of human encounters with the world and each other. Artists are almost impossibly broad, but parts of their experience, judgements and prejudices may be separated and codified into rules structures, and these rules structures retain their human DNA even if, once separated from us, it is not always recognized.

Conclusion

Why Starfish? The diagrams meant to visualizes autonomous art-making systems in “The Machines Wave Back” (which look distressingly like airport terminal plans in hindsight) graphically

map the five primitive verb operations to the legs of an abstract starfish. The diagram's morphology has practical implications but also thematic ones. What is perhaps most known about Starfish is their radial symmetry (never ask a starfish for directions!) and their ability to re-grow lost limbs, or, in some species, even to regenerate an entirely new body from a lost limb.

Canadian media critic Marshall McLuhan had some things to say about technology and metaphorical amputation. One of his primary contentions in this regard was that human technologies were always already extensions of the body: clothing extends the skin, the telescope extends the eye, the gun extends the fist, the wheel is a sort of diagram of feet in motion…

McLuhan argued that because people do not consciously realize that technologies are extensions of the body, they become psychically anesthetized to that reality. He maintained that these extensions were largely invisible to us, until the twentieth century extension of the central nervous system in the form of electric global media suddenly made this situation uncomfortably apparent. So, as media extends, it also amputates. Although electric technology extends the central nervous system, "such amplification is bearable by the nervous system only through numbness or blocking of perception." [5] Thus, McLuhan asserts that a process he terms "autoamputation" accompanies any extension of media.

"Physiologically, the central nervous system, that electric network that coordinates the various media of our senses, plays the chief role. Whatever threatens its function must be contained, localised or cut off even to the total removal of the offending organ." [6]

Yet the starfish shows us that amputation can be the basis for (re)generation, and that recognition of parts of our severed selves as ourselves carries the salty tang of growth about it.

"The Machines Wave Back" concludes with an assertion that technology is itself thoroughly human, and that we will increasingly see ourselves in our artistic partnerships with machines and rules structures. It is vital to argue for the deep humanism of collaborations within autonomous art making systems and to understand rules structures and their technological substrates as structured and bounded but nonetheless valuable expressions of humanity.

As a strategy that both inoculates against some of the darker aspects of working with rules structures within an autonomous art system and prepares a path for growth it is important that we enter into these relationships with the awareness that rules structures are not alien or abject, but condensed and extended aspects of our own humanity (even in the case of "natural law") and that by recognizing them as such, we may learn a great deal about human potential. As we see ourselves more and more in the algorithmic rules structures and technology substrates that enable them, we may learn from the machines to be more human. What starfish know is that which is cut off from us, is still us. And that not only may we (re)generate what has been separated, but that which has been separated may also (re)generate us.

References

[1] Bridle, James. "Waving at the Machines." *Retrieved April* 5 (2011): 2012.

[2] Eby, Chad Michael. "The Machines Wave Back." *Media-N* 15, no. 1 (2019): 69-81.

[3] Galanter, Philip. “Generative Art and Rules-Based Art.” Vague Terrain, 3 (2006), 3.

[4] Cage, John, and R. Kostelanetz. "Conversations with Cage." (2003): 67-8.

[5] McLuhan, Marshall. *Understanding media: The extensions of man*. MIT press (1994): 43.

[6] McLuhan, Marshall. *Understanding media: The extensions of man*. MIT press (1994): 64-5.