

IS THINKING MERELY THE ACTION OF LANGUAGE MECHANISMS^[1]? (V.)

John B. Watson (1920) ^[2]

Classics in the History of Psychology

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[Classics Editor's note: This paper was the final one in a symposium consisting of five papers. The other four papers are not reproduced here. Watson refers to the prior papers -- by Bartlett & Smith, Thommson, Pear, and Robinson -- but fortunately briefly describes each position as he responds to it.]

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1. A CORRECTION OF STATEMENT.

Before attempting to define further in this Symposium the behaviourist's position on thinking, it would seem best to discuss for a moment some of the statements the behaviourist has already made. In advance of any argument I think we can say that he has never really held the view that thinking is merely the action of language mechanisms. Possibly my own loose way of writing may have lent colour to such a view. I frankly admit that in a number of paragraphs in a recent book I may justly be accused of having given an affirmative answer to the question

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before the Symposium. I can make only the well-worn excuse that my over-emphasis was indulged in for the sake of sharpness of presentation before elementary students.

In psychology we can rarely make a complete observation of everything that a human being does at any one moment; and in giving an account of what happens we emphasize those points which the experiment was designed best to bring out. This is what I meant to do in my previous discussion of thinking. I gladly emend any statement I may [p. 88] hitherto have made as follows. -- A whole man thinks with his whole body in each and in every part. If he is mutilated or if his organs are defective or lacking, he thinks with the remaining parts left in his care: but surely he does everything else in exactly the same way. If one studies a game of tennis, one's observation is taken up with the type of strokes the player makes, his serve, his returns, the way he covers the court, etc. In other words, arm and leg activities are principally emphasized. However, everyone admits that the player is using every cell in his body during the game. Nevertheless if we sever a small group of muscles in his right arm his playing is reduced practically to that of a novice.[3] This illustration serves us very well in explaining why one emphasizes laryngeal processes in thinking. Surely we know that the deaf and dumb use no such laryngeal processes, nor does the individual whose larynx has been removed. Other bodily processes have to take on the function of the larynx. Such functions are usually usurped by the fingers, hands, arms, facial muscles, muscles of the head, etc. I have in another place emphasized the extent to which finger and hand movements are used by the deaf and dumb when they are engaged in silent thinking. Mr. Thomson in his paper before the Symposium seems more or less to subscribe to the same view. It would be an easy experiment, but so far as I know not hitherto tried, to bind the fingers and arms of such an individual and then give him a problem in arithmetic, memorizing simple stanzas, and the like, which have to be worked out without exteroceptive aid. It would be necessary probably to tie down eye movements, were such a thing possible, and to restrain even the head and intercostal muscles.

While there is no sacrosanct reason why thinking should go on in normal individuals in the muscular fields of the larynx and throat, there are two very practical ones. There is first the genetic fact that, from childhood onwards, organization has been forced in the direction of language activity. From the third or fourth year onwards probably a thousand language adjustments are made to one manual adjustment. There is, too, a biological reason. This arises from the fact that the human being in his early struggles for existence had to have the undivided use of arm, finger and hand musculature when hunting and fighting. If he [p. 89] had had to employ the large muscles in thinking as, I am convinced, deaf mutes do, manual activity would have been interfered with at critical times. I have never had the opportunity of observing deaf mutes in a fight or in a critical situation where both thinking and delicate action of the manual type were demanded.

2. MORE COMPREHENSIVE USE OF THE TERM 'THINKING' DEMANDED.

The question is often asked what marks off thinking from the mere subvocal unwinding of well-organized language habits. Mr. Bartlett and Miss Smith have brought out this question explicitly and have formulated an answer which is not satisfactory to me. I think we ought to make the term 'thinking' cover generally all implicit language activity and other activity substitutable for language activity. [It should be admitted furthermore that under proper stimulation (usually a request is sufficient) the subject can be made to think aloud.] Thinking would comprise then the subvocal use of any language or related material whatever, such as the implicit repetition of poetry, day dreaming, rephrasing word processes in logical terms, running over the day's events verbally, as well as implicit planning for the morrow and the verbal working out of difficult life situations. The term 'verbal' here must be made broad enough to cover processes substitutable for verbal activity, such as the shrug of the shoulder and the lifting of the brows. It must embrace the implicit movements involved in written words or the implicit movements demanded in the use of the deaf-and-dumb sign manual, which are, in essence, word activity. Thinking then might become our general term to cover all subvocal behaviour. It is obvious that this definition can take care of the most mechanical and deeply grounded of our language habits such as those used in the subvocal repetition of childhood verse, the repetition of stanzas of poetry, limericks, etc.; those depending more particularly upon emotional stimuli as

day dreaming, as well as those verbal processes not completely habitual such as the working out of a lecture, the planning of a book; and finally those in which new results are brought out. It is clear that if in the interests of systematic psychology we need to sub-divide the whole process of thinking, three lines of cleavage will at once appear.

1. Mere unwinding of vocal habits where the word sequences are invariable: illustrated by hymes, quotations; by many of the responses in mathematics, as 2 and 2 equal 4, square root of 9 equals 3, and the like. Here there is no new work, no trial movements like those we see [p. 90] in overt manual activity when a new situation capable of solution is presented the first few times. Such thinking corresponds to an extremely simple stimulus and response type of behaviour. Similarly day dreaming would fall under this division. We assume that such dreaming takes place in response particularly to deficiency stimuli of one kind or another; such as the absence of sex activity, lack of food and water, lack of habitual surroundings and companions, lack of drugs, or even under the sway of drugs.

2. The solving of problems which are not new, but which are so infrequently met with that trial verbal behaviour is demanded; illustrated probably by thinking out of stanzas, partially forgotten; in trying to apply one mathematical formula after another in a particular problem at hand. All of the part processes have been met with by the individual and are part of his organization, but he cannot use these part processes with machine-like facility.

3. Finally we have the extreme extension of 2 above. Here the problem is new and the organism when confronting such a problem is in a grave situation. We will suppose, for example, that a man loses his position and wealth suddenly and must be ready in a few hours to act explicitly in a new undertaking. The problem, it is assumed, is of such a character that it must be worked out verbally before any overt action can take place. Hundreds of examples of this type immediately suggest themselves. Most of the real social and moral problems appearing in one's life are exactly of this type.^[4]

These subdivisions are really guesses as to what may go on. No scientific division is as yet possible. It should be expressly stated, furthermore, that thinking in any of the above forms is not an isolated process. A human animal never gets away from his biography; and the varying organic and emotional states the organism is in must exert a tremendous influence upon the course of his thinking. So that once more we would [p. 91] emphasize the fact that thinking, whatever its type, is an integrated bodily process.

Probably not many of my colleagues would include 1 and 2 under the term 'thinking.' Thinking has come to be identified with 3 of our division, but for no valid reason. We use the term manual activity when our subject ties his shoe strings in exactly the way we use it when he is *learning* to manipulate (for the first time) the most complicated of machine-gun mechanisms. In our opinion 3 represents a bit of behaviour on the part of the human animal which, when stripped of its unessentials, is exactly like that bit of behaviour 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. The deficiency stimuli, lack of food, lack of usual surroundings, etc., cease to operate -- the adjustment is complete. Surely a similar thing takes place in man. He works verbally (that is particularly verbally; many other processes go on of course, such as wrinkling the brow, tearing the hair, etc.) until certain verbal acts ('conclusions') are executed. If, when this conclusion is reached, the driving stimuli (verbal, autonomic, emotional, etc.) cease to operate, the adjustment has been completed.

3. ILLUSTRATION OF THINKING MADE OVERT.

The present writer has often felt that a good deal more can be learned about the psychology of thinking by making subjects think aloud about definite problems, than by trusting to the unscientific method of introspection. Usually a scientific man is quite willing to enter into the experiment with zest. If I ask my subject in 1 (see page 90) to think aloud he overtly responds with his limerick, his day dreaming or his mathematical answer. Similarly if I ask him to think aloud in 2, I notice hesitations here and there, false starts and occasional returns, but in

general a fairly ready response occurs with relatively few errors. It is only when we ask him to think aloud in 3 above that we begin to grasp how relatively crude is the process of thinking. Here we see typified all of the errors made by the rat in the maze: false starts appear; emotional factors show themselves, such as the hanging of the head and possibly even blushing when a false scent is followed up. The subject returns again and again to his starting point as shown by his asking, "You say the given facts are so and so?" The experimenter says "Yes" and again the subject starts off. In conducting an experiment of this kind, one has to be careful to impose problems upon his subject which are as far as possible removed from repressed [p. 92] emotional factors. It is never possible of course completely to do this as the analysts have more than once pointed out. The following illustration will make clear some of the points which appear in overt thinking.

A colleague of mine came on a visit to stay in an apartment in which I had rooms. In a passage leading from the shower bath was a peculiar piece of apparatus standing near a sink. The essential features were a curved shallow nickel pan about twelve inches wide by twenty inches long; at one end the pan had been bent in in the form of a half circle, while at the other end the side pieces did not extend for the full width. The pan was mounted on a stand adjustable in height. Furthermore the pan itself was attached to the stand by a ball and socket joint. My friend had never seen anything like it and asked me what in the world it was. I told him I was writing a paper on thinking and pleaded with him to think his problem out aloud. He entered into the experiment in the proper spirit. I shall not record all of his false starts and returns but I will sketch a few of them. "The thing looks a little like an invalid's table, but it is not heavy, the pan is curved, it has side pieces and is attached with a ball and socket joint. It would never hold a tray full of dishes (*cul de sac*). The thing (return to starting point) looks like some of the failures of an inventor. I wonder if the landlord is an inventor. No, you told me he was a porter in one of the big banks down town. The fellow is as big as a house and looks more like a prize-fighter than a mechanic; those paws of his would never do the work demanded of an inventor" (blank wall again). This was as far as we got on the first day. On the second morning we got no nearer the solution. On the second night we talked over the way the porter and his wife lived, and the subject wondered how a man earning not more than \$150 per month could live as our landlord did. I told him that the wife was a hair-dresser and earned about eight dollars per day herself. Then I asked him if he did not see the sign 'Hair-Dresser' on the door as we entered. The next morning after coming from his bath he said, "I saw that infernal thing again" (original starting point). "It must be something to use in washing or weighing the baby -- but they have no baby (*cul de sac* again). The thing is curved at one end so that it would just fit a person's neck. Ah! I have it! The curve does fit the neck. The woman you say is a hairdresser and the pan goes against the neck and the hair is spread out over it." This was the correct conclusion. Upon reaching it there was a smile, a sigh and an immediate turn to something else (the equivalent of obtaining food after search).

[p. 93] 4. BEHAVIOURIST'S RIGHT TO ASSUME THAT A PROCESS OF IMPLICIT THINKING GOES ON.

Notwithstanding the fact that we can make our subjects think aloud and thereby can observe a large part of the process of thinking, Titchener some years ago raised against an early paper of mine the objection: "How does the behaviourist know there is any such process as thinking since he cannot directly observe it?" Titchener kindly answered this question, to the effect that the behaviourist -- *quâ* behaviourist -- doesn't know that there is any such thing as thinking. The introspectionist claims that the behaviourist first uses the good old-fashioned method of introspection to find thinking and having once found it shuts his eyes and turns his back upon his original method and begins to externalise the process and to put it in the universal language of science. In other words, he describes it merely as the functioning of laryngeal or other motor processes.

Before coming to closer terms with this question, the behaviourist would like to posit the assumption, without discussing its many metaphysical implications, that in no physical or biological science is the fact called into question that the investigator can make an observation; for example, that he can note that his galvanometer needle has swung two degrees to the right,

that when sodium is burned on the end of a glass rod the bright visual stimulus in the spectroscope will be located on the scale at 5800mm: that the physiologist can observe that when such and such a thing is done to an animal whose heart rate is being recorded the rate has decreased or increased. He can also make the same observations on the changes in his own heart rate due to the use of different types of drugs. He can do this either by counting his own pulse or better by attaching himself to some form of recording device. In each of these sciences the observer goes on in his care-free way, accumulating a series of systematic observations. He does not do this in any hit-or-miss way. A definite stimulus starts him upon his work -- the words of the professor over him, or the written or spoken word of an antagonist, or finally some inward organization exerts its pressure. He works, for example, with the effects of strychnine upon human or animal organisms, because he has had some initial stimulus to drive him to that work. Once started, the changing results he obtains serve as a stimulus for further work. Finally he groups his facts and a bit of organized science is the result, namely a monograph upon the effects of strychnine upon living organisms. If you ask him, or the physicist who has worked up a monograph [p. 94] in a wholly similar way upon the spectroscopic analysis of certain compound substances, "Did you realise that there was an observer implied during all your manipulations?" he would probably not know what you meant and he would certainly be mildly angered if you happened to interfere during his working moments with such a question. In other words he gets along without discussing or even being interested in the fact that there is an implied observer at every moment in science and that a thousand interesting metaphysical points lie behind an individual's ability to make observations.

The behaviourist likewise shuts his eyes to the same metaphysical question and asks only to be allowed to make observations upon what his subjects are doing under given stimulating conditions. On the metaphysical side he asks merely to be put into the same basket with other natural scientists. The introspectionist has never made this plea to the metaphysician. He has assumed that the question of the observer is a psychological one and that he has the answer to it. The behaviourist is not so bold. He is engaged in studying, among other things, the process of observing as it appears in others, where the activity is not complicated by the demands of introspection. He must, as must the introspectionist also, assume that his own process of observing is the same as that of the subject whom he is studying. He hopes ultimately to give an adequate account of the process in this subject, an account which will show how even those phenomena which the introspectionist describes as his 'consciousness' result from the complexities of behaviour.

The introspectionist hopes for a solution of the metaphysical problem through some mystic self knowledge. The behaviourist believes in no such transcendental human power. He himself is only a complex of reacting systems and must be content to carry out his analysis with the same tools which he observes his subject using. I cannot, therefore, agree with Mr. Thomson that there is a mind-body problem in behaviourism. It is a serious misunderstanding of the behaviouristic position to say, as Mr. Thomson does -- "And of course a behaviourist does not deny that mental states exist. He merely prefers to ignore them." He 'ignores' them in the same sense that chemistry ignores alchemy, astronomy horoscopy, and psychology telepathy and psychic manifestations. The behaviourist does not concern himself with them because as the stream of his science broadens and deepens such older concepts are sucked under, never to reappear.

Granting then that the behaviourist is a natural scientist and makes his observations upon his fellow man rather than upon himself, utilising [p. 95] the aid of instruments whenever possible or necessary, like any other scientist -- how does he arrive at the concept of implicit thinking? The answer is that he can *at present* arrive at it only by making use of a logical inference. In those cases where the response to the stimulus is not immediate but where it finally occurs in some form of explicit verbal or manual behaviour, it is safe to say that something does go on, and that that something is surely not different in essence from that which goes on when his behaviour is explicit. Let us glance for a moment at a manual illustration. I hand a friend a gold cigarette case which can be opened only by pressing a secret spring. I tell him that he can keep the case if he can open it without violence. I watch him for two minutes, noting his rambling trial manipulatory movements. He fails to open it in this period of time. I then place him in a room alone, and tell him to come out when he has opened it. At the end of thirty minutes he emerges

smiling and with the case open. Since there are no marks of violence on the case, the behaviourist, utilising logic, has a right to assume that the subject continued to work at the problem as he had been trained to work at such problems and that his behaviour in the empty room was essentially the same as that exhibited by him when he was under direct observation. Merely because observation of his behaviour could not take place so long as he was hidden from the observer gives no one the right to assume that any different or unusual process went on. I should not hesitate to call this behaviour on the part of our subject manual thinking or non-language thinking. There is no necessity for it, however, since our categories of trial-and-error learning, functioning of habit, etc. are adequate. I suggest manual thinking here to show its complete homology with that type of behaviour described below which is more universally called thinking.

Suppose instead of giving him a problem which can be learned by manual trial-and-error manipulation I say, "What would be the result on your social and vocational life if through some accident you suddenly had both arms removed?" Assuming, as would be safe in most instances, that such a problem had not hitherto been faced and formulated, he would be unable to give any adequate statement. Suppose we insisted upon a formulation. At the end of an hour he would probably be able to return a fairly comprehensive reply. Surely I have the right to assume, even as a 'despised' behaviourist, that implicit language activity, sensori-motor in character, has been taking place during the hour on as grand a scale as overt bodily movements would have been taking place had I left him in a room from which there was no obvious exit and suddenly [p. 96] yelled "Fire!" from the outside. I infer that language activity from infancy onward has been developed just to meet such situations; hence that during the period of his apparent immobility he was using implicit language processes. Such processes are the only available types of organization which we have any objective right to assume can be used in such a situation.[5]

Some unpublished results of experiments by my colleague, Dr Lashley, begin to approach a scientific proof that essentially the same type of responses goes on in implicit thinking as goes on in more explicit types of verbal response. With a delicate apparatus which recorded the tongue movements in two dimensions he was enabled to show that the overt but whispered repetition of a sentence produced a tracing on the smoked drum which was wholly similar except for amplitude to that obtained when he told the subject to think the same thing without making overt movements. He was enabled to verify this again and again. On the other hand if he obtained a standard tracing to a whispered sentence and then gave the subject other work to do and later came back and asked him to think the sentence, there was no obvious correspondence in the two tracings (the original motor set had changed). This is not an argument against our point for I have already shown elsewhere how varied is the musculature of the larynx and the throat. We can write the same word by a dozen different combinations in the holding of the pen. We can speak or think the same word by many different muscular combinations.

I am not afraid, furthermore, of yielding too much to our friendly enemies the introspectionists when I say that the subject himself could observe during the apparent immobile period that he used words and sentences (and that for a part of the time he did not know what he was using!). I am no more afraid to admit this than I am to admit that a person can observe that he himself is laying bricks or playing a piano. I have elsewhere admitted a verbal report method but at the same time I have insisted upon its untrustworthiness for scientific purposes. To know anything worth while for science about my brick-laying I must get a Gilbreth or some other observer to record by motion pictures or otherwise my every act while laying bricks. In other words, scientific [p. 97] conclusions demand instrumentation. I can observe roughly that I have raised a wall four feet high by my day's work, but I cannot determine how many millions of useless movements I have made or how these useless movements could be eliminated by a change in my method of work. Now I hold that the same thing is true of thinking. The subject can observe that he is using words in thinking. But how much word material is used, how much his final formulation is influenced by implicit factors which are not put in words and which he cannot himself observe, cannot be stated by the subject himself.

The behaviourist, as well as the psychoanalyst, holds that there are hundreds of such factors involved, some of which require a minute search into the subject's biography as far back as infancy before any adequate answer can be returned. Now two or three years' training in introspection on the observation of thought processes will take our subject no further. It has been abundantly demonstrated, both by the failure of psychologists to get anywhere in the problem of thinking and by psychoanalysts, that such methods simply will not yield results. Such training merely makes him pedantic and insufferably prolix and descriptive of his inward processes. The point I am headed toward here is that if we are ever to learn scientifically any more about the intimate nature of thought other than that which can be obtained by observing the end results -- that is, by observing the overt verbally expressed behaviour or the overt ensuing bodily actions -- we shall have to resort to instrumentation. The time seems far off when such a thing is possible. While awaiting it the behaviourist has ample with which to occupy himself. Furthermore he is not in such bad straits after all. The physiologists in many cases have to be content with their observations of end results. We know many factors which affect the functioning of the parotid gland. We count the drops of saliva which issue from it under varying conditions of stimulation. We analyse the chemical changes occurring, etc. But what goes on in the gland itself we cannot say. But no one would have the temerity to assume that for this reason there is no physiology of the gland. We can speculate about what goes on inside of the gland, what the function of the unstriped muscular tissue is, why the solution is now thick, now thin, whether the gland would secrete if this or that were done. But those speculations to be of any value must be couched in some kind of terms which will lead not to metaphysical fancies but to some kind of experimental attack. If they do not lead to an experimental attack, no physiologist will long entertain them. I feel that we are in exactly this same position with regard to thinking.

[p. 98] **5. FURTHER ELABORATION OF THE PROCESS OF THINKING; SOME OBJECTIONS REVIEWED.**

The behaviourist 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; that is, the motor stage is not always necessarily situated in or even near the larynx. I would write up the process as I infer that it goes on somewhat as follows, drawing my analogy from the wealth of facts we have collected about manual activity. If I hand a subject a mechanical problem box rather large in size and ask him to solve it, I note the movements of the hand, the wrist and even the large muscles of the shoulder as he turns the mechanism from side to side. If, before he finishes solving it, I hand him the same apparatus only reduced to one-tenth of its size he continues his manipulations in approximately the same way, but the amplitude of the muscular response is greatly reduced and many of the movements of the large muscles drop out. The two types of activity are, however, in essence essentially the same. When it comes to thinking we have the following facts: children in large measure think aloud and many adults either think aloud or, if not quite aloud, at least overtly. In others thinking is reduced to such an extent that the bystander can observe only the response of the lips, the jaws and occasionally tongue movements. But the great majority of subjects pass beyond this stage and all observable explicit activity directly connected with the process of thinking disappears (there may still be explicit factors remaining such as walking, wrinkling the brow, sweating, etc.). Having watched in genetic psychology the growth of such processes, having made numerous individuals think aloud in solving their problem, what right have I to assume that the process entirely changes its character when it becomes implicit? Here I call attention to Mr. Pear's analysis. He says that the behaviourist catches only the perchings of thought, "When we recall Professor James's description of thought as a series of flights and perchings, it seems that the behaviourist has given us an account of some kinds of perchings, and, fascinating as it is, it reads like a description of flying by an aerodrome mechanic, who sees only the last stages of the aviator's descent." But surely Mr. Pear here is hoisted by his own petard. It would be unkind to rob his remarks of their sting by saying that only a well trained aerodrome mechanic can give, after watching a descent, a scientific description of it. The question [p. 99] I would ask Mr. Pear is, what logical right has he to assume that the flight goes on in any different way when it is not under the observation of the mechanic? Surely if we have enough mechanics stationed along the course to watch the entire flight, their combined

report would be a faithful account of the flight as a whole. William James's account of transitional states and perchings illustrates very well a fallacy into which Mr. Pear and nearly all other psychologists fall, viz., if any part of the process is beyond the range of the bystander's immediate observation he, the bystander, has the right to assume that something unusually interesting and mysterious may go on at the unobserved points. But since the mysterious never happens when the process is under direct observation, the logical fallacy of assuming that something different does go on is obvious. The motive behind James's classical illustration is not difficult to find. It is the motive behind the resistance to the behaviourist's view of thought and its roots lie in mysticism and early religious trends.

Another similar fallacy runs through both Mr. Pear's paper and that of Mr. Bartlett and Miss Smith, namely that the *expression* of a thought in some kind of implicit or explicit verbal action or in general bodily movement is not necessarily *thought*. Mr. Pear uses the illustration of a skater making the figure eight, whereas Mr. Bartlett and Miss Smith show dissatisfaction with my simple illustration of a golf player. The figure eight, Mr. Pear tells us, is not skating, but is the result of an act of skating. The roots of these objections lie in the fact that these authors are discussing behaviourism not from the behaviourist's own premises but from those of a structural psychologist. Why should a scientific observer of *skating* stop, upon beholding the figure eight made by some particular performer? He might wonder at its regularity, its smoothness and the like, but he would say, "My quest is the goose that laid this golden egg." In studying skating, he would take up the whole system of responses of the skater from and including the moment of fastening on the skates until they were removed. His observation would concern itself with arm and leg movements, the way the ankles function, the compensatory movements of the trunk, with the effort put forth by the skater as shown by the ease and grace of the movements, with the fact as to whether he was perspiring or whether he showed only signs of exhilaration or other emotional changes, etc. Nor would he neglect the tracings made on the ice by the skater's various movements. He would go further and take up the question of the type of training required for such adeptness, of the length of the training period and the age at which [p. 100] such training should begin. In other words, his final data would be sufficient for answering all questions which might be asked about the whole process of fancy figure-skating. After he had made a complete and searching analysis, what would be lacking? The individual's own account, of course. For the sake of completeness we will take it down. Our claim is that, in the great majority of cases, a report by the subject throws very little light upon the act he is engaged in. Let us ask him the question, however, "What were you thinking about while you were skating?" Holt has brought out in his *Freudian Wish* the reply one usually gets to such a question. I shall take the liberty of rephrasing Holt's example so that it will fit the present case. "What was I thinking about? I was wondering whether that 'queen' over there in the red sweater was watching me!"

In a similar vein Mr. Bartlett and Miss Smith object to the following statement of mine: "When we study implicitly bodily processes we are studying *thought*; just as when we study the way a golfer stands in addressing his ball and swinging his club we are studying *golf*." Their objection appears in the following words: "But to say that we are studying 'golf' in the second case is to assume that 'golf' -- the structure and character of the game itself -- is identical with how a given player *plays* golf." I fail to see any special force in this objection. What I want to know when I have a given individual under observation is how *he* thinks or how *he* plays golf. Perhaps I should have worded it differently: When we study an individual's implicit bodily processes we are studying his thinking; and when we study the way a golfer stands in addressing his ball, in swinging his clubs, etc., we are studying the way he plays golf. But let us study many other individuals, both their implicit bodily processes (thought) and their golf playing. Let us write down what we see, and record movements in motion pictures and use all possible methods and instrumentation in our quest. In the end we shall arrive at a monograph on thinking and at another on golf playing. Destroy all books on golf and a man from Mars in a month's time, never having seen the game, could, by watching individuals play, write a decent manual on the rules, structure and *technique* of golf. After having made as searching an analysis as we like upon several players' playing of golf, what will be left out? The individuals' own accounts. Again suppose we take down their overt responses to any questions we may ask and incorporate them into our record. They are of relatively little value. No one since objective studies upon golf have been made trusts the verbal report of a golf player. He will tell

you that he never takes his eyes off the ball when [p. 101] making a stroke. The cinema shows that he is a prevaricator. I have never been able to get one valuable scientific statement from a golf player. He does not know how he holds his hands, he cannot tell how he stands, nor the arc he makes with his club, nor whether the arc can vary within wide limits and not affect his stroke. He knows practically nothing about the condition his body is in. To verify this, one needs only to play with a man whose driving has gone off a bit and who has to resort again to trial and error for correction. He asks after every failure, "What did I do that time? Did I bend my body? Did I move my foot?" and so on. A most interesting illustration of the failure of a tennis player to be able to give any worth-while verbal report came to my hands while preparing this paper. A took up tennis again after a ten-year period of non-practice. He played against *B*. On the first day his form was pitiful to behold. He stooped at every stroke and twisted his body in every conceivable way. He played five sets and failed to get a game in any set. The score was deuce on only two occasions. On the second day the score was deuce several times and he won one game. He put over several good serves and his form showed great improvement. On the third day there was again steady improvement in form. The returns were swift, and fully fifty per cent. of his first serves were good. On the fourth day he won three games in succession but he was still unable to win a set. All the way through he was terribly discouraged. He had formerly been a fair player with a good serve. He kept saying to his opponent, "I play worse than I did the first day, my wrist is not flexible, I can't get the knack of serving the ball the way I used to, I have forgotten how and when to play the net and to place my balls." It was not until *B* pointed out the objective facts indicated above that *A* was convinced that his playing had improved.

It would be folly to say that in no case is a verbal report wholly without service. To enumerate the places where it is of service is not particularly pertinent to our present discussion.

6. 'CONCEPTUAL' THINKING REALLY A FALLACY.

Mr. Bartlett and Miss Smith have, I fear, harkened too much to the logician in their treatment of so-called general relations. They find fault with my simple illustration of building a bridle path; The statement they object to is as follows: "...if the grade is too steep I build my road around the side of the hill." I quote their criticism: "But the real fact of the case is concealed in that statement. In so far as the response is a thought response it is definitely a response to *steepness*; not merely [p. 102] to a particular set of visual reactions, because that would not lead on, of itself, to the further set of muscular and other reactions involved in making the path round the hill; not merely to the steepness of *this* hill, because that also would not take me round it; but especially to *steepness* as a quality common to this and to other situations and independent of any particular context." From the whole history of the way responses grow up I cannot yield this point, and yet it probably would be assented to by most psychologists. Mr. Thomson I think has come to my rescue upon this, and I believe he would assent to my further elaboration. One of the first stumbling blocks I had in structural psychology was its treatment of concepts and general ideas. Long before behaviourism took me in tow, I came to the conclusion that such things were mere nonsense; that all of our responses are to definite and particular things. I never saw anyone reacting to tables in general but always to some particular representative. When I began to watch how a child learns to react to words denoting (from the standpoint of logic) a class, the process became clear. When he had his arms full of toys and the stimulus for depositing them was present, his mother would say, "Put them on the table," whether the table was one-legged, an extension table, a library or dining table. The word thus becomes conditioned. The word *table* (any class or abstract word such as animal, justice, mercy, infinity has the same history) becomes thereafter a single individual object, a part of his world of objects, ready to call out a *single definite response* (appropriate to the situation he is in) when he speaks it himself, thinks it or hears it spoken.

In a similar way the definite reaction to the word 'steepness' grows up. The lad takes a walk with his mother over stretches where there are no paths. When he goes up a hill he pants and blows and sweats. His mother says, "Steep, isn't it?" *Steep* becomes substitutable for panting and blowing and sweating. They come to another hill. The mother says "Steep, isn't it? You are tired; let's go round." He learns by trial and error that the word *steep* is followed by sweating, hard work and tired limbs and that this exertion can be avoided by turning to the right or left and

circling instead of keeping straight on. When, interested in constructing a bridle path after reaching adult life, he comes to a hill, his whole organization is such that the hill itself (the situation) calls out the word *steep* (conditioned) and steep in turn calls out "turn right or left and circle." I can see nothing in his reactions not explainable by conditioned word responses and simple trial-and-error learning.

As Mr. Thomson points out, after reaction to such situations has [p. 103] become habitual, merely being in a situation where he is confronted by a hill leads him to the correct response, namely, circling up its side. Thinking in the sense of implicit word processes need not go on at all. I think, then, we need not agree with Mr. Bartlett and Miss Smith when they say, "But what, in this instance, switches me off from the series 'going in this direction' to the series 'going in that,' is the response to a universal quality or relation. That, and that alone, gives us the peculiar characteristic of thinking."

7. 'MEANING' AN EXPERIMENTAL PROBLEM AND NOT A PROBLEM OF PHILOSOPHY OR OF SPECULATIVE PSYCHOLOGY.

This type of argument brings us perilously close to the so-called problem of meaning. I should like to say frankly and without combativeness that I have no sympathy with those psychologists and philosophers who try to introduce a concept of 'meaning' ('values' is another sacred word) into behaviour. At every point we would describe all of psychology in terms of what we see the organism doing. The question of meaning is an abstraction, a rationalisation and a speculation serving no useful scientific purpose. In our seminary at Johns Hopkins University during the past year we went over the various formulations of meaning of the psychologists and philosophers. A more barren wilderness of words it has never been my lot to meet. From the bystander's or behaviourist's point of view the problem never arises. We watch what the animal or human being is doing. He means what he does. It is foolish to ask him while he is acting what he is meaning. His action is the meaning. Hence, exhaust the concept of action and we have exhausted the concept of meaning. It is a waste of effort to raise a problem of meaning apart from actions which can actually be observed. To answer what the church means to men it is necessary to look upon the church as a stimulus and to find out what reactions are called out by this stimulus in a given race, in a given group or in any given individual. Parallel with this query we can carry out another as to why the church calls out such and such responses. This might take us into folk lore and into the influence of the code upon the individual, into the influence of parents upon children, causing the race to project the father and mother into a heavenly state hereafter, finally into the realms of the incest complex, homosexual tendencies, and so on. In other words, it becomes like all others in psychology, a problem for systematic observation and experimentation. I have emphasized these general statements about meaning in this connexion because it is often said that thinking somehow pecu- [p. 104] liarly reveals meaning. If we look upon thinking as a form of action comparable in all its essential respects to manual action, such speculations concerning meaning in thinking lose their mystery and hence their charm.

8. CONCLUSIONS.

Thinking is then largely a verbal process; occasionally expressive movements substitutable for word movements (gestures, attitudes, etc.) enter in as a part of the general stream of implicit activity. Thinking, in the narrow sense where learning is involved, is a trial-and-error process wholly similar to manual trial and error. Verbal manipulation along one line is checked and stopped and a new line is begun for exactly the same reasons that such processes are checked and begun in manual learning (so-called processes of control[6]). The thinking adjustment is completed when the final word-grouping (sentence or judgment) or overt bodily reaction which comes as the end result of the process of thinking makes the initial stimulus to thinking inoperative or inert; that is, the final reaction, verbal or other, so changes the general state of the organism as a whole that the original stimulating factor can no longer affect the subject. A crude illustration which can properly be carried over to thought is to be found in the hungry hunter's eager search for game. He finds it, captures it, prepares and eats it, lights his pipe and lies down. The hares and quail may peek at him from every corner of the brush, but

their driving power for the time is gone.

Footnotes

[1] A contribution to the Symposium presented at the congress of Philosophy in Oxford, 24-27 September, 1920.

[2] The writer had not the opportunity of seeing the preceding contribution to this Symposium.

[3] There remains to the player of course a large organization -- his verbal organization especially is left intact as is the training his eyes have received. He is able to act as umpire, to pass judgment upon playing, write manuals on the structure of the game, etc. Probably he could learn to play with his left hand much more rapidly than a poor player who had suffered a similar loss, in view of the fact that his leg and trunk organization is relatively intact.

[4] I am rather startled by the fact that all of the writers in the Symposium seem to find some confusion in my use of the term 'habit.' They maintain that I apparently imply by the term a fixed or invariable chain of responses. Of course there are a few such invariable sequences in every human being but the number is not large. When used in this sense I quite agree with them that it is opposed to thinking if we mean by thinking the solving of problems such as those indicated in my third division. I have generally made the term habit coextensive with that part of an individual's organism which is not hereditary; but surely in all learning there is a display of previous organization -- of habits (and hereditary activity) most closely connected with the type of situation confronting the learner. No single response already learned (habit) will bring about the present adjustment -- there must be a recombination. But the partial habits forming the new whole adjustments, be they laryngeal or manual, have each had a history and their origin can often be traced.

[5] In other words, since our assumed explanation is simple and straightforward and adequate to account for all the facts and is in line with what can actually be observed in other activities, the law of parsimony demands that the upholders of 'imagery' and 'imageless thought' should show the need of such 'processes' and demonstrate objectively their presence.

[6] Situations *plus* training and organization (the individual's biography) are the only 'control' factors we need in psychology -- either for regulating overt bodily action or implicit thought action.

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