

The new Bergsonism

Discipline, subjectivity and freedom

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This article is intended to raise a number of connected issues. It concludes by suggesting that certain theories of self-organization, in particular the theory of autopoiesis developed by Humberto Maturana, Francisco Varela and, latterly, Fritjof Capra, might help us to reassess how we view the relationship between discipline, subjectivity and freedom. However, the first half of the article shows that this kind of theory of self-organization is really just a part of a more general trend in the conceptualization of human consciousness and action. This trend is what I have referred to as ‘the new Bergsonism’. It can be found in the explicit references to, and reworkings of, Bergsonist themes in the writings of Gilles Deleuze and Félix Guattari and some of their followers (I shall look at some of the claims made by Brian Massumi in particular). It can also, however, be found implicitly in recent shifts of focus made in some branches of contemporary neuroscience and related philosophies of consciousness.

Elements of Bergsonism

For the purposes of this essay, Bergsonism can be summarized under five propositions: anti-Cartesian monism, connectionism, anti-representationalism, selectionism, and a peculiar philosophy of time (or ‘duration’ as Bergson preferred). The first proposition central to any Bergsonist philosophy is simply that (in contrast to the traditional Cartesian view) there is no separation of mind and body. There is only matter and its energetic movement, and matter has no ‘occult or unknowable power’.¹ Consciousness is entirely reducible to the complex movement of matter.

Connected to this is the second proposition. In his book on Bergson, Deleuze states that ‘there cannot be a difference in kind but only a difference in degree between the faculty of the brain and the function of the core, between the perception of matter and matter itself’.² The relationship between consciousness, brain and material world is one of absolute continuity and

connectedness. Indeed, even the classical language of perception is misleading in that it implies a world outside, a mind inside, and a series of intermediate channels through which information is passed. But there is no such separation. The perceptions of matter, and consciousness of matter and ideas, are themselves part of the single material continuum – the ‘plane of immanence’ as Deleuze and Guattari have called it.³ The body, brain, and sensory apparatus are material, they are in direct contact with the extended material world, and consciousness is produced as a particular kind of movement in this material continuum.

In the traditional Cartesian model, in which an ‘occult’ mind gains experience of a separate material world via the senses and consequent perceptions, there is usually an intermediate term. The intermediate term is ‘representation’. The world is somehow *re-presented* to the mind, or to consciousness, as though there were a homunculus hidden inside our heads looking at images projected onto a screen and listening to sounds from hidden internal speakers. The third proposition of Bergsonist philosophy is that there is no such representation. The qualities of the world that we experience are not the qualities of miniature representations inside our heads (‘qualia’ as they have often been called in the philosophy of consciousness); they are the qualities of the world itself. As Deleuze puts it,

The brain does not manufacture representations, but only complicates the relationship between a received movement (excitation) and an executed movement (response). Between the two, it establishes an interval (*écart*), whether it divides up the received movement infinitely or prolongs it in a plurality of possible reactions.⁴

Or, putting it another way, he says that ‘we perceive things where they are, perception puts us at once into matter’.⁵ The brain and nervous system are a machine which, in contact with a material environment, create

a 'cerebral volume' or 'zone of indetermination'. In concrete terms this means the possibility for the exercise of will (even 'free' will?). But this zone of indetermination is not created by mental re-presentation of the world to an occult cogito which hold the levers of the motor systems in its control. So how is it created; what is involved in this 'complication' between stimulus and response?

This leads us to the fourth proposition, which is that consciousness is the product of a process of selection – or a resolution of forces. Crucial to this selectionist model are the twin concepts of the 'virtual' and the 'actual'. Effectively this is a distinction between a world in its totality, as it really is, beyond what can be experienced – the 'virtual', and the world as it is 'actualized' in experience. But we must, of course, guard against any kind of Kantianism – in which the former is the 'world in itself' and the latter simply 'phenomenal experience' going on in a place somewhere removed from the real world 'in itself'. Similarly we must guard against any Cartesianism in which the 'virtual' is the material world outside, and the 'actual' is a mysterious, immaterial, 'representation' of that world for the 'eyes' of an equally mysterious, immaterial, 'cogito' within. Both the 'virtual' and the 'actual' are as real and solid and material as one another. The latter is effectively a subset of the former; a subtraction from the total, the total which Deleuze sometimes refers to as 'the Absolute'. The world as 'actualized' in consciousness is that aspect of the world which is of enough interest to the organism for it to connect its sensory-motor circuits in such a way that a consciousness is 'actualized'. In the process of 'actualization' of consciousness two things occur. First, certain aspects of the world are selected as being of interest. Second, a new entity comes into existence in the world – the temporary articulation of the body, brain, nervous system and environment – which *is* that segment of consciousness.

The virtual is, then, the totality of the material universe in all its unfathomable complexity of movement. But, as Bergson says, 'the images which surround us will appear to turn toward our body the side, emphasized by the light upon it, which interests our body'.⁶ Making the same point, Deleuze says that 'by virtue of the cerebral interval, in effect, a being can retain from the material object and the actions issuing from it only those elements that interest him ... it is not the object *plus* something, but the object minus something, minus everything that does not interest us'.⁷ The virtual impinges upon our body in all of its massive complexity. But not only does it impinge, by

virtue of its contact with the senses; it enters the body. And this body is already awash with virtual complexity of its own from the quantum level up, through the machinery of the cell, to the complex electrical, chemical, hydraulic, pneumatic and kinetic functioning of the body and its organs. The brain and nervous system comprise a machine which, amongst other things, actualizes consciousness by selecting, from this totality, that which is of relevance for the conscious exercise of will. In response to the impinging world the body, brain and nervous system generate a multitude of possible thoughts, actions and utterances, and, as Brian Massumi puts it,

Out of the pressing crowd an individual action or expression will emerge and be registered consciously. One 'wills' it to emerge, to be qualified, to take on a socio-linguistic meaning, to enter action-reaction circuits, to become a content of one's life – by dint of inhibition.⁸

And though only a small part of the 'pressing crowd' which inhabits us makes it to consciousness, the crowd is nevertheless still real – the totality of impressions, impulses, sensations, possible actions and utterances are all real and material; our body is awash with forces which never quite make it to consciousness but which nevertheless affect our behaviour in concrete ways. Some of these movements do not make it to consciousness because the body is perfectly capable of dealing with certain functions without the intervention of consciousness – indeed having to think about the beating of one's heart would make it considerably less efficient. But some possible ideas, actions, thoughts and utterances do not make it because they are not of sufficient interest, or because they are inhibited, or because they are unintelligible; the brain has many filtering mechanisms. Because we *are* our bodies, though, we cannot help feeling this totality of movement washing over us. Massumi makes an interesting distinction between 'affect' and 'emotion'. He argues that 'affect' is the totality of emotional movement within the body (virtual emotion perhaps). Emotion proper occurs when selection has taken place and certain of those affective movements have been assimilated into consciousness, given a name, and placed within a narrative which makes them meaningful (I am angry because ... etc.). Affect, says Massumi, 'is not exactly outside experience ... it is immanent to it – always in it but not of it'.⁹ Massumi argues that the implication of this is that there exists a second system, a second field of energy traversing and binding the connectivity of the social. This is the fabric of connections within the virtual but outside

of – never actualized in – consciousness. In fact, of course, the implication is that there are a multiplicity of systems, non-human in the strict sense; perhaps we cannot actually call them social systems either, but the consciously actualized operations of the social are immanent to this non-human fabric of the ‘virtual’.

Before turning to the final proposition of Bergsonist philosophy, I should like to point briefly to some of the more obvious signs of Bergsonism in contemporary neuroscience. All of the thinkers I shall be discussing are virulently anti-Cartesian for the obvious reason that the Cartesian assertion of an irreducible, occult cogito sustained outside of the normal material realm robs them of their whole purpose – which is to explain consciousness in terms of the material operations of the brain and nervous system.

With regard to the second theme of connectionism, consider the claims made by philosopher and neuroscience expert Andy Clark. After arguing against the Cartesian model of consciousness and cognition, or what he calls the ‘sense–think–act cycle’, he asks:

If brains are best understood as controllers of environmentally situated activity, then might it not be fruitful to locate the neural contribution as just one (important) element in a complex causal web, spanning brains, bodies, and world?¹⁰

Clark describes a number of pieces of research which demonstrate clearly this de-centred quality of cognition, and also how deeply integrated the sensory and motor aspects of the nervous system really are. He describes, for example, the ‘do-it-where-I’m-looking’ routines that we go through when our bodily motion is directed towards whatever is fixated in our visual field (when grasping something for example). Clark quotes cognitive science researcher Dana H. Ballard et al. as saying that in such routines

the external world is analogous to computer memory. When fixating a location the neurons that are linked to the fovea refer to information computed from that location. Changing gaze is analogous to changing the memory reference in a silicon computer.¹¹

Clark lists some of the props which we use in our environment to enable us to perform functions which would otherwise be impossible for our brain and nervous system alone. Notepads, computers, slide-rules, calculators – the list is potentially endless, of course, since anything can potentially serve as a piece of what Clark calls ‘wideware’. He argues that, in fact, the most complex routines are connected and distributed in this way. When we produce academic articles, for example, he claims that



[t]he biological brain is just a part (albeit a crucial and special part) of a spatially and temporally extended process, involving lots of extraneural operations, whose joint action creates the intellectual product.

And consequently, when we ask precisely where consciousness and agency lie, we have to confront a very peculiar question:

Is there a real sense in which the cognitive agent (as opposed to the bare biological organism) is thus revealed as an extended entity incorporating brain, body, and some aspects of the local environment?¹²

When it is recognized that crucial features of this local environment are (in the case of human consciousness) language, culture and social networks, then what we have is a theory of decentred subjectivity entirely in accord with poststructuralist theories of the past couple of decades. Another neuroscience-influenced philosopher, Daniel Dennett, even jokes about the parallels between his own theory of subjectivity and that of Jacques Derrida.¹³ Dennett, too, is anti-Cartesian, connectionist and antagonistic to the notion of internal representation. Of the claims of a person that a plenum of representations exist *in their mind*, he says:

no such 'plenum' ever came into his mind; the plenum remained out in the world where it didn't have to be represented, but could just be. When we marvel, in those moments of heightened self-consciousness, at the glorious richness of our conscious experience, the richness we marvel at is actually the richness of the world outside, in all *its* ravishing detail. It does not 'enter' our conscious minds, but is simply available.¹⁴

Once again, as Deleuze says, 'we perceive things where they are, perception puts us at once into matter'.¹⁵

Dennett also has a selectionist theory of the emergence of consciousness which is remarkably reminiscent of the theory of the 'virtual' and the 'actual' described above. He argues that in response to any given stimulus, the brain and nervous system generate a 'pandemonium' of voices – of possible utterances and actions. There is a pandemonium of 'content demons' trying to get themselves expressed – entered into sensory-motor circuits – and a pandemonium of 'word and expression demons' trying to get themselves used for expressive purposes.¹⁶ This sounds remarkably like the 'virtual' – even more so when we compare it with Massumi's metaphor of the 'pressing crowd'. And Dennett, like the other Bergsonists, argues that consciousness is actualized through a process of selection. Others, such as the neuroscientist Gerald

Edelman, have provided testable hypotheses regarding how these selection processes might work in the brain. He has developed a selectionist model of learning and perception, based around a multiplicity of different mapping schemas which include autonomic, visual, auditory, olfactory, sensory-motor, language, and memory systems. The excitation of these systems converges around organically based homeostats (the interests of the organism). Edelman has built complex automata which display the characteristics of independent, unpredictable learning behaviour, and independent categorization of the world – providing they have homeostats which enable them to discriminate between movement in the sensory apparatus that is of interest and that which is not. In other words, they are able to create ordered structures of cognition by independently selecting that which is of interest in the world, and categorizing it. Importantly, Edelman has pointed to the central importance of memory in this process of creating consciousness; a point to which I shall return.¹⁷

Duration

In understanding consciousness, Bergson says that we cannot limit ourselves to the phenomenology of consciousness while bracketing out the rest of the world – for it is precisely the totality, the virtual, which provides the conditions of possibility for consciousness. Actualized consciousness is a composite of elements, a selected and combined subset from the virtual. So, says Bergson, we must 'seek experience at its source, or rather above the *turn*, where, taking a bias in the direction of our utility, it becomes properly *human* experience'.¹⁸ But what is 'above the *turn*' – in the virtual?

Bergsonist philosophies place a huge emphasis on the role of memory in the creation of conscious experience. Immediate conscious awareness of the present is always a contracted composite of sensation and memory – as Bergson puts it, 'the following moment always contains, over and above the preceding one, the memory the latter has left it'. This parallels precisely Edelman's theory of *primary consciousness*. He describes a system of circuitry within the brain which links a special kind of short-term memory to current sensory mappings of the world, to produce what he calls a 'remembered present'.¹⁹ Paralleling this yet again, in *What is Philosophy*, Deleuze and Guattari say that

Sensation contracts the vibrations of the stimulant on a nervous surface or in a cerebral volume: what comes before has not yet disappeared when what

follows appears. This is its [the brain's] way of responding to chaos.... Sensation is the contracted vibration because it has become quality, variety.²⁰

But how does this relate to the concept of the virtual? What exactly is in the 'virtual', and what are the elemental constituents out of which the composites of the 'actual' are forged? For Bergson there are two elemental lines: extension (spatial dimensions) and duration (temporal). Each is a dimension of concrete multiplicity. Our experience of space and time is always of the composite, so we cannot easily see these discrete elements; but according to Bergson pure instantaneous extension contains differences of degree only – differences of number, size, quantity. Pure extension is qualitatively homogenous but discontinuous, segmented and broken up into parts of differing quantity. Duration, on the other hand, is the line of multiplicity of quality. It is continuous and ever-changing; constantly dividing into differences of kind. As we have seen, Edelman describes the physiological/neurological processes whereby duration (as memory) is drawn into the instantaneously present sensation of space, to produce the 'qualities' (or 'qualia') which constitute consciousness.

Bergson himself initially viewed duration as a psychological property only. But we have seen that Dennett, in his critique of qualia, argues that experienced qualities are not in some inner psychological space but in the encounter between brain, body and the world itself. Deleuze points out that Bergson, thinking along similar lines, came to the conclusion that 'if qualities exist in things no less than they do in consciousness, if there is a movement of qualities outside myself, things must, of necessity, endure in their own way'.²¹ This led Bergson to argue that there is indeed psychological duration, but that it is derived from an absolute ontological duration. This has some strange consequences when we ask the question: Where are recollections preserved? We assume that they must be preserved in the brain somewhere as *representations* of the past, since the past 'in itself' is no more. But this is not Bergson's position. For Bergson, all of duration is somehow coexistent. We do not have to preserve recollections because they preserve themselves, as the pure differentiation of quality. The dimension of duration is no more destructible than is the dimension of space. The evocation of, first, a virtual psychological recollection, and then an actualized memory involves a leap into this 'past in general'. Bergson, in *Matter and Memory*, says that

we become conscious of an act *sui generis* by which we detach ourselves from the present in order

to replace ourselves, first in the past in general, then in a certain region of the past – a work of adjustment, something like the focusing of a camera. But our recollection still remains virtual; we simply prepare ourselves to receive it by adopting the appropriate attitude. Little by little it comes into view like a condensing cloud; from the virtual state it passes into the actual.²²

Deleuze says that 'in the same way that we do not perceive things in ourselves, but at the place where they are, we only grasp the past at the place where it is in itself, and not in ourselves, in our present'.²³ This, as we have seen, directly parallels Dennett's critique of qualia (that qualities are in the world, not in representations 'in the mind'), but Dennett has not argued that recall is directly analogous to perception in this way. Is there any reason why he should? Does it have anything to recommend it? We have already seen that conscious experience of quality, even in the present, is dependent on an element of memory. Now, Dennett says that representation in the brain does not really exist. But how can we have memory that does not involve having representations of some sort? To answer this, Dennett would have to take on the issue of the nature of duration and memory, which, so far, he has not really done.

Autopoiesis

Deleuze claims in *Bergsonism* that Bergson was 'trying to give the theory of Relativity the metaphysics it lacked'. Deleuze speaks of a 'pure perception identical to the whole of matter, a pure memory identical to the totality of the past'. This is the ontological reality – a 'past that is eternal and for all time, the condition of the passage of every particular present'.²⁴ We have learned to decentre our analysis of the subject in the present, but should we – can we – decentre the subject, in terms of its virtual constituents, along the line of duration also?

On the face of it these claims look, frankly, ridiculous. In what sense can duration sensibly be seen as an indestructible ontological ground? How can we leap into the 'real' past? How indeed can we do without representations of the past? Surely our memories cannot in any meaningful way be a re-established link with the past itself – surely they *must* be representations? Bergson, however, insists that

the nervous system is in no sense an apparatus which may serve to fabricate, or even to prepare, representations. Its function is to receive stimulation, to provide motor apparatus, and to present the largest possible number of these apparatuses to a given stimulus. The more it develops, the more

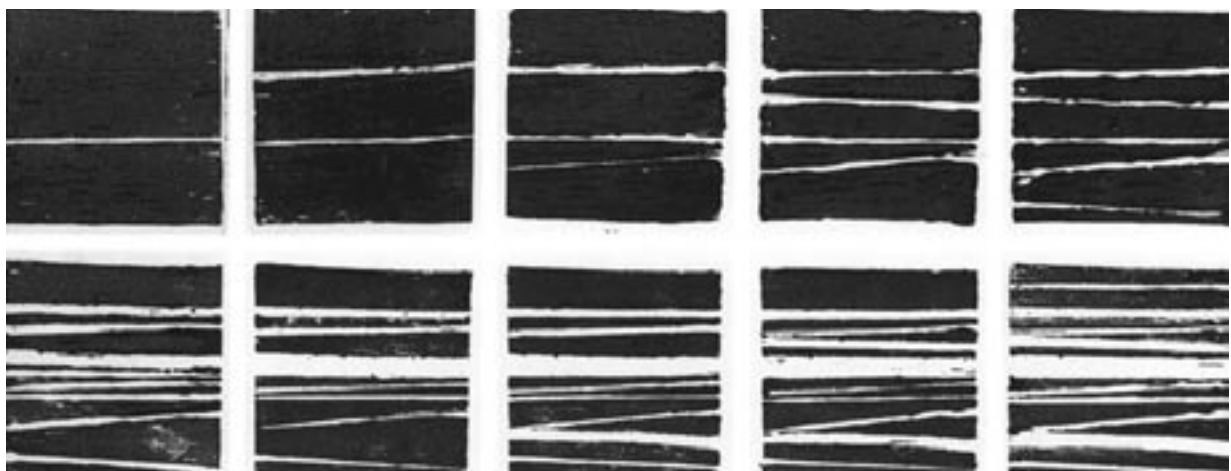
numerous and the more distant are the points of space which it brings into relation with ever more complex motor mechanisms.²⁵

Equally, and for the same reasons, Deleuze, Dennett, Edelman, Clark, and others, are sure that the mind is not composed of representations. In truth, though, all of them retain models of physical structure which are rather static. The *process* of connection to ‘points of space’, and of self-creation from ‘chaos’ (the ‘virtual’, ‘pandemonium’), is left conveniently vague. What kind of physical structure is not inert, stable, dependent on equilibrium, at some level? Could an answer to this latter question give us some clues about the question of duration itself? The answer lies in somehow taking seriously the claim – made by Bergson – that we misunderstand the nature of duration when we spatialize it – when we think of it as a fourth dimension of extension. We seem unable to conceive of it in any other way. The analogue clock is itself a spatialization of time, and even when using digital timepieces we think of time as number, quantity, and therefore as extension. Pure duration is, however, the dimension of differentiation of quality – of Becoming. How can we think of the structures of the body and the mind in terms of a duration which is pure Becoming?

Fritjof Capra, in his recent work *The Web of Life*, attempts to develop an analysis of life, cognition and consciousness which is rooted in a theory of structure that is truly dynamic.²⁶ The skin of the human body replaces cells at the rate of 100,000 per minute, the human pancreas replaces its whole physical structure every twenty-four hours. The body is not a fixed, inert structure, through which ‘information’ passes – like a computer.²⁷ Capra argues that the metaphor of information transmission has been inappropriately applied in biology, and in the philosophy (and sciences) of consciousness. Any theory of consciousness that relies on an information processing, or representationalist, model in which there is a world ‘out there’ which

passes information, or representations, to a mind ‘in here’ inevitably falls into Cartesian dualism (this is the ‘sense–think–act’ model which Andy Clark too explicitly criticizes). We have seen that Bergson, Deleuze, Clark, Dennett and Edelman reject such a model of consciousness. Capra also rejects this dualism. Indeed one could argue that such a model of consciousness is itself a product of the delusion of spatialized duration. Cognition and the coordination of behaviour, the organism’s connection to the world through the *movement* of matter and force, are frozen, and cut up into a spatialized structure – ‘inner’ and ‘outer’, ‘world’ and ‘mind’, ‘object’ and ‘subject’, ‘thing in itself’ and ‘representation’.

In finding an alternative to such static, spatialized, theories and philosophies, Capra draws heavily on Ilya Prigogine’s theory and mathematics of *dissipative-structures*. Dissipative structures are material structures (or patterns) which appear in (thermodynamically speaking) far from equilibrium environments. It is well known that much of this paradigm was developed in the analysis of turbulence. If a liquid is placed in a closed container and shaken, then it will dynamically rearrange itself for a short while but eventually stabilize in the bottom of the container and cease moving – it will reach equilibrium. A liquid flowing between two points, however, is in a state of dynamic disequilibrium so long as it continues to flow. At certain (unpredictable) points in a liquid flow turbulence develops. This turbulence can appear to be random and chaotic; it can then suddenly (and again unpredictably) develop into an ordered structure – a whirlpool. Such a structure is not a structure in the same sense that a clock or a building, or a piece of furniture is a structure. When we construct a building we do not expect it to exchange every atom in its structure for other atoms within seconds of its construction. We do not expect to have to feed it with energy constantly in order to stop it from disintegrating. But this is the





case with a whirlpool. It is a far from equilibrium *dissipative-structure*.

Prigogine and others developed the ‘non-linear’ mathematics which describe such systems, and it is now well known that there are many such dissipative-structures around us: everything from weather systems to the cells which make up every organism on the planet. Indeed the atmospheric chemist James Lovelock and microbiologist Lynn Margulis have argued that the whole planet should be regarded as a far from equilibrium environment.²⁸ This environment is kept far from equilibrium by its biomass – in particular the vast population of bacteria which have inhabited the planet for three and a half billion years. In turn, biological structures are themselves dissipative systems which can only emerge within the torrential flow of matter and energy of a far from equilibrium environment.

Biological structures, though, are a special category of dissipative-structures, according to Capra and the Chilean biologists Francisco Varela and Humberto Maturana, from whom Capra derives a number of key themes. By virtue of massively complex systems of regulatory and amplificatory feedback loops (both within themselves, and out into the environment), living, organic dissipative-structures are able to self-

create, and self-repair. Varela and Maturana call his self-creation ‘autopoiesis’. Autopoietic systems can learn and adapt to their environment. In a recent edition of *Thesis Eleven*, with a section devoted to the biologist and philosopher of biology Henri Atlan, self-organising systems are described as

complex, self-interacting ‘machines’ that continuously generate and regenerate themselves. They constitute stable, albeit dynamic, unities with coherent identities that arise in relation to their specific, global forms of organization. They are autonomous, in the sense that they specify the topological domain of their own fields of interactions, although they can be perturbed and undergo structural changes in relation to external disturbances.²⁹

Atlan himself states that in such systems ‘*the goal* to be reached, the task to be accomplished, would not be imposed from the outside but *produced by the machine itself*’.³⁰ This is precisely the kind of self-organizing dissipative-structure that Capra, Varela and Maturana refer to as autopoietic. Autopoietic systems learn and adapt by a process called ‘structural coupling’. Bergson himself says that

living matter, even as a simple mass of protoplasm, is already irritable and contractile, that is open to the influence of external stimulation, and answers to it by mechanical, physical and chemical reactions.³¹

Capra argues that the body, which is a dissipative-structure in a far from equilibrium environment, itself provides a far from equilibrium environment for the emergence of *temporary structures of cognition*. Many dispersed functions of the brain and nervous system are coordinated into 'temporary cell assemblies' through a process he calls 'phase locking' – the body 'structurally couples' with itself to produce new dissipative-structures. These entities are not a product of the individual body alone, however; they are produced by the body's 'structural coupling' to its environment – to other structures, both inert and dissipative. When structural coupling between an autopoietic structure and its environment takes place, then an entirely new extended, autopoietic entity comes into being. By virtue of language and culture, the human organism extends itself into the autopoietic network of the social group. Higher human consciousness, a special category of cognitive dissipative-structures, appears in this context of the extended, social, autopoietic network. This takes Clark's notion of 'wideware' into a whole new realm.

Now, all dissipative systems are highly sensitive to their initial conditions and to minor changes in parameters; systems which tend towards equilibrium will 'forget' their initial conditions, or any disturbances which occur in their history. Think of a simple pendulum: it does not matter where it starts out, or how one disturbs it, it will always return to the same 'point attractor'; the system 'forgets'. This is not the case with autopoietic, dissipative systems: they have a built-in 'arrow of time' – they cannot go back to earlier states, they have a record of their history, of their duration, of their qualitative differentiation, built into their structure. We can begin to see, then, how Capra helps us to see the body and the mind as structures which have duration built into them as an ontological ground – not as representation, but as progressive differentiation of the dissipative-structure itself. Memory is not (as we conjectured earlier) stored representation; it is a dissipative-structure, built through the rapid coordination of millions of dissipative processes taking place throughout the body – coordinated into a 'temporary cell assembly' – a real entity that *is* a piece of duration. Bergson's assertion that we 'replace ourselves, first in the past in general, then in a certain region of the past ... like the focusing of a camera ... we simply prepare ourselves to receive ... it comes into view like a condensing cloud' no longer looks so strange. The 'real' past is not in an inaccessible place because it is not in space at all. The past, present and future *are* the qualitative differentiation that defines

autopoietic dissipative-systems. Aspects of this qualitative differentiation are accessible to our bodies because they are built into the very structure of our bodies. We don't *have* memories, we *are* memories; or at least we *are* duration, and memory is a function of duration.

Freedom, autonomy and discipline

For Bergson the sort of advancing qualitative differentiation produced by what Capra calls 'structural coupling' was the key to the expansion of the 'zone of indetermination' and thus to freedom:

Is not the growing richness of this perception likely to symbolize the wider range of indetermination left to the choice of the living being in its conduct with regard to things?³²

We can also see, I believe, how the change in focus that Capra forces, in our appreciation of Bergson, must lead to a reappraisal of the unfashionable themes of freedom, autonomy and creativity, but in the context of a sensitivity to the new social-control technologies which are opening up. Put simply, the themes of freedom and autonomy became dirty words with Foucault's claim that

[t]he man described for us whom we are invited to free, is already in himself the effect of a subjection much more profound than himself. A 'soul' inhabits him and brings him to existence, which is itself a factor in the mastery that power exercises over the body. The soul is the effect and instrument of a political anatomy; the soul is the prison of the body.³³

That was a very clever little paragraph: so clever that it has held much of radical social theory and philosophy in its thrall for the past two decades. Even those who have objected to its implications have often been at a loss when it came to saying why. The reason for this is that it is, of course, true – in the sense that the subject *is* a product of disciplinary regimes. But it is also false in that it does not give any sense of the paradoxical quality of discipline itself. Foucault's pronouncement is rooted in the Deleuzian paradigm in which creativity and 'the new' cannot emerge from the cultivation of the subject because this cultivation always entails discipline, and discipline is a closing down of the possible 'lines-of-flight' of 'desiring-production'. In the language of Deleuze and Guattari's early work, the subject is a form of 'anti-production'. It closes off creative possibilities, locks the body into repetitive cycles of habit, compulsion and morality.³⁴ Consequently for Deleuze and Guattari, creativity and freedom became fatefully linked to the erosion and dissolution of subjectivity. Jean Baudrillard pointed to

the dangers of such a course more than two decades ago.³⁵ There is certainly no autonomy to be had in a subjectless absorption into the hyperreal. Nor is real freedom and creativity to be found in psychotic breakdown. Indeed Deleuze and Guattari themselves seem to have come to the conclusion that we are creatures which rely on order, by the time of *What is Philosophy*, when they write of

resemblance, contiguity, causality – which enable us to put some order into ideas, preventing our ‘fantasy’ (delirium, madness) from crossing the universe in an instant, producing winged horses and dragons breathing fire.³⁶

In this book they write of the artist, not as a mindless psychotic, but as the person who dips into chaos and brings back the new. This may be compared to Capra’s account of Stuart Kauffman’s work, which uses computer-generated binary networks to create autopoietic structures:

Complex binary networks exhibit three broad regimes of behaviour: an ordered regime with frozen components, a chaotic regime with no frozen components, and a boundary region between order and chaos where frozen components just begin to ‘melt’. Kauffman’s central hypothesis is that living systems exist in that boundary region near the ‘edge of chaos’. He argues that deep in the ordered regime the islands of activity would be too small and isolated for complex behaviour to propagate across the system. Deep in the chaotic regime, on the other hand, the system would be too sensitive to small perturbations to maintain its organization. Thus natural selection may favour and sustain living systems ‘at the edge of chaos’, because these may be best able to coordinate complex and flexible behaviour, best able to adapt and evolve.³⁷

On the basis of his model of the limits of chaos and order, Kauffman has fairly accurately linked the number of genes in the human genome to the number of cell types expressed by the genome. This, then, is not all simply speculation; the maths works. But what about consciousness on the edge of chaos?

What I am going to argue here is that discipline is a form of structural coupling. It links the intra-organismic dissipative-structures of the individual organism with other dissipative systems and inert structures to create even more complex inter-organismic and organic–inorganic structures. As we have seen, all such encounters leave their mark in the structure of the organism – the organism *is* duration. So while discipline *is* a basis for remote control of the organism it also – paradoxically – *extends its structural complexity*; its repertoire of dissipative, structural

modulation is further extended with every structural-coupling. The more structural-couplings the organism has, the more it can do with the raw materials of the chaotic, dissipative environment it inhabits. All organisms learn. The great artist or philosopher has to forge a multiplicity of dissipative repertoires within him/herself, before dipping into the chaos is possible at all. The untrained encounter with chaos is rarely productive or liberating. Deleuze was very impressed by Henri Michaux’s drug-induced psychotic drawings. In truth they have a certain uncanny unpleasantness about them, but they will never amount to a great deal in the history of human creativity. The same is not true of Deleuze himself. He was a great philosopher precisely *because* of what his training and his discipline allowed him to create. In writing of the historical process of discipline and self-discipline that has made man ‘calculable’, and able to make promises that he can keep, Nietzsche (Deleuze’s other great philosophical touchstone) says that

If we place ourselves at the end of this tremendous process, where the tree at last brings forth fruit, where society and the morality of custom at last reveal *what* they have simply been means to: then we discover that the ripest fruit is the *sovereign individual*, like only to himself, liberated again from morality of custom, autonomous and supramoral (for ‘autonomous’ and ‘moral’ are mutually exclusive), in short, the man who has his own independent, protracted will and the *right to make promises* – and in him a proud consciousness, quivering in every muscle, of what has been achieved and become flesh in him, a consciousness of his own power and freedom, a sensation of mankind come to completion.³⁸

Now, we may have good reasons to disagree with the supposed mutual exclusivity of morality and autonomy, but there is no doubting the nature of the man described here. This free man is no mindless psychotic, or eroded subjectivity engaging in directionless ‘lines of flight’ across the global mediascape. This free man is a massively complex assortment of infinitely adaptable dissipative-structures, produced by a life of richly varied and disciplined structural-couplings with the physical and social environment. Discipline has created this creature within the environment of the human body and nervous system. Language, culture and discipline take the human body well beyond what evolution on its own provided for.³⁹ The individual who cannot read, write, think about and analyse the world, make plans, carry them out, discipline him/herself, or productively command others, cannot structurally couple within the modern social field, cannot cultivate

ever different and more complex dissipative-structures of action, cannot be free.⁴⁰ Indeed, such an individual cannot really know the meaning of freedom, autonomy or creativity at all since they are themselves dissipative-structures achieved within an environment characterized by such discipline.

Just to anticipate one inevitable accusation, isn't this really just a form of behaviourism? The answer depends on what is meant by 'behaviourism'. If by behaviourism we mean an attempt to explain human behaviour while pretending that consciousness, meaning, processes of interpretation and so on do not exist, then of course this is not behaviourism. It is precisely a monist, materialist explanation of the nature, emergence and properties of human consciousness. If by behaviourism we mean that everything that is human can be accounted for in terms of the matter and energy of the body and nervous system, as it is composed into a massive complexification of the relationship between stimulus and behaviour – that consciousness is itself part of complex dissipative material structures which provide the individual with a wider and wider range of behavioural repertoires (both within and between organisms); that the nature of consciousness is linked directly to the organism's capacity for sensation and action – then it is of course behaviourism. This would be a rather stretched version of the term (to say the least), since it effectively defines all forms of monist materialism as behaviourism, but then it would hardly amount to a criticism.

The virtual, then, is the source of the new, the hybrid, creativity. It is the source of our sense of aliveness, our vital spark. But in order to have the freedom to engage creatively with other structures in the environment, and with chaos itself, we must be disciplined creatures in the first place. Freedom has real material roots in the dissipative-structures within the human body. But our need for discipline always leaves us open to the possibility of remote control. We must understand the nature of social and psychological systems as dissipative-structures. In this context social control should be seen in terms of structural-coupling, and autonomy and creativity in terms of autopoiesis. As we have seen, the two are inextricably linked in the forging of subjectivity, as structural-coupling lays down the vast array of dissipative-structures which provide the conditions of possibility for ever more complex, autopoietic processes. This allows us to reassert the art of the cultivation of subjectivity as the route to freedom, autonomy and creativity (none of us would be academics working with, and cultivating, ideas if we did not believe this somewhere in our

hearts). But we must also take note of the other side of this equation.

Brian Massumi has already commented very astutely on the capacity of the hyperreal to manipulate individuals and groups affectively at a level well below consciousness.⁴¹ In a society in which the art of cultivation of subjectivity, of reflective consciousness and self-discipline, has become deeply unfashionable, this is more dangerous than ever. In addition, the progress of neuroscience and neuro-pharmacological technologies means that the dissipative-structures of consciousness and the rest of the body will also be the direct site of the next wave of social-control technologies. Such control offensives as Ritalin, Prozac and the minor tranquillizers are only the beginning. Nanotechnologies are already being envisaged, in which the autopoietic capacities of the human body and nervous systems will be the object of direct and calculated assault.⁴² Forget surveillance which is 'coextensive with the social body'; imagine a surveillance coextensive with the human body. Our existence as dissipative-structures is a real (not a socially constructed) fact. It is what makes us potentially free and creative creatures; it is also what leaves us open to potentially mindless control. The technologies which are advancing in this field are also real and increasingly effective. We dismiss neuroscience, and the biological in general, as the work of epistemologically naive 'technicians' at our peril.

Notes

1. Henri Bergson, *Matter and Memory*, trans. N.M. Paul and W.S. Palmer, Zone Books, New York, 1991 (1896), p. 73.
2. Gilles Deleuze, *Bergsonism*, trans. Hugh Tomlinson and Barbara Habberjam, Zone Books, New York, 1991 (1966), p. 25.
3. Gilles Deleuze and Félix Guattari, *What is Philosophy?*, trans. Graham Burchell and Hugh Tomlinson, Verso, London, 1994.
4. Deleuze, *Bergsonism*, p. 24.
5. Ibid., p. 25.
6. Bergson, *Matter and Memory*, p. 36.
7. Deleuze, *Bergsonism*, p. 25.
8. Brian Massumi, 'The Autonomy of Affect', in P. Patton, ed., *Deleuze: A Critical Reader*, Blackwell, Oxford, 1996, p. 224.
9. Ibid., p. 226.
10. Andy Clark, 'Where Brain, Body, and World Collide', *Daedalus*, vol. 127, no. 2. Spring 1998, p. 268. Andy Clark is Professor of Philosophy and Director of the Philosophy/Neuroscience/Psychology programme at Washington University in St Louis.
11. Dana H. Ballard et al., 'Deictic Codes for the Embodiment of Cognition', *Behavioural and Brain Sciences*; quoted in Clark, 'Where Brain, Body, and World Collide', p. 270.
12. Ibid., pp. 271, 273.

13. Daniel C. Dennett, *Consciousness Explained*, Penguin, Harmondsworth, 1993, p. 411.
14. *Ibid.*, p. 408.
15. Deleuze, *Bergsonism*, p. 25.
16. Dennett, *Consciousness Explained*, ch. 8.
17. Gerald Edelman, *Brilliant Air, Brilliant Fire: On the Matter of the Mind*, Penguin, Harmondsworth, 1992. Importantly Edelman has also shown that such learning behaviour is impossible without fixed homeostats of some kind. This suggests that there is something seriously wrong with traditions in the human sciences that deny the existence of hard-wired biases, instincts, desires and so on. Human beings are hugely malleable, but not infinitely so.
18. Bergson, *Matter and Memory*, p. 184 (my emphasis).
19. Edelman, *Brilliant Air*, p. 119.
20. Deleuze and Guattari, *What is Philosophy?*, p. 211.
21. Deleuze, *Bergsonism*, p. 48.
22. Bergson, *Matter and Memory*, pp. 133–4.
23. Deleuze, *Bergsonism*, p. 56.
24. *Ibid.*, p. 56.
25. Bergson, *Matter and Memory*, p. 31.
26. Fritjof Capra, *The Web of Life: A New Synthesis of Mind and Matter*, HarperCollins, London, 1996.
27. Dennett seems to be of the opinion that computers could – in theory – simulate the functional architecture of the brain and nervous system. Both Edelman and Capra are far more sceptical however. They point out the huge physical differences between them. Apart from the fact that computer hardware is a fixed and inert structure, it is also traditionally sequential in its connectivity, and all elements of the structure have fixed functions which do not vary. Consequently, if one element fails then the whole structure fails to function. In contrast, the elements of the brain and nervous system are multi-functional; the structure itself is constantly modulated – elements change function, connections are built and rebuilt; connectivity is massively parallel and dispersed throughout the structure, there is a large amount of built-in redundancy, and consequently if an element fails others can take over.
28. Among others, see James Lovelock, *Gaia*, Oxford University Press, Oxford, 1979; James Lovelock and Lynn Margulis, 'Biological Modulation of the Earth's Atmosphere', *Icarus* 21, 1974; Lynn Margulis, *Symbiosis in Cell Evolution*, 2nd edn, Freeman, San Francisco, 1993; Lynn Margulis and Dorian Sagan, *Microcosmos*, Summit, New York, 1986; Lynn Margulis and Dorian Sagan, *What is Life*, Simon & Schuster, New York, 1995.
29. Johann P. Arnason and Paul A. Komesaroff, 'Introduction to Atlan', *Thesis Eleven* 52, February 1998, pp. 1–4.
30. Henri Atlan, "'Intentional Self-Organization'. Emergence and Reduction: Towards a Physical Theory of Intentionality', *Thesis Eleven* 52, February 1998, pp. 5–34.
31. Bergson, *Matter and Memory*, p. 28.
32. *Ibid.*, p. 31.
33. Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan, Penguin, Harmondsworth, 1987 (1975), p. 30.
34. Gilles Deleuze and Félix Guattari, *The Anti-Oedipus: Capitalism and Schizophrenia*, Vol. 1, trans. Robert Hurley, Mark Seem and Helen R. Lane, University of Minnesota Press, Minneapolis, 1977.
35. Jean Baudrillard, 'Forgetting Foucault', *Humanities in Society*, vol. 3, no. 1, 1980.
36. Deleuze and Guattari, *What is Philosophy?*, 1994, p. 201.
37. Capra, *Web of Life*, p. 198.
38. Friedrich Nietzsche, *On the Genealogy of Morals*, trans. Walter Kaufmann, Vintage Books, New York, 1969 (1887), p. 59.
39. As the boundaries between organism and machine dissolve, the evolutionary heritage will no doubt play a smaller and smaller role.
40. In *Twilight of the Idols*, after pages of splenetic ranting about 'the "improvers" of mankind', Nietzsche says 'I shall straightaway set down the three tasks for the sake of which one requires educators. One has to learn to *see*, one has to learn to *think*, one has to learn to *speak* and *write*: the end of all three is a noble culture.' Friedrich Nietzsche, *Twilight of the Idols*, trans. R.J. Hollingdale, Penguin, Harmondsworth, 1988 (1889), p. 65. Evidently *he*, at least, saw the importance of disciplinary cultivation of the subject in eventual 'self-overcoming'.
41. Massumi, 'The Autonomy of Affect'.
42. See, for example, K. Eric Drexler, *Engines of Creation: The Coming Era of Nanotechnology*, Fourth Estate, London, 1996.

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