

# Machinic Heterogenesis and Evolution:

## Collected Notes on Sound, Machines and Sonicform

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- [Respond To This Article](#)

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"I write for a species that does not yet exist." -- Nietzsche (958)

### III. Note on Self-Organisation and Selectionism

<sup>1</sup> According to your mainstream brand neo-Darwinian biologist, natural selection is the stuff of which evolution is made, the First Principle of life. There is nothing in the natural world which cannot be explained by random mutations within the genome and subsequent selection of the fittest form by the natural environment. Beyond the constraints set by the period of waiting for mutations to occur and external conditions, there are no limits to this system, and an organism forms from scratch to a furry crawling thing in a gradual process reliant on external factors. Neo-Darwinism is an attempt to reconcile two theories which are quite simply at odds with one another: [Mendelian](#) genetics, which claims that organisms do not change with time, and [Darwinism](#), which claims that they do. This is usually done in a mathematical way, with natural selection as the linchpin of some tight equations. There can be no internal feedback from the body (phenotype) to the genes (genotype). There is no self-organising adaptive order: all emerges from the process of selection as a carefully articulated tree diagram, and adapts over eons.

<sup>2</sup> As the Darwinian critic Arthur Koestler pointed out, natural selection is hence the only process found in nature which is devoid of feedback. Neo-Darwinian theory is both unfalsifiable and all-pervasive; it is easy to forget that it is a theory which has not yet been proven beyond doubt by paleontological fact, and that Darwin himself suggested there may be processes other than natural selection at work in the unfolding of life.

<sup>3</sup> There are a couple of rogue biologists and a-life crazies, however, that don't believe the Selectionist hype. They are not suggesting that natural selection is a dud theory, but simply that there might be other factors involved, and that the really interesting questions don't just concern life as a Darwinian competition between furry, crawling things, but the interplay between structure and chaos at the basic levels of the system which might give rise to it. Biologists such as Brian Goodwin and Stuart Kauffman take issue with this, claiming that an understanding of life should begin at a more fundamental level than tree diagrams and zoology -- molecular biology, biochemistry, complexity theory. This is the 'language' of life: the way that structure spontaneously emerges from chaos.

<sup>4</sup> Niles Eldredge and [Stephen Jay Gould](#) looked at the fossil record a few years back and decided that there is no proof that one species turns into another slowly: the mathematics of the Neo-Darwinists relied upon the idea that species took hundreds of millions of years to evolve eyes and ears and legs and wings, branching off into other species in the manner of a tree diagram over billions of years. What Eldredge and Gould found was that species seem to spontaneously emerge fully formed: there is minimal variation going on. A species emerges rapidly, it lasts for a time (often a short time), and then it dies off. The in-between period, the period of mutation and selectionism, is largely unaccounted for by the fossil record, especially considering the importance of such transitory phases to the neo-Darwinists. There are many 'missing links' in the record.

<sup>5</sup> For over twenty years, Stuart Kauffman has been going on about what we might call a Second Principle in evolutionary biology: self-organisation. He argues that because natural selection alone is not enough to explain the relatively short timescale on which life arose, some other ordering principle is necessary. He locates this, as Katherine Hayles observes, in the ability of complex systems to self-organise (241).

<sup>6</sup> A self-organising system involves the heresy of internal feedback and internally-produced constraints. Living creatures would converge upon certain forms as much as diverge from them due to the influence of mutations caused by cosmic rays, wild chance and external factors. Creatures will not just evolve over billions of years due to selection, but will appear

in a more concerted and spontaneous manner. Systems will seek their own order. The heresy in this (as far as neo-Darwinians are concerned, but not all evolutionary biologists) is located in the fact that such enabling constraints emerge from within the system itself. Consequently, natural selection is not the only force at work in evolution. The system is its own material of expression, and can generate its own tendencies and limits. Kauffman calls this process antichaos, or "order for free" (335).

<sup>7</sup> One can sense that such a theory would be objectionable to biologists: there is nothing distinctively biological about this explanation, which in fact borrows from physics and complexity theory, and it explores living organisms, chemical compositions and non-biological aggregates alike as systems, privileging no particular machine. A 'complex system', in particular, can be anything from the stockmarket to a flock of birds.

## XI. Sonicform

<sup>8</sup> We might note here a similarity with virtual artist Keith Nettos's Java-based sound system, [Sonicform](#), whose evolving sound structures can be obtained from the artist on request <[lucidweave@usa.net](mailto:lucidweave@usa.net)>: the divide between living and non-living is not the issue. As Keith puts it, "it's an echo of that Cartesian dichotomy between mind and matter. Do such distinctions help us to know ourselves better? I'm not sure that they do". Sonicform is more a world of Newtonian discovery than biblical creation. Self-organisation works on a generative systemic level, and is a prerequisite more so than a defining quality of life or evolution; it is necessary but not sufficient to characterise an organic system. The computer is the perfect environment in which to explore the confusion and commonalities between animate and inanimate systems, and in that confusion, reveal something of the processes underlying the actual generation of self and order in the universe. Information-processing, and life, require a certain type of complexity. The system must be dynamic, yet allow for novel patterns. The computer emphasises the logic as well as the mechanics of life, which are then honed and honoured by the more familiar conception of natural selection.

## IV.

<sup>9</sup> Self-organisation is the natural consequence of simple components (cells, units of sound, air molecules, genes) interacting via equally simple rules. Patterns and forms emerge from the collective raucous, and these forms give rise to other forms. The components in such a system are bimbos: they have no idea what is going on in the greater body, and don't care. In other words, a complex system emerges from lots of small but well-chosen components interacting in a rule-governed way, developing a larger behaviour or pattern which cannot be predicted or divined from these constituent parts. Random mutation and selection will act upon such a system -- this is how Selectionism fits in: forms will not just evolve from scratch via selection, but will spontaneously emerge from within the system, working in conjunction with the First Principle.

## IV. Sonicform

<sup>10</sup> In the Sonicform system, the components are 'sound fragments', the samples attached to the images in the top left-hand corner of the screen at startup, and also the people seated at terminals who interact with these fragments. Although it might seem to be stretching the concept of systemic components to include the user population, the fact that the emerging pattern is dependent on these users to evolve renders them part of the system. The organisation of a machine has less to do with its materiality than with the inter-relations of its components.

<sup>11</sup> The rules in Sonicform are the 'sound controllers' located on the right-hand side of the screen, containing basic instructions such as "play sound", "loop sound" and "stop sound" that control the sound fragments and consequently limit the structure of the emerging acoustic pattern. Because Sonicform is linked via the Net to 'sonicserver' and consequently the multiple versions of itself which are being executed at any point in time, any changes that a user makes (e.g. attraction towards a particular kind of sound) are detected by sonicserver and fed back into a primary chain structure. This is the formative basis of Sonicform's 'evolution': a selection of internal behavioural constraints generated by its constituent parts.

<sup>12</sup> The heresy in this is the implication that both biological and technical systems are capable of self-organisation and evolution, that both are constellations of universes which are capable of autonomy and complexity (and 'life' as a certain form of complexity).

This is not anti-humanist. It's not even post-humanist. Ideology is a human concept which is brought to bear on technology. We're talking a different register altogether. Technical machines, organic machines, conceptual machines: each will beget the other, each will inscribe its own pattern on the process, each will redefine the limits of such connections.

## VII. The Death of Metaphor: All That Consists Is Real

<sup>13</sup> 'Machinic heterogenesis', a term used by [Felix Guattari](#) in his book *Chaosmosis*, is a mode of being and production that draws on complexity theory and the work of Francisco Varela (a biologist interested in self-organisation in immune networks) and Kauffman. Guattari extends the concept of self-organisation to create a pragmatic philosophy.

<sup>14</sup> Machinic heterogenesis is a term to describe the way that the machines which populate the universe connect with each other, mutually affect each other, exchange segments and then bifurcate into new machines. Collective existential mutation. When we sit at a computer screen, we are connected with the computer's universes of reference through the circuits of sight, the play of fingers across the keyboard, the conceptual and logical limits of the exchange laid down by both parties. There is a certain synchrony going on across the zone of intersection and compromise to the limits of this exchange. In other words, the limits of the medium define the exchange and what we are becoming as we connect with it.

<sup>15</sup> What is the 'ness' of the computer medium, and what are the possible universes of exchange which extend from this? Sonicform explores this exchange through sound, and through a system which explicitly invites us to be a part of an evolving structure. The use of complexity theory and evolution in Sonicform makes explicit the rethinking of machines which we have been doing here in general: machines speak to machines before they speak to Man, and the ontological domains that they reveal and secrete tend towards pattern in an innate way, determined by the mode of aggregation of their constituent parts. Sonicform rethinks technology in terms of evolutionary, collective entities. And this rethinking allows for the particular qualities of the medium itself, its own characteristics, its own unique interpretations of our model of evolution, to express themselves.

<sup>16</sup> Here I might note something: evolution cannot be naturalised and reified as an entity independent of the conceptual, technical and scientific machinery of its production. In the eagerness to import biological models to the computer in a-life, we sometimes forget that from its very origins, the human species has been constituted by technical evolution, and that it is the mediation afforded by technics which makes "it impossible simply to describe evolution in terms of a self-contained, or monadic, subject that passively 'adapts' to an object-like environment" (Pearson 4). Similarly, we have produced our various models of evolution by analysing the 'natural environment' through the mediation of technology. Technology has always enjoyed more than just the position of a neutral tool to locate and test Nature, and has its own unique limits and qualities to contribute to anything we produce with it.

<sup>17</sup> So this will be the beginning of our rethinking. Constellations of universes colliding, machines exchanging particularities, components that retain their autonomy and yet can collect and self-organise into complex systems, even life. "The ideas that we have been devoting space to here -- instability, fluctuation, complex systems -- diffuse into the social sciences", in the words of Ilya Prigogine (312).

<sup>18</sup> If we can create an evolving complex system on the screen which we ourselves are components of, we tend to rethink the interface between nature and technology. What does it say about the "reference point" of the natural world when creatures whose entire function consists of weird acoustic dances across computer circuitry begin to self-replicate and exhibit the signs of open-ended evolution, resulting in formations which no longer have analogues in the 'natural' world? I'd like to hesitate a start here. Biology is its own material of semiotic expression. Techné is its own material of semiotic expression.

<sup>19</sup> To address the interface between nature and technology, we need a philosophy of cells, flocks, patterns, components, motors, and elements. We need a philosophy that will create an interference pattern across the zone of intersection.

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