

CONCEPT ACQUISITION AND OSTENSIVE LEARNING: A RESPONSE
TO PROFESSOR STEMMER

[Published 1989 in *Behaviorism* **17**, 141-5.]

Ullin T. Place

University College of North Wales, Bangor

ABSTRACT: The alternative offered by Professor Stemmer to cognitivist theories of the process whereby general terms acquire their meaning is criticised in its turn on the grounds that it presents an oversimplified view of the complex processes involved in the acquisition of word meanings.

The argument of Professor Stemmer's paper may be stated as follows: according to a number of cognitivist theorists whose work he reviews the learning of word-meanings proceeds in two stages. In the first stage the child acquires, either through its genetic make-up or through its pre-linguistic learning experiences or through some combination of the two, a set of concepts or "representations" corresponding to the various kinds of object it is liable to encounter in its environment. In the second stage it learns to connect the individual words of its first natural language with the appropriate concept drawn from the stock of concepts which it has acquired during the first stage. As a result the child is now able to select the appropriate concept whenever it hears the word which "stands for" that concept in the language in question.

Stemmer's principal objection to theories of this kind is that they fail to explain how this connection between a word and its concept is established. The cognitivist might appeal, as Stemmer himself does, to the process of ostensive teaching in which the teacher points to an instance of the class of objects which fall under the concept whose name is being taught, while simultaneously uttering the word in question. But then, argues Stemmer, we already have in the shape of the processes

of classical conditioning and its subsequent generalization a theory which explains how ostensive teaching enables the child to connect a word directly to the class of objects it stands for without the need for an intervening concept or representation. If this is correct, it follows that the initial stage of concept acquisition postulated by the cognitivists is redundant.

Stemmer's over-simplification of the process whereby word meanings are learned

The argument is an attractive one, appealing, as it implicitly does, to Ockham's well tried principle of parsimony. Unfortunately, Stemmer's theory is so parsimonious that it fails to measure up to the complexity of the phenomenon it is designed to explain. Stemmer makes two claims:

- (1) that a child as young as two years of age can and frequently does learn the meaning of a word on the basis of a single ostensive experience in which it hears the utterance of the word in question while its visual attention is directed by a pointing gesture on the part of the teacher towards an instance of the class of objects denoted by the word;
- (2) that this learning process can be accounted for completely in terms of the principles of classical Pavlovian conditioning, interpreted as a process of stimulus substitution.

As far as the first of these propositions is concerned, I confess that I have not consulted the references which Stemmer gives in support of his claim that a single ostensive learning experience is all that is required for a child to learn the meaning of a word. But if the example he cites (p. 17) where a child learns the meaning of the word *giraffe* after a single encounter with the word uttered in the presence of the first giraffe it has encountered in the flesh is anything to go by, considerable caution is needed in the interpretation of such evidence in the light of the fact that, although the child may not have had a previous encounter with the word *giraffe* paired with an actual instance of the species in question, it may well have had many previous encounters with drawings and photographs of members

of the class accompanied by an utterance of its name in the natural language it is in the process of learning.

Be that as it may, it is tolerably certain that where such one-trial ostensive learning of word meanings takes place, it does so within a context in which the child has already learned

- (a) that each distinctively different variety of object in its environment has its own distinctive name;
- (b) to evoke an utterance of the name of a kind of object from the teacher when confronted by an instance of a kind of object whose name the child does not know by uttering some such sentence as *What's that?* and
- (c) that, except in the case where the object pointed out is a human being, in which case the word is likely to be the proper name of that individual, the word uttered in conjunction with the act of pointing at an object is the name of the class or species of objects which the object pointed at is an instance and not, for example, the name of some property of the object (e.g. its blackness) or the name of some sub-class to which it belongs (e.g. being a poodle rather than some other variety of dog).

What I am suggesting is that one-trial learning of word meanings, when it occurs, only takes place in the case of a child who has already acquired a considerable measure of linguistic competence built up on the basis of many and varied experiences both of the ostensive teaching of individual word meanings and of the effect of constructing and uttering a variety of sentences containing such words. For to say of a child that it understands the meaning is to say that it has at least the following abilities:

- (1) the ability to utter the name of the kind in question when confronted by a conspicuous and unambiguous instance of that kind of thing;
- (2) the ability to pick out instances of the kind in question when the name of that kind of thing is uttered in its hearing;

- (3) the ability, on hearing the name of the kind in question, to select behavioural strategies appropriate to an encounter with things of that kind which it has learned both before and after learning its name;
- (4) the ability to respond appropriately to sentences containing the name of the kind in question, when uttered by another speaker in the absence of an instance of that kind of thing;
- (5) the ability to construct and make effective use of novel and intelligible sentences containing the name of the kind in question.

Evidently no child could acquire all these abilities with respect to a particular name and the class of objects the name stands for on the basis of a single ostensive teaching experience without either a considerable experience in responding to the words and sentences of others and in using words to construct sentences of its own. Stemmer's contention that we can explain all this by the process of classical Pavlovian conditioning seems little short of ludicrous.

Objections to the stimulus substitution theory of the learning of word meanings

Only humans learn word meanings.

Several lines of argument combine to show that the principles of classical conditioning cannot adequately explain the learning of word meaning. The first and perhaps most decisive argument is that classical conditioning is a phenomenon which is known primarily from experimental observations of the behaviour of animals; some have even questioned whether there is such a thing as genuine classical conditioning in adult human subjects (Brewer 1974). Yet, apart from the doubtful case of apes who have learned a human sign language, there are no known cases of animals who use a language for the purpose of interpersonal communication in the way that human beings do. But if

the principles of classical conditioning are all that is required to explain language, how can we possibly account for the fact that almost all animals fail to acquire it?

Stimulus equivalence requires linguistic competence.

When the proposal is examined in detail further difficulties become apparent. Even if we leave aside the problems associated with the acquisition of the ability both to understand and construct intelligible sentences containing the word in question - problems which Stemmer claims to have resolved in a recent paper (Stemmer, 1987) - we are still confronted with the fact that what is supposed to be learned from a single act of pointing at an instance of the kind of object designated by a word, while simultaneously uttering the word in question, has no precedent in the experimental literature on classical conditioning. For what is proposed is that this single experience results in the development of two distinct and unusually stable conditioned responses:

- (1) the response of attending to and, by response generalization, the response of picking out from a number of objects of different kinds an instance of a particular kind whenever the word which designates that kind occurs in the hearing of the child, and
- (2) the response of uttering the word whenever an instance of the kind which it designates is encountered.

Not only is there no precedent, as far as I am aware, for this simultaneous two-way conditioning in the literature of classical conditioning, but the experimentally studied behaviour which it most closely resembles, namely, symmetrical responding on Sidman's (Sidman and Tailby 1982) matching-to-sample task is far from being a case of simple classical conditioning on the Pavlovian model. In this experiment the subject is trained when presented with one arbitrary stimulus *A* to pick another unrelated arbitrary stimulus *B* from an array of 2-4 such stimuli. The

subject is then presented with stimulus *B* and asked to choose a matching stimulus from an array which includes *A*. Subjects who reliably choose *A* without further training are said to have "passed" the test for "symmetry".

Stemmer cites the original Sidman and Tailby (1982) paper in which this experiment is described in support of his own theory. In fact, whatever interpretation we put on the results of these experiments in the development of so-called "equivalence classes" in the matching-to-sample situation, there is simply no way that this phenomenon can be accounted for in terms of the principles of classical Pavlovian conditioning. This is shown by the following considerations:

- (1) unless they are specifically trained to do so, animals invariably fail the test of symmetry, as well as the tests of "reflexivity" and "transitivity" which together make up the concept of the "equivalence class" as defined by Sidman (Dugdale 1987), whereas classical conditioning, as we have seen, is primarily if not exclusively a phenomenon of animal behaviour;
- (2) the training used to establish the propensity to select stimulus *B* when presented with stimulus *A* follows the principles of operant (instrumental) learning in which behaviour is reinforced by its consequences, rather than those of classical (respondent) conditioning;
- (3) although, in cases where stimulus equivalence is observed, the response of picking *A* given stimulus *B* follows automatically without further training, once the rule *given A, pick B* has been learned, the training whereby that rule is learned in the first place extends over many trials; there is no one-trial learning here;
- (4) all available evidence (Devany, Hayes and Nelson 1986; Lowe and Beasty 1987; Beasty 1987) supports the view that the ability to generalize on the matching-to-sample task in accordance with the principle of equivalence depends on the prior acquisition of the ability to name the kinds of object of which *A* and *B* are instances; if true, this rules out any attempt to explain the acquisition of the ability to name objects in terms of the principle of stimulus equivalence

and likewise any attempt to explain the phenomena of stimulus equivalence in terms of principles like classical conditioning which apply in the case of organisms (animals) who fail to show stimulus equivalence.

Conclusion

I conclude that a theory of the acquisition of word meanings such as that proposed by Professor Stemmer, relying as it does on no principle beyond that of classical/respondent conditioning, cannot begin to address the complexity of the problem as it appears in the light of this analysis. But it is equally clear that, if Stemmer's account of them is to be trusted, the cognitivist theories he criticises are in no better position to offer a constructive account of how this complex system of interlocking verbal and non-verbal behavioural capacities is acquired. To propose, as some of these theories do, that the acquisition of the relevant concepts is wholly or partly innate explains nothing, unless it is accompanied, as it evidently is not, by a systematic account of how genetic mutations which give the organism the abilities in question are selected by what Skinner (1975) has called "the contingencies of survival". Equally, those cognitivist theories which propose that the abilities involved in having a concept are partly or wholly learned, and all such theories in so far as they appeal to learning as the mechanism whereby particular words become attached to particular concepts, owe us an account both of precisely what it is that is learned and of the mechanism by which such learning takes place. To this extent and in so far as no such theory is forthcoming, Stemmer's criticisms are fully justified. The conclusion has to be that neither Stemmer's theory nor those of the cognitivist theorists he criticises provide us with an adequate theory of how children learn the meanings of words in the first natural language which they acquire "on their mother's knee." That story is yet to be told; but of one thing we can be quite certain and that is that whatever turns out to

be the finally correct account, it will be something much more complex than any of the theories which Stemmer discusses in his paper including his own.

References

- Beasty, A. (1987) Language and equivalence relations. Thesis submitted for the degree of Ph.D., Department of Psychology, University College of North Wales, Bangor.
- Brewer, W.F. (1974) There is no convincing evidence for operant or classical conditioning in adult humans. In W.B.Weimer and D.J.Palermo (Eds.) *Cognition and the Symbolic Processes*. New Jersey: Erlbaum, pp.1-34.
- Devany, J.M., Hayes, S.C. and Nelson, R.O. (1986) Equivalence class formation in language-able and language-disabled children. *Journal of the Experimental Analysis of Behavior*, 46; 243-257.
- Dugdale, N. (1987) A search for symmetry in the conditional discriminations of language-trained chimpanzees. Paper presented at the Annual Conference of the Experimental Analysis of Behaviour Group, Manchester, April 1987.
- Lowe, C.F. and Beasty, A. (1987) Language and the emergence of equivalence relations: a developmental study. *Bulletin of the British Psychological Society*, 40: A49.
- Sidman, M. and Tailby, W. (1982) Conditional discrimination vs. matching to sample: an expansion of the testing paradigm. *Journal of the Experimental Analysis of Behavior*, 37: 5-22.
- Skinner, B.F. (1975) The shaping of phylogenic behavior. *Journal of the Experimental Analysis of Behavior*, 7: 117-120.
- Stemmer, N. (1987) The learning of syntax: an empiricist approach. *First Language*, 7, 97-120.
- Stemmer, N. (1988) The acquisition of the ostensive lexicon: the superiority of empiricist over cognitivist theories. *Behaviorism*, 17(1), 41-63.