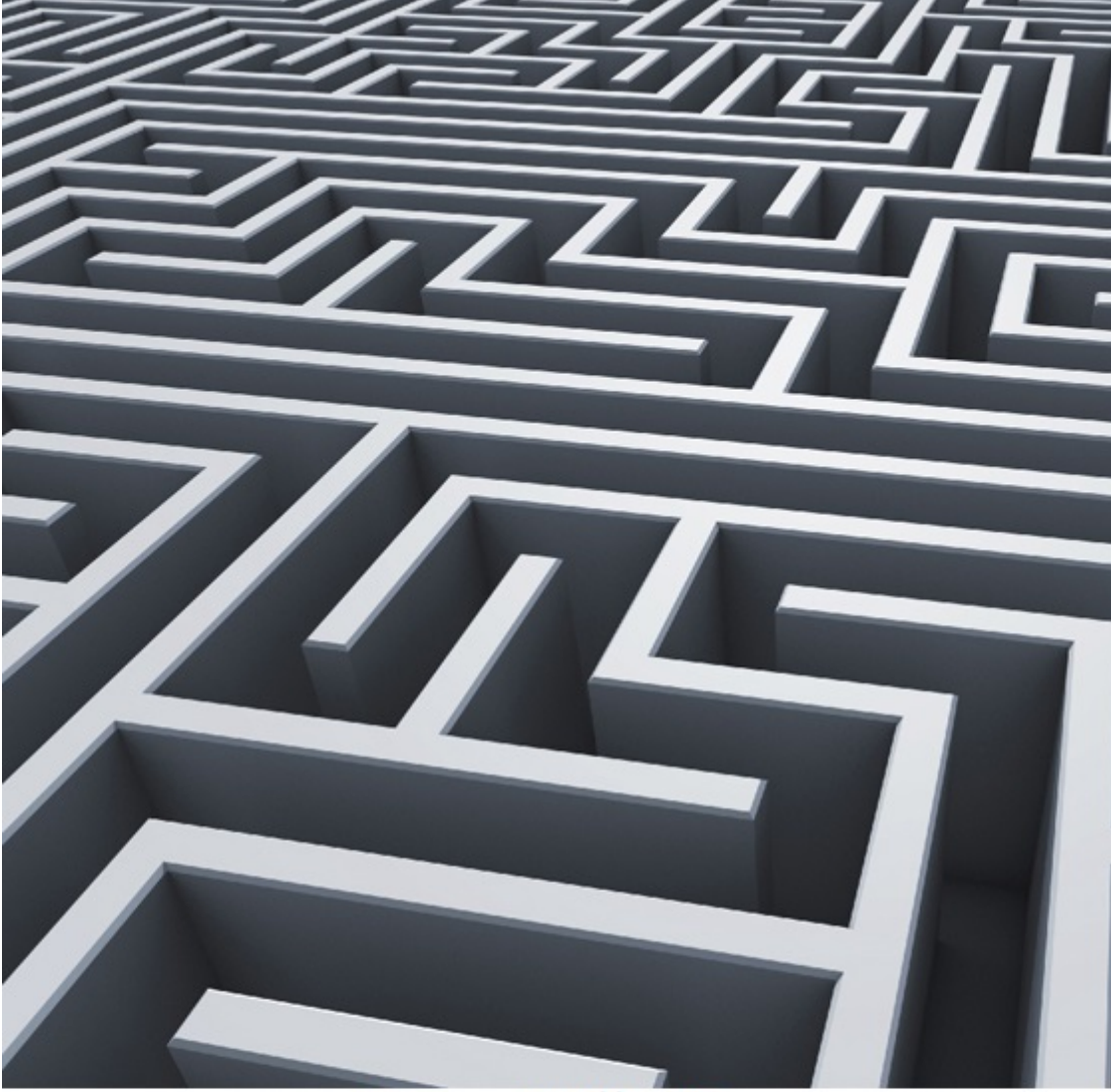

Rows Collection

ALEX CALLINICOS

Minds, Machines and Evolution

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A reply to John Parrington, *Computers and Consciousness*, and Joe Faith, *Dennett, Materialism, and Empiricism*, both in *International Socialism 2:73* (1996)

(March 1997)

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In one of the most interesting passages of his **Philosophical Notebooks** Trotsky confronts what philosophers call the mind-body problem. For materialists this takes the form of the question of how physical organisms like us can generate the complex and interrelated array of mental states that constitutes human consciousness. Trotsky rules out a reductionist solution to this problem which treats the mind (or psyche) as a mere epiphenomenon, a passive effect, of the body:

> By itself the method of psychoanalysis, taking as its point of departure 'the autonomy' of psychological phenomena, in no way contradicts materialism. Quite on the contrary, it is precisely dialectical materialism that prompts us to the idea that the psyche could not even be formed unless it played an autonomous, that is, within certain limits, an independent role in the life of the individual and the species.

> All the same, we approach here some sort of critical point, a break in the gradualness, a transition from quantity to quality: the psyche, arising from matter, is 'freed' from the determinism of matter, so that it can – by its own laws – influence matter. [1]

Trotsky goes on to point to the analogy between the interaction of mind and body and the way in which, in human history, the ideological and political superstructure arises out of the economic base but reacts back on it. He nevertheless admits 'When we make the transition from the anatomy and physiology of the brain to intellectual activity, the interrelationship of "base" to "superstructure" is incomparably more puzzling.' [2]

Trotsky is right. The mind-body problem is one of the most difficult in philosophy. When grappling with it, theorists are constantly liable to one of two errors. They can, in the first place, collapse into mechanical materialism, treating mental states as somehow directly correlated with physical events, and thereby denying what Trotsky calls '"the autonomy" of psychological phenomena'. This error is mirrored by a second – idealism – which treats mental and physical events as absolutely different, and so transforms the mind into a mysterious phenomenon unamenable to scientific explanation.

Marxists are not immune from either of these mistakes. In fact, in their replies to my review article of the American philosopher Daniel Dennett's book **Darwin's Dangerous Idea**, both John Parrington and Joe Faith generally show a slight tendency in the idealist direction. [3] They are, however, concerned to correct what they appear to regard as a serious lapse into mechanical materialism on my part, reflected particularly in my relatively friendly treatment of Dennett's philosophy of mind.

It may be helpful for me, before going on to consider John's and Joe's criticisms in a little detail, to make three general points about this treatment. First, despite the fact that Dennett's book is about Darwin's theory of evolution, it seemed to me unavoidable

to discuss the former's philosophy of mind. One of Dennett's purposes in **Darwin's Dangerous Idea** was evidently to use evolutionary theory as a way of attacking the problem that preoccupied his earlier philosophical writings, namely that of how human mental life could emerge from mindless physical states. Previously Dennett had offered what he calls a 'synchronic' solution to this problem, considering the relationship between the mind as an 'intentional system' of beliefs and desires and the human body (and more particularly the brain) as a physical organism. Evolution, by contrast, provided a 'diachronic, or historical' answer, by tracing the enormously long series of gradual adaptations which finally gave rise to intentionality. [4] Some discussion of Dennett's philosophy of mind was thus necessary to fill in the intellectual context of his Darwin book.

Secondly, my praise of the book, while justifiable in terms of its philosophical strengths, also involved a certain bending of the stick. In a cultural climate where postmodernism has exercised a pernicious influence, in particular by denying that human thought can genuinely engage with the world, here was a philosopher concerned to apply his analytical skills to articulating and defending one of the most powerful theories ever formulated about that world. It therefore seemed to me important to hold up this kind of work as an example of what philosophers can but too often don't do.

Thirdly, however, none of this implied a general endorsement of Dennett's philosophical position. How could it, when a substantial section of my piece is devoted to criticising him as a mechanical materialist, in particular for taking over Richard Dawkins's ridiculous idea of memes as the equivalents in human culture of genes in living organisms? [5] Joe complains that I don't mention Dennett's alleged empiricism, but there are plenty of other mistaken positions of his – for example, his endorsement in some of his writings of a 'methodological solipsism', which requires us to 'ignore the environment in

which the organism resides' – with which I also disagree. [6] Why list all my disagreements with Dennett in an article devoted specifically to his treatment of Darwin?

Minds and computers

John devotes the bulk of his article to a critique of the idea associated with the study of Artificial Intelligence (AI) that, as he puts it, 'a brain … is just a machine that carries out computational processes'. [7] What he says is interesting and, at least in general terms, true. I'm not sure how to the point it is, since I certainly don't think that that the brain, let alone consciousness, is a computer. More interestingly, it's not clear to me that Dennett does.

There are, it seems to me, two basic reasons why minds aren't computers. (For the sake of simplicity, in what follows I don't consistently distinguish between mind and brain.) The first, which John doesn't really discuss, is that human beings are organisms. Because of this we have all sorts of needs – for food, shelter, clothing, sex, etc. – and capacities – for locomotion, manipulation, articulate speech, and so on – to which there are no real analogies in computers. These needs and capacities underlie and interact with our mental activities. This is important, not simply because we can't understand how humans behave except in the light of these needs and capacities, but because any historical explanation of how human mental life developed can only do so by looking at how this process interacted with the evolution of these needs and capacities in successive species of hominids.

This is, I take it, part of what Trotsky is getting at when he says that 'the psyche could not even have been formed unless it played an autonomous … role in the life of the individual and the species'. In other words, the growing complexity of

hominids' brains gave them a selective advantage culminating in the emergence of human society. One of the strengths of the Darwinian strand in Dennett's philosophy of mind is the emphasis it places on the evolutionary process through which human minds developed – although, as I pointed out in my earlier piece, perhaps because of his 'methodological solipsism' he fails to place sufficient emphasis on the role played by labour and language in this history. [8]

The second reason why minds cannot be treated like computers is that, as John argues at some length, brains don't work like computers. But I don't think Dennett thinks so either. John declares that 'Dennett's computer model of mind is one of the primary forms of reductionism operating in psychology today', [9] but the only evidence he cites in support of this assertion is Dennett's declaration in Consciousness Explained that 'what you are is the programme that runs on your brain's computer'. This is strong stuff indeed – Dennett himself says he is making a claim in a 'provocative form' – but it needs to be put in the context of his larger account of the mind, something which John fails to do, but which must be attempted here, at least briefly. [10]

In the first place, when reading assertions such as that just cited we have to keep in mind Dennett's overall characterisation of his aim as 'to replace one family of metaphors and images with another' when thinking about the mind. [11] Now a metaphor is a sentence which is literally false but whose assertion illuminates some resemblance or relationship we might not otherwise have noticed. [12] The Earth isn't really shaped like an orange, but when my primary school teacher said that it was, I began to get some sense of its actual shape.

Dennett's 'family of metaphors', including the claim that the self is a computer programme, are directed at a mistaken view of the brain, what he calls 'Cartesian materialism'. The 17th century philosopher Descartes argued that the mind is a *res cogitans*, a thinking thing distinct from the body, from which we

view and come to know the world. Cartesian materialism is what we get when we give up this dualistic conception of mind as separate from body, but keep the 'idea of a special centre in the brain' which is the seat of consciousness. Dennett calls this 'the most tenacious bad idea bedevilling our attempts to think about consciousness'. Consciousness is not a show being performed in a 'Cartesian Theatre' somewhere in the brain. He wants to establish that, in fact, 'there's nobody home. No part of the brain is the thinker that does the thinking or the feeler that does the feeling, and the whole brain appears to be no better candidate for that very special role'. [13]

This leads to Dennett to formulate what he calls 'the Multiple Drafts model of consciousness', according to which 'all varieties of perception – indeed, all varieties of thought or mental activity – are accomplished in the brain, by parallel, multi-track processes of interpretation and elaboration of sensory inputs'. Different parts of the brain are continually and simultaneously registering information as a result of our interaction with the world, but:

> … once a particular 'observation' of some feature has been made, by a specialized, localized portion of the brain, the information content thus fixed does not have to be sent somewhere else to be rediscriminated by some 'master' discriminator. In other words, discrimination does not lead to a representation of an already discriminated feature for the benefit of the audience of the Cartesian Theatre – for there is no Cartesian Theatre ... These [spatially and temporally] distributed content-discriminations yield, over the course of time, something rather like a narrative stream or sequence, which can be thought of as subject to continual editing by many processes distributed around in the brain, and continuing indefinitely into the future. This stream of contents is only rather like a narrative because of its multiplicity; at any point in time there are 'multiple drafts' of narrative fragments at various stages of editing in various places in the brain. [14]

I have cited Dennett's description of his model of consciousness at some length in order to underline one point. The brain

depicted here as an inherently decentred assemblage of simultaneously occurring processes is very significantly different from any digital computer. The latter is constructed on principles devised by Alan Turing and Johann von Neumann. Their work designed a 'virtual machine' involving 'a serial process (events happening one at a time)' in which 'a finite set of primitive operations' are repeated over and over again at high speed, so that 'all the activity of the system has to pass single-file through a narrow gap.' Dennett comments:

> These fascinating new von Neumann machines … were, in fact, giant electronic minds, electronic imitations – severe simplifications – of what William James dubbed the stream of consciousness, the meandering sequence of conscious mental contents famously depicted by James Joyce in his novels. The architecture of the brain, in contrast, is massively parallel, with millions of simultaneously active channels of operation. What we have to understand is how a Joycean (or, as I have said, 'von Neumannesque') serial phenomenon can come to exist, with all its familiar peculiarities, in the parallel hubbub of the brain. [15]

Dennett thus acknowledges that '[t]here is a big difference between a (standard) computer's serial architecture and the parallel architecture of the brain'. Yet we undoubtedly experience our consciousness as a serial process, as a stream of consciousness in which one thing follows another, however randomly. One of Dennett's main concerns is to show how such 'Joycean machines' emerge despite the fact that they are not based in the physical structure of the brain. He argues that they are a product of human cultural evolution in the 150,000 years since our brains reached their current size and complexity:

> In our brains there is a cobbled-together collection of specialist brain-circuits, which, thanks to a family of habits inculcated partly by culture and partly by individual self-exploration, conspire together to produce a more or less orderly, more or less effective, more or less well-designed virtual machine, the Joycean machine. By yoking these independently evolved specialist organs together in common cause, and thereby giving their union vastly enhanced

> powers, this virtual machine, this software of the brain, performed a sort of internal political miracle: it creates a virtual capture of the crew, without elevating any of them to long-term dictatorial power. [16]

Now whatever one may think of this theory of consciousness, it is not in any straightforward way reductionist. Dennett's use of a whole array of computer-generated metaphors for the mind is intended in part, as he says, to provoke, to challenge the residual idealist conception of the mind as 'a ghost in the machine', a mysterious spiritual essence lurking somewhere behind the physical circuits in the brain. It is also because, despite the fact that there are, as he says, 'important – and often overlooked – disanalogies' between minds and computers, comparing them can help to explain the phenomenon of consciousness. [17]

Dennett's theory has been subjected to searching criticism by other philosophers. [18] But even if many of these criticisms are valid, it doesn't seem to me that his enterprise is inherently a disreputable one. It will not do, as John does, simply to reaffirm the differences between human beings and, on the one hand, other animals, and, on the other hand, computers. Real though these differences are, humans are, after all, physical organisms, and any materialist account of the human mind is going to have to come up with some way of relating mental and physical states. If not Dennett's way, then what? I'm sure that there are other, perhaps more fruitful ways, but John doesn't acknowledge the existence of the problem.

Moreover he implies that any comparison between minds and computers is necessarily a case of alienation. This smacks of the attitude of those philosophers like John Seatle and Colin McGinn whom Dennett denounces as 'mysterians' because they treat the mind as something too sublime and ineffable to be compared with anything as vulgar as a mere machine. Materialism necessarily requires us to see mind as part of nature, including what Hegel calls human-made 'second nature'.

Comparisons between minds and computers should be judged on their merits and not ruled out *a priori*.

Joe shows more awareness of the issue when he takes Dennett to task for having what he calls an empiricist conception of intentionality. In other words, Dennett argues that we should treat something as an 'intentional system', ascribing to it beliefs and desires, when this proves to be the best way of predicting how it will behave. Doing so involves making no judgement about what real properties the intentional system has that are responsible for it behaving in a way that is best treated as the outcome of beliefs and desires. [19]

Undoubtedly Dennett does advance such a conception of intentionality, which I would prefer to call pragmatist rather than empiricist, though I won't quibble about words. Dennett himself describes this approach as 'Interpretivism' and defends it on philosophical grounds too complex to go into here. [20] All the same, Joe is right: treating intentionality as a predictive device does not amount to an explanation of mental life, since that would require identifying the real properties that, for example, human beings have which account for our holding beliefs and desires and acting on them. But this merely reinforces the point I made above. Any such explanation of human mental activities is going to have to come up with some story of how they hook up with the body in general and the brain in particular. Dennett's merit is to have come up with one such story which avoids the more obvious forms of reductionism; for example, the idea that there is a direct correlation between individual events, physical states and individual mental events. [21]

Joes's own attempt at an explanation, even taking constraints of space into account, doesn't even begin to address the problem:

> To put it crudely, what makes our thoughts of a cat about a cat (rather than being a purely private, internal, affair)? The simple answer is that our thoughts can cause our bodies to reach out and

grab a cat, and so bring our contents into contact with their contents through our actions. [22]

But this won't do at all. Dennett calls intentionality 'the "aboutness" that can relate one thing to another'. [23] In other words, our beliefs and desires pick out items in the world in order to ascribe to them properties which we either hold they have or wish they had. The ability of our thoughts to refer to objects in this way is undoubtedly bound up with our causal interactions with the world. [24] But they cannot be reduced to these interactions. Dogs causally interact with cats, but this doesn't mean that Fido when chasing Moggy consciously entertains any of the following thoughts: 'I like chasing cats', 'Moggy is a cat', 'I want to kill Moggy', or even, 'Here is Moggy'. Whatever proto-beliefs and desires we must attribute to Fido in order to explain his behaviour as what Dennett might call a 'semi-intentional system', they do not form an articulated system of thoughts used to refer to and make assertions about different parts of the world. [25] More than anything else, it is the fact that human thought and language are both holist – in other words, our various beliefs and desires interconnect with each other to form a whole – and referential – these beliefs and desires point beyond themselves to the world – that makes it so difficult satisfactorily to identify the physical basis of our mental life. Only a materialism that is fully aware of this difficulty can hope to overcome it.

Evolution, contingency, and chance

Though Joe here lapses into a sort of crude materialism, the general drift of his remarks on evolution is in a somewhat idealist direction. In effect, he accuses me of being too sympathetic to the orthodox Darwinian conception of evolution defended by Dennett. Before I deal directly with what he has to say, it may be helpful to set out some of the main issues that

divide orthodox Darwinians such as Dennett and the biologists Richard Dawkins and John Maynard Smith from what one might call their 'left Darwinian' critics such as Stephen Jay Gould, Richard Levins, Richard Lewontin, and Stephen Rose:

The unit of selection:

Darwin argued that natural selection is the main force responsible for the emergence of new species: variations which enhance an organism's 'differential fitness' – its ability to survive and reproduce relative to other organisms in the same environment – and which can be passed on to its offspring will, other things being equal, lead to its descendants making up a larger proportion of future generations. But what exactly is it that is selected in this process? Is it, as Darwin thought, the individual organism? Is it, as many naturalists have believed, a larger group of organisms – the population or even the species? Or is it, as Dawkins argued in **The Selfish Gene**, the individual gene? [26]

Adaptation:

Adaptation is a key Darwinian concept. Advantageous variations make organisms better adapted to their environment: the adaptation allows the organism either to cope better with an environment that has remained unchanged, or to respond to changes in the environment. But Gould and Lewontin have attacked what they call orthodox Darwinian 'adaptationism', which tries to explain every trait of an organism as an adaptation and to adopt a 'Panglossian' view of evolution in which which the entire array of life is constantly tending towards a state of 'optimal' adaptation to the world around it (in Voltaire's novel **Candide** Dr Pangloss is constantly explaining away everything, good or bad, as a consequence of the fact that 'all is for the best in this best of all possible worlds'). [27]

Punctuated equilibrium:

Darwin wrote:

> I believe that natural selection will always act very slowly, often only at long intervals of time, and generally on a very few inhabitants of the same region at the same time. I further believe that this very slow, intermittent action of natural selection accords very well with what geology tells us of the rate and manner at which the inhabitants of this world have changed. [28]

This conception of natural selection as an extremely slow process of gradual change is defended by contemporary orthodox Darwinians. Thus Dawkins in what is probably his best book, **The Blind Watchmaker**, provides very effective arguments in support of Darwin's thesis that all the complexity of the living world, apparent evidence of design, can be explained as a consequence of the 'very slow, intermittent action of natural selection'.

One difficulty with this approach is that, pace Darwin, the fossil record has never supported his conception of evolution as a series of continual, small scale changes, since markedly new species tend to appear very abruptly. Darwin devoted much effort to explaining away what he acknowledged to be the problem posed by this 'absence or rarity of transitional varieties'. [29] But Gould and his fellow palaeontologist Nils Eldredge have suggested that we should instead take the fossil record at face value. For them evolution is a process of 'punctuated equilibrium', in which long periods of stasis, where little or no adaptation occurs, is interrupted by relatively concentrated bursts of qualitative change. To explain this pattern, they further argue, it is necessary to posit forms of group selection, thus coming into conflict with more orthodox conceptions of the selection of genes or individual organisms. [30]

Contingency:

Gould goes even further in more recent writings, notably his book **Wonderful Life** (1989). He argues that the actual path taken by evolution must not be seen as some sort of necessary pattern. He insists instead on 'the controlling power of contingency in setting the pattern of life's history and current composition'. [31] The great late Cretaceous extinction 65 million years ago provides an example familiar to every school child. Probably the most popular explanation of this extinction, in which most of the dinosaurs died, is that it was caused by the environmental disruption that followed a large comet hitting the Earth. [32] Without this collision, which could hardly be predicted on the basis of the properties of living organisms alone, the mammals might still be small rat-like creatures furtively scurrying around at the dinosaurs' feet. So the development of the mammals, culminating, as triumphalist presentations of evolution tend to, in the emergence of *Homo sapiens sapiens*, turns out to be the product of what is, from the perspective of the life-sciences, an accident.

It is in this sense that Gould argues that natural history is permeated by 'contingency':

> We call a historical event … contingent when it occurs as a chancy result of a long string of unpredictable antecedents, rather than as a necessary outcome of nature's laws. Such contingent events often depend upon choices from a distant past that seemed tiny and trivial at the time. Minor perturbations early in the game can nudge a process into a new pathway, with cascading consequences that produce an outcome vastly different from any alternative. [33]

These are large and complex issues, and it may seem a bit of a cheek for a non-biologist to express definite opinions on some of them, but here goes anyway. [34] It seems to me that on the first and second points the left-Darwinians are right. The effect of their arguments is to undermine the image of evolution promoted by Dawkins and other orthodox Darwinians as an interaction between individual genes and their environment.

On the one hand, the relationship between gene and phenotype (the actual organism) posited by Dawkins's 'genic selectionism' depends on what the philosopher Elliott Sober calls 'beanbag genetics', where 'each gene would produce a single phenotypic characteristic of selective importance. Possessing a gene would then be a positive causal factor for possessing the phenotype in question'. But beanbag genetics is undermined by two phenomena: first, pleiotropy, where the same gene may have more than one phenotypic effect, and not all these effects confer selective advantages; secondly, polygenic effects, 'in which', as Sober puts it, 'a given phenotype is the result of an interaction among an ensemble of genes'. [35] So genic selectionism fails because it posits an atomistic relationship between gene and phenotype.

On the other hand, Levins and Lewontin challenge the idea which underlies the concept of adaptation, of the organism fitting a pre-existing environment. In the first place, organisms interact with and change their environment: Darwin in his last book celebrated the role of the humble earthworm in creating the soil itself. Secondly, however, the features of the environment relevant to a given organism will depend on the nature of the organism itself. So there is an important sense in which the environment cannot be characterised independently of the organism itself; consequently, adaptation cannot be seen simply as a matter of organisms responding to problems posed by an environment independent of them. Finally, an important role is played by 'developmental noise, the random events at a cellular and molecular level that influence cell maturation and division and that especially may result in small differences in the time when critical divisions occur'. Therefore, 'The consequences of the interaction of gene, environment, and developmental noise is a many-to-many relationship between gene and organism. The same genotype gives rise to many different organisms, and the same organism can correspond to many different genotypes.' [36]

Now Joe argues that this 'constructionist' (as Lewontin describes it) conception of the relationship between organism and environment supports Gould's stress on contingency: 'once organisms define their own conditions, then the variability in the initial population can quickly lead to very divergent histories'. [37] And Lewontin himself writes:

> At every moment in the life history of an organism there is contingency of development such that the next step is dependent on the current state of the organism and the environmental signals that are impinging on it. Simply, the organism is a unique result of both its genes and the temporal sequence of environments through which it has passed, and there is no way of knowing in advance, from the DNA sequence, what the organism will look like, except in general terms. [38]

A number of points are worth making here. In the first place, it's necessary to treat the claim that 'organisms define their own conditions' with some care. To say, as Levins and Lewontin do, that '[o]rganisms determine what aspects of their environment are relevant and which environmental variations can be lumped or ignored,' is not to say that they in general control their environment. [39] Their different, genetically based relationships to their environments must explain why mammals survived, and dinosaurs mostly perished in the late Cretaceous extinction, but neither caused the cometary collision apparently responsible for this biological upheaval. The idea of organisms defining their environment, while a useful corrective to the orthodox Darwinian conception of adaptation, can, unless used carefully, have idealist connotations.

Secondly, to say that the actual path of development taken by an organism cannot be predicted from its DNA is not to say that it cannot be explained. It is possible, in principle, to reconstruct the way in which the organism's genes, 'the temporal sequence of the environments through which it has passed', and 'developmental noise' interacted to produce the actual course it followed. This may be a retrospective exercise, but then the

study of living organisms, like that of human societies, necessarily requires the historical reconstruction of processes that unfolded in the past.

Thirdly, these historical reconstructions undoubtedly involve an element of contingency in the sense that there are a number – perhaps a very large number – of developmental paths in principle consistent with the same genotype. It is precisely for this reason that an organism's actual development can be the subject of a historical narrative which seeks to capture the particularities which led it along the path it took. In that sense Gould's stress on the importance of natural history in his recent writings is entirely correct and praiseworthy. [40]

Nevertheless, these possible paths are subject to a number of constraints. One is provided by the laws of inorganic nature: organic evolution must respect such physical realities as gravitation and the conservation of energy (though, as Lewontin, points out, the effect of these forces is filtered through the genetic structure of the organisms concerned: gravity is a burden for large mammals such as us but not for bacteria). [41] Another is provided by the laws of genetics and of biological structure: whatever the variations in the environments that I encounter, I am never going to sprout wings and fly, or turn into a typewriter. Then there is the phenomenon of 'convergent evolution', in Gould's words, 'the repeated development of similar adaptations in different lineages', or what Dennett calls 'forced (or good) moves'. The same problem may pose itself to a wide variety of organisms, nudging them towards the same solution: the eye is a good example, since it has evolved independently on a number of different occasions. [42]

Whatever contingency there is in natural history occurs within the framework of these, and no doubt other constraints. Evolution is thus neither random nor arbitrary, even if it is unpredictable. Maybe Gould would accept all the above provisos to his thesis about historical contingency. Indeed, occasionally he makes analogous points, asserting for example, 'Invariant

laws of nature impact the general forms and functions of organisms; they set the channels in which organic designs must evolve.' But, characteristically, he then takes away much of what he has apparently conceded: 'When we set our focus upon the level of detail that regulates most common questions about the history of life, contingency dominates and the predictability of general form recedes to an irrelevant background'. [43]

In advancing this thesis Gould seems to be bending the stick against vulgar Darwinian identifications of the concept of evolution with 'some notion of progress, usually inherent and predictable, and leading to a human pinnacle'. If so, he nevertheless does at times bend the stick to the point of breaking, as when he identifies himself with:

> … the most philosophically radical concept arising from our modern study of life's early multicellular history – the notion that most losses occurred by the luck of the draw rather than by the predictable superiority of a few founding lineages, and that any particular lineage still alive today (including our own) owes its existence to the contingency of good fortune. [44]

Does Joe agree with this? Is evolution simply a lottery in which survival or extinction is determined by 'the luck of the draw'? To answer the latter question in the affirmative is to come dangerously close to abandoning the claim – central to Darwin's theory of natural selection – of being able to explain the evolution of organisms. Gould is a brilliant populariser of that theory's successes, and its vigilant defender against the inroads of 'creation science', so it is surprising to see him pull the rug from under himself and the rest of the Darwinian camp. The reason is, I have suggested, a reaction to the kind of triumphalism characteristic of vulgarisations of evolutionary theory. But in seeking to differentiate himself from this he does not seem to notice that he is thrusting himself into the arms of other foes – not just the creationists who eagerly seek to exploit any disagreement among evolutionary biologists, but also postmodernists happy to the use the writings of a leading

scientific populariser to prove that natural as well as human history is nothing but the play of 'contingency'. [45]

Conclusion

This brings me to a more general point on which I shall conclude. Biological reductionism – as represented, for example, by Dawkins's genic selectionism – is not merely a theoretical error but a ideological threat. It serves to justify a whole series of practical projects which seek to control or alter people's behaviour or to legitimise their oppression on the basis of their genes – the idea that IQ tests reflect inherent differences in intelligence, the Human Genome Project, and so on. [46] The left Darwinians have provided a brilliant critique of such nostrums: Gould's **The Mismeasure of Man** in particular stands out as a devastating historical and scientific demolition of the whole wretched business of IQ testing.

But we should not be led, either out of gratitude to the left Darwinians or because of the real intellectual substance of their work, into one of two errors. One is to assume that orthodox Darwinians like Dennett and Dawkins are always wrong. As John has himself pointed out, Dawkins, despite his genic selectionism, is a superb expositor of the theory of natural selection, who has defended it very effectively against the mystifications of creationism. [47] Indeed, like Dennett, he is something of an old fashioned Victorian mechanical materialist, who overstates the importance of a purely intellectual struggle against Christianity, astrology, and other superstitions, as opposed to Marxism's effort to identify and address their social causes.

The second and related error is to adopt an uncritical attitude towards the left Darwinians. Important, indeed simply brilliant as their work often is, they are liable for a variety of reasons –

overreaction to biological reductionism and vulgar Darwinism, their social position as academics relatively isolated from working class organisation and struggle, in some cases conceptions of 'radical science' of Maoist derivation – to react to the mechanical materialism of which Dennett and Dawkins are often guilty by lapsing into various forms of idealism. Gould's tendency to reduce natural history to contingency is a case in point.

Though I am grateful to John and Joe for the opportunity their articles have given me to discuss these issues, I think that, in their reaction to my original review of Dennett's book, they show a certain tendency towards this kind of left Darwinian idealism. We have much to learn from Gould, Lewontin, Rose *et al.*, and will often find ourselves fighting alongside them, but we should not therefore abandon our critical faculties or refuse to learn from other currents in evolutionary theory.

Notes

1. L. Trotsky, **Philosophical Notebooks** (New York 1986), p. 106.

2. **Ibid.**, p. 107.

3. A. Callinicos, *Darwin, Materialism and Evolution*, **International Socialism 2:71** (1996); J. Parrington, *Computers and Consciousness*, and J. Faith, *Dennett, Materialism, and Empiricism*, both in **International Socialism 2:73** (1996).

4. See especially D.C. Dennett, **Darwin's Dangerous Idea** (London, 1995), pp. 205–206.

5. A. Callinicos, **op. cit.**, pp. 106–112.

6. D.C. Dennett, *Beyond Belief*, in A. Woodfield (*ed.*), **Thought and Object** (Oxford 1982), p. 25.

7. J. Parrington, **op. cit.**, p. 55.

8. See C. Harman, *Engels and the Origins of Human Society*, **International Socialism 2:65** (1995), pp. 84–104.

9. J. Parrington, **op. cit.**, p. 55.

10. D.C. Dennett, **Consciousness Explained** (London 1993), p. 430.

11. **Ibid.**, p. 455.

12. See D. Davidson, *What Metaphors Mean*, **Inquiries into Truth and Interpretation** (Oxford 1984).

13. D.C. Dennett, **op. cit.**, pp. 29, 108.

14. **Ibid.**, pp. 111, 113.

15. **Ibid.**, pp. 212, 214. 'A virtual machine is what you get when you impose a particular pattern of rules ... on all that plasticity' – i.e. that possessed in different ways by both computers and brains: **ibid.**, p. 211.

16. **Ibid.**, pp. 215, 228. See generally **ibid.**, chs. 7 and 8.

17. **Ibid.**, p. 219. See A. Callinicos, **op. cit.**, pp. 101–102, for a brief account of the role played by metaphors derived from AI in Dennett's earlier work in the philosophy of mind.

18. See Dahlbom (*ed.*), **Dennett and his Critics** (Oxford 1993).

19. J. Faith, **op. cit.**, pp. 67–69; compare, e.g., D.C. Dennett, **Brainstorms** (Brighton 1981), especially ch. 1.

20. See especially J. Fodor and E. Lepore, *Is Intentional Ascription Intrinsically Normative?*, R. Rorty, *Holism, Intrinsicality, and the Ambition of Transcendence*, and D.C. Dennett, *Back to the Drawing Board*, all in Dahlbom, **op. cit.**

21. For a classic critique of this kind of physicalism, see D. Davidson, **Essays on Actions and Events** (Oxford 1980), essays 11–13.

22. J. Faith, **op. cit.**, p. 68.

23. D.C. Dennett, **Darwin's Dangerous Idea**, **op. cit.**, p. 205.

24. G. Evans, **The Varieties of Reference** (Oxford, 1982).

25. Dennett discusses the whole issue of animal consciousness in **Kinds of Minds** (London 1996).

26. E. Sober, **The Nature of Selection** (Chicago 1993), Part II.

27. S.J. Gould and R.C. Lewontin, *The Spandrels of San Marco*, **Proceedings of the Royal Society B205** (1979).

28. C. Darwin, **The Origin of Species by Means of Natural Selection** (Harmondsworth 1968), p. 153.

29. **Ibid.**, p. 206.

30. See N. Eldredge, **Reinventing Darwin** (London 1996).

31. S.J. Gould, **Wonderful Life** (London 1991), p. 289.

32. See S.J. Gould, *The Belt of an Asteroid*, in **Hen's Teeth and Horses' Toes** (Harmondsworth 1984), and M. Davies, *Cosmic Dancers on Earth's Stage?*, **New Left Review 217** (1996), especially pp. 55*ff.*

33. S.J. Gould, **Bully for Brontosaurus** (Harmondsworth 1992), p. 69; see also S.J. Gould, **Wonderful Life**, **op. cit.**, pp. 277–291.

34. I say nothing here about the question of punctuated equilibrium because I simply lack the competence to judge whether Gould and Eldgredge or their orthodox Darwinian opponents are right. It is not in any case quite so obvious how much hangs on which side is right here as it is with respect to the other issues. The idea of punctuated equilibrium is an attractive one for Marxists since it seems to be an instance of the dialectical law of transformation of quantity into quality, but that is not, on its own, sufficient reason for accepting it.

35. E. Sober, **op. cit.**, pp. 312–313. See also S.J. Gould, *Caring Groups and Selfish Genes*, in **The Panda's Thumb** (Harmondsworth 1983).

36. R. Levins and R.C. Lewontin, **The Dialectical Biologist** (Cambridge MA 1985), pp. 93–94. See also **ibid.**, part I, and R.C. Lewontin, *Genes, Environments, and Organisms*, in R.B. Silvers (*ed.*), **Hidden Histories of Science** (London 1997).

37. J. Faith, **op. cit.**, p. 70. Joe also says that I present 'a one-sided picture of natural selection [as] being primarily about competition for resources'. This is, I think, a strained reading of my exposition of Darwin's theory (Callinicos, **op. cit.**, pp. 103–104, and see also pp. 113–114, n15). Darwin himself stressed, 'I use the Struggle for Existence in a large and metaphorical sense', and that competition may be 'one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life' (C. Darwin, **op. cit.**, pp. 116–117; emphasis added). So 'the Struggle for Existence' may pit an organism against its environment rather than against other organisms.

38. C.R. Lewontin, *Genes, Environments, and Organisms*, **op. cit.**, p. 124.

39. R. Levins and C.R. Lewontin, **op. cit.**, p. 55.

40. See, for example, S.J. Gould, **Wonderful Life**, **op. cit.**, pp. 277–291, and *George Canning's Left Buttock and the Evolution of Species*, in **Bully for Brontosaurus**, **op. cit.**

41. C.R. Lewontin, *Genes, Environments, and Organisms*, **op. cit.**, pp. 136–137.

42. S.J. Gould, **The Panda's Thumb**, **op. cit.**, p. 35; see also D.C. Dennett, **Darwin's Dangerous Idea**, **op. cit.**, pp. 128*ff.*

43. S.J. Gould, **Wonderful Life**, **op. cit.**, pp. 289, 290.

44. S.J. Gould, *Ladders and Cones*, in R.B. Silvers (*ed.*), **op. cit.**, **Hidden Histories of Science**, pp. 42–43, 67.

45. Thus see Gould's correspondence with ex-president Jimmy Carter where the latter seizes on his claim in **Wonderful Life** that '*Homo sapiens* … is a wildly improbable evolutionary event' (p. 291) to argue for divine creation: S.J. Gould, *In a Jumbled Drawer*, in **Bully for Brontosaurus**, **op. cit.** Gould's highly technical answer is, to say the least, unconvincing.

46. See R.C. Lewontin, **The Doctrine of DNA** (London 1993).

47. J. Parrington, *No Mere Gene Programme*, **Socialist Worker**, 7 September 1996.