Generator: the Dialectics of Orderly Disorder

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ABSTRACT

As complexity theory has demonstrated in correlation with dialectical thinking, the relationship between order and disorder does not lie simply in their opposition. This paper proposes that generative artworks have a useful analogical relation to the way computer systems (and systems in general) operate and the ways in which artist-programmers might interfere with these operations. This principle of the correlation of dialectical and generative processes will be demonstrated by referring to the exhibition *Generator* (Spacex Gallery, May-June 2002, and touring in the UK) and in particular by referring to two works: *ordure::real-time* by Stuart Brisley & Adrian Ward; and *forkbomb.pl* by Alex McLean. Despite the appearance of order, *Generator* suggests that disorder is just below the surface and this is where change can be found and prompted.

Keywords

Art, Dialectics, Disorder, Generative, Order.

INTRODUCTION TO *GENERATOR*

The exhibition *Generator* presents a series of self-generating projects, incorporating digital media, instruction pieces, experimental literature, and music technologies. The intention of the exhibition is to act as a point of connection for different generative practices across disciplines, pointing to the relationship of visual arts to other media, and drawing together a younger generation of artist-programmers with more established artists working in the conceptual tradition (such as Stuart Brisley, Tim Head, Jeff Instone, Alex McLean, Yoko Ono, Joanna Walsh, and Adrian Ward). More details on the exhibition are available on the project website <http://www.generative.net/generator>

The exhibition title refers literally to the term 'generator' itself, *describing the person, operating system or thing that generates*.

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Sounds, images, and objects, distributed online and offline, all generate their contents and possible meanings live throughout the course of the show. In this way, *Generator* seeks to comment allegorically upon the wider systems within which the artworks generate their meanings. With this in mind, works might be seen to follow rules set by the curators too: following rule-based or mathematical structures, operating in real-time, and by addressing issues of authorship (not by deferral, but more through the critical activities of the artist-programmer) by placing an emphasis on the productive apparatus under contemporary conditions - all operating within the context of a (dead) gallery system. *Generator* attempts to throw emphasis on these productive processes, rather than end products or the dead-end commodity form of art. In such a scenario, the artist-programmer and machine work in partnership to disrupt tired old mythologies of creativity - emphasising that art conforms to formal structures and constraints, and that computers might be used for manipulating these structures.

With limited reference to complexity theory, this paper reiterates that the relationship between order (that which can be classified and rationalised) and disorder (that cannot, because it is too chaotic and generalised) does not lie simply in opposition - but rather in dialectical tension.

BOTH/AND DIALECTICS

The dialectic is a dynamic, perhaps even generative process, by which an argument (thesis) is posed, only to be disputed by another (antithesis) in order to bring about a combinatory resolution (synthesis). The dialectical movement results in a synthesis that is not just the conclusion, but can be seen to be part of a continuing critical process. With more reflection, the synthesis will reveal itself to be a thesis in some other respect and so require the same dialectical treatment, and so on, in order to continue a chain of better understanding - whether finally concluded or not.

My argument is simply that it is this 'state of perpetual becoming' that makes the process generative.[1] But this is all very general, since the term 'dialectics' itself has a rich history and varied application. Significantly for my argument, it is within German idealist philosophy that the notion of contradiction is extended, not only to the process of discussion, but to reality itself. The Hegelian distinction of appearance and essence is important not least, in describing the dialectical method of peeling back successive layers to discover the deep-seated laws of motion (like code). These, in turn, might explain why phenomena evolve in a certain

direction and in certain ways. The critical power of dialectical analyses are emphasised in the rejection of mere surface appearances, designed to hide critical depth, the system's inner workings and its contradictory forces. Contradictory tendencies unfold in every detail of the system, 'every one of its basic "cells"' according to Mandel.[8]

For Hegel, this contradictory principle is central to the dialectical process in the 'continuous unification of opposites, in the complex relation of parts to a whole'.[11] Hegel imagined an ultimate 'reconciliation' of these opposing forces. There is plenty of contention on this point - in the so-called 'Hegel debate'; between Hegelians and anti-(or neo-) Hegelians - as to whether it is possible to retain a 'totality with an open ending' that I simply haven't space to discuss. Perhaps unsurprisingly (and rather unscientifically), I am not so much interested in the viability of this idea of reaching absolute knowledge as investigating the (generative) process of getting there - through dialectical thinking.

Following the Hegelian method but different, Marx thought his dialectical method '…exactly the opposite to it'. But this is not to dismiss the Hegelian dialectic out of hand as he explains:

'The mystification which the dialectic suffers in Hegel's hands by no means prevents him from being the first to present its general forms of motion in a comprehensive and conscious manner. With him it is standing on its head. It must be inverted, in order to discover the rational kernel within the mystical shell.'[9, pp.102-3]

Ironically much criticism has been levelled at Marx for his mystification of the dialectical method - amongst others, by Karl Popper, in *The Open Society and its Enemies* (1962), who accuses *Capital* of being unscientific, because its hypotheses cannot be tested. Against the criticism of the unscientific nature of the method, it is crucially verified through practice (more accurately praxis) and arguably the test of history. On the other hand, many critics of Marxism see it as simply too mechanistic, but this fails to take proper account of the dialectical method. To my mind, most criticism simply confirms the motives for the method in the first place.

The dialectical principle of 'progressive unification' is further grounded by Engels emphasising matter and materiality in the concept 'dialectical materialism'. It is also evident in the more usual Marxist definition of 'historical materialism' that stops short of applying the concept as widely (i.e. of applying it to nature as well). Engels, in 'Introduction to Dialectics of Nature' (first written in 1875-6), outlines the defining characteristics of the dialectical laws of motion. He describes science locked into a theological logic of the 'absolute immutability of nature', planets circling, stars fixed, all kept in place by 'universal gravitation'. In contrast to the 'petrified outlook on nature' of divine creation, materialists attempted to 'explain the world from the world itself'. Echoing the sentiment of *All That Is Solid Melts Into Air* (itself a quote *The Communist Manifesto*) Engels summarises these tendencies as:

'all rigidity was dissolved, all fixity dissipated, all particularity that had been regarded as eternal became transient, the whole of nature shown as moving in eternal flux and cycles. […] It is an eternal cycle in which matter moves […] nothing [even the concept of nothing] is eternal but eternally changing, eternally moving matter and the laws according to which it moves and changes.'[2, pp.341-353]

There are obvious parallels to complex systems in the interconnectedness of things and the recognition of the importance of the influence of external conditions on adopting any perspective. Crucially, this interconnects the economy with the natural and social realm – where these realms are governed by the same dialectical laws (incidentally, it is whether these laws extend to the natural realm that complexity theory perhaps confirms). In other words, no part of the system can be falsely separated from its interconnection to the whole system as all elements are dialectically bound. Moreover, the whole is greater than the sum of its parts. It follows that dialectics is not simply a dualistic notion but the idea that opposites interact in meaningful contradiction. The laws of motion are subject to inner contradictions at every level of operation, that define the mode of production:

'The given economic structure is seen to be characterised at one and the same time by the unity of these contradictions and by their struggle, both of which determine the constant changes which it undergoes.' [8, p.18]

FIGURE 1.

ordure::real-time by Stuart Brisley & Adrian Ward - demonstrates a dialectical play between order and disorder. <http://www.ordure.org>

Dialectics suggests that nothing is finished or resolved but in a continual state of flux. Furthermore, these laws are possessed in a materialist sense, in existing social and historical frameworks that even reflect the production of the analysis itself – with reference to a history of ideas and the mode of production in which it was itself produced. Although largely out of fashion, dialectical thinking might be seen to challenge the pessimism of much contemporary critical theory. Marshall Berman has suggested that our thinking has stagnated: 'Open

visions of modern life have been supplanted by closed ones, Both/And by Either/Or.' [1]

Clearly preferring *Both/And*: meaningful contradiction is inherent in these processes so change on all levels is inherent too. In other words, change is built into the system through dialectical conflict.

GENERATING ORDERLY DISORDER

Dialectics appears to be an appropriate critical method for the study of computer functionality because at a fundamental level of operation (of 1s and 0s), it works dialectically. In this way, a digital-dialectical method might operate as both a description of a system and critical method for the analysis of that system. Peter Lunenfeld in his introduction to *The Digital Dialectic* (2000) is cautious of this easy conflation of the digital and the dialectic. He claims that the on/off switching of cybernetic calculation does not create a synthesis and merely reflects the contradictory condition of thesis and antithesis. Yet Lunenfeld sees this as a potential advantage in not uncritically imagining a digital utopia. I disagree. I think what Lunenfeld describes as the limited regeneration of the system is part of the dialectical process itself. This would be consistent with Hegel's view in describing the dynamic social relations of history; a process of back and forth zig-zag movement that I prefer to regard as continuous - therefore not with revelation or utopia in mind but a series of modest but cumulative improvements. Lunenfeld is not rejecting the dialectical method out of hand, but merely drawing attention to its limitations (and after all he has a book to proffer). He is keen to point to its strength in the central dialectic of theory/practice and in its application to detail in pursuit of the general.[7] Furthermore, in the spirit of historical materialism, this approach brushes the recent (amnesiac) history of new media criticism against the grain. Critical work on the nature of digital culture (like the execution of code) should remain in progress.

This perceived problem of an inconclusive synthesis is accounted for in the contradictory phrase *Orderly Disorder* [4] - a perfect maxim for correlating ideas of complexity with dialectical thinking. According to N. Katherine Hayles: 'complex systems nevertheless become chaotic in predictable ways'. In other words, they are not absolutely chaotic (or random) but express a complex structure of order and disorder. Thus systems, even social systems, are not closed but also open to influence and change from external and internal factors. In complex systems, 'recursive symmetry' is described as the kind of perspective required 'to see the predictability that lies hidden within their unpredictable evolutions'.[5] This explains the relationship between large and small scale wherein the form remains constant (a pattern within a pattern and so on – or 'recursion', that Hofstadter calls 'sameness-in-differentness').[6] In other words, the concept explains how dynamic systems are very sensitive to small changes. It would appear that old systems of measurement which assume that systems are linear, closed and fixed are no longer appropriate to a vision of a networked society and technology that emphasises non-linearity, openness and mutability. The science of complexity, in other words, 'refers to the potential for emergent order in complex and unpredictable phenomena'.[3] For instance, the system expresses unpredictability despite its deterministic character. When a change takes place in a predicted chain of events, the 'strange attractor' causes the initial system and the disturbed system to move apart exponentially fast. If this all seems a rather inadequate description, I hope it is clear that I am not so much interested in a precise scientific mapping or explanation of this but its metaphoric potential: in that 'tiny disturbances can produce exponentially divergent behaviour' and this has some level of verification.[3] Within self-organising or generative systems, disorder may lead to order, and order is encoded into disorder at a fundamental level. The argument that disorder is no mere opposite of order provides dialectical potential.

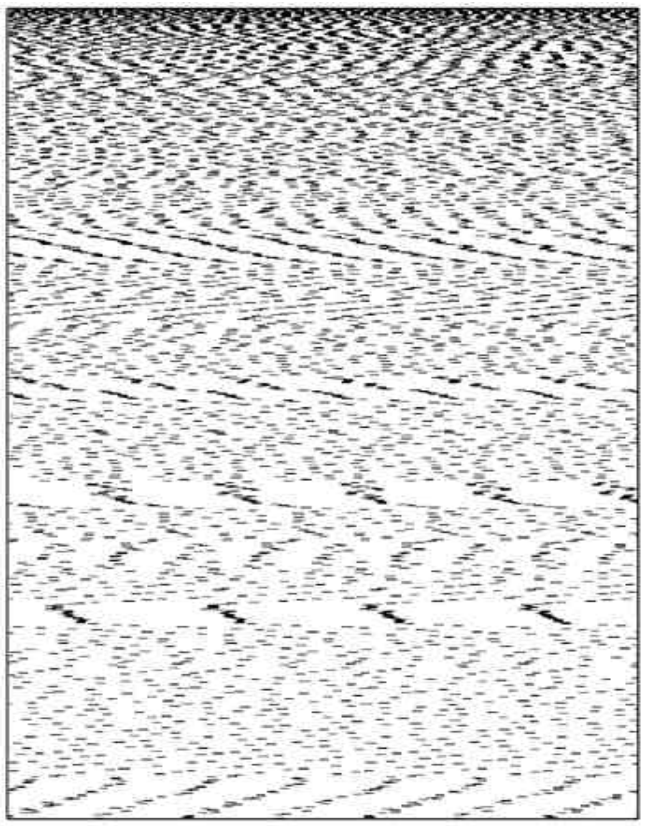

FIGURE 2.

forkbomb.pl output (as pixels) by Alex McLean - demonstrates bifurcation. <http://www.slab.org/wout.gif>

Furthermore, and extending the metaphoric potential to synthesis, Ilya Prigogine suggests that (new) order might be generated through disorder. Within systems and their sub-systems, positive feedback loops (from computer science) might generate the further development of a process to the point of causing a fundamental and unforeseeable change of the existing system. By analogy, one could think of capitalism as one such system that contains the seeds of its own destruction (to paraphrase Marx). This is important as it emphasises the constructive positive role that disorder might play in creating order. According to this logic, at the 'bifurcation point', chance takes hold of determinism, and as a result either disorder or order may be generated. If 'Bifurcation' means splitting, as the point where within a system, one path or another must be followed, although the choice is limited to one of two, the decision is thoroughly unpredictable. With increased frequency, bifurcations can lead to chaotic systems of course. In science, this is the theory of self-organising matter that Sue Owens has adopted to explain the possibilities of a social system – wherein order is both expressed in disorder and might be generated out of disorder.[10] Living systems

(such as society itself) are determined by rules, but at the same time demonstrate emergent properties that are unpredictable and appear to break rules. The possibilities are large and complex, but not endless nor open-ended. Hence, bifurcation theory is a common explanation for how ordered structures can arise from disorder. In other words, synthesis arises from bifurcation. At this point, the synthesis might become a new thesis in endless reiteration:

'At a bifurcation point, chance takes over, and it is impossible to predict what will happen; but in between times, determinism takes over again, until fluctuations force the new system into far from equilibrium conditions and a new bifurcation point is reached.'[10, p.88]

```
#!/usr/bin/

$power = 8;
sub fission {
  fork or $child = 1;
  --$power if $child;
  if ($child) {
    exit unless --$power
}
  return $child;
}
while (not &fission) {
  print 0;
  bomb:
  while (&fission) {
    print 1
  }
}
goto 'bomb';
```

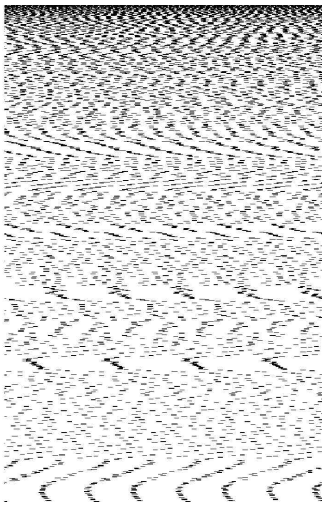

FIGURE 3.

forkbomb.pl (code and visualisation) by Alex McLean - contains 'the seeds of its own destruction' as the system will eventually crash. <http://slab.org/>

This transformative quality provides an unfashionable belief in the possibility of positive change. The reality we experience is decidedly complex: 'Like chaos theory, the negation of negation [in dialectics] is not just a metaphor, but a description of a pattern of change'.[10] Thus, it is possible to draw a parallel between the revolutionary moment and the bifurcation point as the point where dramatic change takes place. It is here that order and chaos are combined so that change can take place. But this patterning does not stop there for it to operate dialectically, but needs continual improvement so as to not stagnate (thus Stalinism is accounted for its lack of open-endedness, as it wrongly assumed the dialectical process to have ended, and closed it down). On the contrary, every new synthesis should become a new thesis and in order that progress is not stopped short, and in this way resist 'premature closure and false totalities'.[10] Contradiction between parts is required for the complex whole to adequately describe the ways in which these parts express both disorder and order (and is thus one of the essential functions of life itself). Thus fragmentation might be rejected for an 'ordered complexity' that is neither ordered nor random.

Along these lines of thinking and in general terms, recent critical theory exemplified by postmodernism rests on 'bad science' and 'bad history' according to Owens - and I would add bad politics. Despite recognising the interrelationship of order and chaos, Brian Goodwin (amongst others) too easily equates this sense of uncertainty to a critique of modernity, assuming modernism to affirm determinism. Berman's appropriately titled study *All That Is Solid Melts Into Air*, refutes this misconception of modernity.[1] It is too easy simply equating chaos with the non-linearity, fragmentation and discontinuity of postmodernism or post-structuralism. My position (and I am mercifully not alone in this regard) is that modernity has always embraced uncertainty and its own critique, and should not necessarily to be seen as deterministic – dialectics is a case in point. Employing dialectical thinking, it might be said that scientific method is both open and closed, in that it both embraces chance and determinism in a complex manner. The synthesis of order and disorder allows for the unpacking of deterministic or totalising theories and the possibility of conceiving positive change. Of course, the same can be said of postmodernism itself – in that it became a totalising theory on the subject of anti-totalising theory. If every attempt to provide an anti-totalising theory becomes a totalising theory in itself, the only solution is to accept mutability. In fact, Owens goes further and suggests an unconscious hypocrisy in denying progress and teleology on the one hand, and a belief in the progression from 'spurious order to playful disorder' in orthodox postmodernism on the other. To Owens, even the project of deconstruction is trapped in the very dualism it seeks to undo.[10] At the same time, she argues that scientific method has always embraced a strategic sense of uncertainty, not just the arts. There is a necessary politics to the representation of order in all this.

One possible solution would be to see any antithetical mode as effective only as part of a chain of events of dialectical movement, making it a temporary state and only ever strategic. My contention is that dialectics continues to remain a useful conception and model of change to describe systems that appear to contain the same logic. Whether it is a law of nature seems debatable, although the science of complexity appears to lend weight to the more precise idea of dialectical materialism. More convincing is that Marxist dialectics and complexity together suggest that human subjects are constituted through their relationship to society and institutions. Society cannot be described simply as a collection of individual subjects, but is a far more complex system that takes account of individual differences, and also of collective and networked actions. The simple logic of the whole as more than the sum of its parts is made manifestly evident. Herein lies the impetus for change, and in the case of Marxism, as a result of the contradictions between the means and relations of production. As a model of generative processes, the parallel of dialectical thinking and complexity theory offers a counter-argument to causal relations, such as a straightforward linear movement between cause and effect. Each new stage of development is an improved and synthesised version of the previous stage, in the continuing cycle of progress (although admittedly, the possibilities for negative change are likely too). This approach provides the possibility of change through collective human agency – at the point of bifurcation or revolution.

By its inherent method, dialectics offers the possibility of transformation coexisting with a tight structural framework – it is both a paradigm shift and an old discredited paradigm in itself. It encapsulates the idea of orderly disorder wherein positive change remains a possibility and represents 'an optimistic turn to such processes by positing them as sources of renewal…'[5]. Evidently, people and things are more complex, dynamic and self-organising – echoing the exhibition title 'generator' in *describing the person, operating system or thing that generates*.

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