

## **Futurity from a Complexity Perspective**

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### **Abstract**

On first inspection of complexity theory one expects there to be an affinity with a temporal perspective on social relations and institutions. Many of its key concepts have a decidedly temporal ring to them, with ‘emergent properties’, ‘non-linear dynamics’, ‘interactive flows of exchange’ just some of the more pertinent examples. Equally, the idea of feedback-loops resonates not only with reflexivity in social theory but also with the social enfolding of past, present and future. On the surface, therefore, complexity theory is time friendly and amenable to take account of purposive and constitutive processes of interaction. On closer inspection, however, the application of complexity theory to human socio-temporal relations in general and the production of futures in particular turns out to be more problematic than it first appeared. In the last chapter of *Timewatch* (1995) I have set out my detailed position on social complexity from a temporal perspective. In this working paper I start from a complexity perspective and then ask how well it is equipped to encompass futurity within its cohesive web of key assumptions, and whether the social future might be a complexity too far. Bringing together complexity theory with a focus on the future raises questions about the kind of complexity that emerges when we take social futurity seriously. From this, in turn, arise questions about implications for social science research.

### **Biographical Details**

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### **Complexity Theory for the Social sciences**

For the social sciences, complexity theory is a welcome change. Its root in mathematical and natural science perspectives gives it respectability. As socially revered ‘scientific’ (meaning ‘hard’ science) knowledge, it can support and give credence to the more complex analyses of the social world. In other words, when the natural sciences and mathematics ‘discover’ complexity, their ‘findings’ legitimate what have been inescapable features of cultural investigation and knowledge. To accommodate the public reverence for knowledge based on ‘scientific evidence’, the socio-cultural sciences have had to squeeze the complexity of their living, creative, productive, innovative, questing, temporally extended, future oriented, knowledge based, reflexive, moral subject matter into a methodology designed for inanimate matter (dead things) in motion. To be recognised as a scientific enterprise they had to find ways to square the circle of social complexity and scientific reduction to simplicity and general laws.

Complexity perspective, as it is applied to biological systems, allows for bringing into a coherent unity of analysis the material, spatial and temporal dimensions of existence. Material structure, spatial patterns of networked relations and temporal processes of becoming are given equal weight in the analysis. The material, spatial and temporal are seen as mutually implicating rather than mutually exclusive. For the social sciences this is a methodological quantum leap that takes scientific praxis out of the dark ages of binary opposites, reductionism and linear causality and reunites what had been so carefully prised apart. More revolutionary still, the temporal is given due recognition, with many of the key concepts of complexity theory having a decidedly temporal ring to them: ‘attractors’, ‘autopoiesis’, ‘catalysis’, ‘co-evolution’, ‘emergent properties’, ‘dissipative structures’, ‘feedback loops’, ‘interactive flows of exchange’, ‘iteration’, ‘non-linear dynamics’, ‘perturbation’ and ‘synergy’ being just some of the more pertinent examples. When material structure, spatially networked relations and temporal processes are brought together in one analytical framework, context becomes an important consideration. It brings with it an implicit appreciation that each approach to investigations will need to be appropriate to its subject matter, that is, the knowledge sphere to which research and analysis are directed. Single cell organisms will require different conceptual and methodological tools from earthworms, forests different ones from social organisations and institutions. No one method will fit all. Once more, the complexity framework of analysis provides the social sciences with tremendous potential for scope and development.

This much-appreciated increased scope, however, comes at a price. The complexity perspective increases uncertainty. It asks us to embrace it, to face up to it, to find new ways to engage with it. That is discomfiting and disconcerting stuff. Focus on complexity may be essential to better understand and cope with the contemporary world of our making but it leaves us more vulnerable and discomforted. It unsettles tried and trusted schemas of coping with the unknown. Thus, when politicians and funding bodies, for example, continue to hanker after the science of old and expect certainty, simplicity, and trustworthy evidence, they resist the loss of certainty that comes with a complexity perspective on the social world and the changes it introduces to the way the future has been handled for the past three hundred years. They want to retain the historically tempered deep structure of cultural engagement with the not yet and the unknown.

Questions we need to ask in the context of this futures research project is whether the complexity perspective with its key components is adequate to the study and explanation of temporally extended human culture or whether socio-cultural futurity is a complexity too far.

### Complexity of Social Futurity

Extension into the future is a defining characteristic of human culture (see figure 1). Futurity as primary orientation is an emergent property in the chain of being that marks us as humans. Archaeological records of earliest forms of humans show that they extended their influence beyond the present sphere of action and ventured into the realm of the ‘not yet’. By establishing a relationship to death the biological boundaries of individual lives were opened up and made flexible; individual finitude was transcended by cultural means. From historical records we know that throughout the ages experts were consulted to prophesise the future and forecast individual and collective fates. The quest to render the uncertain more certain has spawned industries and technologies. Scientific predictions, trend analyses, forecasts and foresight exercises are merely the latest in a very long history of efforts to cope with the not yet, know the unknowable and make the opaque transparent.

Attempts to *know* the future were complemented by development of *know-how*, knowledge practices intended for access to the beyond by both the living and the dead. Shamanism, clairvoyance, astrology, séance, death rituals, Aboriginal dreaming and tattooing being just some examples. With artefacts, cultural permanence is inserted into the world of directional change and cyclical renewal. Some of this artefactual continuity outlasts its creators into the long-term future, whether the cultural products are burial chambers, temples or cathedrals, paintings, novels or musical instruments, cities or institutions, radiation from nuclear technology or chemical pollution. Some are means to colonise the future; others have the potential to eliminate the future: our own and that of successors. Much of scientific and technological development is to aid social efforts to gain control over this elusive realm beyond control. As long as the changes introduced are small and incremental, a certain measure of control is possible. The more substantial the cultural insertion, the greater the scale and the higher the speed of the change, however, the higher will be the resulting level of complexity, the larger are going to be the unintended consequences and the smaller is the potential for predictability and control.

When we look more closely at futurity we recognise that different combinations of past, present and future afford different subject positions on the one hand and different action potentials on the other. The sample below is in no way intended to be exhaustive but merely indicative of some of the different kinds of futurity that arise from the modulations with their associated subject positions and action potential.

**Futures:** open & contingent sphere of choice, option, imagination, rational action, projection  
**The Future:** realm of projections, predictions, foresight, trend analyses, utopia, expectation  
**Past Futures:** beyond influence, record of potential hopes, fears & choices, memory of future  
**Future Pasts:** mind world of imagination, vision, projection, speculation, potential memories  
**Future Futures:** world of science fiction, futurology, scenarios, hopes, dreams and visions  
**Present Future:** realm of economic activity, empirical study, instrumentality, politics/policy  
**Present Futures:** ‘possidictions’, choice, selection, option, instrumentality, deeds underway  
**Future Presents:** immanent/latent/invisible process realm of (techno-scientific) productions  
**Past Futures in Present:** predecessors’ hopes/desires/decisions/actions as contexts for plans  
**Past Futures in the Future:** potential reduced to activated choices not yet symptom or cause  
**Pasts & Futures in the Present:** present action delimited by past and/or future based action  
**Past Futures extending into Future:** predecessors’ futures delimiting our context of action

With the complexity of cultural futurity in mind, we can appreciate that it may be exceedingly difficult, if not impossible to encompass the human social with complexity theory’s triple base of analysis – material structure, patterned relations and process. In his *Hidden Connections* Fritjof Capra adapts and extends the triple schema for analyses of the human social world. He changes the elementary units to matter, form and process in order to accommodate the social sciences’ different use of structure and pattern and he adds a fourth dimension of ‘meaning’ to account for the evolutionary emergent property of the social, that

humans act in the light of knowledge and social investigators interpret a pre-interpreted world. With the fourth dimension of meaning added to encompass the increased complexity that arises with self-reflective consciousness and socially constituted knowledge, we are ready to explore what might be involved when the social is viewed from a complexity perspective.

- *Matter* is our physical world: the earth we live on, the soil that feeds us, the air we breathe, the water we depend on, the body we inhabit, the landscapes and cityscapes we dwell in, the other beings we co-evolved and co-exist with and the world of artefacts we created. It thus includes our socio-culturally produced world, such as buildings, clothes, books, tools, machines, vehicles, power stations, instruments, computers, laboratory products such as plastics, viruses and genetically modified organisms, etc.
- *Form* encompasses patterned and networked relations of family and friends, work and play, with domesticated and non-domesticated other species. It covers all infrastructural aspects of social life such as institutions and communication systems (including transport), as well as political, economic, religious and knowledge-based associations.
- *Process* focuses on the temporal aspects of the world of matter and relations. It relates to the way this world is produced and to emergent properties arising from interactions. As such it includes understanding of the dynamics of change and creativity, continuity and discontinuity, stability and novelty, cycles of repetition, evolution and history.
- *Meaning* involves products and processes of reflective consciousness and socially constituted knowledge such as language, values and beliefs, what Karl Popper (1983) calls the world of ‘intelligibles’. With meaning we acknowledge that humans interpret a pre-interpreted world, that they inescapably operate in a context of double hermeneutics.

To bring these four elements together in social analyses is clearly a vast improvement on the either-or thinking that governed the perspectives of old: either structure or process, function or meaning, order or control, system/institution or individual action, technology or language, mind or matter and other combinations of these and further incompatibles. As a coherent framework, which does not privilege one element over any of the others, the complexity perspective encourages an understanding that appreciates the embodied, embedded, nested and contextual nature of social relations and processes. It facilitates understanding of the hidden connections and the interdependence of everything with everything.

To theorise this complexity and make it intelligible is a more difficult endeavour than appears at first sight. Since we can't hold all the balls in the air all the time, I have in the past suggested that we need to work with the idea of implication. I had proposed (Adam 1990, 1995) that aspects of our socio-cultural complexity, which are not primarily focused on or fore-grounded in any given investigation (be this theoretical or empirical), nevertheless have to be implicated in the understanding and the analysis. This means knowing our world holographically, where the disattended is enfolded in that which is attended to and where the explicated implicates that which is out of focus. I still hold to this view, and maintain that it is one way to encompass complexity not just as rhetoric but social science praxis. It makes for difficult writing of theory, given that writing is a serial medium. It gets more difficult still when the approach is used in empirical research. The struggle is well worth the effort, however, as the work of David Byrne (1998) shows, and should not deter us from the pursuit of complexity in our research and our endeavours to communicate it accessibly.

From the above you can see that I am in full support of this way of looking, framing and understanding the human social. There are, however, issues that still trouble me, which I feel need further attention. I am referring here to three problematiques in particular:

- the strong present-orientation of the approach, which cannot easily encompass the temporal extension and futurity of socio-cultural life,
- the way we conceive of causality
- and the bracketing of responsibility.

It is these, which I briefly want to address in the last section of this paper.

### **Taking Complexity Seriously: Implications for Social Science Research**

Bringing the four elements of social complexity together as coherent framework of analysis changes each of the single elements. Understood as a complex whole, the units implicate each other, each element resonating with all others, the quality of each changed in the process. In this presentation I cannot outline all of these changes. Instead I will just indicate how matter, form and meaning are changed by the requirement to encompass process as an integral part of the complexity framework of analysis. In addition, with figure 2, I provide one example of the mutual implication of Form, Process and Matter without yet assigning it to any particular context of investigation. Thus, when we allow for the temporal to be implicated in the structural elements of social complexity our understanding of the ‘nature’ of the elements needs to change:

- *Matter* needs to be understood not just spatially as frozen in time but also as temporally extended and enduring, decaying and regenerating, leaving a record, projecting into the future and entailing for-ness.
- *Form* needs to be conceived not only synchronically as pattern and structure but also diachronically: form as forming (figure 2), relations as relating, networks as networking, patterns as patterning.
- *Processes*, in turn, need to be grasped not merely as the dynamic that produces the emergent present but more importantly as processes that produce timescapes<sup>1</sup> and futurescapes, where much of the on-goings are time-space distantiated and therefore often latent, immanent and invisible until, that is, where processes congeal into matter and emerge as symptom – sometime, somewhere.
- *Meaning*, interpretation, values and beliefs, which tend to be tied to the present or the a-temporal (Platonic) realm of ideas, need to be temporalised, to resonate with process and becoming, with form as forming, historical and projective.

In order to accommodate the active, processual quality of meaning, I would like to propose that we change the domain of ‘meaning’ to that of ‘knowledge practices’. With this change of label, the subject matter of the overarching fourth dimension remains in tact whilst the new focus allows for a more active nature of knowledge. It sets knowledge in motion, shows the productive nature of knowledge as practice, that is, its processuality and its temporal extension. With the knowledge sphere infused with contextual, *projective practice*, the persistent space- and present-bound imaginary of old, which continues to underpin and pervade contemporary approaches to complexity, is overcome and the conceptual ground prepared for timescapes and futurescapes to be encompassed.

A similar situation pertains with respect to causality. The complexity perspective requires non-linear thinking, that is, to understand networked interdependencies and processes in a reflexive, autopoietic, non-sequential, non-linear way. When we look more closely at the implicit understanding of causality that underpins much of the writing on complexity, however, we see that the meaning of causality has not been adapted to the requirements of the complexity perspective. Even Fritjof Capra (2003), one of the most consistent complexity thinkers to date, tries to retain the traditional scientific meaning of causality. I would like us to reconsider this position and re-visit Aristotle’s proposal to understand causality with reference to four interdependent elements. It is my argument that these four mutually implicating elements are essential to the quadruple complexity proposed for the social realm, which they parallel to perfection:

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<sup>1</sup> (Adam 1998 and 2004 for detailed elaboration)

**Aristotle's causes:**

Material cause  
 Formal cause  
 Effective cause  
 Final cause

**Complexity dimensions:**

Matter  
 Form  
 Process  
 Knowledge practices, temporally extended  
 and future oriented

The history of the way causality has been conceived shows that the natural sciences have reduced the first three causes to one general physical cause where action causes subsequent effects in a linear fashion from past to present and future<sup>2</sup>. The idea of a 'final cause' as both for-ness and the goal or end towards which organisms develop has been eliminated altogether. Biological scientists, however, had difficulty with the eradication of final causes, given that they were encountering unmistakable forms of goal directedness in their subject matter. Acorns grow into oak trees (and not beech trees or dandelions), the final cause of the oak tree being encoded in the acorn, and vice versa. To eliminate all traces of the religious language of creation and destiny, biological scientists replaced final causes with the a-temporal idea of function: each part has a function within the whole. Thus, the function of a part brings about development, not its potential encoded in a pre-existing end. It is the acorn's function not its destiny to become an oak tree. With this simple move the temporal has been reigned in and futurity effectively shielded out from scientific causality. In its place, the past and the a-temporal present have been installed as the exclusive sources of scientific meaning. Social theorists will recognise the parallel move in the social sciences.

The complexity perspective on the social provides us with the means and motivation to overcome that reductionist, linear, a-temporal understanding and take account instead of the complex, interdependent, temporally extended social realm of matter, relations, processes and knowledge practices that produce time-space distanced material effects. It is because our knowledge practices have impacts, which extend both spatially and temporally, that we need to explore ways that allow us to accompany the consequences to their eventual, potential destinies: tomorrow, in one hundred, even one thousand years' time. For this we need a causal understanding that transcends the Newtonian perspective. This new complexity conceptualisation of causality needs to achieve the following:

- implicate each of the other dimensions in any one aspect explicated
- extend not just from the past to present and future but also from the future to the present and the past
- allow for the future-to-present direction to be not just an aspect of mind, that is of our imagination, but to be materially constituted as for-ness and as deeds under way, as futures in the making that cast shadows from the future to the present, not yet congealed into matter but material nevertheless.

We may not want to call this fourth cause 'final cause'. We may find a better match to the meaning/knowledge practice elements of the complexity perspective on the social.

Irrespective of the label we might want to attach to it, however, the pertinence of Aristotle's 'final cause' relates to its materiality, that final causes permeate the realm of matter. In contradistinction to Capra (2003: 65), I want to argue that for today's social sciences that seek to take complexity seriously, this is precisely the point: future-oriented and future-creating knowledge practices have material effects that reverberate through the entire system of

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<sup>2</sup> It is important to bear in mind here that the concept of cause as established by the empiricist David Hume and modern science cannot be mapped cleanly onto Aristotle's concept of *aition*, an inherently ambiguous term which means whatever one can cite in answer to a "why?" question. Aristotle recognised that explanations for the emergence of a phenomenon can be given from various perspectives. Of these, only that of effective or efficient causality comes close to the modern scientific notion of cause. Aristotle's concept of explanation is therefore much wider than that of cause, and rules out the possibility of completely understanding a phenomenon by explaining it deterministically and reductively in relation to previously existing states of the system to which it belongs.

physical, biological and cultural relations and processes. Aristotle's four causes, therefore, provide us with a base from which to start our reconceptualisation of causality in a way that is consistent with the complexity perspective.

This brings me neatly to the issue of responsibility, the last point I wanted to address with regard to implications for social science approaches that seek to take complexity seriously. When we understand the social as embedded in and interdependent with the entirety of our world and when we grasp that our knowledge practices are neither isolated nor isolatable from their networked connections, that our actions reverberate through the system, activating responses that are not necessarily proportional to their initial 'cause', then we are also bound to recognise that we are implicated participants that cannot escape their responsibility. The complexity perspective deprives us of the comfortable position of external, uninvolved observer. It divests us of the 'view from nowhere' that allowed us to act with impunity. This change in understanding of our subject matter brings with it a change in methodology and both in turn confront us with our constitutive knowledge. The complexity perspective therefore demands that we acknowledge ourselves as future makers and understand our responsibilities accordingly.

At the end of this exploration, do we think that futurity is a complexity too far for social science research? My answer is: not necessarily. It is merely an exceedingly complex task that requires our collective determination and effort to take seriously our responsibility as social scientists, citizens and participating members of a complex world.

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**Figure 1**

**Futures<sup>3</sup>**

We tell futures  
Druids & wizards  
Oracles & prophets  
Astrologers & palmists  
Scientists and soothsayers  
All but different means & modes

We know futures  
From past experiences  
Forecasts & forebodings  
By prevision & premonitions  
Through clairvoyance & intuition  
To indeterminate degrees of certainty

We create futures  
Through technology  
Science & economics  
For ourselves and others  
Here and in distant locations  
With no responsibility for effects

We colonise futures  
With clock time values  
And unintended outcomes  
With econo-political impacts  
And techno-scientific innovations  
With impunity & freedom from redress

We eliminate futures  
Our own & successors'  
Through present-orientation  
In politics, science and business  
With the help of economic discounting  
And no guardians to safeguard environments

We risk others' futures  
Trading opportunity costs  
For personal & political gain  
Without being held to account  
For potential harm to those affected  
With no plans to protect new generations

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<sup>3</sup> Adam 2004: 149.

**Figure 2:*****Form***

Form is forming  
 Form is product & process  
 Form is developed in repetition  
 Form is its own past, history & evolution  
 Form is formed and forming in the present  
 Form is its past future, its projection, its destiny  
 Form is the stable arrangement of parts over time  
 Form is created, recreated and maintained in repetition  
 Form is visible expression of specific interplays of space, time & matter

***The Times of Form***

The time of form is stability  
 The time of form is temporality  
 The time of form is timelessness  
 The time of form is the eternal present  
 The time of form is repetition of the same  
 The time of form is duration and endurance  
 The time of form is encoded pasts and futures  
 The time of form is memory, recognition, anticipation  
 The time of form is extending from the now to origin and eternity

***Transformation***

Transformation is the changing of form  
 Transformation is forming form speeded up  
 Transformation is the intersection of origin and destiny  
 Transformation is the fading of one form shading into another  
 Transformation is forming form beyond the stable relation of parts  
 Transformation is the visible expression of past and future in the present

***The Times of Transformation***

The time of transformation is change  
 The time of transformation is creativity  
 The time of transformation is instability  
 The time of transformation is visible process  
 The time of transformation is sequence and duration  
 The time of transformation is repetition of the similar  
 The time of transformation is intersecting before and after  
 The time of transformation is bounded by observers' timeframes  
 The time of transformation is past and future expressed in extended present

***Metamorphosis***

Metamorphosis is change of form  
 Metamorphosis is forming out of sight  
 Metamorphosis is radical discontinuity of form  
 Metamorphosis is a sequence of stages in change cycles  
 Metamorphosis is the replacement of one complete form by another

***The Times of Metamorphosis***

The time of metamorphosis is rupture  
 The time of metamorphosis is exquisite timing  
 The time of metamorphosis is inaccessible process  
 The time of metamorphosis is discontinuous continuity  
 The time of metamorphosis is speed and intensity of change  
 The time of metamorphosis is clearly bounded before-and-after  
 The time of metamorphosis is sequence from one stable form to another  
 The time of metamorphosis is the intersection of past-in-present & future-in-present