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Darwinisms’s Multiple Ontologies

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In recent decades, George Gaylord Simpson's 1959 complaint that "one hundred years without Darwin are enough" has found a measure of resonance. In the wake of the recession of the two other great nineteenth-century systems of thought, Marxism and Freudianism, any number of discourse communities have been "taking Darwinism seriously," in Michael Ruse's phrase. We have Darwinian accounts of emotion, behavior, cognition, language, economics, morality—all topics that for most of the twentieth century were protected from what Daniel Dennett calls "the universal acid" of the theory of natural selection.

This sea change was provoked, I imagine, by discoveries in the mathematics of kin selection. The case of the Hymenoptera, with their lopsided haplodiploid genetic system, has become as paradigmatic of Darwinian thinking as the beaks of Darwin's finches or the differently colored pepper moths of industrial Britain. It has encouraged Darwinians to extend the theory of kin selection to diploid organisms by a variety of additional instruments—game theory, for example, which assures us that in any evolutionary stable population there will be as adequate a supply of doves as of hawks. The result is a proliferation of selectionist explanations of behavior and cognition that collectively have eroded a standing objection that had kept Darwinism safely away from the human scene: that, even in a world conceded to be generally selfish, natural selection seemed incapable of explaining the amount of cooperative and altruistic behavior that we do in fact find among animal and human communities.

The erosion of this barrier has in turn had the effect of destroying the truce that the makers of the modern synthesis had encouraged between physical and cultural anthropology, according to which the former were to be Darwinian and the latter roughly Lamarckian. More generally, it has disturbed the boundary markers of what Bruno Latour calls "the modern constitution," which keeps the natural sciences separated from the social sciences and the social sciences separated from the value-preserving, aesthetics-centered, but decidedly nonscience humanities. These disturbances have been intensified recently by the now widespread perception that molecular genetics has at last made biology a technoscience, capable for the first time in its history of manipulating objects that were hitherto largely theoretical. In the concomitant recirculation of old topoi about how humans can now direct their own evolution, we cannot help recognizing the recrudescence in biology and psychology of themes from the radical Enlightenment. Such themes were a prominent feature of the physical and chemical sciences in the first flush of discovery but have largely been domesticated in them. In contemporary evolutionary and molecular biology, on the other hand, we are currently hearing a good deal of crowing about how genetic Darwinism "blocks the exits"—Dennett's phrase again—that afford metaphysical solace and religious sanctuary only at the cost of childish illusion.

These developments have provoked a significant shift in the iconic meaning of the term Darwinism. By iconic meaning I mean the sort of imagery that crosses from one discipline to another, in part by circulating through the general public. The latest iconic image of Darwinism springs from the perception that the logic of Darwinism requires that something must be selfish in the sense of being favored by selection's winnowing process. If cooperating and even self-sacrificing organisms do not till the hill, then perhaps genes do. Accordingly, today's iconic Darwinism is tilted toward versions of natural selection in which genes, viewed as coding pieces of DNA, are taken to be the primary units over which selection ranges and, in their proliferation, to be the beneficiaries of the selection process. The bits of morphological structure, including neural architecture, that favor successfully proliferating genes are construed as modularized units of function. Variant versions of these can be recombined and recycled in different populations, species, and lineages to form selection-driven adaptations. Among these functions are behaviors, emotions, and various cognitive skills, including perhaps language use.
I do not deny that many eminent genetic Darwinians and philosophers of evolutionary biology reject this picture or that many of those who support some of it may be repelled by the rest. It is, after all, only an icon. What I do maintain, however, is that these days, when strong inferences are made from the very idea of natural selection—"the best idea anyone has ever had," as Dennett puts it—to conclusions that purport to offer definitive solutions to philosophy's questions—metaphysical, epistemological, and normative—by pulling them into the presumably empirical orbit of Darwinism, one or another aspect of the iconic image of Darwinism generally does the persuasive work.

My aim here is to unsettle such inferences. There are two aspects to my argument. The first has to do with the identity, stability, and referential range of the term *Darwinism*. Inferences from the very idea of Darwinism to matters hitherto considered safe from its grasp clearly depend on what Darwinism is taken to be. The term is, I think, essentially contested enough so that we cannot prevent Darwinian rhetors from at least attempting to corner the market on the idea of natural selection. Nice try, we might say, once again borrowing sneers from Dennett. Nonetheless, such attempts anachronistically rely on treating natural selection as an idea that has only recently come to clarity about itself. In the current iconic view, for example, Darwin's frustration with the apparent inability of natural selection at the organismic level to explain altruistic behavior—he was forced to invoke unstable combinations of sexual selection, group selection, and the inheritance of acquired characteristics—could not be relieved until the discovery of genes and the development of kin selection theory gave us something closer to the very nature of Darwinism. In a similar vein, Dennett thinks that the "universal acid" that makes Darwinism 'reductionism incarnate' had to wait for the emergence of the technological notions of feedback and computational programming to reveal its own identity.

Such "retrospective coronations"—Dennett again, though turned in an unwelcome way on his own thinking—depend, I assert, on a picture in which what I take to be a historical fact is obscured: that the identity of the Darwinian tradition has been knitted and reknitted together in response to a series of contingencies; that at any number of points it might have perished; that this knitting up has been achieved by way of often agonistic conversations, punctuated by temporary peace treaties, in which different bits of empirical data have been assimilated to the core idea of natural selection by way of different, often conflicting conceptual frameworks; and that in consequence the ever-widening array of empirical facts that evolutionary theory has incorporated and will presumably continue to incorporate as best it can—it is, after all, still a progressive research tradition—are best represented as a totality when they are distributed over a plurality of interpretive frameworks, some of which do well on one set of data while others do well on another. The teleological logic of iconic Darwinism may rely tacitly on a retrospectively crowned, and factually inadequate, image of the meaning of the term Darwinism. But if I am right about the pluralistic conditions for the historical development of the Darwinian tradition, it might also follow that if the iconic image were to further consolidate its growing hegemony over the Darwinian research tradition it might obstruct the further empirical articulation of the idea of natural selection. Not content merely to stand on the shoulders of giants, genocentric Darwinians might press so heavily on the shoulders of Darwinism's giants that the latter would be pounded down into the earth, where they would be rendered invisible and silent.

The second aspect of my argument contends that appeals to natural selection to "block the exits" to philosophy's traditional monopoly on questions about mind and knowledge (and to the religiously transcendent) depend more on the conceptual schemes adopted by their authors than on any empirical evidence encoded by means of those schemes. Interpretive frameworks, at least the ones I have in mind, have generally to do with the nature of the relationship between the parts (including genes) of organisms and the organisms that contain these parts; between organisms and populations; and between populations and species. Since issues about these relationships bear upon the ontology proper to describing and measuring living things and the processes in which they are imbricated—they are the very stuff philosophy of evolutionary biology is made of—conceptual schemes that figure these relationships can be considered ontologies. These schemes vary. In their variation they provoke intense theoretical quarrels and large extrapolations from known facts. Taken apart from the empirical information and explanations they encode, however, such frameworks are prone to generate transcendental illusions in Kant's sense; when proponents of each framework are left to their own devices, they spin their wheels without gaining sufficient traction in matters of fact to justify the large inferences that the preferred conceptual vocabulary and system of tropes seem to license. This tendency is particularly marked whenever we talk about the implications of Darwinism for matters of behavior, mind, and language.

The antidote is reasonably obvious. The impulse that commends the deployment of a plurality of conceptual schemes in order to advance the empirical adequacy, or at least respectability, of Darwinism is the same impulse that, if followed, will block strong inferences from the alleged meaning of Darwinism to
philosophical or religious conclusions. The form of my argument is simple. Such inferences are always the work of preferred interpretive schemes. The very effort to silence other schemes, however, obscures some of the empirical data that must be weighed before any inferences about the implications of Darwinism can be ventured. In consequence, a discursive space must be left open in which are weighed the advantages and disadvantages of various schemes for interpreting Darwinism and the larger implications they might sustain. Versions of naturalism that collapse this space by demanding too much continuity between sciences and reflective discourses about it are as dangerous as versions of philosophy that insulate metaphysical, epistemological, and normative propositions from the deep insights of evolutionary science.

**DARWINISM DEMARCATED**

Inferences about Darwinism's alleged ability or inability to dispose of philosophy's traditional problems or religion's traditional aspirations depend on what one means by Darwinism. I have already implied that Darwinism is co-extensive with the idea of natural selection; natural selection, I have said, provides the thread that has tied the Darwinian research tradition together through its many vicissitudes. There is an important distinction to be drawn, however, between the bare notion of natural selection and a potentially open-ended array of different and contesting interpretations by means of which that bare notion has been and presumably will be articulated under the pressure of new discoveries and problems. Thus I want to defend the centrality of natural selection in demarcating Darwinism both from wider interpretations, which tend to identify it with transmutation plus monophyletic descent with modification no matter by what means, whether natural selection or something else, and from narrower interpretations, which presume that if and when it becomes strenge Wissenschafts evolution by natural selection can, should be, and even will be articulated in only one way.

There was a moment in Darwinism's career when one might reasonably have circumscribed it solely as commitment to transmutation combined with monophyletic descent of all taxa from a common ancestor. The negative reception that at first greeted *On the Origin of Species* was reversed within a decade by recourse to just such a broad definition. Once it took hold, this broad definition gave rise to a wild assortment of interpretations of Darwinism-as-evolutionism promoted by a no less wild profusion of metaphysical frameworks, from purely idealist to grossly materialist. These interpretations were metaphysical, in the casually Kantian way that I am stipulatively using the term, because the interpretive frameworks tended to drag the empirical evidence around rather than the reverse. After all, there wasn't a lot of empirical evidence available at the time. Soon enough, however, only the materialist interpretations seemed to count as Darwinian; those holding idealist interpretations began to think of themselves as neo-Lamarckians or as neo-Geoffroyans. It was under a materialist banner, for example, that Clemence Royer's translation of *On the Origin of Species* exported Darwinism to France, that Ernst Haeckel's *Darwinismus* was diffused throughout Germany, and that Chernosevsky and other political radicals promoted "Darwinism without Malthus" in Russia. At home in Britain, and in the United States, where one could not as easily plead misunderstanding due to different cultural contexts, Darwinism was more or less co-opted by Spencerism.

Strikingly, none of these interpretations had much truck with natural selection, and many of them actively opposed it. In reflecting on this well-known fact, we might take a tolerant, permissive view of the identity of Darwinism by agreeing with David Hull, who argues that these self-proclaimed Darwinsisms without natural selection should be allowed to count as Darwinian, at least by Darwinians, because by its very nature Darwinism cannot have an essence, only a history, and we might correspondingly disagree with Peter Bowler, who speaks of this diffuse period as "the non-Darwinian revolution." Bowler's claim is somewhat excessive: he neglects the many selectionists who were at work during this period, whose biostatistical inquiries led to the reknitting of the new synthesis of the Darwinian tradition in the twentieth century. I am more ready to concede to Hull, then, that evolutionism of all sorts once was Darwinism. At the same time, it is clear that monophyletic descent alone has not been the primary means by which the unity and projectibility of the Darwinian tradition have been carried over some very difficult moments into the present. Most versions of nineteenth-century Darwinism-as-evolutionism failed to generate empirical research programs that had much staying power or were able to give birth, through closely engaged controversy, to successor programs—programs that, with a loss here and there, tended to consolidate the gains made and to move on new problems, such as speciation or the articulation of variation in terms of mechanisms of inheritance. All that was, and still is, the work of the idea of natural selection, and indeed of natural selection encoded within a fairly large range of competing interpretive frameworks.

There is, however, a still more telling reason for demarcating the Darwinian tradition by means of the idea of natural selection and for trying to evade Hull's
accusation that this identity involves essentialism by invoking, as I have been doing, Darwinism's conceptual pluralism. The shift away from thinking of Darwinism as monophyletic evolutionism simpliciter was not a matter of mere conceptual drift. Nor was its recentering on natural selection when it rose from its rumored deathbed a reprehensible suppression of Darwinism's original pluralism with respect to evolutionary forces. Late-nineteenth-century evolutionism, even when it traveled under Darwin's name, was intrinsically directional: the heated question of the day turned on whether evolution was actually directed or tended by some inner impulse to move from monad to man. Natural selection, by contrast, is at best only accidentally directional and quite possibly not directional at all. The reason is that natural selection ties the very idea of an organism to available variation in a population and to selection pressures operative in a given environment. The more this idea takes hold, the more difficult it is to see any sort of cumulativeness regarding what is more successful, more adapted, more complex, more progressive, or more anything else as one moves from selective context to selective context.

At an extreme, the "cumulativeness problem" can suggest that a strongly directional Darwinism is inconsistent with the very idea of natural selection. If you want your Darwinism to include natural selection, let alone make it primary, you had best give up on direction except in a weak ex post facto sense. This is exactly the inference that tended to take hold as the modern synthesis hardened, although, as Ruse has shown, it was not the private view of most of its pioneers. The reason for this neo-Lyellian dogma, as it might be called, is not hard to find. The modern synthesis gave new life to natural selection by linking it to genetics through a conceptual framework in which organisms were construed as members of statistically identifiable gene-exchanging populations and in which the notion of a species itself was adjusted to "population thinking." The setting in which even such a basic concept of species made any sense at all was biogeographical. The modern synthesis's defense of natural selection was predicated on privatizing, as it were, evolutionary directionality: you might see it from some points of view, but from other points of view you might see no progress at all.

As Ruse and others have recently pointed out, however, a shift away from this view and toward a sort of objective-directionality-pushed-from-behind has become increasingly respectable among Darwinians. Game theory and mathematical population ecology have given us a fairly well-developed notion of evolutionary arms races and in so doing have refreshed Darwin's own intuition that what looks like evolutionary progress is an unavoidable, and hence unintended, consequence of the fact that as occupied niches close, selection is forced, willy-nilly, to produce more complex morphological and psychological entities to exploit available resources.

It is just here that we can vividly see the workings of rival conceptual frameworks within contemporary Darwinian discourses. The fact that genes are highly conserved across taxa—arguably one of the greatest discoveries of recent gene-sequencing programs—it's rather nicely into an interpretive framework in which units of genetic-morphological-behavioral functioning are conceived of as modules that can be shuffled and reassembled as natural selection, under the pressure of evolutionary arms races, explores what Dennett calls "design space." It is relatively easy to see on this view how species might be more or less "advanced," in the sense that weaponry is more or less advanced. This idea is rhetorically powerful in part because it preserves the commonsense conviction that there is in fact some sort of evolutionary direction, thereby appealing to a general public that, as Stephen Jay Gould lamented, has always been loath to give up this intuition and has held it against modern Darwinism that it does.

Predictably, this interpretation is less attractive to those who, like Gould, sponsor versions of the modern evolutionary synthesis that stress many-to-many relationships between genes and traits, the relativity of genetic effects to particular contexts, the great breadth of norms of reaction, and statistically based population thinking rather than Lego-block constructionism. Gould's own stress on contingency and irreversibility was simply an extreme case of this protest. At the same time, it must be acknowledged that in the dawning age of genetic biotechnology the burden is increasingly being shifted to those who think that the new genetics does not affect the stability or adequacy of the modern synthesis. While those who offer new articulations of genetic Darwinism—Richard Dawkins, for instance, or Dennett—often proclaim that all they are doing is articulating the modern synthesis in a slightly different but equivalent way, their ways of articulating it tend to suggest that in its canonical organism-population-centered formulations, the synthesis of the 1940s is not quite up to the challenges posed by molecular genetics. Clearly, one's opinion on this question depends greatly on one's preferred conceptual framework for encoding the results of genetic Darwinism. This fact calls for some reflection.

**DISPUTED ISSUES IN CONTEMPORARY DARWINISM**

The synthetic theory, at its most theoretical, was supposed to be sublimely indifferent to what kinds of genetic variation might turn up and what mechanisms might produce it. As for distributing variation once produced, it was assumed that Mendel's laws would not in any significant way be violated. Many advocates of the
modern evolutionary synthesis do not think that the ascendancy of molecular genetics and biotechnology has done anything to affect these assumptions. For Darwinians of this persuasion, the reference of the term gene was fixed prior to the rise of molecular genetics. It meant "allele." Others, however, such as the "modularists" I have been mentioning, think that genetic Darwinism should be reformulated in terms more accommodating to the new genetics. To be sure, molecularists like to cash in on modern Darwinism's "every snowflake is different" concept in order to tell us that our individual identities are written in our genes — that is, our alleles. On the whole, however, the molecular gene refers to a structure that, while it certainly varies, can also be seen to be "the same" across many species and other taxa. Molecular geneticists refer to just such structures when they now tell us that we have only thirty thousand or so genes rather than the expected eighty to one hundred thousand. There need be no contradiction here; one need only speak of alleles of genes. Nonetheless, what is foregrounded about genes by the pre-molecular modern synthesis — and has of late been defended in terms of an explicit conception of genes as difference makers and difference explainers rather than constructive elements — is precisely what is put into the background by the molecular account of the gene. Such perspectival shifts bear rather closely on interpretations of particular facts, as well as on opinions about the extent to which Darwinism forces us to revise our picture of the world.

This issue exercises contemporary Darwinians and Darwinism-oriented philosophers mightily. Iconic Darwinians such as Dawkins work hard at devising hybrids between the Mendelian gene concept and the molecular gene concept in order to recast the synthetic theory in a different, presumably more precise language that describes genes as immortal bits of DNA. They think that everything that can be stated in an organocentric-populationist version of Darwinism can be stated in a genocentric framework but that more can be added. Adherents of traditional, organism-population-centered versions of the modern synthesis and their philosophical allies tend to doubt this; perhaps the genocentric view subtracts something important. Developmental systems theorists, meanwhile — at least those who will allow themselves to be called Darwinian — suspect that the solid insights of the modern synthesis about the context dependency of adaptedness, snowflake-like individuality, and the primacy of the organism as an agent in its own world can be preserved in the age of biomechanical reproduction only by reversing the casual complicity of the makers of the modern synthesis in what Evelyn Fox Keller calls the discourse of "gene action." The developmental systems approach demands a bit of explication. In the eyes of Paul Griffiths, Susan Oyama, Lenny Moss, and others, the notion of a genetic program has become an albatross from which the Darwinian tradition can free itself only by thinking of genes as merely one among a whole raft of developmental resources that interactively come together in the development of an organism. In Lakatosian terms, the genetic program idea is not part of the identity-constituting core of modern synthesis but a contingent, dispensable analogy that is now a drag on the progressive problem-solving prowess of the research program. Ernst Mayr commended the notion of a "genetic program" at a time when that phrase was attached rather innocently to the notion of cybernetic feedback. It helped him resolve the problem of biological teleology. In the era of iconic Darwinism, however, when the hardware-software distinction has become a key trope, the same phrase connotes the idea that organisms are not coupled to their environments and to their own development by massive feedback but are instead printout from a digital-like program. This image seems to compromise the agency of organisms by treating them as passive effects of their own genes. For developmental systems theorists, then, only by jettisoning the excess baggage of "genetic programs" can contemporary Darwinism restore the primacy of the organism and make peace with the developmental biology that the modern synthesis strategically but unfortunately marginalized in midcentury.

I now reach the key point: each of these ways of adjusting empirical innovation to Darwinian tradition clearly uses different ontologies about the relationships between genes and organisms, organisms and populations, and populations and species. Dennett's preference for an aggregative, decompositional, module-centered conceptual framework, for example, undergirds his conception of natural selection as an algorithm and his related defense of the claim that Darwinism is "reductionism incarnate." To block the exits to the philosophically a priori and to the religiously transcendent, all empirical data are to be fitted into a scheme that depends heavily on an analogy to our current technology. Darwinism of this sort is a Darwinism of building blocks. This framework explicitly construes evolutionary adaptation, moreover, as an effect of design, albeit by the "generate-and-test" methods of natural selection, rather than as a process that explains what at best only looks like design and is often mere bricolage, which was the dominant view in the modern synthesis. The use of highly decompositional conceptual frameworks then licenses progress-oriented inferences from the starting point when naked RNA began to catalyze itself through the successive ratcheting up of ever more complex organisms. Rhetorically, this view makes it easier to debate creationists; both sides presuppose design and argue head on about who or what the designer might be.

Unfortunately, however, this set of inferences reaches its goal only by subtly converting a framework for processing empirical knowledge into a materialist
meta-physics by promising that all the details will eventually be filled in. It thereby converts a useful ontology into a bad metaphysics by appealing to the Enlightenment rhetoric that one can find in Dawkins, Dennett, and, most recently, explicitly, and confidently, E. O. Wilson's *Consilience* to make up the gap between the real and the promised. Wilson virtually confesses that this is so. "Human beings," he writes: "Are obsessed with building blocks, forever pulling them apart and putting them back together again . . . The cutting edge of science is reductionism, the breaking apart of nature into its natural constituents. . . . Given enough components assembled the right way, chemists may someday produce a passable living cell."

On the basis of our presumed assent to this building block ontology and its past triumphs, we are then called on to give our assent to the following:

Because human geneties is still in its infancy, there is a near absence of direct links between particular genes and behaviors underlying universal culture traits. . . . As a result, the exact nature of gene-culture coevolution can in most cases only be guessed. . . . These shortcomings are conceptual, technical, and deep. But they are ultimately solvable. Unless new evidence commands otherwise, trust is wisely placed in the natural consilience of the disciplines now addressing the connection between heredity and culture, even if support for it is accumulating slowly and in bits and pieces.

It seems to me that the prudent inference is to suspend judgment, even about conceptual issues. Wilson's faith in "the consilience of disciplines now addressing the gene-culture relationship" depends almost entirely on fixing a given conceptual scheme by embalming it in the ambient fluid of Enlightenment ideology. To me it is more likely that by the time all the details are filled in they will not fit within one interpretive framework and that even if they do it will not be this framework - which, if the littered trail of past scientific speculations is any guide, will have gone the way of the inevitably outdated technological models that form its topological core.

It is not just, or even primarily, because of its metaphysical excesses, however, that this way of talking about evolution by natural selection is vulnerable. It is more importantly vulnerable because it tends to screen out statistical, populational, and biogeographical considerations that, in other versions of genetic Darwinism, support many-to-many relationships between genes and traits. These considerations throw cold water on the very possibility of considering the effect of genes taken out of a particular selectionist context and counsel Darwinians to shift the ground of the debate rather than to debate design with creationists. Either things can be designed or they can evolve.

The Darwinian research program first developed by Theodosius Dobzhansky within the broader context of the modern synthesis has been prominent in defense of this alternative view. This idea involves the following: first, finding ever new sources of variation - from meiotic recombination to protein polymorphism and, most recently, gene reduplication; second, discovering the clever ways in which natural selection shapes, out of this stupendous array of heritable variation, adaptations that enable populations not only to meet the challenges that directly confront them but to retain variation so that it can be used to meet the challenges of future environments; and, third, reconstructing selection's subtle solutions to the particular problems of particular populations of particular species in particular environments at particular times. Taken together, these considerations tend to interrupt straightforward inferences about progress from selective context to selective context. Typically, solutions to concrete adaptive problems are accessible only to careful, ex post facto narratological reconstructions and exhibit the spirit of a satisfying trade-off rather than sleek optimization. The relationship between sickle cell anemia and malaria in West Africa exemplifies both these characteristics.

One might plausibly view developmental systems theory as fueling this approach by adding still more sources of variation and still more ways of evolving adaptations. Developmental systems theorists regard genes as merely one sort of "developmental resource." Only in combination with a wide array of other such resources do genetic variations enter into the reliable reconstruction of a breeding population across generations. Among these resources might be parts of the environment that are themselves reliably reconstructed by the agency of organisms themselves, which ensures higher heritability in the next reproductive cycle. Developmental systems theorists thus preserve themes that are prominent in Richard Lewontin's version of Dobzhansky's program by adopting a more process-oriented, self-organizing ontology than Lewontin himself might command.

**NATURAL SELECTION AND THE QUESTION OF AGENCY**

Nowhere is the rivalry between these broad interpretations of natural selection more intense, more directly relevant to questions about the evolution of cognitive abilities, or more germane to whether issues previously left to the tender mercies of philosophers will be or should be handed over to scientists than on the question
I have just mentioned: the agency of organisms. Are they actors in their own worlds, even makers of these worlds, as Lewontin is sometimes prone to say, or passive pawns of their genes and of environments that force highly constrained behavioral moves on them? It is possible that conflicting views about the evolution of mind and language sort themselves out primarily on the basis of this issue.

The issue of evolution and mind is not a new one, particularly among American Darwinians. If you stood on any corner in Cambridge, Massachusetts, in say, 1894, and inquired at the top of your lungs whether anyone wanted to talk about Darwinian theories of mental capacities and functions, about as many people might pour out into the street then as in 1994. We owe it to the researches of Robert Richards and, in the case of Dewey, Peter Godfrey-Smith that we are now aware of a discourse in which, as early as 1895, William James could write, "Taking a purely naturalistic view of the matter it seems reasonable to suppose that, unless consciousness served some useful purpose, it would not have been superadded to life."11

The problem that exercised James and Dewey was social Darwinism. Social Darwinians relied on Spencer’s belief that adaptation is the result of the environment’s ability to work directly on the developing organism to argue that a strenuously laissez-faire economic environment was the best way to keep humans adaptively tuned to their environments. Spencer viewed organisms as generally passive, embattled, hostages to their surroundings — although he hoped that in the long run better adaptation would make people happier. Obsessed from his youth with free will, James took an exactly opposite view. For him, and even more for Dewey, the problem was to let organisms be problem-solving agents in their own worlds without regressing to vitalism or panpsychism.15

James and Dewey were certainly not alone in opposing social Darwinism, the iconic Darwinism of its day, which Dewey called "the ordinary biological theory of society."16 Unlike religious populists such as William Jennings Bryan, however, James and Dewey did not reject evolutionary theory altogether as a way of protesting social Darwinism. Nor did they resubscribe, as much of the clerical intelligentsia was inclined to do, to vague, ultimately untenable neo-Lamarckian theories of cosmic evolutionary progress. Instead, they opposed social Darwinism by denying that it was good Darwinism in the first place. James and Dewey viewed habits and mental representations as adaptations that enable humans to respond to changing, complex environments by anticipating how to respond to those environments; and they thought of consciousness, and even self-consciousness, as having evolved by natural selection as a way of accessing just these kinds of selective advantage. Dewey’s early critique of the reflex arc concept convinced him that the agency of organisms is enhanced, not diminished, by behavioral and cognitive adaptive mechanisms of this sort. For fitness, Dewey wrote, includes “the ability which enables organisms to adjust themselves without too much loss to sudden and unexpected changes in the environment."17 Natural selection, accordingly, which ex hypothesi enhances fitness, will select for the problem-solving capacities Dewey called “intelligence,” which he defined as the ability of organisms to anticipate the consequences of their behavior and to guide that behavior toward useful ends by amending their environments. What Dewey called “intelligence” was not a push-pull mechanism, as it was in the empiricist tradition that Dewey rejected in both his non-naturalistic and naturalistic phases. Indeed, Dewey felt that empiricism undermined Spencer from the outset and even peripherally tainted the work of James.18

One indication of the authenticity of Dewey’s claim to have become a Darwinian, rather than some other sort of evolutionist, is his idea that the most important influence of Darwinism on philosophy is its stress on particular responses to particular environments. “If organic adaptations are due simply to constant variation and the elimination of those variations which are harmful in the struggle for existence,” he wrote in his famous 1910 essay of the same name, “interest shifts from the wholesale essence back of special changes to the question of how special changes serve and defeat concrete purposes.”19 Readers have often dismissed this claim as blandly uninformative. It is true that Dewey never gave up the notion of higher and lower organisms; capacities that enable organisms to deal with their environments, and even to construct those environments, become incrementally heritable traits of progressively more adapted, because adaptable, lineages and species. At the same time, Dewey’s sensitivity to the fact that the reference of ideas to world is constrained by their tie to selective environments was strong enough for him to reject intrinsically directional evolution, which in an uncharacteristically witty remark he called “design on the installment plan,” and to develop pragmatism. Ideas, he argued, which necessarily circulate in social space rather than in the isolated, semi-Cartesian minds of individuals, can secure no reference beyond their ability to reconstruct (or retard the reconstruction of) the environment. Thus for good reason pragmatism, until its physics-oriented, behaviorist-leaning rearticulation at midcentury, was known to friend and foe alike as “the biological theory of mind”20 and was opposed by the philosophical establishment as a threat to its very existence.

James’s and Dewey’s approach did not fare well after the full force of Weismann’s denial of the heritability of acquired characteristics began to sink in. But neither did any other pre-Weismannian theory of evolution. Social Darwinism, which
relied heavily on the inheritance of acquired characteristics, began to be displaced by eugenics, and orthogenetic Christian evolutionism drifted ever further toward the fundamentalism that eventually consumed Bryan. To be sure, pragmatist Darwinisms made a brave stand by having recourse to the hypothesis known later as “the Baldwin effect,” after the American child psychologist James Mark Baldwin. That notion, advanced simultaneously by three desperate authors at the same time Dewey became a Darwinian, 1895–96, was an attempt to find a middle way between what Dewey called “extreme Weismannism” and Lamarckism. It suggested that if a particularly useful bit of learning could be maintained across generations in a population with some mimetic ability, that bit of learning might stabilize the cultural and physical environment in which the learning took place in such a way that whatever genetic variation subsequently arose would be forced to shift in the direction of learned behavior. If this was so, Baldwin argued in 1896, “the direction at each stage of a species’ development must be in the direction ratified by intelligence”—intelligence in Dewey’s sense—for the simple reason that the fitness of organisms not carrying the trait, whether phenotypically or genotypically, would be lowered.41

A clever idea, which has in recent years had its innings again.42 With the coming of genetics, however, the Baldwin effect, and pragmatic Darwinism as a whole, became a degenerating research program. The founders of the modern evolutionary synthesis were generally skeptical about it. Any novel behavior had to already be licensed by a preexisting, if only occasionally activated, gene complex; and even if a novel behavior was conceivably to precede genetic change in a particular circumstance, it was difficult to see why, if the behavior was so effective at the phenotypic level, it would be replaced with genes, which would tend to reduce the very behavioral plasticity they were supposed to foster. It was even more difficult to see how this might happen.43 By then, however, Dewey was in no position to respond to these difficulties. Even though, ironically enough, his own Columbia University was during this entire period the site where Dobzhansky’s action-oriented, problem-solving version of the modern synthesis was being articulated, he ceased to follow developments in evolutionary biology after he had made up his mind in the 1890s how it worked; and in the course of having to defend himself against realist philosophers he naturally took to arguing for his account of mental adaptation by increasingly philosophical and decreasingly Darwinian means.44

What may have gone overlooked in this story, however, is that, while Dewey did not seem to have been affected by Dobzhansky, Dobzhansky may well have been at least peripherally influenced by Dewey’s notion of problem solving. The very conception of organic flexibility that Dewey defended at the phenotypical level was defended by Dobzhansky at the genetic level. Dobzhansky saw adaptive evolution as a problem-solving process. “The method by which a living species responds to environmental challenges is natural selection,” he wrote.44 Literally, remarks like these refer to genetic variation as exploring genotype space for solutions to the adaptive problems set by particular, and particularly capricious, environments. Nonetheless, Dobzhansky clearly meant also to imply that over time natural selection would favor phenotypic adaptations, many of them behavioral and cognitively anticipatory, that would enable organisms, and not just gene pools, to deal with environmental complexity. Indeed, the variation-maintaining principles pos­ulated by Dobzhansky, when combined with recognition that natural selection is a two-step process that begins in each generation with how the organism performs at the phenotypic level, virtually imply, in the words of Robert Brandy, that “[a] range of conditions favoring the evolution of phenotypic plasticity also favors the development of cultural transmission. One would expect a species subjected to such conditions to become highly plastic and to develop culture: . . . A high degree of genetic determination of behavioral traits would be a rarity, not the rule: . . . The behavior of a cultural species could not be predicted simply on the basis of the central tenet of sociobiology”45

I think it likely that this view flourished in the pragmatic environment at Columbia in which Dobzhansky worked—an environment permeated with the anti-eugenic democratic thinking that Dewey and the totalitarianism-hating refugee Dobzhansky shared.46 The same agent-centered vision of the adaptive process was defended by Lewontin, who was schooled by Dobzhansky at Columbia and who differed from his mentor only in ascribing even more agency to organisms. “It is not that organisms find environments and either adapt themselves to them or die;” Lewontin wrote, actually construct their environments out of bits and pieces, both by internalizing the information that enables them to deal with their world and by changing their world to meet their needs and desires.47 Lewontin, by his own account, saw in Marxist dialectics an antidote to Dobzhansky’s overly deterministic-sounding notion that environments posed problems to which organisms had to adjust.48 He may have heard echoes in this wording of the pop-psychological “adjustment theory,” flat behaviorism, and complaisant preference for consensus over conflict into which Dewey’s pragmatism had degenerated by the 1950s. In turn, developmental systems theory can be seen as outdoing Lewontin in promoting agency by about as much as Lewontin outdid Dobzhansky, or Dewey outdid James. They were all on the same side, but they saw traces of their opponents’ thinking in that of their mentors.
I confess my own attraction to the action-oriented view of organisms. Nonetheless, a fair-minded judge must concede that it is based on an ontology of the person as a deliberator and maker that precedes the versions of Darwinism it seeks to commend. It projects this model onto other species. It gets its metaphorical suggestiveness, its normative appeal, and its reassuring quality by intimating that very little that we prize in pre-Darwinian ontologies of the person—suitably amended Aristotelian ontologies, for example—needs to be given up, even after mental and behavioral functions have been naturalized by an encounter with Darwinism. In this vein, Dobzhansky writes, “It has become a commonplace that Darwin’s discovery of biological evolution completed the overthrow of scientific materialism. It is very difficult to back from Dennett’s or Dawkins’s account of the evolutionary process, for example, to what organisms and populations are actually doing in the wild. For built into the building-block framework is always the lurking suggestion that Lewontin identifies and rejects: that the environment and the genes are conspiring to make us do something by producing in us an adaptation that merely leads us to think that we are doing it. In Dawkins and Wilson, our genes fool us into cooperation and altruism in a way that is favorable to their interests but not incidental to ours; and even in Dennett, who has an admirable penchant for thinking of organisms as agents in their worlds—in reviving consideration of the Baldwin effect, for example—there is always an implicit suggestion that in building modular assemblies like us natural selection solves the genes’ problems by tricking us into adopting an intentional stance that merely leads us to interpret our environment as a scene of purposive activity. It is far more flattering to say that we really do understand our environments and that when we act in these environments it is truly us, as integrated organisms, that do the acting. Nonetheless, I admit that in projecting onto all organisms an ontology of the person that bears traces of a pre-naturalistic past, what seems a reassuring framework for Darwinism can potentially become as question-begging and metaphysically in an invidious sense as the building-block approach of its opponents, as when Lewontin uses Marxian materialism to express it.

In the heat of debate, every conceptual framework probably tends to become excessive, to make up for the knowledge it cannot (yet) encode by calling on the framework itself to make up the difference. Sometimes philosophers or their philosophies are enlisted to freeze-frame the intensively discursive, open-ended discussions in and through which knowledge of the evolutionary process is acquired by putting their a priori blessing on one interpretive framework or another. In science, however, as in human affairs, you cannot get wholesale what must be purchased retail. Evolutionary knowledge, no less than political or economic wisdom, depends on well-informed judgment; and acute judges alone will know how to separate the chaff of conceptual framing from the wheat of knowledge.

I have illustrated Darwinism’s reliance on conceptual frameworks by considering two concepts: progress and agency. These are big themes—perhaps too big. One might object to the role I have assigned to multiple interpretive frameworks in articulating Darwinism’s key notion, natural selection, by asserting that evolutionary scientists, as opposed to those who package the science for public consumption, do not depend on conceptual framing at all. They simply do the work of observation and experiment, and the work adds up. I do not think, however, that this is so. Even the most technical evolutionary work takes place within research programs whose identities are held together by conceptual frames and obligate metaphors. Even if this were not so, moreover, the question of conceptual framing would necessarily arise whenever even the least hint is given that evolutionary science might have larger implications. But such hints are everywhere and have an influence on the formulation of Darwinian research programs.

**NATURALISMS WORTH HAVING AND NOT HAVING**

Reasserting my main claim about ontological pluralism leads me to ask what, if any, larger implications of the relationship between Darwinism and metaphysics flow from the pluralism I have postulated as a condition of Darwinism’s growth. Surely, one implication must be that Darwinians should reject the view that one conceptual frame or another is uniquely consistent with all possible objects of experience and knowledge. If pluralism is a necessary condition for the pursuit of knowledge about evolution, and indeed for a realistic interpretation of the particulars that constitute that knowledge, Darwinians should oppose those who would epistemologically and metaphysically police the first-order sciences. Darwinian naturalism actually implies Darwinian pluralism. For naturalism has historically asked philosophy to be responsive to the changing play of the natural sciences and to remove the heavy hand of aprioristic metaphysical and epistemological
doctrines from the scene of scientific inquiry. Naturalism has thus helped Darwinism secure for itself a space in which it could grow robust enough to deal, as it is now beginning to do, with cognitive functions. One might well ask, then, what sort of naturalism can block philosophical apriorism without at the same time undercutting the conceptual pluralism that, in evolutionary biology at least, is a beneficent midwife to knowledge.

Surely there can be no objection to a naturalistic approach to human behavioral, cognitive, and ethical traits in the sense that Darwin was a naturalist when he looked at worms, orchids, and finches, or Wilson at ants, or Mayr at birds, or Dobzhansky at flies. Natural selection, articulated in one way or another, serves as both a heuristic stimulus to and a suitable background warrant for increasingly good explanations of behaviors, affections, and cognitive capacities considered as natural phenomena exhibited by natural beings in a natural world. The work of a naturalist in this "muddy-boots" sense easily becomes, as a point of professional pride, naturalism, in the weakest possible sense, when it embodies what to a practicing naturalist is a reasonable determination never to cry uncle and give in to a supernatural explanation, no matter how tempting it may be. Thus Darwinism has a built-in tendency toward naturalistic, and away from supernatural, explanations.

Since naturalism in this sense has its roots in and gets its warrants from the experience of naturalists, Darwinians of the mind should be expected to make substantive, rather than hand-waving, appeals to actual Darwinian research and reasoning. We should not be treated to spectacles in which self-described naturalists wave up and down that they are Darwinians without telling us, or even thinking they can tell us, anything much about how such phenomena as consciousness or language actually evolved. It is just here, however, that a stronger, perhaps objectionable sense of naturalism sometimes appears to compensate for this missing but always promised information—a scientific naturalism that asserts that questions once exclusively philosophical will eventually be answered by science and that consequently holds that philosophy will lose both its unique subject matter and its unique discursive forum, if it has not already lost it. The most objectionable aspect of scientific naturalism is that it is so readily converted into full blown metaphysical materialism of the sort that, oddly enough, flies in the face of naturalism's chief virtue—its opposition to philosophical apriorism. Scientific naturalism also conflicts with the conceptually pluralistic conditions under which evolutionary knowledge has been and probably will continue to be acquired. For no matter how sensitive to and reliant on the results of up-to-date science they may be, those who take this view sooner or later will find themselves opting for one interpretive scheme or another on grounds that exceed the work that the scheme does in organizing and explaining particular bits of knowledge and that screen out the bits of knowledge preserved by other frameworks.

Darwinians not only can, therefore, but should reject the collapse of a naturalistic stance into scientific and metaphysical naturalism. For this view diminishes, or even destroys, the discursive space that must be kept open if discussions about the inadequacies and inadequacies of various conceptual frameworks for capturing, analyzing, and diffusing knowledge of the evolutionary process, and for estimating its current and prospective effect on human affairs, are to be carried on. Certainly, discoveries coming from evolutionary psychology and ethology can and should be allowed to throw cold water on, or even rule out, some revered philosophical theories, and may suggest others. But even if one were limited to a purely naturalistic account of all human psychological functions, one's naturalism, since it depends on discussions about the uses and limits of this or that ontology for this or that issue, would still call for a kind of discussion—which the kind of discussion to which this essay purports to be a contribution—that would never fully coincide with the work of science itself. If Dobzhansky's and Lewontin's example is apposite, moreover, such discussions will leave room for a far wider range of conceptual frameworks than scientific naturalists are typically comfortable with. A good case can be made that this forum is philosophical, whether a scientist or a philosopher avails himself or herself of the opportunity to speak in it. This apparently was the position of Dobzhansky himself. Far from subscribing to an approach in which philosophy served as an "underlaborer" to science, he relied on evolutionary scientists to serve "as purveyors of raw materials with which philosophers operate when they formulate and try to solve their problems." Something very close to this view has also been consistently maintained by Dobzhansky's former colleague Marjorie Grene, who has done much to shape philosophy of biology into such a forum. It is also the view that I have advocated in this essay.

NOTES

5. The treaty, as I call it, was sealed at the University of Chicago's 1959 centennial commemoration of the publication of On the Origin of Species, led by the anthropologist Sol Tax. It was generally agreed by all participants that the genes we have made us cultural beings. In Tax's view, nineteenth-century progressive evolutionism had given biological accounts of cultural evolution a bad name; cultural anthropologists generally avoided them. The modern synthesis, Tax wrote, "brought Darwin and evolution back into anthropology, not by resurrecting analogies, but by distinguishing man as a still evolving species, characterized by the possession of cultures which change and grow non-genetically." Sol Tax, quoted in Vassiliki Betty Smokovitis, "The 1990 Darwin Centennial Celebration in America," Osiris, 2nd ser., 14 (1999): 791. Tax's rhetoric, notably R. S. Fisher and H. Muller, were absent from this celebration and perhaps were consciously excluded from participating in it. A scandal ensued when Julian Huxley came close to some sort of eugenic rhetoric in his keynote address. See Smokovitis, "1959 Darwin Centennial Celebration."


7. Dennett, Darwin's Dangerous Idea, 419.

8. I have developed the notion of "iconic Darwinism" from the notion of the gene as "public icon" in P. Reuten, R. Falk, and H.-J. Rheinberger, eds., The Concept of the Gene in Development and Evolution (Cambridge: Cambridge University Press, 2003), ix. I believe I am entitled to use the notion of iconic Darwinism by reference to Dennett's icon because Dennett assumes in Darwin's Dangerous Idea the role of a scientist, or even a philosopher, but a rhetorician: "This book is largely about sciences, but is not itself a work of science. . . . Scientists do, however, quite properly persist in holding forth, in popular and not-so-popular books and essays. When I quote them, rhetoric and all, I am doing what they are doing: engaging in persuasion." Darwin's Dangerous Idea, 11. In responding, my voice in this essay is that of a rhetorical critic. This means that I have placed what people have said about the assumptions and implications of Darwinism not in a space of context-independent reason giving, but in terms of what it seemed persuasive to someone to say in one particular context or another in order to secure an audience's consent to his or her own views about how best to collect and explain a variety of facts and to draw that audience away from rival interpretations toward one's own.


10. Ibid., 193.

11. Ibid., 82.

12. Ibid., 96.


17. Darwinism as evolution generally is the kind of Darwinism that some creationists, ever anxious to reiteratively reperform nineteenth-century debates, still hope it to be—for at least two reasons: by conflating Darwinism and evolutionism they can, in their public debates, evade the subsequently acquired explanatory power of natural selection; and, in the absent space thus created, they can all the more easily point, as evidence of their belief that Darwinism is a pseudoscience or a religion, to the outbursts of fecality to metaphysical materialism to which Darwinian rhetors are, whether through frustration or triumphalism, occasionally prone. They could not have been more delighted, for example, when Richard Lewontin, more frustrated, I think, than triumphal, acknowledged in a now famous piece in the New York Review of Books that commitment to materialism precedes and guides Darwinism. R. Lewontin, "Billions and Billions of Demons," New York Review of Books, January 9, 1997, 28–32. In making this rhetorical misstep, Lewontin failed to pause long enough to make clear that his brand of materialism was supposed to be agent centered and agent empowering—active materialism in Marx's sense—and not the reductionistic, atomistic, and Hubbesian passive materialism of his genocentric opponents. Differences between rival views about how selection bears on the agency of organisms gain whatever relevance they have only when evolution generally, and indeed evolution by natural selection, is already presupposed to be a fact. Standard-issue creationists, however, could not be expected to grasp Lewontin's meaning, let alone evaluate it, precisely because for them the transmutation of species was not conceded to be a fact in the first place. To them Lewontin was just another materialist.

18. Darwinism's only rival for sheer historical continuity of this sort is, I think, the structuralist morphological approach to descent from a common ancestor that goes back to Geoffroy, a tradition that is still alive in Brian Goodwin and others. Proponents of structuralist approaches to evolution certainly rely on preferred ontological frameworks: Goodwin, for example, is quite insistent that species are stable natural kinds rather than historical individuals à la Hull. But at least some of its ontological frameworks are sufficiently tied to experimental and observational results that they don't become mere metaphysical surrogates for science, as many late-nineteenth-century versions of evolution certainly did—Henri Bergson's, for example, which was inherited by Pierre Teilhard de Chardin.


23. This announcement gave rise to some amusing reflections in the popular press. Some people worried that thirty thousand genes were not enough to generate the uniqueness of all human individuals— as if eighty to a hundred thousand were much better. Others concluded that identity must not be encoded in the genes at all. It was a matter of development, or even of acculturation. The entire discussion suffers from the confusion introduced by bioreliativists who sought funding for the Human Genome Project in the 1980s by promising that it was the key to human identity. See especially the essays by Walter Gilbert and James Watson in The Code of Codes, ed. D. Kevel and J. Hood (Cambridge: Cambridge University Press, 1992).
30. Ibid., 172–73.
35. This is Richard Rorty's way of putting it in "Dewey between Hegel and Darwin," in Consequences of Pragmatism (Minneapolis: University of Minnesota Press, 1982), 54–68.
38. Ibid., 55:41. In his first flush of enthusiasm for Darwinian psychology, Dewey blames just about everyone for regressions to empiricism— James Mark Baldwin, for example, and Lester Frank Ward, both of whom were, in the larger scheme of things, as much his allies as that other regressor, William James.
47. It is true that Dobzhansky brought much of his conception of organisms as agents with him from Russia and that he was influenced on this point especially by I. I. Schnalhausen. It is also true, as scholars have pointed out, that Dobzhansky got the challenge-response model from reading Toynbee's account of history and meeting with him. See
Is a Non-Naturalistic Interpretation of Darwinism Possible?

Within evolutionism, the great alternative to Darwinism was Lamarckism (in fact, Darwin himself accepted the idea that acquired modifications could be inherited and tended to grant it more and more importance in the course of his life; only August Weismann freed Darwin's theory from all Lamarckian remnants). It seemed therefore essential to begin this section with the essay of a highly respected biologist such as Rupert Riedl, who perseveres in asking questions that according to him cannot be answered by orthodox Darwinism alone. Can an approach based on the systems theory of evolution shed light on phenomena that Darwinism tends to ignore or take for granted? Are there ontological assumptions of the classical philosophy of nature that have to be given a new interpretation on the basis of Darwinism but that still retain part of their validity? Can Lamarckism be modeled within Darwinism? In fact it is quite obvious that the mechanism of natural selection as such is compatible with a host of possible evolutions; to explain the evolution of life on our planet—which includes the astonishing phenomenon of convergence, best known from the Metatheria and the Eutheria—took the course it took, we need more than the principle of natural selection, namely other biological "laws." How can these be formulated, perhaps explained? And does the phenomenon of retroactive causality, so important in the organic world, oblige us to abandon a more linear way of thinking even if the latter, itself a result of evolution, is more natural to us?

A greater openness to a non-naturalistic interpretation of Darwinian biology may be achieved if one analyzes the concept of nature Darwin himself had. The