# THE SYMBOLIC PROCESS

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In a previous paper [1] upon the nature of 'consciousness,' I have attempted to substitute a matter-of-fact formulation of stimulus-response relationships for the customarily accepted indefinable psychic aspect of human nature. I have attempted to show that 'consciousness' is a term applied by the subjectivist to a phenomenon whose typical form is that of a language response aroused by sensory stimulation. Since language responses, which for brevity's sake I have designated by the hieroglyphic *LR*, are a certain kind of muscular contraction under the control of the nervous system, they stand in a bipolar relationship to sensory processes (designated by the sign *SP*). Antecedent to the muscular response is a sensory process and, due to the stimulation of receptors by these muscular activities, other sensory processes are consequent to them. This bipolar relationship can be written *SP–LR–SP*. The one specific relationship, or phenomenon, *SP–LR*, I have sought to identify with the phenomenon termed 'consciousness.' In order to have a minimum of misunderstanding, one instance of behavior has been taken as the standard to which the definition of 'consciousness' is to apply. This instance is called the Type-*X* situation, and its definition is quoted on page 485 of the present article. The *SP–LR* relationship, which formulates the Type-*X* situation in stimulus-response terms, is an irreversible one-way relationship—not irreversible in the sense that the direction of the nervous impulse is irreversible from receptor to effector, but irreversible in the sense that the *SP* concerned in the Type-*X* situation is antecedent and not consequent to the *LR*. With this brief summary of our analysis to date, let us proceed with the task of the present paper.

[1] Hunter, Walter S., 'The Problem of Consciousness,' PSYCHOL. REV., 1924, 31, 1–31.

One of the important problems for analysis which remains over from our preceding article is that of the nature of the language response. In that discussion it was pointed out that two of the most important characteristics of language responses were their symbolic character and their revivability by the organism. Of these two characteristics, the former will chiefly concern us because it contains the clue to the difference between a language and a non-language response. The particular aspect of the symbolic process which is most engaging is that of its relationship to the development of a substitute process from an initial stage until complete automatization is reached or approximated. On pages 24 and 25 of the earlier paper, in dealing with the life-history of the Type-*X* situation, it was said that the *SP–LR* relationship might become so automatic that, while the response might appear to be one of language, it would in reality be no more a true language response than would the knee-jerk following upon patellar stimulation. In a way which we have not yet presented, increasing practice serves to destroy the symbolic character of the response. And as this destruction proceeds, the *LR* undergoes a transformation which obliterates it.

A symbolic process is a substitute process of a certain kind and of a certain stage of development. It will be well therefore in developing our subject to restate briefly the general character of substitution. This we shall do in terms of the conditioned reflex. Certain stimuli will without previous training of the organism elicit certain responses. Thus an increase in the intensity of light stimulating the normal eye will produce a contraction of the pupil of the eye. Chemical stimulation of the tongue will produce a secretion from the salivary glands, and a pricking stimulation of the finger is followed by a withdrawal of the finger. Starting with this relatively simple basis, training may result in the addition of new stimuli or in the addition of new responses. Probably experiment could show that neither type of change is present without the other. Woodworth [1] has said: "The substitute response machinery is more complicated than that

[1] Woodworth, R. S., 'Psychology,' 1921, p. 408.

of the substitute stimulus. . . . Evidently because there is something wrong with the original response . . . ." That this is not necessarily the case, our above statement implies and the following case illustrates. An auditory stimulus, such as is found in the ringing of a bell, produces a dilation of the pupil of the eye. And yet if the bell is sounded while the pupil is contracting because of an increase in light intensity, the bell soon becomes an effective stimulus for pupillary contraction. Figure 1 gives a diagrammatic repre-

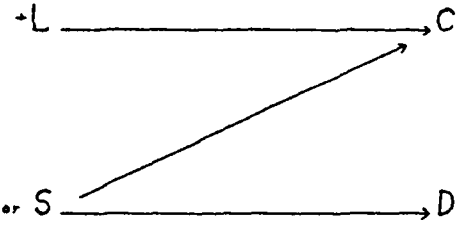


FIG. 1. A diagrammatic representation of the conditioned pupillary response. + *L*, increase of light intensity; − *L*, decrease of light intensity; *S*, sound; *D*, dilation; *C*, contraction.

sentation of the case. The change in the stimulus-response situation must be described both as a modification of the stimulus and as a modification of the response. The sound has become a substitute for the change in light intensity, and the contraction has become a substitute for dilation of the pupil. It is theoretically possible that proper experimental conditions might condition an increase in light intensity to a dilation of the pupil.

Inasmuch as a substitute always arises as a result of practice, it may be defined as any stimulus-response relationship, *i.e.* connection, resulting from training. (Standard case: the conditioned protective reflex.) One may, however, wish to emphasize a part only of the process, in which case one may speak either of the stimulus substitute or of the response substitute. It is important to point out two particular characteristics of the substitute process:

(1) It may be established without the 'awareness' of the subject (as is shown in Cason's [1] study of the conditioned

[1] Cason, Hulsey, 'The Conditioned Pupillary Reaction,' J. EXPER. PSYCHOL., 1922, 5, 108–47.

pupillary response) and in that sense therefore without 'consciousness.' Stated in our terminology, this would mean that neither the elements nor the totality of the substitute process need afford a first term for an irreversible *SP–LR* relationship.

(2) After a substitute stimulus or a substitute response has been set up, further training under the original conditions fails to change the qualitative nature of the process. Thus if sound has been substituted for injury as the stimulus for the protective reflex, additional training still leaves the sound a substitute. It is therefore to some added characteristic of the substitute process that we must look for the essential nature of the symbol so far as that is related to training, because in some way, we have said, training serves to eliminate the symbolic character of a stimulus-response connection.

Let us first inquire into the changes which occur in a stimulus-response situation with continued training. These may be listed as follows:

(1) The establishment of sensory and motor substitutes as instanced in the conditioned reflex process. In so far as the change is on the sensory side, it may be described as a shift in the sensory control of the response.

(2) An increased accuracy of response when judged by the standard of the final level of attainment.

(3) A decrease in the fatigue accompanying the execution of the response.

(4) An elimination of stimulus-response connections (random movements) which are at first involved but which are not manifest at the final level of attainment.

(5) A decrease in the time required for the completion of the responses set up by the stimulus and terminated by the experimentally chosen goal.

(6) A decrease in the time variations from one repetition to other adjacent ones, *i.e.* an increased automatization of the stimulus-response connections.

(7) A partial or total elimination of 'consciousness' of the stimulus and the response.

(8) The elimination of the symbolic character of the substitute.

If we consider such instances of behavior as the conditioned reflex and the maze-performances of the earthworm and the rat, we notice that the first six characteristics may be present without any scientifically necessary implication of characters 7 and 8. In other words, substitutes may be acquired as well as maintained without involving 'consciousness.' It is generally admitted by psychologists that a substitute process, once it has reached a high level of efficiency, may function without involving 'consciousness' and without coming within the range of a possible report by the subject. We must therefore look outside of the phenomena covered by the first six items above if we are to clarify the problem presented by the relation of items 7 and 8 to the learning process and thereby arrive at a more adequate understanding of the irreversible *SP–LR* relationship. We have already identified 'consciousness' with the symbolic character of the substitute as formulated in the irreversible *SP–LR* relationship. It now behooves us to indicate clearly how it is possible for a substitute to lose its symbolic character while still remaining a substitute.

The analysis of this phenomenon may be put most briefly in diagrammatic form. Let us first consider the case where the visual stimulation by a box leads to the verbal language response, *box*, under the influence of the instruction-stimulus "What is it?" We shall assume that the pathway (Fig. 2)

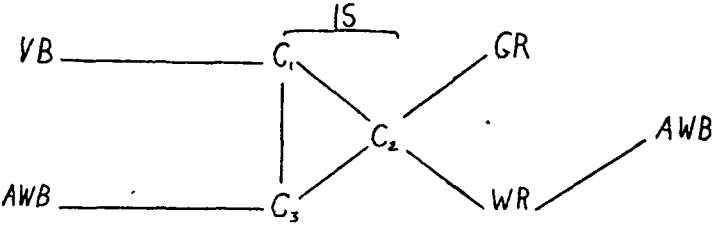


FIG. 2. Diagrammatic representation of substitutes and symbols. *VB*, visual box; *AWB*, auditory word box; *IS*, instruction-stimulus; *GR*, grasping response; *WR*, word response; $C_1$ $C_2$ $C_3$, neural centers.

*VB–C*$_1$*–C*$_2$*–GR* has already been functionally established in the individual, so that at the time when we consider him, the visual box will arouse the grasping response. We shall

also assume that the pathway *AWB—C₃–C₂—WR* has been functionally established so that the auditory stimulus of the word *box* will arouse the verbal response, *box*. We shall further assume the controlling, or limiting, influence of the observational setting or of the instruction-stimulus, "What is it?" By the conditioned reflex method, these two stimulus-response systems may be interconnected as indicated in the figure, where *IS* stands for the instruction-stimulus. Now when the visual box is presented, the subject responds verbally and may in addition reach for the box. The nervous activity diffuses through all three centers, $C_1$ $C_2$ $C_3$. The irreversible *SP–LR* relationship constituted by *VB–WR* is the phenomenon termed 'consciousness,' and the subjectivist says that the individual is conscious, or aware, of the box. Again, by a different arrangement of the training conditions, the auditory word, *box*, may set up the grasping response, and the nervous impulses may again diffuse through the centers, $C_1$ $C_2$ $C_3$. Here also we draw the same conclusion as above, viz., that the irreversible relationship, *AWB–GR*, constitutes an instance of 'consciousness' which the subjectivist would say involves a 'consciousness' of the sound. Attention should also be drawn to the fact that many centers (or forms of nervous activity) other than $C_1$ $C_2$ $C_3$ will be involved in each case which we have described. These other centers will represent the influence of training and hereditary conditions which for simplicity's sake do not enter into the figure.

The situation as it now stands in our description persists throughout a certain undetermined middle interval of the training period. During this interval, *AWB–GR* is not only a substitute for *VB–WR*, but it functions as a symbol of it. (Because of convenience and ease of observation, *GR* alone is often said to be the symbol.) And under the other conditions described, *VB–WR* (or simply *WR*) is the symbolic substitute for *AWB–GR*. With continued training, the complexity of the central connections is decreased until the pathway involved is a more direct one from sensory excitation to response. The activity is now quite automatic, and while it is still a substitute process, it is in no sense a symbol,

inasmuch as its relationship to the associated neural centers of the original process has been eliminated. Furthermore, observation reveals that at this stage of the training that which the subjectivist has termed 'consciousness' has likewise disappeared. It is also at this time that the subject becomes unable to report "I saw the box" or "I heard the sounds." Now since the decrease in central connections is the chief change which has occurred (as evidenced by the loss of random movements and the increased automaticity of the response), it seems very probable that the verbal report is essentially conditioned by the symbolic character of the stimulus-response relationship.

Attention should now be invited to the very important fact that each of the responses with which we have dealt may be aroused by the organism, *i.e.* each is under the organism's control through the associative mechanism. Both *GR* and *WR* become conditioned to stimuli other than those indicated in our figure and may become rearoused through such processes quite independently of stimuli which cannot be produced by the organism.[1] In the case of *WR*, it is to be noted that the response itself gives rise to an auditory stimulus essentially identical with the one (*AWB*) which was initially effective. Whenever *WR* is rearoused by neural processes containing as an integral part processes represented by $C_1$ (those conditioned to *VB–GR*), it is again a symbolic response and so constitutes a part of an irreversible *SP–LR* relationship.

This last statement leads us to the definite formulation of a question for which the statement itself is the answer. After a conditioning process has become automatic, may it ever revert to its condition in the earlier symbolic stage? The problem is an important one for the organism. We have already indicated that in the language responses the individual has at his command an adaptive process of unique value. This behavior, through its symbolic character and its initiation by the organism's own activity, makes possible an adjustment to stimulating conditions which are no longer present. The greater complexity, variability, and range of

[1] Hunter, Walter S., 'General Psychology,' 1923, pp. 288 and 299.

adaptive value of an *LR*, when compared with typical learned or unlearned behavior, is clearly evidenced in any comparison of the behavior possibilities of man and the animals below him. Almost all that Bergson claims for intelligence as opposed to instinct might be applied to the capacity for the indirection of responses found in an *LR*. If any case of a symbolic process existed only during a certain undetermined period of the training interval and if after that period it were forever merged with merely learned behavior, then the organism would be limited in its exercise of that function to those conditioned responses which were as yet incompletely established. Something fundamentally like this does occur, and still a wide range of *LR*'s remains by virtue of the exceedingly large number of uncompleted automatizations which one finds in man.

We may formulate the above account more concretely as follows: Where the stimulation by 660 $\mu\mu$ light leads directly to the verbal response 'Red,' the Type-*X* situation [1] does not exist. Nor does it exist when the self-produced auditory stimulation 'Go' leads directly to the response of running. In the latter case, the stimulus is under the control of the organism through the associative machinery and is in addition a substitute for the original stimulus for the response. However, by definition, the 'Go' leads to the response as simply, as directly, and *with as little evident involvement with other stimulus-response connections* as though its genetic history did not prove it to be a substitute for a more original stimulus. *A substitute can only be identified through its past history.* No amount of immediate observation can reveal the original or derived status of the stimulus, 'Go.' In the same way the sensory process occasioned by the light, 660 $\mu\mu$, leads to a

[1] The following quotation from the paper on the 'Nature of Consciousness' (page 11) is offered in explanation of the Type-*X* situation: "Here, then, at the conclusion of this brief examination of language activity, we may repeat the statement first made that the presentation of a given stimulus with the instructions 'What is it?' may be followed by a language activity in an organism possessing: (1) a certain receptor capacity, (2) a certain habit history, and (3) language ability. This phenomenon is observable and verifiable and is typified in what we shall term, for convenience of future reference, the *Type-X situation, where the language response 'red' follows upon a certain visual stimulus and a certain instruction-stimulus.*"

verbal response 'Red' without direct observation being able to pass upon the substitute character of the response. In the light of our discussion in the previous paper, it is necessary to add that in any specific case it is extremely difficult to determine by any means whatsoever whether or not the substitute is also a symbol. If the process is a symbol, it will still involve active associative relations with the original process. This is made theoretically probable by the stage in the training period at which the functionalist says that 'consciousness' is found and by the undoubted decrease in central connections with practise. It receives empirical support from the report of the subject. This testimony consists essentially in an effector activity which appears to be conditioned by the associative connections in question. A SYMBOL CAN ONLY BE POSITIVELY AND SPECIFICALLY IDENTIFIED WHERE RESPONSES CAN BE CONDITIONED TO THE ASSOCIATIVE TRACES OF THE ORIGINALLY EFFECTIVE STIMULUS. To say that 'the stimulation by 660 $\mu\mu$ light leads *directly* to the verbal response' is equivalent to saying that no central processes (associative traces) are present which in themselves might condition another report by the subject. In human subjects the responses "I am conscious of this," "I saw that," etc., have been conditioned to these associative traces of stimulus-response connections. In the animals below man no such evidence of specific symbolic processes is available. Here one can only depend upon such general evidence as the delayed reaction experiment may offer.

For those of us who are aided by diagrammatic presentations, the analysis of Fig. 3 will be helpful. This figure purports to indicate the receptor-effector relationships in the subject who has passed through training periods prior to this particular one. The visual stimulation by the box, $VB$, sets up impulses directly through $C_1$ and $C_2$ to $WR_1$. Although substitute processes are present, no symbolization is involved, and no associative connections are present which permit a report, $WR_2$, by the subject. If, on the other hand, $VB$ sets up a neural excitement which involves $C_1C_2C_3C_4C_5C_6C_9$ and

terminates in $WR_1$, then the substitute process is also a symbolic process. The associative traces other than $C_1C_2$ may at a later date condition $WR_2$, the subject's report. In other terms, the two following irreversible *SP–LR* relationships are present: (1) $VB—C_1–C_6C_9—WR_1$, and (2) $Y—$

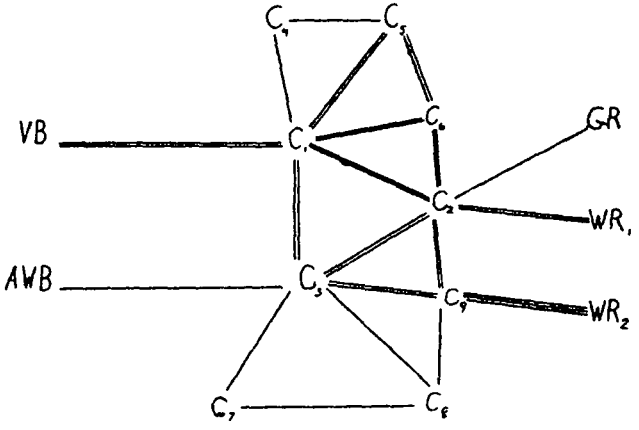


FIG. 3. The connections represented in double lines indicate the general nature of the neural basis of an irreversible *SP–LR* relationship as discussed in the text. $WR_2$ is an *LR* made possible by the complex central connections which have not yet been eliminated, *i.e.* reduced to a $C_1$ $C_2$ basis.

$C_1–C_6C_9—WR_2$. Each of these would be an example of the Type-*X* situation. (*Y*, in the formula, stands for the associative cue which rearouses the central process and which is not indicated on the diagram.)

Although the diagrams of Figs. 2 and 3 are theoretical constructions and are explanatory and not descriptive of behavior, the following points can be made in their support: (*a*) Behavior is controlled by neural processes working through a complex of centers. (*b*) There is an elimination of certain neural paths as the final integration of stimulus and response is approximated. And (*c*) after the integrative process has attained a certain degree of perfection, it no longer conditions a report by the subject.

Let us turn our account briefly in the direction of description. Suppose we set our subject the task of learning to say: "The — curfew — tolls — the — knell — of — parting — day."

Training may be conducted to such a point that, when the subject is stimulated by "Did you say, 'tolls the knell,' " he may be unable to report, "I did." The simplest explanation is that associative traces making possible a conditioning of the response "I did" were inactive in arousing the response "tolls the knell." "Tolls the knell," therefore, symbolized nothing, was an 'unconscious' response, was not a part of an irreversible *SP–LR* relationship. It is said that the response took place automatically. Perhaps it is also said that the response was *inattentively* made. This distinction between an attentively and an inattentively performed response is the distinction between a response which can be reported and one which cannot be. More and more as training proceeds, the inattentive performance preponderates over the attentive. The subjectivist's phenomenon of 'attention' is present only when the symbolic process is active. And the readiness with which the process determines the report is probably his 'degree of attention.' We have spoken only of the later stages of the memorizing of the verse from Gray's Elegy. We might, however, have used any stage. In the earlier periods, verbal report by the subject could have been elicited more readily and frequently. This situation can be best described, as we have frequently done before, in terms of the loss of symbolic character of the stimulus-response situation, although the subjectivist would be tempted to describe it in terms of decreasing consciousness and attention.

We may then restate the conclusion reached in our previous paper with a qualification as follows: A language response is equivalent to a substitute process which can be reinstated by the organism, but ONLY where associative traces of the original process persist in the integration. Where this *LR* occurs, the organism is said to *use* the substitute as a symbol. Evidence of the genuine language character of the response can be secured (with certainty) through the accurate conditioning of further substitute responses by the associative traces and, for most practical purposes, through the utilization of the observer's clinical picture of how the organism

behaves when it is using the substitute as a symbol. It is at this point that the greatest need for experimental work exists. Most of us feel that it is possible to distinguish between responses set up automatically in an infant and responses used by the infant to symbolize certain wants. Experiment, rather than theory, should make precise the basis for this distinction.

Up to this point, the present paper has sought to point out the probable nature of the change which occurs in the neural conditions of a symbolic process in order to reduce it to the merely substitute level. We shall continue to clarify the nature of the symbolic process by working through the topics of thinking and purposefulness; and first, the question of thinking.

We can perhaps make the significance of our position clearer by contrasting with it certain views presented by Watson in his book 'Psychology from the Standpoint of a Behaviorist' and in his article 'Is Thinking Merely the Action of Language Mechanisms?' [1] First a series of quotations from the above sources:

> It is well to draw distinction between a vocal habit and a language habit. By vocal habit is meant the mere sounding of words of the non-instinctive type. The word has to be learned, but it may be learned as the parrot learns it. It has not yet been connected up with other verbal action and with general bodily actions. (Book, p. 318.)
>
> Vocal acts or habits, however numerous they may be, do not become language habits until they become associated with arm, hand and leg activities and substitutable for them. (P. 319.)
>
> If our view is correct, it [thought] is a constituent part of every adjustment process. It is not different in essence from tennis-playing, swimming or any other overt activity except that it is hidden from ordinary observation and is more complex and at the same time more abbreviated so far as its parts are concerned than even the bravest of us could dream of. (P. 325.)
>
> The question is often asked what marks off thinking from the mere subvocal unwinding of well-organized language habits. (Article, p. 89.)
>
> In our opinion, 3 [solution of new and important problems] represents a bit of behavior on the part of the human animal which, when stripped of its non-essentials, is exactly like that bit of behavior which the rat exhibits when put into a complicated maze for the first time. When it gets to the food the autonomic strivings die down and it goes to sleep. . . . Surely a similar thing takes place in man. He works verbally . . . until certain verbal acts . . . are executed. If, when this conclusion is reached, the driving stimuli (verbal, autonomic, emotional, etc.) cease to operate, the adjustment has been completed. (Article, p. 91.)

[1] *British J. Psychol.*, 1920, 11, Pt. 1, 87–104.

> The behaviorist believes that thinking in the narrow sense where new adjustments are made corresponds to the trial-and-error process in manual learning. The process as a whole consists in the organized interplay of laryngeal and related muscular activity used in word responses and substitutive word responses; . . . . (Article, p. 98.)
>
> Thinking, in the narrow sense where learning is involved, is a trial-and-error process *wholly* similar to manual trial and error. (Italics mine. Article, p. 104.)

The above quotations are intended to bring out the following points: (1) Watson distinguishes between true language and a merely vocal habit. (2) He assumes that a response which is once a language habit is always a language habit. And (3) he fails to utilize the distinction between true language and merely vocal habit after it is once made, even in the case of thought.

We are moved to make the following observations upon Watson's position as an aid to the better understanding of the irreversible *SP–LR* relationship. If it is necessary to distinguish between a vocal habit and a language habit, the separation can only be one which applies to language responses *vs.* a large number of other forms of behavior of which vocal habits are but a specific case. In this event language responses will differ significantly from tennis-playing, golf-playing, and the behavior of a rat running a maze. Thinking *is* different 'in essence' from these forms of activity in the opinion of most psychologists. In our opinion this difference lies fundamentally in the fact that thinking involves a certain amount of language activity. (A careful reading of Watson's contribution to the Symposium leads to the conviction that language is not there regarded as an essential part of thought.) Watson's account of thinking is acceptable, therefore, only if he admits a significant difference between thinking and the running of the rat through the maze. No one has ever suspected the rat of having any kind or degree of language capacity, and yet it is notorious that he can be the possessor of substitutes in his behavior equipment. Language responses may be built up in the same general manner as non-language habits and may be constituted by muscular contractions as is also the case with non-language behavior, and yet it does not follow in any sense that there are no significant

differences between the two classes of response. These differences have not as yet been clearly formulated upon an experimental foundation. The existence of the differences, however, is well recognized, and the formulation of the irreversible *SP–LR* relationship seeks to clarify them.

If thinking is to be recognized as a distinguishable phenomenon of human nature, the simplest and most abbreviated type of thought is to be found in language behavior and is therefore indistinguishable from the irreversible *SP–LR* relationship itself. In the typical form, however, in which thinking is usually identified, the process possesses the following characteristics: (*a*) it is a sequence of distinguishable processes; (*b*) the sequence follows upon the formulation of a problem *by* the individual organism; (*c*) this formulated problem shapes the nature of the ensuing processes until the problem is abandoned or solved; (*d*) a significant number of the elements of the sequence can be aroused through the self-stimulation of receptors; (*e*) irreversible *SP–LR* processes occur; and (*f*) the train of events comprising this particular act of thought is terminated when the sequence of behavior ceases to concern the problem formulated. If we examine the above description of the thought-process with the intention of comparing it with such activities as (1) the formation of a maze-habit by rats and (2) the execution of perfected typewriting responses in man, the following likenesses and differences are apparent:

Thinking is like maze-learning, in that:

(*a*) it involves an acquisition of substitutes;
(*b*) it involves muscular and glandular responses to present stimuli;
(*c*) it is a process of adjustment;
(*d*) it is influenced by a 'drive' and ceases when the 'drive' no longer controls the train of responses;
(*e*) it is partially determined by the setting in which the response occurs; and
(*f*) it involves control through the self-stimulation of receptors.

The following are necessary characteristics of thinking but not of the other two types of behavior:

(*a*) a formulation of the problem by the organism;
(*b*) the irreversible *SP–LR* relationship; and
(*c*) the use and acquisition of non-automatic connections of the symbolic type.

Thinking is like using the typewriter in all of the above respects except that typewriting is more a use than an acquisition of substitutes.

The conclusion is forced upon us, then, that thought differs fundamentally from the general formation and use of habits in that it involves the exercise of language responses. The problem for solution is formulated by these symbolic processes aroused by the organism's own activity. Although the individual may have the problem set for him by another, yet unless it is incorporated into his behavior-system through symbolic representation, the ensuing process is not thought. This may be illustrated as follows: The knee-jerk in response to adequate patellar stimulation and the pupillary reflex to increased light intensity are each methods of meeting problematic situations. Each serves to adapt the individual to his environment. Each may therefore be termed purposeful. There is, however, no experimental evidence that either is ever controlled by the purpose, or problem, as formulated by the individual in whom the behavior occurs. It is possible to learn the nature of the purpose served by these responses, but the resulting *SP–LR* process does not then control the behavior. In the case of the wink-reflex, on the other hand, not only can the above described procedure be accomplished, but an irreversible *SP–LR* relationship can be aroused, through the associative machinery, which may then control or condition the wink-response. In this case not only is it said that a problem is met, or a purpose accomplished, but it is said that the individual winks with a 'conscious' purpose. Purposeful behavior is behavior controlled by a problem formulated by the individual. And 'formulation of a problem by the individual' involves an *SP–LR* relationship similar to that which occurs when the experimenter gives his subject certain instructions. It is in this sense that thought is said to be 'voluntary' and 'conscious.' Behavior determined at critical points by the associative mechanism and under the control of a formulated problem to be solved *is* thought

(*is* purposeful and voluntary behavior, if one wishes to use these terms).

Our account here turns inevitably to a consideration of the nature of purpose, inasmuch as we have found purpose to be an integral part of thought and inasmuch as thought has been found inseparably connected with the symbolic processes which are the vital characteristics of the irreversible *SP–LR* relationship. As in the case with thought, we may begin our discussion of purpose with a quotation. This we select from Warren's 'Human Psychology' [1] as follows:

"The fact that we are able to picture future situations is deemed by some psychologists to constitute a distinguishing mark of conscious behavior. This conscious component is supposed to differentiate intelligent from non-intelligent acts. Purposive thought, like other types of thought, leads to motor activity; and if the ability to picture the future is solely a character of consciousness, it follows that consciousness is itself a factor in determining the course of activity. In other words, according to this view consciousness is not merely a *characteristic* of neural activity; but it is a *force* or guiding activity in itself. This interpretation of purposive activity is called *Voluntarism*, since it emphasizes in peculiar fashion the volitional type of experience."

There are important points of similarity between our account previously sketched and Warren's statement of voluntarism, in spite of the fact that, inasmuch as voluntarism is not a proper characterization of our position, we do not make of 'consciousness' a separate aspect of the universe. Our position in agreement with the one described by Warren would make, in the first place, the formulation of instructions or problems a result achieved solely by the irreversible *SP–LR* relationship. In the second place, we have continually stressed the directive value of the Type-*X* situation. The adjective 'intelligent' we should reserve for use in other connections than the present.

McDougall, who regards all behavior as purposeful, has made certain analyses of purposefulness which it will be useful

[1] Warren, H. C., 'Human Psychology,' 1919, p. 428.

to present. His most recently expressed position [1] may be stated as follows:

I. Behavior possesses the following characteristics: (*a*) a certain spontaneity, (*b*) persistence independent of the continuance of the impression which may have initiated it, (*c*) variation of direction of persistent movements, (*d*) termination when the behavior has brought about a particular kind of change in the situation, (*e*) preparation for the new situation toward the production of which the action contributes, and (*f*) some degree of improvement when it is repeated by the animal in similar circumstances.

II. "Now, when the movements of a human being exhibit the first five marks of behavior, we do not hesitate to infer that they are purposive; *by which we mean that they are made for the sake of attaining their natural end, and that this end is more or less clearly anticipated or foreseen.*" (Italics mine. P. 47.)

III. "Purposive action is, then, action that seems to be governed or directed in some degree by prevision of its effects, by prevision of that which still lies in the future, of events which have not yet happened, but which are likely to happen, and to the happening of which the action itself may contribute. *Purposiveness in this sense seems to be the essence of mental activity; . . . .*" (P. 48–9.)

We shall comment upon these three statements in the reverse order of their presentation. Number 3, with the exception of the italicized portion, is a statement which can be accepted as a description of a type of phenomenon in human nature. The term 'mental activity,' however, introduces uncertainty and great controversial possibilities without a probability of fruitful result. The influence exerted upon behavior by instructions formulated primarily or secondarily by the subject is a verifiable occurrence, but I know of no other instance in addition to this case. Such a case of behavior we have signified our willingness to designate 'thought,' but the term is of minor importance. 'Mental activity,' however, is so indelibly linked with Mind and Consciousness, both in general and by McDougall, that the italicized statement must be rejected for reasons that, whether agreed to or not, must be evident to the reader.

The second statement of McDougall's must be most unqualifiedly rejected as a contribution to the science of human nature. It involves a vicious error, viz., that of accepting as a fact of science a theoretical interpretation which goes beyond observable data and which, moreover, leads only to further over-generalization rather than to additional observa-

[1] McDougall, Wm., 'Outline of Psychology,' 1923.

tional material. It must be insisted that there is not a scintilla of evidence to show that such 'purposive behavior' exists below man. *Of course*, it *may* be there, in the sense of the italicized passage, but no scientific man can assume its presence without evidence, any more than he can assume color-vision in animals without proof. There is not the slightest necessary connection between the first five marks of behavior and the italicized passage in question. They cannot therefore constitute a proof for a purpose of which the individual is conscious. A language report is the only evidence of 'foreseen results' which an individual can give to himself or to others.

Let us now turn briefly to McDougall's characteristics of behavior. We shall at the very beginning admit that there are differences between chemical reactions (outside of the living organism), the life-processes in plants, and the behavior of animals. As a consequence one would not expect to observe the same phenomena in a chemical laboratory which he can observe in an animal. Whatever else the animal is, it is established beyond reasonable doubt that it is a chemical laboratory *all in itself*, possessing and manufacturing new chemicals which can be released into the retort upon suitable stimulation. This is sufficient to account for all of the characteristics which McDougall advances. Let us consider the normal activity of the stomach during the period when the individual eats suitable food. The biological purpose of this activity is the mixing, partial assimilation and the conveyance of the food-substances to the intestines. The glandular and muscular responses show a 'certain spontaneity' in their onset, a persistence beyond that of the stimuli which initiated them, and a variability of response. They also terminate when a certain change has been effected towards which change they have indeed contributed. There is furthermore a well-known adaptive, or learning, capacity involved, whereby the stomach's behavior becomes adjusted to new kinds of content and stimulation. However, no one can draw a scientifically valid conclusion from this to the effect that either the stomach or any other part or the entirety

of the individual need do these things for the sake of attaining a natural end which has been more or less clearly anticipated or foreseen. And yet this is exactly what McDougall does, guided by philosophical prepossessions and the belief that behavior should be explained from complex to simple rather than from simple to complex. He would be on ground even more valid if he interpreted the stomach's activity as embodying and working out the conscious purposes of a Supreme God. This latter hypothesis may well be true, but it lies outside the realm of science.

Before summarizing our discussion, it will be helpful to present a classification of behavior which will aid in clarifying the mutual relations of the processes with which we have been concerned.

MUSCULAR AND GLANDULAR RESPONSES TO STIMULATION

I. *Classified upon the basis of genetic history*
  1. Unlearned responses to stimulation
    *X. Classified upon the basis of possible membership in an irreversible SP–LR relationship*
      *A.* Those which can condition an *LR* ('Emotions' included here.)
      *B.* Those which cannot condition an *LR*
    *Y. Classified upon the basis of location of response*
      *A.* Those located in the vocal apparatus
      *B.* Those located outside of the vocal apparatus
  2. Learned responses to stimulation
    *X. Classified upon the basis of the degree of learning*
      *A.* Completely automatic, and therefore not open to report
      *B.* Incompletely automatic, open to report
    *Y. Classified upon the basis of symbolic character*
      *A.* Language responses, *LR*
        *Classified upon the basis of location of response*
          (1) Those located in the vocal apparatus
          (2) Those located outside of the vocal apparatus
      *B.* Non-language responses
        Same sub-divisions as for *LR*

II. *Classified upon the basis of a sequence of responses chiefly controlled from within the organism*
  *A.* Sequences whose trends are determined by implicit or explicit arousal of:
    Unlearned behavior
    Learned behavior, and their sub-divisions
  *B.* Sequences not significantly controlled

It need hardly be said that this classification is not intended to portray all of the varieties of behavior nor to

indicate all of the desirable groupings of responses. It is essentially concerned with types of behavior that have made their appearance in our discussion. Its chief purpose is to keep us clear of an error commonly made, viz., that of assuming that because two forms of behavior are alike in certain respects they are therefore identical, whereas very great differences may exist. Because thinking and maze-running are alike in some respects, we are not justified in concluding that the two are alike in all essential characteristics.

## Retrospect

In seeking to describe that aspect of human nature termed 'consciousness' by the subjectivist, we have held closely to the observable data. The result has been a description of a one-way, or irreversible, relationship composed of sensory process and language response (*SP–LR*). This descriptive analysis has revealed the practical equivalence of this process and that termed 'consciousness.' It has further been possible to show that the irreversible *SP–LR* relationship has the adaptive values claimed for 'consciousness' by the functionalists.

Our analysis of the nature of the language response has taken us into the theoretical field of explanation, and it has led to a conception of the symbol in terms of associative processes in the nervous system. The further consideration of the symbolic process has led us through certain related phases of the topics of purposeful behavior and thinking. In these diverse and difficult problems, the conception of the irreversible *SP–LR* process has proved a significant and clarifying hypothesis.