

Learning: Acquisition or Selection, Possibility vs. Probability - James B. Klee

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THE IMPLICATIONS OF 'ACQUISITION' FORMULATIONS IN THE LEARNING PROCESS
(It is the implications of the formulations, not of the formulators, with which I am here concerned. I doubt if any one individual ever "meant it").

It is quite common in our texts and periodicals to run across formulations of the learning process in which the word acquire is used in some way as part of the description.

Individuals are said to "acquire" habits or skills or languages or attitudes or solutions or emotions. The organism is said to "acquire" certain of its traits from the environment (sometimes through experience, sometimes not) and even to "acquire" from heredity. Such usage is not technically incorrect. Webster defines "acquire" as follows:

1. To gain by any means, usually by one's own exertions; to get as one's own.
2. To take on as part of one's nature or qualifications; to establish by means of repetition or effort, as characteristic in one's behavior or range of ability; as to acquire a habit.

Synonyms: attain, procure, win, earn, secure, receive, learn, adopt, cultivate, affect. See obtain.

It is, of course, the second usage which most psychologists have adopted. However, as psychologists are just as prone as their rats to the structurizations of habit family hierarchies, it is doubtful if the second usage 'comes clean' without some traces of the first. And the first definition is additive in its thought-directing aspects. Most psychologists will say immediately that is not what they "meant." But one is easily misled just the same.

It would probably not be inaccurate to first acknowledge that from the point of view of an inventory of the skills which characterize a particular individual, new skills are in this sense - but in this sense only - an addition to the particular inventory. Or if an unrelated stimulus were presented along with another known complex of stimuli (e.g., light presented with electrical shock), the light would from the point of view of the inventory of properties of the stimulus complex of shock be added to it. At least it would not have been on the list of a

previous inventory of the shock. The same could be said about any inventory - be it of habits, emotions, attitudes, or of any other categories one might desire to invent. However, the addition has been made only in terms of the experimenter's inventories and not necessarily by the individual organism of which the inventory has been or is being made. In other words, although we have added something in terms of our symbols, we have no right to say or imply the organism has added or gained anything unto itself unless we find this to be the case.

Let us now examine what would happen if we were to deliberately misuse the word "acquire" - i.e., use it in its additive sense - as we describe those activities of the individual characterized as the learning process. Individual O has certain known (listed in our inventory) traits - A, B, C, etc. During our observations, O is said to "acquire" X - a habit, a trait, or what you will. We have added X to our inventory, but have we added X to the individual, as is frequently implied in the literature (if not stated outright)? For example, we test in the conditioning experiment to see if the stimulus to be conditioned (X) will produce a response (R or R') identical or similar to the response (R) usually produced by the stimulus (S) which is the S-R system to be conditioned. We also check as to whether or not X is capable of producing any response (Y). If X produces Y but not R or R', we proceed with the conditioning process (our own) so that now O responds to X with R or R' (with or without Y). We then say that before our operation X does or can not produce R or R', whereas following our operation X does or can produce the desired response. As long as we can recognize that this is a description of our operations only, we are safe. Or as long as we stick to does and only does, we are safely describing our experimental animal's behavior. But does can and frequently does bring its can dimension along with it. And if this possibility should occur in our description, we would be saying something like this:

O can do X-Y. O also can do S-R.

O can not do X-R (or R') and he (now) can do X-R (or R').

The latter proposition is patent nonsense as it is a complete contradiction in terms. (The "now" doesn't excuse it). O cannot be held to "can do" and "cannot do" something. O "can do" it or he "cannot do" it, but not both. This applies to any case of X - be it a skill, habit, or anything else which is to be "acquired." If O "does-can" not do X at first, then he can never do it. The potentialities of X - that is, the "can" of X, must always be present. Thus if our inventory is of what the individual "does-can" do, we are not permitted to add to it.

If our inventory is of what the individual "does," (only) then we add X, but only to our list - not to the individual, since the individual could do it all along and we have only succeeded in bringing it out where we now note it.

THE MULTIDIMENSIONAL NATURE OF LANGUAGE

The question is primarily one of good (grammatical in the broad sense) usage - i.e., conforming to a set of agreed-upon rules for word usage. Many words are multidimensional - that is, they are capable of use in different contexts with different meanings, which may or may not be correlative. For example, "fall" in one dimension means a season; in another dimension, a drop of some body in a particular fashion. There is no correlation between the two different dimensions. (The etymology of the form of the word is irrelevant as a word, symbol, can mean anything we wish it to mean). However, in the case of any multidimensional word, it is possible to slip, pun, or equivocate from one dimension or context to another even without realizing it. The obvious case is humorous. "Make a pun on some subject, make it on the King." "The King is no subject." The less obvious case creates some of the most difficult problems in science and philosophy. Such problems are the function of both the way the term is used as well as how clearly the denotation of the term has been perceived or described. Although the responsibility always rests upon the scientist to avoid such difficulties to the best of his ability at the time, this cannot always be done. Scientific definitions cannot be expected to be perfect on an a priori basis. How clear and precise a particular definition will be usually depends upon the degree of development of the investigation into the referent of that definition, as well as upon the investigator's usage of it. But once a mistake in usage has occurred, it is likely to persist and be perpetuated through succeeding students unless one exercises self-consciousness - that is, constantly examines usage.

The mind-body problem is a good illustration of the above considerations and is a problem only in terms of these considerations. The physiologist or anatomist attributes to the organism a body. The psychologist attributes to the organism a mind. The difference is not in the organism but in the points of view of the two scientists - that is, the dimension or "direction" (to use Maier's [3, 4] term) of their method of approach. Aristotle knew this when he said that mind is to body as cutting is to axe. For a further interesting and illuminating discussion of this, see White (9, 10). Once the two dimensions are developed, it is impossible to unite them - unless one returns to the pivot or pun point, the organism.

Failure to do this results in parallelism - or worse yet, interactionism. Actually, like any two dimensions which do not necessarily correlate, they cross cut each other at right angles - that is, they are two different aspects of the same thing, rather than two different things in the same aspect or context or dimension. They are not sequential. Perhaps a word of caution is advisable in regard to multi-aspect formulations. The traditional formulation was to make an analogy in terms of the two sides of a sheet of paper. Such an example could only lead to hopeless confusion - as it did. It lacked any sense of fluidity. The mind-body problem will probably be with us until enough of us have the intellectual tools with which to think about it. And it was not until the development of correlation, factor analysis, and the recognition of multidimensional space that such tools became generally available.

POSSIBILITY VS. PROBABILITY

Lacking clarity of definition until further experimentation makes probable the more precise formulation of operations - we can, however, be constantly on guard or at least take time out now and then to review and criticize. Otherwise, we run ourselves into further "nonsense" or illogical formulations where self-contradictory assertions are contained in, or are implied by, a single proposition. The illustration - 0 does-can and does-cannot X, as developed earlier - was an instance of this.

Aside from questions of fact, the great difficulty in putting heredity and environment back together once these aspects had been analyzed out is due to the above type of semantic difficulty. First, both series of facts tended to be handled in the same dimension. But secondly, once a list of traits had been made on the basis of what an individual could do presumably as the result of heredity, it was hard to explain how another list of traits from the environment was to be added to the individual. As these are mutually contradictory assertions, one was forced to either choose between them, taking one or the other and feeling very uncomfortable with either one alone, or worse yet, one was obliged to use that workhorse of utter confusion - interactionism. However, once we see that heredity and environment determine both the range of the possible and the degree of the probable, the dilemma is resolved and we are not put in the position of having to have our organisms "acquire" anything from either. Heredity sets certain limits or makes certain traits possible. Environment sets certain limits or makes certain traits possible. "All knowledge (with the exception of the kind they get at Duke University) is through the senses." "There is nothing in mind that was not previously in sense . . ." On the other hand, one must have

organisms capable of sense, capable of the knowledge, capable of "taking" what they seem to take from the environment. The latter is determined by heredity. Heredity is not coercive upon development; it only creates the possibilities. The environment makes it possible, too. The possibilities or forms of behavior are a function of the extent to which both heredity and environment supply those possibilities. Heredity may give possibilities for traits A, B, C; environment may give possibilities for traits B, C, D. We only know about traits B and C here (to be conceived as a product of the relationship of heredity and environment, not as an entelechy in the teleological sense attributed to Aristotle) unless we find an environment with A possibilities or an organism with D possibilities.

We used to be and still are amazed when we suddenly did or do discover new possibilities we hadn't contemplated before. Now with the rapid progress in scientific fields and the evolution of our own culture, it would almost seem as if the reverse were true. Within the limits set by heredity and environment almost anything seems possible. And just because a thing is possible - e.g., Utopia, a million dollars, fame, peace - we are beginning to find that it is by no means necessarily probable. The question for us then changes to one of probabilities. It becomes that of determination of conditions which enhance or curtail the appearance of the results (behavior) in which the investigator is interested or which we desire. If we now return to our original conditioning situation, we find that O is capable - i.e., it is possible to him, of X-Y, S-R, X-R (or R'), and perhaps S-Y (or Y'). The environment is likewise capable of stimulating these, for we have already tested them, and of receiving the responses. The experimenter associates or places in contiguity two of these known possible stimuli (X and S) and if conditions are favorable (e.g., repetition, temporal position, attention, etc.) the O may give the response of R or R' when stimulus X is given alone. Thus, the conditions of the organism and of the learning situation are seen to determine the probability of occurrence of the events while the question of possibilities remains that only.

At this stage it might be interesting to point up another problem similar to that of acquisition and which likewise is both procedural and semantic in origin. As in the case of the "addition" of traits which is a function of the investigator and not of the investigated, we are confusing what we ourselves do with what we attribute to our experimental organisms. In the preceding paragraph it was said that "The experimenter associates" the stimuli X and S. For this is in fact what actually happens. If the organism can already

connect X and S - that is, has the possibility or form of X and S, it is obvious that the experiment didn't create it. The latter only sets the conditions whereby the organism's connection of X and S become apparent to the investigator. (It may also become apparent to the organism should it happen to be self-conscious). Thus, any "associations" of stimuli which have been formed are those which the investigator has associated or placed together. Is not that what is meant by association formation? Basically, to associate is to indulge in a kind of activity which one performs by placing things, symbols, people, ideas, objects in contiguity or together. If the investigator does the associating, what then does the experimental animal do? So far as can be determined at present, the experimental conditions in the conditioning situation enable the individual to reorganize its experiences and/or responses so that a different experience occurs leading to the response or to a similar response. The reorganized experience is probably in the nature of a new (new in the sense of not previously experienced and not that of something new having been added) gestalt. Do we in our experience "associate" red with meat, or do we perceive something which our language enables us to call red meat; does the dog associate buzzer with shock or does he experience a buzzing shock?

During the thirties, a stimulating controversy was going on in the literature between the "Hullians" and the "Krechevskyans" as to whether or not learning was a continuous process. Krechevsky claimed learning tended to occur by insightful shifts of systems, gestalts or hypotheses, Hull by continuous increments or reinforcement. Neither took sufficient account of the origin of what shifted or what was reinforced. Both groups seemed to be working from implicit assumptions that the learning process created the possibilities of the gestalt or system of "association" rather than just the probabilities of its appearance. Once recognition of the latter interpretation occurs, however, both of their approaches are revealed as just different aspects of the same process. What the size and complexity of the shifting gestalts happen to be will depend on the state of the particular forms or organizations involved. When and if they will shift will depend upon the degree of reinforcement of one particular system relative to the other systems.

Thus, once we recognize that we are dealing with probabilities and not possibilities, we are in a position to go ahead and put some system and order into the chaos that is current psychology.

AN ALTERNATIVE SOLUTION

The question of just what are the possibilities of behavior or the "forms" is not the province of this paper. They will be whatever they are found to be. Suffice it to say that they are limited by the heredity of the particular organism and what is available in the environment to which to react. These are the "givens" in any particular relation of organisms to environment. What concerns us are the things we can change and the methods by which we are enabled to change them. In other words, we are interested in the "dynamics" rather than the "statics" of behavior, for those are the things over which both as psychologists and human beings we have some control. To be fashionable for a moment, we have man and the atomic bomb, the natures or forms of which we have to accept. Neither can be changed at this point. However, over the relation between the two we have, we hope, considerable control or at least the possibility of that control. What we will do, of course, depends on the conditions or, as I prefer, the "selective loadings" of the relation. In fact, what any organism does depends on the selective loadings of the relation between itself and what is apprehended as its environment. To retrace for a moment, ideas of association or acquisition as descriptive concepts in learning were rejected because of the semantic difficulties implicit in these terms which could and have prevented progress in the psychology of learning. They mislead us by asking about possibilities or forms rather than about the probabilities of the appearance of these forms, changes therein, and resulting reorganizations in experience and behavior. How then are we to describe these appearances and changes of behavior? Perhaps the easiest way is to borrow a concept from statistics - that is, to talk in terms of selection. If a large number of possibilities can logically be envisaged and not all turn up one may say that some selective factor has been operative. We know from the aspect of possibilities or forms that any man can be both peace-loving and war-like. Since by nature both alternatives are possible, it is pointless to discuss it further. Instead, if we are to advance our knowledge, we must ask not what makes both possible but what makes either probable. What are the conditions of each, what selects one or the other out of the mass of possibilities of human behavior? The answer, we all know, depends of course on the functional relations of the organism in its environment. Hence we can start with two classes of selective factors, Organism and Environment.

THE PROBLEM OF ENVIRONMENTAL SELECTION

The author does not intend at this point to write a textbook but to indicate only how this and the succeeding problem might be handled so as to avoid the semantic difficulties thus far discovered.

To revert for a moment to possibilities - almost all environmental possibilities could be present at any one time for a particular organism. In matter of fact this hardly ever occurs. A child in the United States is seldom exposed simultaneously to the Sanskrit, Coptic, Russian, Chinese, Algonquin, and English languages. He doesn't meet with rubles, pesos, dollars, etc. at the same time. Nor does he meet with all the different patterns of cultures and sub-cultures at the same time. Hence one must always consider the phenomenon of cultural selection in relation to the individual. My or your or his culture is always selective or at least selected. The same is true of the living creatures the individual may experience. As the result of natural selection, one meets with sulfa-fast strep germs or certain types of dogs or people or plants or animals. Our inorganic environment, the weather, soils, seas, atmospheres are again of limited types. And the arrangement of all three - cultural, biological, and inorganic events - are limited and selected. This is true also of the experience of our subhuman experimental animals which as far as they are non-cultural creating species would be parts of the selective nature of the inorganic and organic aspects of their world. A dog or man exposed to buzzer and shock meets only a limited range of possibilities, and so knows only these.

Again, the pattern of arrangement of these environmental forms is selective at least in terms of human experience as our gestaltist colleagues have long pointed out. The effect by virtue of our possibilities on our experience of contiguity, proximity, good continuation, etc. are well known as making probable one pattern of organization over another, although the possibility of other organizations remains.

Those items mentioned in the two immediately preceding paragraphs select not only so as to encourage some experiences against others, but also make probable some responses over others. What language we speak with what accent, what objects we kick, to whom we speak, or what we eat or throw away is again selected by what in our environment reinforces them and makes these forms of behavior most probable.

THE PROBLEM OF SELECTION BY THE ORGANISM

Similarly, within the limits of the particular organism with which you are concerned everything is possible. But again not all possibilities occur at once. It might be profitable

here also to delimit areas of selection. Perhaps the very nature of the spatial-temporal or structural-functional organization makes certain forms more probable than others in a very fundamental sense. (By the device of the hyphen I am trying to restore the unity destroyed by those who separate time from space, structure from function for their own analytic purposes. I hope the reader will oblige by reading these hyphenated words as unities for the time being). Although it is theoretically possible for all animals to fly or swim or walk, some do not do so as a matter of fact, and not because of the possibilities but the probabilities engendered by the limitations of their structural-function organization itself. Conceivably, a man could jump out of the window and, by flapping his arms as does a bat, land gracefully ten floors below. In fact he doesn't because of his limitations as an organism which makes such a feat highly improbable. No other reason need be given.

On a more obvious level we recognize the selective loadings placed on an individual by a particular emotion or state of motivation (two conditions which, as far as their ability to organize the individual in a selective fashion, differ very little from each other). A man with little culturally-selected training would perceive, think about, and respond toward a plump young woman very differently if in terms of his response to the selective tension systems activated - we characterize the result as sexual or fearful, angry or hungry. Experiments have established that what an individual organism perceives or in what directions it thinks or what responses come most easily depend to a large extent on the particular emotional or motivational structurization of that organism at the time. (The reader is urged to read Morgan's *Physiological Psychology* [6] - especially p. 458-465 - for an excellent summary of the physiological approach to the problem, and also Magda Arnold's article [1]).

Again, what has brought success or adjustment or reinforcement in the past will, when actively part of the present situation, also tend to make for greater probability of some patterns over others in the area of experience, intervening constructs and response. In other words, past experience or experience once-having-occurred contributes to the selective organization of the individual. In fact, anything which has been identified as affecting the organism would here contribute to what it selects. Almost always some frame of reference, attitude, direction, "hypothesis" is operative in the selective organism, affecting what we identify as the organism's experience, response, or whatever intermediate central constructs we may have invented.

Thus, both the organism and the environment - seen from the point of view of probabilities instead of possibilities, selection instead of "acquisition" of forms - become somewhat more understandable. And from this frame of reference greater unity in psychological theory may develop. "Hullians" and "Lewinians" - once they are recognized as not explaining the origin of possibilities but only as dealing with probabilities in behavior - may not be found to be so far apart as was once thought by their audience and students. And in terms of what seems an indecent compulsion to haste on the part of our present very selective environment, perhaps psychology might evolve more rapidly than it seems to be doing towards still greater understanding of behavior problems.

EXTRINSIC VALUES OF A SELECTION APPROACH

Values for the social sciences:

Most of the above material was puzzled out in response to problems engendered in teaching social psychology without going over into social science directly. It was a response directly to Klineberg's (2) excellent text on social psychology, especially his use of the idea of dependability in dealing with the nature of human nature. Unfortunately, in discussing the dependability (or probability here) of forms - especially motives - he uses as criteria ideas which are derived from possibilities rather than those which imply probability. These criteria were (a) a physiological basis, (b) universality of appearance, and (c) continuity with other biological species. If mind and body are different aspects of the same thing, then all behavior has a physiological "basis" if approached from a physiological point of view, and all behavior can likewise be described from a psychological point of view. Just because we know a little about the physiology of hunger and very little about the physiology of creating a flag doesn't prove one has a physiological "basis" and the other not. This criterion is totally irrelevant and is a good example of the results of the present state of semantic difficulty in this area. The other two criteria may be dealt with as one. Universality of a mode of behavior within a species or between species implies nothing beyond the universality of the environment. If you believe eating is a universal response of all species read about Padilla's (7) experiment on the development of pecking in chicks. Some of his chicks never did eat and failed (did not) to learn to eat because of their relation to a radically altered environment. They didn't peck because they could not but in spite of the fact that presumably they could peck. And no one will deny that pecking is universal in chicks and some other fowl or that it has a physiological basis.

Fortunately, although these criteria are adduced early in relation to the discussion of human nature, Klineberg doesn't harp on them, and the rest of the discussion - if not the whole book - gives a far more accurate impression of the subject than the author might admit to have intended. (This is true only if he took his "criteria" very seriously, which somehow I doubt).

We can hardly blame the social scientists for trying to deal with possibilities, forms, "human nature" in their approach to their problems when we ourselves are guilty of it. The current state of affairs in the social sciences is almost as reductionistic (and for the same reasons, or at least same type of fallacies) as was psychology before it thoroughly realized that there weren't different types of nervous impulses to correspond to all the different types of responses or sensations. The social sciences are still trying to deal in types of man - or what is worse, in a more subtle way, types of mind. At present many books are appearing which are "psycho-analyses" of cultures. They are excellent examples of reductionistic practice from the point of view of the establishment of a science of culture or society, although excellent pieces of descriptive work of how particular individuals are affected by and in turn affect particular cultures. There are a few brave souls who recognize this and are fighting to establish a science of culture from a genetic or evolutionary point of view in face of the current onslaught by the rest of the anthropologists, sociologists, economists, and historians. In fact, the great anthropologist Malinowski - who was reductionistic to the point of skipping psychology altogether in favor of physiology - once (5) could list only two anthropologists who were true scientists of culture; i.e., were interested in describing culture per se without trying to reduce it to the characteristics of particular peoples. The economic theories of Keynes - like most current economists - likewise rests on the validity of his concept of original human nature. Should that change, the rest of his theories are likely to go with it.

As mentioned above, this unfortunate reductionistic attitude toward cultural institutions rests on the confusion of the possibilities with the probabilities of man's behavior. Man is capable of most anything, hence you do not predict from possibilities what his institutions are going to be or in what direction they will grow. Anything is possible. Prediction, as well as description, must be done in terms of the culture itself until such time as man mutates or evolves and thus somehow changes his basic structure - i.e., there might be other possibilities. Meanwhile, attempts to label and derive the nature and laws of institutions

and their growth from an "Oedipus Man" or an "Economic Man" or an "Industrial Man" or a "Cooperative Man" or an "Individualist Man" or a "Masochist Man" or a "Capitalist Man" or a "Poetical Man" or a "Man's Man" is off to a sad start into a blind alley.

Shifting to the point of view of probabilities, man is whatever we find he happens to be. He reflects his culture (to a social scientist) as much as his culture (to a psychologist) reflects him. As far as the social scientist is concerned, man is a constant in the problem.

Psychologists, much as they would like to help, can't give the social scientists the answers they seek. They will have to find it in their own terms. We say man can be anything. He is likely to be thus and so given such-and-such. And if the selective conditions are right he can start from any place and get to any other that is satisfying to him, whether we like it or not.

Man as a responsible creature:

If we deal in terms of forms only, whatever forms do appear will determine our perceptions of man, and man will appear to us as static, "mechanical," and necessarily so. However, from the point of view of probabilities we see a fluid picture. Man expresses whatever the selective loadings of the situation and himself elicit. If we do not like what he is expressing we need only change the selective loadings, the conditions, for in this dimension they are variable. A form either is or is not and must be accepted as is. But if the form has "processes" (a la Whitehead) or has amount or degree, then that may be varied to suit our purposes - be they bad or good as we value them. From the point of view of selection, man - as other creatures - chooses between alternatives. That the particular selection is a function of the selective loadings or conditions (i.e., is determined) enables us to ask how can we alter choice, and enables us to find the tools with which to change them to suit better our present purposes. If we do not know man's basic nature then we can give as free a choice as possible and let the selective loadings within man himself make the ultimate choice. We have been in the habit so long of making of man a list of special and limited forms only that we really don't know. It was not until the advent of Freud that anyone asked "what does man want" instead of telling him what he ought to have occurring to the prevailing concept of "Economic Man" or whatever other particular form of man was current. From the point of view of selection, we can ask man to reveal himself instead of telling him what he is. We also can in the process find out how to change what man himself doesn't care to promote if he wishes to survive. In this we have a free choice to the limits allowed

by our own institutions. (This is intentionally sketchy. A thorough semantic analysis of the whole problem of responsibility has been made by the late Moritz Schick in his book *Problems of Ethics* [8]. Chapter 7, "When Is a Man Responsible?" is especially recommended to the reader). This is not a denial of determinism in psychology. If a man's choices were not determined, any stimulus could always lead to any response at any time and the result would be purely a matter of chance. It is a denial of the misinterpretation of determinism so as to mean compulsion by which a scientific description such as the Law of Effect is thought to be compelling upon the individual it describes. An individual doesn't tend to repeat the successful because of the Law of Effect (What would happen if he failed to obey the law? What court sits on these cases?); We have the Law of Effect because we find the individual tends to repeat the successful. There would be no sense to the use of reward or whatever method of control works better if this were not true.

If, then, man is determinate in his choices, we can hold him responsible for them and thus ask his help in our labors. We may at least hold him to his responsibilities within the area of his freely-made choices, those which express himself. That is all that can be asked without additional help from his environment. But that is all that need be asked of anyone.

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