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Behaviourism as a Standpoint in Linguistics

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Introduction

The thesis of this paper is that behaviourism is the only adequate scientific foundation for the disciplines of psychology, linguistics and linguistic philosophy. Behaviourism in psychology is presented as a convergence of *six* principles: (1) behaviour as the subject matter of psychology, (2) the objectivity principle, (3) the rejection of mentalistic explanation, (4) the three-term contingency, (5) the distinction between discriminative stimuli and establishing conditions, and (6) learning theory.

Behaviourism in linguistics and linguistic philosophy is seen as resting on *ten* principles: (1) language as communication in the service of technology, (2) language and thought, (3) the sentence as the functional unit of linguistic communication, (4) novel sentence-construction, (5) novel sentences and the representation of unfamiliar contingencies, (6) sentence-construction and the win-shift/fail-stay contingency, (7) the picture theory of the meaning of sentences, (8) the associative learning of word and phrase meaning, (9) lexical words, syntactic words and Bickerton's "proto-language", (10) mutations and the facilitation of language learning.

Behaviourism

It is my view that behaviourism is the only scientifically acceptable foundation, not only for the science of psychology, but also for the science of language or linguistics, as it is usually called. Moreover, since I hold that philosophy, in so far as it is capable of contributing to the body of human knowledge, is a branch of the science of language, it follows that I also think that that discipline too requires a behaviourist foundation.

What Behaviourism is not

That said, the behaviourism which is needed as the foundation for psychology, linguistics and philosophy is something very different from the popular stereotype. It is no part of the behaviourism to which I subscribe that it denies either the existence of consciousness in the sense of private experience or the possibility of studying such experiences scientifically. It is no part of my behaviourism to reject explanations of the behaviour of organisms in terms of what is going on in the brain and nervous system. Nor is it committed to explaining that behaviour in terms of mechanical reflexes or stimulus-response connections.

Behaviourism in Psychology

Behaviourism as an approach to psychology is committed to the following principles:

B1. *Psychology as the Science of Behaviour.*
It was accepted by every school of psychology until the advent of the "cognitive revolution" that an empirical science must be defined by reference to the *phenomena* it observes and studies, rather than by reference to the *theoretical constructs* it currently uses to explain those phenomena. It is by applying this principle that the behaviourist concludes that the proper definition of psychology is as the science of the behaviour of living organisms, rather than as the science of the mind.

B2. *The Objectivity Principle.*
The *Objectivity Principle* holds that the observation statements which provide the foundation of empirical knowledge are and can only be observations of permanent states of affairs in the public domain whose correct description will be agreed by any competent observer who is also a competent speaker and interpreter of the language and technical code in current use. It is a consequence of this principle that conclusions about the nature of events, whether in the public or in the private domain, must be based on objective records whose relation to the events they record must be understood before they can be relied on. This means that before we can make serious evidential use of an objective record of a subject's "introspective report", we need to understand both the nature of what is being reported and the semantics of the process whereby the report is generated.

B3. *The Rejection of Mentalistic Explanation.*
When explaining the behaviour of living organisms for scientific purposes behaviourists have traditionally objected to the use of what have been called "*mentalistic explanations*". Exactly what kinds of explanation qualify as "mentalistic" and why they are objectionable has never been made entirely clear. I take it that a mentalistic explanation is one which invokes the kinds of process, instantaneous event and ongoing dispositional state which are referred to in the "common sense" or "folk psychological" explanations of human and animal behaviour which we encounter in ordinary non-technical discourse. If so, my view is that such explanations are scientifically objectionable *only* in so far as they presuppose that the behaving organism is linguistically competent and rely for an explanation of why the agent acted as she did on a quotation of what she might be supposed to have said to herself when deciding what to do. It should be obvious that such explanations are scientifically unacceptable when the behaviour to be explained is that of a pre-linguistic organism (animal) or in the case of linguistic behaviour itself. But the principle of the unity of science requires a theory that will apply to all forms of human and animal behaviour. Consequently, a form of explanation which is restricted in its scope to those aspects of human behaviour which are indeed controlled by linguistic formulations of the contingencies involved is unacceptable for the purposes of scientific theory; though equally unacceptable is a theory which cannot accommodate the phenomenon whereby a great deal of human behaviour is controlled in this way.

B4. *The Three-Term Contingency.*
At the molar level of analysis all instrumental/operant behaviour including verbal behaviour, both that of the speaker and that of listener, is acquired, maintained and abandoned in accordance with the principle of the *three term contingency* (Skinner 1969), consisting of

1. a set of Antecedent conditions
2. the Behaviour emitted or omitted under those conditions, and
3. the Consequences of so behaving

B5. *Discriminative Stimuli and Establishing Conditions.*
A distinction needs to be drawn within the *antecedents* of behaviour between *discriminative stimuli* whose effect is to alert the organism to the impending presence or availability of a particular behaviour-consequence relation and the *establishing conditions* (Michael 1982), such as food-deprivation or the lack of the appropriate utensils required in order to eat the food set before one in a socially acceptable manner, which determine the valence of both the anticipated and the actual consequences of emitting or omitting the behaviour, i.e. whether the effect of those consequences is to strengthen (*reinforce*) or weaken (*disinforce* - Harzem & Miles 1978) the organism's disposition to emit similar behaviour on similar occasions in the future. It should be apparent that this distinction corresponds to that traditionally drawn between "cognition" and "motivation".

B6. *Learning Theory.*
While no one could seriously deny that there are aspects of both animal and human behaviour that are innate, and other aspects that are learned, behaviourists have traditionally attached greater importance to the latter than to the former, and would insist with many contemporary neuroscientists that there are no "hardwired" connections in the brain, i.e., nothing that is not susceptible to modification by subsequent learning. In particular they have always insisted that, although its acquisition has undoubtedly been facilitated by genetic mutations, linguistic competence, both that of the listener and that of the speaker, is acquired in accordance with the same principles as are observed in experimental studies of animal learning. Contemporary learning theory, however, has moved on in a number of respects from the position adopted by most behaviourists in the 1950s and early 1960s before behaviourism was swamped by the cognitive revolution. One principle which at that time had only begun to impress itself on the scientific community was that expounded in Ferster & Skinner's (1957) book *Schedules of Reinforcement*, namely that instrumental/operant reinforcement is as much a matter of maintaining ongoing behaviour as of acquiring new patterns. Another principle which had been around for a long time, but which has only recently begun to make its mark is that demonstrated by Miller & Konorski (1928; Konorski 1948) when they showed that underlying every case of instrumental/operant learning there is a classical conditioning to the kinaesthetic feedback from the instrumental/operant response as it develops of the autonomic response elicited by the

instrumental/operant reinforcer in the case of a positively reinforced response and by the aversive stimulus in the case of a negatively reinforced response. More recently, this observation has been given added significance by the work of the associative learning theorists (Rescorla & Wagner 1972) which suggests, if it does not actually demonstrate, that what the organism learns in a classical conditioning situation is to "expect"(1) the US, given the CS, that such expectations develop in accordance with the Principle of Association by Contiguity (Hume 1739), whenever a stimulus of one type is regularly followed by a stimulus of another type, and that the function of the autonomic UR in the classical conditioning situation is simply to make this expectation visible in the form of an autonomic CR. Combining this view of classical conditioning with the Miller-Konorski evidence on the one hand and the evidence (Adams & Dickinson 1981) of the effect of reinforcer-devaluation on an instrumental/operant response on the other shows that in instrumental/operant learning the organism learns to expect certain consequences, given a particular combination of discriminative stimulus and the feedback of an instrumental/operant response. It also suggests that the way the organism behaves in response to that expectation will depend on the value it currently attaches to those consequences (Rescorla 1991). From this it would seem that the learning principle that applies depends on the level of analysis under discussion. Thus at the neuro-synaptic level some version of the Hebb (1949) Principle would seem to apply. I find the version proposed by Montague, Gally & Edelman (1991) the most convincing. At the mental process or, to use Edelman's (1987) term, the "neuronal group" level the Association by Contiguity or Stimulus-Stimulus Expectancy Principle applies; while at the molar behavioural level it is the Law of Effect (Thorndike 1911).

Behaviourism in Linguistics

The behaviourist approach to the science and philosophy of language, the position Place (1996) calls "*linguistic behaviourism*", is committed to the following principles:

L1. *Language as Communication in the Service of Technology.*
Language is a form of behaviour which has evolved in the first instance by virtue of allowing the development of the kind of *social control* and *information transmission* within the social group which are needed for the implementation of the *technology* required to adapt to the environment in which the group finds itself.

L2. *Language and Thought.*
Language has an equally important but ontologically derivative function of allowing its possessors to *solve problems*, both technological and personal, through *symbolic representations* of the consequences of doing one thing rather than another. It seems tolerably certain that the ability to solve problems by means of *iconic representations* (mental images) of the past consequences of emitting or omitting different kinds of behaviour in circumstances resembling those currently prevailing is part of our common mammalian heritage. But, not only are such iconic representations incommunicable from one organism to another, in the absence of language they are necessarily restricted to behaviour-consequence relations which the organism has experienced in its own case.

L3. *The Sentence as the Functional Unit in Linguistic Communication.*
The *sentence* is the functional unit of language, the unit which must be completed if an utterance is to effectively control the listener's behaviour and secure the reinforcement from the listener on which the continuation of the speaker's turn and hence the conversation as a whole depends.

L4. *Novel Sentence Construction.*
As Chomsky (1957 etc.) has always insisted, though they are made up of units, words, phrases and sentence frames, which *are* repeated, sentences, in so far as they are used to convey information, are seldom repeated word for word, and are typically *constructed anew* on each occasion of utterance. But although any reasonably intelligent speaker can break down her sentences into their constituent words when called on to do so, in practice, sentences are assembled, not from their individual constituent words, but from what Miller (1998) calls "prefabricated chunks", phrases, embedded sentences and sentence frames which, in the overwhelming majority of cases, are borrowed by imitation from other speakers.

L5. *Novel Sentences and the Representation of Unfamiliar Contingencies.*
The speaker's ability to construct and the listener's ability to construe sentences the like of which neither party need have encountered before, allows the speaker both to induce the listener to emit behaviour which he or she may never have emitted before and communicate to listener information about contingencies (antecedent-behaviour-consequence relations) the like of which he or she need have had no previous experience.

L6. *Sentence-Construction and the Win-Shift/Fail-Stay Contingency.*
Unlike the situation presented to the organism by the Skinner box which is a *win-stay, fail-shift* contingency, at the level of sentence construction verbal behaviour is on *win-shift, fail-stay* contingency in which what are variously referred to as "back-channels". "response tokens" or "verbal reinforcers" play an essential role in indicating to the speaker that his or her sentence has been successful, thus allowing the speaker to proceed to the next sentence. Only when the listener's response indicates failure to communicate or persuade is a sentence repeated. Even when it is repeated, it is usually with a different intonation, if not with different words.

L7. *The Picture Theory of the Meaning of Sentences.*
According to the *picture theory of meaning* (Wittgenstein 1921/1961) in the form in which I subscribe to it, a sentence is complete when it depicts, in a manner capable of being deciphered by any competent listener, a complete *situation* (Barwise and Perry 1983). A situation is either an *event* whereby a change occurs in either the properties of an individual entity or the relations between two or more individuals, or a *state of affairs* in which a property of an individual or a relation between two or more individuals remains unchanged for a period of time. The nature of what persists or changes is indicated by the *verb phrase* or *predicate*, the individual or individuals involved by *noun phrases* or *arguments*.

L8. *The Associative Learning of Word and Phrase Meaning.*
Unlike the sentences of which they form part and to whose meaning they contribute, the constituents of sentences, *words*, *phrases* and *sentence frames*, are repeated. Unlike the sentences of which they form part and to whose situation-depicting function they contribute, words, phrases and sentence frames acquire their semantic function by virtue of a *repeated past association* between the linguistic unit (word or phrase) and the aspect of the various situations into whose depiction it enters and which it depicts.

L9. *Lexical Words, Syntactic Words and Bickerton's Proto-Language.*
Words as the smallest functionally discrete constituents of phrases and sentences are of two kinds; *lexical words* (nouns, verbs, adjectives and adverbs) and *syntactic words* or, as Skinner (1957) has it, "autoclitics". The developmental evidence shows that the earliest sentences that a child produces are ones consisting only of lexical words and in the first instance only of verbs and nouns (Bickerton's 1990 "*proto-language*"). There is also evidence (Morford et al. 1993: Morford 1996) from studies of "*homesigning*" (individual sign-languages developed by the deaf who have no access to other sign-language users) that *iconic signs*, those where the sign resembles the natural signs which regularly accompany and thus signal the presence of a particular object or kind of object or event, precede *symbolic signs*, those where the connection between the sign and what it stands for is arbitrary. Needless to say, all syntactic words, prefixes and suffixes are symbolic in this sense.

L10. *Mutations and the Facilitation of Language-Learning.*
There is evidence both from developmental events, such as the "*naming explosion*" and a "*critical period*" for the acquisition of syntax, and from the existence of corresponding structures in the human brain, *Wernicke's area* in the case of naming and *Broca's area* in the case of syntax, of mutations that have been selected in the course of human evolution which, together with the changes to mouth and larynx which have made speech possible, have given our species an ability to acquire language that no other species possesses. Nevertheless, the lack of continuity between these structures and the innate communication system of pre-linguistic organisms, a system which survives in our species in the form of the so-called "*language of emotion*", emphasises the fact that language is something that has to be *learned* by both speaker and listener. If it were not, it would not be able to adapt and contribute to the development of a new technology as the group moves into a new environment.

References

Adams, C. D. & Dickinson, A. (1981) Instrumental responding following reinforcer devaluation. *Quarterly Journal of Experimental Psychology*, 33 B, 109-112.

Barwise, J. & Perry, J. (1983) *Situations and Attitudes*. Cambridge, MA: M.I.T. Press.

Bickerton, D. (1990) *Language and Species*. Chicago: University of Chicago Press.

Chomsky, N. (1957) *Syntactic Structures*. The Hague: Mouton.

Edelman, G. M. (1987) *Neural Darwinism: The Theory of Neuronal Group Selection*. New York: Basic Books.

Ferster, C. B. & Skinner, B. F (1957) *Schedules of Reinforcement*. New York: Appleton-Century-Crofts.

Harzem, P. & Miles, T. R. (1978) *Conceptual issues in operant psychology*. New York: Wiley.

Hebb, D. O. (1949). *The Organization of Behavior*. New York: Wiley.

Hume, D. (1739/1978) *A Treatise on Human Nature*, L.A. Selby-Bigge (Ed.), 2nd Edition, P.H. Nidditch (Ed.). Oxford: Clarendon Press.

Konorski, J. (1948) *Conditioned Reflexes and Neuron Organization*. English translation by S. Garry. Cambridge: C.U.P.

Michael, J. (1982) Distinguishing between discriminative and motivational functions of stimuli. *Journal of the Experimental Analysis of Behavior*, 37, 149-155.

Miller, J. (1998) Acquiring spontaneous spoken language: the role of simple syntax and ready-made phrases. Paper presented to the 6th International Pragmatics Conference, Reims, 20th July 1998.

Miller, S. & Konorski, J. (1928) Sur une forme particulière des réflexes conditionelles. *C. R. Soc. Biol. Paris*, 99, 1155-1157. For a more detailed description of these experiments in English see Konorski (1948) pp. 211-235.

Montague, P. R., Gally, J. A., & Edelman, G. M. (1991) Spatial signalling in the development and function of neural connections. *Cerebral Cortex*, 1, 199-220.

Morford, J. P. (1996) Insights into language from the study of gesture: a review of research on the gestural communication of non-signing deaf people. *Language & Communication*, 16, 165-178.

Morford, J. P., Singleton, J. L. & Goldin-Meadow, S. (1993) The role of iconicity in manual communication. In K. Beals, G. Cooke, D. Kathman, S. Kita, K.-E. McCullough & D. Testen (Eds.) *Papers from the Chicago Linguistic Society*, 29, Volume 2: The Parasession, pp. 243-253.

Place, U. T. (1996) Linguistic behaviorism as a philosophy of empirical science. In W. O'Donohue & R. Kitchener (Eds.) *The Philosophy of Psychology*. London: Sage, Chapter 9, pp. 126-140.

Rescorla, R. A. (1991) Associative relations in instrumental learning: The eighteenth Bartlett Memorial Lecture. *Quarterly Journal of Experimental Psychology*, 43B, 1-23.

Rescorla, R.A. & Wagner, A.R. (1972) A theory of Pavlovian conditioning: Variations in the effectiveness of reinforcement and non-reinforcement. In A. H. Black & W. F. Prokasy (Eds.) *Classical Conditioning*, Vol. 2: *Current Research and Theory*. Englewood Cliffs, NJ: Prentice-Hall.

Skinner, B. F. (1957) *Verbal Behavior*. New York: Appleton-Century-Crofts.

Skinner, B. F. (1969) *Contingencies of Reinforcement*. New York: Appleton-Century-Crofts.

Thorndike, E. L. (1911) *Animal Intelligence*. New York: Macmillan.

Wittgenstein, L. (1921/1961) Tractatus logico-philosophicus. *Annalen der Naturphilosophie*. *Tractatus Logico-philosophicus* With second English translation by D. F. Pears & B. F. McGuiness. London: Routledge & Kegan Paul.

Notes

1. Provided its grammatical object is not an embedded sentence in *oratio obliqua* or indirect reported speech, and unlike the verb `predict' which is often used in this context by associative learning theorists, the verb `expect' is one of the mentalistic concepts that does *not* presuppose linguistic competence on the part of the organism concerned and is therefore immune to the objection raised to such expressions in Section B3 above.