shifted from research institutions to individual R&D projects. Enforcement mechanisms are expected to be developed and used to deal with the protection of intellectual property.

With respect to science and human values, 'strategic research' no longer means laboratories with restricted access where new weapons are put to test or the space race is under way. In the developed world, it refers to social environmental concerns, such as public health and global warming. In Greece the emphasis is put on the amalgamation of social, environmental and economic issues with technology. This is not yet the case for even the most advanced transitional economies. Theocaris points out the importance of spiritual, moral and cultural values which is a big problem in most of eastern Europe. Another worrying fact is that nuclear technologies are still top research priorities in, for example, Turkey and Hungary (albeit for nuclear waste disposal research for the latter). Generally, most of the countries share the global environmental concerns and recognise the need for ecological aspects in research; but only very few government strategies include measures to deal with societal issues.

None of the papers in the book discusses the problems of defence-related research and research institutions. Not so surprisingly, there is also no mention of the role the wider community can play in establishing scientific priorities and shaping technological developments. Science and sustainable development is another non-existing issue. Nevertheless, putting science and technology on the economic and management agendas is a positive sign of change.

Havas writes about the tasks of transforming the national R&D system to facilitate innovation as being challenging and 'far more formidable . . . than, say, in the OECD countries' (p. 193) as it offers the opportunity to make it fair and actually to make it work. The book does provide some evidence that all the countries related to the Balkan region are engaged on a route to avoid the balkanisation of their science systems.

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Evolutionary Economics and Chaos Theory: New Directions in Technology Studies

Loet Leydesdorff & Peter Van den Besselaar (Eds)

London, Pinter Publishers, 1994, xi + 215 pp., £35.00 (hbk), £14.99 (pbk), ISBN 1-85567-1980 (hbk), 1-85567-2022 (pbk)

As it becomes more widely appreciated that central tenets of economics dogma are not only unsubstantiated but plainly wrong—from the idea of an all-knowing 'rational' man to the belief in a self-stabilising equilibrium macro economy—alternative concepts are being explored (not always by economists) with greater urgency. One of these is the metaphor of the 'evolutionary' economy, with which this book is concerned.

The book demonstrates how different are the research approaches to the 'evolutionary' economy; so different, that the book is broken into four major parts to reflect the differences. An important question for the general reader is whether these sub-areas have informed one another and whether there is a process of convergence around a common project. An epilogue chapter 12 pages in length by one of the editors, Loet Leydesdorff, claims to tackle the question 'is the whole more than the sum of the parts?' However,

this chapter does not constitute a critical assessment of the many chapters or of the entire evolutionary approach which is accessible to non-specialists. It rather summarises and condenses the contents and jargon of the different chapters so as to become near incomprehensible to the non-specialist and probably to the specialist as well.

> As is well known from harmony theory . . . (p. 183).
>
> While biological theory has operated with natural units of time like seasons, years, generations, cultural evolution theory has to specify one or more frequencies for each relevant context . . . (p. 183).
>
> In principle, each additional context introduces an infinite number of possible interactions. Without substantive specification—that is, assumptions—the problem is usually non-computable (p. 183).

This book is not written for the general reader. I would go further and argue that it appears from its own structure and the different jargons that the writers are not really communicating with each other—that indeed they cannot. They are too wedded to the abstract concepts, the jargon, that characterises their sub-areas, but whose precise meaning is not clear to those outside that area. Simply blending these concepts in a stream of continuous prose as in some chapters does not constitute a demonstration of compatibility.

The origin of the book suggests why the 'new directions' of the title do not represent a synthesis in approach. The book chapters are a selection of the best papers presented to a workshop with the same title as the book and funded by various (mostly Dutch) state bodies. From the acknowledgements it is apparent that the publication of the book itself was subsidised by these bodies. So the book represents the formal 'goings-on' of a workshop and although this is a popular and relatively easy route to the creation of a book, one may question whether it should have been published in this form, since it is unclear how as a collection the book adds to a general understanding of the subject of evolutionary economics. This is most apparent in parts 2 and 3 which are concerned with the attempt to construct formal models of dynamic systems. You will find aspects of evolutionary systems modelled through Markov random field theory, Polya urns, percolation theory, multi-layer niche chains and coupled mat lattices. What I gained from such chapters is that they show they can successfully replicate some of the patterns of technological change that one is familiar with from innovation case studies. What I wish to be convinced of is whether they can add understanding beyond what is already understood from case studies and written theory.

To this end the book has an introductory chapter by P. M. Allen which sets out the rationale for evolutionary and formal modelling approaches and gives a framework which can be used to classify the many formal 'evolutionary' approaches and to understand the limiting assumptions they must make to models so that they reflect some aspect of 'reality'. Allen's long experience in this area shows in the lessons he draws from his own models. These include: the pointlessness of analysing 'final' system states (for they do not represent 'optima'); the value of maintaining diversity at the level of individual experience; the repeated selection of 'learning' entities in evolutionary models; and the spontaneous emergence of cooperation between populations of entities. The chapter is thought-provoking and it is particularly striking that the general conclusions that Allen draws appear to converge on the ideas that comprise the Austrian school's version of economics.

Nelson's chapter is another that outlines the rationale for the formal modelling approach, asserting that one must set out 'appreciative' theory (which I understand to be

one expressed in text) before one embarks on formal mathematical modelling. Formal modelling is useful because it clarifies thought about assumptions and causal connections that prove necessary for the model to work; this understanding may then inform 'appreciative' theory.

Perhaps this was meant as gentle criticism of the formal modelling chapters, for unfortunately many of these are sparing, to say the least, in their attempt to inform any 'appreciative' theory—an exception is David and Foray's chapter on modelling the standardisation process in EDI networks. The value of Markov random field structures for modelling standardisation processes is clearly argued as is the case for a strong IT policy for promoting the selection and diffusion of a single universal EDI standard. Because the limiting assumptions are transparent one could at least begin to judge the value of the analysis and policy recommendations

Despite its prominence in the title there is little concentrated discussion of the implications of chaos for evolutionary economics. One of the questions I had as someone relatively ignorant of the field was to what extent formal modelling would have to make qualitatively distinct claims about its ability to inform policy, and whether it would ever be able to claim as much as those who convinced themselves that linear models were a useful representation of reality. Patterns in linear systems can be projected forwards into the future to make often precise numerical predictions—with non-linear systems in chaotic states one cannot do this. If the economy shows the patterns of chaotic behaviour, one might infer that it is a non-linear system, but therefore formal modelling can never offer the 'magic' of a known future that linear models offer. But there is little discussion of such basic ideas in the book.

The fourth part of the book contains contributions from the sociology of technology; on institutional change, the sociology of translation and Luhmann's self-organisation theory. However, these last two are embedded in their own sub-field jargon, not without insight to the general reader on a close reading, they are nevertheless barely intelligible unless you are familiar with the writings of, in the one case, Latour and Callon, in the other, Luhmann. For the general reader the question arises again—despite the claims to the contrary, are these perspectives really compatible? Nothing I read convinced me that they were. Another reaction of the reader is to find both resonances with and startling contrasts to prior belief. A good example comes near the end of Lee's chapter.

> Last, by understanding the underlying dynamics of 'actualisation' hierarchies, we can better discern the effects of 'domination' hierarchies in human societies. If specific feedbacks at each level could be identified and modelled, the deterministic effects of specific resource configurations could be better predicted (p. 178).

This quote demonstrates both the tendency to jargon and the occasional incidence of remarkable claims, that, in my eyes at least, need a great deal more substantiation. In this case it is the claim about the 'knowability' of the economy as an evolutionary, self-organising system. I thought one of the major advantages of evolutionary thinking was that it justified the abandonment of the attempt to forecast precisely and predict in the way that orthodox economics still attempts, and fails to do. The problem here is perhaps that to convince the uninitiated requires more than one compact chapter. This is demonstrated by Blauwhof's chapter, which does attempt systematic comparison more than Lee, this time of the sociology of translation with evolutionary economics. However, I suspect it needs a book rather than one chapter to convince the reader how the two perspectives are really consistent with one another. In one chapter little more can be done but to take both perspectives as valid within their own domains, when both could be subject to a rigorous critique in a book.

The bottom line? Overall the book is not an attempt to communicate with the general reader either in style or in the questions it selects for discussion, nor does it make a convincing case that there is much communication or convergence between the different contributors. If this book is representative of work in the field (if indeed it can be called a field), there is little consensus on the precise form or significance of the 'evolutionary economy'. That is not necessarily bad news—there is plenty of room for further contribution and probably a great need for analytical review of work in the area of the 'evolutionary economy'.

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Netiquette

Virginia Shea

San Francisco, Albion Books, 1994, 154 pp., $US19.95, ISBN 0-9637025-1-3

Netiquette is an examination of Internet etiquette, or more precisely, E-mail etiquette. Shea's main argument is that Internet etiquette is based on the foundations of 'real world' etiquette. Therefore, netiquette involves a set of normative behaviours that help oil the social wheels for the benefit of everyone. Furthermore, according to Shea, the French origins of the word etiquette imply gaining access, or 'ticket for entry' (p. 19) into a social sphere.

Shea argues that just as there are different sets of accepted etiquette in different cultures or social circles, netiquette involves a number of sets of normative rules for social conduct in different domains in cyberspace (p. 323). So, sending an E-mail message to work colleagues involves a different set of rules to those which may operate if you were to post a message on the alt.jokes.tasteless bulletin board. However, despite the different cyber domains and different behaviours accepted within them, Shea's core rules can be distilled into four major groups: 1) having respect for people's time, privacy and feelings; 2) being aware that etiquette may be different in different Internet domains; 3) acknowledging that sharing knowledge is of prime importance; and 4) being careful to show yourself in a good light by considering what you write—which means always carefully checking your grammar, spelling and message (pp. 32–33).

Netiquette also provides useful information about what the Internet and E-mail are in a technical (but not necessarily technological) sense. For example, it explains the anatomy of an E-mail message, what a header is, how E-mail addresses are constructed, and what carbon copies and filters are. As well, there are other very useful things like a table of emoticons, or :-) smilies, and abbreviations like BTW (By The Way) that other people use but which you never knew or just cannot be bothered to remember (pp. 59–60). It also covers topics like making signatures and tone of voice. Given this kind of content, *Netiquette* can be said to be a kind of Computer-Mediated Communication (CMC) style guide.

Another practical aspect of *Netiquette* is that a number of specific E-mail use situations are covered. Business netiquette from the perspective of individual users and also from a company E-mail policy perspective are covered. Netiquette at home and school, which also raises the issue of children and the Internet, are given the netiquette treatment too. In addition, love and sex (and pornography) are covered with some interesting ethical scenarios which are resolved for the reader by Shea in light of the netiquette rules.