

Text (slightly modified) of a paper given at the Christmas Meeting of the Experimental Analysis of Behaviour Group, University College, London, 4th January 1983.

Title: *Behavioural Contingency Semantics and the Analysis of Behaviour*.

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[It was assumed in delivering this paper that members of the audience had all been supplied with a copy of the Abstract which is appended to the text of the paper.]

In his book *Verbal Behavior* (1957), B. F. Skinner gives us a powerful and perceptive account of the way the emission of verbal behaviour by a speaker is controlled by the stimulus environment in which it occurs. However, in a previous paper (Place 1981), I argued that, as an account of language in general, *Verbal Behavior* has two major defects.

The first of these defects is the failure to draw an adequate distinction between sentences and the words of which they are composed. No account of language can hope to succeed, if it fails to recognise that words, the units of verbal behaviour which are repeated, can only produce a determinate effect on the behaviour of a listener in so far as they are combined with other words in such a way as to form a grammatically complete sentence or else a string which, though grammatically incomplete, can be taken in the context of utterance as equivalent to such grammatically complete sentence. Nor can it hope to succeed unless it is recognised that sentences which are the functional units of verbal behaviour, are seldom repeated word for word and are usually constructed *de novo* on each occasion of utterance by assembling words and phrases into novel combinations.

The second major defect of Skinner's (1957) account of language which I identified in my paper is the inadequacy of the very little which he says in the book about the control exercised by verbal stimuli over the behaviour of the listener.

Between them these two defects have the effect of exposing Skinner's account to the criticism made by Chomsky (1959), namely, that Skinner cannot, in terms of the concepts he deploys in *Verbal Behavior*, account for the fact that, by putting familiar words together in new ways, a speaker can generate sentences

which can both induce the listener to emit behaviour that he or she has never emitted before and convey to the listener information about contingencies which he or she has never previously encountered.

In a paper to be published under the title 'Skinner's *Verbal Behavior* IV - how to improve Part IV - Skinner's account of syntax' (Place 1983), I have introduced the term 'Behavioural Contingency Semantics' as the title of a semantic theory designed specifically to make good these defects in Skinner's (1957) theory. This theory accounts for the control exercised by verbal behaviour emitted by the speaker over the behaviour of the listener on the assumption that the functional unit of verbal behaviour as far as the listener is concerned is the sentence and that sentences are constructed anew on each occasion of utterance by putting words together in accordance with the syntactic and semantic conventions endorsed by the verbal community within which the utterance in question is recognised as a well formed sentence.

In order to incorporate this conception of the sentence as the functional unit of verbal behaviour within Skinner's conceptual framework, we need to construe the sentence as it impinges on the behaviour of the listener as a discriminative stimulus. But, when compared with the discriminative stimuli described by Skinner in Chapter V of *The Behavior of Organisms* (1938), sentences display a number of peculiar features. Perhaps the most striking of these peculiarities is the fact is that sentences are constructed afresh on each occasion of utterance out of familiar stimulus elements - words and phrases - which only have a determinate effect on the behaviour of the listener by virtue of the position which they occupy in the sentence as a whole. From this it follows both that the listener will not normally have encountered that precise combination of stimulus elements (words and phrases) before and consequently that the effective discriminative stimulus in such cases (i.e., the sentence as a whole) will not have been associated in the past experience of the listener with the contingency for which it nevertheless acts as a discriminative stimulus.

In order to accommodate the notion of a sentence as a newly constructed contingency-specifying discriminative stimulus within the conceptual framework of Behaviour Analysis, I am proposing three substantial modifications in the original account of discrimination learning and the discriminative stimulus presented by Skinner in Chapter V of *The Behavior of Organisms* (Skinner 1938).

1. The first of these modifications is laid out in Proposition 9 of the Abstract of this paper. This proposition makes explicit the conceptual connection between the concept of 'discriminative stimulus' on

the one hand and the concept of 'a contingency' on the other. This conceptual connection, though arguably implicit in *The Behavior of Organisms*, was not made explicit in 1938 for the very good reason that the term 'contingency' had not yet been introduced. More recently, however, an excellent precedent for this conceptual connection has appeared in Chapter 6 of *Contingencies of Reinforcement* (Skinner 1969, p.147) where Skinner talks of "discriminative stimuli (as exemplified by maxims, rules, and laws)" being "more easily observed than the contingencies they specify" and on the following page (p.148) of "a rule" in its capacity "as a discriminative stimulus" being "effective as part of a set of contingencies of reinforcement". I take this as a precedent for the principle which I have formulated in Proposition 9 of the Abstract where 'a discriminative stimulus' is defined as a "stimulus which prepares the organism that responds to it to encounter a situation in which a particular contingency or type of contingency is operating."

In the account of discrimination learning which he presents in Chapter V of *The Behavior of Organisms*, Skinner distinguishes only two varieties of discriminative stimulus, the S^D , a stimulus which has been consistently associated with and consequently prepares the organism to encounter a contingency in which a response is positively reinforced, typically by the delivery of food, and the S^A , a stimulus which has been consistently associated with and consequently prepares the organism to encounter the time-out from positive reinforcement or 'extinction' contingency. If these were the only conditions under which we could speak of a stimulus acquiring the properties of a discriminative stimulus, we could not possibly hope to account for the complexity of the information that can be conveyed by a sentence in terms of the notion that sentences act as discriminative stimuli. The only kinds of sentence which would qualify as discriminative stimuli by the criteria laid down in Chapter V of *The Behavior of Organisms* would be sentences like *Dinner is ready!* in the case of S^D and *Sorry! We're closed* in the case of S^A .

The suggestion that is incorporated in Proposition 9 is that we need to extend the notion of 'discriminative stimulus' so as to include *any* stimulus which has the effect of preparing the organism to encounter *any* contingent relationship between any behaviour which the organism has emitted in the past or might conceivably emit in the future and the probable or possible consequences of that behaviour.

But if we are to extend the notion of 'discriminative stimulus' in this way, we are immediately confronted with the need to develop a more adequate classification of the different types of contingency for which a discriminative stimulus in this extended sense can prepare an organism to encounter; and the first thing that struck me when I attempted to develop such a classification was that the discussion in the operant literature both in relation to discrimination learning and in relation to contingencies is dominated by a pre-occupation with contingencies of reinforcement with correspondingly little discussion of contingencies in which the consequences of behaviour are aversive.

It was principally the perception of this lack of balance which has led me to adopt Harzem and Miles' (1978) term 'disinforcement' in this connection and to propose the extension of this term as laid out in Proposition 1 of the Abstract so as to include any consequence which has the effect of weakening the propensity to emit the behaviour of which it is a consequence, just as the term 'reinforcement' covers any consequence which has the effect of strengthening the propensity to emit the behaviour of which it is a consequence. The great advantage of this conceptual innovation is that it allows us to recognise the time-out from positive reinforcement or 'extinction' contingency as a contingency of disinforcement alongside the contingent aversive stimulation or 'punishment' contingency and hence to assert that *any* consequence of behaving in a given way is either a Contingency Reinforcement if it strengthens the behaviour or a Contingency of Disinforcement if it weakens it. When combined with the concept of 'the significant stimulus event' (defined in proposition 2) to which I shall be returning later and the distinction between a Positive Contingency and a Negative Contingency laid out in Proposition 3, this contrast between Contingencies of Reinforcement and Disinforcement gives us the elegant fourfold classification of contingencies according to the nature of the consequences involved which is laid out in Propositions 4, 5, 6 and 7, with Positive and Negative Disinforcement balancing Positive and Negative Reinforcement.

2. The second modification of Skinner's account of the discriminative stimulus which is required in order to accommodate the notion that a sentence acts as a discriminative stimulus for the listener, is a relaxation of the requirement that in order for a stimulus to acquire the properties of a discriminative stimulus with respect to the behaviour of an organism, its occurrence in the stimulus environment of the organism must have been consistently and repeatedly associated with the contingency in question and its

absence or non-occurrence must have been consistently and repeatedly associated with the opposite contingency (i.e. the corresponding negative contingency in the case of positive contingency or the corresponding positive contingency in the case of a negative contingency).

What is needed here is a relaxation of the requirement that, for a discriminative stimulus to be effective, the whole stimulus must have been repeatedly associated as a unit with the contingency for which it acts as a discriminative stimulus. We need to allow for the fact that sentences which are the effective discriminative stimuli on this view can be understood by a listener despite having never previously heard precisely that combination of words before. We also need to allow for the fact that the listener can be thereby induced to perform behaviour which, in that precise form, he or she has never performed before and for the fact that a sentence can prepare a listener to encounter contingencies which he or she has never previously encountered. We must therefore accept that an effective discriminative stimulus complex or sentence can be and is composed of stimulus elements (words) which, as constituents of *other* sentences, have been repeatedly and consistently associated with the same element when it has occurred as a constituent of other contingencies. We must also accept that these words are arranged in a pattern such that the same sentence pattern composed of different words has been repeatedly and consistently associated with the same type of contingency, though involving different elements, (i.e. different objects and different properties of those objects). This is the principle I have tried to lay out in Proposition 10.

The suggestion here is that, by putting these discriminative elements or words together in accordance with the grammatical conventions endorsed and selectively reinforced by the verbal community, the speaker is constructing a kind of map or diagram of part of the contingency which it consequently prepares the listener to encounter. In other words there is an isomorphic relationship between the structure of the sentence on the one hand and the structure of the part of the contingency onto which it maps and which it thereby specifies.

I can perhaps illustrate what I mean by giving three examples of a simple sentence each of which maps onto and thus specifies one and in each case a different one of what I call the three 'legs' into which, according to Skinner, every contingency is to be analysed, the Antecedent conditions, the Behaviour to be emitted under those Antecedent conditions, and the Consequences of emitting that Behaviour under those

conditions. An example of a sentence which maps onto an Antecedent condition under which Behaviour is called for, would be the sentence '*The baby is crying*'. An example of a sentence which maps onto Behaviour called for under these conditions would be the imperative sentence or 'mand', as Skinner would call it, *Give the baby a bottle*, while an example of a sentence which maps on to the, in this case, reinforcing Consequence of that behaviour would be *The baby has gone back to sleep*. Given these simple or atomic sentences each of which maps onto a different leg of the same contingency we then can go on to construct compound conditional sentences of the form *If p then q* like *If the baby cries, give it a bottle* which specifies the Antecedent condition and the Behaviour called for under that condition or *If you give the baby a bottle, it will go back to sleep* which specifies the Behaviour and its Consequences, or *If the baby cries, give it a bottle and it will go back to sleep* which specifies all three legs of the contingency.

3. The third and final modification in the account of discrimination learning and the discriminative stimulus given by Skinner in Chapter V of the *Behavior of Organisms* which is needed in order to accommodate the notion of a sentence as a discriminative stimulus in relation to the behaviour of the listener, is the principle which I have stated in Proposition 11 and which provides the principal justification for introducing the concept of the 'significant stimulus event' in Proposition 2, namely the principle of the Motivational Neutrality of Discrimination Learning.

In the second of my series of papers on Skinner's *Verbal Behavior* (Place 1981) I used the case of the 'fact' or indicative sentence *Joe is coming* as an example of a sentence which acts as a discriminative stimulus for a contingency which will be a contingency of reinforcement for a listener for whom Joe's appearance is positively reinforcing and contingency of disinforcement for another listener for whom Joe's appearance is positively disinforcing or aversive. Nevertheless we use the same sentence in order to specify what is objectively the same contingency regardless of the motivational attitude of the particular listener to the consequences in terms which the contingency in question is defined, which alone determines whether the contingency is a contingency of reinforcement or of disinforcement. The reasons for this motivational neutrality is readily intelligible in the case of a 'pure fact' or purely information-providing sentence where it would be most inconvenient if one had always to ascertain the attitude of the listener to the consequences in question in choosing the appropriate words to characterise the contingency, as one would have to do, if

the speaker was always required to differentiate between what, for the listener, is a contingency of reinforcement and what a contingency of disinforcement. However the linguistic inconvenience of having to divine the motivational attitude of the listener to the relevant consequences before constructing the appropriate sentence, though it might explain why sentences like *Joe is coming* are motivationally neutral, is not enough to justify the claim that is made in Proposition 11 to the motivational neutrality of discriminative stimuli and discrimination learning in general.

According to the principle laid down in Proposition 11, discrimination learning and discriminative stimuli in general are motivationally neutral in the sense that a discriminative stimulus prepares the organism for the situation in which the emission of certain behaviour will have certain consequences regardless of the motivational attitude of the particular organism to those consequences, and hence regardless of whether or not for the organism concerned the contingency for which it is thereby prepared is a contingency of reinforcement or of disinforcement. The consideration which leads to that conclusion concerns the role of attending behaviour in ensuring that the behaviour of the organism is controlled by those stimuli that are motivationally significant to the organism regardless of whether those stimuli are reinforcing or disinforcing, pleasant or unpleasant, while other equally salient stimuli which are not motivationally significant are ignored.

Not only is there a considerable body of experimental work that was done in the fifties and sixties on motivational factors in perception which shows that motivationally significant stimuli are more readily perceived than motivationally insignificant stimuli, regardless of whether those stimuli are pleasant or unpleasant, reinforcing or disinforcing. It is also manifest that any perceptual mechanism which obeyed the Law of Effect and tended to filter in pleasant or reinforcing stimuli and filter out unpleasant or disinforcing stimuli would be grossly maladaptive in so far as all danger signals would be systematically ignored.

In conclusion just a brief word about the empirical consequences of all this. I hardly need say that the empirical consequences with which I am primarily concerned are those relating to the initial acquisition and subsequent deployment of verbal skills by human speakers and listeners. It seems to me that apart from the inherent difficulty of developing an empirically testable theory in this area, it is precisely because some of the basic concepts have not been adequately thought through that the account

of language that Skinner presents in *Verbal Behavior* (1957) has notably failed to generate the kind of empirically testable consequences which would sustain an on-going programme of empirical research. However, my hunch is that there is still a good deal of conceptual clarification and theoretical elaboration to be done in this area before such empirically testable consequences begin to emerge as I am confident they ultimately will. Nevertheless the three modifications I have proposed to what has now become the traditional account of operant discrimination learning are conceived as applying generally and not to verbal behaviour only. Of the three modifications I am proposing the first, represented by Abstract Propositions 1 to 9, is mainly a matter of tidying up the terminology in this area. This has no immediate empirical consequences, though such conceptual reconstructions can often lead one to see old problems in a new light and thus trigger empirical research which might not otherwise have been done. The second and third modifications represented by Propositions 10 and 11 respectively seem to me to have clear cut empirical consequences that ought to be susceptible with a bit of ingenuity to experimental test in the animal laboratory. But the question as to exactly how, I will leave to those better qualified than I am in such matters.