

Reflexive Modernization Temporalized

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IN THIS article I explore to what extent reflexive modernization makes sense from the vantage point of time-literate social theory and in what way the synergy of the two theories (i.e. temporalized reflexive modernization and time theory with the reflexive elements made explicit) could facilitate improved knowledge for deliberative change.¹ Towards this end I draw out those aspects of the theory of reflexive modernization that best allow me to show the connections and mutual benefits, leaving unattended those elements that would sidetrack from this endeavour. Of particular interest to this exploration are the relation between continuity and discontinuity, the idea of irresponsibility as a structural, endemic feature of industrial society and the theory of reflexive modernization's emphasis on (a) naturalization and taken-for-granted assumptions and (b) the separation of culture from nature.

To demonstrate the affinity between the two theories, I discuss industrial modernity with reference to its social relations, structures and institutions of time. I make explicit its temporal underpinnings with respect to five Cs: the creation of time to human design (C1), the commodification of time (C2), the compression of time (C3), the control of time (C4) and the colonization of time (C5). While today the five Cs are mutually implicating and supporting, historically, I want to suggest, they stand in a particular relation to each other. I propose the creation of time to human design to be the base upon which the other temporal developments are built. By identifying the stresses and strains of the cumulative logic of industrial time, and by considering some of the implications of a logic that has reached its limits, I show reflexive modernization in action. The issue of responsibility is of concern throughout the article.

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Dis/continuity

Reflexive modernisation means self-confrontation with the effects of risk society that cannot be dealt with and assimilated in the system of industrial society. (Beck, 1994: 6)

Ulrich Beck's theory of reflexive modernization suggests that what cannot be absorbed by the relentless pursuit of the logic of the industrial way of life creates tensions and contradictions that fold back to haunt the system as unintended consequences. Reflexive modernization recognizes that the continuity and intensification of the logic of modernity undermine their own base: discontinuity arises from continuity. This structural reflexivity means that the quest for neat distinctions between modernity and postmodernity would be a futile exercise. Through an explicit focus on the social relations and politics of time we can see reflexive modernization at work. Dis/continuity becomes palpable. We can appreciate what the theory postulates: not a new logic but the logic intensified to a point of potential self-destruction.

In addition to the continuity–discontinuity relation, Beck et al. (this issue) raise the issue of 'naturalization' and suggest that it has been a precondition for the success and effectiveness of the institutions of industrial modernity. By naturalization they mean that the structures and institutions of modernity are understood as given and unalterable. 'Simple modernization becomes reflexive modernization', they propose (p. 3 this issue), 'to the extent that it disenchant and then dissolves its own taken-for-granted premises'. Beck et al. argue further that taken-for-granted assumptions become the object of reflection and analysis at precisely the point when tried and trusted principles and structures fail, when the logic of an established system begins to implode. Reflection ensures dis/continuity.

The social time of modernization tends to be naturalized. In just the way naturalization processes are postulated in the theory of reflexive modernization, social time forms an integral part of the deep structure of taken-for-granted, unquestioned assumptions. As such it shapes not only everyday understanding but also the theories that social scientists develop to explain their world. Up until the 1990s, the explication of social time was considered to be a fringe activity of Western social science. Today this is no longer so. The interest in naturalized clock time as social time is burgeoning and a significant number of key social theorists have made it a central feature of their current work.² This rise in social science attention on a previously taken-for-granted, naturalized element of social life can thus be viewed as both an integral feature and confirmation of reflexive modernization. That is to say, social scientists ceased to treat time as a taken-for-granted parameter of their discipline and methodology at the very moment that the logic of clock time began to become dysfunctional for the socio-economic system of its creation.

The separation of culture from nature is, according to the theory of reflexive modernization, a third key feature of simple modernization. The

creation of a purely cultural time to human design, as I show below, played a key role in this process. And yet, despite this temporal separation of culture from nature through the creation of clock time, there is no before-and-after, no either-or condition. Rather, embodied time is lived and experienced alongside, despite of, and in conflict with the culturally constituted social relations of time. Our lives continue to be bounded by birth and death, growth and decay, night and day. In our daily lives we weave in and out of these different kinds of time without giving much thought to the matter. The entanglement and mutual implication of the times of nature and culture are taken for granted and disattended until, that is, the strains and stresses of the industrial temporal logic begin to produce anomalies that can no longer be contained within the boundaries of its logic. Not a choice between continuity and discontinuity but dis/continuity thus characterizes the changes in temporal relations.

Time is our window on the world. With time we create, order and shape the kind of world we live in. . . . Every culture has its unique set of temporal fingerprints. To know a people is to know the time values they live by. (Rifkin, 1987: 1)

If reflexive modernization was a new form of cultural expression then we ought to be able to trace it in the current social relations and politics of time. To ascertain dis/continuities, we would need to understand the distinctiveness of industrial time in the wider cultural context of time-transcending activities that have been a mark of cultural history.

The culturally constituted temporal relations, which did not evaporate with industrialization but were altered in their expression and continue to be transformed through the reflexive processes of modernization, are rooted in the engagement with the times of the body, nature and the cosmos. Throughout history, as individuals and cultures, people have established a relationship to death and finitude, to seasonality and to the cycles of night and day, change and decay. Art and writing, ritual and religion, science and exchange based on money have all served as cultural means to transcend the temporal boundaries and limits imposed by nature. Standing stones, burial chambers and temples gave material expression to the quest to extend the mortal self beyond its physical boundaries, to posit a life beyond death. While the body reminds us of the inescapability of death and the earthly dimension of being, cultural activities facilitate the belief in human distinctiveness and a distancing from all things natural.³ Products of technology are particularly pertinent expressions of the cultural effort to extend the 'natural' powers of the body by artificial means and to increase control over the temporality of the earthly condition. In the light of this history, it is not surprising that the genesis of the industrial way of life has been accompanied by an effort to put on ever firmer footings the difference between human culture and nature, mental activity and the physicality of being, artefactual time and the rhythmicity of the cosmos. As we shall see below,

industrial being is a continuation of the cultural relations of time by new means, which in turn have brought about some marked discontinuities. Rendering those relations explicit further alters those continued temporal relations.

The Enlightenment Project from a Temporal Perspective

C1 – Clock Time: The Creation of Time to Human Design

It is the control over embedded time, common to humanity, which needs to be differentiated from the control over time afforded by the creation of clock time during the early Middle Ages. The first mechanical clocks were developed in the 14th century. Large cumbersome structures, they were initially located in towers so as to be audible by the community for whom they tolled the collective daily rhythm. This time created to human design, however, had/has a number of features that are fundamentally different from the temporal processes of nature: where nature's rhythmic cycles are marked by variance, the hourly cycle of the clock is invariable and precise. Where each rhythmic return in and of nature is simultaneously a context-dependent renewal, the return of the same hour of clock time is independent from context and content. Where animals and plants have time encoded in their being/becoming, the time expressed by the clock is external to the processes it measures. This means that the kind of time that is encoded in the clock is very different from the cosmic and terrestrial times upon which it is based. Unlike the variable rhythms of nature, the invariant, precise measurement is a human invention and, in our society, it is this time created to human design that has become dominant to the extent that it is related to as time per se, as if there were no other times. Clock time has become naturalized. This re/construction of time to human design is an essential precondition to the development of industrial culture.

During the same period that clock time was emerging as an important force in the organization and regulation of socio-economic life, Italian artists developed the linear perspective, which involved parallel transformations of the pre-modern logic. It is pertinent to see the two innovations together, given that both are premised on abstraction, decontextualization, quantification and rationalization, key processes that underpin the Enlightenment project of modernization. Both revolutionized the way we see and understand our relation to the external world. Both constitute crucial turning points in the development towards the modern scientific, technological, industrial way of life. The linear perspective separated observers from their subject matters, isolated the objects of vision from their context and fragmented those objects behind a mathematical grid. By looking at the world through such a grid, the world was translated from a living temporal process into a set of fixed numerical relations.⁴ Moreover, it shifted the artist from the participatory centre to a position of external spectator, from implicated participant to objective observer. Abstraction from context, objective observation, quantification of sense data, the single fixed focus, preference for

space over time and the association of ‘the real’ with visibility are its innovative features. They are, of course, also the naturalized bedrock assumptions upon which the laws of traditional science are built. Together with the clock-work understanding of the world, this perspective today permeates industrial societies’ public knowledge worldwide. Contemporary technological developments are the materialization of its logic, a logic that has become an almost unquestioned norm, taken for granted and naturalized.

The naturalization of clock time, social scientists agree,⁵ has its roots in the numerous monasteries of medieval Europe where the first and most thorough social application of the clock-time logic had been introduced and perfected. In *The Protestant Ethic and the Spirit of Capitalism*, Max Weber (1989/1904–5) suggested that the purpose of such rationalized conduct was to overcome the natural state: the strict time discipline was to free monks from their dependence on impulses and the world of nature. Partitioning and structuring their days into segments and stretches of time trained monks objectively as workers in the service of God and thus ensured the salvation of their souls. Gradually, Weber suggests, this concern for rational action and proper time-keeping spilled over into the countryside and the market place until it became a duty, an integral part of righteous conduct. According to Weber (1989/1904–5: 119), this active self-control in the service of God, as it was practised by the monks, became the most important practical ideal of Puritanism. The doctrines and guidelines for conduct of the various forms of Puritanism prescribed methodical control over the whole person: ‘now every Christian had to be a monk all his life’ (Weber, 1989/1904–5: 121). Under Puritanism, however, the negative time discipline that prevented any ‘waste of time’ was extended to encompass a more active one of intensifying efforts (Foucault, 1977: 154). Thus, as Lewis Mumford (1955/1934: 5) suggested, ‘[t]ime-keeping passed into time serving and time accounting into time rationing. As this took place, eternity ceased gradually to serve as measure and focus of human actions.’ This engendered not just the pursuit of a disciplined and frugal use of time but the quest for maximum speed and efficiency, that is, the compression of time.

While the various institutional spheres of contemporary industrial societies may have developed different uses of clock time, the principal structure of the machine time remains common to them all. As Table 1 shows, in the realm of industrial politics, science and economics time is decontextualized, spatial, invariant, quantifiable and external. Difficulties clearly arise when the invariant measure is imposed as norm on highly context-dependent, rhythmic and variable situations and processes, when the new intersects and clashes with continuing earlier forms. Thus, for example, we know that not all children learn at the same pace. Yet, age-based classes, educational attainment targets and assessment apply the invariable norm as measure. The periodic changing of the education system therefore can be never more than a fiddling at the edges as long as it ignores the contradictions and stresses of the competing temporal logics at the

Table 1 Clock Time Across Institutional Spheres

Political time use	Scientific time use	Economic time use
Regulate time	Measure time	Use as resource
Define time values	Create clock time	Commodify time
Impose time values	Impose clock time on nature	Impose economic time norm
Control (and discount) future	Control (and discount) future	Control and discount future
Globalize clock time	Colonize all time	Globalize time economy
Time is	Time is	Time is
Clock time	Clock time	Clock time
Decontextualized	Decontextualized	Decontextualized
Quantified	Quantified	Quantified
Linear	Linear	Linear
Invariant	Invariant	Invariant
External	External	External

centre. We also know that all working time is not the same: night time is different from daytime, weekends and festive days different from week days. The idea of working ‘unsocial hours’ acknowledges that there are significant differences in the apparently neutral working hours, and many a strike and labour dispute has arisen over this issue: while all hours are the same for machines, this is not the case for people. Finally, we know that the rationalized time of the clock does not sit easily with animal husbandry and the growing of crops. Industrial agriculture is the domain of production at the sharpest end of this clash of temporal principles and relations. In each of these examples the superimposed logic is impeccable. And, from within the clock-time logic, there is no way of taking account of continuing contextual variations and distinctions: the continuity is rendered invisible. That which is repressed and negated, however, has not disappeared. Rather, it is merely silenced – for a while. And, as I shall begin to show below, in this clash of principles can be located not only the successes and the excesses of the industrial way of life,⁶ but also the potential for radical change.

However, the fact that clock time has become naturalized as the public norm and the linear perspective absorbed as common sense vastly increases the difficulty of recognizing the role both innovations play/ed in everyday life. Other principles fade into the background, become invisible. Both the clock-time and linear-perspective norm act as filters through which reality is sieved and as lens through which all social relations and structures are refracted. As such they affect how industrial societies educate their children, relate to nature and fellow creatures, treat land and livestock, define and regulate their econo-political life and institutions. No longer participants but observers, we are separated from that which we observe and interact with. Objective and decontextualized, our actions lose the character of personal involvement; we no longer accompany them and their effects

to their destination. Lines of responsibility are severed. Irresponsibility becomes structurally located.

It is therefore pertinent for social and socio-environmental analyses to call attention to the fact that the shift in cosmology is a conceptual move with practical application, a heuristic that first transforms an ephemeral world of infinite complexity into a static, bounded, quantifiable object for comprehension and control, that secondly converts contingent, interconnected processes into abstracted, isolated parts, that thirdly moves participants outside their frames of reference and that finally banishes into the shadow world of invisibility whatever is incompatible with the logic. Focus on the application of the clock-time logic in a variety of contexts, working its way through a range of specific practices, allows us to see the hierarchically situated competing logics. Efforts to render explicit what are currently implicit, taken-for-granted aspects of contemporary social structures on the one hand, and unintended 'glocal' outcomes of processes, interactions and exchanges on the other, are both an indication of reflexive modernization and a means to facilitate change.

The creation of clock time is the foundation upon which other key temporal strategies of industrialization are built. Having set out the clock-time and linear-perspective base it is now possible to sketch the commodification, compression, control and colonization of time as means to bring into clear focus processes that are postulated by the theory of reflexive modernization.

C2 – The Commodification of Time

The commodification of time needs to be understood with reference not only to the prior development of clock time but also to changes during the Middle Ages in religious dogma that facilitated the transformation of time as God's gift into an object of trade and unquestioned exchange value. From the Christian perspective, trade in time is theft because it is trade in something that cannot belong to individuals – hence the charge of usury. As long as the Christian Church considered the trade in time to be a sin and the notion of earnings on time was rejected outright, capitalism and the money economy could not develop, since, for the merchant, time is a prime opportunity for profit (Le Goff, 1980: 29–30).⁷ While interest and credit had been known and documented since 3000 BC in Babylonia, it was not until the late Middle Ages that the Christian church changed its position on usury (Wendorff, 1991). It is against this background that we have to read the extracts from Benjamin Franklin's (1736) text entitled *Necessary Hints to Those that Would be Rich*, which contains the famous phrases 'Remember, that *time* is money. . . . Remember that money begets money' (quoted in Weber, 1989/1904–5: 48–50). Clock time, the time created to human design, was a precondition to this change in value and practice, and formed the perfect partner to abstract, decontextualized money.

When 'time is money', then time costs money and time makes money because the economic practice of charging interest means that capital has

got a built-in clock that is constantly ticking away. Every hour, every day, every month and every year brings profit on the invested sum of money. Equally, every hour, every day, every month and every year that money is borrowed has to be paid for in interest. This inevitably leads to careful time calculations with respect to the costs arising from the time that goods are stored, the time materials spend in warehouses before they are used in the production process, the time goods spend in transit, the time machines are running, and the time products lie on the shelves before they are sold.

The time economy of interest and credit, moreover, directly feeds into the monetary value of labour time, that is, paid employment. Any time of work and production that is not easily translatable into money exists in the shadow of this dominant perspective, falls outside its framework of evaluation: the time of children and the elderly, the time of mothers and fathers and of those who care for spouses in the home, the time of prisoners and the unemployed. In the majority world, this negation applies to artisans and subsistence farmers and traders, to the service industry and, more generally, to women's work the world over (Adam, 2002). Time outside the time economy of money is 'valued' in the shadow of economic relations, filtered through that way of thinking about and evaluating the world. And since, furthermore, money relates to power, any time that is not readily translatable into money tends to be associated with a lack of power.

Traditionally conceived, the economy is an endless circular flow of money: that is, from firm to workers to goods and services back to firms, with accumulated surplus needing to be reinvested back into the system. This perpetual flow of money is the economic equivalent of the clock-time and linear-perspective vision: abstract, decontextualized and de-temporalized. In all three habits of mind, the environment (whether physical or social) is external to, that is, excluded from, the conception. Processes and products thus externalized become detached, free-floating, independent agents belonging to everyone and no one in particular, with knock-on effects for individual responsibility. Of course, here too, that which is banished from the decontextualizing logic (externalized in economic discourse) has never disappeared. Rather, it has been rendered invisible without losing any of its pertinence.

What is not seen, not reflected upon, but externalised instead adds to the structural rupture, which separates industrial society from risk society, which separates it from the 'new' modernities of the present and future. (Beck, 1994: 183)

In environmental problems, agricultural disasters and the crises of the caring professions, to name just a few examples, we are today experiencing the return of the repressed. Moreover, in support of Beck's theory, we can see how the un/intended growth in 'by-products' of the industrial relations of time begins to dominate the econo-political agenda and force actions in the present from the position of potential and anticipated effects in the future.

C3 – The Compression of Time

When time is money, then faster means better. When (clock) time is commodified, time compression becomes identified, equated even, with efficiency and profit: speed is valorized as an unquestioned and unquestionable good. Naturalized, the valorization of speed overshadows other social or environmental considerations. Time compression, as Harvey (1989) and Castells (1996) identified, has been achieved by a number of means: by increasing activity within the same unit of time (introduction of machines and the intensification of labour), re-organizing the sequence and ordering of activities (Taylorism and Fordism), using peaks and troughs more effectively (flexibilization), and by eliminating all unproductive times from the process (just-in-time production).

Paul Virilio (1991, 1995) has analysed a number of broad time-compression strategies as they developed over the past 200 years. He has clustered these into three epochs of time-compression: 19th-century transport, 20th-century transmission and 21st-century transplantation, each with their own distinct means of enhancing independence of the social relations of time from space and the body.

19th-century Transport Throughout the ages, Virilio suggests, the wealth and power associated with ownership of land were equally tied to the capacity to traverse it and to the speed at which this could be achieved, just as military prowess is tied to the speed of movement by bodies and missiles across space. With the invention of trains, cars and aeroplanes, at the turn of the last century, the relation of time and space has been altered.⁸ The speed at which bodies can move across space has been massively increased, the time it takes dramatically shortened. Since their inception, all improvements in these modes of transport have been primarily in time compression. However, these increases in speed, as Virilio insists, brought with them a range of contradictions and paradoxes. Thus, for example, while cars, planes and trains have become progressively faster, the time spent in transit has not been compressed at an equal rate. Stand-still and traffic jams, snail's pace and stop-go progression are key features of today's traffic around urban centres. Endless queues in crowded lobbies are characteristic of travel by plane, delays and cancellations an integral part of commuting by train. Virilio (1991) has formulated the dromological law, which states that increase in speed increases the potential for gridlock. Evidence of dis/continuity as well as the rise in paradoxes and contradictions points to the relevance of the reflexive modernization thesis for these 19th-century innovations in time compression.

20th-century Transmission Wireless telegraph, telephone, radio and, some 50 years later, computer and satellite communication have once more changed the relationship between time and movement across space. Together, these innovations in transmission replaced succession and

duration with seeming simultaneity and instantaneity. Duration was compressed to zero and the present extended spatially to encircle the globe: it became a global present. Globally accessible events and the possibility of concerted action in 'real time' bring into one frame of reference causal and non-causal, instantaneous and sequential processes. The intensive (electronic) present, Virilio (1995) points out, is no longer part of chronological time; we have to conceptualize it instead as chronoscopic time. Real space, he suggests, is making room for decontextualized 'real-time' processes and intensity takes over from extensity.⁹ Similar to the time compression in transport the compression in transmission has led to an overload of information so extensive that taking advantage of only the tiniest fraction of it not only blows apart the principle of instantaneity and 'real-time' communication, but also slows down operators to a point where they lose themselves in the eternity of electronically networked information. With the potential capacity of extraterrestrial beings to be everywhere at once and nowhere in particular bound to the inescapable embodied temporal limits of terrestrial existence and sequential information processing, the real capacity for parallel absorption of knowledge is disappointing.

21st-century Transplantation The time compression afforded by transplantation is best exemplified by genotechnology, with its potential capacity to reduce to an instant what took generations to achieve with conventional breeding methods. This particular intensification of processes has enormous implications with respect to matters of control and responsibility. I therefore want to talk about its promise and costs in more detail in later sections on control and colonization.

Virilio understands human history in terms of a race with time, of ever-increasing speeds that transcend humans' biological capacity. To theorize culture without the *dromosphere*, that is, the sphere of beings in motion, he therefore suggests, misses the key point of cultural activity and the uniqueness of the industrial way of life. Without an explicit conceptualization of the contemporary *dromosphere* – or, in my terms, *timescapes* – it is difficult to understand fully the human–technology–environment constellation. It becomes impossible to appreciate that people are the weakest link when the time frames of action are compressed to zero and effects expanded to eternity, when transmission and transplantation are instantaneous but their outcomes extend into an open future, when instantaneity and eternity are combined in a 'merger of all times' (Castells, 1996: 463). There is no question, therefore, that Virilio would agree with Beck's (1999: 87) conclusion that reflexive modernization means that the social sciences require 'new categories, theories and methods' to theorize the dis/continuity.

C4 – The Control of Time

The control of time has many facets. Initially it is tied to the re-creation of the variable rhythmic times of life in uniform, invariable, decontextualized,

quantifiable form, which, in turn, has been imposed as the global standard. In addition to being compressed through socio-economic technologies, transport, transmission and transplantation, time is processed by regulating and rationalizing the pace, order, sequence, rhythmicity and seasonality of organisms, beings, social activities and institutions. The control of time thus includes the slowing down of processes, the re-arrangement of past, present and future, the re-ordering of sequence, and the transformation of rhythmicity into a rationalized beat.

Thus, for example, in the production of food it has proven economically advantageous not only to speed up the processes of growth and maturation but also to control the rate of ripening and decay during transit and storage. The control of shelf-life, the extension of the sell-by date, the control of production, storage and delivery to a just-in-time system, all of this depends on the control of time with respect to a desired pace. As part of modernity's overall project of rationalization and predictable control, the control of time is extended to the seasonal rhythmicity of nature, to the variable patterns and cycles of activity and rest, growth and decay: fallow periods are transformed into productive ones. The dormant season is, as much as possible, negated or at least shortened by artificial means (electric light, hydro-culture, genetic modification). Sexual, seasonal and maturational rhythms are hormonally regulated.

The mastery of time and the control of rhythms, as Castells (1996) points out, restructure temporality and, in the process, usher in contradictory logics: time is both compressed and denied. When we re-visit the temporal innovations associated with Virilio's three Ts (transport, transmission and transplantation) we can see how the intensification of the temporal logic (time = money, speed = profit, increased speed = unmitigated good thing) has paradoxical consequences. The increase in mastery is accompanied by a decrease in control. First, with mass public transport and private (and corporate) car ownership, the speed afforded by that mode of transportation has become an *expectation*, elevated almost to the status of a human right. When it became apparent that there are socio-environmental costs attached to this speed of movement, the deeply held beliefs and expectations made it extremely difficult to mitigate some of those effects. Both the underlying belief that time is money, and the association of speed with individual rights, wealth and power, work energetically against any political control and efforts to alleviate associated socio-environmental problems.

Second, with regard to late 20th-century transmission, the movement of information has not just been decontextualized but de-materialized, with the result that the power of the non-material and the virtual is on the ascent, which means that events in one part of the world can have almost instantaneous effects on the other side of the globe and send ripples through the entire network. Structural relations and processes that arise from the control of time tend to be beyond the control of those involved, since the combination of instantaneity of communication with simultaneity of networked relations no longer functions according to the principles of clock time and

mechanical interaction. 'The new level of interconnectivity', Mark Poster (1990: 3) proposes, 'heightens the fragility of social networks.' The enormous speed coupled with multiple, simultaneous, reflexive connections, moreover, poses problems at the level of perception, understanding, expectation and action: it constitutes, at all these levels, an unconquered reality. Social scientists have an important role to play here: elaborating the time connections, showing how the control of time can lead to loss of control and identifying access points for alternative action. Two further examples of increased mastery and loss of control will serve to illustrate how the pursuit of the Enlightenment logic has consequences that begin to erode it from within, the key process of reflexive modernization first identified by Beck in his seminal *Risk Society* (1992/1986).

Financial trading in stocks, futures and derivatives relies heavily on electronic networked communication and, as such, is notoriously out of control. Futures markets, in particular, we need to appreciate, do not trade in goods but *time alone*. They are bets on future prices of the stock market, currency prices, interest rates, even on the entire stock market indices. The trade in time, which is estimated at \$18 trillion for 1999, equals the entire stock of productive fixed capital of the world. There is, however, an important difference between the two kinds of trade – the trade in goods and the trade in futures – that sheds light on some of the inherent paradoxes associated with reflexive modernization. While the trade in goods requires economic and financial stability to flourish, the speculation on and trade in time requires volatility: the higher the volatility the higher the potential for quick extractive returns. This financial trade in time spells big trouble for national governments charged with managing their country's economy. While the former create wealth on the basis of volatility the latter's task is the creation of stability. Thus, controlling the future for the benefit of the present in a context of networked instantaneity, once more is accompanied by a loss of control that seems to be equal to the increase in mastery. It means loss of control for governments charged with its control and regulation, lack of control for contemporary members of society the world over who are affected by that trade, and no control for successors whose present has been pre-determined for the benefit of predecessors' financial gain.

Genetic modification, as I have already indicated above, is an innovation with all the hallmarks of reflexive modernization. With genetic engineering, science controls not just nature's products but its processes. It controls time at the level of *reproduction*, which means it controls life and the temporality of being. Genotechnology, therefore, has the potential of realizing the time rationalizers' dream: precise control of *reproduction* and instantaneous change in unlimited quantities. At a stroke, changes introduced in the present alter the life-course and evolution forever. However, the massive advances in control in the laboratory are not matched by the control over genetically modified reproductive organisms once they are released into the environment. Instead, unprecedented increase in control in the laboratory over short-term processes is matched by an equally

unprecedented loss of control over long-term effects in species and their environments: potential impacts of genetically modified organisms are unbounded in time and space without the possibility of recall or of undoing mistakes.¹⁰

‘Throughout the modern era’, writes Zygmunt Bauman (1998: 57), we have grown used to the idea that order is tantamount to ‘being in control’. Today, he suggests, ‘*no one seems to be in control*. Worse still – it is not clear what “being in control” could, under the circumstances, be like’ (Bauman, 1998: 58). Unintended consequences force us to operate in a no-man’s-land beyond design and action capacity. From a temporal perspective we can say that, at the beginning of the 21st century, increased mastery over time tends to be accompanied by an equivalent loss of control on the basis of (a) the *functional principles* of the technologies and (b) the *outcomes* of the technologies. Thus, control is lost due to massively increased speed, instantaneity and networked connections. Instantaneity means ‘real-time’ processes across the globe coupled with the elimination of linear cause-and-effect relations (in a context of continued linearity). This brings with it loss of time to reflect and act in the intervening period between cause and effect. It turns masters into slaves, designers and operators into the weakest links. It has the effect of fostering ephemerality and volatility and with it a massive reduction in econo-political stability, scientific predictability and social security. Instantaneity, moreover, means that such loss of control is global and affects not just innovators and perpetrators but people at the receiving end of the time-space distantiated effects. The global reach therefore is un/intended, that is, intended and unintended simultaneously.

C5 – The Colonization with and of Time

The global imposition of industrial time and the contemporary incursion into the times of predecessors and successors are two different aspects of temporal colonization. In the first case Western clock time and commodified time have been exported across the globe and imposed as the unquestioned and unquestionable standard. This is colonization *with* time. The second case refers to the contemporary economic and scientific-technological reach into the past and future. With genotechnology, for example, as I have suggested above, the reach extends to the beginning and the end of time – the temporal equivalent to (spatial) globalization. This is colonization *of* time. The colonization with and of time, as I shall show below, provides an alternative perspective on globalization, a key feature of reflexive modernization.

Colonization *with* time has been achieved with the aid of standard time, time zones and world time on the one hand and with the globalization of industrial time and its associated economic values as unquestioned norm on the other. In the latter case, it is the time values and the social relations of industrial time that are being *adopted* as well as *imposed* on a worldwide basis. To be ‘modern’, ‘progressive’, even ‘civilized’ means to embrace the industrial approach to time. Towards the latter part of the 19th century, for

example, Japan (Nishimoto, 1997) and Russia (Castells, 1996) proceeded to 'Westernize' their social relations of time. The political leaders of both societies considered this to be a precondition of becoming a fully fledged industrial nation. They realized that there is a heavy economic and political price to be paid for any deviance from the industrial norm. In most cases of Third World 'development', however, clock time is imposed as norm irrespective of its suitability (Adam, 2002). This industrial norm, as I indicated above, is fundamentally rooted in clock time and underpinned by naturalized assumptions about not just the capacity but also the need to commodify, compress and control time. The elements of this package of industrial time are both cumulative and mutually supporting and form a coherent, integrated dis/continuous whole. As long as the underpinning assumptions remain naturalized, taken for granted and unquestioned, unwilling recipients will find it difficult, if not impossible, to make their protests heard and heeded. Only when the fault lines in the logic begin to become exposed and irresolvable contradictions begin to destroy the system from within can alternative visions take hold and openings for change be operationalized.

The colonization *of* time, in contrast, refers primarily to the economic-political reach into, as well as the ab/use of, the past and future, that is, predecessors' and successors' presents. Archaeology, astronomy and geology, for example, provide insights into the very distant past. Entire industries are building up around the uncovering of the past, that is, the interpretation, representation and reconstruction of the past, both ancient and more recent. Whether the colonization relates to distant planets and black holes, to our earth history, to the lives of ancient cultures or to the consumption of heritage, the past as a resource is brought into the present for use and abuse. With genetic modification of organisms, as I suggested above, the colonization of time has been taken to the limits of time, that is, to the beginning and the end of time. With this technology, science extends its deliberate reach to the beginning of time on the basis that it taps into the shared origin of all life when it splices genes from one species into another and it extends its (unintended?) reach to the end of time as soon as genetically modified organisms are released and begin to interact with their environments. With genetic engineering, science has therefore achieved the temporal equivalent of (spatial) globalization: the reach to all time – past and future.

In his Reith Lectures, Anthony Giddens (1999: 2) addresses the colonization of the future when he suggests that '[m]odern capitalism embeds itself into the future by calculating future profit and loss, and thereby risk, as a continuous process'. It is distinct in its relationship to the future, whether this be in its system of credit and interest, insurance or financial trading, for example. Since the 16th century the insurance system has redistributed risk. It makes projections about the future on the basis of a known past and promises to financially compensate future loss in exchange for payments in the present. Whether this economic engagement with the future operates at the private, commercial or (welfare) state level,

it is based on the belief that the future is amenable to human regulation and design in the present. Furthermore, since the latter part of the Middle Ages, the economic future is understood with reference to the threat or benefit it holds for the present. The economy therefore operates in the sphere between present and future with a view to using the future to secure the present. To achieve that task, it borrows from the future to finance the present. This means a radical present-orientation makes parasitic use of the future – our own and that of successor generations. Helga Nowotny (1994/1989) conceptualizes those incursions as 'extended present', as a future that is organized, regulated, tamed, safeguarded and foreclosed *now*. This is a political act for which perpetrators are not and cannot be held accountable and the potentially affected do not and cannot get redress as long as the five Cs of time remain the naturalized norm.

Time for Reflexive Modernization

When social theory focuses explicitly on the social relations and structures of time there emerge the kind of dis/continuities, paradoxes and consequences that are hypothesized in the theory of reflexive modernization. From the above it is clear that Bruno Latour's (this issue) renaming of reflexive modernization as re-modernization is not appropriate, that it misses the mark. As I showed with reference to just a few features of reflexive modernization – naturalization and dis/continuity, the nature–culture separation, decontextualization and irresponsibility – the theory is not about a doubling up or re-doing of modernization. Rather, its hallmarks are recursiveness, the stresses in the logic, the undermining of key premises, the openings for change that arise from the paradoxes. Despite its awkwardness, therefore, reflexive modernization is the more appropriate term.

From a time perspective we could see how unintended consequences arose from a clash of temporal logics on the one hand and from the naturalization of industrial time as norm on the other. We could appreciate how the rationalization of time, taken to its limits, becomes irrational. In situations where the limits of time compression and colonization are reached we could recognize the relationship between increase and loss of control. From this perspective, discontinuity is to be located in the Middle Ages in processes that began with the creation of time to human design and allied disembedding processes such as the linear perspective, the logic of which has been pursued ever since with almost missionary zeal.

In this article I have begun to show some of the processes involved and worked through some of their institutional implications. On the basis of the five Cs of industrial time – creation, commodification, compression, control and colonization – it has been possible to identify the logic and accompanying paradoxes and to show how the continuities associated with the unwavering pursuit of the logic encompass their own dis/continuities and potential destruction from within. This means that the system of temporal coordinates is changing: clock time as the dominant, naturalized temporal perspective is undermined by the results of its own logic being

taken to the limit. Cause and effect, linearity, spatiality, invariability, stability, clarity and precision are *not* being replaced but have alongside and superimposed contrasting temporal principles such as instantaneity, simultaneity, networked connections, ephemerality, volatility, uncertainty as well as temporal multiplicity and complexity. Emerging alternative and contradictory temporal principles constitute today a lived reality for a significant number of people across the world: people engaged in information technology systems, people interacting with electronic media, people listening to TV and radio as well as those producing and presenting programmes, people involved in financial markets, even people using the phone, fax, email and the Internet, as well as people whose lives are structured to principles that are at odds with the imperialist incursions.

Furthermore, the level of both time control and temporal reach is changing. Again, this is not about one system replacing another. Rather, it is about interpenetration and mutual implication. All of the historically established temporal control and reach continue to exist and coexist with the new increased and intensified levels in an often conflictual and paradoxical relation. It means, first, that when transmission technologies operate at the speed of light then speeding up is no longer an option and economic advantage has to be achieved by other, entirely new means. These range from organizational technologies (e.g. flexibilization and just-in-time processes) to innovations in transplantation such as xeno-transplantations and animal 'pharming' as well as geno-technology and molecular engineering.¹¹ It means, second, that when genetic sciences potentially reach to all time – the beginning and the end of time – in combination with instantaneous change then they have reached *two temporal limits*. Having reached those temporal limits there is the potential for implosion or a move sideways into entirely new options that have yet to be identified, explored, analysed.

As social scientists we have not even begun to contemplate the implications of this double move towards temporal limits for the economy, politics and 'glocal' society. This is the kind of challenging context that Beck's theory addresses and for which he insists the social sciences require 'new categories, theories and methods' (Beck, 1996: 39, 1999: 87) in order to be able to identify the access points for change in economic processes and structures. Interception of the politics of time, as they are played out in the political, economic and scientific institutions, requires that the social sciences first break through the shield of their own taken-for-granted temporal assumptions. Only then can the de-naturalization process of the subject matter begin, only then is there a chance to identify access points for change and follow Beck's call to 'reinvent our political institutions and invent new ways of conducting politics at social "sites" that were previously considered unpolitical' (Beck, 1999: 93).

In the sphere of politics, those who cannot vote have no say in the system of representative democracy. We have no institutions adequate and appropriate to our current temporal politics. To date there exist no institutional means to be accountable to those most affected by the economic

and scientific construction of long-term futures. There is, in other words, no governance of time. There are no democratically elected guardians of the future. This point differs from the spatially constituted arguments that we have no global governance and it temporally extends the space-based realization that we have no institutions that monitor technological change on a global basis. Similarly, in the sphere of economics almost every principle and tool is predestined against taking responsibility for the future. Irrespective of whether this be insurance, the financial trading with time and the future, or the discounting of the future, the emphasis is on the present and what mis/fortune the future can yield for the benefit of the present. Responsibility for the future is a principle that falls outside the remit of the economic system. In the sphere of science, finally, the insistence on decontextualization and objectivity makes it difficult to entertain the idea of taking responsibility for the future created by scientific action since it separates actors from actions and their effects. The creation of hazards, dangers and perils, as Ulrich Beck rightly insists in his theory of reflexive modernization, is *not* an unintended consequence but an integral part of the rigorous application of the modernist logic. To take responsibility for our actions, as social scientists and as citizens, requires that we know ourselves in contexts, acknowledge our shadow, accompany our actions not just into the immediate but the very long-term future.

Notes

1. The basic arguments for this article were developed in response to an invitation by Ulrich Beck to take part in an international conference in Munich, organized for theorists to discuss reflexive modernization from their field of expertise. I was asked specifically to consider the relation between my work on social time and Beck's theory.
2. For example, Bauman (1998), Castells (1996), Melucci (1996), Serres (1995/1982) and Virilio (1991, 1995) have incorporated chapters on time in some of their current publications. This literature is growing fast across the full range of social science disciplines. Social theorists who took a lead earlier include Adam (1990), Elias (1992), Frankenberg (1992), Giddens (1979, 1981), Harvey (1989), Ingold (1986), Lash and Urry (1994), Nowotny (1994/1989), Rifkin (1987), Thrift (1981, 1988), Urry (1995, 2000), Wendorff (1980).
3. There are numerous fascinating books on the subject of time and culture. Reference to a small selection of these is therefore inevitably arbitrary. From this vast selection I have particularly enjoyed Bourdieu (1979), Dunne (1973), Eliade (1989/1954), Fraser (1981), Kern (1983), Le Goff (1980) and Mbiti (1985/1969).
4. For more detailed expositions see Romanyshyn (1989); also Adam (1995: chs 6 and 7), Adam (1998: 37–9) and Arendt (1958: 165–7).
5. From Weber (1989/1904–5) to Mumford (1955/1934) to Foucault (1977), Le Goff (1980) and Zerubavel (1981).
6. For work supporting this argument, see Adam (1998), Adam et al. (2002), Castells (1996), Rifkin (1987), Virilio (1991, 1995), Whipp et al. (2002).
7. In footnote 2, Le Goff (1980: 289–90) quotes a long passage from G. d'Auxerre's

(1160–1229) *Summa aurea* (III, 21), in which the position on usury is set out with unambiguous clarity.

8. For a detailed cultural analysis of these changes, see Kern (1983).

9. Zygmunt Bauman (1998: 19) writes about 'dephysicalization', where the power holders of global finance and cyberspace, for example, become truly exterritorial, even extraterrestrial.

10. For a more detailed argument see Adam (2000).

11. On molecular engineering and nano-technology, see Clark (1998).

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