



Pass it on: Towards a political economy of propensity

Nigel Thrift*

University of Warwick, Coventry CV4 8UW, UK

ARTICLE INFO

Article history:

Received 14 January 2009

Received in revised form

11 February 2009

Accepted 23 February 2009

Keywords:

Animal spirits

Biology

Imitation

Propensity

Stage

Geometry

Capitalism

ABSTRACT

The paper argues that the work of Gabriel Tarde on imitation provides a fertile means of understanding how capitalism is forging a new affective technology which conforms to a logic of propensity rather than to means–end reasoning. This it does by drawing together a biological understanding of semiconscious cognition with various practical geometric arts so as to re-stage the world as a series of susceptible situations which can be ridden rather than rigidly controlled. The paper examines the advent of technologies which attend to the variable geometry of so-called animal spirits in the realm of business and then, using Tarde's work as a springboard, considers some alternative means of understanding imitative rays which have less instrumental undertones. The paper is an illustration of the way in which biology and culture have increasingly become intertwined.

© 2009 Published by Elsevier Ltd.

I can calculate the motions of heavenly bodies, but not the madness of people (Isaac Newton, 1720, on losing a large amount of money in the South Sea Bubble, cited in Dale, 2004: 21).

The idea that economic crises, like the current financial and housing crisis, are mainly caused by changing thought patterns goes against standard economic thinking. But the current crisis bears witness to the role of such changes in thinking. It was caused precisely by our changing confidence, temptations, envy, resentment, and illusions – and especially by changing stories about the nature of the economy (Akerlof and Shiller, 2009: 4).

[The] mountain in the rain or the mountain in fine weather are, for the painter, easy to depict ... but the fact that from fine weather [it] tends to rain, or that from fine rain [it] tends to return to fine weather ... when the whole landscape is lost in confusion: emerging–immersing itself, between there is and there is not – this is what is difficult to depict (Laozi, cited in Bayart, 2007: 289).

1. Introduction

This paper will begin its course by taking up the work of Gabriel Tarde on the economy but as a signpost to what is occurring in the present.¹ In other words I will use Tarde as a staging post in a longer and more involved history of what I will call *propensity*, understood jointly as both a tendency-cum-attraction and an innate inclination, that is, as a disposition to behave in a certain way which is only partly in the control of the agent. In other words, I want to produce an account of contemporary 'societies' in which the biological can be on much the same footing as the cultural (if, indeed, that is a distinction worth having). In turn, I want to argue that this blurred vision can become the foundation of a different kind of political economy – a political economy of propensity – which understands the promise of the economy in quite different ways, ways which are gradually starting to reflect back upon themselves and so produce new economic technologies.

Let me start with two different but related examples. In the year 1597, when Yang Shicong, a Ming dynasty official, was born, no one in his home Province of Shandong to the south of Beijing had tasted tobacco. Few Chinese anywhere had. In all likelihood introduced into China from the Philippines, there were some tobacco smokers on the Southeast coast, and the leaf had found its way to Beijing

¹ That is because I want to argue for a biologically-inclined, longer-term view of human societies and economies which has something of a Nietzschean flavour insofar as it recognises the fundamental ironies of what we call culture, given the limited freedoms of human being.

* Tel.: +44 (0)24 7652 3630.

E-mail address: vc@warwick.ac.uk

where it appears on lists of purchases as a very expensive luxury. But Yang is at pains, in *Collected Writings from Jade Hall* (1643), to emphasize just how quickly the situation changed. By the time he arrived to take the examinations that would assure his progress up the bureaucratic hierarchy, smoking was well established in the capital. ‘Yang dates tobacco’s arrival in Beijing to the reign of Emperor Tianqi who was enthroned in 1621 and died six years later. Beijing farmers, he writes, have been cultivating tobacco for “the last twenty years”’ (Brook, 2008: 121). The shift to ‘eating’ or ‘sucking’ smoke finally caught the attention of the authorities who, predictably enough, tried to ban it. The Emperor Chongzhen was particularly concerned that land used for grain was being turned over to tobacco and in 1639 he decreed that anyone caught selling tobacco in Beijing would be decapitated. But in 1642 the ban was lifted: it was already too late. The habit had caught on, not least amongst the influential constituency of soldiers. Smoking had rapidly moved from an exotic custom to becoming the habit of large segments of the population, surrounded by all manner of paraphernalia and protocols and its own economic infrastructure. Indeed, China rapidly took on a reputation for being smoking-mad which it more than justified in terms of overall levels of consumption and the elaborately performative nature of its smoking cultures (Brook, 2008).

Now fast forward to the present and to the other example: the case of modern-day financial markets.² Such markets have, of course, been in operation for many centuries – indeed, Tarde (1902/2007: 630) commented upon them extensively in *Economic Psychology*, arguing that ‘the peaks and troughs of values in the stock market, unlike the oscillations of a barometer, could not even remotely be explained without considering their psychological causes: fits of hope or discouragement in the public, the propagation of a good or bad sensational story in the minds of speculators’. But their reach and complexity has expanded inordinately since Tarde’s time, allowing them undreamt of generative powers that precisely follow a logic of ‘mimetic rationality’ (Marazzi, 2008). That expansion has taken place for four reasons. First, new socio-technical platforms have allowed price-fixing, market-making, and means of generating liquidity undreamt of by Tarde. Second, new kinds of complex product have become available, based upon these socio-technical platforms but with their own powers. Third, new regulatory frameworks have forced particular economic behaviours which have ultimately proved problematic, such as mark to market. Fourth – and this is the issue I want to concentrate on – there has been a powering up of communication. As a result of this general tendency, the role of the mediated conversation has moved centre stage. As the financial media have become actors in their own right so what was largely private conversation, conducted behind closed doors, has become largely public, as institutions of public intimacy born out of the concatenation of performance and the media have become general in the economy, staging dances of calculative and calculated affect through stories that, in Tarde’s time would still have been a preserve of the comparatively few (Roach, 2007). In other words, enhanced communication has allowed what Richard Dawkins famously called the meme to become something like a reality in financial markets, markets which depend upon a pyramid of promises for their existence and which therefore generate a pervasive and probably inescapable degree of uncertainty since ‘chance, ignorance, or knavery – in the jargon, uncertainty, adverse selection, or moral hazard – can intervene to prevent financing from being repaid’ (Rajan and Zingales, cited in Wolf, 2009: 13). Following Marazzi (2008), we can therefore say

that the markets are based on herd behaviour which is dependent upon the information deficit³ of individual investors. This herd behaviour depends for its momentum on the swash and swirl of affect which is both the fuel and the result of the systematic uncertainty created by this deficit. This uncertainty allows prices to be continuously made and unmade, liquidity to be maintained and profits to be made – until market sentiment turns and panic, caused by a ‘flight to safety by investors who know they do not know the riskiness of the assets they own’ (Wolf, 2009: 25), sets in. As it now has.

Here, then, are two textbook examples of imitative processes rapidly sweeping through populations, one fuelled by a substance with an addictive property, tobacco, the other by a series of conversations fuelled by hormones reacting within a mediated environment to produce something not dissimilar to addictive behaviour. It is Tarde’s work come to life in the most graphic kind of way.⁴ Tarde (1902/2007) (cited in Hughes, 1961: 555) was, above all, interested in psychosocial processes of imitation, processes that were the result of mind working upon mind, of ‘mental states acting upon each other’, and the way that these ‘interspiritual’ states gradually evolved through minute changes without necessarily needing the push of any structure. For a long time, Tarde’s work on imitation fell out of fashion, not least because of its emphasis on process at the expense of the substantive results of social interaction.⁵ But now it is coming back into favour, fuelled by new work in disciplines as unlike as cognitive science, archaeology, primatology, social medicine, and media studies in which renewed attention is being given to basic biological processes like imitation which do not assume such social intermediaries as ‘the development of a self or the possession of a theory of mind’ (Turner, 2007: 367). My aim will be to use Tarde’s work to begin to construct that missing portion of political economy that might be understood as Keynes’s infamous ‘animal spirits’ – contagious spirits like confidence, fear, ‘irrational’ exuberance, bad faith, corruption, confidence, a sense of fairness, and the very stories we tell ourselves about our economic fortunes, with all the push that they encapsulate. The global financial crisis has made it painfully clear that these powerful psychosocial forces have come to imperil the wealth of nations today, whether we consider the overweening confidence of so many consumers that house prices could continue to rise indefinitely or plummeting trust in the workings of capital markets (Akerlof and Shiller, 2009). Yet, until recently, only a very few commentators – Mill, Bagehot, Pigou, and Keynes – have explicitly considered these forces as anything other than epiphenomenal to the real business of economy and, even then, they are often assigned to what is quite literally a spirit world outside of the bounds of normal economic calculation.⁶ Tarde was different. For him, there was no concealing ‘under abstractions such as credit, service and work, the sensations and feelings underlying them’ (Tarde, 1902/2007: 630).

I will therefore commence the paper by trying to etch the main components of mimetic rationality and radiation as we might now

³ An information deficit which is both general and asymmetric.

⁴ Although the flame was carried on in a few niches. So, it is no surprise to find that Tarde has continued to have influence on the study of psychosocial processes like the epidemiology of smoking.

⁵ But it is worth remembering that imitation does not have to be understood as a necessarily bad thing. As Brecht (1976) put it: ‘From new transmitters came the old stupidities. Wisdom was passed on from mouth to mouth’.

⁶ This state of affairs is now changing. For example, see Malmendier and Nagel’s (2009) famous study of the way in which different generations, with different affective experiences of economic conditions through their lives, took a different attitude to risk and saving, even controlling for age, year and household characteristics.

² Equally, I could have used the example of other market forms, for example, housing markets (see Smith et al., 2006; Monro and Smith, 2008).

understand them, with another 100 years of scientific knowledge to hand. That will involve the consideration of four different biological-cultural moments: imitation and neurological processes of mirroring more generally; what might be termed short-term genetic change; what can be called the to and fro of hormonal swashes, and; what might be identified as the humours that arise from particular kinds of material culture. I will then turn to two other aspects of Tarde's work which can be updated with the benefit of historical hindsight, namely the growing importance of what I will call 'premediation' and how it is possible to understand the gradual build-up of small changes into something significant without the benefit of a guiding hand. The second part of the paper then moves on to consider how aspects of the economy which were considered as without the sphere of economic calculation are gradually being brought within through the increasing interest of business and economics in things biological. I will show how the first glimmerings of this interest are turning into an attempt to produce a world in which semiconscious action can be put up for sale, so sealing Tarde's account in practice as well as theory. But though my general intention is to show that Tarde is ever more relevant to the historical moment, his work cannot just stand as is. In the third part of the paper, I therefore want to put three modifications of his work into place: small but important mutations, if you like, which herald larger changes in how imitative momentum is built, maintained, and channelled arising out of more and more complex processes of *worlding*.⁷ First, there is the matter of the creation of worlds through the mass production of phenomenology. Second, there is the matter of the construction of doors. Third, there is the matter of the production of more active spaces, undergirded by a cinematic mathematics. These modifications not only allow us to provide Tarde with a theoretical and practical persona better suited to the present but they also provide important jumping-off points in their own right, means of understanding the diverse currencies of the present. Then the final part of the paper provides some brief conclusions on what I call the political economy of propensity.

2. Understanding the bio-social constitution of human being

Let me begin this section by addressing the mutual constitution of the 'social' and the 'biological'. For a long time, the categories of the social and the biological have bedevilled rational analysis of human cultures, producing no-go zones which are only just beginning to crumble. On the one side have stood the guardians of 'causes understood as 'social'' (Freese, 2008: S3), on the other side have stood the guardians of biological causes, and ne'er the twain shall meet. Indeed, the two sides are often actively opposed to each other (see Korf, 2008). Worse than the obstinacy of the distinction has been the ways in which it has disallowed research into areas of human experience which can only be explained by appealing across the divide: affects like violence, for example, or fear, for example. Tarde is interesting precisely because, as a writer who at least acknowledged Darwin,⁸ he sought models which would incorporate both domains. This he did by privileging 'conversation', understood not just as a linguistic process but as something much broader taking in gesture and other forms of interaction, for 'if,

among the actions from which opinion results, one seeks the most general and constant, one perceives easily that it is this elementary social relation ... which has been most completely ignored by sociologists' (Tarde, 1902/2007; cited in Hughes, 1961: 556).⁹ Key to this great science of communication, in which 'symbolic networks provide a fourth dimension of heredity and evolution' (Jablonka and Lamb, 2005: 201), were models of semiconscious imitation which, by Tarde's day, already had a long history,¹⁰ models which could explain the dynamics of change. But Tarde was no mere diffusionist. He well understood that 'the needs and labours of men do not simply repeat themselves; they are often opposed, and more often adapted. It is on condition of being adapted to one another that they succeed in repeating themselves' (Tarde, 1902/2007: 627). In other words, each iterative act of imitation was more likely than not to undergo adaptation. Like one of his forebears, Ravaissou (1838/2008), Tarde never considered habit as a fixed repetition but as a general disposition which permits initiative.¹¹

The importance of models of semiconscious imitation of the kind that Tarde espoused has been confirmed by subsequent work in the area of what might be called 'cultural biology', work which is dependent on the discovery of the prominence of short-term and comparatively rapid biological change which is clearly connected to and indeed is part and parcel of cultural change. Habit, if you like, is gradually laid down as biology. This change can be found in four areas which Tarde's work can be seen as prefiguring, each of which I will address in turn. These are changes in neurophysiology, in genetic make-up, in hormonal balance, and in tool use. Work on such changes already begins to provide something of an extension to Tarde's thinking in its own right. I will then continue to update Tarde by considering two other issues, namely the rise of what I will call 'premediation', the process by which the media have tapped into semiconscious processes of imitation and amplified them in various ways, and how the gradual build-up of small changes produces large changes without there necessarily having to be any large structure to contain and guide the process.

Let me begin, then, with habit, understood as both culture and biology. My first moment is, not surprisingly, Tarde's subconscious processes of neurophysiological imitation. These processes are now better understood than ever before and I will therefore simply reprise the summary I gave first in Thrift (2007). We now know that the bulk of what we understand as a person is 'mostly unconscious, or spontaneously and intrinsically generated brain activity' (Stafford, 2008: 4) which is continuously active.¹² Though we may not want to go quite as far as Metzinger (2003: 1) in arguing that 'no such things as selves exist in the world', only the 'shaded surfaces' of a continuous process of self-modelling (see Thrift, 2007), still we now realize that we are founded on a neurodynamics which is the result of evolutionary developments which mean that we experience the world in very particular ways. Thus, we now comprehend that human beings are imitative animals – depending on what is meant by imitation, of course. Human beings subconsciously mirror

⁷ I take this term equally from the work of the Italian operaismo Marxists, particularly Virno, Lazzarato, and Marazzi, and from the work of Peter Sloterdijk. Sloterdijk's phenomenological twist on the Italian Marxists revitalized political economy is crucial, as we shall see in a later section.

⁸ Some authors describe Tarde as an unabashed Darwinian (e.g. Hodgson, 2006) but this is too simple. In fact, he was influenced by Darwinism – but only barely and, in part, based on misunderstandings (see Jahoda, 2002; Valsiner and van der Veer, 2000).

⁹ Of course, in a time after Garfinkel and Goffman, such an insight seems less compelling but it is worth remembering how revolutionary such a statement was at the time.

¹⁰ Such as in the work of Erasmus Darwin, William Preyer, James Mark Baldwin, and William James, and in therapeutic contexts by Hippolyte Bernheim and Jean-Martin Charcot (Jahoda, 2002).

¹¹ This tradition can be thought of as having some roots in biology, notably through the work of Bichat and its influence on Maine de Biran.

¹² Indeed, recent research suggests that the brain never rests. For example, the brain's visual centres remain active even when eyes are closed or when asleep. One suggestion is that neurons must 'think' in order to live. Another is that a minimal level of activity allows a 'quick start' from rest if there is a crisis (see Britt, 2009).

each other's actions in a constant iterative ballet of not-quite duplication, that rolls what we call society over but which also allows room for the vagaries of accident and the necessities of improvisation, just as did Aquinas's original notion of habitus in signifying a durable characteristic which could therefore become the foundation of virtue (Davies, 2002). Imitation takes place through media like conversation and gesture but can be boosted and extended by all manner of technologies, such as print and now the various new visual media. In other words, what we can see is a constant adaptive creep which has its own momentum and cannot be catalogued as a social category or force since it is happening continuously, as a background of contagion which acts equally as a foreground. The contagion includes all manner of psychosocial states. For example, recent research (see the summary in Steptoe and Diaz Roux, 2009) suggests that even a condition like happiness (and, by implication, important determinants of health and wellbeing) may be contagious, travelling via particular social connections in ways which seem to be independent of factors like socio-economic status.

The importance of imitation has only been underlined by the discovery of mirror neurons which fire at the *perception* of another's actions – with no motor actions involved at all. This discovery confirms this line of thinking in the way that it produces a plausible neurophysiological explanation for the means by which the existence of the other is etched into the brain so that we are able to intuit what the other is thinking – we are able to 'mindread' – not only because we see others' emotions but also because we share them (Rizzolati and Sininaglia, 2008; Iacoboni, 2008). Through the template of movements we have build-up, which activates particular muscles and provides us with particular movement properties, we learn not just to identify but to anticipate; 'our brains are capable of mirroring the deepest aspects of the minds of others, even at the fine-grained level of a single cell' (Iacoboni, 2008: 34). In other words, to see others perform is to perform ourselves: 'we reciprocally paint our affective lives inside one another' (Stafford, 2008: 76). For example, a subset of the cells in our brains fires 'when an individual kicks a soccer ball, hears a ball being kicked, and even just says or hears the word 'kick' ...' (Iacoboni, 2008: 12). Perception, cognition and action do not therefore occupy discrete zones. Indeed, such descriptions of behaviour are suspect when perception and motor functions occupy the same space. In other words, the dictates of phenomenology find a neurophysiological anchorage, an insight now being followed-up by all manner of investigators.

In turn, imitation is understood as at the root of what it means to be human. Moving well beyond the kind of stimulus enhancement routinely observed in animals, imitation is revealed as a high-order evolutionary construct, not least because it has been shown that mirror cells can acquire new properties and therefore can fuel emergent behaviours: what most seems to distinguish humans from the majority of animals, therefore, is not language but the capacity to imitate and this ability to imitate is innate: babies as young as 41 minutes have been shown to imitate. In other words, imitation provides a novel evolutionary pathway for *learning*. Babies do not learn to imitate, they learn by imitating, and imitation is the prelude to and facilitator of verbal communication. Indeed, imitation is probably even more important than Tarde thought it to be not least because the imitative faculty underlies the empathy which human beings feel for each other. In other words, imitation is the condition of being human. Put another way;

These [scientific] discoveries transform empathy, taking the attitude of the other, and imitation, from a vague and dubious phenomenon that can be observed and described but not explained, into something that can be explained in terms of

brain processes. This on the one hand validates them – especially against the scepticism of positivists about such things as empathic understanding – but on the other hand forces us to ask some serious questions about brain processes and about the ways in which our received descriptions of phenomenon, such as taking the attitude of the other, do not match up with the neuronal evidence (Turner, 2007: 367).

But there is something else that Tarde did not really foresee. There is no reason to think that our imitative faculty will just stand still, not least because the human brain is still evolving. Nor can imitation be understood as just relying on imitative capacities and capabilities: the rest of brain function also needs to be taken into account, not least because the most relevant trend in the evolutionary history of *Homo sapiens* is a rapid increase in brain size and complexity and there is no reason to think that it is not continuing in present-day humans: after all, there is no reason to think that evolution stops at the neck. In other words, there is no completed human being.¹³

One way of approaching this question of current evolutionary change is through genetics (Bearman, 2008); after all, many human characteristics which are conventionally regarded as social have been found to have substantial genetic heritability (see Table 1 in Freese, 2008). If a gene has evolved adaptively in the making of the human species, there seems no obvious reason why it will not continue to undergo adaptive evolution after the emergence of anatomically modern humans. Indeed, by analyzing human polymorphism patterns, some evidence is emerging that certain 'humanness' genes are experiencing ongoing positive selection in humans. Of particular interest are the *ASPM* and *Microcephalin* genes. In each of these two genes, a new sequence variant has arisen in the recent past of human history, and has since swept to exceptionally high frequency around the world, presumably due to strong positive selection (Linden, 2007). The exact fitness advantage conferred by these new variants is not yet known. However, given the highly specific function of *ASPM* and *Microcephalin* in regulating brain size and also given their history of intense adaptive evolution in the lineage leading to *Homo sapiens*, it is not unreasonable to hypothesize that these new variants may improve some aspect of brain function. Work is currently underway to test this hypothesis and the preliminary findings suggest the tantalizing possibility that the human brain is still evolving, in the sense that it is still undergoing adaptive change, through plodding but detectable increases in brain size.

One thing Tarde did foresee, however, was the importance of fugue. Like many of his contemporaries, he was fascinated by states like hypnotic trances, sleep, sleepwalking, and night terrors, and all the other 'spiritual' conditions in which the social vocabulary of agency, inner worlds and outer worlds breaks down and is unable to be restored because of the prepersonal 'biological' nature of such moments (Lee, 2008). Famously, Tarde wrote of imitation as though it could be likened to somnambulism, and of a resultant somnambulist society. But states of fugue have increasingly come back into scientific notice and as they have done so the resultant research has thrown down some challenges to Tarde's account.

Take the case of sleep. Increasingly, NREM sleep, which, incidentally, is the phase of sleep in which sleepwalking occurs, is

¹³ It might even be the case, as Sloterdijk and others have argued, that human beings should be thought of as a special case of neoteny – in which arrested development has become the mature form. It has already been hypothesized that certain disorders such as infantile epilepsies, dyslexia, Huntington's and Alzheimer's might be born out of neural misconnections taking place at early developmental stages before symptoms appear, and it is a relatively small step from here to the more general thesis.

understood as an evolutionary phenomenon, a way of producing enforced inactivity during periods when being inactive is the optimal strategy,¹⁴ as well as reducing the requirement for food. NREM sleep is not so much recuperative as a mechanism to ensure that animals stay still when they have nothing better to do. Such a theory also explains why babies sleep so much: there is not much else they can do with their time (Martin, 2002). But REM sleep, a universal characteristic of all large-brained animals which makes up 20–25 per cent of sleep in mature human adults (and much more in babies), is a very different matter indeed. There the chief function seems to be maintaining the brain in some way; the resting body is put to use. There is considerable evidence that REM sleep is chiefly concerned with learning, and most particularly the consolidation of memory (for example, the rehearsing of experiences from earlier in the day), and also with the regulation of mood (Linden, 2007). Dreams process the whole of cognition, and most especially emotion,¹⁵ into narratives that allow distant associations and insights which would be much more difficult to make within the continuous sensory bombardment of everyday life: they are ‘faulty’ awakenings (Horne, 2006). In other words, dreams involve what might be called ‘worlding’ but as the shaping of a highly selective and distorted model of the world in which some elements of reality are systematically over-represented while others are under-represented.

What’s most important about dreaming is that it allows you to experience a world where the normal waking rules don’t apply, where causality and rational thought and our core cognitive schemas (people don’t transform or merge, places should be constant, gravity always operates, and so forth) melt away in the face of bizarre and illogical stories. And, while you dream, you accept these stories as they unfold. Essentially the experience of narrative dreams allows you to imagine explanations and structures that exist outside of your waking perception of the natural world. In your waking life you may embrace the distorted structures of the dream world or you may be a hard-headed rationalist, or you may blend the two (as most of us do), but in all cases the experience of dreaming has thrown back the curtain and allowed you to imagine a world where fundamentally different rules apply (Linden, 2007: 220).

The point is that these REM states are not so much unconscious as semiconscious acts of redescription – Tarde’s exact description of much of human life. But the model of somnambulism that Tarde adopted as a description of semiconsciousness is not a good one, since it suggests NREM automata with only a limited repertoire of behaviour. However, the example of REM sleep shows that human beings are actually wired to produce alternate worlds, to unward rather than towards, as a matter of course (Tallis, 2008). The brain can create a ‘virtual reality’ of a kind (Hobson, 2002).¹⁶ Thus, the language of worlding may well hold at the deepest level.

A second moment follows on, namely short-term genetic change, on the same timeframe as cultural change. The evidence for this proposition is steadily increasing too. There are, of course, famous cases of the progress of genetic adaptive evolution in the historical short-term. The case of the spread of lactose tolerance

comes to mind, a change which happened about 8000 years ago, sufficiently recently that many populations still do not have the gene: one in 50 Swedes, for example, but nine out of 10 Asian Americans. So does the ambiguous case of the sickle cell trait as a response to malaria. But more recent, admittedly controversial, studies suggest that the human genome may still be evolving very rapidly. If these studies prove to be accurate, then it may be that ‘we invented agriculture, started eating different food, and began dwelling in cities. Our numbers swelled, our world changed, and our DNA is still catching up’ (Phelan, 2008: 21). What seems likely is that changes to environment (the change from hunter-gathering to more sedentary existences), to diet (the corresponding shift to less diverse food sources), and to the susceptibility to disease (occasioned by larger, more concentrated populations) have produced new genetic vectors. What would be the most interesting finding would be to show that intelligence is still being selected for. There are some studies that very tentatively seem to suggest that this may be so. Others suggest that qualities like emotionality are still evolving. What does seem certain is that ‘culture is not an escape from conditioning environments. It is an environment of a different kind’ (Phelan, 2008: 23). Once the brain gets to a certain level, it permits an explosion of cultures which in turn condition the brain. Perhaps we can evolve into our successors before we destroy ourselves – or perhaps not.

A third moment is in the history of brain–body chemistry and especially the interaction between hormones, psychotropic mechanisms,¹⁷ and material cultures. After all, in everyday life we are constantly altering our brain–body chemistry. This is the neuro-historical vision that Smail (2008: 157–158) has recently conjured up.

In everyday life, we do many things that alter our moods and feelings on a regular basis. These alterations are reflected in constantly changing levels of chemical messengers in our tissues and in our brains. In principle, an omniscient observer of human moods should be able to track these changes, like a technician in a recording studio facing an array of dancing meters. Each meter on the board would register a different neurochemical: serotonin, dopamine, all the androgens and oestrogens, and dozens of others besides. Most bars, as they rise and fall, would follow a fairly slow rhythm, measured on the order of hours, days, or even weeks. A few, such as those registering epinephrine, norepinephrine, or corticotrophin-releasing hormone, would occasionally show rapid spikes and dips, corresponding to the sudden shocks or flashes of rage we experience from time to time. With enough study, patterns would emerge: of the Wall Street trader, say, whose testosterone takes a beating in a bear market and is restored by visits to sex shops. Of the teenager, whose frenetic spikes and dips show as much variation in a week as an older and wiser person would experience in several months. Of whole groups whose levels of dopamine or serotonin, averaged across a month, are distinctly higher than those of other, more favoured groups. Studies like this might show, in fact have shown, how social privilege, a product of cultural patterns and historical trends, correlates strongly with levels of stress hormones.

The array of meters might also reveal how the neurotransmitters and hormones present in our bodies, in theory, could unite to produce an infinite range of different moods and feelings. As a practical matter, however, we soon learn to recognise the

¹⁴ Though inactivity is a relative term since human beings move incessantly whilst asleep, changing body posture every 15 or 20 minutes. However, their muscles are near-paralysed during REM sleep.

¹⁵ Indeed the regions of the brain that subserve emotion seem to be particularly strongly involved in REM sleep, not least because they activate certain hormones.

¹⁶ But, as Hobson (2007) points out, the structure of this reality still eludes us. Is it based on narrative, or is that simply how dreams tend to be reported by awake respondents? Is it based on logic and associated detail or, more likely, hyper-associativity and emotional salience? And so on.

¹⁷ In Smail’s (2008) usage, these mechanisms encompass all kinds of objects, practices and institutions which have similar neurochemical effects to those produced by psychotropic or psychoactive drugs.

familiarity of certain combinations, certain chords, both in ourselves and in others. Our cultures have found it convenient to assign names to these common chords: joy, depression, sadness, anticipation. Your moods and feelings may be tinted with a slightly different range of combinations than mine, and we gossip about the variations so as to calibrate our mood-descriptions more closely to the feelings we actually have. In some cases, we may find that we have nothing to share whatever, and that is where we reach the limits of empathy. Our bodies, by virtue of the genomes they carry, are capable of providing us with a whole palette of sounds. But it is our own life histories, the variations between the alleles we carry, and, perhaps above all, the cultures we live in that write the actual music.

In other words, history can be seen as the swash of hormones which constantly operate on what are remarkably plastic brain synapses through the medium of cultural amplifiers like caffeine, sentimental novels, pornographic works, and all manner of consumer goods. Thus Smail writes of the constant generation of neurophysiological ecosystems as ‘a field of evolutionary adaptation in which the sorts of customs and habits that generate new neural configurations or alter brain–body states could evolve in unpredictable ways’ (p. 155). Like Hawks, Smail cites the extreme changes that took place in the Neolithic – the expansion in calories available for human consumption, the domestication of animals, new more sedentary lifestyles, and the growing density of human settlement, as central to the contemporary ecosystem. But equally, he is willing to countenance all kinds of other shorter-run biological–cultural ecosystems, each with their own hormonal ways of going on. For example, in the passage above, he points to the financial markets as being awash with hormones. Indeed, recent research suggests that there is something in this: the waves of irrational exuberance and pessimism that routinely destabilize the markets may be driven by naturally produced steroid hormones which have mildly addictive effects. With receptors in almost every nucleated cell of the body, steroids like testosterone and cortisol affect the behaviour displayed in risk-taking situations. Thus, Coates and Herbert (2008) found that a male trader’s cortisol rises with both the variance of his trading results and the volatility of the market. They suggest that higher testosterone levels may contribute to economic return whilst cortisol is increased by risk. Elevated levels of steroids may even shift risk preferences.¹⁸

A fourth moment lies in material culture which now becomes something akin to an all-enveloping miasma as technological objects are no longer just tools but means of grounding (Tresch, 2007). Whereas the mainstream approach to cognition holds that it happens in the brain and that material culture is nothing more than an outgrowth of the brain’s mental capacity, most material culture approaches now posit an extended and distributed mind, in which material culture is not a reflection of the human mind but a part of it’s functioning: ‘objects also make the mind’, laying ‘down tracks that affectively activate our eyes and mind ... [and] ...stamp us with the marks and textures of the phenomenal world’ (Stafford, 2008: 9, 11). Think, for example, of the interaction between hand, brain and object in which evolution has responded to the environment by producing a more and more complex brain architecture which can cope with reaching out and grasping what is to hand, and has coevally produced more and more complex models of the hand which can form brain and world in myriad ways (Thrift, 2007). It

follows that, if material culture is an extension of human cognition, then it has actively shaped the evolution of human intelligence. Tarde, being interested in ‘interspiritual’ contagion, tended to neglect the influence of the technical environment as a crucial determinant of cognition. Take the case of the media. It is true that Tarde well understood the importance of the print media of the time as a determinant of contagion. But subsequent developments have made the importance of the media much clearer. That development has taken place on a number of levels, all of them precipitated by the internet to a greater or lesser extent. The first is the identification of populations. Indeed, the spread of the internet has produced both a new medium and a means of getting much closer to what Tarde was trying to study through developments such as geodemographics, geographical information systems, and data mining. The second development results from the fact that these new forms of demographic have also produced means of reflecting on medium and message in a concerted manner from everyday metrics like hits, through social networking sites to the ubiquitous website and blog – with clear and obvious consequences, not least for participants and organizations who are increasingly able to see and measure their own influence. Thus, a new source of reflexivity has become available. The third development has been the addition of locative technologies allowing both data acquisition and reflexivity to move with the agent, producing all kinds of new possibilities (Thrift, 2007). In turn, and in aggregate, these three developments have produced an enhanced power to propagate psychosocial forces. Kellaway (2009) points to precisely this quality when she discusses the current recession;

This is our first experience of recession in the internet age ... You could say that the internet makes the recession more bearable as there are all those networks to help people get jobs and there is Ebay for buying things second-hand.

Yet such things are trivial compared to what the internet is doing to our confidence. The internet has created a global psyche. The web has mentally joined us at the hip, so we can no longer put our heads in the sand ...

Through blogs, websites and e-mails the world’s economic ills are fed to us on a drip all day long. It is not just that we hear about bad things faster, we hear about more of them and in a more immediate way. My worries become yours and yours become mine. On the internet, a trouble shared is not a trouble halved. It is a trouble needlessly multiplied all over the world ... This would not matter so much if it were not for the fact that confidence is the medicine that cures the recession: and all this sharing of bad news leaves one with no confidence at all.

If I had been alive during the last comparable recession, over 60 years ago, I would have limited my news injection to reading The Times front page every morning. In those days it had a front page given over not to big scary headlines, but to small classified ads. The news inside would probably have left me a little depressed over breakfast, but I would have had the rest of the day to recover my equanimity (Kellaway, 2009: 12).

The point is that something like memetics has become a practical possibility as communication systems have broadened and deepened. The language of memes, one of those terms that says both something and nothing, has not been a good one, I think. It has flattened analysis by positing a cultural equivalent of a genetic engine in ways which Tarde would never have allowed (Jahoda, 2002). It may be marginally useful as an expression of what is attempting to come into existence. But, no more than that. There is, in any case, an alternative – one that arises from within the study of the media. Niklas Luhmann was known for his study of communication, but he also applied this interest, notably in his

¹⁸ In another paper, Coates and Herbert (2008) suggest that high levels of prenatal androgens, as measured by the second to fourth digit ratio of the hand, may produce more successful traders, given that prenatal androgens increase risk preferences and promote more rapid visuometer scanning and physical reflexes.

Zettelkasten system, an index card reference system which was used to map out ideas, thoughts and theories. The Zettelkasten system allowed Luhmann to think about society as a system of communication rather than individuals or actions, and as a series of multiple, independent and parallel subsystems dividing in non-linear and non-hierarchical ways. In effect, Luhmann had invented hypertext of the kind now found structuring the world wide web, in which no text is more important than any other, and the entries refer to each other by links. From this experience, Luhmann fashioned an autopoietic¹⁹ theory of communication which replaced the delicious certainty of the notion of goal-oriented action with something closer to the reference system of poetry, in which the system 'gives itself priority over all external reference, but only to make itself seem ambiguous' (Luhmann, 1998: 21). Such systems provide a practical means by which memes can spread since there are no barriers of hierarchy to constrain them.

To summarize, culture is gradually biologically aggregated and embedded at a series of temporal scales. The process of aggregation and embedding can be short-term as in the to and fro of imitative rays and their accompanying hormonal reactions. It can be longer-term as in practices which bring various cultural actions together which, if taught over a long period, can produce neural grooves in the brain as a normal part of development. It can be longer-term again, as in the invention of new pharmacopeias like those that came together in eighteenth century Europe or drastic material rearrangements like agriculture (Smail, 2008). And it can be very long-term, as in the interaction between the structure of the brain, and the body more generally, and genes. But note that, in each case, the interaction between what was formerly termed the biological and the social is often all but immediate, given the timeframe within which particular biological processes work.

Indeed, we can now see the way in which particular economies can have biological effects in what, in evolutionary terms, is short order. Take just the period after speciation and the longest-term of these biological processes – the interaction between culture and genes. Thus the great settlement of the Neolithic is now being inscribed in our bodies at the genetic scale. Our bodies are being born with its sedentarist genetic imprint (Gamble, 2007; Renfrew, 2008). The great age of globalization is likely to achieve something similar because of the unparalleled degree of genetic mixing in large populations, though these effects are unlikely to be seen and felt for many hundreds of years (Bayart, 2007). Finally, the imprint of the economies of the present is registering in our bodies in all kinds of ways and may well in time provide genetic shortcuts as a saleable commodity. But, more generally and as this example shows, it is possible that material culture is often acting as a surrogate for genetic change. Changes that might have taken place biologically over a longer time horizon are now taking place over a shorter time horizon through technical means. As Evernden (1993) puts it, we have become 'natural aliens'.

I will now move to my second aspect: it has become increasingly clear that subconscious processes of imitation can be directed, most

particularly by processes of what might be called 'premediation'. Tarde pointed to the power of imitative processes in the mediated environments he recognised at the time, such as newspapers and markets. But too often he tended to see these mediated processes as spreading like wildfire, like mobs all but out of control, or as currents pushing up against each other in a fluid dynamics in which ascendancy could be all but accidental. However, there are numerous examples of ways in which imitative processes can be consciously and carefully steered. One on which considerable work has been carried out is democracy as it is practiced in a media age (Thrift, 2007). Here we find that getting people to vote in particular ways through the appliance of mediated narrative framings which have taken on their own force has become something much closer to a science than an art. For example, Lakoff (2008) argues that modern political consultants now understand enough of the dynamics of imitative processes and brain-body chemistry to be able to make reasonably predictable interventions in the political unconscious of the democratic political process. They can construct 'neural bindings' which frame events in particular ways, 'narratives' that work as part of the unconscious as biases to understand the world in particular ways, and to be susceptible to particular prompts.²⁰ The result is that it is possible to tug on the behaviour of voters by transferring these narratives into the political domain as forms of habitual response which the individual voter is plainly susceptible to. For example, the narrative of celebrity, which has been a staple of many popular cultures since at least the beginning of the twentieth century, and no doubt before, is transferred into politics, producing responses which arise out of a potent combination of technology and genre, imitation and hormone.

One way in which we can approach these kinds of developments in simultaneous measurement and influence is through Tarde's own writings in *Economic Psychology* on 'glory'. For Tarde (1902/2007: 618, 619), not only can we think of a division of labour and a division of riches but also of a division of glories; 'an ever-growing multiplicity and difference of celebrities and notorieties' buoyed up by persistent media attention.²¹ What counts as glory will vary from culture to culture, of course. The accent might be on the doings of musicians or merchants – or both. But what is clear is that 'the most intoxicating glory began as the fanatical, impassioned and devoted admiration of a small group of partisans, of acolytes gathered in a narrow chapel; it ended up as the relatively cold – and never truly devoted – acclamation of a dispersed and immense public, which does not know its hero personally'. In turn, such musings can be understood as part of a more general process of what Agamben (2007) calls 'glorification', a process which has religious overtones and which can be seen flowing over into the economy. Thus Agamben argues that the word *oikonomia* is itself religious in origin and that a providential understanding of the economy still continues, albeit honoured in the breach. The trace of a theologically-founded ordering of the world can still be detected even though the expansion and intensification of capitalism have become an autopoietic mechanism with no soul, no sovereign, and no law. Without having to subscribe to all of Agamben's theses, it is worth thinking about how the feverish work of glorification of a non-existent deity has continued in the economy, even as the economy seems to become ever more technical, through the use of the media as both ceremonial and liturgical builders of reality: 'If

¹⁹ Of course, the term was originally coined by Maturana and Varela to describe biological systems and was transferred to the social domain. To wit, 'an autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in space in which they (the components) exist by specifying the topological domain of its realization as such a network'. Thus, '... the space defined by an autopoietic system is self-contained and cannot be described by using dimensions that define another space. When we refer to our interactions with a concrete autopoietic system, however, we project this system on the space of our manipulations and make a description of this projection' (Maturana and Varela, 1973/1980: 78, 89).

²⁰ It is no surprise that the new neuromarketing techniques are finding favour with political consultants.

²¹ We might, at least in part, link this narrative to Weber's account of charisma, noting that Weber did not think that charisma could be fully understood without reference to biology.

the role of the media is so important in modern democracies, it is not only because they allow [us] to control and to govern public opinion, but also because they administer and dispense Glory: that *doxa*, that acclamatory element of power, that seems to have disappeared in modern times' (Agamben, 2007: 11). In other words, the economy can have all kinds of richness inserted in it by these media ferrymen, and many of these will operate at the semi-conscious or unconscious level. Indeed, Tarde thought that it would be possible to develop a 'gloriometer' that would be able to measure admiration and notoriety (Hughes, 1961), using techniques not so far removed from the kinds of network analyses now routinely performed on the web.

A third aspect is simply the importance of small changes which cumulatively produce large changes, on the model of evolution. Famously, Tarde wanted to set up experiments in which he and a network of correspondents would trace out these small changes, bit by bit (Thrift and Barry, 2007), showing the way that they produced an emergent drift in particular directions without there being any centrally located, controlling agency. This thinking has migrated into modern social thought as a virtual dimension. Here is Deleuze, producing a Bergsonian moment much influenced by Tarde.

The actualisation of the virtual ... always takes place by difference, divergence or differentiation. Actualisation breaks with resemblance no less than it does with identity as a principle. Actual terms never resemble the singularities they incarnate. In this sense, actualisation or differentiation is always a genuine creation. It does not result from any pre-existing possibility (Deleuze, 1994: 178–179).

Although this kind of vision has often been seen as unusual, even bizarre, in cultures like those of the West which depend on abstract modelling of ideals which are then applied as goals, it is the kind of view of social change which has been shared by a number of cultures. Take the culture of classical China. Jullien (2009) has argued that this culture followed a quite different course, one which stressed responding to the vagaries of the situation as constituting an art of living in itself. In such an art, the trick is to detect favourable factors in a situation which allows the agent to be carried forwards. The agent keys into the momentum of the situation and surfs its possibilities. The agent is not surrounded by a situation which (s)he attempts to control but, rather, weaves in and out of it, detecting factors that display promise and putting them to work, exploiting them as they become available, accepting the situation when they are not. Each situation has a potential which can be harvested: the 'aim' of Western styles of thought is dispersed and replaced by something much more diffuse and silent which is never completed but forms part of an endless tactical adjustment. This is the logic of *propensity* rather than purpose and it seems to me to fit this strand of Tarde's work much more exactly. The idea is to conform to propensity and support it, not to guide but to 'second': as Laozi puts it, to 'help what comes of its own doing'. This is not, it needs to be stressed, either non-action or passivity. Rather, it is the work of aiding and abetting certain aspects of continual transformation, strategically bending process so that it 'ripens' in certain directions rather than others (Jullien, 2009).

3. Capitalism tracks Tarde

The preceding section has been a report back from the academic world. But what is interesting is how these developments are being replicated in the world of business and economics, sometimes using exactly the same inspirations for fuel. Let us examine some of the developments aimed at maximising 'mindshare' by inducing particular habits of buying, but with one caveat. These

developments are at an early stage. They usually come laden with hyperbole in the manner of many management books. But that is no reason to believe that they can therefore have no grip. Behind the hyperbole, a series of practical experiments continue to allow this kind of thinking to inch forward and to begin to produce prescriptions that work, not least, of course, because they begin to change how the world is thought to turn up – through a combination of rhetoric, new technologies and practical shortcuts – all against a background of a capitalism which is increasingly rooted in the exercise of biopower and of populations through which discourses circulate which are increasingly medicalised, partly as a result of capitalism's 'biologisation' (Esposito, 2008). Indeed, in *Economic Psychology*, Tarde can be seen as prophesying their arrival when he argues that:

The tendency to mathematize economic science and the tendency to psychologise it, far from being irreconcilable, ought rather, in my view, to support each other. In a statistics, reformed and better understood – in a statistics penetrated by interpsychological spirit, I see a possible and even an easy conciliation of these two apparently divergent tendencies (Tarde, 1902/2007; cited in Hughes, 1961: 558).

Three developments are producing what might be termed a 'capitalist meteorology', an atmospheric dependent upon unpacking what might be called the simple mechanics of sociality, a mechanics which operates at the intersection between the biological and the cultural, understanding that the basic building blocks of sociality are genetically encoded and neurally etched (for example, certain facial expressions formative of strong emotions do seem to be genetically inbuilt) but that these building blocks are still open to all kinds of operation. Primed by all the work on social networks in business throughout the 1990s and into the early 2000s, by the work on 'sensory brands' and allied work on brands as emotional touchstones in the 2000s, as well as all the work on redefining work both to make it more satisfying and to harness the potential of the whole of the body which dates from at least the 1950s but has undergone a renaissance in recent years, this variant of capitalism has now turned to cognitive science in particular, and biology in general, for further inspiration with the firm intent of producing what Lindstrom (2008: 6), with tongue only partially in cheek, calls 'buy-ology' – 'the key to truly and completely understanding the thoughts, feelings, motivations, needs, and desires of consumers, of all of us'. And this is not an insignificant problem for business – after all, eight out of ten products launched in the United States fail, even more in countries like Japan. Put another way, business is intent on the construction of gloriometers.

The first of these developments is the rise of what might be termed neuromarketing. Here the intention is clearly to sell more goods by using the latest techniques and technologies of cognitive science. Focus groups, surveys, and the like, are replaced by experimental techniques from cognitive science such as functional magnetic resonance imaging (fMRI), functional diffuse optical tomography, and magneto-encephalography (MEG) in order to trace out correlations between brain activity and propensity to buy (Shermer, 2008). Notwithstanding caveats and cautions (see Zaltman, 2008), and (brief) moments of ethical awareness, many of them occasioned by unexpected encounters with medical ethics, the aim is clear: to 'unlock the innermost secrets of the consumer's mind' (Economist, 2008: 109) and this development has already led to the use of 'decoy items' and other means of making the consumer happier in stores and therefore more likely to make a purchase. Although in its infancy, the literature on reading (and, more to the point, re-engineering) the mind of the market has produced some interesting results: for example; fragrance and sound produce more powerful reactions than brand logos and

brands associated with fragrance and sound can produce very powerful reactions, strong brand icons code for the selfsame areas of the brain as religious experience, brands must play an integral part in the narratives of television programmes, that is they are only effective if a credible part of the world is being conjured up, images associated with cigarette brands may produce more craving than the brands themselves, many anti-cigarette warnings actually seem to stimulate smoking, objects like i-pods can be designed to simulate mimetic rays, smiling faces really do sell goods, subliminal advertising does work, the most effective advertising tries to initiate small social rituals, and so on (Lindstrom, 2008; Shermer, 2008; Zaltman, 2008). The trick has now become to understand how specific neural and endocrine agents interact, for example, how mirror neurons and dopamine (one of the most addictive brain chemicals) affect self-perception and socially held emotions, and, in turn, produce greater susceptibility. The talk is not just of sensory branding but of worlding. The intent is, by means of selection and integration, to operate in the semiconscious domain. The goal is profit.

The second development is the study of imitation, particularly through technologies that recognise faces and gestures. Using image recognition software, the study of footage from cameras can be analyzed in order to track the unconscious emotional reactions of consumers. Cues from the face and gesture are becoming much more easily read for 'honest signals' that facilitate this tracking. I have already considered the face in other papers (Thrift, 2007). Here I will look at gesture and body movement cues more generally. Consistency is increasing all the time in the analysis of gesture and body movement: 'we need to look for signals that are processed unconsciously, or that are otherwise uncontrollable, before we can count them as honest' (Pentland, 2008: 4). Historically akin to the physiognomic systems of the eighteenth century, these shortcut signals are usually counted as of four kinds, each of which corresponds to a distinct brain function: *influence*, the degree of influence one person has over another, usually measured by the extent to which one person's speech or bodily activity pattern becomes entrained to the other's (attention and ordering systems); *mimicry*, the extent to which one person copies another during an interaction, measured by, for example, nodding heads (cortical mirror neurons); *activity*, where increased activity is usually a sign of interest and excitement, measured by activity levels (autonomic nervous system), and; *consistency* of emphasis and timing, where many different thoughts and emotions usually leads to movements becoming jerky and uneven, as measured by bodily movement (integration of action sequence control). Tiny temporal and spatial differences, which are now measurable, can predict and influence future behaviour.²² For example, imitation of an agent very often leads to feelings of trust which means that the agent is likely to imitate them in a loop of 'self-inflicted brainwashing' which many businesses are feeling more and more confident that they can set up. These effects can be extraordinarily simple: 'when experimenters ask people to move their heads up and down while listening to a sales pitch or seeing a consumer product, the people end up liking the pitch or product more, and they are more likely to buy it' (Pentland, 2008: 41).

The third development is the greater and greater understanding of hormonal swashes and how to influence them through the media. This dimension is probably the most advanced in that it has been a dream of business at least since the 1950s. The intent is clear – to identify susceptible populations and to render them open

to suggestion. That involves a series of techniques which allow the susceptibility of populations to be described and worked upon. To begin with, contemporary information technology allows populations to be gathered up and monitored in ways heretofore impossible, for example, through emotional stance, with the result that it increasingly becomes possible to track mimetic rays. The rise of analytics premised on the mining of very large and continuously updated data sets allows 'prediction competition' to become general (Ayres, 2008; Davenport and Harris, 2008). Then, through the internet and various mobile technologies, it becomes possible to rapidly feed information and recommendations to these populations, producing a means of trading on those susceptibilities that have been identified. Finally, it also becomes possible to enter in to something like an individualized dialogue with members of these populations, so that they feedback their reactions, both producing more information on their susceptibilities, and new triggers. In extremis, they may well produce their own new and innovative variants which can themselves become the basis of new business. In other words, an era of permanent survey of populations replaces the fractured surveys of 'samples' that used to be king (Savage and Burrows, 2007), survey which is active, able to initiate, modulate, even pre-empt.

These kinds of developments in the wild go hand-in-hand with developments in the academic world. Indeed, the links seem to have become ever closer. Consider first the case of sociology and the career of Duncan Watts, a quantitative sociologist of networks at Columbia University who became well-known through his book, *Six Degrees. The Science of the Connected Age*. Several degrees removed, Watts's work on social influence and contagion bears some relation to Tarde's work and it has been influential in business as well as academe. Indeed, in 2007, Watts moved to Yahoo as a Principal Research Scientist, working on the determinants of success in cultural markets.²³ Then take the related case of Marc Davis, a UC Berkeley computer scientist-cum-literary theorist who since 2006 has also worked for Yahoo. His brief has been to design networks that use mobile media metadata to achieve breakthroughs in context-aware face and place recognition, so producing maps which are simultaneously social networks in that they represent where, when, and by whom data are created, shared, and recombined (Davis, 2008).

But, not surprisingly, it is economics that has become the best barometer of interchange. Thus, the rise of behavioural economics – the marriage of economics with the procedures of experimental psychology – since the 1990s and before has been meteoric and threatens to convert economics into a 'romantic economics' (Bronk, 2009: 297) which insists that only by employing 'many (more or less) systematic forms of analysis ... can we hope to capture the multivalence of socio-economic reality'. Behavioural economics has spent a considerable portion of its effort in understanding so-called 'exotic preferences', influences on behaviour like emotions which simultaneously expand what it means to choose and the determinants of choice (Loewenstein, 2007). In turn the rise of behavioural economics has primed the ground for the ascent of neuro-economics: 'the biological science of making choices' (Politzer, 2008: 3). Neuroeconomics holds out the prospect of using knowledge of the brain to rework microeconomic theory, and it recognises the full range of human abilities and constraints in this domain, including feelings. This field has already reached a second generation of research, one in which much more sophisticated experimental techniques (single neuron recordings, functional magnetic resonance imaging, magneto-encephalography, evoked

²² Pentland (2008) claims that about 40 per cent of variation in behaviour can be predicted by social signalling, regardless of what words are used or the array of personal attributes.

²³ I am indebted to David Stark for this example.

signals in the electroencephalogram, positron emission tomography, measures of biochemical metabolites, etc.) are combined with more sophisticated models and experimental procedures which can interrogate many different kinds of populations. Of course, it would be foolish to say that, as yet, neuroeconomics constitutes a coherent body of knowledge, not least because of the sheer heterogeneity of subjects, models, definitions, measures and tasks to be found in the literature and the undoubted difficulty of matching specific neural circuits to particular neuroeconomic parameters. Equally, there is no such thing as a neuroepidemiology of decision-making which searches out different kinds of efficacy. And the study of non-monetary outcomes, especially those that stimulate strong feelings, is still in its infancy. All that said, it is also clear that such a field will gradually come into existence as neural and economic correlations and explanations move together and are shown to be, at the very least, plausible. This plausibility will only be spurred on by neuroeconomics' performativity, which is now becoming considerable (Mackenzie, 2008), as part of a more general move in economics towards intervention in the design of markets and institutions which might be thought of as 'economic engineering' (Guala, 2007). This performativity takes two forms. First, it produces a set of experimental sites – laboratories if you like – in which the new can be simultaneously born and demonstrated: fMRI imaging suites, for example. This experimental moment is important in its own right, not least because it can be seen as heralding a much wider turn in the protocols of the human sciences in data-rich environments as well as intersecting with a cultural inflection which is closer to the notion of propensity found in non-Western cultures (Lash, 2009). Second, it produces new rhetorics which are gradually convincing more and more actors and institutions. In this case, neuroeconomics is a sign of new norms shaping economic action, norms which are remaking the world in their image. The formal institutions and procedures of economics interact with economics in the wild to produce a new landscape, one which, if anything, is becoming closer to Tarde's vision, not farther away (Callon, 2007).

4. Reworking Tarde

Given these thoughts on the ways in which capitalism is increasingly concerned with the engineering of propensity, what avenues might we follow that both extend and enrich Tarde's view of a universe of imitative currents and also produce formats for enquiry that counter the brutally instrumentalist view that underlies developments like neuromarketing? I want to suggest three of these related avenues of enquiry, all of them related to the spaces produced by more and more sophisticated processes of worlding. They can be called worlds, doors and stages.

4.1. Worlds

The first avenue is the purposeful construction of a meteorological 'flock and flow' (McCracken, 2006) economy of imitative rays. Such an economy requires considerable technical infrastructure, whether the flows be of financial concerns or consumer enthusiasms. Until recently, this infrastructure was seen as mere technical mediation. But it is becoming clear that something much more thoroughgoing is occurring. That is the creation of so-called neurophenomenological worlds through a combination of phenomenology, experimental brain science, new forms of data (including knowledges of spatial disposition) and new kinds of mathematical symbolisms (most notably those born out of systems theory and algorithmic structures more generally) (see Petitot et al., 1999; Gallagher and Zahavi, 2008). These worlds are exactly designed to chime with the findings of cognitive science but against

a phenomenological backdrop. Using the new internet and locative technologies that have become available, and associated practical and theoretical knowledges of disposition which have accumulated and become more systematic over time, a science of 'placing' is therefore coming into existence. This science mixes the virtual and physical such that it becomes possible to create something like the all-at-onceness of phenomenological worlds on a temporary basis in something like a predictable way.

Neurophenomenology has arisen out of developments in phenomenology which are instructive, both as new sources of knowledge and as keys to the kinds of ambitions that are now unfolding which involve a showdown with both metaphysical, absolute realism and the naïve objectivism of scientism, a showdown which is a means of making it possible to 'buy realism'; 'not an illustrative realism, but a realism that comes about through a real invention of a new way to lock reality into something completely arbitrary' (Bacon in Sylvester, 1987: 179). Gallagher and Zahavi (2008) point to three of the developments which make a this-worldly stance possible. First, there is a general interest in phenomenal consciousness, based in a coalition of psychologists and philosophers. Second, there is the advent of embodied approaches to cognition, drawing especially on the work of Merleau-Ponty but also making obeisance to the work of writers like Varela, Clark, and Dreyfus. Third, there is the rise of neuroscience and the experimental technologies that typify it. The point is this. To the extent that phenomenology was ever introspectionist, under the spell of cognitive science it has now gone out into the world and has become something closer to a technology as it has become 'more problem-oriented' (Gallagher and Zahavi, 2008: 220).²⁴ Famously, phenomenology was the science of the way things are experienced as an 'all-at-onceness' and we might see the general aim of this new technology as to intervene in experience, not just by adding in or altering elements (what might be called the product placement strategy) but actually by changing how people experience the world, that is the very sensory and perceptual pathways on which they rely (the so-called front-loading strategy). That means intervening at a whole set of levels at once. It means intervening in the intentionality of experience (to use the key phenomenological term first deployed by Brentano), the about or of something that all experiences conform to, by understanding which objects are related to and why. It means intervening in temporal structure, and especially in structures of anticipation, most especially through premediation. It means cultivating the ability to change what is focussed on by intervening directly in perception, especially by considering proprioception. It means understanding the phenomenal state of the perceiver, through imitative mindreading apparatuses, which have now received all manner of prosthetic extension. And so on.

Our knowledge of each of these elements of propensity has become more acute. Premediation has already been discussed elsewhere in the paper. It is now a major industry. Understanding proprioception has equally become a major industry. Fuelled by the dictates of security, reading 'honest signals' has equally become a substantial industry, whether that reading takes the form of facial recognition, detection of gesture, or all the other ways in which influence, imitation, activity, and consistency can be picked up, analyzed and worked with. Then, mindreading has become easier, partly because of the previous developments and partly because of the sheer amount of reflexivity that now exists. All kinds of

²⁴ We should not go too far. As Gallagher and Zahavi (2008) (p. 221) also argue 'although it might be argued that phenomenology should pay attention to empirical findings, this doesn't entail that it should accept the (metaphysical and epistemological) interpretation that science gives of these findings'.

feedback have become possible which, in turn, make it easier: to not only read but also produce such features as structures of anticipation; to not only seek out but also produce like minds; to not only understand (at least in a preliminary way) the work of mirroring but also to engage in it.

But the phenomenological take also needs to be extended out from the lived body to what might be called non-organic life. The creation of worlds also requires material substrates which act as more than context, both because they have their own independent existence and force and because they too exist in time and continually change their nature. Developments in information technology, materials, and algorithmic thinking are allowing these active substrates to come into existence, both producing and allowing calls to be heard. For example, whereas once there was brainstorming and bodystorming, now there is place storming using methods like charettes and iterative engineering, aligned to extreme programming, that encourages the amalgamation of humans and materials so as to produce different prospects (Ladly and Beesley, 2008; Thrift, 2009).

4.2. Doors

The second avenue consists of the way in which new kinds of door can be opened to mimetic flows. To consider this topic, I want to turn first to an unlikely source of inspiration: the life and poetry of Emily Dickinson. Dickinson wanted to control the space around her in an almost obsessive fashion. The world becomes a compartmentalized and consecrated domestic dwelling, a geography of interiority, in which she could reign; 'the more limited the space, the more unlimited the speaker' (Fuss, 2004: 59). In her life, the domestic interior became a means of producing distance through a kind of enforced intimacy/not-intimacy of 'meeting apart' and of 'exposed hiding' (Fuss, 2004). And to this careful isolation the door was key; open, closed or ajar the door produced a carefully choreographed dynamic of intimacy that Dickinson felt able to manipulate and control. Often, she would insist on speaking or playing music behind a door held open a few inches. Equally, as a motif, the door produced an enormous symbolic range in her poetry – of loss and gain, of absence and presence, of separation and connection, even of life and death.

Famously, Georg Simmel, the sociologist who is perhaps closest to Tarde, also fixed on the door as a key to understanding the particular kinds of finiteness of space in the construction of a more general account of what Kemple (2007: 2, 1) calls 'allosociality'; 'the full spectrum of forms of collecting both human and non-human beings' which 'is not reducible to either social interactions of opposition and duality (*hetero*), nor is it resolvable in relations of symmetry and sameness (*homo*) or modes of reflexivity and self-hood (*auto*) among human subjects'. Simmel argued that the door is always superior to the deadened geometric form of the wall; 'the door is the line of demarcation where the limited and the limitless meet, but not in the dead geometrical form of merely a partition wall, but rather as the permanent possibility of continuous alteration' (Simmel, 1909/1994: 410).²⁵ Whereas the wall is mute, the door can speak. 'Moreover, a door more successfully transcends the divide between the inner and the outer; a door is where the finite borders on the infinite; a door marks the plane where separation and connection come together, but still remain apart' (Fuss, 2004: 43). The door functions on several levels, therefore. In everyday life, it acts as a threshold for negotiating intimacy and anonymity, as

a material boundary between the public and the private, and as a general feature of Dickinson's lovingly cultivated domestic space. But it can also have much wider resonances, for example, as a device for marking asymmetries of power, as a means of controlling movement, as a way of separating out the non-human from the human. The point is this. Doors are not barriers. They are a potent means of both controlling flow and defining our natures since they constitute 'a link between the space of the human and everything which is outside of it' (Simmel, 1909/1994: 409). They mean that no bounded parcel of space can ever be accorded just one meaning.

So far as this paper is concerned, therefore, doors provide a way of thinking about how imitative flow can be channelled and regulated, overcoming or resisting the inertia of its own dynamics. Doors exist at all levels and rather than act to halt imitative flow (though they can do that) they continuously alter – modulate – it by acting, as in Simmel's work, as means of constructing relations through separations.

The prevailing model of sentiment in business is increasingly one in which the idea is to use doors in three ways, each of which deploys the simultaneous separation and closeness of the door in order to construct relationships with the consumer; as a means of producing exactly the enclosed domestic and other spaces in which certain sentiments can reign by designing objects and spaces which resonate in the 'heart' by linking form and feeling (e.g. Crawford, 2005), as a means of producing allegiance by offering differential access to privileged information, only allowing selected people through the door, and as a means of producing sentimental journeys in which business is the guide and can charge a toll for each stage (Thrift, 2009).

4.3. Stages

The third avenue is related too: the engineering of active spaces. These spaces do not act as bounded worlds in the old style. Of course, these kinds of bounded spaces will continue to persist, becoming more spectacular as a result of the development of new technologies – new materials, new forms of lighting, new information technologies, and so on (Thrift, 2007). But even these spaces are being injected with all kinds of means of calling to selected demographics so that they provide worlds in parallel, so to speak.

That said, these species of space can never act as anything other than grand statements, italicizing everyday life. Active spaces start from a different premise: they are a means of harnessing and working with process in order to produce particular propensities: this continuous activity of strategic intervention might be called *worlding*, with the emphasis on the 'ing' (Thrift, 2009). Recall the work of Jullien on classical China. There the intention was not to control. It was to look for the most advantageous conditions and then to help them to grow in particular ways. Thus the tactics on a battlefield did not consist of producing a model plan and sticking to it. Rather, the commander might engage in watchful waiting until an opportune moment could be identified in which to intervene forcefully. Equally, victory could be achieved by gradually pushing the enemy towards the conclusion that they had lost through a host of small but effective measures.

The engineering of active spaces tries to do something similar. The intention is not, on the whole, to create fully-formed spaces, dressed to kill. Rather it is to add mediological detail into the existing everyday spaces through which we endure and are supported which makes these spaces resonate in ways which would not have otherwise occurred so that they grow in desired directions. Not the creation of discrete worlds into which participants enter, then, but a continuous process of *worlding*. At their best, these spaces will act as doors, allowing entry into new worlds by

²⁵ There are a number of translations of Simmel's famous essay, 'The bridge and the door'. I favour the translation by Kaern (1994). See also Frisby and Featherstone (1997) and Ritter (1994).

adding extra dimensions to existing spaces, so providing extra momentum, or by providing the tools, ready-to-hand, for participants to create new spaces. Such boosted spaces rely on two developments. The first is the continuing history of the development of institutions of public intimacy, which has produced both a larger canvas and a means of allowing imitative rays to spread both farther and faster. The second is what might be called the means of scattering objects and stances that are akin to 'emblem gestures', the disciplined mobilities of the body by which social life is carried through the everyday,²⁶ 'deployed to make something happen, to impinge on the behaviour of the self and others' (Rotman, 2008: 18). 'Emblem gestures signify and have meaning – better have force, affect, point – through the fact of their taking place, in the effects they help bring about, in the affectual matrices they support, in all that they induce by virtue of their occurrence as events' (Rotman, 2008: 19). The brand was an early example of emblemizing activity bypassing volition, allowing a 'gestural' object designed to be a semiotic *force* to be inserted into everyday life, where it acted as a semiotic lighthouse, changing the space that was occupied, for example by providing a different frame, in much the same way as gesture does. But we are, quite literally, moving beyond these kinds of 'impressed' hieroglyphics.

Thus, some of the recent developments I have outlined make it possible to go beyond such simple sigils, using a mix of new media technologies and enhanced calculative capacity to produce something much closer to a staged performance in which to perceive the environment is also to perceive oneself. First, time structures can be played with so as to produce new structures of anticipation. Then, proprioceptive frames can be changed so as to signal in directed ways. Last of all, the fund of numerical proxies for mindreading skills has increased so that it becomes possible to practice empathy in more forms. The net effect is clear; it becomes easier to produce influence in any interaction. Each of these developments depends both on designing signs and designing their context, the one only rarely being able to be divorced from the other. These signs are no longer based on only alphabetic codes but on a much more extensive logographic 'vocabulary' which takes in number and calculation on one side and gesture on the other and which depends upon a language of geometric calculation for sustenance (Thrift, 2009).

Let me provide an analogy. We might see such developments as akin to the evolution of theatre in the seventeenth century in its potential reach (Roach, 2007). At the time, a combination of different actors invented new forms of public space, with all their accompanying minutiae like props, which gradually produced both a new kind of authenticity and new kinds of public intimacy which allowed the production of interested publics who did not exist before. These forms of imagined space were concerned with performance but their origins as practical spatial arts can be found as much in everyday forms of geometry (in activities like surveying, navigation, mapping, engineering, building, and the like) as in acting; for example, stage practice drew from practical geometry to develop the concepts of *plat*²⁷–plot and to define the use of scenes as both spatial divisions and structures (Turner, 2006). In other words, geometry became a crucial element of poetics and theatre

itself became a centre of empirical knowledge production, a technology best compared to 'an atlas of maps, to a wonderful museum or encyclopaedia, or to the new mechanical globes that suddenly reduced the entire human world into miniature form – and which may have given the name to the Globe Theatre, where Shakespeare's own company performed as of 1599' (Turner, 2007: 4). These miniature worlds were produced by constructing genres (which included specific arrangements of space) in which the audience routinely filled in the space by using their own imagination. The audience becomes poetic artisans able to summon and control. Active spaces now take this process a stage further (if you will excuse the word play) in that they demand infill and even actual participation as a matter of course. They too depend upon geometric back-up, both to allow movement to take place and be traced and to invest the audience with new senses of space. Just as Tudor Londoners new-found ability to represent the land and buildings they owned geometrically gave them new ways of thinking about staging the imaginary and of imagining their incomprehensibly vast city, so the new geometry provides a similar prosthetic which in time becomes an innate sense of space, helped along by practical spatial arts – techniques akin to those of the old workshop – drawn from all kinds of sources – computer engineering and software writing, landscape design, computer gaming, media location experts, choreographers, and the whole gamut of contemporary geometric skills. Turner (2006: 30) calls these modular skills topographic; 'the representation of place by texts of all kinds but also by maps, diagrams, paintings or images, and even by built structures such as buildings and monuments, particularly when these are approached as "texts" with a coherent semiotic function and a communicative function'. Proto-experimental, these arts of re-staging through the linking of topography and cognition depend not upon emblematic iconicity as such but rather upon realist modes of iconic presentation in which actual space and time are being measured out and signified, allowing mental content to be held and distributed in external forms.²⁸ Enactive symbols, if you like, depending upon a distributed aesthetics. Since 'perception is always dilated, dispersed, distributed' (Stafford, 2008: 92) we can say that we are moved by what is moving.²⁹

To put this another way, the advent of these mobile spaces can be seen as permitting the form of naturalism that was Deleuze's stock-in-trade when considering space as a set of circulating refrains. But, we might see Deleuze and Guattari's transhistorical thoughts on space as only now beginning to apply in the human domain *in toto* as space moves from being constructed through circulation between static, consistent and more or less architectural sites to circulation, period. Space itself becomes vibration, vibration which acts to charm, not unlike the erotic appeal of music which, hardly coincidentally, was one of the keys to Darwin's thoughts on evolution.

Vibrations, waves, oscillations, resonances affect living bodies, not for any higher purpose but for pleasure alone. Living beings are vibratory beings: vibration is their mode of differentiation, the way they enhance and enjoy the forces of the earth itself. Music is 'charming'; that is why it survives and why it is so culturally universal (Grosz, 2008: 33).

²⁶ Gestures like 'holding up the palm, jerking the thumb, kissing one's fingertips, pointing, snorting, smacking one's forehead, squeezing a shoulder, bowing, slapping someone on the back, giving the shoulder, biting a knuckle, flourishing a fist, tapping the nose, shrugging, chuckling, beating one's breast, giving the finger, winking, and innumerable other visible, haptic, auditory, and tactile disciplined mobilities of the semiotic body' (Rotman, 2008: 17–18).

²⁷ A term used in geometry tracts and surveying manuals to describe the spatial conceit upon which the work of poetry is built which came to mean both a schematic map or diagram and the emplotment of a story or a play.

²⁸ They can be seen as resurrecting the Romantic conviction that geometry constitutes a core set of intuitions but equated with the current scientific view that, after millions of years of evolution, we have internalized certain ways of doing space and time. As Stafford (2008) points out, we seem to be heading towards a radical material monism or even a direct realism.

²⁹ Classically, motion is a key element of emotion.

Territory takes on a different function in this kind of space. Whereas it had an inside and an outside and so a passage from one to another; through 'a space that is annexed, outside, contestatory, a resource: a cohesion inside, a domain outside, doorways from one to the other and energy reserves to enable them to reconfigure or reorchestrate themselves' (Grosz, 2008: 47), this space is more about going through doors than it is about boundaries. Territory becomes a fundamentally constructive orchestration of tonality.

We might see this orchestration as the next stage of the spatial evolution of the attempt to 'visibilize the compressive structure of attentive thought' (Stafford, 2008: 24)³⁰ in that what becomes clear is that it is now possible to produce a mobile tapestry which acts as a permanent prosthetic to thinking, just as the denizens of the Neolithic transformed the world when fixed sites were first installed in human history as not just stopping places but productive nodes, so allowing human and natural resources to be rearranged in a very substantial way. But instead of being based around the discovery of writing and other graphic forms of mediated memory–communication which transformed thought, this stage will be based on the manipulation of mediated iconographic images, so as to act directly on sensations, affects and intensities (Thrift, 2009). We will feel knowledge through dynamic shapes. In other words, the dominant model will be art (Grosz, 2008), and the aim will be to produce pleasurable and intensifying qualities that can be both partaken of and passed on. But this is an art that is becoming a science: art no longer imitates life, rather it creates it. There are many ways of achieving an art–science, of course,³¹ but perhaps the model of such an art form that we are coming closest to is that of Francis Bacon, an art which Deleuze (2005) describes as 'figural' because it relies on the visceral force of painting but contained in a part rather than the whole of the painted field;

the figural is, for Deleuze, the end of figuration, the abandonment of art as representation, signification, narrative, though it involves the retention of the body, planes, and colors, which it extracts from the figurative. The figural is the deformation of the sensational and the submission of the figurative to sensation. It is the development of art as an 'analogical language', a non-representational language of colors, forms, bodily shapes, screams' (Grosz, 2008: 88).

Bacon yearned for a future in which brute reality directly impacted on the nervous system through the re-invention of a sensuous realism, a kind of neuroart.

As the techniques of the cinema and all forms of recording become better and better, so the painter has to be more and more inventive. He has to re-invent realism. He has to wash the realism back onto the nervous system by his invention, because there isn't such a thing in painting any longer as natural realism. But does one know why very often, or nearly always, the accidental images are the most real? Perhaps they've not been tampered with by the conscious brain and therefore come across in a much more real sense than something that has been tampered with by consciousness (Bacon in Sylvester, 1987: 177–178).

Now that future of an alternative realism appealing directly to sensation and perception is starting to come into being. 'Presence,

presence ... this is the first word that comes to mind in front of one of Bacon's paintings' (Deleuze, 2005: 36) and it is the first word that should come to mind in understanding the changes that are now taking place as art becomes science. What if presence can be re-engineered? Certainly, that is what is being attempted. Indeed it might be seen as the construction of a giant temporal shortcut. For all their comparative speed, neural and genetic changes still take time to impact the body but now, courtesy of new technological practices which are driven by the logic of propensity and make appeals directly to particular biological territories, simulations of their work can come into existence all but immediately as sensations and perceptions.³² Animal spirits indeed.

5. Conclusions

I have tried to show how the potential for a new kind of political economy of propensity is coming into being, one that is inspired by the spirit of Tarde but that also goes beyond his work. That potential arises from three sources. To begin with, as we saw in the first part of the paper, developments in science allow us to gain a greater analytic hold on the way in which imitative rays can spread out and gain traction. Second, and in turn, these developments are being tracked in the wild by capitalism itself and are gradually being threaded into its very fabric through a combination of rhetoric, experiment and intuition. Third, these developments suggest ways in which it might be possible to add to Tarde's work in productive ways. I concentrated on three of these, namely, the industrial engineering of phenomenology, the design of doors, and the production of active spaces out of a 'cinematic mathematics'.

It may be that we are groping towards a different vision of political economy, one which has a biocultural foundation, one in which animal spirits can be identified and tamed, and one in which the engineering of propensity can then become a guiding principle. I can at least begin to see its outlines of this political economy, still some way off in the fog but becoming clearer with each and every step ...

Acknowledgements

I would like to thank Mick Smith, Joyce Davidson, Arun Saldanha and John Urry for their careful readings of the paper. Equally, audiences at Goldsmiths and the Academy of Management in London provided me with very helpful comment and criticism.

References

- Agamben, G., 2007. *Il Potere e la Gloria*. Neri Pozza, Vicenza.
- Akerlof, G.A., Shiller, R.J., 2009. *Animal Spirits. How Human Psychology Drives the Economy and Why it Matters for Global Capitalism*. Princeton University Press, Princeton.
- Ayres, I., 2008. *Number Crunchers. How Anything can be Predicted*. John Murray, London.
- Bayart, J.F., 2007. *Political Subjects. A Critique of Globalization*. Polity Press, Cambridge.
- Bearman, P. (Ed.), 2008. Special Issue on Exploring Genetics and Social Structure. *American Journal of Sociology*, vol. 114 Supplement.
- Brecht, B., 1976. 'New Age' in *Poems: 1913–1956*. Methuen, New York.
- Britt, R., 2009. *At Rest, Your Brain Runs in Saver Mode*. LiveScience.com.
- Bronk, R., 2009. *The Romantic Economist. Imagination in Economics*. Cambridge University Press, Cambridge.
- Brook, T., 2008. *Vermeer's Hat. The Seventeenth Century and the Dawn of the Modern World*. Profile Books, London.
- Callon, M., 2007. What does it mean to say that economics is performative? In: Mackenzie, D., Muniesa, F., Siu, L. (Eds.), *Do Economists Make Markets? On the Performativity of Economics*. Princeton University Press, Princeton, pp. 311–357.

³⁰ The brilliant science fiction novel by Watts (2006) tracks many of these changes.

³¹ After all, Western art has always been replete with technologies (think only of the perspectival grids and optics used in the Renaissance and thereafter) and with discourses on the science of art (think only of the Impressionists linkage of the science of color with painting (Schaefer et al., 2008)).

³² A good analogy here is with the growing amount of work in neuroarthistory (see Zeki, 1999; Onians, 2007).

- Coates, J.M., Herbert, J., 2008. Endogenous steroids and financial risk taking on a London trading floor. *Proceedings of the National Academy of Sciences of the United States of America* 105, 6167–6172.
- Crawford, I., 2005. *Home Is Where the Heart Is*. Quadrille, London.
- Dale, R.S., 2004. *The First Crash. Lessons from the South Sea Bubble*. Princeton University Press, Princeton.
- Davenport, T., Harris, J.C., 2008. *Competing on Analytics. The New Science of Winning*. Harvard Business School Press, Boston.
- Davies, B., 2002. *Aquinas*. Continuum, London.
- Davis, M., 2008. Context, content, and community. Inventing the future of mobile media. In: Ladly, M., Beesley, P. (Eds.), *Mobile Nation*. Riverside Architectural Press, Toronto, pp. 125–131.
- Deleuze, G., 1994. *Difference and Repetition*. Athlone Press, London.
- Deleuze, G., 2005. *Francis Bacon: The Logic of Sensation*. Continuum, London.
- Economist, 2008. The way the brain buys. *The Economist*, 109–111.
- Espósito, R., 2008. *Bios: Biopolitics and Philosophy*, trans. T. Campbell. University of Minnesota Press, Minneapolis, MN.
- Evernden, N., 1993. *The Natural Alien, Humankind and Environment*, second ed. University of Toronto Press, Toronto.
- Freese, J., 2008. Genetics and the social science explanation of individual outcomes. *American Journal of Sociology* 114, S1–S35.
- Frisby, D., Featherstone, M. (Eds.), (1997) *Simmel on Culture*. Sage, London; Thousand Oaks, CA.
- Fuss, D., 2004. *The Sense of an Interior. Four Writers and the Rooms that Shaped Them*. Routledge, New York.
- Gallagher, S., Zahavi, D., 2008. *The Phenomenological Mind. An Introduction to Philosophy of Mind and Cognitive Science*. Routledge, London.
- Gamble, C., 2007. *Origins and Revolutions. Human Identity in Earliest Prehistory*. Cambridge University Press, Cambridge.
- Grosz, E., 2008. *Chaos, Territory, Art. Deleuze and the Framing of the Earth*. Columbia University Press, New York.
- Guala, F., 2007. How to do things with experimental economics. In: Mackenzie, D., Muniesa, F., Siu, L. (Eds.), *Do Economists Make Markets? On the Performativity of Economics*. Princeton University Press, Princeton, pp. 128–162.
- Hobson, J.A., 2002. *Dreaming. An Introduction to the Science of Sleep*. Oxford University Press, Oxford.
- Hobson, J.A., 2007. Wake up or Dream On? Six Questions for Turnbull and Solms. *Cortex* 43(8), 1116–1121.
- Hodgson, G., 2006. *Economics in the Shadows of Darwin and Marx. Essays on Institutional and Evolutionary Themes*. Edward Elgar, London.
- Horne, J., 2006. *Sleepfaring. A Journey through the Science of Sleep*. Oxford University Press, Oxford.
- Hughes, E., 1961. Tarde's *Psychologie Economique*: an unknown classic by a forgotten sociologist. *American Journal of Sociology* 66, 553–559.
- Iacoboni, M., 2008. *Mirroring People*. Farrar, Straus and Giroux, New York.
- Jablonka, E., Lamb, M.J., 2005. *Evolution in Four Dimensions. Genetic, Epigenetic, Behavioural and Symbolic Variation in the History of Life*. Harvard University Press, Cambridge, Massachusetts.
- Jahoda, G., 2002. The ghosts in the meme machine. *History of the Human Sciences* 15, 55–68.
- Jullien, F., 2009. *Efficacy*. Sage, London.
- Kaern, M., 1994. Georg Simmel's the bridge and the door. *Qualitative Sociology* 17, 397–413.
- Kellaway, L., 2009. At last I have fallen into the recession's web of fear. *Financial Times*, 12.
- Kemple, T., 2007. Bridges and the doors to Simmel's social theory of the limit. *Theory, Culture and Society* 24, 1–19.
- Korf, B., 2008. A neural turn? On the ontology of the geographical subject. *Environment and Planning A* 40, 715–732.
- Ladly, M., Beesley, P. (Eds.), 2008. *Mobile Nation*. Riverside Architectural Press, Toronto.
- Lakoff, G., 2008. *The Political Mind. Why You Can't Understand 21st-Century American Politics with an 18th-Century Brain*. Viking, New York.
- Lash, S., 2009. Afterword: In Praise of the *A Posteriori*. *European Journal of Social Theory* 12(1), 175–187.
- Lee, N., 2008. Awake, asleep, adult, child: an a-humanist account of persons. *Body and Society* 14, 57–74.
- Linden, D.J., 2007. *The Accidental Mind. How Brain Evolution has given us Love, Memory, Dreams, and God*. Harvard University Press, Cambridge, Massachusetts.
- Lindstrom, M., 2008. *Buy-ology. How Everything We Believe About Why We Buy is Wrong*. Random House, London.
- Loewenstein, G., 2007. *Exotic Preferences. Behavioral Economics and Human Motivation*. Oxford University Press, Oxford.
- Luhmann, N., 1998. *Observations on Modernity*. Stanford University Press, Stanford.
- Mackenzie, D., 2008. *Material Markets*. Oxford University Press, New York, NY.
- Malmendier, U., Nagel, S., 2009. Depression babies: do macroeconomic experiences affect risk-taking? National Bureau of Economic Research, NBER Working Paper 14813 [Online] Available at: <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1369049>. Last accessed 30 April 2009.
- Maturana, H., Varela, F., 1973/1980. *Autopoiesis and Cognition: The Realization of the Living*. D. Reidel, Dordrecht.
- Marazzi, C., 2008. *Capital and Language. From the New Economy to the War Economy*. Semiotext(e), New York.
- McCracken, G.D., 2006. *Flock and Flow: Predicting and Managing Chance in a Dynamic Marketplace*. Indiana University Press, Bloomington, IN.
- Metzinger, T., 2003. *Being No One. The Self-Model Theory of Subjectivity*. MIT Press, Cambridge, MA.
- Monro, M., Smith, S.J., 2008. Calculated affection? Charting the complex economy of home purchase. *Housing Studies* 23, 1–19.
- Onians, J., 2007. *Neuroarthistory. From Aristotle and Pliny to Baxandall and Zeki*. Yale University Press, New Haven, CT.
- Pentland, A., 2008. *Honest Signals. How they Shape Our World*. MIT Press, Cambridge, Massachusetts.
- Petitot, J., Varela, F., Pachoud, B., Roy, J.M. (Eds.), 1999. *Naturalizing Phenomenology*. Stanford University Press, Stanford.
- Phelan, B., 2008. How we evolve. *Seed*, 66–73.
- Politzer, P., 2008. *Neuroeconomics. A Guide to the New Science of Making Choices*. Oxford University Press, Oxford.
- Ravaisson, F., 1838/2008. *Of Habit*. Continuum, London.
- Renfrew, C., 2008. *Prehistory. The Making of the Human Mind*. Phoenix, London.
- Ritter, M., trans. (1994) Georg Simmel 'Bridge and Door', *Theory, Culture & Society* 11, 5–10.
- Rizzolatti, G., Sinigaglia, C., 2008. *Mirrors in the Brain. How Our Minds Share Actions and Emotions*. Oxford University Press, Oxford.
- Roach, J., 2007. *It*. University of Michigan Press, Ann Arbor.
- Rotman, B., 2008. *Becoming Beside Ourselves. The Alphabet, Ghosts, and Distributed Human Being*. Duke University Press, Durham, NC.
- Savage, M., Burrows, R., 2007. The coming crisis of empirical sociology. *Sociology* 41(5), 885–899.
- Schaefer, I., Saint-George, C., Lewerentz, K. (Eds.), 2008. *Painting Light. The Hidden Techniques of the Impressionists*. Skira, Milan.
- Shermer, M., 2008. *The Mind of the Market. How Biology and Psychology Shape Our Lives*. Holt, New York.
- Smail, D.L., 2008. *On Deep History and the Brain*. University of California Press, Berkeley.
- Smith, S.J., Monro, M., Christie, H., 2006. Performing housing markets. *Urban Studies* 43, 81–98.
- Stafford, B.M., 2008. *Echo Objects. The Cognitive Work of Images*. University of Chicago Press, Chicago.
- Stephens, A., Diaz Roux, A.V., 2009. Happiness, health, and social networks. Psychosocial determinants of health may transfer through social connections. *British Medical Journal* 338, 1–2.
- Sylvester, D., 1987. *The Brutality of Fact. Interviews with Francis Bacon*. Thames and Hudson, London.
- Tallis, R., 2008. *The Kingdom of Infinite Space. A Fantastical Journey Around Your Head*. Atlantic, London.
- Tarde, G., 1902/2007. *Economic psychology*. *Economy and Society* 36, 614–643.
- Thrift, N.J., 2007. *Non-Representational Theory. Space/Politics/Affect*. Routledge, London.
- Thrift, N.J., 2009. Different atmospheres. Of Sloterdijk, China, and site. *Environment and Planning D: Society and Space* 27, 119–138.
- Thrift, N., Barry, A., 2007. Gabriel Tarde: imitation, invention, and economy. *Economy and Society* 36, 509–525.
- Tresch, J., 2007. *Technological world pictures. Cosmic things and cosmograms*. *Isis* 98, 84–99.
- Turner, H., 2006. *The English Renaissance Stage. Geometry, Poetics, and the Practical Spatial Arts, 1580–1630*. Oxford University Press, Oxford.
- Turner, H., 2006. *Shakespeare's Double Helix*. Continuum, London.
- Turner, S., 2007. Social theory as a cognitive neuroscience. *European Journal of Social Theory* 10, 357–374.
- Valsiner, J., van der Veer, R., 2000. *The Social Mind. Construction of an Idea*. Cambridge University Press, Cambridge.
- Watts, P., 2006. *Blindsight*. Tor, New York.
- Wolf, M., 2009. *Fixing Global Finance. How to Curb Global Financial Crises in the 21st Century*. Yale University Press, New Haven, CT.
- Zaltman, G., 2008. *How Customers Think. Essential Insights into the Mind of the Market*. Harvard Business School Press, Boston.
- Zeki, S., 1999. *Inner Vision. An Exploration of Art and the Brain*. Oxford University Press, Oxford.