

DARWIN, ECOLOGICAL PSYCHOLOGY, AND THE PRINCIPLE OF ANIMAL-ENVIRONMENT MUTUALITY

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... traditional theories have separated life from nature, mind from organic life, and thereby created mysteries. ... Those who talk most of the organism, physiologists and psychologists, are often just those who display least sense of the intimate, delicate and subtle interdependence of all organic structures and processes with one another. The world seems mad in pre-occupation with what is specific, particular, disconnected in medicine, politics, science, industry, education. ... To see the organism in nature, the nervous system in the organism, the brain in the nervous system, the cortex in the brain is the answer to the problems which haunt philosophy. And when thus seen they will be seen to be in, not as marbles are in a box but as events are in history, in a moving, growing never finished process (John Dewey, 1958, pp. 278 & 295).

The separation of life from nature

According to the textbooks, René Descartes (1596-1650) has a lot to answer for. He is supposed to have set up, apparently single-handedly, a whole range of dualisms that continue to trouble the human sciences: the physical *vs* mental, body *vs* mind (or more precisely, soul), animal *vs* human, self *vs* other, mechanical *vs* rational, passive *vs* active, natural *vs* normative, to mention just a few. Certainly, Descartes had been impressed by the scope of the new scheme of physical science and its extension to the distant heavens, on the one hand, and to the intimacy of our own bodies, on the other. (He had been particularly struck by William Harvey's account of the circulatory system). According to Descartes, the new physics was nothing less than a comprehensive science of nature. Consequently, anything failing to figure within that science *must exist beyond the realm of the natural* (Wilson, 1980, pp. 41-42).

Maybe Descartes does not deserve all the blame. On first reading, at least, Galileo and Kepler, among others, also seem to have engaged in a

similar ‘ontological fix’ to save the universal claims for the new physics (Burt, 1969, Whitehead, 1926; Young, 1966; cf. Chapman, 1966).¹ Put bluntly, the fix amounts to this: the new science explains *everything* – and *everything* it *fails* to explain is not *really* real.

Within this scheme, psychology’s own subject – the ‘*subject*’ – became radically subjectivized, as that which *eludes* science. As Alexandre Koyré has put it:

[Modern science] broke down the barriers that separated the heavens and the earth [But] it did this by substituting for our world of quality and sense perception, the world in which we live, and love, and die, another world – the world of quantity, of reified geometry, a world in which, though there is a place for everything, there is no place for man. (Koyré, 1965, p. 24).

This is not just a matter of rather distant history. With regard to modern science, Bergman (1973) has asserted that »it is the task of physics to build a world which is foreign to consciousness and in which consciousness is obliterated« (cited in Rosen, 2000, p. 82.) But we need to be clear about the implications of this exclusion of *us*. First, it is not clear how there could be *any* kind of science. For, after all, despite any claims to the contrary, scientists are people, too, and science is a human enterprise. If they/we do not belong to the natural order of things, how is science getting *done*?

But this intellectual scheme also ‘set up’ psychology to be rather an odd kind of enterprise, the science of the ‘unscientific’, the science of that which *eludes* science. Once physical science had promoted its methodology (of atomism, mechanism, and quantification) to an exclusive ontology, psychology (so conceived) was a pretty obvious mistake waiting to be made – an essentially derivative science modelled on physics, yet having as its subject the very realm that physics rendered utterly obscure.

Discussions of the history and philosophy of science continue to remain obsessively fixated upon classical physics, and when psychologists themselves worry about the status of their own science, it is, again, classical physics they usually take as the standard. Yet physics itself has been subject to fundamental change over the last century (most notably, relativity theory, and quantum theory), and in a way that has questioned the exclusion of *us*, though not, however, as a possible object of scientific inquiry, but – *qua* scientists – as the practitioners of science itself. But, of course, earlier, in the nineteenth century, there had already been a development

1 For example, Galileo’s treatment of the »secondary qualities«, and the strict bounds that Kepler put upon his mechanistic account of vision (based on the analogy of eye and camera).

within natural science that changed the ground rules of science, and found a more secure place for people within the natural order of things.

Bringing things to life

Charles Darwin's evolutionary theory broke nearly all the rules, and yet it came to be accepted as part of natural science. It was non-mathematical, predominantly non-mechanistic (Costall, 1991), and invoked history and contingency (Gould, 1989; Landau, 1991). It also involved a remarkable reconciliation of two seemingly opposed concepts: *adaptation* and *evolution*.

In the eighteenth century, evolutionary theory had come to be associated with atheism, materialism, and political terror. To challenge evolutionism, natural historians (typically clergymen with time on their hands) sought »evidences of the existence and attributes of the Deity collected from the appearances of nature« (to quote the subtitle of William Paley's *Natural Theology* (1819)). Many of their texts name and shame the materialists and their connection with political revolution. According to the natural theologians (or »Paleyologists«), the exquisite adaptations of plants and animals to their circumstances, and, conversely, of the circumstances to the organism constituted compelling evidence of divine design. What is more, the very fact of adaptation seemed to rule out the possibility of evolutionary change, for surely any transformation of a species and/or the world could only lead to a disruption of their coordination, and hence »degeneration« rather than improvement (Whewell, 1846, p. 104; see also Richards, 1987, pp. 63-4, on Georges Cuvier).

Darwin's own theory explained both adaptation in terms of transformation and, conversely, transformation in terms of adaptation.² The important point for my present purposes is that Darwin introduced the concept of adaptation into the discourse of natural science, and, in the process, undermined the dualism of subject and object at the heart of Cartesian mechanistic science.

So much has happened since Darwin (not least the hijacking of Darwinism by standard reductionist science) that it is easy to forget the profound impact his work initially had upon psychology. As his protégé, George Romanes, suggested, this was in part precisely because »Mr. Dar-

2 This latter aspect of Darwin's theory was taken up, shortly after his death, by James Mark Baldwin and Conwy Lloyd Morgan (see Costall, 1993). For an excellent biography of Darwin, that places him squarely in social and political context, see Desmond & Moore (1991).

win was not only not himself a psychologist, but had little aptitude for, and perhaps less sympathy with, the technique of psychological method.«

The whole constitution of his mind was opposed to the subtlety of the distinctions and the mysticism of the conceptions which this technique so frequently involves; and therefore he was accustomed to regard the problems of mind in the same broad and general light that he regarded all the other problems of nature. (Romanes, 1882, pp. 65-66).

In addition to Darwin's treatment of mind as inherent to the natural order of things (Allen, 1983, Richards, 1987, Schweber, 1985; Smith, 1978), there was the specific emphasis upon the fact of adaptation – the *co-ordination* – of organism and environment. Here is Dewey discussing the impact of biological thinking on the »new psychology« just two years after Darwin's death:

We see that man is somewhat more than a neatly dovetailed psychical machine who may be taken as an isolated individual, laid on the dissecting table of analysis and duly anatomized. ... To biology is due the conception of organism. In psychology this conception has led to the recognition of mental life as an organic unitary process developing according to the laws of all life, and not a theatre for the exhibition of independent faculties, or a *rendezvous* in which isolated sensations and ideas may gather, hold external converse, and then forever part. Along with this recognition of the solidarity of mental life has come that of the relation in which it stands to other lives organized in society. *The idea of environment is a necessity to the idea of organism, and with the conception of environment comes the possibility of considering psychical life as an individual, isolated thing developing in a vacuum.* (Dewey, 1884, pp. 278 & 285; emphasis added).

A very similar stress upon the need to take the animal-environment relation as the focus of study also occurs in the work of William James and George Herbert Mead:

... since organism and environment determine one another and are mutually dependent for their existence, it follows that the life-process, to be adequately understood, must be considered in terms of their interrelations. (Mead, 1934, p. 130).

The great fault of the older rational psychology was to set up the soul as an absolute spiritual being with certain faculties of its own by which the several activities of remembering, imagination, reasoning, willing, etc., were explained, almost without reference to the peculia-

rities of the world with which these activities deal. But the richer insight of modern days perceives that our inner faculties are adapted in advance to the features of the world in which we dwell, adapted, I mean, so as to secure our safety and prosperity in its midst. ... *Mind and world in short have been evolved together, and in consequence are something of a mutual fit.* (James, 1892, p. 3-4; emphasis added.)

Of course, many different aspects of Darwin's work have been appropriated (and misappropriated) by psychologists, within differential psychology, eugenics and sociobiology, and developmental and comparative psychology. So it is important to remember that Darwin himself conducted psychological research. He was not entirely the 'old buffer' portrayed in the textbooks, relying exclusively on anecdotal reports.

An important, but neglected, case in point is Darwin's remarkable research on the activities of the lowly earthworm, brought together in his final book, *The formation of vegetable mould, through the action of worms with observations on their habits* (Darwin, 1881). This seemingly minor, even quaint, topic, meant a lot to Darwin. He conducted his studies of earthworms over many years, and he was convinced that worms were among the important species in the history of the earth in terms of their widespread and radical impact upon the landscape (Ghilarov, 1983).

The studies relate to Darwin's wider project in several ways. First, over the course of many years, he carefully recorded the rate at which earthworms' castings come to cover objects on the surface of the ground. Although the process is, indeed, very slow, it was evident that earthworms must have a profound impact, eventually burying very large structures indeed. This, Darwin argued, was a demonstration of the more general point that very gradual change can nevertheless lead to profound even radical change of the kind he proposed selection could itself eventually achieve.

Second, he regarded the activity of the earthworms as essentially adaptive, and sought to determine, in relation to the ambient conditions, the biological significance of their drawing in of leaves (was it to maintain the humidity or the temperature of their burrows?).

Thirdly, he carefully put the earthworms through their paces, by presenting them with unfamiliar and tricky leaves (including artificial leaves cut out of paper) to see how they coped. After all, it is far from an easy task to drag a large leaf into a tight burrow. Yet the worms proved impressively flexible and astute, heading for the optimum part of the leaf. They are, Darwin insisted, most definitely *not* the mechanical automatons of Cartesian psychology:

They act in nearly the same manner as would a man, who had to close a cylindrical tube with different kinds of leaves, petioles, triangles of

paper, etc. For they commonly seize such objects by their pointed ends. But with thin objects a certain number are drawn in by their broader ends. They do not act in the same unvarying manner in all cases, as do most of the lower animals; for instance, they do not drag in leaves by their foot-stalks, unless the basal part of the blade is as narrow as the apex, or narrower than it. (Darwin, 1881, p. 313; see also Reed, 1982).

Finally, and most importantly, the example of earthworms and their ‘world’ should help us think differently about the relation between animal and environment. For even within so-called ecological approaches to psychology, it is easy to slip into a kind of environmental determinism, and treat the environment as an ‘independent variable’, ultimately separable from the animal in question. But animal and environment are interdependent, and this is not just a question of logic or definition, but of history, »a moving, growing never finished process« (John Dewey, 1958, p. 295). Earthworms, through their collective activity, have both transformed and sustained their circumstances. Earthworms and the vegetable mould surrounding them have co-evolved. Vegetable mould did not exist before earthworms. Their relation is *mutual*.

... in his *Earthworms* [Darwin’s] attention was drawn to that aspect of ecology which at that time and still many years later was neglected by ecologists. Ecology, according to its very definition, studies interaction and interrelationships of organisms and their environments. Up to a short time ago, ecologists only studied dependence of organisms on their environment. Darwin in his *Earthworms* has shown brilliantly the other side of the medal – the influence of organisms on their environment, i.e. the dependence of the milieu, of the environment, on their activity. (Ghilarov, 1983, pp. 3-4).

After Darwin

So what happened to this early mutualist or ‘ecological’ psychology? Well, for a while it seems to have thrived. Far from the image of early psychology as devoted exclusively to introspection, there was certainly a lively interest in what people actually get up to. As Woodworth (1943, 49-50) has stressed, a psychology of ‘conduct’ was established well before Watson’s so-called behaviorist revolution. But this early psychology became eclipsed for a number of reasons. At the beginning of the twentieth century, Darwinism itself was widely regarded as discredited, and *in vivo* research was displaced by the *in vitro* studies of the experimental physio-

logists and anatomists. Psychology's own agenda turned more to technological control rather than self-understanding (Danziger, 1979).

Linked to all this was the rise of behaviorism. Watson's version of behaviorism was essentially a return to Cartesian assumptions. The first of these was the supposed logical disjunction between body and mind. Behaviorism's interest in 'behaviour' was primarily methodological rather than substantive.³ Behavior mattered primarily because it could be observed. Second, there was the restoration to a central position of the conception of the body as a passive mechanism, or, in other words, stimulus-response psychology (cf. Dewey, 1896).

Although in very obvious ways modern cognitivist psychology was a reaction to mainstream behaviorism, it has also perpetuated much of the kind of behaviorism it claims to have replaced (Costall & Still, 1991). Again, the body has been assumed to be essentially passive or reactive, and the task of theory to explain what mediates between 'stimulus' and 'response', or 'input' and 'output'.⁴ And, again, there is the same commitment to methodological behaviorism, and for the same dualistic reasons, though this time round the theoretical focus is on the other side of this dualism: the mind, rather than 'mere' behaviour. What people actually *do* is not of interest to psychology:

To take behavior as the focus of attention for psychology is as big an error as to take tracks in cloud chambers as the main object of study in particle physics. Such tracks are interesting *only as clues* to the existence of certain particles and to their properties. (Macnamara, 1999, p. 241; emphasis added).

3 By the time of the 'behaviourist revolution', the word 'behaviour' had largely lost its original moral meaning: how one conducted oneself in polite society. This original meaning is retained in the term, »misbehaviour« and the command »behave yourself!« Behaviour, in this original sense was publically observable, and also regular in the sense of according with social norms. However, once the term had been extended, as a metaphor, to physical processes (such as chemical reactions) and later to animals, its moral significance was lost, and just the sense of observability and regularity remained (see Ardener, 1973; Costall, 1998).

4 »In some respects, cognitive psychology is not as distant from stimulus-response (S-R) behaviourism as its proponents made out. While it replaces non-mentalism with mentalism, it retains the mechanistic notion of mind as an input-output conversion device, where the path between input and output is traced as information flow rather than S-R connections.« (Edwards, 1997, p. 28; see also Reed, 1997).

‘Ecological psychology’ and the principle of animal-environment mutuality

A number of ecological psychologies have been established as a corrective to the focus, within mainstream psychology, on mind as both disembodied and abstracted from a wider ‘world’. I am thinking of the work of Egon Brunswik (see Hammond & Stewart, 2001), Kurt Lewin (1951), Uri Bronfenbrenner (1979), Roger Barker (1968), and James Gibson (1979). There are interesting commonalities and differences among these theorists (see Heft, 2001, for comparisons between Gibson, Barker, Lewin, and Bronfenbrenner).

Gibson put a special emphasis on the mutuality of animal and environment, but, at the same, was wary of the ‘subjectivication’ of the environment. Here is Gibson’s statement of the mutuality principle:

The words animal and environment make an inseparable pair. Each term implies the other. No animal could exist without an environment surrounding it. Equally, although not so obvious, an environment implies an animal (or at least an organism) to be surrounded. (Gibson, 1979, p. 8).

Two of Gibson’s concepts are more specific manifestations of this principle. The first is the concept of ‘affordances’:

»The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*, either for good or ill. The verb to afford is found in the dictionary, but the noun affordance is not. ... I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment.« (Gibson, 1979, p. 127).

Affordances are actual properties of the environment, even though they are animal dependent. Apples and, for that matter, grass, afford eating – they constitute food – *in relation to* certain kinds of organism. If, for example, ungulates and certain insects did not exist, grass would not ‘be’ food. The concept of affordances, as Gibson left it, has many limitations (see Costall, 1995). Nevertheless, with this simple concept, Gibson, in effect, promised to challenge the long-standing assumption within Western thought that ‘reality’ *excludes* us.

The second concept, »visual kinesthesia«, concerns our »awareness of being the world« (Gibson, 1979, p. 239). This relates to his classic work on »optic flow«, and »the awareness of movement or stasis, of starting and stopping, of approaching or retreating, of going in one direction or another, and of the imminence of an encounter« (Gibson, 1979, p. 236). Then there

is the ‘visible horizon’ which corresponds to our eye level, and relates distant objects to our own bodies. For example, objects extending above the visible horizon are higher than eye level (and the horizon sections equal sized objects in equal proportions). As Gibson put it, the horizon »is neither subjective nor objective; it expresses the reciprocity of observer and environment« (Gibson, 1979, p. 164).

Furthermore, we can *see* our own bodies, not only our arms and legs there *in* the world, but also our *selves* restricting our view:

»Ask yourself what it is that you see hiding the surroundings as you look out on the world – not darkness, surely, not air, not nothing, but the ego! (Gibson, 1979, p. 112).⁵

In short, Gibson provided some important resources for a mutualist approach to psychology. And yet Gibson himself evidently felt uneasy with the implications, the fear that relational thinking would degenerate into relativism (Costall, 1995; Costall & Still, 1989). We find in his own writings, and in that of some of his students, the assertion that environments are *not*, after all, animal-dependent (Gibson 1979, p. 129); that affordances are *not* relational (Heft 2001, p. 125; Reed, 1993); and that information exists and can be defined *without reference to perceivers* (Gibson, 1961; Reed, 1996, p. 253). In reaction to the extreme subjectivism of standard psychological accounts, Gibson so often reverted to its direct opposite (and, ultimately, just the other side of the same coin):

Reading Gibson, one often gains the impression that his keen philosophical criticism of idealism (and ‘subjectivism’) leads him ‘automatically’ into the opposite camp, i.e. that of Realism. A philosophical argumentation in support of Realism, however, can hardly be found. ... Ecological theory needs [a relational ontology] and should not define and articulate its basic notions in terms of Idealism’s direct opposite. (Tamboer & Heij, 1991, p. 18).

Ecological psychologies, of many kinds, find it so difficult to stay with the principle of mutualism. But in the absence of relational thinking, of non-disjunctive distinctions, dualisms necessarily persist: of subject and object, of agent and world, and of the ‘intentional’ and the material. A retreat into traditional realism entails the same old exclusion of *us*.

5 »*Problem*: To carry out the self-inspection of the Ego. *Solution*: It is carried out immediately« (Mach, 1959, p. 20). See Neisser (1994) for an important elaboration of these points.

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