THE FUTURE TIME PERSPECTIVE IN HUMAN MOTIVATION AND LEARNING

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In psychology more perhaps than in any other biological science an accurate description of the phenomena to be studied is important as an introductory phase of the investigation. When this descriptive analysis is neglected, essential differences between phenomena may be overlooked and significant variables may remain unexplored. Therefore, I intend to introduce my subject with a theoretical description of the future time perspective as it is related to *learning* and to *human motivation*. This description will provide us with the general framework of two research programs which are presently conducted in our laboratory at Louvain and on which I would like to report briefly. Finally, I intend to outline some broader hypotheses which have developed out of this research and which are related to behavior theory in general.

I

A. The Future Time Perspective and Learning

A simple analysis of human behavior calls attention to the fact that man, in his dealing with a given situation, is usually directed toward something which is not yet there, something which is still to come, something different, even something new. For instance, the student preparing for his examinations, the vacationist exploring new places, the mason engaged in building a house, the scientist performing experiments or simply reading a book, are all oriented towards something ahead, something that they are looking for: their behavior is "future-bound."

Time and space have always been considered the basic dimensions of the framework in which the behavioral as well as all other events develop. But with regard to time, one pole of the temporal continuum — namely, the dimension of the past — seems to have been favored almost exclusively in the experimental study of behavior. The *future* time perspective, by contrast, is considered to be of much less scientific value. And it is easy to understand why. Events, of course, are caused by what is called "preceding conditions".[1] The future, on the contrary, is related to finality.

[1] Instead of "preceding conditions" it would be better to say "the present situation in which the event happens" (Lewin, 1, p. 48, n. 3).

And terms such as finality or teleology sound quite out of place in the vocabulary of experimental science. One usually forgets that the future is cognitively *present* in the behaving subject.

Learning theory is the best illustration of this preference for explaining behavior as a function of the past: according to the theory, what the organism is doing at the present moment has been built up progressively on the basis of previous experiences and reactions.

One cannot help naively expressing his astonishment at the fact that man's behavior, which is so strongly characterized by a restless striving towards something new in the future, is now to be explained entirely or mainly as a function of what he has previously done.[2]

This strange conception can be understood if we realize that an important distinction has often been overlooked, namely, the distinction between behavior in the sense of *what* I am really doing and behavior in the sense of *how* I react i.e., the pathways which I am following or the behavioral techniques which I am using. Learning theory has been more successful in explaining *how* I react than predicting *what* I am really doing. It explains, for instance, the acquisition of my writing and speaking "techniques", rather than the fact that I am now trying to present a paper to an international congress. It easier explains how I acquire the technique of driving a car than the fact that I intend to drive to the Deep South at the end of this meeting. If instead of *driving* to the South I finally decided to go *by railroad*, nothing would be altered in *what* I really do, although the learned behavior patterns, which I put into action would now be almost completely different. As long as my behavior consists in learning to drive a car, I can say that what I do is just driving or trying to drive; but what I now intend to do at the end of this meeting is not adequately expressed by saying that I will be driving a car; I should rather say that I am going to the Deep South. That is precisely the reason why going either by car or by railroad does not make any substantial difference in what I am doing.

In lower organisms the distinction which we have just made between "what one is doing" and the "techniques" of one's behavior is of lesser importance. In fact, the behavior of these organisms consists precisely in exhibiting a limited number of learned or inborn reaction patterns in order to reach some essentially unchanging objects which are related to automatically recurring needs. Therefore, their behavior is sufficiently explained as an activation of these behavioral techniques which were acquired in the past. This explains why the time dimension of the past has played such a

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[2] Compare also Freud's position with regard to man's tendency towards progress (5, p. 42).

disproportionate role in the study of behavior *in general,* and why the important variable of the future has been unscientifically disregarded.

During the past several years, however, the time dimension of the future has come increasingly into the foreground, due to the fact that the taboo on cognitive factors has been progressively abolished. The notions of *anticipation* and *expectancy* have become familiar to most psychologists. But I would like to emphasize the fact that the outlook on the future, which is implicit in these notions, is still currently interpreted as a consequence of experiences in the past. The prototype for this view is, of course, the classical conditioning experiment in which the repetition of the conditioned stimulus seems to become a signal for something else to come. The animal is anticipating food because in a previous experience the stimulus was followed by food. Therefore anticipation, or the outlook on the future, is seen as nothing else but the effect of a previously experienced sequence of events which is now merely being repeated.

My question then is: Can the outlook on the future be explained as the effect of conditioning or learning in the past?

The learning concept of the future may be a sufficient explanation of the fact that in a given situation one is usually expecting or anticipating a *concrete* object. But a closer analysis shows us that conditioning itself already presupposes a certain forward orientation in the organism. In fact, it is only under certain well defined conditions of dynamic orientation in the organism that a stimulus will become a signal for something else. If the unconditioned stimulus (the food) were to be given first, so that the dynamic "looking forward" disappears, no signal function could be established at this elementary level of behavior. Therefore, conditioned anticipation implies a more primary, dynamic orientation toward "something to come" (i.e. toward the future). More generally speaking, anticipation cannot be conceived of as just the learned result of a previous experience or reaction. In fact, repeating a learned sequence of stimuli should by itself evoke only the same or analogous reactions as in the past. The orientation towards the future cannot be created simply be recollecting or re-eliciting a sequence of events as they had been presented in the past. In other words, anticipating the actual future is something other than evoking an association of an event with another event in the past.

I suggest then that anticipation or the behavioral outlook on the future cannot be conceived of as an effect of learning or conditioning as such. On the contrary, the presentation of a sequence of stimuli creates anticipation only if a certain form of looking ahead is already there.

As to the origin of this elementary form of orientation toward the future, it is our hypothesis that the need situation of the organism is at the basis of this future time dimension in behavior. In fact, the need experience

implies a dynamic relationship toward something absent. The psychological future seems to consist primarily of a dynamic orientation toward something which is not yet there.[3] This means that the object that we need is not just "absent". By the very fact that we need it, we are vaguely oriented toward it: it should be present but it is not yet here. The concrete object we need may even be unknown, but the behavioral need itself is a situation of "looking outward" toward "something" to come. On the other hand, the actual contact with the satisfying object seems to enclose the organism in the time dimension of the present as Fraisse (4) and others have shown.

I therefore conclude: the psychological future is not just a learning effect of the past; it is essentially related to motivation. On the behavioral level the object needed is something to come to reach or to achieve, and this constitutes the behavioral future. Thus, the future is the time quality of the goal object; the future is our primary "motivational space".

B. The Future Time Perspective and Motivation: Needs and Plans

If it is true that the future time perspective is primarily related to motivation, how should we explain that this outlook on the future is so elaborate in men, while it remains so extremely limited in all other animals as many experiments on delayed response for instance have shown?

The behavioral future as created by need is nothing more than a vague orientation. The further structuralization of the future is due to more elaborate cognitive functions. This creation of a deeper time perspective is related to the fact that needs develop in men in numerous means-end structures which constitute our behavioral plans, our long-term projects, and the tasks we assign to ourselves. Thus, the future time perspective in man is related to the cognitive elaboration of needs in plans, intentions, and tasks which have a more or less elaborate temporal structure.

The outline of such a temporal structure, to take one example, might be as follows: *next month* a man foresees he will lose his job, and since his wife is expecting a baby *five months from now*, he is anxious to get a new job as soon as possible; therefore he will go to another city *next week* to see an old friend who may be able to give him advice. He should not forget *tonight* to ask his wife to buy a new shirt before he goes to the city, etc. The plan to go to the city and to see his friend is motivated ultimately by a cognitively elaborated need to earn a living for himself and for the people with whom he identifies himself. This is the concrete way in which needs exist and act in human behavior. Few activities—at least in our culture—are motivated by hunger as such, but the requirement

[3] This behavioral orientation in the newborn infant has been described by J. Piaget (15, p. 325-326).

that a man "earn his living" is precisely a "need" converted into a task. This is the concrete way in which the need for food actually exists and activates a large part of his behavior. This task then develops in concrete plans or projects of action according to the particular pattern of behavioral relationships with persons and situations in which a man is involved. In any case, the need develops in a complicated means-end structure in which a definite future time perspective is present. The same can be said about the sexual need and its relation to a man's plans to get married, to date a girl, to gain her affection, and so on. This is even more so with regard to the specific human needs.

I do not intend at this point to go into the general subject of the development of needs as a function of the interaction beween motivational and cognitive processes in man.[4] It may be sufficient to summarize our conception in the following way. If we look at motivation from a behavioral point of view, needs can be considered general and meaningful patterns of behavioral relationships which an organism seeks to establish or to maintain with its world. The reason why this general set of behavioral relationships is called "needs" lies in the fact that one or another kind of malfunctioning, displeasure or failure is elicited when an organism does not succeed in establishing or maintaining one of these types of relationships. For example, a psycho-physiological malfunctioning seems to follow when certain kinds of behavioral relationships between mother and child cannot be established or maintained during a certain period of life. Thus, this general type of behavior pattern is called a need. This means that the well-functioning organism of a child is constituted by a dynamic structure or a network of behavioral relationships which includes this type of mother-child interaction.[5]

This conception of needs as general types of behavioral interaction patterns ("needed" for the good functioning of the organism) is based on a more general view in which the living organism is conceived of as an active insertion in the environment. Different organisms are different ways of being actively inserted in the biochemical and social environment. In other words, the living organism and its world are seen as one functional unit constituted by a network of biological and behavioral interactions. This insertion of the organism in its world is primarily a *structural* one: the insertion becomes functional on the psychological level by actual behavior.

[4] I had the opportunity to elaborate on this subject in several publications. See, for instance (14).

[5] I conceive of needs not only as states of deficiency. The fundamental structure of a need is something permanent in man, and several activities are elicited or maintained in order to avoid that the state of deficiency corresponding to this need actually comes into existence.

In fact, behavior *is* the active way in which the organism actualizes this potential insertion. The dynamics of this behavioral interaction lie ultimately in the fact of living itself. Thus, motivation and needs are ultimately to be conceived of as the dynamic aspect of the interaction pattern which constitutes the organism as a functional unit with the environment. In other words, the organism is striving in a variety of ways for certain kinds of relationships because its functional structure itself is constituted by these modes of interaction. These interactions are striven for by the individual in the same way as biological regulation mechanisms are elicited in the organism in order to maintain its biochemical "identity" or homeostasis, i.e. by the fact of living itself.

As to each *concrete* motivation and each *concrete* behavioral plan, we should consider them as specific means-end structures which develop from these general needs as just described.

This, then, is the theoretical background on which, in my opinion, the future time perspective must be studied, namely within the framework of the elaborate means-end structures in which needs develop in man. In fact, as has been shown, these means-end structures are precisely the tasks, the intentions and the behavioral plans or projects in which the cognitively elaborated needs manifest themselves.

C. The Dynamic Properties of Plans

As we all know, the relationship between cognitive and motivational aspects of behavior is a much discussed topic today. In a very stimulating book, Miller, Galanter and Pribram (7) have recently tried to conceive of Plans of action "without reference to motivating factors", as they put it. Their position is characterized by what they call a "renunciation of the dynamic properties of plans" (p. 64). This "renunciation", however, seems to be the result of the very model which they have in mind. Their model is not inspired by the behaving person but by a particular product of human behavior and motivation, namely, the computer. The computer, of course, has been endowed by man with many of his own behavioral processes but obviously not with all. Man was not able to transfer to the computer his own motivations but only the processes to which I have referred above as the "techniques" of behavior. We should not be surprised, therefore, that in their interesting effort to assimilate behavioral plans to the "programs" given to a computer, these authors could easily renounce the dynamic properties of human plans. In making such a program and giving it to the computer, man himself is motivated, but the computer's "execution" of the program is carried out according to inbuilt behavioral "techniques" and does not imply motivational processes. The true reason why these authors exclude the concept of motivation from their notion of Plan—is

that they overlook the cognitively elaborated means-end structures in which motivations develop. More specifically, they do not take into account that most of the objects for which a man is striving are in fact means-objects. Miller, Galanter and Pribram are right in saying that "the dynamic 'motor' that pushes our behavior along its planned grooves is *not located in* our intentions or our Plans, or our decisions to execute Plans" (p. 64), but they fail to see that intentions and plans are means-end structures which participate in the motivation towards the goal-object. I agree that, as they put it, the dynamic motor is "located in the nature of life itself" but in the sense just mentioned, namely that motivation is the dynamic aspect of the behavioral interactions which are essential to the functional network itself which constitutes the living unit.

The same authors define a Plan as "any hierarchical process in the organism that can control the order in which a sequence of operations is to be performed" (p. 16). It is evident, however, that this order in a sequence of operations is depending upon the end or goal-object to be attained. The sequence of operations is nothing else but the means-end structure of one or another motivation, and therefore the Plan as such is to be considered the *cognitive elaboration of the motive*. There is, of course, some value in distinguishing between the dynamic impulse and the cognitive process by which concrete objects are recognized as leading towards a goal-object. But the very fact that the means-object is really "intended" (and not just *cognitively perceived* as an efficient means) is due to the dynamic process by which the subject is striving for the goal-object. In other words, there is an important distinction to be made between a plan of action drawn up for me by an adviser and the plan which I am following in actual behavior. The plan of the adviser is a purely cognitive or technical map, while the plan followed by a person in actual behavior is the fulfillment of a task or a project and therefore dynamic. The motivating factors are working in and through this plan.[6]

[6] It is interesting to follow the reasoning of Miller, Galanter and Pribram (8) with regard to the distinction between *intention and motivation*. Following the example given by these authors (p. 61), let us suppose that Jones hires Smith to kill Brown. Smith commits the murder but from the viewpoint of the motives, the authors say, Smith would not be guilty because he was not *motivated* to murder; he had the *intention* to murder but he was only motivated to earn money which is a commendable motive. The man motivated to murder was Jones, and therefore he is guilty.—Leaving aside the opinion of criminal lawyers in such a case, we can say that Jones also was probably not motivated to murder as to a goal-object. Very few people are. He was perhaps motivated to succeed to Brown in his office or to marry a woman who happens to be Brown's wife, and so on. All these motives are commendable to the same extent as the motive to earn money is.

II

From our theoretical description it appears that the future time perspective is to be studied in the framework of the plans, intentions, wishes, strivings, and tasks in which behavioral needs develop in man. At this point, I would like to summarize some of the problems and findings of our research in this field.

A. The Temporal Location of Motivational Objects

With a group of collaborators from different countries we are investigating the depth of time perspective in which the motivational objects of men are located. This research is going on with subjects of different age, sex, and cultural background in various European countries, and also in Canada, India, Formosa, and the Congo. From each subject we try to get a sample of the things for which he is actually wishing, hoping or working. This is done with an adaptation of the method of sentence completion. Nothing with regard to time perspective is suggested to the subjects; they are simply asked to complete—as applied to themselves and with complete

Thus, Jones and Smith are *both* motivated to murder as to a means-object. The way, however, in which one is motivated towards the means-object takes different forms. Jones' ambition to get Brown's job or the love of Brown's wife may create a hatred towards *Brown himself*. In that case murdering Brown is still a means-object, but the main motivation (love or ambition) has communicated a large amount of affective value to the means-object as such. While in the case of Smith, Brown is a neutral object and the intention to murder him is a rather rational canalization of motivation towards this means-object. Thus, the valence of the means-object may differ from one case to another depending upon ill-defined conditions which regulate the transfer of affective value from the goal-object to the means-object. But this transfer or absence of transfer of affective value does not alternate the general nature of the means-end structure itself. In all cases "intending" the means-object *is* the concrete way in which the subject strives for the goal-object. His *motivated behavior* is directed towards the means-object as towards an intermedian step.

From the psychological point of view, one must say that most of the objects for which man is striving are means-objects in one way or another. There is no use in restricting motivation to the goal object as such. The means-object may be neutral or even repellent in itself but as a means it activates and directs behavior. This is the way in which most students are motivated to study and to pass examinations, others to earn money, etc. Failing to reach the means-object may be as disappointing as failing to obtain the goal, especially if no other means-object is available; and the striving for the means may be as determined as the striving for the goal itself.

sincerity—40 phrases beginning for instance as follows: I really want . . ., I wish . . ., I am trying to . . ., I would like . . ., etc. Each beginning of a sentence is printed on a page, and the 40 pages together make a small booklet. Anonymity is maintained so that complete sincerity can be expected from the subjects. A slightly adapted method is used with illiterate subjects.

In the first stage of our research we are investigating only the conscious motives of our subjects. We realize the limitations of such an enquiry, but we are convinced that conscious motivation may be as important as phantasies and dreams in the study of normal behavior (2; 13, p. 169).

A method has been worked out for analyzing first the content of this material and second the time perspective in which each content or object of motivation is located. My only purpose now is to describe, without going into any detail, some of the tentative results we have obtained.

1) A first interesting point to be mentioned is the fact that practically all motivational objects are located in the future and extremely few in the past. We consider an object as located in the past not only when the subject irrealistically desires the past to come back but each time a reference to the past is included in his aspirations: for instance, the desire to enjoy as much liberty as in earlier days, to be as healthy as one year ago, etc. It is striking that even in our subjects of ages between 65 and 80 years these explicit or even implicit references to the past are very rare (4.6 per cent of the wishes expressed by our oldest subjects, against about 1 per cent in young adults and 0 per cent in high school students). Our oldest subjects are more concerned with things situated years ahead and even located after their death than with their past. We have also data related to what they fear, what they regret, etc. It will be interesting to see if they regret, for instance, that they will not be able to go to visit their children *next week*, rather than not having done such and such *in the past*, etc. Unfortunately we have not yet finished the analysis of the data on this last point.

2) As to the different periods of time in which the motivational objects or goals are located, let us look for a moment at a graphic representation of the future time perspective of our subjects.

On the left side of Fig. 1 the total temporal continuum is represented in which the sample of 40 motivations expressed by each subject are located. The different steps are based on the empirical data as found in our research. They follow very closely the main articulations of time as found in social life. Omitting the more detailed differentiations, the main steps can be described as follows:

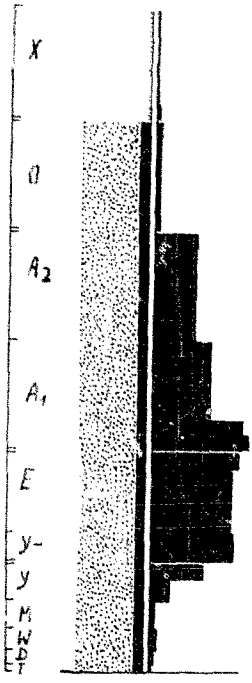

Fig. 1. Location of motivational objects in different life-time periods. Subjects: First year university students. (Thickness of blocks is proportional to number of motivations located in each period.)

a. The near future is divided up in the following steps:

T	=	the present activity
D	=	today
W	=	one or two weeks from now
M	=	one or a few months from now
Y	=	this year
Y—	=	between one and two years from now

b. Then follows the main phase of life in which the subject finds himself according to his own age. Let us take the example of a college student. His phase of life is called here the *Educational Period* (E). Objects located further than the "one to two year" period but within the limits of the university education period are to be found in E. Then follows the adult period (A) which we consider to begin with married life or with professional work (or other equivalent criteria according to the

cultural group). This long period is divided into A_1 and A_2 on the basis that some objects of motivation are related to the beginning phase or the first half of professional and married life, while others are clearly related to the period of maturity (A_2).

The old age period (O) is supposed to begin with the age of retirement (or one or other equivalent criterium according to the cultural group). In each of these main phases several smaller steps have been introduced on the basis of the empirical findings, but they are not mentioned here.

c. Motivations concerning events following the individual's death are located in the X-period (e.g. "that my children may be such and such after my death").

d. Some motivations are explicitly related to the subject's lifetime as a whole. They are indicated at the left side of the white column in the center of the diagram. Some motivations (concerning the self-concept, for instance) have no definite temporal location (for example: I wish to be considered a capable person; I hope to stay in good health, etc.). They are here represented by the dotted space in the left part of the diagram, while motivations concerning supra-individual goals, such as world-peace for instance, are indicated by a dotted column in front of the X-period.

Looking at Fig. 1, we see that a relatively large amount of motivational objects is located at the end of the one year period (the upper section of the Y-period). Still more motivations, however, are situated in the E-period (including the "between one and two year" section) which means the phase of life in which the subjects find themselves at the moment (university life as a whole or beyond the one year period). The largest amount of motivations is concerned with the very beginning of the adult period (the section at the bottom of the A_1-period). A certain number of goal-objects is related to the A-period as a whole (i.e. professional or married life as a whole), while others are situated in the A_2-period alone (see the thin column at the right of the long A-block).

Fig. 2 represents similar data for a group of 45 older people (23 men and 22 women between the ages of 65 and 84). A significantly higher number of motivations is located here in the first month period. The main concern is with the life phase in which the subjects find themselves (old age) with an emphasis on the period called "the end of life" (the upper section of the O-period). A significantly higher amount of motivations is to be found also in the period after death (at the bottom of the X-period). The large number of aspirations in the dotted space at the left of the diagram indicate goal-objects related to personality traits (most of them are concerned with physical health and well-being), while very few ex-

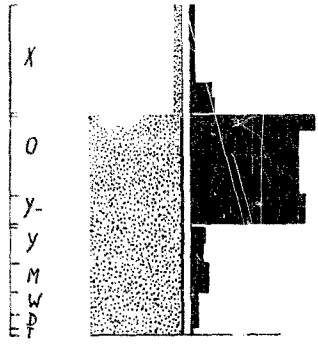

Fig. 2. Location of motivational objects in different life-time periods. Subjects: Men and women between 65 and 84 years of age.

plicitly cover the lifetime as a whole (see the thin black column at the right side of the dotted quadrangle).

We are comparing at the moment the motivational time perspective of many groups of age, sex, education, etc., in different countries. More specific hypotheses about the factors involved in this motivational time perspective are elaborated on the basis of these comparative data. To give one example, I will compare now the data obtained with three small age groups of people in the same profession in the same country (cf. Table 1).

TABLE 1

Temporal distribution of motivational objects in three different age groups.

Time periods	Age groups		
	18—20	23—25	30—35
A	15	23	30
	24		
A_1	9	42	32
E	21		
	43	45	45
Y			
D	22	3	8

Group I of Table I is composed of college students between 18 and 20 years of age.

The subjects of Group II have just finished their university studies and are beginning their professional careers; this is also the period in which most of them get married (age 23-25).

Group III is about 10 years older, but is still in the ascendant phase of their career and family life (30-35 years of age).

All three groups are equivalent with regard to social level and professional field (psychology).

The striking fact as shown in Table I can be summarized as follows:

1. All three groups have a roughly equal proportion of their aspirations located in the life phase in which they find themselves. This phase is the Educational period (E) for Group I, and the first half of the Adult period (A_1) for Groups II and III. (The proportions are respectively: 43, 45 and 45 per cent).
2. Notwithstanding this striking similarity, we find a significant difference in the inner distribution of the aspirations in this period. A large proportion of the students' aspirations is located in the first one-year period, while this is not the case either in Group II or in Group III. Thus, Groups I and II are close to each other with regard to their age, but they differ strikingly in the amount of motivations in the first one-year period, while Group II shows a similar structure as Group III which is more distant in age.

From an analysis of the data it appears that the students' motivations are more related to tasks and events, such as examinations, vacations, week-ends, etc., which are situated within a one-year structure. On the other hand, the tasks, plans, and aspirations of people engaged in building up a career or a family-life are not so much embedded in that close temporal structure and go beyond the one-year period (at least in the culture investigated here, i.e. Continental Europe).

This points to the idea—which is proposed here as a working hypothesis —that the depth of the future time perspective in human motivation is not primarily related to age and to differences in age as such, but rather to the nature of the behavioral plans and tasks and to the social structure in which these plans and tasks are embedded. This hypothesis is tested at the moment by comparing the time perspective of men beginning their military service with subjects of the same age starting a professional career (11).

A few other comparative data can be formulated as follows:

As to the aspirations located within the one-week period, junior high school students (14 years of age) have a significantly higher proportion

of such aspirations as compared to the three older groups just mentioned.

In a group of adult people in India we found a significantly higher proportion of motivations within the one-week period for uneducated subjects as compared to educated persons (10).

Systematic relationships were found also between the depth of the future time perspective and the *content* or the nature of the aspirations.

These are only tentative conclusions of a research project which, as I already said, is still in its beginnings.

B. The Learning Effect of Reward in "Open" and in "Closed" Tasks

In a second research program we have approached the future time perspective in a more experimental way. Time perspective, as mentioned before, is best manifested in the behavioral plans, the long term projects and tasks in which human motivation develops. Our purpose here is to see if the future time perspective as expressed in an experimental task influences human learning.

With regard to this time perspective we should distinguish between two kinds of tasks. Some experimental tasks are accomplished by giving only one response to a situation or stimulus, while other tasks remain unaccomplished after this first response because they have a further goal: something remains to be done; the response given is only a first step.

The first type of tasks might be described by the following experiment:

I tell the subjects that I am conducting an experiment to test their sense of realistic evaluation. I would like to know to what extent they are able to estimate, for instance, the approximate number of cars on a parking place, the number of houses in a block between two streets, etc. Each subject then is presented with a series of slides successively projected on a screen. Each slide brings on the screen a view representing a group of the objects just mentioned: cars on a parking place, an avenue with trees, a flock of sheep, etc. The instructor says: "I want you to estimate by one glance at the screen (4 sec.), the approximate number of objects you see in front of you. Each time your answer is as good or better as the average of a group of your fellows previously tested, I will tell you that your answer is *Right* or *Good*. I will say *Wrong* each time when your response is not as good an approximation as the average estimation of your fellows".

In this type of experiment the subject is convinced that his task with regard to each situation projected on the screen is finished when he has given his response to it. In other words, according to the instruction given, *no further task remains to be accomplished by the subject with regard to each of these scenes.*

We will now compare with this first type of task a second one which is best exemplified by an ordinary verbal learning task of the Thorndike type.

Suppose the subject has to learn for a series of letters the corresponding digit for each letter. It is understood that in order to do so the subject has to repeat several times the whole series; and after each response he is told by the experimenter if his response is Right or Wrong. The important point here is the fact that the subject's task, *with regard to each situation* (or stimulus word), is *not* finished by giving his response during the first presentation of the series. In fact, according to the task created in the subject by the instructions, the whole series of stimuli has to come back again and again, and the real task consists in giving more and more right responses to the stimuli in the course of the subsequent repetitions.

The essential difference between the two types of experiments lies in the fact that in the first one (the estimation task), the subject's task with regard to each item is finished after he has given his estimation. I therefore call it a *closed task;* while in the second type, i.e., in the ordinary learning experiment, the subject does not finish his task by giving a right or wrong response to each of the stimuli: the task with regard to each item goes on as long as the series is not completely learned. I therefore call it an *open task.*

From the viewpoint of the future time perspective, the difference between the two experiments is striking and essential. In the closed task experiment no further time perspective is attached to each item, since it is not expected ever to come back again. In these circumstances, the "reward" or "punishment" given by the experimenter concerns only a *past* event, namely the response as just given by the subject. In the open task experiment, on the contrary, each stimulus-word, each response given, and each reward or punishment received is to be considered in the future time perspective of a further task which remains to be accomplished by the subject with regard to each item. Therefore, the *Right* or *Wrong* as pronounced by the experimenter does not only mean a reward or a punishment for a past response, it also has a differential meaning for the subject in the framework of his *future* task: it endows the response with information as to its usefulness in the accomplishment of that further task.

Generally it has been assumed, as we all know, that reward *by itself* strengthens the connections. Our problem here is to examine whether in this kind of experiment with humans this special learning effect of reward is due to the reward as such, or if it is dependent upon the fact that a further task is to be accomplished with regard to the same stimulus or situation. In other words, does the presence and the absence of a future time perspective have an influence on the learning process? To put it in traditional terms: does reward equally strengthen the S-R connections in *closed* as it does in *open* task experiments? If not, we must account for an

important new variable in the process by which reward influences human learning and behavior.

If we try to formulate our problem in terms of need reduction, one can say that in the closed-task experiment the task tension with regard to each item is completely reduced by giving the right response. On the contrary, in the open-task or learning experiment the rewarded response only partially reduces the task tension with regard to each item. As has been shown, the task and the task tension *persists* in the frame of the future time perspective of a further task to be accomplished concerning the same item. Our hypothesis, then, is as follows: the very fact that the task tension persists with regard to an item entails some change in the nature and the effect of the reward. In other words, reward will not have the same differential effect in closed-task experiments where no task tension persists as in open-task experiments.

This differential effect will be measured here by the percentages of the rewarded and punished responses which the subjects are able to repeat when the stimuli are presented again. This will be done at the end of the closed-task experiment and after the first trial of the open-task experiment. In this way we will be able to ascertain the influence of need *persistence* versus need *reduction*.

Numerous experiments with the two types of tasks have been carried out with different groups of subjects. Only the most general result will be mentioned here which can be summarized as follows.[7]

In the experiments with open task there is a significant difference in favor of the rewarded responses, while in the closed-task experiments, i.e., the experiments without a future time perspective beyond each response given, no systematic difference is found between rewarded and punished responses.

In addition to the percentages of correct repetitions of rewarded and punished responses we also calculated the number of subjects who repeat better the rewarded responses and those who reproduce better the punished ones. Here also we did not find any significant difference in favor of the rewarded responses in closed-task experiments. In adults there is even a non-significant difference in favor of the *punished* responses: almost 45% of the adult subjects reproduce better the punished responses, whereas 40% reproduce better the rewarded ones; 15% have an equal number of both.[8]

Fig. 3 indicates the number of subjects who repeat correctly an equal

[7] Detailed description of method and results can be found in (12).

[8] In all these experiments each subject had 15 responses rewarded and 15 punished.

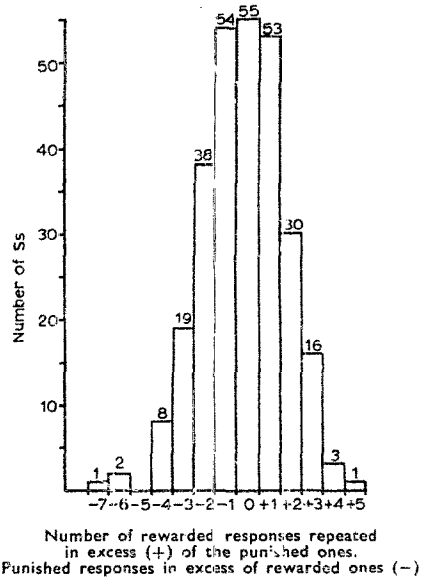

Fig. 3. Distribution of subjects repeating a given number of rewarded responses in excess of the punished ones (+), and vice versa (—).

number of rewarded and punished responses (0), those who have one correct rewarded response *in excess* of the punished ones (+1), etc. We notice that there are 54 subjects who have an excess of one correct response among the punished responses (see the "-1 group" on Fig. 3), while 55 have an equal number of both (see the "0 group" on Fig. 3), etc. It is interesting to notice the large individual differences among the subjects: some of them have many more correct responses among the punished connections, others, on the contrary, have many more among the rewarded ones. The differences in excess are up to 6, 7 and even 8 items out of a total number of 30 responses.

An objection could be made to the results of these closed-task experiments; in fact it may be that by applying just one reward to a connection one obtains only a subliminal effect. Thus, the fact that in this accidental learning type of experiments rewarded responses were not better "stamped in" than punished ones might find its explanation in the fact that reward and punishment was applied only once to each connection. In order to check the adequacy of this explanation, another series of experiments has been done in which, due to a special device which I will not describe now, it was possible to apply several times reward and punishment to the

same S-R connections without creating an open task. This experiment was carried out with six experimental groups, totalling 444 subjects between 15 and 22 years of age. A reward was applied up to twelve times to certain connections during twelve successive presentations of the series; others were punished twelve times. Even under these circumstances we did not find any significant difference between punished and rewarded connections in a closed-task experiment. There was even a slight excess of correct reproductions among the punished responses (42 % against 40.4 % per cent for the rewarded ones). Individual differences are similar to those shown in Fig. 3. Most of the subjects have an almost equal number of correct reproductions among rewarded and punished responses, while a small number has a large majority in one or the other direction.[9] It would be interesting to see if any personality trait is related to this strong favoring of punished against rewarded responses in closed-tasks experiments. In fact, in another type of experiments we were able to show a significant relationship between several personality variables and what we could call the sensitivity to successful and unsuccessful responses.

To summarize: No significant differences are found in the percentages of correct repetitions of rewarded and punished responses in closed-task experiments, while in open-task experiments—in accordance with the law of effect—the percentage of correct reproductions is significantly higher for the rewarded connections. In other words, in this type of learning reward does not strengthen connections when the items are not integrated in the time perspective of a future task. The very fact that the task created by the instructions is not finished by giving the response, but that it *persists* beyond each response and its reward, has an influence on the learning effect of punishment and reward.

I therefore conclude that *task persistence* or *need persistence* in the frame of a future time perspective is an essential variable in this type of learning.

III

It is not possible in the few minutes left to expound the results of other experiments (some of them made on motor learning) supporting the same conclusion.

I prefer to sketch briefly a few theoretical hypotheses which have developed out of this research: some of them have already been submitted to further experimental tests, others being still more tentative in nature. These hypotheses concern the relationship:

[9] I must add, however, that in experiments with younger subjects (12-14 years of age) we constantly found a slight trend to favor the rewarded responses also in closed-task experiments. This trend disappears in more mature subjects.

1) between learning and dynamic systems;
2) between learning and performance or action;
3) between overt behavior and cognition.

1) Our experimental results suggest that learning can be conceived of as a process by which responses are incorporated in a persisting dynamic system. This persisting dynamic orientation is created in the subject by a behavioral task or plan, by an interest or any other cognitive elaboration of a need. In the framework of such a dynamic orientation, reward endows the response to which it is applied with a new meaning. In fact, the rewarded response is recognized by the subject as a valuable means for further task fulfillment or final need reduction. According to our hypothesis, the valuable means is "picked up", so to speak, due to the selective attitude of the task-oriented organism. Thus, the rewarded response is incorporated in the persisting dynamic system, and this incorporation or embeddedness in a dynamic orientation, is the process by which a behavioral response is better kept by the organism or better learned. The punished response, on the contrary, is sloughed off, so to speak, as a worthless thing: it is not integrated into the persisting dynamic system and therefore not so well kept or learned by the organism.

This hypothesis has been tested and has been confirmed by several experiments in which the subject's attitude as created by the instructions was such that non-rewarded and even punished responses were "useful" for further task fulfillment and, therefore, "picked up" or incorporated in the persisting task tension. In other experiments incorporation and non-incorporation in the dynamic system was obtained without reward and punishment by a Zeigarnik-like technique.

I cannot go into any details about these experiments, but the following graph gives some of the results (Fig. 4). In all these cases, the responses which were "picked up" by or embedded in the persisting dynamic system were significantly better kept by the organism, i.e. better learned and better reproduced afterwards, than the ones which were unrelated to further behavioral plans, interests or tasks.[10]

In short, we conceive of learning as a process by which a behavioral response, an S-R unit, is incorporated and remains embedded in a more or less persisting dynamic system. Thus, in this type of learning need persistence and embeddedness in a persisting need system is more important than need reduction.

Going now a step further, one can say that behavior develops not only by the fact that certain responses get embedded in dynamic systems but

[10] The details of these experiments have been exposed also in our book (12, p. 341-379).

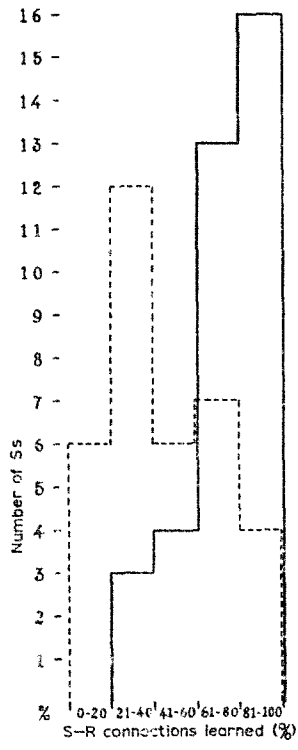

Fig. 4. Learning in function of embeddedness (full line) and non-embeddedness (dotted line) of the S-R connections in the task tension system of the subjects.

also by the fact that, correlatively, dynamic systems or needs become gradually more and more embedded in behavioral response patterns. In other words, needs and dynamic systems in general are *canalizing* themselves in behavioral responses. In fact, there are good reasons to say that undifferentiated needs for food, protection, self assertion, etc., become canalized into behavioral relationships with concrete objects satisfying the need (Murphy, 9). This canalization process is probably nothing else but the automatic or non-cognitive type of learning process by need reduction as such. Thus, the need for food, for instance, can be canalized in one type of behavioral reaction pattern and the need for water in a different one (Leeper, 6). Therefore, on the psychological level of conceptualization, we conceive of needs as behavioral relationships in a state of tension (cf. supra). In this way we easily understand that mechanisms may become drives (Woodworth, 16, Allport, 1), since the drives themselves have been

canalized in these mechanisms. As a matter of fact, several drives may successively or simultaneously find an outlet in the same behavioral mechanisms, so that the mechanism is maintained even at a time when the original drive no longer exists.

Summarizing the first point of our hypothesis: in the more cognitively elaborated type of learning behavioral patterns are learned by being incorporated in motivational systems; on the other hand, the dynamic systems or needs themselves become canalized in behavioral relationships and are therefore automatically learned or kept by the organism (learning by need reduction). The degree of flexibility of these behavioral patterns in which needs are canalized is dependent, of course, upon the degree of cognitive functioning of the organism.

2) From the point where we are now, the central problem of the passage from learning to performance or action seems easier to solve. In fact, the activation of the need system in our conception entails at the same time the activation of the more or less flexible patterns of learned behavior which are embedded in that same need system.

3) Just one last word about the relationship between cognition and overt behavior. The distance between both functions has been exaggerated by those who oppose cognition as mental content against behavior as purely overt reactions. Thus, it seemed impossible to fill in the gap between both.

One should not forget, however, the ways in which the practical cognition of our behavioral world develops. Cognizing the objects of our behavioral world, for instance, a telephone or a typewriter, is not to be separated from behavioral interactions. The concept or cognitive content of "telephone" is nothing else but a specific pattern of virtual behavioral interactions with some parts of our social environment. As to the origin of these concepts or cognitive contents, we see that a child progressively participates in all kinds of interactions with the different parts of his behavioral space. This participation goes on even when a child does not actually take part in overt behavior but only perceives what others are doing. The child's perception itself is a kind of co-acting with the behaving person he perceives. I suggest therefore, that the cognition of objects be conceived as formation of a "deposit", a "precipitate" or a "cristalization" of the behavioral interactions in which one has participated in one or the other way. This cognitive content could even be conceptualized in terms of a flexible pattern of neural pathways in the same way as we used to conceptualize learning in terms of neural connections. Learned behavior and the so-called mental content or cognition are therefore not so different from each other as naive behaviorism seems to claim. The problem to know how cognition is able to influence behavior is practically the same as to know how learned behavior influences new responses to new situations.

As a conclusion: Future time perspective as manifested in an open task plays a role in human learning. In fact, behavioral S-R patterns which are incorporated in future oriented dynamic systems are better learned. It is suggested that also in other types of learning, which can be conceived of as canalisations of needs, behavioral responses are better kept by the organism by the very fact of their embeddedness in these dynamic systems. Thus the learning process is essentially a process by which behavioral responses become integrated and embedded in the dynamic systems of the individual. This intimate interpenetration of learned behavior and dynamic orientations allows us to bridge the gap between learning and performance. The arousal of the motivation or need entails the activation of more or less flexible behavioral patterns embedded in that same dynamic system. Finally, also the cognitive aspects of behavior are intimately related to motivation and learning; on the one hand, cognitive functions are able to transform needs into future-oriented plans and tasks; on the other, the cognitive content itself is a deposit of previous behavior.

SUMMARY

The future time perspective is described first in its relationship to learning and to motivation. The cognitive elaboration of human needs in plans, projects, and tasks is emphasized, and it is shown that the future time perspective in men is to be studied with regard to these plans, aspirations, and tasks.

The results of two research programs are summarized: 1) The depth of time perspective in which the motivational objects of different categories of subjects are located is investigated in a cross-cultural study. 2) In a series of experiments on learning the influence of a future time perspective with regard to the response given is investigated in "open" and "closed" tasks. On the basis of these results some hypotheses on learning and behavior with regard to motivational and cognitive processes are proposed. Learning is conceived of as a process by which behavioral responses are incorporated or embedded in the dynamic systems of the individual. The arousal of the dynamic system activates at the same time the behavioral pattern embedded in it, and in this way the gap between learning and action or performance can be bridged. As to the influence of cognition on behavior it is emphasized that cognitive content is a kind of "precipitate" or cristalization of earlier behavioral contacts and that its influence on actual behavior is, therefore, no separate problem.

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