

present mutually influences the other. For example, anticipations are not separated from retentions or from the original impression (the now). In reading a sentence, the words just read at the beginning (and now retained) give direction to and set constraints on the readings (words) anticipated. The words now being read may sustain the meaning or what has just been read (and is still retained) and what is anticipated or the words now read might change the sense of what has just been read (and retained) and what is likely to follow (new anticipations). Expanding the horizons beyond the present retention to a recalled past and beyond the present anticipation to an expected future, the same interrelations and mutual influencing prevail.

If anticipations and retentions are of the present, what of past and future? Retentions begin at the "edge" of a primal impression (the now) and extend to the past as past. They are the bridge from the now to the past. The past as past must be recalled because it is no longer retained as part of the present. Similarly, anticipations begin at the other "edge" of a primal impression and extend to the future. Expectations give us the future as possible future.

In contrast to retention, something remembered or recalled has become discontinuous with (no longer a part of) the present. What is remembered is something which is brought back; recalled, re-presented from the past as past in the present. Here there are two tracks of temporality as opposed to just one in the above account of the present as momentary presence. For example, in seeing a tree, we not only see the object but we also experience the act (of seeing). In remembering the tree, however, we relive the portion of our conscious life that was the original perceiving of the tree (Sokolowski, 1974). In the act of remembering we are aware of this act in the present and of the object remembered; hence, we are dealing with temporality of the act of remembering with its relevant retentions and anticipations. But within the object or event being remembered, is nested the re-presented flow (temporality) of the original act of perceiving the tree (with its anticipations and retentions; thus, I remember the tree-as-having-been-perceived). Consequently, in remembering there are two tracks of temporality whereas in retention there is only the one track of a lived present.

These sketchy and incomplete comments will have to suffice

because it is clearly beyond the scope of this chapter to engage in a full-blown phenomenology of temporality. For a more complete account of temporality, the interested reader is referred to Gurwitsch (1974), Husserl (1964), Kvale (1974), Merleau-Ponty (1962), Sokolowski (1974), and Zanel (1970).

We are now in a position to consider the three models of learning mentioned earlier.

#### 4. SIGNAL OR RESPONDENT LEARNING

##### 4.1 The model of how learning occurs.

This model almost always is reduced to Pavlov's paradigm for establishing a conditioned reflex. We will see that restricting this phenomenon to Pavlovian or respondent conditioning is the direct consequence of misunderstanding the essential nature of signal learning. To fully appreciate this misunderstanding, we will begin with a traditional account of learning from this perspective; we want first to present this model in its own terms before pointing out the nature of the misunderstanding involved.

Three steps or phases are required for learning to occur and to be demonstrated according to this paradigm:

- Step 1 involves the presentation of a stimulus (food) which leads to a reflexive response (salivation). In this example, the food is called an unconditioned stimulus (US) and salivation an unconditioned response (UR). Unconditioned means learned in the sense that the stimulus "naturally" leads to the response; the response is a reflex caused by the stimulus.
- Step 2 requires the repeated presentation of a neutral or conditioned stimulus (CS), say a bell, slightly before presenting the food (US) which then causes salivation, the reflexive UR.
- Step 3 entails presenting the bell (CS) alone. If learning has occurred, the organism will respond by salivating to the previously neutral bell. One can look at this change in behaviour as a result of the experiences provided in step 2. This change

\*Of six recently published and widely used educational psychology textbooks consulted, none emphasizes that the CS must precede the US. Four state this is so but do not stress it. Two of these give a misleading diagram or a misleading example, and two state outright that simultaneity of CS and US will lead to respondent learning.

sometimes is referred to as a stimulus substitution in the sense that the CS has become a surrogate, a substitute, for the US — at least as far as salivation is concerned.

What counts as learning here, a change in behaviour as a result of experience, is not the change in the response (salivation) but rather a responding now to a previously neutral stimulus. Why the above interpretation is erroneous will become clear below.

#### 4.2 Why should teachers, educators know about this model of learning?

Gage and Berliner (1984) offer as clear an answer as anyone to this question. They argue that any time an unconditioned stimulus (US) elicits "a visceral or emotional reaction (the UR), such as fear, anger, vomiting, revulsion, joy, pleasure, happiness, and ecstasy" (step 1 above), then a previously neutral stimulus (CS) can be paired with the US-UR connection by presenting the CS slightly before the US. This results in "the development of a conditioned response (such as fear or joy) to that conditioned stimulus". For example, Gage and Berliner say, "the smiles, hugs, and compliments of the teacher may be interpreted as the unconditioned stimulus. These acts elicit in the child feelings of pleasure, which we can interpret as the unconditioned response. The previously neutral teacher and school, the conditioned stimulus, are associated with the unconditioned stimulus and soon come to elicit the same feelings of pleasure."

These authors also present the following scenario, regarding a number of students from homes of low income who come to school without having eaten any breakfast.

"They come to school reluctantly... as the morning goes on each day, however, they experience increased discomfort, particularly during science class that just precedes the lunch hour. The student's hunger brings increased anxiety and tension that makes it difficult for them to concentrate and attend to their work."

Gage and Berliner (1984) then analyse this situation in terms of the Pavlovian model of respondent learning. The US is hunger; the UR is the combination of discomfort, anxiety and tension, with little concentration or attending behaviour; the CS is the science class; the science class and hunger are paired (step 2); finally,

the CR is the feeling of discomfort, anxiety, and tension when it occurs as a response to the science class alone.

And how can an understanding of this model provide a basis for practical action? Gage and Berliner state, "The CS-CR link is well established, although in time it certainly could be extinguished. Providing food during science class would, however, break the relationship and establish positive emotional responses to science by association with rather than hunger."

Of course, Gage and Berliner, as is the case with most other authors of educational psychology textbooks, recognize that the model of respondent learning has severe limitations when applied to human beings to change their behaviour, to provide insight into what learning is, or both. Still, they say, "the teacher who can analyse the learning environment in terms of this basic kind of learning is in a better position to understand and improve student behaviour".

It will become clear after a phenomenological analysis of signal or respondent learning that the above examples, in fact, are *not* instances of signal learning. To say this is not to deny the phenomenon of signal or respondent learning, and it is not to deny that a child's attitudes, interests, and feelings about school often are influenced by a teacher's actions, by being hungry, etc.

#### 4.3 A phenomenological view of respondent learning

Long before Gagné (1965) typified respondent learning as signal learning, Ervin Straus, first in 1930 (see Straus, 1982) and then in a more elaborate fashion in 1935 (see Straus, 1963), offered a devastating critique of Pavlov's "doctrine" of conditional reflexes, and he also showed that, in essence, Pavlov was dealing with signal learning. Straus justifies calling Pavlov's interpretations a "doctrine" because they are based on the following inconclusive assumptions: "(1) there is the possibility of purely objective observations and descriptions, free from any presuppositions; (2) Pavlov's experimental design is simple and perfectly lucid; (3) the theory directly follows, as an evident generalization from the results obtained by the experiments; (4) these results, carried through in all possible variations and verified in each case, provide ever-renewed proof of the theory" (Straus, 1963).

Generators of psychologists and educational psychologists have promoted Pavlov's interpretations as self-evident, though perhaps limited in application to human beings: even though Straus (1963) has shown that Pavlov's theory is shot through with contradictory and *ad hoc*, invented hypotheses (e.g., inhibition, disinhibition, cortical irradiation, concentration, traps, reflexes, orienting reflexes).

However, the point here is not to repeat Straus' criticisms of Pavlov. Rather, the issue is this: if the results of the experiments by Pavlov and hundreds of others are trustworthy (and, generally they are), what do they mean? As Straus (1963) puts it, "The phenomena observed by Pavlov exist, and they remain unshaken even if his own explanation of them collapses. But on collapse of his theory, it becomes a matter of utmost urgency to ask: How must sensory experience be constituted so that the so-called 'conditioned reflexes' are possible?"

This guiding question leads Straus (1963, 1982) to show, among other things, that respondent learning or Pavlovian conditioning is a form of signal learning. When viewed as such, all of Pavlov's data are accounted for in terms of the nature of what a signal is, and none of his "ad hoc, invented hypotheses" are needed. Not only that, when respondent learning is seen as signal learning, it is released from being bound to reflexive (Pavlov) and to emotional (Watson) responses.

As already indicated, as early as 1930, Straus (1982) had worked out a phenomenology of "signal-formation" which he showed to be the essential theme of Pavlov's experiments. Now the question is, what is a signal in its essence?

A signal is the *middle* term of a three-term relation in that it signifies a transition from a neutral to a non-neutral situation. From Pavlov to Gagné, signal learning is viewed only in terms of the relationship between the signal (CS) and that which is signified (US). In talking for granted the neutral situation, the focus becomes one-sided and this distorts or hides the essential nature of a signal because the formation of a signal is in part dependent on the neutral situation.

The reason for this neglect of the neutral situation is clear. Not seeing the signal as the middle term, it is seen as the stimulus,

the cause, the beginning of the event. What went before is irrelevant. More will be said about this below.

According to Straus (1982), "If an object is to become the signal it must fulfill two conditions. It must, even though it is itself neutral (indifferent), nevertheless stand out in relief against the neutral situation. It must be a sudden or conspicuous modification of the neutral situation to which it belongs, and at the same time it must be different in nature from the non-neutral situation to follow and to which it merely points. Within the limits of these conditions, "in principle the stimulus applied as a signal must be replaceable by other stimuli." This pointing to is precisely why a signal (CS) must precede what it points to (US).

However, not just any stimulus will become a signal because of merely contiguous pairings with the non-neutral situation. (This seriously qualifies the simplistic notion of contiguity learning, that the mere pairing of any events will result in their connections or relations being learned). Although it belongs to the neutral situation, the signal must stand out in contrast to this situation. If a stimulus is too weak, it will go unnoticed (it will not belong to the neutral situation); if it is too strong, it will be experienced in itself and not point to anything else. In other words, there are essential limits to what can serve as a signal and these limits cannot be defined without taking into account the nature of the neutral situation. Again, from Pavlov to Gagné, this precisely is what is not done; hence, what can serve as a signal (CS) becomes extended, in theoretical examples, to events or objects that could not in reality become signals at all. (I am thinking of the examples offered by Gage and Berliner referred to earlier and to be discussed later).

Returning to Straus (1982) once again, "If a stimulus is to become a signal the external circumstances must be ordered so that the transition takes place only at the point indicated by the stimulus." And further, "to form a good signal . . . it is necessary that the specific situation enters only when the stimulus selected to be a signal has appeared in the neutral milieu; inversely, as soon as this stimulus shows itself, the non-neutral situation also follows it every time." Straus also says the so-called conditioned reflexes "are formed only by narrowing-down the possible stimuli of the neutral milieu to one definite stimulus." And later, "The development of the conditioned reflex is from the beginning with-

ing more than a process of concentration, that is, of narrowing down and limiting the stimuli.

Finally, according to Straus (1962), Pavlov's theory distorts the temporally ordered, three-term relation in which the signal stands as middle term. "The animated organism's anticipation of what is coming and its reaction to it has no place in his theory."

Straus' criticism of Pavlov is so thorough that we need not dwell on the temporality of signal learning and how Pavlov distorts it. Rather, mention will only be made of the temporality of signal learning as viewed phenomenologically.

If the present did not have a thickness or duration to it as described earlier, then it would be virtually impossible to understand how a signal could function as the middle term of a three-term relation without introducing fictions such as memory traces (see Straus, 1966), which is precisely what Pavlov did. However, with an understanding that a momentary present is made up of a primal impression with its horizons of retentions and anticipations, the signal and its relation to the other two terms becomes transparent. Let us say that after the signal has been learned, it is presented. At that moment, the neutral situation is retained and it is still present as having just been interrupted (by the signal). The signal is the primal impression, and anticipated, as part of the present, is the coming non-neutral situation. What other retentions and recollections are involved would depend on the situation, e.g., whether a previous occurrence of the signal were retained or recalled.

In connection with anticipating the non-neutral situation, to the credit of Gagné (1965), he recognizes an essential difference between an unconditioned and a conditioned response. Indeed, he refers to the latter as an "anticipatory response", a response in anticipation to what is being announced by the signal. In his example of eyelid conditioning, what is anticipated is the "puff-of-air-to-come". Even so, Gagné is unable to penetrate to the essence of a signal because he ignores the first term (the neutral situation) and sees a signal as the first of a two-term relation. Also he does not see anticipation as a temporal but rather as a psychological (an act) phenomenon. Gagné views temporality in essentially the same way as does Pavlov. Although it will not be taken up here, a clear example of his unacceptable view of temporality is his account of what he calls "chaining" (Gagné, 1965).

#### 4.4 An evaluation of respondent learning in light of the phenomenology of a signal

Although it is an accurate description of what one must do to promote signal learning, the three-step model with which this section was begun is misleading with respect to providing insight into the nature of what is going on in this type of situation. Analyzing the model of respondent learning into its constituent parts of US, UR, CS and CR invites the misunderstanding that the essence of respondent learning is stimulus substitution in that the US is dropped out and the CS takes its place as the cause of the response (now CR). However, a true substitution has not taken place. There are differences between an UR and a CR, such as latency. But the most decisive difference is that the organism eats the food but not the bell. Surprisingly, these differences usually are not acknowledged. For example, Gage and Berliner (1964) talk about "a response very similar to the one given when the meat powder is presented". And Klausmeier (1965) says, "the learning process consisted of associating the already available response with a new stimulus". Both of these statements reflect a fundamental misunderstanding of the nature of signal learning.

Also, the answer to the question of what is learned is obscured by this three-step model. For most, the learner learns to pair an old response (salivation) to a previously neutral stimulus (bell). As already seen, for Gagné what is learned is the anticipation of a stimulus (food), and for Straus what is learned is the changed meaning (significance) of the signal from neutrality to a pointing to. What is learned is that the signal means a transition from the neutral to the non-neutral and not a particular response to a particular stimulus.

Viewed in the context of the nature of a signal, it is clear that the school-related examples of respondent learning offered by Gage and Berliner (1964), and those offered by countless other authors, do not meet the criteria of signal learning. What is more, their assumption that signal learning is limited to visceral or arousal reactions is unfounded. This idea has been widely accepted at least since Watson's classic study with little Albert. But a signal does not cause an emotional response; it belongs to the neutral situation, and is not a cause of what follows. Rather, in Watson's study, the signal (a white rat) pointed to a non-neutral situation (a