Discourse analysis and complex adaptive systems: Managing variables with attitude/s

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Abstract: There have been long-standing debates about the relative values of quantitative vs. qualitative research, and of positivism vs. critical theory in management studies. In this paper we discuss the value of discourse theory and the tools of discourse analysis in the context of complex adaptive systems theory, which can usefully be seen as a synthesis of the thesis of modernism and the antithesis of post-modernism. Discourse' has been developed and used in several disciplines, to interesting effect. It is now time to systematise the notion of discourse, and the tools of discourse analysis, both theoretically and practically, so that they can better be applied to management research, and to management practice.

Keywords: Discourse, modernism, post-modernism, complex adaptive systems, communities of practice

1. Introduction

Traditionally there have been debates on the merits of positivism vs. critical theory, quantitative vs. qualitative methodology, and modernism vs. post-modernism. However, we believe that these discussions can be approached quite differently. Complex adaptive systems theory can help us to achieve a "synthesis of modernism and post-modernism" (Byrne in Rihani, 2002:72). Similarly, discourse theory and discourse analysis can provide us with practical tools to apply this 'synthesis' to current management issues.

It is important to see the different modes of social organisation from modernist, to post-modernist, to Complex Adaptive Systems as, by and large, *cumulative* modes of social organisation, not as substitutive or oppositional theories. The point about complex adaptive systems theory, and discourse theory, is that different modes of social organisation and different epistemologies are applied in different contexts, and for different purposes. The cumulative development of these different modes is outlined in Figure 1.

2. Variables

Variables are the basis of research. There have been two fundamental developments in epistemology and research methodology, which share a strong common thread – their radical scepticism. The first development, in science, overturned the uncritical conservatism of metaphysical and traditional practices, by its insistence on the criteria of falsifiability and replicability as the basis for rational truth and knowledge. This resulted in a body objective knowledge, which was stripped of context and subjectivity, and which was highly commodified, which is why much of it is defined quantitatively. Like money, quantified scientific results are highly exchangeable, which is both a result of scientific method, and a constituent part of it.

But science left culture largely undisturbed, by confining scientific scrutiny to the 'social sciences', which were not entirely successful in producing the same kind of 'objective' knowledge that could be produced in the natural sciences. The 'individuals' who were the object of study in the social sciences were not as amenable to the reductionist quantifiability of the natural sciences, nor did they perform very well on the other metrics of the natural sciences – predictability and determinism. 'Social control' and even 'social engineering' were tried, but remained elusive. This led to a long-standing, and still largely unresolved debate in the social sciences, of which management research is a part, on the divide between the two "cultures": 'science' and 'culture', or natural and social sciences.

Natural and social sciences are embedded in language and social practices, much of which has become 'naturalised'. The second development, the radical scepticism of post-modernism, challenged the uncritical conservatism of the epistemology of language itself; thereby challenging culture and society, and the notions of rationality, truth and the individual, which had become 'royal game' within the research establishment. It brought the radical scepticism of science under its own radical scrutiny

2.1 Dispersed Subjects

The semiotics of post-modernism contested the notion of the individual, particularly the apparently 'objective' notions of gender, race and class, and deconstructed the extent to which these are socially constructed, and the extent to which the notion of the individual is also socially constructed. Post-modernists replaced the 'individual' with the notion of the

dispersed subject; no longer one 'identity' - the individual - but 'identities': occupying various subject positions, within different discourses and discursive communities. Identity is no longer seen as 'individual' but as a process and a contestation within overlapping and even contradictory discourses – i.e. an intersection of the personal and the social.

Just as an 'individual language' is a non sequitur, so too the notion of the 'individual' itself came to be seen as a non-sequitur (a useful riposte to Margaret Thatcher's claim that there was "no such thing as 'society' "). The idea of people shifting their identities was nothing new, except that it was now underpinned by a radical and systematic epistemological critique of language and culture. It is of course now also enhanced by the *hardware* and the *architecture* of post-modernism, i.e. the networked society.

2.2 Variables with Attitude

The point that discourse theory and complex adaptive systems theory make is that human 'variables', which are ubiquitous as the objects of study of management research, are quite simply not 'objects' but rather, subjects with identities (in fact, *changing subjects*). Moreover, this has specific methodological and epistemological implications.

Rihani writes that:

> *The new discoveries [in physics] did not prove Newton to have been in error. Essentially, they revealed circumstances where linear methods yielded excellent results, and others where they did not. More fundamentally, they established beyond dispute that some phenomena, now referred to as non-linear systems, are essentially probabilistic. They do not conform to the four golden rules associated with linearity: order, reductionism, predictability and determinism. Causes and effects are not linked; the whole is not simply the sum of the parts; emergent properties often appear seemingly out of the blue; taking the system apart does not reveal much about its global behaviour; and the related processes do not steer the systems to inevitable and distinct ends (2002: 68).*

Snowden, writing on knowledge management, comes to much the same conclusion. He illustrates the difference between systems which are not *adaptive,* and human systems which are adaptive - precisely because they are made up of humans who have *identities*, or (what we refer to as) *subject positions*; people who are "subjects", rather than "objects":

> *Human systems are complex; a complex [adaptive] system comprises many interacting agents, an agent being anything that has identity. We all exist in many identities; the author can be son, father or brother in different contexts; similarly with work group identities, both formal and informal along with various social groupings. As we fluidly move among identities, we observe different rules, rituals, and procedures unconsciously. In such a complex system, the components and their interactions are changing and can never be quite pinned down. The system is irreducible. Cause and effect cannot be separated because they are intimately intertwined Two examples make this clearer: Consider what happens in an organization when a rumour of re-organisation surfaces: the complex human system starts to mutate and change in unknowable ways; new patterns form in anticipation of the event. On the other hand, if you walk up to an aircraft with a box of tools in your hand, nothing changes. A feature of a complex system is the phenomenon of retrospective coherence in which the current state of affairs always makes logical sense, but only when we look backwards. Organisations tend to study past events to create predictive and prescriptive models for future decisions based on the assumption that they are dealing with a complicated system in which the components and associated relationships are capable of discovery and management. (Snowden 2002:17).*

There are particular methodological consequences of this. Human variables must be regarded as variables with identities, which are (particularly in a networked society) dispersed subjects. They are capable of acting powerfully and 'changing the subject' from time to time, and context to context. In short, they are 'variables with attitude', and are unlikely to be amenable to behaving as predictable and deterministic 'objects', no matter how complex the researcher's psychological description and analysis of the subject is.

3. Complex Adaptive Systems

In complex adaptive systems it is not useful to look for directly, and predictably linked, causes and effects; instead, what one has to look for are *emergent properties, attractors,* and *fitness landscapes*. The solutions within complex adaptive systems are those that allow for

interaction between the 'subjects' with a substantial amount of freedom, but within supportive rules.

A large shift in mind-set is required

> *…from one suited to linear, highly predictable, systems to an approach based on non-linear, less predictable systems, in which internal chaotic interactions between local actors produce self-organised … order (Rihani op cit: xv).*

He goes on to say

> *for a system to exist in a state of self-organised Complexity, its internal elements should be capable of interacting at an appropriate level of connectivity and in accordance to suitable local rules (p9).*

In other words, a network of communication between the people within the system, and a certain degree of freedom within a set of mutually acceptable rules are pre-conditions for 'self-organised complexity' to emerge. Self-organised complexity is distinct from either chaos or order, and the

> *management of complex adaptive systems is therefore a reiterative process that relies on slow, and uncertain evolution (ibid).*

It is vital to note that this does **not** mean a linear approach is never valid; this is not an either/or approach. In the management of objects rather than subjects, a linear systems approach could be valid and appropriate.

It is also important to realise that complex adaptive systems are not merely systems which are complex, and which adapt – because they are made up of people with identities. They are particular systems, which have to be *managed* to elicit self-organised complexity (a fine balance somewhere between order and chaos), and which share four common traits:

- They have active internal elements that furnish sufficient local variety to enable the system to survive as it adapts to unforeseen circumstances
- They systems' element are lightly but not sparsely connected
- The elements interact locally according to simple rules to provide the energy to maintain stable global patterns, as opposed to rigid order or chaos
- Variations in prevailing conditions result in many minor changes and a few large mutations, but it is not possible to predict the outcomes in advance (Rihani, op cit: 81).

4. Discourse

We are concerned in this paper to outline, both theoretically and practically, ways in which a combination of discourse theory and complex adaptive systems theory can indeed offer us a dialectical synthesis of the thesis of modernism/positivism and the antithesis of post-modernism. In order to do so, we need to build on the radical scepticism common to both modernism and post-modernism, and to extrapolate and build further on the notion of the dispersed subject. To this effect, we need to insert the dispersed subject back into the social – to put post-modernism back into sociology (without the linear and positivistic reductionism), back into communities of practice and discourse communities, but not 'communities' as they have been traditionally defined.

Rihani and Snowden both view linear and non-linear systems as what we would call different discourses - different ways of making sense of particular contexts (or all contexts, if you wish to be reductionist) and acting within them. There is an overlap between this notion of *discourse*, (and *discourse communities* that support and maintain particular discourses) and the concept of *Communities of Practice (CoP).* CoPs, as used in the ICT world, refer to groups of people who may be organised very informally, and who do not necessarily maintain, or seek to maintain, any integrated and sustained discourse over any considerable period of time. Although there may be similarities between this (ICT) understanding of a *Community of Practice* and the concept to we refer, there are distinct differences in that discourses are generally more structured and more stable

Discourses can be characterised in the following ways

1. Discourses in broad terms serve two related purposes, to make sense of the environment, and to order it accordingly. Or as Ferguson says, discourse is an "interpretative grid", but it is also "a conceptual 'apparatus' … that *does* something" (1994: xiv).

2. It is quite possible to approach the same issue from the point of view of quite different discourses.

3. The best intentions do not always work out in practice. Discourse is first and foremost about what *actually happens.* This might relate only ironically or paradoxically to what was intended.

4. And in overall terms, a discourse can be distinguished from other discourses by:

- Its primary concerned and /or focus
- How it identifies its key issues
- What kinds of solutions it advocates and implements
- What assumptions it makes about the desirability of and necessity for change
- How it changes and develops in terms of participation and consultation.
- The people who constitute the community of practice.
- How it relates to other discourses – does it take precedence or not and, if so, under what circumstances?

We need to return to point 3, i.e. that what *actually happens* might relate only ironically or paradoxically to what was intended. Discourses are sustained and systematic ways of articulating, making sense of the environment, and ordering it accordingly: discourse is an "interpretative grid", but it is also "a conceptual 'apparatus' …that *does* something" (Ferguson, ibid). The group of people who support and maintain particular discourses are its discourse community. Other groups may of course contest these discourses.

4.1 Discourses of Economic Development

A classic analysis of what *actually happens* within a particular discourse is that of economic development in Lesotho, in Ferguson's book *The Anti-Politics Machine* (1994). He locates the

> *intelligibility of a series of events and transformations not in the intentions of one or more animating subjects, but in the systematic nature of the social reality which results from those actions (op. cit:18, emphasis added)…*

and, continues

> *the outcomes of planned social interventions can end up coming together into powerful constellations of control that were never intended and in some cases never even recognised, but are all the more effective for being 'subject-less'... It is this emphasis on the 'systematic nature of the resultant social reality' that is the core of the notion of discourse here. It includes a framework for making sense of the world and for planning interventions, but it also includes what the anthropologist knows full well, namely "how easily structures can take on lives of their own (op. cit: 17).*

Ferguson is not just stating that these are *unintended outcomes.* He says that it is often the case in economic development that

> *…outcomes, that at first appear as mere 'side effects' of an unsuccessful attempt to engineer an economic transformation, become legible in another perspective as unintended … elements in a resultant constellation that has the effect of expanding the exercise of a particular sort of state power while simultaneously exercising a powerful depoliticising effect" (op. cit: 21)*

- hence, the "anti-politics machine". More specifically, Ferguson says later on:

> *the 'development' apparatus in Lesotho is not a machine for eliminating poverty, that is incidentally involved with the state bureaucracy; it is a machine for reinforcing and expanding the exercise of bureaucratic state power, which incidentally takes 'poverty' as its point of entry … depoliticising both poverty and the state … Such a result may be no part of the planners' intentions – indeed it almost never is – but resultant systems have an intelligibility of their own (op. cit: 255-6).*

4.2 Discourses of Distance Education

Ferguson's analysis of economic development in Lesotho is similar to Yates and Orivel's analyses of the management of distance education. They found that distance education paradoxically often exacerbates inequity while increasing access. (Yates 2000, Orivel 2000).

Distance and Open Learning generally aims to provide access to quality education. The most important factors are:

> *accessibility, cost, distance, equity of opportunity, and interaction in a supportive environment.*

These are the stated aims of distance learning. But what actually happens? Or to put it another way, what is the *effect* of discourses of distance education on educational practices and provision, and what are the realities?

Perraton writes that research on distance learning can be interpreted in two ways. On the one hand, it has provided new forms and levels of access, and therefore increased equity in education, while on the other hand, it is a second-rate system used to offer a shadow of education while withholding its substance

> *…[and] an inefficient way of containing educational demand without meeting it … [that] helps insulate the elite system from pressures that might otherwise threaten its status or ways of working (in Yates 2000:230).*

Yates continues

> *paradoxically, basic education Open and Distance Education (ODE) systems which are set up to provide extended educational opportunity to underprivileged groups also often exploit those who work for them," and he says that "there are situations where distance learners are required to pay a disproportionate part of the cost of their education, compared with those who attend more conventional institutions. This represents a kind of double inequity for those who cannot access conventional provision (p236).*

Yates also cites Oliveira and Orivel (1993):

> *The Brazilian teacher education project, Logos II … can be seen as reinforcing inequality… by a strange inequitable quirk of policy, ODE learners may be said in some instances to be subsidising the inefficiencies of conventional education. In such a case, ODE is masking, rather than addressing, issues of social equity and democracy" (op. cit: 237).*

He quotes examples of the Malawi College of Distance Education which provided education for more than 50% of secondary education students, on only 20% of the secondary education budget, and the Papua New Guinea College of Education which similarly provided education for 50% of secondary school pupils, on only 5% (five percent!) of the secondary education budget (ibid). Not only does this highlight the practice of providing cheap, and often inferior quality education (as in the cases discussed), but it also raises the question seriously under-paid and /or inadequately supported staff.

So we have to be very aware of not only how distance education is, or is not, satisfying its own internal, or intended outcomes, but also how it functions within the broader provision of education and social equity – what the discourse *does,* as well as what it says it does, and more importantly, what it begins to represent.

Distance education can be analysed within different management discourses: that of input compliance, or administration, or that of outcomes management. Interestingly in Perraton's comments above (ibid) he not only says that distance learning can be interpreted in two different ways, but that "the evidence will fit either interpretation". This is confusing and unhelpful. It would be better to analyse the different discourses that are at stake here, examining who maintains, defends and uses them, to what purpose, in which contexts and who successfully or unsuccessfully challenges them. Discourses at this level are not 'equally valid' options. They are political and social choices that have implications for what happens, what works, and for whom it works.

Within a discourse of *input compliance* for instance, one might use Perraton's data to conclude that 'access' had been successfully provided. Then again, within an *outcomes discourse*, one might conclude that access had only been provided at the expense of equity and quality, and that it also functioned as a cross-subsidy from the poor to those who were already privileged and already had inequitable access to educational resources. Furthermore, one might conclude that the discourse was politically successful mainly in that it deceived the socially excluded into believing that what was being provided was part of welfare provision and promoted equity, rather than actually being a 'dis-welfare'; in this case a double dis-welfare in that the recipients of dis-welfare usually subsidise the beneficiaries of welfare elsewhere in the system.

Orivel (2000) points out that:

> *The least developed countries have a simple choice to make: either they introduce new technologies in their schools at the expense of expanding school opportunities to currently excluded children, or they concentrate their limited resources on educational expansion, and thus renounce the chance to develop new technologies in their school systems. As long as GDP per capita remains highly unequal from one country to another, the capacity of new technologies to reduce the education gap will not constitute a viable option (op. cit. 138).*

He takes a traditional, linear, economic approach to the discourse of Open and Distance Learning. An Economic Discourse looks for, and at, discrete variables that can be reduced to numbers. In this case, 'technology' is one discrete variable, and 'education' the other. 'Technologies' are further reduced to NICT ("new information and communication technologies"), which are further reduced to CAI (computer aided instruction), which is further simplified by saying

> *the best assumption one can make is that one hour of learning in both cases [face-to-face teaching vs. CAI] generates on average the same educational outcome.*

At this stage the content has been so over-simplified that one wonders whether Orivel, is talking about anything at all, apart from numbers)

The only alternative for Orivel is the low-tech approach of teachers' talk-and-chalk. He believes that there is, in effect, a 'simple' choice between low-tech and high-tech. And goes on to argue that for *as long as* we have large inequities in GDP per capita, virtually no developing country should use ICT in education. That might be a very long time, and seems a rash statement, even though he later qualifies this by specifying that the threshold for the use of ICT in education is $7,300 per capita GDP. Nevertheless, that too will be a long time in coming in many countries. There are many problems here, apart from the extensive economic reductionism. Technological change and the adoption and implementation of new technologies doesn't happen in discrete variables – certainly not *that* discrete.

What is needed is not the sudden transformation of education through the use of technology, but rather the step-wise addition of features for communication and learning; not a complete change of systems. Besides, CAI has not been at the top of anyone's priority a list since the late 1980's. What learners and educationalists are exited about now are the possibilities that ICT offers for interaction with humans, not machines. CAI will continue to have its place, if it can be justified in terms of costs, but it's only a drill-and-practice box, and an interesting box to help you ask further questions. The enthusiasm for 'expert systems' has also faded, and what is left are useful simulation and modelling systems which are best used to find better questions, rather than better answers. What's more, these simulation and modelling systems are even more specialised and more expensive than CAI, and are only appropriate and feasible in a business strategy environment, not a basic learning environment.

Not every teacher needs to have a desktop computer or a high-powered laptop. The issue is that learners and teachers need to be connected to humans and machines in a *network that as a whole* will provide them with incrementally better learning and teaching, and personal knowledge management opportunities, as well as support through a carefully structured environment, which includes materials that form a well-designed and integrated package. Too often e-Learning 'opportunities' are planned as low-budget ventures with little regard to the participants. It's not a numbers game to see if everyone can master every skill that is available, nor should it be seen as a purely economic venture, although one clearly has to take account of budgets and costs.

Within a *network configuration* approach to learning-and-communication we are no longer dealing with *independent* variables in the strict sense of the term. Orivel's approach assumes independent (and discrete) variables: he assumes that we are dealing with inputs such as CAI/NICT *from the outside*, which are applied to/inserted into a fenced-off domain called 'education', much as an economist would approach issues of production and consumption. Orivel's application of traditional economic discourse to (N)ICT-enhanced education is not an example of a 'possible' and 'equally valid' discourse, which one might choose to analyse networked learning. It is simply wrong. It's not applicable at all. The whole point about networked distance learning is that it is a configuration *within which* learning takes place, and where all of the learners (consumers) are potentially contributors (producers) as well. The learners and teachers are *part of* a network (which extends to many others, quite outside the education sector), which *as a whole* makes up the networked learning environment. They are no longer *consumers* of *externally produced* goods and services, in the way that the earlier beneficiaries of mass education were, and if they continue to be seen as such, networked learning will never take off.

Orivel makes revealing comments about the key factors that allow developing countries to achieve some measure of mass education in the current context. He cites the example of China, to which Rihani also refers (op. cit: chapter 3). China, says Orivel, is a "special case, where the dependency ratio [the ratio of people in the workforce to people not in employment] has fallen dramatically, and where unit costs are also very low. This unusual combination of factors allows China to allocate a lower percentage of GNP to education without sacrificing the objective of expanding education opportunities. In addition, China is able to allocate more resources to physical investment" (op. cit: 146). In other words, because China has lowered the birth

rate, the 'dependency' of young people - for funds to pay for their education, on older people - who are taxed to provide those funds, is lower. In comparison to other developing countries, more people are working and paying taxes, and fewer people are at school. That, combined with low 'unit costs' (i.e. low teachers salaries) enables China to provide mass education without eating too much into GNP.

This is a sound argument, and a good economic analysis. The answer would seem to be plain. Education for All can be achieved; you just need to reduce the birth rate, and everything will fall into place. But then Orivel ducks the issue, and defaults to the comfort zone of a linear economic discourse. He says, very tellingly, that although this argument

> *may have some policy relevance in terms of priorities", one must remember, "it is* ***easier to manipulate*** *unit costs than fertility rates" (ibid, emphasis added).*

In other words we are back to the overriding linear (modernist) discourse in which 'education costs' and 'reproductive health' are regarded as discrete variables and domains, an economic discourse in which such messy (and unmanageable) variables as 'fertility rates' are seen as 'unsuitable' for intervention, especially given the reductionist / correct, political environments of today. It's a discourse in which objectifiable, quantifiable, discrete, independent variables are fore grounded, and in which continuous, complex adaptive human *subjects* and their behaviours are excluded because they are 'more difficult to manipulate'.

4.3 Primary Health Care Management

Discourse analysis can also assist in analysing seemingly coherent management domains such as Primary Health Care, where there are in fact a number or disparate discourses in operation. These can undermine the very notion of a Primary Health Care *system.* One only needs to think of the 'subjects who make up the communities of practice that intersect across the sets of 'sub-disciplines' of primary health care, all of whom may be intent on doing their job well, but few if any of them effectively contributing to the management of a Primary Health Care *system.* The examples from Distance Education and Development Discourse call attention to areas of contestation in the Health Care sector, and foreground how theories of discourse and Complex Adaptive Systems can inform the way we manage the demands presented by opposing subject positions, and 'variables with attitude'.

5. Conclusion

We have examined the development of different modes of social organisation and knowledge, and outlined the ways in which modernism and post-modernism can be said to share a fundamental characteristic – radical scepticism. We have also argued that complex adaptive systems can be seen to be a synthesis of the thesis of modernism and the antithesis of post-modernism. Finally, we've touched on the how complex adaptive systems theory can be used to systematise the use of 'discourse' in the management of development economics and distance education. This requires a shift in our thinking from linear to non-linear systems, and from objective variables to human 'variables with attitude' – i.e. with identities as 'dispersed subjects'. In terms of both discourse and complex adaptive systems, it is important to note that the

> *intelligibility of a series of events and transformations [is to be found] not in the intentions of one or more animating subjects, but in the systematic nature of the social reality which results from those actions" (Ferguson 1994:18).*

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	Pre-scientific	Modernist	Post-Modernist	Complex Adaptive Systems
Threshold Criteria	Language, tool-making Culture & tradition	Radical Scepticism of Nature "2 cultures": culture and science	Radical Scepticism of Language, Society, Culture (& Science) Dispersed subjects	Virtual CoP. Networked Society Configurations of Discourses
Nature	Nature	Nature Science	Ecology	Ecology
Society	Culture & Tradition	Culture & Individual identity & choice	Dispersed Subjects, contesting agency and structure	Virtual Communities of Practice/ Configurations of Discourse Communities. Social ecologies
Person	Pre-determined	Individual Identity – "made"	Subject positions constructed and contested.	In & out of Subject Positions in various CoP.
Basis of Information System	Traditional Use	Commodified Information (exchange)	Pastiche	Virtual Communities of Practice.
Capital	Tradition & Craft	Technology Algorithms Commodities – goods and objective, procedural information – context and subject stripped.	Algorithms, Objects, Contexts, Commodities as Objects, Deconstruction, Decontextualisation.	Algorithms, Deconstructed and Decontextualised Objects, BUT subject to social ecolologies of virtual CoP.
Cumulative MODES (not "eras")	Pre-scientific	Modernist	Post-Modernist	Complex Adaptive Systems
Variables	Metaphysics, within which is Nature and Culture.	Nature and Society as Objects of Study, with some cognisance of Individual Identity, the unconscious, etc.	Highly constructivist notion of variables as 'socially constructed'. 'Individuals' replaced by 'dispersed subjects'.	Different types of variables, for which different modes of discourse are appropriate. 'Subject positions' within various CoP.
Epistemology	Experience Tradition Metaphysics Metaphysics & Truth	Reason Falsifiablility Commoditised, Objectified knowledge/procedural information. Rational Truth	Ironic Experience/ configurations Just-in-context Strategic Knowledge Useful algorithms & discourses	Virtual/immediate experience/ configurations. Just-in-context Strategic Knowledge Ecologies and Configuration of CoP
Management	Tradition, Obedience	Compliance, Administration ….. Executive Management	Executive Management of Configurations	Ecologies and Configurations of CoP. Chaos, Emergent Properties, Sticky Events, Historical Accidents
Markets	Local, barter +	Commodities	Globally transparent	Virtual / CoP.
Entrepreneurs	? Preserving, expanding	New algorithms	New configurations	New ecologies & configurations.
Methodology	Preserving & defending traditions	Positivism, anthropology	Deconstruction, Discourse Theory, ethnography.	Complex Adaptive Systems Theory, Discourse Theory.

Figure 1: Cumulative Modes of Social and Epistemological Disciplines: