

Skinner's Distinction between Rule-Governed and Contingency-shaped Behaviour¹

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ABSTRACT The distinction that Skinner draws in his 'An operant analysis of problem solving' (1966; 1969; 1984) between "rule-governed" and "contingency-shaped" behaviour is arguably the most important single contribution to the theory of behaviour that he has made in a long and uniquely distinguished career. The concept of a "rule" as a "contingency-specifying" verbal formula which exercises "stimulus control" over other aspects of the behaviour of a linguistically competent human being presents a formidable challenge to contemporary cognitive psychology in that the "representation" and "computation" of environmental contingencies is seen as confined to verbally controlled behaviour emitted by linguistically competent human subjects. It also suggests a way of filling a major gap in the account of language offered by Skinner in his earlier book Verbal Behavior (1957), namely the lack of any account of how the speaker is able to use instructions to evoke behaviour which the listener has never previously emitted and declarative sentences to convey information about contingencies which the listener has never previously encountered.

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INTRODUCTION

According to a recent paper by Vaughan (1987), the way in which verbal stimuli control the behaviour of the listener was first discussed by Skinner in his William James Lectures at Harvard in 1947. However, his first use of the term "rule-governed behavior" in this connection and his first deployment of the distinction between "rule-governed" and "contingency-shaped" behaviour appears in a paper entitled 'An operant analysis of problem solving'. This paper was presumably written some time in the early 1960's on the evidence of a cyclostyled copy which I recently came across among my papers and which he must have given me when I visited him in his office in the William James Building at Harvard in the Spring of 1965. It was first published in the following year (Skinner 1966) in a collection of papers on 'Problem solving' edited by Kleinmuntz and was subsequently incorporated as Chapter 6 in his book *Contingencies of Reinforcement* (Skinner 1969). It was reprinted with Peer Commentary as one of his 'Canonical papers' to which a special number of *Behavioral and Brain Sciences* was devoted in 1984. Apart from his reply to the Peer Comments published alongside the BBS re-issue of the paper, Skinner has not published anything else on this topic, as far as I am aware. Nevertheless the idea has been taken up with enthusiasm by many of his followers who see it as crucial to our understanding both of the difference between human and animal behaviour and of the link between the two. It has consequently become a major, if not *the* major, focus of research in the experimental analysis of human behaviour. Unfortunately, so deep rooted are current prejudices within Psychology against Behaviourism in general and Skinner in particular that there is almost total ignorance of the existence of this work and of the theoretical discussion on which it is based outside the academic ghetto to which behaviour analysis and all its works have been consigned in recent years.

THINKING AS SELF-DIRECTED TALK

While the distinction has all the marks of an original idea, there are two strands in the history of Behaviourism of which it can be seen as a continuation and development. The first of these strands is the notion which goes back to Watson and which is, perhaps, the only prejudice which is shared by psychological and philosophical behaviourists alike, namely, the belief that thinking is simply a matter of talking to oneself or, as A. J. (now Sir Alfred) Ayer put it in his Inaugural Lecture at University College, London (Ayer 1947),

"the process of thought can[not] be validly distinguished from the expression of it."² This traditional behaviourist prejudice which makes thinking the exclusive prerogative of linguistically competent human beings finds expression in Skinner's description of 'rule-governed behavior' as behaviour under the stimulus control of a verbal formula which "specifies" the relevant contingency.

PAVLOV'S FIRST AND SECOND SIGNALLING SYSTEMS

The second strand in the history of Behaviourism which parallels, even if it has not influenced, Skinner's formulation of the contingency-shaped/rule-governed distinction is the distinction drawn by Pavlov (1938) between the "First" and "Second Signalling Systems." The First Signalling System is what generally known as "Classical", "Pavlovian" or, to use Skinner's term "Respondent" conditioning. The Second Signalling System with which the First is contrasted is language. Now since a rule for Skinner is some kind of verbal formula or sentence which controls or is capable of controlling the behaviour of a competent interpreter of the language or code in which it is formulated, it is evident that there is a fairly precise correspondence between his concept of rule-governed behaviour and Pavlov's Second Signalling System. On the other hand, when Skinner speaks of "contingency-shaped behavior", he is thinking primarily of operant rather than respondent behaviour, of the products of instrumental learning rather than those of classical Pavlovian conditioning. Nevertheless there are three sets of considerations which suggest that Pavlov's distinction between the First and Second Signalling Systems coincides rather more exactly with Skinner's distinction between Contingency-shaped and Rule-governed Behaviour than would appear at first sight.

The first of these considerations is the evidence of the experiments by Miller and Konorski (1928) which suggests that operant or instrumental learning involves and depends on an underlying respondent or classical Pavlovian conditioning of autonomic responses to the sensory feedback from the motor behaviour and its immediate environmental effect. The second consideration comes from a suggestion which was first made by Professor N. J. Mackintosh (1977) to the effect that classical conditioning should be understood as a process whereby the organism "learns about" causal relations in its environment. Despite the mentalistic flavour of Mackintosh's formulation, it is not difficult to see a link here with Skinner's notion of

² I am indebted to Mr. L. J. Cohen of Queen's College, Oxford for reminding me of this passage.

Contingency-shaping, once it is appreciated that a contingency in Skinner's sense is a causal relation (or in some contexts the absence of such a relation - Mackintosh's "causal irrelevance") which holds under certain *Antecedent* conditions between a particular *Behavioural* event and the *Consequences* of so behaving.

But perhaps the most decisive evidence in favour of a coincidence between Skinner's distinction and Pavlov's comes from observations of which neither Pavlov nor Skinner appear to have been aware when they formulated their respective distinctions. In the case of both types of conditioning, subsequent observation has demonstrated a number of discrepancies between the behaviour of human subjects and that of animals under what are, in all relevant respects, identical experimental conditions. Moreover, in both cases these discrepancies are directly traceable to the effect either of verbal instructions issued by the experimenter or, where no instructions are given, of a self-directed verbally formulated hypothesis on the part of the subject as to the contingencies operating within the experimental situation. In the case of operant responding, evidence of significant differences between the behaviour characteristic of animals and pre-linguistic human children and that shown by older children and adults on the classical "schedules of reinforcement" (Ferster and Skinner 1957) has been summarised by Lowe (1979; 1983). In a number of ingenious experiments reported in those papers, Lowe and his co-workers have shown beyond reasonable doubt that these differences are directly attributable to the effect in the human case of either (a) verbal instructions from the experimenter, (b) verbally formulated hypotheses generated by or suggested to the subject, or (c) some combination of the two. Evidence that human classical conditioning is similarly influenced by verbal instructions and verbally formulated hypotheses is reviewed by Brewer (1974) in his critical survey of the evidence purporting to show the occurrence of conditioning in humans which is independent of the "higher mental processes."

THE CONCEPT OF THE THREE-TERM CONTINGENCY

There is, however, one respect in which Skinner's distinction between contingency-shaped and rule-governed behaviour has something that is missing from Pavlov's account of the distinction between the First and Second Signalling Systems. This is his formulation of the difference between behaviour that is and is not verbally controlled in terms of the concept of the "three-term contingency", consisting of Antecedent

condition, Behaviour and Consequence.³ All behaviour on this view is a matter of adapting to the contingencies prevailing in the organism's environment. It is a matter of selecting the behaviour whose consequences will, in general, tend to promote the survival and well-being of the individual, the social group and the species and of suppressing any behaviour whose consequences tend to threaten the survival and welfare of individual, group or species. Contingency-shaped behaviour is behaviour which proceeds from a behavioural disposition or propensity which has been shaped by repeated exposure to the consequences of behaving in that particular way under those particular antecedent conditions in the past history either of the species, in the case of unlearned behaviour, or of the particular individual, in the case where the behaviour is learned. The unlearned behaviour that is characteristic of the species as a whole is said by Skinner (1975) to have been shaped by "the contingencies of survival". In other words, these behavioural propensities have been shaped in the course of evolution by their success in securing the survival of the individual and the reproduction of the species in the particular ecological niche which is occupied by that species. In contingency-shaped *learned* behaviour the same process of natural selection takes place within the lifetime of the individual organism in accordance with the Law of Effect (Thorndike 1911). Behavioural propensities which have consequences towards which the organism exhibits approach or appetitive behaviour are strengthened or reinforced. Behavioural propensities whose consequences are aversive are weakened or disinforced and ultimately eliminated from the organism's behavioural repertoire.

A living organism whose behaviour is contingency-shaped in either or both of these senses can sometimes make a novel and creative response in a situation it has never previously encountered and to which its behavioural propensities have not been specifically shaped by the past history of the species to which it belongs; but it can only do so by noting some feature or features which the present situation has in common with one or more situations for which it already possesses an appropriate strategy by virtue of the way its behavioural propensities have been shaped either by its own past experience or by that of the species to which it belongs.

³ In *Contingencies of Reinforcement* (1969) Skinner specifies the three terms rather more narrowly as Stimulus, Response and Reinforcement. The more generalised form given here is to be preferred in so far as it allows us both to recognise Antecedent conditions, such as a state of deprivation, which are not stimuli, Behaviour, such as failing to respond, which is not a response and Consequences, such as punishment or non-reinforcement, which are not reinforcing.

Rule-governed behaviour, by contrast, escapes from the restriction to behavioural propensities shaped by the past experience of the individual and the species by virtue of being governed or controlled by a verbal formula or sentence uttered by the agent as a self-directed thought which is said to "specify" the contingency with which he or she is confronted and to which he or she is able to adapt his or her behaviour without having either an innate capacity to deal with situations of that kind or a capacity to do so shaped by previous experience of dealing with similar contingencies in the past. By means of verbal communication rule-governed behaviour is accessible, not only to the experience of other speakers, but to the accumulated experience of a whole culture and, given literacy and world wide communication, that of all mankind. Moreover, by using the same linguistic forms to construct sentences summarising his or her own personal experience of the prevailing contingencies as are used by other speakers to communicate their experiences and those of the culture as a whole, it is possible to bring together both sources of information and thus generate problem solutions which would not have occurred to the thinker on the basis of one source of information alone.

WITTGENSTEIN'S CONCEPT OF "RULE-FOLLOWING"

We can, perhaps, bring out the nature of rule-governed behaviour, as Skinner construes it, by contrasting it with Wittgenstein's notion of "following a rule" with which it has sometimes been confused. It cannot be too strongly emphasised that Wittgenstein's "rule-following" and Skinner's "rule-governed behaviour" are quite different kinds of behaviour. The only thing they have in common is that in both cases the rules that govern or are followed are in some sense linguistic entities and some kind of linguistic competence is consequently involved in following or being governed by them. In other respects there is hardly any overlap between the two. As we have seen, a rule for Skinner is a verbal formula or sentence uttered as a self-directed thought immediately prior to the emission of the behaviour which it thereby initiates and controls. The kind of example he has in mind would be an instruction like *When you get to the T-junction, turn left* which specifies an antecedent condition and the behaviour to be performed when that condition is encountered or a verbally formulated means-ends belief, like *If I turn left here, it will bring me out onto the main road by the Coach and Horses* which specifies the behaviour whose performance is up for consideration and the

consequences of so doing. The relationship between the self-directed utterance of a rule in this sense and the behaviour which it is said to govern is strictly and directly causal. However, the behaviour that is governed by the rule is only rule-governed under *one* of its descriptions. In this example, the behaviour is only rule-governed under the description "turning left rather than right at a particular road junction". Described in terms of its component parts - braking, changing gear, turning the steering wheel - the behaviour, in common with all habitual and well practised skilled performance, is contingency-shaped.

For Wittgenstein a rule is not primarily a verbal formula or sentence. Some rules in his sense are written down as verbal formulae, but you do not have to rehearse the verbal formula prior to following the rule. Indeed there are many rules in Wittgenstein's sense which speakers follow without ever having been confronted by their verbal specification. There are, for example, linguistic rules which never have been and, in the case of some semantic rules, never could be formulated. Moreover the relation between the rule and the behaviour it is said to follow is not a causal relation. A rule in Wittgenstein's sense is a pattern to which human behaviour must conform if it is to be accepted as constituting a particular socially defined action or activity, using "defined" here in its sociological sense. The paradigm of rules and rule-following in Wittgenstein's sense are the rules of a game. The rules of most games are written down somewhere, but an experienced player of the game doesn't have to rehearse the rules in order to conform to them. In Skinner's terms the behaviour of the experienced player in following the rules of the game is behaviour shaped by the social consequences of deviating from them in the remote past. Such rule-following only becomes rule-governed in Skinner's sense under two circumstances:

(1) in the initial stages where a novice is beginning to learn the rules of a game he or she has never played before and finds it helpful to rehearse the relevant rule in order to achieve conformity to it, and

(2) where an umpire or referee rehearses the relevant rule in the course of arriving at a decision or ruling on how the game shall proceed.

In all other cases rule-following behaviour is entirely automatic and hence, in Skinner's terms, contingency-shaped. This is true even in highly intellectual games like bridge and chess which involve a great deal of what Skinner would call rule-governed behaviour, but the "rules" which the players rehearse and which govern the moves that they make or the cards they play are not the rules of the game. Those are taken

for granted as part of the contingency-shaped framework within which the game is played. What are rehearsed are rules in the sense of the player's means-end beliefs about the consequences of making one move or playing one card rather than another.

MENTALISM AND THE RULE-GOVERNED/CONTINGENCY-SHAPED DISTINCTION

Finally a few words about what I take to be the significance of the distinction between contingency-shaped and rule-governed behaviour for contemporary Psychology. I have three points to make.

My first point concerns the thesis which is implied by Pavlov's distinction, as well as by Skinner's, to the effect that there exists a radical discontinuity between behaviour that is controlled by verbal instructions and self-directed verbally formulated thoughts and behaviour, such as the behaviour of animals and pre-linguistic children, which is not so controlled. The experimental evidence cited above which supports the existence of such a discontinuity, both in the case of classical respondent conditioning and in the case [of] operant or instrumental behaviour, is overwhelming. Nevertheless, psychologists on both sides of the Behaviourist/Cognitivist divide seem peculiarly reluctant to accept its implications. The implication which the behaviourist finds difficult to stomach is that principles of behaviour which have been laboriously worked out on the basis of experimental studies of the contingency-shaped behaviour of animals cannot be automatically extended to explaining the rule-governed behaviour of human subjects. The implication which sticks in the cognitivist's gullet is that we cannot legitimately explain the contingency-shaped behaviour of animals and pre-linguistic children in "mentalistic" terms, if it is the case, as I am persuaded it is, that such explanations presuppose both linguistic competence on the part of the behaving organism and that the behaviour to be explained is verbally controlled or "rule-governed" in Skinner's sense.

What persuades me that this is so is the role that is played in such explanations by sentences in which a "cognitive" verb, such as 'know', 'believe', 'think', 'remember', etc., takes as its grammatical object an embedded sentence in *oratio obliqua* or indirect reported speech. Where the embedded sentence is in the declarative mood, typically introduced by the pronoun 'that', it gives what Geach (1957) calls "the gist or upshot" of a class of sentences which together constitute a "proposition", to use the philosopher's term, or "rule", as Skinner would say, which controls the agent's behaviour when one of them is uttered in his or her

presence or occurs as a self-directed thought as part of the process of deciding what to do. Where the embedded sentence is in the interrogative mood, introduced by an interrogative pronoun, it characterises the capacities and incapacities of the agent by reference to the questions he or she is able or unable to answer. Where the embedded sentence is in the imperative mood, introduced by the preposition 'to', it gives the "gist or upshot" of a rule or instruction which the agent has agreed or decided to follow.

When used, as they frequently are in ordinary language, to explain behaviour that is not in fact subject to the kind of verbal control which, taken literally, they appear to presuppose, locutions such as these are for most purposes a convenient and harmless metaphor; but where scientific precision is important and in the face of the evidence of discontinuity between behaviour that is and is not verbally controlled, the use of such locutions in the explanation of behaviour that is contingency-shaped could only be justified if there were no alternative, which plainly there is.

VERBAL BEHAVIOUR IS CONTINGENCY-SHAPED

Although most of the instrumental behaviour of human adults and older children is evidently rule-governed at the level of strategic decision, there is one form of peculiarly human behaviour which is overwhelmingly contingency-shaped, namely verbal or, if you prefer, linguistic behaviour itself. Not only is it the case that we seldom work out what to say in advance on the basis of an evaluation of the predicted consequences of saying one thing rather than another, there are also a number of *a priori* considerations from which it follows that such rule-governed control of verbal behaviour itself will be the exception rather than the rule:

(1) since responding to a rule, in the sense in which rules are said to govern behaviour, is itself a form of verbal behaviour requiring a substantial linguistic competence for its performance, the process whereby that degree of linguistic competence is acquired in the first place cannot itself be rule-governed and must, therefore, be contingency-shaped;

(2) the self-directed verbal utterances which are involved in the control of most rule-governed behaviour cannot themselves be rule-governed; for if they were, we would be faced by the kind of vicious infinite regress of higher order verbally formulated thought processes controlling the lower order thoughts to which Ryle draws attention in *The Concept of Mind* (1949);

(3) verbally formulated thought processes take time to formulate, emit and react to; the reaction times required both for ordinary conversation and other spontaneous verbal performances are too short for the kind of verbally formulated pre-planning which is required by rule-governed behaviour.

But if all verbal behaviour is contingency-shaped to begin with, and if most subsequent verbal behaviour remains so, it follows that a mentalistic theory of language which, if taken literally, assumes that such behaviour is rule-governed cannot hope to succeed in the long run. Only a non-mentalistic behaviourist theory has the conceptual resources to provide an adequate and non-metaphorical account of contingency-shaped behaviour.

SENTENCES AS CONTINGENCY-SPECIFYING STIMULI

This brings me to my third and final point. As is well known, the behaviourist approach to language which dominated American Linguistics, as it did Psychology, in the 1930's, 40's and 50's was given what many still believe to have been its death blow by Chomsky's (1959) Review of Skinner's (1957) book *Verbal Behavior*. Although many of Chomsky's criticisms of Skinner's book cannot be gainsaid, I am convinced, by the argument just rehearsed, that reports of the demise of the behaviourist theory of language were premature, and that only a theory along these lines can hope to do justice to the contingency-shaped character of linguistic behaviour. Moreover, it is my belief that in the account of rule-governed behaviour that he gives in 'An operant analysis of problem solving' Skinner points us in the direction in which we must go in order to make good three major omissions which weaken the account of language which he presents in *Verbal Behavior* and justify many of Chomsky's criticisms. As I see it these omissions are as follows:

(1) he fails to explain how verbal stimuli control the behaviour of the listener;

(2) he fails to acknowledge the existence of the phenomenon to which Chomsky has repeatedly drawn attention whereby sentences are rarely repeated word for word, but are constructed anew on each occasion of utterance with the result that the speaker is constantly constructing and the listener is constantly construing sentences which neither has ever constructed or encountered before;

(3) he fails to explain how it is that, given the ability to construct novel sentences, the speaker can, by means of a verbal instruction, evoke behaviour from the listener which, in an organism lacking the

requisite linguistic competence, would require a lengthy process of contingency-shaping, and, by supplying the appropriate information, enable the listener to adapt effectively to contingencies which he or she has never previously encountered.

The concept of rule-governed behaviour makes good these omissions in so far as:

(1) a rule in this sense is a verbal stimulus which controls the behaviour of the listener or, where it occurs as a self-directed thought, the behaviour of the thinker,

(2) a rule in this sense is a verbal formula or sentence which, when it occurs as a self-directed thought during the process of problem-solving, is a new construction formed by the thinker,

(3) a rule in this sense exercises stimulus control over the behaviour of the listener or thinker by virtue of providing a verbal "specification" of the contingency whose operation in the present case it predicts.

Needless to say, the concept of rule-governed behaviour, as developed thus far, provides no more than a tantalising suggestion of how an adequate theory of the way language controls the behaviour of the listener/thinker might be developed. But since it appears to have no serious rivals in this respect, this, I am convinced, is the direction in which the science of language needs to develop.

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