

The Diffusion of Management Innovations: The Possibilities and Limitations of Memetics

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ABSTRACT This paper applies a theory of memetics to help explain the diffusion of management innovations as a dynamic evolutionary process. Existing analyses of diffusion frequently note the variation, selection or replication of management innovations, yet few have linked these together with the common observation that some innovations seem to 'evolve'. This paper draws on qualitative evidence from two case-studies of BPR implementation to illustrate that the replication, selection and variation of management innovations can form evolutionary algorithms ('memes') which support diffusion processes, and, in doing so, clarifies the ways in which innovations contribute to their own replication and explains how the high 'failure' rates associated with BPR can sometimes improve its chances of reproduction.

THE DIFFUSION OF MANAGEMENT INNOVATIONS

In organizational studies, evolutionary theory has been applied to illuminate several dynamic processes, including technological innovation (Basalla, 1988; Ziman, 2000), organizational change (Bruderer and Singh, 1996; van Witteloostuijn, 2000) and theory building (Weick, 1989). However, despite the frequent observation that management routines, habits and systems often appear to evolve (Fujimoto, 1999; Hodgson and Knudson, 2004; Nelson and Winter, 1982; Yong and Wilkinson, 2002), there has been relatively little attention paid to the application of evolutionary theory to the diffusion of management innovations. This is all the more surprising as observations of the three components of an evolutionary algorithm (selection, replication and variation) have each been noted separately as central to the dynamics of innovation diffusion.

Regarding the *selection* of innovations, early work focused on the rationality involved in selecting the programmes that individuals perceived were most likely to be successful (Abrahamson, 1996; Holloway, 1977; Rogers, 1983). In recent years this focus has altered in the face of evidence that weaker innovations are often adopted at the expense of stronger alternatives (Abrahamson, 1991). The analytical focus has, therefore, shifted to the political, institutional and social factors that influence management decision-

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making (Robertson et al., 1996). Concerning the *replication* of innovations, studies examining the dynamics of fashion-setting have emphasized the importance of trend-setters, consultancies and funding bodies in encouraging imitation (Abrahamson, 1996; Grint and Case, 2000; Jones and Thwaites, 2000; Newell et al., 2001). Other approaches emphasizing replication in the diffusion process have examined institutional isomorphism and the convergence of organizational practices (Guler et al., 2002; Strang and Meyer, 1993). Finally, in attempting to understand the *variation* of innovations in both their interpretation and implementation, recent work has emphasized the phenomena of 'interpretative viability' (Benders and Van Veen, 2001), 'pragmatic ambiguity' (Giroux, 2006) and 'translation' (Czarniawska-Joerges and Sevón, 1996) in suggesting that 'certain labels or concepts have a greater likelihood of survival and dissemination . . . because they "lend themselves to various interpretations" ' (Giroux, 2006, p. 1231).

This paper argues that, when combined, replication, variation and selection can create a dynamic algorithm by which some innovation variants spread more rapidly than others. In doing so, the paper draws upon the concept of 'memes', developed by Dawkins (1976). Memes are self-replicating cultural ideas: 'not the "simple ideas" of Locke and Hume (the idea of red, or the idea of round or hot or cold) but. . . complex ideas that form themselves into distinct memorable units' (Dennett, 1991, p. 344). The paper suggests that successful management innovations are cultural memes that 'infect' organizations, residing in documents and memories (both biological and digital), being transmitted through consultants, training seminars and networks, and by mutating both the innovation itself and its environment to improve the likelihood of its reproduction. By bringing together diverse observations on the selection, variation and replication of innovations under the 'memetic' umbrella, the theory is intended to complement existing studies and incorporate their strengths into an explanatory perspective.

This argument ascribes no intentionality to memes (they are not conscious) but suggests instead that they form algorithms which can, by interacting with their environment (including humans), spread to other organizations. Nor is memetics reductionist: in the same way that it is possible to talk about genes whilst accepting the impact of the environment on human development or the existence of 'higher level' artefacts such as feet, dogs or houses, memetic theory is theoretically congruent with the existence of deliberative action, social construction and social structures. Memetics aims to provide an alternative vision of innovation diffusion by highlighting the ways in which the 'internal' instructions of innovations contribute to their own replication by interacting with social phenomena.

This memetic approach to innovation diffusion aligns itself with the recent repositioning of the analytical spotlight away from the agent and back towards the innovation and its rhetorical context. Recently, theorists have moved away from early anthropocentric models of diffusion, which emphasize the primacy of human action in generating diffusion (Holloway, 1977; King and Kugler, 2000), and towards approaches which highlight the rhetorical and interpretative environment of the innovation (Cornelissen, 2006; Giroux, 2006; Green, 2004; Taylor et al., 1996; Weick, 1989). At an empirical level, this paper develops this perspective by illustrating how the innovation contributes to its own replication by *interacting with and altering* its political and cultural context. Rather than seeing an innovation statically, in terms of its attributes or properties (which are usually

treated as adjectives), this paper suggests that innovations can act as dynamic and proactive agents (more akin to verbs), changing both themselves and their environments to maximize their chances of reproduction.

Such a proposition is not just a simple shift of perspective. By seeking to understand the *proactivity* of the innovation, this paper seeks to ascribe action not just to 'externalities' such as humans, networks or cultures but also to the innovation itself: its structuring, ordering and even production of organizations, users, artefacts and routines. The paper suggests that management innovations are spread, not just because people and organizations *adopt* them, but also because the programmes *adapt* people and organizations. Like a computer or biological virus, management innovations not only contain instructions for their own implementation but frequently directions for their reproduction. In arguing this point, the paper builds upon earlier work that examined the attributes of innovations (Kearns, 1989; Rogers, 1983) by suggesting that these properties are much more dynamic and proactive than had previously been thought.

By drawing on the idea of evolutionary algorithms, the application of memetics also fits within the wider literature on organizational ecology (Aldrich, 1999). This paper, however, develops this literature in two ways. First, by focusing on management innovations rather than organizations, the argument provides a different level of analysis to most ecological applications (Baurn and Singh, 1994; Durand, 2006). This in turn allows an examination of different forms of variation, replication and selection than those upon which analysts usually focus. Secondly, as explained in the next section, the paper utilizes a critical realist ontology to help avoid the charges of determinism and reductionism that are often associated with the organizational ecological literature.

The paper first introduces the concept of the memetics and suggests ways in which the theory is applicable to the diffusion of management innovations. Second, drawing upon stories from two case-studies of business process re-engineering (BPR) implementation, the paper examines the ways in which this innovation can be argued to be memetic. The paper examines the implications of the argument for innovations generally and makes some specific observations about the characteristics of BPR as a meme; it suggests that the high failure rates associated with BPR may actually enhance its ability to replicate by 'infecting' other organizations and that its 'cut and burn' philosophy can serve to eliminate competing innovations. Finally, the paper suggests some limitations of the theory and suggests avenues for future exploration.

MEMETICS: ORIGINS OF THE THESIS

In his book, *The Selfish Gene*, Dawkins (1976) outlines the methods by which genes evolve by drawing upon an algorithm comprising variation (slightly differing genes in a given population), selection (the survival of genes more suited to any specific environment) and retention (the preservation of genes through hereditary replication). After completing this survey, Dawkins speculates that similar evolutionary processes may also exist in cultures. In seeking to explain why some (effective) cultural ideas perish and why some (damaging) ideas spread like powerful viruses, Dawkins argues that many cultural innovations contain information to enable them to replicate themselves in a similar way to genes. In

doing so, Dawkins coined a new term: the 'meme'. Instead of biological data, memes contain cultural information that is transmitted through imitation and codification (the manifestation or inscription of the meme).

It is important to stress that, as an algorithmic processes, the concept of the meme can operate at both a material and rhetorical level. Thus, whilst cultural artefacts, such as designs, plans and products can be seen to evolve, the social discourse which frames and interprets such phenomena can also be influenced by the processes of variation, replication and selection. Thus, 'published texts also acquire a life of their own, sometimes far removed from the intention of their authors' (Giroux, 2006, p. 1232). A similar concern leads Green to suggest that 'in future studies researchers could examine the rhetorical viral and mimetic properties of managerial discourse' (2004, p. 663). Whilst these material and rhetorical dynamics are clearly symbiotic, for the purposes of clarity it is often simpler, as we shall see, to distinguish between them.

The algorithmic processes of the meme, Dawkins argues, are contained in three key constituents:

- Replicators: self-contained fragments of instructions that are replicated or imitated. 'There will always be errors in copying so the population will contain variety' (Dawkins, 2004, p. 467).^[1]
- Active replicators: these are instructions aimed at improving the chances of memetic reproduction; analogies include a cold virus which may cause sneezing or a computer virus which installs itself in all executable files on a PC.
- Vehicles: these are the 'carriers' of the replicators, the things that interact with the environment. In terms of evolutionary biology, they tend to be organisms (Plotkin, 1995), but with memes could be books, CDs, discourse, art or human memory: anywhere that information can be stored.

The ability of a meme to reproduce is, to a large extent, dependent upon how its replicators interact with their externalities (e.g. people, other memes, organizations, societies). A simple email saying 'copy me to your friends' would suffer short shift amongst the wired community and as such has a weak 'active replicator'. However, one promising a regular income interacts better with human needs to turn a simple email into a chain letter or a pyramid-scheme. More powerful still is an email that automatically sends itself to a user's contacts list regardless of their intervention (Blackmore, 1999).

An additional distinction is usually made between the instructions in the gene or meme, called the 'genotype' (for example, DNA, architectural plans, computer code) and its physical manifestation, called the 'phenotype' (for example, an organism, a physical house or a computer program). It is usually the genotype that drives the behaviour of the phenotype. As a result, behaviour influenced by genes can often actually damage the vehicle they inhabit. Dennett give us an example:

We see an ant laboriously climbing up a stalk of grass. Why is it doing that? . . . That is the wrong question to ask. No good at all accrues to the ant . . . The ant's brain has been invaded by . . . tiny parasitic worms that need to get themselves into the

intestines of a sheep or cow in order to reproduce. . . . [these] drive ants up grass stalks to improve their chances of being ingested. (Dennett, 2003, p. 175)^[2]

Similarly, it should not be assumed that a successful meme is necessarily good for its vehicle (or genotype):

It is a mistake to assume that the natural selection of a cultural trait is always [due to] some perceived (or even misperceived) benefit *to the host*. . . some memes surely enhance our fitness, making us more likely to have lots of descendents (e.g. methods of hygiene) . . . some memes are surely deleterious to our genetic fitness . . . (the techniques of birth control are an obvious example). (Dennett, 2003, p. 117)

The core argument proposed by this paper is that many management innovations can be represented as memes. Not only have many commentators observed that innovations that frequently damage organizations spread successfully (Abrahamson and Rosenkopf, 1993; DiMaggio and Powell, 1983; Knights and Willmott, 2000; Valentine and Knights, 1996) but several have noticed the ability of management innovations to 'evolve, in the sense that they arise what came before' (Blackmore, 1999, p. 27). This emergence from previous states is often implicit in those analyses which classify the latest fad as 'old wine in new bottles', by writers who trace the origins of various fads to historical cycles (Barley and Kunda, 1992) and by those who notice the differing implementations or 'translations' of innovations (Czarniawska-Joerges and Sevón, 1996). From the memetic perspective, if the environmental conditions are right, a management meme can successfully 'infect' vehicles such as organizations, technology and humans even if it is deleterious to such vehicles. It should not be surprising, therefore, if the host is damaged by the resident meme, providing that the deleterious effect is beneficial to memetic replication.

It is important here to understand the differences between Dawkins's meme and Rogers' attributes (Rogers, 1983). Whilst the meme could simply be listed as another attribute of an innovation, this categorization would ignore its generative and dynamic properties. If genes, for example, were simply classed as another attribute of human beings, alongside skin, feet and lungs, the categorization would miss out on the ways in which genes help determine the human form. To the purist, it is more correct to view the vehicle as an attribute (or the phenotype) of the meme rather than vice-versa, as attributes are the product of the genotype and will vary according to the evolutionary state of the entity. This highlights a wider debate which concerns the identification of the meme and the necessity of demonstrating that the classification of the meme is not merely whimsical but forms part of a wider ontological effort within social sciences.

The discussion of memetics in this paper is framed within a (critical) realist ontology (Bhaskar, 1989, 1997) which has recently made inroads into management studies (Contu and Willmott, 2005; Reed, 2005). Critical Realism commits to the notion of a layered ontology and the existence of causal mechanisms which underpin surface events, holding that something is real if 'it has an effect or makes a difference' (Ackroyd and Fleetwood, 2004, p. 29). A critical realist ontology permits the identification of structures, processes and mechanisms that exist at different levels independently of our identification of them (Delanty, 1997). This distinction between different levels of reality enables a critical

realist ontology to distinguish between the 'internal structures' of memes (the replicators) and the 'external' discourse and rhetoric which frame them. In other words, rhetoric does not necessarily equate to reality. This in turn enables a distinction to be made between the successful diffusion of rhetoric (e.g. 'compassionate conservatism' or 'the third way') and the actual practices which are often less spectacular. The consequence of this ontological commitment is not that discourse and rhetoric are unimportant but rather that different innovations will respond in different ways in similar cultural or rhetorical contexts.

Whilst the critical realist *ontology* is at odds with constructivist approaches which focus on discourse and rhetoric, 'critical realists can comfortably engage with critical discourse analysts in advocating the need to take semiosis. . . . seriously' (Mutch, 2006, p. 754). Indeed, in seeking to displace the actor in anthropocentric accounts of change, memetics shares a common theme with many post-structuralist perspectives, including Actor Network and neo-Foucauldian theories (Fox, 2000; Galliers et al., 2000; Latour, 2005). The distinction between rhetoric and reality allows critical realism to engage with both constructivists, who point to the 'evolution' of knowledge (Campbell, 1974), theory-building (Weick, 1989) and metaphor (Cornelissen, 2005; 2006), and realists who propose that innovations themselves evolve (Basalla, 1988; Fujimoto, 1999; Yong and Wilkinson, 2002; Ziman, 2000). It should, therefore, be possible to identify memetic dynamics in both the discourse of management innovations (how they are talked about) and the actual practice (what is implemented).

Given this ontology, how is one able to identify a meme? At what level should this unit of information be classified? To some extent any identification will be dependent upon the environment in which the meme operates. Weeks and Galunic (2003) argue that:

neither culture nor knowledge divides itself neatly into independent units for our convenience. The meaning and effect of any element of culture depends less on its essence than on the context of the rest of the culture around it. We cannot look at memes in isolation . . . memes only make sense when we look at their patterns of combination. (Weeks and Galunic, 2003, p. 1317)

The answer to the challenge of identification may be found in biology - the organism that is replicated can exist on several different levels at once. For example, parasites, viruses or bacteria can live within a human and may contain other organisms that have little to do with the host. The BPR 'meme', therefore, may contain, or be part of, other memes that help sustain or replicate it, such as TQM or HRM (Benders and Verlaar, 2003). However, the 'evolution' of this meme may mean that different instructions are discarded and new ones adopted through the process of replication, variation and selection. As Blackmore (1999) argues, certain memes tend to exist together (for example, within specific religions or science) and produce large 'memeplexes' that serve to sustain the memes they contain (in a similar way to genomes housing 'complete' bodies of genes). Thus, whilst some observers may argue that BPR is a memeplex rather than a meme, we might expect similar evolutionary processes to be evident in its operations. It should not, therefore, be expected that the identification of any particular meme will be permanent or provide an uncontested categorization.^[3]

This focus on memes inevitably opens itself to the charge of reductionism: that higher level phenomena (e.g. societies) are determined through the workings of smaller components. However, unlike atomists or materialists, memeticists (certainly those using a critical realist ontology) do not claim that society (or indeed anything else) is made up solely of one unit of reality, only that memes such as inventions, viruses and songs exist amongst and interact with other phenomena. From the Critical Realist perspective, human agency, social networks or translation are not the epiphenomenal consequences of memes, but simply other real entities that operate at different levels, interacting with and shaping the interpretation of memes. This account ascribes action, causality and process, not just at the level of society and the individual, but also at the level of the meme:

the meme's-eye view respects the importance of human agency while also reflecting the importance of unconscious processes and unintended consequences. (Weeks and Galunic, 2003, p. 1344)

In the next section, the paper explains the methodology used to examine BPR from the perspective of memetics. It draws upon two case-studies to argue that observations of variation, selection or replication made by other analysts can be combined to illustrate the evolutionary tendencies of some innovations.

METHODS AND ANALYSIS

Why BPR?

Focusing on the message of obliterating traditional, functional organizational divisions, BPR was proclaimed by gurus as the salvation of the post-industrial age. Within two years of the publication of *Re-engineering the Corporation* (Hammer and Champy, 1993), 75 per cent of companies in some sectors reported its implementation (Grint and Wilcocks, 1995; McCabe et al., 1997). Jones and Thwaites (2000) point out that, if the measure of citations is anything to go by, the interest in BPR peaked in February 1994 despite evidence of the high failure rates associated with the programme (Coulson-Thomas, 1994; Edwards and Peppard, 1994; Heusinkveld and Benders, 2001; Jones, 1994; Knights and Willmott, 2000).

There are two reasons why BPR may be useful in exploring the applicability of memetics. First, from an evolutionary perspective, BPR has undergone significant changes in the 15 years since its inception. The original 'hard' emphasis of its proponents was, in a short space of time, changed to a more people-orientated 'soft' version and later variations included BPI (Improvement), BPM (Management), the Six Sigma methodology and the Sarbanes-Oxley approach. This variation is regarded by some writers to be key in enabling the rapid diffusion of an innovation (Benders and Van Veen, 2001; Scarbrough and Swan, 2001) and, from a memetic perspective, is essential in providing the variety required in any population so that effective variants can be selected and others discarded.

A second reason why the 'internalities' of BPR are worth examining is that despite its high failure rates, several premature obituaries and common labelling as a fad, BPR has

undergone something of a renaissance in recent years. The recent Sarbanes–Oxley legislation aimed at preventing recurrences of cases such as Enron, Arthur Andersen and WorldCom, has spawned a whole new process industry focused on financial accountability. Even before this, a resurgence of media and telecoms industries found process-based structures more amenable to content-management systems. The utility of using BPR to investigate the operation of memes is, therefore, that it has many of the characteristics associated with 'memetic activity': if one were to look for strong evidence of a memetic nature in management innovations, one would be likely to find it with BPR, which, despite the failure rates and critiques, still manages to flourish almost 15 years after the concept was first introduced.

Methodology

In his comprehensive review of diffusion literature, Sturdy (2004) argues that:

studies tend to rely on using a narrow range of methods such as citation indices, texts and presentations and/or post hoc accounts from interviews. These fail to provide sufficient insight into the ongoing processes through which ideas, practices and other actors are produced, adopted, negotiated, translated, abandoned and/or rejected. In other words, they often do not address the very questions they set out to answer. (Sturdy, 2004, p. 171)

Partly in response to this challenge, this paper seeks to illustrate the processes of innovation diffusion through a rich ethnography that focuses on understanding workplace social and political relations through a combination of participant observation, action research and interviewing (e.g. Burawoy, 1979; Cavendish, 1982; Delbridge, 1998; Graham, 1995). In these studies the author worked alongside those he was studying and learned about the workplace through direct experience. However, the focus of the studies was not, at the outset, to provide material specifically to support memetics but to provide ethnographic data on how BPR was experienced and implemented, how it was translated into practice, codified and reacted to by workers, managers and consultants. Compared to a statistical or comparative study, this methodology is aimed at illustrating the hard-to-measure processes by which innovations spread throughout and between organizations by exploring the formal and informal practices of actors on the receiving end of management innovations.

At TruckCo, the BPR exercise was undertaken in 1997 and data was collected between 1996 and 1999. Interviews were held with about 15 people in each company and were followed by periods of two weeks working on the shopfloor and shadowing key personnel. During this period, notes were made on a pocket recorder and paper. Further visits and interviews were conducted, so that some changes could be studied in 'real time'. In total, interview notes amounted to 900 sides of material; about one-third of the taped material was transcribed, and this generated a further 200 pages. At TeleKom, between 2002 and 2004, a vast amount of ethnographic material in the form of work diaries, emails, minutes and proposals was collected. This amounted to over 6000 relevant documents and emails over the course of three years. In addition, 12 interviews were conducted with members of

the process analysis team (permanent staff and contracted consultants) and a diary was kept. In both companies the richest material came from the day-to-day records of emails, meetings summaries, projects proposals and other records.

Whilst the analysis of the material sought to understand how and why BPR was implemented in these organizations, it was not the intention to 'prove' that the programme *was* a meme. Instead, it aimed to bring together existing observations concerning the replication, variation and selection of innovations to show how these can work together in providing a dynamic evolutionary algorithm. The analysis draws upon both the implementation of BPR (i.e. as a change programme) and the operation of business processes (i.e. as a new way of running the companies). The cases presented below attempt to show the whole picture of the introduction and implementation of BPR in the cases, whilst the subsequent analysis draws out key themes that illustrate the representation of the programme as a meme.

THE CASES

TeleKom

In March 2000, the UK government sold five licences to broadcast data on the '3G spectrum', earning itself over £20bn in the process. In response, a Chinese holding company set up TeleKom which purchased a licence for £4.4bn and began building Europe's first 3G mobile network. The parent company, a cash-rich business owned by a Hong Kong entrepreneur, had a strategic aim of buying 3G licences around the world and replicating the UK business in each region. Such an undertaking was no small task. As a licence is only a grant of rights, a new infrastructure of radio-masts, networks and systems to distribute digital content needed to be built, alongside other operational processes such as billing, customer care, marketing and sales.

At the point I joined, TeleKom employed only 12 people based in a small office in the Thames Valley. By the time I left in 2003, the organization had grown to employ over 2000 people, developed the first 3G mobile service in Europe and built a completely new radio infrastructure across Britain. The challenge for the early organization was to build a stable business and IT infrastructure as fast as possible and then replicate this in other countries where TeleKom was also bidding for licences. To this end, a meeting was called with the senior members of TeleKom to provide a strategy for developing the organizational structure. However, it was immediately evident that few of the attendees had any idea how to tackle this task. One of the consultants present, Alan, introduced the idea of using a process-based architecture to build the organization. The idea was one of many suggested and discussed and the participants were eventually won round — partly by Alan's illustration of the concept through drawing large pictures on a white board of how processes worked. The different shapes and colours used engaged the audience in a way that other approaches that were presented did not and BPR was adopted by the meeting as their preferred strategy (whilst the programme was actually concerned with 'engineering' rather than re-engineering, the techniques were virtually identical and the team consistently called the project BPR). Talking about the decision-making process later, one of the directors told me that whilst there were a number of other factors taken into consideration, 'those processes stuck in my mind more than the other options'.

It should be noted that Alan's ideas did not emerge from a vacuum. Alan himself learned the tools and techniques of BPR whilst on a previous job with Panthra, a client he had just left. Although this project had proved unsuccessful, he had been provided with a 'CD and a "how to" manual by the company . . . both were ambiguous enough to be used [at TeleKom]'. Interestingly, the idea of applying BPR to TeleKom came to Alan after an automated email was sent though to him by a e-newsgroup that he had subscribed to in the previous year, which suggested, the utility of using process methodologies in media companies. Some months later Alan produced an amended version of the manual for use by the TeleKom Development Team, which was modified again by the team itself, and was later used on other projects by consultants who left TeleKom. Having reviewed all of these documents it was clear that they shared a similar message, structure and methodologies although the content often differed considerably. In 2005, Alan posted a case-study of TeleKom on the e-newsgroup for others to learn from.

One interesting feature of BPR at TeleKom was the extent to which the methodology altered over the three year period. Whilst the general process approach advocated by Alan was maintained, the procedures used to define and create processes altered, often in a seemingly random manner, without decision-makers getting involved. One reason for this was that six different consultancies were bought in to deal with the burgeoning workload and it was difficult to maintain consistency across all the different teams. Another reason was simply the variations that people made in translating the methodology into practice and the differing interpretations each person made of the (often ambiguous) guidelines provided by the company. However, as one business analyst pointed out, this variation was no bad thing:

By having the variety you take the responsibility for making it work away from [the consultants] . . . it's harder work to start-up but more likely to be successful in the long term. [Business analyst at TeleKom]

The process methodology that was developed (the 'TeleKom Development Process' - TDP) was based upon several different ideas, concepts and models and stored in various documents, systems and websites. The TDP acted as a control on the variants of processes, ensuring that many of the deviations from the instructions were corrected. However, the TDP was not overly strict in its controls. Jill, the TDP leader, explained to me:

Often you'll get mistakes, either intentional or otherwise . . . I suppose they're not mistakes . . . that will improve the process . . . for example a new form of labelling, or an unusual approach to modelling software which we will leave in there. If they're good enough, they'll get written into the guidelines.

An interesting example of this occurred on a project I was leading, where a complex piece of software needed to be modelled. Against company policy, a new consultant assumed this could be done using the TDP but, in any case, applied it incorrectly. The resulting 'mistake', however, seemed to work and I passed it onto the TDP team for review, who accepted the work (as no-one could come up with an alternative) but refused to incorporate the change into their methodology. The resultant processes, however,

were 'borrowed' by an employee who left for another organization and used them to design a similar project there. Indeed, I later used the 'mistake' as an example of best practice in teaching an MSc.

One of the difficulties the TDP team faced was keeping their methodology stable. As one IT manager commented:

I've worked with lots of different methodologies: they all have their strengths and weaknesses . . . all these internal contradictions and inconsistencies are usually seen as problems but often I think it is these that keep the thing alive.

To some extent, this observation was correct. The inconsistencies often provided individuals with the flexibility required to approach problems from different angles. One process manager later commented that:

It's useful because if you can't solve a problem one way, you can do it differently and still not get told off for doing the wrong thing . . . of course you don't publicize the fact to your manager.

The process design was first used in the IT department to design IT applications (e.g. multimedia products). When completed, these processes were hung on the walls around the company because the Director of Business Analysis felt they provided a visual representation of the work his teams had done. Interestingly, an acquaintance who worked for another telecoms competitor, later informed me that these diagrams could be seen from the street. As two major competitors had their headquarters in the same area he did not believe it to be coincidence they later implemented process designs for their own operations.

The unusual application of a process methodology to software development proved to be a disaster 18 months later when it was found that the business processes were of no use to the coders that eventually built the systems. Whilst this had always been suspected, the process system was very much an 'everything or nothing' method and the company was constantly being told by consultants, employees and best-practice literature that things would have to get worse before they got better. Unfortunately, only the former happened and processes for IT were phased out towards the end of 2002. This did not, however, stop several newsletters and press releases being issued that decreed the exercise a 'successful project'.

Towards launch, the TDP team automated several business processes on a system that tracked process activities. This system incorporated a function which could initiate a process review by sending out automatic emails to the process owner requesting maintenance or improvement. The email not only informed the person to review the process but also linked to relevant documentation (on the company's servers) and help documentation (held on publicly available servers). The architecture, therefore, acted as an initiator of action without the instruction from a human agent. Indeed, the only part of the process instructions that were *not* subject to this kind of review were the sets of instructions that managed these initiations. The system was capable of initiating change regarding all aspects of the system other the instructions to change.

These processes and the system used to support them also formed the basis of an effort to replicate the UK business overseas. The parent company of TeleKom had subsequently purchased licences in several other countries and attempted to save money by cutting and pasting the UK processes into other locations. The effort was only partially successful. Due to the differences in culture and law, as well as the usual power struggles between the centre and periphery, many of the companies felt the processes were unsuitable and so completely redesigned them.

By the end of 2002, the process teams (which had cost up to £10m by this stage) had come under scrutiny from the Director of Finance who was not convinced about the benefits of the process methodology. However, due to its 'everything or nothing' approach it was virtually impossible to stop the project once its implementation had begun as this would have left the organization with half-finished operations. The following recounts an (abbreviated) transcription of an exchange between the IT Director (ITD) who wanted to cut parts out of the project and the Director of Business Analysis (DBA) who was responsible for the process architecture:

ITD: So, if this [the process project] was cut, which areas would you take out first?

DBA: I'm not sure that . . . that's like saying 'let's do without sales . . . or IT . . . or marketing'. The thing is that there's nothing there to take its place, we either do processes or we don't, I think. It's not like you can have a process for sales and then make up warranty work as you want.

ITD: I'm not saying that . . . we're two years in and God knows what it's cost but I'm saying that if it doesn't end soon questions will be asked. Well, they are being asked . . .

DBA: Sure, but without it we have no company . . . no-one's going to scrap ten million quid's worth of work like that [clicks fingers] are they?

ITD: I'm not saying they are but I am saying this is bigger than most people thought it would be.

The decision was, however, forced upon the DBA who, in early 2003, had to make several consultants and permanent staff redundant, including himself. Many of these employees, having already designed their own process methodology, set up a company called Process2Go, selling BPR services to other organizations. Others went to work on process projects in other telecom organizations or joined consultancies specializing in process work. What was interesting about this phenomenon was that the process work at TeleKom was a failure, with the product of £10 m and two years' work being marginalized and virtually ignored by 2004. However, this fact was rendered invisible by the translation of this failure, through consultants' CVs and the new company's marketing literature, into 'valuable experience'.

The BPR programme was also spread through suppliers, vendors and industry associations. As part of the selection process of vendors, for example, audits were undertaken

to assess the companies' stability. These included a financial audit, a technology audit, a people audit and finally a process audit. Before the audits took place, vendors were informed that the process audit would include 'a detailed examination of your business processes both automated and manual'. Often, when the audit team arrived, we would be shown processes that had clearly been pieced together the previous week. Indeed, after a major contract was tendered out in 2002, one of the consultants working in a process team told me that his consultancy had been asked to do a 'rushjob' on one of the vendor's operational processes in time for the TeleKom team to review. This pressure on vendors was completely accidental — the wording of the audit information was unintentionally leading — as a member of the audit team, I knew it was virtually irrelevant whether that company used processes or not.

Another way in which BPR spread was through the creation of institutions that supported and replicated the programme. Multimedia companies which were prevalent during the late 1990s frequently needed guidance on how to organize automated processes to manage content. At the beginning of 2001, TeleKom, together with two other large multimedia companies started an informal group on issues that they were facing. An offshoot of this looked at producing a process methodology that would be best suited to this kind of company and contributed to the creation of the TDP. By 2003, this had turned into a more formal organization, 'Meze', which collected and published papers, organized speakers and advised consultancies on best practice. This in turn had considerable influence in dissemination of BPR and, despite the failure at TeleKom, encouraged others to follow a similar route.

TruckCo

TruckCo, a medium-sized manufacturing company in England, was established in 1971 to produce road tankers under the charismatic leadership of its MD, Rob. Responding to increasing competition in the 1990s and decreasing profit margins, Rob appointed several new directors, culminating in the recruitment in 1995 of Colin as the new MD. Colin professionalized, and in some ways bureaucratized, TruckCo and, in 1997, re-engineered the production, procurement and after-sales processes and introduced IT systems to the design department.

Colin decided to introduce BPR after he noticed a marked improvement in one of his suppliers, BallCb, who had implemented a similar system:

A few people had told me about the changes that [the supplier] was making and I thought I'd have a look. When I went round, they had all these process diagrams so that people could see what they were doing.

Colin also checked up on some stories of BPR implementation on the internet, commenting: 'it was difficult to find any bad stories, though in retrospect I realize this may not have been entirely reliable'. He also checked with his local Business Link where he contacted an organization that had also implemented BPR.

From the start, Colin wanted to involve the workforce as much as possible in the re-engineering effort. He provided all the senior managers with a key book on the topic

and bought in consultants from BallCo to train employees who then identified, created and edited the processes for their own use. In many cases, because they were unsure which process would prove more effective, the employees created two or three processes where one would normally have been designed.

When the consultants were asked where they got their ideas from, one Programme Manager replied:

We were encouraged to do it by a director who had seen it work in another company . . . We got most of our stuff from [Hammer and Champy's] original book and we all had to read it . . . It wasn't a recipe, more some guiding principles.

Neither did it surprise him to find that the methods TruckCo used were different from those of his own organization:

I've seen other places that have read the same stuff but have pulled different things out of it. I don't think BPR is actually a thing.

Another consultant suggested the variation was due to BPR mixing with other methodologies and producing hybrid designs:

. . . if you stick BPR into a company that uses SSADM [a software design methodology], you're going to get something new whether you like it or not. It might work or it might be a complete disaster, but at least you get to learn something for next time . . . if you look at BPR over the last ten years, it's now nothing like what it was meant to be . . . this is part of the reason why.

TruckCo relied upon a number of suppliers for components for its vehicles and exerted considerable power in these relationships. Whilst TruckCo fostered more co-operative relationships with suppliers than many competitors, the re-engineering exercise placed unintentional pressure on companies to follow suit. The procurement process, for example, relied upon several 'organizational interfaces' where TruckCo's processes placed an input into a supplier (for example, an order) and required a response (confirmation, parts, invoices). During the design phase of the programme meetings were held with suppliers to ensure they could respond to the inputs they would receive. During one of these meetings, where new processes were being projected up onto a screen, the following exchange took place between the TruckCo Operations Director (OD) and the Sales Manager (SM) of a supplier:

OD: This is where we interface to you . . . here. You get the email instead of us picking up the phone . . . you give us confirmation here [pointing]. Your processes can be automated to do this automatically.

SM: . . . er . . . no problem there but . . .

OD: So if we don't get a response then we know there's something wrong. You'll probably need to measure how often that happens because we will be.

SM: Okay, I can see that.

OD: These things are handy because you can actually see what's happening . . .

SM: Sure, so our processes on our side will . . . will just fit into yours giving you the confirmation, the parts and eventually the tick [invoice].

OD: It's like it becomes one big company instead of lots of fragments glued together.

Interestingly, the supplier, who did not use organizational processes, began talking about 'our processes' but when I later spoke to the Director involved, he expressed no interest in whether or not the supplier also used business processes:

It doesn't matter one way or another to me. None of these [meetings] are intended to make them adopt business processes. Why would they?

There were some similarities between TruckCo's experience of BPR and that of TeleKom. BPR was presented to the director as an 'everything or nothing' programme. As Colin said:

[BallCo] made it clear that this could not be a slow, half-hearted attempt at change, and that . . . to get the rewards we would need to be very ambitious.

As the programme progressed Colin also found that the methodology of BPR made it more likely that the programme would spread throughout the organization:

It's really difficult to have a process, such as 'warranty work', that might cross into HR, Operations, Finance and Sales and to keep any of those departments separate from the effects of BPR . . . contrary to what I first wanted we've now re-engineered pretty much the entire company.

Another similarity is that TruckCo found that they could make their own amendments to the BPR programme that they implemented. The finance director told me:

when I saw these processes and what they looked like, I thought 'I can use these for costing'. It was simply a matter of attaching a cost for each step of the process and . . . you could cost them.

The HR director also found this:

You can use them for role management as well. Each step of the process needs to be done by someone or something and if you give each bit a name you suddenly find yourself with a role definition . . . I'm not sure if it's worth the work though!.

Unsurprisingly, these innovations were incorporated into BallCo's own methodology and used on their next client. According to one of the consultants:

when you use this for different clients, you pick up different ideas and make things better — more effective — so that next time you've got more chance of winning the contract.

A final similarity between TeleKom and TruckCo is the fact that in both companies the press releases associated with the programme were sent out long before the success was known. TruckCo issued a press release to several industry magazines suggesting that the programme was 'a model for others to follow'. When asked about the hastiness of this release, Colin said that 'it's important to strike while the iron's hot . . . if people believe it's a success it makes success more likely'.

The implementation of BPR was, however, not as quick or as successful as Colin would have liked. The re-engineering effectively removed many of the reforms that Rob had bought in to prop up his ailing company and many of the workers resented this. These included quality circles, a suggestion scheme and a job-rotation scheme. When Colin implemented BPR, many of these procedures were scrapped as the re-engineered processes effectively replaced what was there before. This was partly due to BPR's totalizing approach to redesign, but also because many of the processes implemented by BallCo had been 'cut and pasted' from other clients, thereby leaving the organization lacking much of its own operational architecture.

Colin also felt that BPR effectively limited the options for the organization because once business processes were adopted they were virtually impossible to get rid of:

I've found that [BPR] has left us in a state where it's impossible to go back to where we were before . . . when things are organized along a process, it's all that people can see . . . [especially so] when they're automated. You just have to fix the broken processes because you can't afford the investment to do it all again.

This, however, did not stop TruckCo contributing to the spread of BPR. The project is now categorized as one of the 'successful cases' on the BallCo website and the optimistic press releases made their way into several trade magazines. Unsurprisingly, despite the huge investment and the unspectacular returns, Colin frequently referred to the saying that 'things will get worse before they got better' and, to some extent, they did. However, in one of my last meetings with Colin he was still unsure whether the effort had been worthwhile.

DISCUSSION

The argument that BPR can be portrayed as an evolutionary meme rests on two empirical propositions. The first is that the variation, selection and replication of BPR are qualitatively demonstrated in the cases. The second is that these phenomena work together to produce a dynamic algorithm that adapts and is adapted by its environment. To this end, the discussion will first expand on the instances by which BPR was selected, replicated and adapted in TeleKom and TruckCo. Many of these observations confirm those made by others in recent analyses of diffusion. However, in the final section, it will be argued that these three processes can work together to produce a sustainable

algorithm which aids the diffusions of BPR. It should *be* stressed that the findings proposed here are, as with all case-studies, generalizable to theory not to the population of management innovations as a whole (Yin, 1994).

Variation

In TeleKom and TruckCo, BPR varied in both its method and manifestation. The variations were both temporal and geographic and occurred within and between organizations. In both cases the BPR that was imitated was different from that which was implemented, which changed considerably over time and mutated again when it was passed on to other organizations. Some of these changes occurred unintentionally through variations in replication or the misinterpretation of ambiguous instructions, whilst others were through intentional intervention or the mixing with other memes (such as financial reporting or job design) or by the intervention of consultants and managers. Whilst this latter form of intentional activity is different from that which forms genetic mutations, it is essential to the rapid development of memes in social settings. Some have argued that the 'internal variety' of management innovations is a phenomenon that existing theories find difficult to explain (Mueller and Carter, 2005, p. 240). However, memetics suggests that variation of a management programme, as both a product of intelligent intervention and random mutation, is essential in producing the phylogeny of a successful innovation.

An examination of the cases provides three reasons why BPR may be more prone to this form of mutation. First, as both Colin and Alan recognized, the guru texts on BPR do not actually instruct users how to 'do' BPR. Instead, they communicate the principles and the high-level strategy that might be needed to guide the implementation. As few texts prescribe a re-engineering method, this provided the teams with a degree of interpretative flexibility in creating their own methodologies. As other writers have noticed, 'its ambiguity means that (potential) users can eclectically select those elements that appeal to them' (Benders and Van Veen, 2001, p. 37). Second, as Colin found, the implementation of the programme often meant that different processes had to be written, often resulting in the more successful being used, and the less successful dying out. This form of variation is specific to BPR and can be traced back to part of the original instructions in *Re-engineering the Corporation* that: 'processes have multiple versions . . . we need multiple versions of the *same* process . . . processes with multiple . . . paths usually begin with a "triage" step to determine which version works best in a given situation' (Hammer and Champy, 1993, p. 55).

Third, BPR, unlike some innovations, is applicable to any department, and therefore encounters new memes which it can 'cross-fertilize' with. In TruckCo, the implementation of BPR in the Finance and HR departments led to innovations that were passed on (through BallCo) to other companies, whereas the experiment in TeleKom with using BPR for IT systems failed. The unpredictability of this 'cross-fertilization' of management programmes rarely appeared to be the result of rational planning on behalf of decision-makers and more an outcome of the unpredictable ways in which memes either complement or contradict each other when put into practice. This places a different emphasis to those who emphasize the strategic manner in which actors intervene in

changing innovations (Benders and Verlaar, 2003; Benders et al., 1998). The 'accidental' forms of variation described here are, of course, not antithetical to such intentionality and can co-exist with other methods by which innovations get modified.

The importance of variation in management innovations is not a new discovery. Many writers have argued that it is a key feature of successful management innovations that they leave much room for the interpretation of their implementation (Benders and Van Veen, 2001). However, this variation is often presented as a negative aspect of BPR (Knights and McCabe, 1998; McCabe, 1996): 'contradictions can be found between different accounts of BPR, and even within one account or book (e.g. Hammer and Ghampy, 1993); and certainly between different re-engineered organizations' (Knights and Willmott, 2000, p. 22). However, meme-theory places variation within a wider algorithmic pattern of survival — innovations that lacked the requisite variation simply failed before they reached the radar of organizational analysts. Without variation, an environmental change might destroy all copies of the same meme. By varying in their form, memes increase the likelihood of their own survival in differing contexts.

Selection

BPR contains several features (replicators) that cause it to be attractive to decision-makers. In both TeleKom and TruckCo the highly visual processes central to the BPR meme caught the attention and acted as a mnemonic. Additionally, the radical 're-engineer or die' message of the BPR proved highly attractive in both cases where minor tinkering would not solve the organizational problems: TeleKom was faced with creating Europe's largest start-up in less than two years and TruckCo had tried virtually every other change programme but still found their market share slipping away.

Whilst there is a place for rational decision-making in the spreading of BPR in these cases, what appeared equally important was the exposure of the companies to what might be termed 'infectious' agents, such as trade associations, consultancies and institutions such as 'Meze'. As a manufacturer of complex machines, TruckCo was also exposed to dozens of suppliers, who themselves were connected to many other suppliers and buyers. As well as being connected to a similar number of suppliers, TeleKom also bought in hundreds of consultants who had previously been exposed to many different innovations. In both TeleKom and TruckCo we saw how associations such as suppliers, Business Link and trade associations acted as agents to encourage the spread of the BPR meme. The emphasis upon networks is not new in the literature, but the focus here is more on how networks are created and recreated through memetic activity. If we look at the relationships between the Business Link or Meze and the cases, these networks existed to store and transmit cultural information, thereby acting as agents to further spread the infection.

In both cases, it appeared that BPR aided their survival through its elimination of rival innovations that compete for organizational resources. In TruckCo, for example, BPR acted to destroy existing memes (such as quality circles and suggestion schemes) through its 'cut and burn' message. This is a feature actively encouraged by Hammer and Champy's original philosophy: 'instead of embedding outdated processes in silicon and software, we should obliterate them and start over' (Hammer, 1990, p. 104). This

observation is not necessarily inconsistent with Abrahamson and Fairchild's (1999) finding that new fashions are usually variants of previous management programmes: in both cases, BPR both contained elements from earlier implementations and yet worked to eliminate concurrent rivals. The observation that BPR is sometimes supported by other innovations such as TQM or HRM (Valentine and Knights, 1996) is not necessarily inconsistent with the evolutionary metaphor. Organisms will co-operate with or attack competing variants depending on the which strategy is most likely to ensure their own survival.

In the cases above, BPR developed what Von Hippel (1994) calls 'stickiness' - a feature that makes the meme difficult to remove once it is established. This works in four ways. Firstly, similar to a parasite, BPR ensures that its removal would result in severe damage to the organization. Both companies recognized that stopping BPR early could cause irreversible damage to the organizational structure. From the memetic perspective this is a powerful way of ensuring the project isn't easily stopped before it has had the chance to spread to other organizations. Secondly, by hijacking other programmes and departments, BPR gains control of areas that it may not have been intended for. Other writers have noticed a similar phenomenon without necessarily finding purpose in it. In Scarbrough and Swan's study of Knowledge Management, they note that 'KM is being reconstructed by the HR community as the creation of intellectual capital . . . the fact that KM is a popular term provides a convenient trigger with which to resurface and revitalise change processes' (Scarbrough and Swan, 2001, p. 10). Similarly, Fineman notices that, 'what is unarticulated in current theorizing is the extent to which managers/corporations themselves can capture a management idea to (a) reduce its threat, and (b) to re-present it in a form that attempts to neutralize the role of key protagonists of the idea' (Fineman, 2001, p. 28).

Thirdly, in both cases, the organizational restructuring made it more likely that some form of BPR would be utilized in the future as many business processes were automated through ERP systems or simply because new vested interests were created (e.g. process managers) that would lobby for the preservation of process structures. Many of the process managers created in the case-studies became a powerful lobbying force for the maintenance and extension of process architectures. Finally, as with many other management memes, many of the directors believed firmly that their current difficulties with BPR were part of a 'birthing process' which had to be painful in order for it to succeed. This message of 'no pain no gain' or 'things get worse before they get better' encouraged the continuity of the BPR programme when less optimistic people would have cancelled it.

Replication

The cases, to some extent, displayed all the usual methods of innovation diffusion: consultants, suppliers, trade associations and personal networks. However, what is different about seeing the meme as the unit of analysis is that BPR is viewed as central to the production and reproduction of these methods. At both companies, BPR resulted in the removal of dozens of consultants and employees who had been involved in the BPR project. Several of these used their experience to convince other companies to adopt

BPR. In my personal experience, I was, some years later, faced with designing the operational procedures for a new organization. I immediately fell back upon what I knew best: BPR. In doing so, I aroused the interest of two directors in the company, who then went out and bought Hammer and Ghampy's original book. This is not to say that memes operate without human intervention, indeed, they rely upon people as instinctual imitators to replicate the meme.

Another way in which BPR encourages its own replication is through the structure of the BPR projects. That BPR implementation is generally a short project, of around three to five months, means that consultancies require many more of these projects to remain profitable. More importantly it means that the consultants (and permanents) who implemented the project were made redundant or moved when the projects were finished: 'BPR implementation' was added to the CV and employment sought elsewhere. Additionally, many other (intentional and unintentional) outputs of the BPR project, such as press releases, the Meze institution, Process2Go, the TDP and websites, also acted as 'spores' infecting other agents with a readily available tool-kit and a seductive presentation of the projects (see Zbaracki, 1998 for a similar observation).

Finally, the similarity of many business functions meant that whole processes (e.g. invoice management) were copied from other companies with slight modifications to ensure the interfaces were tailored to TeleKom or TruckCo. This phenomenon, noted to varying degrees in both cases, was a simple way of both saving consultants' time and ensuring that the processes used did not miss anything obvious. The most common application of this 'borrowing' is found in generic functions such as call-centres, IT support and payroll. Whilst this process cannot happen without the intervention of human actors, the copying ensures a high level of fidelity in the memetic process. The replication of parts of the BPR 'vehicle' is encouraged not only by BPR's message of obliteration but also by the ease with which entire processes can be pasted from similar organizations.

BPR: A Memetic Algorithm?

By drawing together the ways in which BPR is subject to variation, selection and replication, this paper points towards an algorithm by which the meme evolved, changing both itself and its environment to enhance its ability to diffuse. Variation occurred through copying 'errors', mixing with other memes and intentional change; selection through a promise of radical salvation, by destroying competing memes or by developing 'stickiness'; reproduction through imitation, mnemonics, the creation of institutions and the rapid dispersal of 'infectious' agents. Together, these produced a dynamic algorithm by which BPR mutated in both its genotypic instructions and its rhetorical vehicle and spread successfully from BallCo to TruckCo to its suppliers, from Panthra to TeleKom to Process2Go, and then possibly further through websites, press-releases, consultants and the Meze institution. At each step, BPR took a different form which was partly determined by the intentionality of actors but also the instructions and structures of the innovation itself.

Seen as an organism, BPR was similar to a virus, mutating as it moved between organizations, being stored in digital systems, physical literature and human memory

and establishing architectures to support its own existence. Whilst human action and choice was an essential part of this dynamic, it is evident that the innovation itself also played an important part in initiating, constraining and structuring this action. The actors involved in the projects drew on (and responded to) BPR's rhetoric of obliteration and hope, its methodology of interfaces and cross-departmental structures and its production of visual processes, redundancies, new institutions and press-releases. When viewed from an informational or evolutionary perspective, there is no reason to prioritize the human input into the algorithm above that of the innovation itself. Thus, as Actor Network Theory has suggested, action should not be seen as the sole preserve of humans. In the cases above, action was prompted through system interfaces, automated emails and e-newsgroups as well as several other institutional prompts.

The proposition that an evolutionary algorithm is at work in TeleKom or TruckCo does not necessarily mean that BPR will continue to evolve. As with all evolutionary processes, the fidelity of replication needs to be sustainable so that each copy is capable of reproducing itself. However, seeds die on barren ground, the fertility of the environment can never be taken for granted.

CONCLUSIONS

In taking a memetic approach to management innovations, this paper attempts to bring together several complimentary observations regarding diffusion under one explanatory umbrella. In doing so, memetics asks 'who benefits?'. Is it consultants, organizations or employees that gain from the spread of BPR? Memetics suggests that this may be the wrong question to ask: 'replication is not necessarily for the good of anything; replicators flourish that are good at . . . replicating — for whatever reason' (Dennett, 1995, p. 362). Whilst many theorists express surprise that innovations with high failure rates like BPR diffuse successfully, memetics shows that, like biological and computing viruses, damage to the host need not prevent the diffusion process and can actually encourage the spread of the meme. The dismissal of experienced personnel and consultants after infecting them with the BPR meme is akin to the sneeze of the cold-laden person or the automated email from the Doom virus.

This perspective inverts some traditional approaches and suggests that the prime-movers in innovation diffusion are not just humans but also memes themselves. Thus, consultants, decision-makers, organizations, guru texts, process documents and networks form an ontological eco-system with which memes interact and compete for organizational resources. This approach does not undermine the importance of what is 'outside' the innovation but does suggest that the 'inside' of BPR needs to be understood as much as its political and social environment. Contrary to the approach of writers who emphasize the role of discourse, metaphor and language in constructing innovations (Cornelissen, 2006; Green, 2004; Taylor et al., 1996), memetics suggests that BPR. This is not to suggest that memetics is an alternative theory to that of fashions, networks, attributes or translations — memes rely upon these to produce the variation, selection and replication that motor their development.

There is much more work to be done on both the theory of memetics generally and its application to innovation diffusion. The question of the meme's ontological status requires a more detailed explication which this paper has only touched upon. Moreover, if memetics is to be understood as more than a simple biological metaphor and have some claim to theoretical utility, more theorization is necessary regarding its methodological and epistemological implications. As in biology, the phenotype is more easily identifiable than the genotype, raising questions of identification, causality and boundaries. Equally importantly, the dynamics of the meme's interaction and embeddedness with society requires more explanation. BPR itself is an evolved product, not just, as many have pointed out, from Taylorism and Fordism (Blair et al., 1998; Grint, 1994), but also from more powerful social and historical forces. Hammer and Champy themselves point out that BPR emerged from (or at least with) traditional American characteristics such as 'individualism, self-reliance, a willingness to accept risk and a propensity for change' (Hammer and Champy, 1993, p. 1). Although this algorithm, in nature, software design and game theory, often produces evolutionary tendencies, the cases here are far too limited to illustrate any form of sustained phylogeny and can only show that changes to both the genotype and phenotype can occur in two or three generations. However, one possible avenue for future exploration would be to examine how far the changes in BPR (from soft, to hard to Sarbanes Oxley and Six Sigma) can be traced through memetic 'evolution'. The more adventurous might even track the decline of a management fad within this framework — do old fads actually die out or do they evolve into something that better suits the environment?

This paper cannot cover all the arguments for and against a theory of memetics and more work is needed to examine its potential for innovation diffusion and organizational analysis more generally. With regard to BPR, the paper argued that memetics provides a useful explanatory theory for understanding diffusion in two key respects: understanding the role of the meme itself in encouraging its own replication, and explaining how BPR can diffuse successfully without necessarily being useful for the organization. A central implication of this is that theorists should not necessarily label an innovation a 'failure' simply because it damages organizational profitability. From an ecological perspective, its replication is more important than its utility to the host.

NOTES

- [1] It should be noted that while some analysts term these variations in replication, 'errors', from an evolutionary perspective they are simply variations that are essential in adapting the meme to its environment.
- [2] This quote also illustrates the linguistic difficulties of not ascribing intentionality to algorithmic processes. The lancet fluke does not actually do anything '*in order to* reproduce' because it cannot think. It just happens that its evolutionary history favoured variants which drove ants to climb grass, thus maximizing the chances of its reproduction. Linguistically, it is often impossible to describe unintentional actions which favour the survival of an entity in ways which avoid seeming to ascribe action. When this paper describes memes as doing things '*in order to*', it should be recalled that this is a necessary linguistic short-cut, not a suggestion that algorithms actually think.

- [3] Of course, the identification of any unit of analysis has always proved problematic for philosophers, scientists and social scientists. The 'gene', for example, was not mentioned by Darwin at all, and provided a malleable and variable classification until the discovery of DNA provided some stability. Even now though, the categorization is criticized by biologists who argue that a more useful unit of analysis may be exons, operons, chromosomes or any number of other new and evolving definitions.

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