

RESCUING THE SCIENCE OF HUMAN BEHAVIOR FROM THE ASHES OF SOCIALISM

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The discredit into which the socialist ideal has fallen as a consequence of recent political events calls into question, not just the viability of a particular political and economic system but, the very idea that the social order can be improved by applying principles derived from the scientific study of human social behavior. Before the collapse of socialism, the idea of a science of human behavior, construed in biological terms as a branch of the science of the behavior of free-moving living organisms in general, had been undermined by Chomsky's (1959) repudiation of the behaviorist project to construct a science of language (verbal behavior) based on principles derived from the study of animal learning. I contend that only by reinstating the link between linguistics and the study of animal learning can confidence be restored in the possibility of a genuine science of human behavior with application to the problem of constructing a better social order.

Socialism and the Science of Human Behavior

The collapse of communism in Eastern Europe and the economic failure of socialism in western democracies has brought us at the end of the second millennium of the Christian era to an intellectual crisis of monumental proportions. For what has been discredited is not just Marxism, but the very idea that by applying scientific method to the study of human social behavior it is possible to devise ways to improve human societies in a way that will benefit everyone. Free market competitive capitalism may have proved itself a much more efficient form of economic organization, but the pursuit of individual and collective profit can never inspire the kind of allegiance that in its heyday drew men and women to socialism from every corner of the earth. Into the intellectual vacuum that its discrediting has created, the only creeds on offer that appear to command that kind of allegiance are divisive and obscurantist principles such as tribalism, nationalism, and religious fundamentalism.

Comte and the Objective Science of Human Behavior

The idea that the method of systematic objective observation and experiment that has proved so effective in the natural sciences can and should be applied with equal diligence to the study of the more intractable phenomenon of human social behavior was first proposed by Auguste Comte (1798-1857) in his *Cours de Philosophie Positive*, published in installments between 1830 and 1842. Despite the widespread collection of statistical information and the use, within economics at least, of sophisticated mathematical models both at the level of theory and the level of practical forecasting, there is little evidence within the social sciences, as they have evolved over the century and a half since Comte's day, of the emergence of the kind of theoretical consensus that has characterized physics since Newton, chemistry since Lavoisier, and biology since Darwin. Many would argue that this is because human social behavior is not the kind of phenomenon that is susceptible to analysis by methods devised for use in the natural sciences. I want to propose another diagnosis. I suggest:

- (1) that the failure of the social sciences and of socialism, considered as the practical application of the social sciences to human affairs, is a consequence of the failure to develop an effective science of human behavior at the level of the individual,
- (2) that the failure to develop an effective science of human behavior at the level of the individual is caused by a failure to consistently apply at the level of the human individual the principles of instrumental/operant learning that have been identified in experimental studies of the behavior of other species of free-moving living organisms (particularly mammals and birds), and
- (3) that the development a science of human behavior based on operant principles has been inhibited by the widespread acceptance of the claim by Chomsky (1959) and his followers that there is no place for such principles in a science of language, the one phenomenon which above all others distinguishes human behavior from that of other species of living organism.

Behaviorism

Earlier this century the behaviorist movement in psychology set out to study human behavior objectively in the way that Comte had envisaged. But unlike Comte, behaviorism had the benefit of the insight provided by Darwin's theory of evolution by variation and natural selection which demands that human behavior be seen as an outgrowth of the behavior of man's primate ancestors and that of free-moving living organisms (animals) in general. By the middle of this century the idea that the study of animal behavior, particularly the study of animal learning, was the key to the understanding of human behavior had begun to outgrow the simplistic mechanistic reductionism of Pavlov and Watson. With the publication of Skinner's *Walden Two* (1948) and

Science and Human Behavior (1953) it was becoming possible to foresee the day when humans would apply the principles of the science of human behavior to the resolution of the problem of how to live harmoniously and constructively together, using positive reinforcement in place of aversive control.

Chomsky's Review of Verbal Behavior

By the beginning of the 1970s behaviorism had been effectively stopped dead in its tracks by its failure to deal adequately with the phenomenon of language, the one feature which more than any other creates a discontinuity between human behavior and the behavior of pre-linguistic organisms. The process that led to the abandonment of the behaviorist project for a science of human behavior by all except B. F. Skinner's most devoted disciples was the publication ten years earlier of Noam Chomsky's (1959) review of Skinner's (1957) book *Verbal Behavior*. In the wake of that epoch-making review a whole generation of psychologists, linguists, and philosophers has grown up in the belief that human language and cognition can and must be studied without regard not only to the study of animal behavior, but to the study of human behavior itself. Despite the fact that every empirical science from astronomy to neuroscience studies the behavior of something, in these circles the very word 'behavior' can hardly be uttered without a sneer.

Not only does Chomsky's linguistics break the link between language and its biological foundation in the process whereby a complex free-moving living organism adapts to its environment. By espousing, as he does in his *Aspects of the Theory of Syntax* (1965), the view that linguistic competence is the product of an innate language faculty Chomsky is denying any but the most superficial role for learning in the acquisition of language. He thus excludes the possibility of being able to explain how significant changes in behavior might be executed and controlled by language. Socialists have no doubt been guilty in the past of overestimating the malleability of human nature. Chomsky, despite his political stance, leaves little room for such changes in his theory of language. Indeed, his linguistics, with its preoccupation with syntax, does not even begin to address the issue of how linguistic utterances control behavior, whether it be the behavior of the listener by the utterances of the speaker or the behavior of the thinker by one's own vocal and subvocal utterances. So long as the view prevails that a substantial part of human behavior is controlled by processes which are innate and thus by implication immune from modification by learning, we shall be driven to the pessimistic conclusion that there is little or nothing we can do to change human nature, no way that we can prevent the depredations of the criminal, the violence of the terrorist, the horrors of warfare, and the ultimate self-annihilation of the human species.

The Experimental Analysis of Behaviour Group - An Instructive Example

This loss of confidence in the possibility of a science of human behavior based on the study of learning in animals is dramatically illustrated by the history of the British Experimental Analysis of Behaviour Group since its foundation by Harry Hurwitz at Birkbeck College, London, more than thirty years ago. Although the membership has never been restricted either in theory or in practice to behavior analysts in the strict sense of that phrase, for the first ten or more years of its existence it would have been difficult to find anyone who did not think that the point of studying learning in animals was in order to provide a foundation for a science of human behavior. Thirty years on, the organization has split into two subgroups which barely communicate with one another. Only one of these subgroups, the behavior analysts proper, are happy to describe themselves as behaviorists, preserve the traditional behaviorist idea that the principles of animal learning can and should be applied to human behavior, and suffer discrimination by the academic establishment as a consequence. The other subgroup, the associative learning theorists, has succeeded in preserving its respectability in the eyes of the academic establishment, and thereby its research grants, by pursuing the study of animal learning as a pure scientific enquiry, abandoning any claim that it has relevance for or application to the study of human behavior.

Restoring a Science of Human Behavior Based on Learning by Reinforcement

I have suggested that the collapse of socialism as an economic and political system calls into question the very idea of a social order based on a science of human behavior. I have also suggested that the idea of a science of human behavior has been undermined by Chomsky's repudiation of the link between linguistics and the scientific study of animal learning, and that his insistence on the predominantly innate character of linguistic competence leads to a pessimistic view of the possibility of changing behavior by changing the environmental conditions under which it is emitted. Taken together, these claims suggest that if we are to recover a belief in a science of human behavior as a foundation for the social sciences and, hence, for the practical application of those sciences to the conduct of human affairs, the first step must be to restore to academic respectability the idea of a link between linguistics and the scientific study of animal learning.

Connectionism and Selectionism

There are some hopeful signs, signs that we may be beginning to break out of this persistent disparagement of behaviorism and the mood of apathetic fatalism with respect to human nature that is bred by nativism. During the 1970s the neurosciences, cognitive psychology and the new disciplines of Artificial Intelligence and Cognitive Science, were dominated by the notion that the brain is a digital computer which

computes its output by reading coded instructions on some counterpart of a magnetic tape or disk, and can only do so in so far as its ability to read the digital code or "machine language" in which the instructions are written is irreversibly "hardwired" into the device before birth by its genetic constitution. This model¹ is the source both of Chomsky's notion that the rules of syntax or rather their underlying structure are hardwired into the human brain, and of Fodor's (1975) idea that, long before language developed as a vehicle of human interpersonal communication, there was what he calls "the language of thought," the brain's machine language, in which the programs running in the animal brain are written.

More recently this conception of the brain has increasingly been challenged. It has been challenged by the neuroscientists who insist that, although the brain has genetically determined predispositions which favor the establishment of some synaptic connections rather than others, none of them are hardwired, if by that is meant that they cannot be modified in the light of subsequent experience, particularly during the formative years of growth and development. The classical computer model has also been challenged in what was formerly its heartland by the connectionist revolution in Artificial Intelligence where the digital computer has given way to the neural network as the preferred model for the brain. The neural network requires no symbolic coding of inputs and no hardwired ability to read the code in order to transform input into output, and its principal functional property is its ability to learn.

The Revolution in Animal Training

Another equally promising recent development is the revolution that has taken place in the field of animal training as a result of the systematic application of the methods and principles of operant reinforcement. This is important, not just because it vindicates the operant analysis of learning in animals. It is important because of two observations which are of significance in relation to the possibility of a science of human behavior. One of these is Karen Pryor's (1984) observation that having learned the art of controlling the behavior of animals by the systematic application of positive reinforcement, both she and her students spontaneously found themselves successfully using these same techniques to control the behavior of their fellow human beings, and, be it noted, without provoking any of the resentment and hostility which are aroused both by aversive control methods and by laboratory-inspired methods of positive reinforcement, such as the supplying of tokens in a token economy situation. The other observation which I regard as significant in this connection is the way in which animal trainers such as Irene Pepperberg (1992) and Ronald Schusterman (Schusterman & Kastak, 1993) have succeeded in teaching what, for me at least, are the rudiments of true language to organisms other than

¹Or rather in Chomsky's case (personal communication, November, 1993) its ancestor, the conception of the brain as a Turing Machine (Turing, 1937).

primates, thereby weakening the claim that the ability to learn language is an innate capacity possessed only by human beings and perhaps to a limited extent by the anthropoid apes.

Restoring Linguistics to Its Empiricist-Behaviorist Roots

Sadly, news of what is going on in the world of animal training is unlikely to penetrate the groves of academe where deep-rooted prejudices against behaviorism and all its works prevail. Connectionism and the kind of neurological selectionism represented by Gerald Edelman's (1987) *Neural Darwinism* stands a better chance; but in linguistics the nativism of Chomsky and Fodor remains without a serious challenger. Here the implications of the more radical eliminative version of connectionism which dispenses altogether with the digital computer model have been blunted by the adoption of the implementational version advocated by Pinker and Prince (1988) and Paul Smolensky (1988) in which the neural network is seen as simply the way in which something like the digital computer is implemented in the brain. Smolensky in particular has been actively promoting a reconciliation between connectionism and orthodox formal linguistics in the Chomskian mold in recent years. There has been some resistance from the likes of George Lakoff (1987) who sees the psychological research on the role of stereotypes in concept formation as a way of introducing an empirical element into semantic theory; but in the theory of syntax Chomskian nativism is still the order of the day. It provides as it has done for more than thirty years a major obstacle in the way of a constructive and effective science of human behavior.

Behavior Analysts Must Abandon Verbal Behavior

What is needed in order to give back to the science of human behavior the kind of academic prestige without which it cannot hope to have its proper influence on human affairs is a total reconstruction of the science of linguistics based on the principle that linguistic competence is acquired and maintained by the same processes of selective reinforcement that govern the acquisition and maintenance of every other human skill. Behavior analysts, as the custodians of the vision of a science of human behavior growing out of a science of the behavior of living organisms, in general have an important role to play in that reconstruction. But if they are to do so, they must accept that they will never succeed so long as Skinner's book *Verbal Behavior* is taken as the sole source for a behavior analytic approach to language. *Verbal Behavior* contains some important insights; but as a comprehensive account of language it is deeply flawed. Its most serious weakness is the failure to recognize the fact to which Chomsky has repeatedly drawn attention that the functional unit of language, the unit that controls the behavior of the listener and secures the reinforcement that only the listener can supply, is the sentence rather than the individual words and phrases that comprise it. But unlike the bar presses and key pecks that

secure reinforcement in the Skinner box, sentences are not repeated as a consequence of the reinforcement they produce. At the level of the sentence, verbal behavior is subject to what has been called, following Olton and Schlosberg (1978), a "win-shift/fail-stay contingency."² If your sentence is reinforced by an appropriate expression of surprise or agreement or an acknowledgment of comprehension from the listener, you don't repeat it either at the time or later. You move on to the next sentence. You repeat yourself only if your first attempt has failed. Even then you seldom repeat yourself word for word. You construct *another* sentence which puts the gist or point of your previous sentence in another way.³

Failure to grasp this fundamental point and explain how these novel sentences are constructed by the speaker and construed by the listener means that Skinner's book and approaches to language based upon it cannot begin to address the issues concerning sentence structure that preoccupy the linguist. It also means that behavior analysts are prevented from making two contributions to our understanding of the phenomenon of the novel sentence that only they can make, the understanding of (a) its functional significance, and (b) the role of the listener's reinforcement in keeping it going and making it possible.

The Functional Significance of Novel Sentence Construction and Construal

In what must have been just about the last article of his to be published before he died, his 'The behavior of the listener' which appeared in Steve Hayes' collection on *Rule-Governed Behavior*, Skinner (1989) finally conceded the reality and significance of the phenomenon of the novel sentence. But the passage in which he does so is short, relatively inconspicuous and easily overlooked. It is, therefore, hardly surprising that, apart from a feeble effort of my own in an article published in *Behaviorism* some fourteen years ago (Place,

²Olton and Schlosberg speak of "win-shift" and "win-stay" as alternative foraging strategies. For the terms "win-stay/fail-shift contingency" and "win-stay/fail-shift contingency" to describe the conditions that make these strategies adaptive I am indebted to a presentation by Elizabeth Gaffan at the Annual Conference of the Experimental Analysis of Behavior Group at the University of York in April, 1986. These terms, however, do not appear in the published version of the paper (Gaffan & Eacott, 1986), and it remains unclear (E. A. Gaffan, personal communication, December, 1996) whether she actually used those words or whether they represent my extrapolation from what she said.

³The observation that at the level of sentence construction the speaker's verbal behavior is on a "win-shift/fail-stay" contingency shows why the contingency provided by the Skinner box which is essentially of the "win-stay/fail-shift" variety is not the right model for verbal behavior. It is true that at the level of speech-act type (opinion-stating, troubles talk, news- or joke-telling) verbal behavior, in casual conversation at least, is indeed on a "win-stay/fail shift" ... If telling a joke is reinforced by laughter on the part of the audience, it may encourage you to tell the same joke to another audience on some future occasion, but not to repeat it to the same audience immediately after the first successful telling. What it may do is encourage you to tell *another* joke. But telling a sequence of different jokes one after the other is a far more abstract response class than the key pecks and bar presses in a Skinner box. I am indebted to Linda Hayes (personal communication, March, 1996) for drawing my attention to the need to clarify this point.

1982), the literature of behavior analysis contains no systematic discussion of the functional significance of this phenomenon. There are, nevertheless, a number of oblique allusions to it. For me the most striking, when I heard it in a talk given to an audience of behavior therapists in this country some time in the mid-1960s, was Israel Goldiamond's (1966) point that by emitting what he called "an instruction stimulus" a speaker can induce a listener to emit straightaway a pattern of behavior which an organism without language could only be induced to emit after a long process of gradual behavior-shaping spread over hours, if not days. He makes this point, though not as emphatically as I remember him doing on the occasion to which I have referred, in the Kleinmuntz volume on *Problem Solving* in which Skinner's (1966/1969/1988) 'An operant analysis of problem solving' first appeared.

The functional significance of novel information-providing sentences or "tacts," as they are called by Skinner in some of his uses of that ambiguous term (Place, 1985), is alluded to by Skinner in *Verbal Behavior* when he remarks (Skinner, 1957, p. 85) that

We come a little closer to the ultimate explanation of behavior in the form of the tact when we examine a case in which the stimulus which the tact specifies is not directly accessible to the listener.

and again when he says (on the same page)

In very general terms we may say that behavior in the form of the tact works for the benefit of the listener by extending his contact with the environment and such behavior is set up in the verbal community for this reason.

In other words the function of a tact in the sense of a novel information-providing declarative sentence is to allow the speaker to convey to the listener information about contingencies to which neither speaker nor listener need be currently exposed and the like of which neither party need have experienced in their own cases.

The importance of this human ability to communicate information about remote contingencies the like of which the listener need never have encountered personally is difficult to exaggerate. It is the very foundation of the culture that more than anything else distinguishes the way human beings adapt to their environment from the way animals do. But acting as a vehicle for communicating information from speaker to listener is not the only function performed by novel declarative sentences. They also constitute one of the varieties of "contingency-specifying stimuli" or "rules" of which Skinner speaks in his "An operant analysis of problem-solving" (Skinner 1966/1969/1988). It is plain both from the examples that he gives and from everything he says about them that rules for Skinner are novel sentences. But although some of his examples are of rules that have become embedded in a culture and are

regularly communicated from one person to another, he is primarily concerned, as the title of the paper suggests, with the use that the individual makes of such sentences in the thought process which, if successful, leads to problem solving.

As I have argued elsewhere (Place, 1992), rules in Skinner's sense are compound conditional sentences of the form: "If a situation of the *x* type exists, a situation of the *y* type will or should be made to exist." Such conditionals are of two kinds:

- (1) *prescriptive rules* (corresponding to the "Plays" of Zettle & Hayes, 1982) as in the sentence *If the baby cries, give it a bottle* which specifies an *antecedent condition* and the *behavior* to be performed under that condition, and
- (2) *descriptive rules* (corresponding to the "Tracks" of Zettle and Hayes) as in the sentence *If you give the baby a bottle, it will go back to sleep* which specifies the *behavior* to be performed and the *consequences* of so behaving.

It will be apparent that the rules that occur as part of the thought process which, if successful, results in problem solving are usually of the descriptive variety and that their function is to specify the probable consequences of the various courses of action under consideration by the would-be problem solver. In order to perform that function the would-be problem solver needs to be able construct sentences specifying behavior-consequence relations based on personal experience of the contingencies so that they can be evaluated alongside those derived from information-providing sentences received from others. Small wonder that the construction of novel sentences in the form of a descriptive rule is a characteristic feature of the thought processes that accompany every attempt at problem solving by a linguistically competent human being.

The Role of Reinforcement in Maintaining Communication and Linguistic Competence

Something needs to be said about the role of reinforcement in maintaining and making possible the construction and emission of novel sentences by the speaker and their construal by the listener. On that point I will say only this. If you listen attentively to a tape recording of any naturally occurring verbal interaction between two or more people, or read any professionally prepared transcript of such an interaction, or simply listen to a conversation in which you are not a participant, you cannot avoid observing that virtually every sentence that a speaker completes is reinforced by the listener. In most cases the reinforcer takes the form of an expression of agreement or an acknowledgment of comprehension such as a head nod, an *Mhmm*, a *Yes*, or a *No* (depending on whether the speaker's sentence is an assertion or a negation). As conversation analysts have often pointed out, the immediate effect of such "continuers," as I call them (Place, 1997), is to maintain the speaker "in turn" until some behavioral significant piece of

information (usually a complete three-term contingency) has been communicated. Once this is complete, the listener has a chance to emit what I call a "terminator" which, although it acts as a reinforcer insofar as it acknowledges the previous utterance as a successful communication, has the effect of allowing the listener to take a turn to play the role of speaker.

Often the listener will respond to the completion of a sentence with what Harzem and Miles (1978) call a "disinforcer." This may take the form of an expression of incomprehension, an objection to what has just been said, a request for clarification or simply the omission of the reinforcer that would be expected in such circumstances. All such responses or absences thereof tell the speaker that the sentence has failed either to communicate or persuade, and that some repetition, restatement, elaboration or answer to the objection is required.

The effect of these different varieties of consequence provided by the listener in either maintaining, terminating, or disrupting the speaker's flow is plain for all to hear. What is less easy to demonstrate is their *extra-episodic* effect on the initial acquisition and subsequent maintenance of the linguistic competence of the individual, the ability to construct and construe novel sentences specifying contingencies the like of which need never have been encountered personally. All one can say is that in the average human social environment there are more than enough reinforcers, interspersed with the occasional disinforcer, as evidenced by their *intra-episodic* effects, to explain the acquisition and maintenance of the linguistic competence of the individual and thereby the possibility of effective linguistic communication within the verbal community without needing to invoke the kind of innate programming of the underlying structure of the rules of syntax as postulated by Chomsky. If that is so, Ockham's razor demands that we remove from our ontology an entity which is evidently *praeter necessitatem*, redundant as far as explaining the phenomenon is concerned. The conclusion I draw from this is that selective operant reinforcement and the three-term contingency is everywhere in language, and if they are everywhere in language they are everywhere in human behavior. There is a science of human behavior, and it is a science of learning by operant reinforcement.

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