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ABOUT A century ago, the publication of Albert Einstein's *On the Electrodynamics of Moving Bodies* revolutionized our understanding of time. What was to become the most famous paper in 20th-century physics created turmoil in 'God's sensorium', which, according to Newton, constituted the proper place of time. From now on, God's sensations were replaced by the functionalism of Einstein's brain (Barthes, 1993: 68–70). The Newtonian world view of universal time as repository of bodies and their movement finally collapsed, to be substituted by the numerical multiplicity of space–time relations determined by rulers and clocks.[1]

If one remains at the popular level of scientific *événement* (in the Braudelian sense), it might not be too far-fetched to announce that Einsteinian time is about to be surpassed with the help of another genius. Peter Lynds, a 27-year-old broadcasting school tutor from Wellington, New Zealand, has published a paper in *Foundations of Physics Letters* that has stirred up the international physics community.[2] Lynds attacks physics for maintaining at its very foundation what in his assessment is a nonsensical notion of time: time as a succession of precise static instants. So far, the reception of Lynds' paper has been as frantic as it has been controversial. The spectrum of reactions ranges from comparisons to Einstein through to musings as to Lynds' potential non-existence. Among those sympathetic to Lynds' analysis is John Wheeler of Princeton, collaborator of both Albert Einstein and Richard Feynman.

This article delineates the thrust of Lynds' argument, particularly in its apparently surprising relation to Bergsonism. In order to overcome the initial surprise, the analysis turns to a rather punctual exploration of shifting understandings of time. Lynds and Einstein will be considered as events within and beyond physics, the latter representing an actual time-revolution

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and the former having the potential of pointing towards a possible one. This argument is predicated on the assumption that the materiality of social time forms the ontological fabric out of which conceptual – i.e. physical – time emerges.[3] Einstein and Lynds will each serve as a specific historical *Erhebung* in the double sense of a *mound* that arises out of contemporary social practice and from which it will be possible to pan around to *survey* a certain phase of historical becoming. Ultimately, it should be possible to show that the re-emergence of Bergsonism in the Lynds-event can be connected to certain socio-ontological tendencies within contemporary society.

Lynds' Timelessness

Lynds' challenge to modern physics lies in his radical rejection of the concept of time as a succession of definable quantities, i.e. instants. The truth, unrealized by today's scientists, is that the value of such a supposed instant always indicates an interval:

> Regardless of how small and accurate the value is made . . . it cannot indicate a precise static instant in time at which a value would theoretically be precisely determined, because there is not a precise static instant in time underlying a dynamical physical process. (Lynds, 2003a: 1)

If there was a precise static instant, Lynds argues, it would logically follow that the world remains frozen at this precise instant, 'as though stuck on pause or freeze frame on a motion screen' (2003a: 1). This would not be changed by postulating a continuous sequence of further instances, as it is the logical nature of frozen instances not to have duration. Thus, in its own understanding of time, physics prohibits continuity and motion from taking place.

The solution Lynds offers to this obvious paradox is the fairly outrageous claim that time does not exist at all. Or rather, time does not exist in a way that can be grasped by conventional physics. Time has no existence as *physical quantity*: 'This may seem somewhat counter-intuitive, but it is exactly what is required by nature to enable time (relative interval as indicated by a clock), motion and the continuity of a physical process to be possible' (2003a: 2). Intuition also suggests that without physical progression the universe would remain motionless, again frozen at an instant.

> But if the universe were frozen static at such a static instant, this would be a precise static instant of time: time *would* be a physical quantity. Thus, it is then due to nature's very exclusion of time as a fundamental physical quantity, that time is measured in physics (relative interval), and as such, motion and physical continuity are indeed possible. (2003a: 2)

In other words, there is a necessary trade-off between precision at a time for continuity through time. This, however, means that no physical magnitude is safe anymore. From the relative position of a body in relative motion

to the very structure of space–time, precise determination is impossible. What is important for Lynds is that this universal indeterminacy is not a consequence of quantum uncertainty but is caused by the very nature of time.

Zeno's Solution

Over the course of his analysis, Lynds disposes of block-time, chronons, Hawking's imaginary time, and a number of other physical hypotheses – they all go into the bin of the history of ideas.[4] Of particular significance is Lynds' treatment of Zeno of Elea's motion and infinity paradoxes which he claims to have solved. It is here that the unintended proximity to the philosophy of Henri Bergson becomes obvious.

Let us briefly recall Zeno's paradoxes. Zeno was a disciple of Parmenides, one of the greatest deniers of time. For Parmenides, logic necessarily excluded time from being. According to him, being is one and continuous. Hence, what *is* (present) is and what *is not* (past and future) is not. In his four paradoxes, Zeno reiterates his master's arguments in as far as he employs the logical method of *reductio ad absurdum* in order to explore the consequences of a pair of opposite hypotheses, i.e. that time and space are infinitely divisible ('dichotomy' and the Achilles/tortoise paradoxes) and that space and time consist of dimensionless instants (the 'arrow' and the 'stadium' paradoxes).[5] Aristotle records the paradoxes as follows:

> Zeno's arguments concerning motion . . . are four in number. The first states *that there is no motion* because the travelling object must arrive at the halfway point before reaching the end . . . The second, called the 'argument of Achilles', asserts that *the slower runner will never be overtaken by the faster who pursues*, for the latter must first reach the point from which the runner started, and this way the slower runner will never be overtaken. The third argument . . . states *that a flying arrow is stationary*. This results by granting that time is composed of instants. The fourth argument concerning two rows with an equal number of bodies all of equal length, the rows extending from the opposite ends of the stadium with the same speed: and the conclusion of this argument, so Zeno thinks, is that half an interval is equal to its double. (*Physics VI*: $239^{b}10$, emphasis added)[6]

Although it is rather doubtful that Zeno's intention was to show that '*there is no motion*', etc., Aristotle's record helps to recall the detail of Zeno's argument. Lynds now argues that Zeno's problems are paradoxes *only as long as* it is assumed that the respective positions of travelling object, Achilles, or the arrow, can be precisely determined. According to Lynds, however, such a precise determination would result in the impossibility of changing this position, because in order to proceed to another precise value, it would first have to proceed to half that value, then to half that value, and so on, *ad infinitum*. Hence, the movement would be 'trapped' in the instant.

Lynds continues and expands his discussion of the paradoxes in his follow-up to *Time and Classical Quantum Mechanics: Indeterminacy vs.*

Discontinuity (2003a). In this second paper, entitled *Zeno's Paradoxes: A Timely Solution* (2003b), Lynds rejects the solutions to the paradoxes that have been offered previously, including those related to relativity theory, 'at-at theory', and those using calculus and the summation of infinite series of progressively smaller time intervals and distances. Instead, he proposed that

> the solution to *all* of the mentioned paradoxes . . . is that there isn't an instant in time underlying the body's motion (if there were, it couldn't be in motion), and as its position is constantly changing no matter how small the time interval, and as such, is at no time determined, it simply doesn't have a determined position. (2003b: 8, emphasis in the original)

Lynds thus believes to have found 'the correct solution to Zeno's motion and infinity paradoxes . . . just less than 2500 years after Zeno originally conceived them' (2003b: 9). However, paradoxes of this kind do not really require resolution but are meant to be provocative thought exercises. The much more interesting issue lies in the realization that Lynds' proposal strikingly echoes Bergson's century-old critique of time's quantification.

Bergson's Echo

For Bergson, Zeno's paradoxes were due to the illegitimate identification of movement with the space upon which it supposedly takes place, while in fact: 'the trajectory is created in one stroke, although a certain time is required for it; and . . . though we can divide at will the trajectory once created, we cannot divide its creation, which is an act in progress and not a thing' (Bergson, 1998: 309). What is being attacked by the unlikely couple Bergson/Lynds is precisely the confusion of intensity (movement, quality) with extensity (space, quantity). Lynds' dictum, 'there is no precise instant', can already be heard in Bergson's first engagement with Zeno's paradoxes in *Time and Free Will* where he states that

> just as nothing will be found homogenous in duration except a symbolical medium with no duration at all, namely space, in which simultaneities are set out in line, in the same way no homogenous element will be found in motion except that which least belongs to it, the traversed space, which is motionless. (1910: 115)

Derivative of this fundamental agreement is Bergson and Lynds' proximity in their utilization of Einstein's famous 1905 train. Lynds takes recourse to the train in order to prove once more the impossibility of precise determination of a moving object's position, while Bergson attempts to reveal the fallacy of Einstein's claim of non- (or *relative*) simultaneity regarding two events occurring on the tracks and on the train respectively. Bergson's protest is directed against what he believes to be an illegitimate transposition of an event taking place on the train on to the point of view of the observing physicist who himself is standing on the tracks. His argument

rests on the crucial distinction between time as lived becoming and the (although now dynamically) pulverized *concept* of time (Bergson, 1999: 67–85; Lynds, 2003b: 7–8).

It is at this point that Bergson went far beyond Lynds, whose critique, quite naturally, remains at the level of the conventional empiricism of science and thus negative ('physics got it wrong'). Bergson's 'superior' empiricism (Deleuze, 1999: 46), in contrast, allows him to support his rejection of physical time on a positive theory of qualitative time, i.e. time as duration [*durée*]. However, if Bergson thinks of duration as continuous, lived becoming, this does not imply that time qua duration for Bergson is the noumenal one beyond the complex phenomenal world. Accordingly, his attack on relativity is not directed against Einstein's claim of the multiplicity of time *per se*. Bergson's notion of duration always implies in a rather complex manner the thought of multiplicity.[7] This multiplicity is a virtual, continuous multiplicity that evolves through perpetual dissociation into an actual, discrete multiplicity. There are hence two multiplicities for Bergson: one virtual, the other actual. It is the movement between these two multiplicities that characterizes lived, creative becoming. Bergson rejects relativity theory precisely where this movement is reduced to a mere actual multiplicity. His main charge against relativity theory was to have 'put the actual and the virtual on the same plane' (Metz and Bergson, 1969: 174). In other words, Bergson argues that relativity tries to capture the living, virtual 'source' of time by introducing into science the idea of an actual multiplicity of mathematically discrete space–time blocs/events. This charge seems to remain valid notwithstanding the obvious shortcomings of *Duration and Simultaneity* (1999), particularly regarding its critique of general relativity. Bergson did correctly reproach Einstein for reinforcing the confusion between intensity and extensity; between a virtual, intensive multiplicity of time and an actual, metric multiplicity that emerges from the first one. Hence, although Einstein's theory did away with the idea of absolute time (time independent of things), it not only upheld an essentially spatialized notion of time, but pushed it to its absolute limit (Ansell Pearson, 2002: ch. 2; cf. DeBroglie, 1969; Deleuze, 1988a).

With Lynds, Bergson's critique re-emerges in the midst of 21st-century science. What are the implications – one has to ask – of Lynds' involuntary memory of Bergsonism in our own 'present'? If there is anything to be learned from this strange encounter, it would seem to begin with the fact that, rather than being shunned as an apostate gone over to the side of the crazy philosophers, Lynds has met with an overwhelming response from the physics community.[8] In the beginning of the 20th century, it was rather easy for Einstein to denounce Bergson's proposition of real, qualitative time or duration as 'philosopher's time', allegedly resting on a dubious blend of physical and psychological time.[9] It took almost a century, but the heterogeneous reaction to Lynds' intervention seems to suggest that physics' attitude is changing.

Relativity's Discipline

If time is not a succession of instants, no more is the time of physics determined by a succession of masterminds. A more productive approach can be found in the hypothesis that a particular society's historical conception of time emerges out of that very society's material practice. Such an approach raises the question of the historical context of 'time-revolutions' themselves. A brief consideration of the emergence of relativity should be instructive in this respect. It might also provide clues as to the significance of the Lynds-event in terms of a potential opening of physics to a novel conceptualization of time.

Einstein, far from being the detached, other-worldly genius of popular myth, was of course not only very strongly embedded in the cultural and technological *Zeitgeist* of mature industrial capitalism, but was also among the foremost experts on time-keeping and synchronization technology due to his work in Bern's patent office.[10] Consequently, the emergence of relativity has to be understood within the broader historical framework. Peter Galison describes Einstein as a nodal point at which the flows of technology, physics and philosophy intersected and who understood how each of these flows

> struggled to rip simultaneity from the metaphysical firmament and bring it to earth as a procedurally defined quantity. Time standardisation . . . was the order of the day, for each scientist a natural extension of the standardisation of length. It announced itself on the faces of public clocks, railroad schedules and inside regulated schoolrooms and factory floors. (Galison, 2003: 311)

The divine booty of time was not the fruit of a single-handed Promethean burglary by Einstein, but the result of a systemic effort to capture time. Einstein, of course, did it for science. Vital prerequisites for this endeavour were a number of advances in physics, especially around heat conduction in thermodynamics as well as the emergence of the wave theory of light and Maxwell and Faraday's theory of electromagnetic interaction, all of which pointed towards an understanding of matter as continuum. After the Michelson–Morley experiment of 1888 had failed to produce any evidence as to the existence of the ether, Einstein read the results of H.A. Lorentz's work as effectively merging ether and space. To this Einstein added his adaptation of Riemann's concept of space, according to which space loses its rigidity and participates in physical events (cf. Einstein, 2001: 154–64).

Hence, space became dynamic; one could almost say that it 'absorbed' time. In doing so, space lost its independent existence vis-a-vis that which supposedly filled it. From now on, space (–time) is implicated in a field of forces. It has existence only as a structural quality of the field (Einstein, 1988: 98–104). In other words, relativity designed a space that could subsume time and by doing so, shake off its Cartesian heritage of emptiness and passivity in order to enter the stage of physical reality as an active player.

Such a becoming dynamic of (the concept of) space, however, could be observed at this historical conjuncture in society at large. Sanford Kwinter has recently stressed a certain isomorphism between relativity theory and futurist design in relation to this novel understanding of space.[11] His definition of the field proves very instructive in the present context: 'The field describes a space of propagation, of effects. It contains no matter or material points, but rather *functions, vectors, and speeds*' (2002: 60). This definition is extremely helpful as it points toward an isomorphism much more fundamental than the one stressed by Kwinter. Is not the 'space of propagation, of effects', the space that is invested with abstract 'functions, vectors, and speeds' precisely the sort of space that multiplied and colonized the social from the onset of modernity? One should remind oneself that Einstein's time – in both senses of the word – was the time of mature industrial capitalism at its apex. Einstein might have merged space–time blocs with fields, but modern society at large had long been engaged in the project of merging the spaces of its confinements with the abstract functions, vectors and speeds of the disciplinary machine. In the words of Michel Foucault, the spaces of modernity were penetrated by

> mechanisms that analyse distributions, gaps, series, combinations, and which use instruments that render visible, record, differentiate and compare: a physics of a relational and multiple power, which has its maximum intensity . . . in the bodies that can be individualized by these relations'. (1977: 209)[12]

What the field was for physics, the disciplinary diagram was for everyday modern life. The confinements that colonized the social were implicated in the 'functions, vectors, and speeds' of this diagram. The advance of so-called 'civil society' was synonymous with the ascendancy of a form of rule characterized by its 'immanence to the population through a multiplicity of forms' (Hardt, 1998: 28). Gilles Deleuze often refers to this immanence as abstract machine, 'coextensive with the whole social field' (1988b: 34). Qua this machine, space took on the lead role in the play of discipline, in shaping the body/matter. Hence, what Foucault presents us with is a veritable microphysics of power, but one that is less mechanistic (though he refers to mechanisms) than it is relativistic. Factories, hospitals, colonies, prisons, etc. functioned as machines for the quantification of time/quality in relation to whatever appropriation desired. They did work as extensive machines but only in so far as this extensity allowed them to become intensive by capturing the virtual energies – i.e. time – of the social bios. To paraphrase Karl Marx, it is the real subsumption of lived social time under the diagram of discipline on which the entire system is predicated.

Given these considerations, it is unsurprising that modern society at the zenith of discipline should propel the emergence of a notion of time as absorbed in a multiplicity of dynamic (space–time) containers. The introduction of these space–time containers drove the spatialization of time

to its limits (Ansell Pearson, 2002: 57; Deleuze, 1988a: 83–5) while simultaneously pushing physics conceptually onto the plane of modern, disciplinary ontology. Physical time caught up with lived social time just in time to see the beginning of its demise.

Space–Time's Re-organization

From such a historical perspective, then, today's renaissance of Bergsonism is much less surprising than it might first have seemed. It coincides with the completion of the long *durée* of capitalist expansion. Globalization – understood as geographical extension of the capitalist world-system – ended some decades ago. What has happened since is best described as an accelerated intensification of capitalism (cf. Hardt and Negri, 2000). This process – and this is why the couple Lynds/Bergson is so instructive in understanding the present phase of capitalism – goes hand in hand with a sort of de-spatialization, with a fading of extensity as the defining principle of capitalist organization.

This is not to say that space disappears. It only disappears as quantity in order to re-emerge as a problem, as something that is immediately invested with time/quality, no longer as a succession of concrete, confined blocs, but as virtual flow. This is – in the final analysis – the phenomenon Lynds articulates. After the collapse of modernity's confinements, time/quality does not lend itself so easily anymore to spatializing conceptualisations. The ontology of post-discipline unavoidably has to enter the epistemological edifice of modern science. However, it is once more not the genius of an isolated individual scientist that 'makes the difference'. Rather, the scientist 'merely' conceptualizes a development that is already here in the process of actualization.

Reorganizing Life

We are no longer 'in the midst of a general breakdown of all sites of confinement' (Deleuze, 1995: 178). Rather, our societies have reached the stage of reorganization. It is interesting to note that today's fiercest critics of the confinement are the swarms of management consultants that have acquired such a pivotal role throughout western society (cf. Thrift, 2005). There is no post-confinement that does not have its layer of these architects of disorganization. As the edifices of modernity are reorganized, their role is to ensure that what was once solid does not melt into air but transforms into fluid streams of becoming, i.e. if possible, valorization. Reorganization as a strategy aims at disposing the containers of social production in order to let the collective energies of the social flow more effectively. Extensity – once the bedrock of capital's process – increasingly becomes dispensable. The machine is reorganizing itself according to a variety of novel technologies, maybe even according to a variety of new diagrams. Deleuze highlighted the shift away from extensity when calling contemporary capitalism 'essentially dispersive', something that is 'short-term and rapidly shifting but at the same time continuous and unbounded' (1995: 181). In such a manner, the

machinery of undisciplined appropriation is already successfully operating on the virtual flows of social creativity. One could think, for instance, of the inherent productivity of internet consumption. The 'excess cooperation of intellect ... as capital's most eminent resource' (Virno, 1996: 195) congealed in the virtual channels of the internet flows through an army of ever-productive, ever-modulating avatars.

However, the most obvious sites of valorizing fluidity are today's financial markets. As Benjamin Lee and Edward LiPuma (2002) have recently argued, the derivative-driven expansion of the financial markets can be understood in terms of the emergence of a fluid metatemporality of risk-circulation, dominating the disciplinary temporality of value-production. Indeed, the idea that the static time of labour is being replaced by the fluid temporality of risk is appealing, not least in the light of the numerous finance-induced crises of the recent past. However, focusing on the highly sophisticated technologies of 'symbolic exchange'[13] prevents the analysis from recognizing a much more radical onslaught on the established limits of temporality emanating from the new finance dispositif. If one considers the rather mundane *materiality* of high finance risk-gaming, one encounters, for instance, the well-known fact that a substantial share of the money that fuels financial markets is channelled through pension funds. The way these giant institutions work is by providing a multitude of policy holders with supposed future security as reward for their present financial sacrifice. What makes today's commercial pension funds different from the traditional state-sponsored security systems is that they are increasingly based on individual contribution rather than collective responsibility. This individualization process is accompanied by a decline of policy holders' control over their funds. The latter are turned into 'grey capital' whose status in terms of legal ownership is unclear enough to put it outside the reach of policy holders.[14] Thus, whilst the integral logic of pension shifts from security provision to high risk, the future of a substantial part of living labour (e.g. about 50% of the working population in Britain and the USA; see Blackburn, 2002) as expressed in abstract capital is alienated and becomes the fuel of global financial speculation. Consequently, the crux of Lee and LiPuma's metatemporality lies in the fact that it is systematically imposed on the *future* of living social labour. Marx taught that the factory functioned as a mechanism organizing the appropriation of workers' *lived time*. Factories stripped life of a good part of its actuality, transforming it into commodities and machinery (dead labour). The self-reflexive finance apparatus functions like a vortex whose extreme acceleration enables it to seize ontological virgin spheres, expanding the logic of appropriation into the future. The issue is not a shift from production to circulation, but rather an ontological intensification of exploitation. By reaching into the virtual flows of the future, capture becomes more intensive, qualitative: it is the creative virtuality of living social labour that feeds back into the machine of appropriation. There is still mediation (money) but the appropriation of life's virtuality is itself a highly undisciplined, virtual process.[15]

Capital's de-spatializing 'progress', however, can also be observed in the more conventional sectors of the economy. The spread of *project organization* is a case in point. It is a mode of organization based on time rather than space. A team of people are brought together for the duration of a particular endeavour. Once the goal is achieved, the team disperses; the project as organizational phenomenon disappears.[16]

In the light of the rise of project organization to ubiquitous organizational practice, Scott Lash and John Urry's (1996) thesis regarding the collapse of culture into the economic might require modification. Today, it appears more precise to speak of a collapse of the political [*praxis*] into the process of production [*poiesis*]. Here the present analysis adopts the notion of the political that Paolo Virno has recently discussed in relation to Hannah Arendt, i.e. not politics as 'life in some local party headquarters, but the generically human experience of beginning something again, an intimate relationship with contingency and the unforeseen, being in the presence of others' (Virno, 2004: 51). According to Virno, these faculties that were formerly endemic to the sphere of politics have been absorbed into the process of capitalist production:

> I maintain that it is in the world of contemporary labour that we find the 'being in the presence of others', the relationship with the presence of others, the beginning of new processes, and the constitutive familiarity with contingency, the unforeseen and the possible. (2004: 51)

Virno revisits Marx's prophetic notion of the *general intellect* (Marx, 1973: 706), arguing that it is only now that capital has acquired the ability to develop the technology appropriate for its systematic capture. Capital's advance lies in the spectacular[17] mobilization of what Virno calls *virtuosity* for the process of production *per se*. In Virno's hands, the ancient concept of *virtuosity* becomes a concretization of the *general intellect*. It is a 'resource' that exhausts itself in the process of production (comparable to, e.g., a choir performing a song). It is what enables the worker to modulate social cooperation. And it proceeds in a strangely political mode as it ceaselessly re-creates a public sphere, a space of social cooperation. In short, it is the ability to submerge into the virtual flows of social creativity. Understood in these terms,

> virtuosity is nothing unusual, nor does it require some special talent. One need only think of the process whereby someone who speaks draws on the inexhaustible potential of language (the opposite of a defined 'work') to create an utterance that is entirely of the moment and unrepeatable. (Virno, 1996: 195)

Project organization represents a concrete technology for the mobilization of virtuosity. 'In post-Fordism', Virno writes, 'labour requires a "publicly organised space"' (2004: 55). Project organization provides precisely such a public space. A recent study on multi-team research and

development projects comes to the conclusion that the most collaborative and successful project teams are those frequently considering questions such as 'What would we improve in our team and in the cooperation with other teams if this project started right now?' (Hoegl et al., 2004: 51). This is politics – understood in terms of virtuosity – injected into the production process. As foretold by Marx, labour moves to the side of the immediate production process in order to focus on the amelioration of the process of social coordination. The project provides a vehicle for this move.

The capacity to mobilize the virtuosic energies of the multitude – and herein lies the crux of the present argument – is predicated on project organization's functioning as a relay between extensity and intensity, as a techno-ontological transformer of space into time. Projects temporalize organization. The ontological advance of capital lies precisely in this achievement: the spatiality of *pouvoir* (confinement) is temporalized in order to immediately invest the flows of *puissance* (the virtual flows of social creativity). The project is time – the time of *pouvoir* – seizing the time of ontological creation.

This can be elaborated with reference to Antonio Negri's (2003) distinction between the analytical time of the capitalist apparatus of capture and the ontological time of the multitude's productivity. For Negri, real subsumption means that the analytical time of the law of value has invested the social bios as a whole, leading to the factual subsumption of *life* (as opposed to mere labour) under capital. The analytical time of capitalist capture *envelops* social life in such a manner that time ceases to be the measure of value and instead becomes its very substance.

Project organization represents a particular example of the process that Negri describes as the '*re-invention of time as envelope*' (2003: 40, emphasis in the original). It is a concrete organizational strategy that drives the ontological shift whose scientific implications are articulated in Lynds' critique of physical time. Liberated from the extensive constraints of the disciplinary edifice, social life–time is virtuosically mobilized while simultaneously and immediately being enveloped by the analytic of project–time. Thus, the analytical time of capitalist organization swells into the thick 'phenomenological fabric' (Negri, 2003: 40) that becomes the substance of immediate valorization. Enveloped *social life–time* is subjected to immediate (qua virtuosity) exploitation: a veritable *biopolitical* mode of production.

Time's Life

The examples provided in the previous section cannot, of course, replace a systematic analysis of potential mutations in contemporary capitalism. However, they should be able to demonstrate that the appropriation of social life–time is shifting, becoming more intensive. Capital is moving beyond the disciplinary field, or rather, one might say, the field has moved beyond the factory walls of modern capitalism. Today, the field invests the whole of the social by way of strategies like those delineated above. As modernity's four-dimensional space–time blocks mutate into the non-spatial intensity

of today's capitalist production, the social is liberated from its previous Euclidian prisons. Yet it is simultaneously hijacked into vitalist custody. 'What once was *civil* becomes *vital*' (Fach, 2003: 165, emphasis in the original), as one could say. Enduring freedom comes with the obligation of life as permanent value-production. Where factory walls crumble there appear 'strange horizons' (Massumi, 2002: Ch. 8),[18] membranes mercilessly ushering the collective bodies into ceaseless connection with their own virtual energies.

To conclude, one has to return to the significance of Lynds in all this. If one agrees with the above elaborations regarding today's strategies of appropriation, then it should be obvious that capital has well understood time as highly productive virtuality, as qualitative duration. Lynds articulates this shift for the world of physics and offers it a chance to catch up on the issue of time. His attempt to drive space out of physical time is not dissimilar to the management consultant who tries to drive hierarchy out of the organization. Both are trying to get 'closer' to the flow of qualitative duration. The prospect of physics appreciating the quality of duration is hence as promising or bleak as is the 'discovery of time' for our existence in general. Indeed, there appears to be a movement towards the ontological but it is not by any necessity a movement toward the 'better' or the more profound. It simply indicates capital's increasing ability to instrumentalize constituent power [*puissance, potentia*] formerly considered outside its sway. Thus, a 'Bergsonian turn' – whether located in science or society at large – does not signal liberation from the axiomatics of capital. Neither is it a release from the burden of 'finding new weapons', as the late Deleuze (1995: 178) put it. It might, however, shift the ground of potential struggle onto the sphere of ontology.

Notes

1. This is, of course, a caricature. One cannot do justice here to the complex history of the concept of time in physics. The present argument operates at the level of particular socio-ontological events that involve shifting understandings of time. For this reason, Einstein will figure prominently in this article.

2. The frenzy has somehow avoided Britain, but entering 'Peter Lynds' into an internet search engine not only generates a host of international press reports on the phenomenon of Lynds, but also a variety of heated debates within physics discussion forums.

3. A similar argument is made by Stengers (1997) in relation to the genesis of time measuring technology.

4. A detailed discussion of Lynds' rejection of these different hypotheses would not only be beyond the scope of this paper, but also beyond the scope of the author's expertise in physics.

5. It should be noted that Lynds explicitly excludes the 'stadium' paradox from his discussion.

6. The quote is from a fascinating article by Robin Durie (Durie, 2000: 6).

7. Deleuze refers to the introduction of multiplicity into a philosophy of continuity (duration) as one of Bergson's crucial innovations (Deleuze, 1988a: Ch. 2).

8. Cf. note 2.

9. The reference is to Bergson's public debate with Einstein, which Bergson was believed to have lost. Cf. Bergson (1999: 159) as well as the relevant articles in Gunter (1969).

10. On the very interesting detail of Einstein's embeddedness, see Galison (2003).

11. Modernist art is, of course, full of explicit and implicit references to relativity theory (e.g. Cubism).

12. Foucault, of course, refers to early modernity. However, as Deleuze (1995: 178) argues, the regime of disciplinary mechanism seems to have remained hegemonic until after the Second World War.

13. The structure of Lee and LiPuma's argument is curiously reminiscent of Baudrillard's (1993) thesis on the end of production.

14. Blackburn (2002) provides a fascinating analysis of the history and present of pensions.

15. It is interesting to note, however, that recently a number of studies into the heights of contemporary finance have shown that these virtual markets are embedded in emergent professional communities to such an extent that it becomes very difficult to determine whether they follow the logic of economic or social flow. See Agnes (2002), Knorr-Cetina and Bruegger (2002), MacKenzie (2003).

16. From a neo-Weberian perspective, the rise of project organization has been discussed by Boltanski and Chiapello (1999) as well as Hodgson (2004). For an organization studies perspective see e.g. Ekstedt et al. (1999), Powell (2001), Grabher (2002). Whittington et al. (1999) and White and Fortune (2002) provide empirical evidence for the 'projectification' thesis in the form of surveys.

17. Not capital-become-image anymore, but capital as communication.

18. The reference is to Massumi's somatic topology, projected on to the intensive extensity of contemporary capitalist appropriation.

References

Agnes, Pierre (2002) 'The "End of Geography" in Financial Services? Local Embeddedness and Territorialization in the Interest Rate Swaps Industry', *Economic Geography* 76(4): 347–66.

Ansell Pearson, Keith (2002) *Philosophy and the Adventure of the Virtual. Bergson and the Time Of Life*. London: Routledge.

Barthes, Roland (1993) *Mythologies*. London: Vintage.

Baudrillard, Jean (1993) *Symbolic Exchange and Death*. London: Sage.

Bergson, Henri (1910) *Time and Free Will*. Montana: Kessinger.

Bergson, Henri (1998) *Creative Evolution*. Mineola, NY: Dover.

Bergson, Henri (1999) *Duration and Simultaneity*. Manchester: Clinamen.

Blackburn, Robin (2002) *Banking on Death. Or, Investing in Life: The History and Future of Pensions*. London: Verso.

Boltanski, Luc and Eve Chiapello (1999) *Le Nouvel Esprit du Capitalisme*. Paris: Gallimard.

DeBroglie, Luis (1969 [1947]) 'The Concepts of Contemporary Physics and Bergson's Ideas on Time and Motion', pp. 45–62 in P.A.Y. Gunter (ed.) *Bergson and the Evolution of Physics*. Knoxville: University of Tennessee Press.

Deleuze, Gilles (1988a) *Bergsonism*. New York: Zone.

Deleuze, Gilles (1988b) *Foucault*. London: Continuum.

Deleuze, Gilles (1995) *Negotiations*. New York: Columbia.

Deleuze, Gilles (1999) 'Bergson's Conception of Difference', pp. 42–66 in John Mullarkey (ed.) *The New Bergson*. Manchester: Manchester University Press.

Durie, Robin (2000) 'The Strange Nature of the Instant', pp. 1–24 in R. Durie (ed.) *Time and the Instant. Essays in the Physics and Philosophy of Time*. Manchester: Clinamen.

Einstein, Albert (1988) *Über die Spezielle und die Allgemeine Relativitätstheorie*. Berlin: Springer.

Einstein, Albert (2001) *Mein Weltbild*. München: Ullstein.

Ekstedt, Eskil, Rolf Lundin, Anders Söderholm and Hans Wirdenius (1999) *Neo-Industrial Organising*. London: Routledge.

Fach, Wolfgang (2003) *Die Regierung der Freiheit*. Frankfurt: Suhrkamp.

Foucault, Michel (1977) *Discipline and Punish. Birth of the Prison*. London: Allen Lane.

Galison, Peter (2003) *Einstein's Clocks, Poincaré's Maps*. London: Sceptre.

Grabher, Gernot (2002) 'Cool Projects, Boring Institutions: Temporary Collaboration in Social Context', *Regional Studies* 36(3): 205–14.

Gunter, P.A.Y. (ed.) (1969) *Bergson and the Evolution of Physics*. Knoxville: University of Tennessee Press.

Hardt, Michael (1998) 'The Withering of Civil Society', pp. 23–39 in Eleanor Kaufman and Kevin Jon Heller (eds) Deleuze and Guattari. New Mappings in Politics, Philosophy, and Culture. Minneapolis, MN: University of Minnesota Press.

Hardt, Michael and Antonio Negri (2000) *Empire*. Cambridge, MA: Harvard.

Hodgson, Damian (2004) 'Project Work: The Legacy of Bureaucratic Control in the Post-Bureaucratic Organisation', *Organization* 11(1): 81–100.

Hoegl, Martin, Katharina Weinkauf and Hans Georg Gemuenden (2004) 'Interteam Coordination, Project Commitment, and Teamwork in Multiteam R&D Projects: A Longitudal Study', *Organization Science* 15(1): 38–55.

Knorr-Cetina, Karin and Urs Bruegger (2002) 'Global Microstructures: The Virtual Societies of Financial Markets', *American Journal of Sociology* 107(4): 905–50.

Kwinter, Sanford (2002) *Architectures of Time. Toward a Theory of the Event in Modernist Culture*. Cambridge, MA: MIT Press.

Lash, Scott and John Urry (1994) *Economies of Signs and Space*. London: Sage.

Lee, Benjamin and Edward LiPuma (2002) 'Cultures of Circulation: The Imaginations of Modernity', *Public Culture* 14(1): 191–213.

Lynds, Peter (2003a) 'Time and Classical Quantum Mechanics: Indeterminacy vs. Discontinuity', *Foundation of Physics Letters* 15(3): 1–7.

Lynds, Peter (2003b) 'Zeno's Paradoxes: A Timely Solution', URL: http://philsci-archive.pitt.edu/archive/00001197

MacKenzie, Donald (2003) 'Long-Term Capital Management and the Sociology of Arbitrage', *Economy and Society* 32(3): 349–80.

Marx, Karl (1973) *Grundrisse: Foundations of the Critique of Political Economy*. New York: Random House.

Massumi, Brian (2002) *Parables for the Virtual*. Durham: Duke.

Metz, André and Henri Bergson (1969) 'Exchanges Concerning Bergson's New Edition of *Duration and Simultaneity*', pp. 135–90 in P.A.Y. Gunter (ed.) *Bergson and the Evolution of Physics*. Knoxville: University of Tennessee.

Mullarkey, John (1999) *Bergson and Philosophy*. Edinburgh: Edinburgh University Press.

Negri, Antonio (2003) *Time for Revolution*. New York: Continuum.

Powell, Walter W. (2001) 'A New Logic of Organizing: Causes and Processes of Diffusion', in *Acta Universitatis Upsaliens. Studia Oeconomiae Negotiorum* 48. Uppsala: Uppsala University Press.

Stengers, Isabelle (1997) 'Time and Representation', pp. 177–209 in I. Stengers (ed.) *Power and Invention. Situating Science*. Minneapolis, MN: University of Minnesota Press.

Thrift, Nigel (2005) *Knowing Capitalism*. London: Sage.

Virno, Paolo (1996) 'Virtuosity and Revolution: The Political Theory of Exodus', pp. 189–210 in Michael Hardt and Paolo Virno (eds) *Radical Thought in Italy*. Minneapolis, MN: University of Minnesota.

Virno, Paolo (2004) *A Grammar for the Multitude*. New York: Semiotexte.

White, Diana and Joyce Fortune (2002) 'Current Practice in Project Management – An Empirical Study', *International Journal of Project Management* 20(1): 1–11.

Whittington, Richard, Andrew Pettigrew, Simon Peck, Evelyn Fenton, and Martin Conyon (1999) 'Change and Complementarities in the New Competitive Landscape: A European Panel Study, 1992–1996', *Organization Science* 10(5): 583–600.

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