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Integral Energy Psychology

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THE FIELD CONCEPT IN PSYCHOLOGICAL THEORY©

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I. HISTORICAL AND CULTURAL BACKGROUND

A. THE RELATION OF FIELD-GESTALT THEORY TO ELEMENTARISM AND MECHANISM

"Theory of knowledge was fettered for hundreds of years to the dogmatic prejudice according to which the world consisted basically of summative particles or bundles..." (75:96) Such is a typical statement in regard to atomism by the leader of the Gestalt movement and such statements were prevalent in the early part of the movement. "The 'atomistic' psychology, characteristically dependent as it was upon the natural sciences for its method of thinking, tried to conceive the reality of psychic life as built up of sensations and feelings, of conscious elements, and set itself the task of carrying through a construction of this sort on the basis of a study of these very elements with reference to their elementary properties and the laws of their synthesis." (66:3-4)

Atomistic thinking goes back to the Greeks who thought the world consisted of minute elements, indivisible and endowed with specific energies. This type of thinking, according to Katz (29:4) has the most following in the natural sciences, especially chemistry; and from here it transferred to physiology and biology. Here the organism was conceived as a combination of the smallest elements, i.e., cells. The understanding of the mechanism of a cell meant the comprehension of the whole organism and this would be achieved through summation. This gradually led to the concept of the reflex as a basic element of organic movement. "...isolatable pieces of reflex apparatus of constant build and constant response were said to react collectively on environmental events." (29:4) The reflexes either facilitated or inhibited each other, thus explaining the gradients of response strength. What was believed to actually occur resulted from the addition of these individual operations. The reflex concept was taken over by the older psychology, thus making it more scientific. It also had the added advantage of being more mechanical.

Wertheimer has stated the belief in the atomistic analytic character of science thus: "... 'science' means the breaking up of complexes into their component elements. Isolate the elements, discover

their laws, then reassemble them, and the problem is solved." (10:2) The importance of this fact is that most of the experimenters who preceded modern psychology came from the natural sciences and they took the atomistic view and the experimental method with them. The experimental method has not been seriously questioned as to its applicability to psychology, but the atomistic approach to the nature of mental life could not by itself do justice to the topic. The study of sensation acted as a borderland between natural science, psychology, and physiology. The atomistic view seemed to justify itself best on the basis of the anatomy of the sense organs, especially the punctiform sense organs of the skin. Here individual sense spots were "real". Therefore, if in the environment a group of individual sense spots were stimulated it was a "summative-aggregative" phenomena. This concept was applied to the other senses as well. The resulting sense impressions arise in an additive manner from the individual sensory units. Thus there occurred a parallel to the analytic and synthetic methods of natural science in the sensation experiments. Images in the atomistic view were weaker copies of sensations.

The stream of consciousness was a result of sensations and images were associated by contiguity in space and time; any image could be connected to any other by "chance". The Gestalt criticism of this "mechanical" view was that it could not do justice to the liveness of "meaningful thought and phantasy". Time atomism is another form of this general outlook. The atomistic view thought it possible to slice up the stream of consciousness without misrepresenting its structure. Here the object was to analyze a conscious process into the smallest time fragment in order to understand its structure. In the view of Katz (29:7) "It was time atomism, above all, which prevented the older psychology from recognizing the whole wealth of natural mental forms."

Wheeler has made an interesting cultural-historical analysis of the mechanistic or atomistic view in contrast to the organismic position. (76:239-244) Gestalt psychology is one phase of the general trend in psychology away from the mechanistic to an organismic view based on fundamentally opposite grounds. This trend is exhibited in the whole culture and the shift has occurred many times in history. When one movement has run its course the entire culture pattern changes to an opposite set of assumptions. The two patterns have to do with the question: "What is basic, primary, more important or fundamental in nature and what is secondary and derived?" For the mechanistic pattern, the answer is that the basic thing is the element, self sustaining and independent, whose attributes must be innate or inherent. A part implies the whole but the part is first and is used to explain how the whole came into existence. Therefore the whole is secondary and derived having no properties or attributes outside of its parts; it is conceived as an aggregate or mechanical combination of parts. In contrast to this, the organismic pattern believes that systems of energy patterns and wholes are basic and primary and therefore the part or element is thought of as secondary, and derived by a process of individuation. According to Wheeler these two patterns are mutually incompatible and impossible to blend without basically altering one or both. Scientific laws in the mechanistic view pertain to the machinery by means of which the complex is obtained from the simple. In organismic thought the manner in which parts move and behave or change in already integrated systems of energy constitute the substance of laws. The laws pertain to the behavior of wholes.

The psychological literature of the nineteenth century was mechanistic. Association, using mechanical laws, was the dominate psychology. This viewpoint was taken over by the behaviorists, bond psychology, and structuralism of Titchner, all considered holdovers from the nineteenth century. Wheeler sees the transition from the mechanistic to the organismic pattern, occurring in the 1880's, in four steps. (a) The rediscovery of continuity or unity in time. (b) The rediscovery of unity and its implications in both space and time. (c) A rapidly growing realization that psychological

processes cannot be explained completely by reducing them to elements; a given mental state possesses an attribute of its own, (a "field property"). (d) The main break took place in Germany with Wertheimer, Koehler and Koffka.

Gestalt psychology was slow to take hold in America where there were entrenched three schools; Titchner's introspective structuralism, Watson's behaviorism, and Thorndike's bond psychology. Wheeler believes that is characteristic of the organismic times to break down departmental barriers and to introduce new branches of science. This type of culture is also more subjective and introspective than the mechanistic type and it has an inclination toward eastern mysticism.

Somewhat along the same line is J.F. Brown's treatment of the basic philosophies of biology (6:23-30) atomistic-mechanism, vitalism and the organismic viewpoint. The distinctions are most clear in his table (6:29) and I shall reproduce it with a slight addition of point 5.

Vitalism	Atomistic-Mechanism	Organismic Theory
1. Man is a machine plus an elan vital, entelechy, soul.	Man is a machine.	Man is a system of energy.
Antithesis Underlying Viewpoints Machines are systems of energy but not all systems of energy show the properties of machines. A machine requires an engineer. Atomistic-mechanism meets this problem with scientific agnosticism. Vitalism meets it with the plus. Organismic theory does not have to meet it.		
2. The whole is equal to its parts plus the vitalistic force.	The whole is equal to the sum of its parts. (Parts exist first. There is local determination.)	Whole is more than its parts. (Wholes exist first. There is no local determination.)
Antithesis Underlying Viewpoints Atomistic-mechanists say causation must be from part to whole. Vitalists say causation is from part to whole under direction of the vitalistic force. Organismic theory says causation is from whole to parts.		
3. The analysis is primarily structural-substantial, plus.	Analysis primarily sturctural-substantial.	Analysis primarily functional-relational.
Antithesis Underlying Viewpoints Since there is no local determination in organismic theory analysis is possible only through variation of the conditions under which an event occurs. Since there is local determination in atomistic-mechanistic theory substantial analysis is common.		
4. Biology cannot be reduced to physics.	Biology must be reduced to physics.	Both physics and biology are amenable to the propositions of the logic of dynamics .
Antithesis Underlying Viewpoints Here there is more agreement between atomistic-mechanism and organismic theory than there is between either of these and vitalism. Organismic theory is in much better agreement with contemporary physics than atomistic-mechanism.		
5. Purposivist psychologists.	Behaviorists and reflexologists.	Gestaltists.

Brunswick (7) has analyzed several systems of psychology, using as a standard the work actually done in sufficiently detailed fashion. The following paragraphs show his analysis.

Early experimental psychology (early psychophysics). This system's ideology was typical of the non psychological sciences. The interest and research centered around proximal stimulation and the guiding ideal was a desire to know as much as possible about mediation -- the mechanism of the sense organs and the condition of the nervous system. A shift of emphasis occurred in the development from the J. Miller to the Fechner era, with interest centered on the relationship *per se*

between stimulus and sensation; a shift away from physiology to psychology. In early psychophysics, the focus of concept formation was on proximal stimulation and their interrelations and use was made of verbal responses. Sensation problems arose out of a concern with the psychic structure of the universe. (28:316)

Early conditioned reflex behaviorism. The conceptual emphasis has shifted to overt responses (bodily movements). The mediation problems are centered around the motor rather than the sensory processes. The results were expressed in terms of muscle movements.

Gestalt psychology. There was a general trend in psychology at that time for extension of the range of consideration from the molecular to molar phenomena. An increasing emphasis on gross correlations between events located at a distance from each other with a more and more subordinate interest in mediation problems per se. The first important step in which Gestalt psychology differed from psychophysics was in the shift from a single stimulus to a pattern of stimuli. Response is always to a pattern and the laws of dynamic interaction in the sensorium are the central issue. Gestalt psychology was a psychology "from the retina inward" and had great interest in mediation problems.

Thing-constancy research. This was a further extension of the psychology of perception and included manipulable solid bodies and their cognitions as the determiners of a reaction. The beginnings can be traced back to Helmholtz. Stimuli are defined in distal and not proximal terms. Research centers around how far the organism has established mechanisms which are able to extrapolate the causal chains from the retina backward and thus reach out cognitively into the farther surroundings. The focus of concept formation is shifted from the organism to the relationship of the organisms with the distal stimuli and the organism is characterized by its ability to achieve something with the environment. Varied proximal cues are responded to similarly and meaningfully and are therefore "equipotential". This caused psychology to focus on the end terms of the relationships and the mediation process is de-emphasized. This molar psychology of achievement is a "lump" treatment and this feature seems to be one reason for its rejection by some psychologists. It is believed that psychology should develop from the molar to the molecular. Constancy research is "...concerned with problems of reception and cognition, on the organismic achievement of a backward extrapolation of causal chains..." (7:138)

Molar or purposive behaviorism. Constancy research and molar behaviorism are complimentary. The results of behaviorism are expressed in terms of reaching a goal. Like constancy research it is "environmentalistic" and not "mediationistic" or "physiologistic". It is believed that the essentials of behavior are lost when description is focused on proximal determination. Strong interest is centered on the family of mediational patterns analyzed in a conditioned reflex fashion. Molecular and genetic descriptions have often been called "explanations," while molar achievement analysis has been called descriptive. Molar psychology does not aim at explanation for its own sake, it is a way of registering and conceptually looking at gross correlations.

Introspectionism. There is a tacit assumption of a one to one relationship between verbal responses and inner events. In objective psychologies, verbal responses are not treated as symbols but as symptoms whose meaning is obtained through correlational study. A more fundamental type of substitution in introspectionism is that of "intentionality" where the essence of consciousness is characterized by its pointing toward an object. The "intended objects" are not to be confused with objects in the physical environment. There is no chance of quantitative treatment on a physicalistic basis for the relation of the organism to distal stimuli is accepted as univocal. This relation is a

qualitative entity all its own and was admitted without further control from mere inspection of the inter-organismic events. Introspectionism has two main branches.

> (1). Structuralism, including Wundt, Titchner, and Mach. The problem here was to look for basic elements of which complex experiences "consist". It coincides in time with early molecular sensory psychology, which is characterized by its emphasis on mediation features. The general attitude of the mosaic nature of events at the sensory surface was carried directly over into the hypothetical structure of the inner event. The interorganismic events and molecular behavior are confused with the interorganismic events and distal stimuli.
>
> (2). The second branch is phenomenalism, somewhat related to act psychology. It is the type of introspection represented by Gestalt psychology and Wurzburg school. It has sophistication enough to recognize the entanglement of structuralism with "elementarism," "mediationalism," and functional "explanation." Here unbiased pre analytic description was aimed at and common language was used deliberately. "Since all 'qualities' might be regarded as gross reactions of the organism to some features of the environment and thus be systematically located in the [organism], phenomenalism is the strictest expression ...of an [organism] internal system of psychological concept formation." (7:142) Lewin's topological "lifespace" is, as is characteristic of phenomenalistic introspection, the environment as it is cognitively or functionally responded to by the organism. It deals with a pattern of reactions located in the organisms and represents an adequate conceptual tool for the description of the organized pattern of field between the stimulating environment and the acted upon environment.

In general, I believe, the dichotomous classifications of the gestalt psychologists tend to carry the emotional evaluations of good and bad when they speak of schools or movements in psychology. This creates a type of "vicious circle" wherein a split is formed in the science and schools are kept busy defending their own points of view. Criticism is good for a growing science but self criticism of one's own viewpoint is also necessary. One should strike a balance between the extremes of confusing eclecticism and dogmatic chauvinism. All approaches are needed, if for no other reason than to determine whether they are actually productive.

B. GESTALT PSYCHOLOGY AND ITS PROBLEMS

"...much of the character of the Gestalt movement, certainly in its early years, was determined by the fact that it was proclaiming a revolution. Its first task was to expose the inadequacies of existing psychology." (20:344) Gestalt psychology dwelt on this reform character and was a more avid proselyter than its contemporary movements such as James, the functionalists (Dewey, Angell and Carr), Woodworth, and the Watsonian behaviorists. Elementarism, at the time, was most avidly pursued by the Wundt-Titchner school and the students of these men and it was against this that the counter movements made their stand. Gestalt psychology was against the established order: elementarism, associationism, the constancy hypothesis, the meaning theory, the reliance on analysis, and the conception of the nervous system as a mechanism of rigid arrangements in which definite and fixed pathways connect definite points. (9, 29, 31, 32) "... in attacking the practice of exploring psychological phenomena in terms of elements and their combinations, they were striking the very foundations of the science." (20:330)

Most of the fuss was centered about: (a) the doctrine of elementarism in general (20:339-345;9:24-27;19:308), (b) the doctrine of associationism (10:12;19:64,158,307-308), (c) the danger of analysis (20:331;29:20) and the subsequent integration of units (9:21-23), (d) the constancy hypothesis (29:8-11) and meaning theory (20:338-342), (e) the physiology of the old school (9:53-54:20:343-344).

Though behaviorism was itself against structuralism (70:172-178), it also received criticism from the gestalt school (78:136-137;24:322-323), the main objection being to the elementarism they saw in the S-R concept. It also struck out at Thorndike's bond psychology (50:43-45) and his concept of trial and error learning as the only kind possible. (78:142-147) "...Gestalt psychology disagrees with both behaviorism and structuralism in that it refuses to model its procedures slavishly on those of the older and better developed sciences." (20:365) The Gestaltists saw psychology as a young science and much of its striving for exact measurement and precise determination was inappropriate to its stages of development. As Kantor said (28:317) "Psychologists, perhaps more than other scientists, frequently forget that it is easier to make measurements than to know what one is measuring." Ellis (9:40) in his identification of Gestalt psychology with the relativity theory in physics has said, "The criticism of alleged 'exact measurement' theories which Gestalt-theory levels is that they are in error even in their own proper sphere, for the Newtonion physics upon which they wish to rely, is itself incommensurate with things as they actually are. The more 'exact' the 'absolute measurement' theory becomes, the farther it recedes from truth." Along the same line is the use of the Heisenberg indeterminacy principle in criticism of exact measurement (19:72). "All measurable and observable phenomena in nature are differentiations of a pre-existing organic system...From this fact, Heisenberg...has drawn his...'principal of uncertainty', which maintains that accuracy of prediction is proportional to the knowledge of the totality within which an event is occurring. The more isolated the part, the less certain the prophecy of its behavior. For this reason, the orthodox assumption that psychological phenomena must ultimately be reduced to physiological terms and these in turn to psycho-chemical properties, is grossly misleading for such 'parts' can never explain the whole. All things and events are subject to the primary fact of relativity and interdependence."

1. THE USE OF MATHEMATICS IN PSYCHOLOGY

Brown, (6) in his discussion of mathematics in psychology says, "Psychologists have made wide use of mathematics in measurement, but have scarcely ever used mathematical concepts in theory building." (6:469) He describes "fundamental measurement" as the scientific process whereby numbers are assigned to nature and the arithmetic theorem of addition holds for the numbers involved. Scales on which these measurements are built have an absolute zero point and assume equality of units. "Science becomes systematized by relating the events of nature to fundamental measurement...Where fundamental measurement is not possible, simple assignation of numbers to the qualities of nature has advantages, but such assignations ought not to be honored with the title of measurement....In general sciences start with such numerical assignations and through a very complicated process reduce these to measurements." (6:470)

The two most ambitious attempts at exact measurement in psychology have been the Fechnerian psychometrics and the intelligence measurements started by Binet. While they have practical value, neither have done much toward systematizing psychology. They both attempt to apply a physical methodology of measurement to psychology without a proper understanding of how derived measurement is possible in physics and how it is related to fundamental measurement.

It was a prevalent belief in the nineteenth century that the scientific process followed three steps: (a) events of nature are measured, (b) correlations are found between sets of these measurements and these correlations are the laws, (c) laws are related under theories. Modern methodology considers the nineteenth century inductive process as a misinterpretation of the scientific method. The process is much more complex. Measurement ability can be said to result from a law as well as the reverse. Practically every measuring device in physics depends on the knowledge of a law for its construction. The instrument might well be called a "law in action", and measurement "the process whereby the experiment which originally uncovered the law is repeated with a new set of variables." (6:471) Therefore measurement in physics actually appeared at a fairly late stage. "Laws are necessary for exact measurement and can be defined as, the statements of functional relationships which may be used to reduce the quantitative aspects of nature to fundamental measurement." (6:471) Correlations between sets of measurements will not give laws; however law and measurement are so closely related that any chronological separation in the scientific process is actually impossible.

It is likely that the theory comes before both law and measurement in the form of a hunch, i.e., it is the start and not the end point in the scientific process. "...the measurement attempts of modern psychology have been sterile because laws have not been found which can be turned into instruments for reducing psychological variants to fundamental measurement." (6:471-472) Brown believes that the reason why psychologists have so far not had the "hunches" necessary to set up working hypotheses which might lead to laws, has been the lack of an adequate mathematical methodology in which to phrase its theories. If the view as stated is correct, mathematics is as important for theory construction as for measurement. "The psychologist's manipulatory powers are much more limited than those of the physicist. What he most needs at the present time is a mathematical methodology which will enable him to phrase theories precisely in terms of the whole-part relationships. Such a methodology might eventually lead us to fundamental measurement in psychology." (6:472) This is what topological and vector concepts are to do.

2. MACHINE VERSUS FIELD VIEW OF THE ORGANISM

This dichotomy is tied up closely with the Gestaltest concept of the whole. Hartman defines machine theory as "...the view that physiological processes are determined by constant conditions...rather than by dynamic forces of a self-distributing nature..." (19:312) (homeostasis). In all physical systems there are two sets of factors; the forces themselves (the supplied power) and the properties of the system which are the constant conditions of its action (the structure which confines the power and provides the direction) (20:357;78:132). "Rigid arrangements such as those found in a machine are but a special class of constant conditions; and in the physical systems actually found in nature, there is an enormous variation in the relative influence of the actual force, and the constant conditions." (20:357)

The organism reacts as a whole to any stimulus constellation; individual fields have a dynamic interrelationship whose central dynamics play a part in determining the distribution of events, as well as their local nature. "Spontaneous self-structuring occurs in the psychophysical field, just as it does in the physical field". (29:49) Man has always been inclined to assume special mechanical arrangements in nature whenever he came upon order; it was therefore "natural" to ascribe mechanical processes to the organism when order became apparent. The older psychology first had isolated rigidly established paths believed present from birth. When it was found that sensory impressions were affected by individual experience, it was postulated that new connections could develop, but once established could not be altered.

There were, therefore, two sides to the old view; all orderly phenomena in the adult nervous system depended upon: (a) original inherited structure, the topological-histological conditions (a nativistic tendency); (b) mechanical arrangements developed as the person grew (an empirical trend). In contrast to this, Gestalt psychology believes that the theory of dynamic self-regulation of the psychophysical organism, has ended the struggle between the two views.

Koehler believes (31:55-56) "A theory of perception must be a field theory...the neural functions and processes with which the perceptual facts are associated in each case are located in a continuous medium; ...the events in one part of this medium influence the events in other regions in a way that depends directly on the properties of both in their relation to each other. This is the conception with which all physicists work. The field theory of perception applies this simple scheme to the brain correlates of perceptual facts. In earlier theories of perception, such direct mutual influences were but occasionally admitted and then with so much hesitation that the field principle could scarcely be recognized in those rare theoretical concessions. It was one of the main occupations of Gestalt psychology to point to one observation after another which proved that the field concept had to be put in the very center of the theory of perception. In the present situation of psychology, the great importance of perception lies precisely in this fact; that in perception, the acceptance of field concepts has long since become necessary, and that as a consequence it is now becoming a hard task indeed to defend any different views in other parts of psychology. On the other hand the psychological field theory...is not yet in a satisfactory condition. It still has grave defects in its application, both to perception and to other parts of psychology. Its principal short comings are a certain vagueness and a lack of well established dynamic principles according to which events in a given field are supposed to be interrelated." This vagueness is due to the fact that no definite assumptions have been made about: (a) the medium to which field theory is to be applied; (b) the nature of the interrelated facts; (c) the actual forces which cause their interrelation.

3. THE GESTALT WHOLE CONCEPT

Wertheimer has stated the fundamental question with which he believes psychology has to deal as this (75:93-94): "Is the meaning of a part derived from the intrinsic structure of its whole, or are the happenings of the whole a mechanical, piecemeal, accidental, blind consequence of the happenings in the single parts?" The latter often happens in physics (e.g., man made machines). "This is a point where Gestalt theory is least understood, because during the course of the centuries numbers of prejudices concerning nature have been conceived and piled up, such as that nature must follow blind laws and that what happens to the whole must occur through a process of summation." The basic doctrine of configurationism is stated in answer to this question as "There exist natural circumstances in which what happens in the total is not conditioned by the nature of the parts or their mode of combination, but on the contrary, what occurs in any part of this whole is determined by the inner structural laws of this entirety." (19:63) The whole is then defined as that which is pre-analytically characteristic, regardless of what post-analytical discrimination may reveal to be its parts.

The claim that psychological phenomena contained super-summative Gestalten at first gave support to vitalism, for physical systems, it seemed, could be quite adequately explained in terms of atomistic-mechanism. Koehler, who saw the methodological drawbacks of a vitalistic interpretation, went on to attempt to demonstrate supersummative wholes in the non organic world as well. The final acceptance of Koehler's theory would mean that psychology could be looked on as actually a branch of physics. This, of course, is one of the goals of the positivists. Psychodynamics and

physical dynamics could both use the same type of methodology, and the conceptual foundations of both sciences would be the same. It is Brown's belief that "There are very good reasons for believing that physical systems do show supersummative properties in a 'metaphysical' sense, but through precise methods of experimentation, physicists are able to handle many of their problems with an atomistic-mechanistic methodology, particularly where these problems are not investigated from the standpoint of systems...The field concept...which is the cornerstone of modern physical theory, has implicit in it, the idea of an organized whole." (6:4791. However, whether physical systems are supersummative in a "metaphysical sense" or not is unimportant. The success of the science seems to be a demonstration of the actual non-importance of this "metaphysical supersummativeness."

4. CONCLUSION

Gestalt psychology, because of its reform character has tended to over emphasize many aspects of "the old scientific doctrine" and at the same time has clung to the new physics. Positively, however, it has pointed out many paths, more or less blindly followed by the psychologists of the time, which were unproductive. In addition, a tremendous amount of research and experiment was conducted in order that each side could support its position with some feeling of security. However, taking any one view alone without diluting it with contrary opinions will give a tremendously unbalanced view and this is very true of the Gestalt-field orientation.

C. SOME CRITICISMS OF GESTALT PSYCHOLOGY

...a person despises no faults as intensively as those he has himself thrown off.
Goethe

1. THE GESTALTISTS HAVE OVERDONE THEIR CONDEMNATIONS

The Gestaltists have produced a characterature of the older psychology and have not given an accurate portrayal, by using such emotive laden words as "mosaic-like, additive, piecemeal, mechanistic, mechanical, unrealistic, spiritless, blind, meaningless, senseless." (29:3) Hartman has characterized the classical Gestaltists as follows: (19: 300-301) "An air of superiority and intolerance in exposition, an unshakable conviction of the rightness of the chosen position, and a subtle implication that failure to agree whole-heartedly is symptomatic of dullness or incompetence, are hardly calculated to win adherents or even the esteem of an enemy -- especially in the light of configurationism's neglect of the healthy practice of self-criticism...Gestalt theorists appear to be guilty of a lack of insight into the defects of their own doctrine, as unwillingness to modify even minor features indicate." They lacked the "positivistic eclecticism" (24:320) which characterized most of the psychologists who have been influenced by the field-gestalt position but who have not been raised under their influence.

2. CRITICISMS OF THE GESTALTIST VIEW ON ANALYSIS

Indeed, as Heidbreder (20) says, there has been confusion as to what Gestalts meant by their stand on analysis. In some of the earlier warnings against the dangers of analysis, they overshot their mark. In an attempt to clarify the issue they have restated their position so that in their emphasis on wholes, they do not mean to imply abandonment of the analytical method. They definitely recognize what they call "segregated wholes" and they thus analyze "genuine" parts, i.e., parts that are given by an unbiased observation, phenomenological observation. They also recognize a

"...'differential' analysis in which the material studied is broken into convenient parts with the definite understanding that the parts are not real and that they will disappear in the final results..." (20:374).

Madden (62), in his criticism of Gestalt psychology, makes a distinction between (a), "W-Gestalts", a pattern or configuration which determines the nature of its parts, and (b), "K-Gestalts", a system of functional interdependence. He proceeds to a "methodological refutation" of what Gestalts have to say about wholes, etc., by showing that the same concepts can be stated in analytic terms. In tackling physical problems it turns out that the W-Gestalt is primarily a description of a physical system and includes both the elements and their relations to each other; while the K-Gestalt is equated primarily with an explanation of the system and attempts to show the interaction of the elements in the system.

Wertheimer's statement (W-Gestalt) that the "whole is more important than the sum of its parts" may have two meanings,(a) The first is that statements of relations are fundamental and not defined in terms of statements about the objects or their properties. However, the relations can still be stated in analytic terms. (b) The second meaning is that the description of a "whole" is a description of the relation between the sub-systems. Wertheimer considered both the "and" of explanation and the "and" of description as untenable and that statements of the "relation between elements" will not account for the whole. In Madden's opinion the "and" of explanation has no clear meaning and should be discarded, but Wertheimer confuses the two "ands" and unnecessarily rejects the logical descriptive "and". A complete description is merely the finding of an empirical law. There are no a prior criterion for completeness. Therefore, one may add statements (analytic) to the initial description until a law is found enabling a prediction of subsequent conditions. If the prediction is not borne out one should; (a) recognize the description as incomplete and (b) try to supplement it by either adding new basic data or deriving new relations from the available data. This means that the W-Gestalt is in principle capable of being described in conventional analytic terms.

In regard to the K-Gestalt, Madden defines an explanation as "...any function connecting subsequent descriptions of a system. When properties occur in any curve which do not occur in the curves of any lesser number of bodies, we will speak of this situation as <u>novelty</u> in aspect to laws." (62:565) The task is to discover what he calls "composition rules" which are single rules which will enable one to derive the computation rule for any given number of elements. Koehler stresses interaction (K-Gestalt) in the sense that a change in one element causes alteration in all areas of the system. This, stated in analytical language, is "...given a prediction which holds for one set of initial conditions, this prediction will, in general, not hold in any of its particulars, if even one of the variables in the initial conditions is changed... Interaction is accounted for in the correct statement of the composition rule...The deduction of the law of the complex from laws of the elements is not a matter of linking together two laws by a logical 'and'." (62:566). The composition rule is not additive in the descriptive sense. "A composition rule is <u>another</u> law, not a preexisting rule for getting a logical product..." (62:566). Therefore Koehler is confused when he says that an "analytical" science derives the properties of the complex from the properties of the independent local elements. Both scientific description and explanation have some features which were rightly stressed by the Gestaltists, but these aspects can also be rendered in analytical terms. When they are so rendered, it turns out that they have different aspects and implications which the Gestaltists did not see from their point of view.

3. CRITICISM OF THE USE OF THE TERM "FIELD THEORY"

Madden (62:568-570) recognizes two meanings of the term field. (a) The first is a general meaning designating a system of interaction. In this sense all scientific theories are field theories. (b) The second is a special meaning and it is used to designate theories which work with a continuously spread medium and use partial differential equations. Not all scientific theories are theories in this special sense and psychology has no field theory in the special sense of the term. The Gestalts have blurred the difference between the general and the specific meanings of the term field for two reasons. (a) Field theories have a prestige and supersede mechanics. (b) Gestaltists felt that field theories in the specific sense, share a clear structural characteristic with perceptual phenomena.

4. A BEHAVIORIST'S CRITICISM

Spence (70) believes that the term "elementarism" is one of the stereotypes, a "rally-round-the-flag" word, that the Gestaltist uses in defense of his holistic doctrines. No matter how much the Gestaltist says he deals only with total situations and wholes, he must fractionate and abstract out certain features if he is interested in finding out scientific laws. These uniformities or laws describe the way in which events are repeated; total events are rarely repeated, only certain aspects of events are repeated and it is these that science must abstract. "The problem here is one of the size of the 'units of description' that the scientist is to employ." (70:177) The significance of a scientific concept is the extent into which it enters into law formulation. Whether elementaristic or Gestalt units of description which are closer to the "meaningful" level, are to be chosen, is entirely a pragmatic matter of which is more successful. "The particular alternative chosen, molecular or molar, depends upon the interest and purpose of the scientist and the type of law he expects to find or use." (70:177)

These different descriptions do not, as many Gestaltists would lead one to believe, represent fundamental disagreements. "If two systems of concepts should each be successful in leading to the discovery and formulation of laws, it should also be possible to discover coordinating definitions, which will reveal the interrelations of the two systems." (70:177) The behaviorists position, when he selects the descriptive concepts to be employed in his science, recognizes that (a) the significance of a concept is measured in terms of its productivity, (b) a scientific law is always an abstract of certain events or sequences of events out of a whole host of phenomena which are not considered relevant to the purpose at hand, (c) "The method of elementary abstraction or analysis has been highly successful in all fields of science." (70:178) Because psychology is dealing with, probably, more complex factors than the natural sciences, provides no reason for abandoning the analytical method.

For Spence, the much discussed distinction between field and non-field theories in psychology has not helped the development of psychology. A more useful procedure would be to "...examine in detail these differing theoretical positions with a view to particular variables they believe to be relevant in a particular instance and what differences, if any, exist in their postulation as to the pattern of the interrelationships involved..." (70:185).

This is attempted by Welch (74). The Gestaltists have been very fond of this distinction and wish to equate the Gestalt approach with modern field theory in physics. This is usually accompanied by an implication that behavioristic theories are of the outmoded mechanical type. Spences believes, "In the sense ...in which the theoretical physicist understands the dichotomy, mechanical versus field theory, no such distinction...exists in psychology today." (70:184) However, if field theory in

psychology refers to the notion of a system of interdependent variables, then the behaviorist is a field-theorist, (see 62), and there again is no distinction to point to. Lewin's (39) principle of "contemporaneity", stating that behavior for any moment is a function of the situation at that moment only, is quite hard to deny by any scientist. The past does not "jump" up to the present and affect behavior. However the past can modify the situation or the organism and thereby cause a difference in behavior.

5. CONCLUSION

The first criticisms of the Gestalt reform movement tended to be defensive reactions and the field of battle was confused because emotions were involved. The actual basic issues were confused by over statements of the positions. Field-theorists have found that there exists at present no field theory in the sense used in physics, and when the term is used in a broad sense, all science is a field theory in essence. What remains is a difference in emphasis, of type problems, and of personal preferences. There is no basis for labeling as good, field theory, and as bad, any non-field. Again, research is needed on all levels of emphasis.

II. METHODOLOGICAL AND THEORETICAL CONTEXT

A THE GENERAL NATURE OF THEORY CONSTRUCTION AND SCIENCE

1. SOME BASIC ASSUMPTIONS IN SCIENCE

"The ultimate aim of all natural science is explanation and understanding and not simply prediction and control in a practical sense." (63:5) The task of the scientist is that of "...attempting to discover ever more generalized laws by which the observable events within his field of study may be brought into interaction with one another." (71:68)

Science consists of the postulates regarding experience to which universal assent of competent observers is obtainable, plus the organization of the postulates into theories, for which universal assent is also obtainable in principle. (The ideal toward which science should strive.) Lewin was much influenced by the work of Ernst Cassirer, and his basic attitude toward science is given in his description of Cassier. The basic character of science is "...the eternal attempt to go beyond what is regarded scientifically accessible at any specific time. To proceed beyond the limitations of a given level of knowledge of the researcher...has to break down methodological taboos which condemn as 'unscientific' or 'illogical' the very methods or concepts which later on prove to be basic for the next major progress." (37:275) Here, then, science is conceived as a striving, and not as a logical procedure.

The development of any scientific theory must depend directly upon empirical operations. Theories in present day physics serve primarily to bring into functional connection, previously isolated realms of knowledge. In the behavioral and social sciences, they serve a different function, that of aiding in the formation of empirical laws. Empirical data constitute only a part, though indispensable part, of science; the rest is logic and mathematical logic. Along the same lines Koch has brought out the discrepancy between experiment and theory formation. "While the empirical research carried on by psychology has been elaborately experimental ever since the time of Wundt, the form of its theories remains just as elaborately literary as in the days of Aristotle." (30:138)

All scientific investigation is socio-linguistic behavior (63:5) requiring communication to the scientific community. The knowledge is common or public. "Observation alone is therefore of no value. It does not become even the first step in scientific method until it is supplanted by words and phrases..." (67:62) to move it to the public domain. Paradoxically, the necessity and possibility of using language is one of the main sources of confusion. The initial material protocol must include a statement somewhere, that the observer introspected on his observation. A scientific datum can never be divorced completely from the devices used to observe it, and therefore it is important that the methods as well as the datum be public. (67)

2. INTERBEHAVIORAL PSYCHOLOGY

Kantor (28) has tried to develop a psychology which takes cognizance of the place of the observer as well as the observed. Scientific progress is directly proportional to its investigation of specific happenings. The emphasis on the place of the observer in an investigation is in line with the reorientation of science exhibited by relativity theory, quantum mechanics, the indeterminacy principle, etc. Interbehavioral psychology insists on specificity of observation and interpretation, and emphasizes the place of the observer. A described happening is regarded as a function of both the components of a situation, and the instruments and operations of the investigator.

Postulates for interbehavioral psychology:

a. Psychology is homogenous with other sciences. All science is an investigative enterprise to determine the nature of specific events. All nature is a manifold of events and different branches of science draw different events to study.

b. Psychology is a relatively independent science; i.e., the events it singles out for study are different from those of other sciences.

c. Psychology is interrelated with the social, biological, and physical sciences, due to the common pool from which they draw their subject matter. It is inevitable that the subject matter should overlap.

d. Crude data and construction are continuous. (see also 64:112) Science consists of the building of descriptive and interpretative constructs; these constructions should be derived from, and made applicable to the original events and when building on the construction, it should be carefully controlled.

e. Interbehavior is the essential datum of psychology. Psychological events are the interaction of organisms and the actions are concrete and based on observable events. When one is unable to observe the details of an interbehavior it is due to either the intricacy of the phenomena or the ineffective technique.

f. Psychological behavior comprises unique details. Physical interbehavior is commutative, a relatively simple interchange of energy. The biological organism is a complex of interrelated parts, with many energy interchanges; biological responses are physiological functions of anatomical structures. Psychological organisms are both physical and biological, and are therefore more complex, with more complex interchanges of energy. Psychological interbehavior is spontaneous on the basis of previous interactions.

g. Psychology is correlated with organismic biology. Inter-behavioral psychology assumes that only the activities of the total organism participate in psychological events, and no organ is primary.

h. Psychological phenomena are ontogenitic; that is, they evolve during the course of the interbehavior of the organism with its stimulus objects.

3. GENERAL CHARACTERISTICS OF A THEORY

All theories aim at the establishment of functional relationships between variables. A theory is both a tool and an objective of science and is always relative to the bias of both the theorist and the various observers of the facts. The theorist "...must have at least some tentative ideas as to what the relevant factors might be,...,as to what the determinants of the phenomena studied are." (3:56) "...alternative theoretical approaches can be directly compared scientifically, only if they make different predictions within the same observational framework." (63:7)

4. MAJOR ELEMENTS OF THEORY CONSTRUCTION

There are three major types of verbal statements:

(a). Empirical proposition, the statement of fact. "The orderly arrangement of the observations constitutes the empirical component of science." (26:218)

(b). Hypothetical propositions, statements of supposition of what is predicted in observation.

(c). Theoretical propositions, "...general statements of varying degrees of abstractness and comprehensiveness, concerning functional relations among variables." (63:7)

This is the logical systematization of the ideas concerning the observations. What is needed in psychology now is a more adequate relating of the empirical and theoretical components. The hypothetical propositions are what will do the relating. Lewin would also stress clarification of relations between the various constructs in the theoretical part of science. This is what his concepts are to do eventually.

The inductive phase of science is the establishment of the empirical propositions; the establishing of a generalization by showing that it applies to every instance which it is supposed to include. The deductive phase is the development of the logically consistent implications of a given set of postulates or axioms. Scientific methodology can be divided into three parts (67:82)

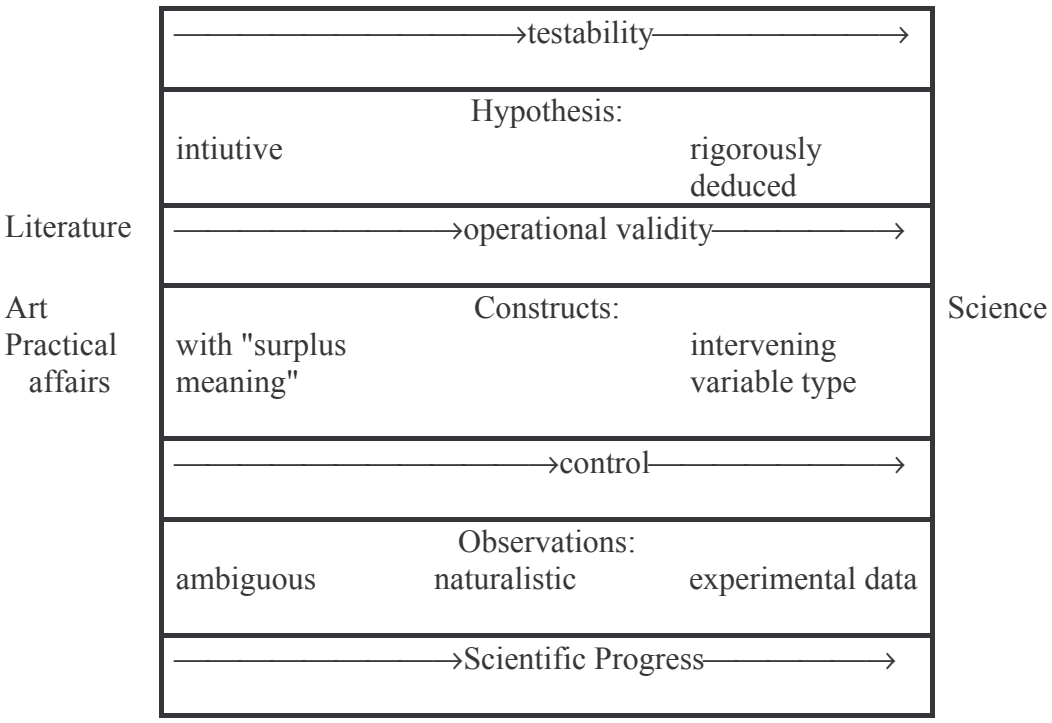
(a). The use of the experimental techniques and the collection of the data observation, i.e., apparatus and their use.

(b). Inference from observations given by the inductive method; laws, interrelations, generalizations, concepts and symbolic or logical constructs generally.

(c). The deduction of the consequences from the laws and hypotheses.

There are three basic elements of theory constructions; control of observations, operational validity of the constructs and testability of the hypothesis. Their interrelation is shown in the following figure:

The three basic elements of scientific theory construction. (63:10)



5. CRITERION FOR A "BEST" THEORY

Brown (6:501) has set four criterion for a "best" theory for the explanation of sets of data:

1. It should be economical, based on the fewest and simplest postulates which will adequately integrate the data.
2. It should be the only possible theory, i.e., the fact will not be adequately explained by any other theory.
3. It should be fruitful in the sense of leading to an accumulation of integrated facts.
4. It should yield postulates to which universal assent is obtainable.

B. SOME SPECIFIC ASPECTS OF SCIENTIFIC METHODOLOGY

1. OPERATIONISM

Skinner (68:585) has defined operationism as "...the practice of talking about; (a) one's observation, (b) the manipulative and calculational procedures involved in making them, (c) the logical and mathematical steps which intervene between earlier and later statements, and (d) nothing else. Actually 'operationism' is a new name for certain fairly generally recognized aspects of the scientific method...a refined and modernized emphasis upon the requirements that scientific concepts must meet if they are to be meaningful and fruitful." (13:498) Operationism is aimed mostly at the large, philosophically oriented type of problem which must be eliminated and clarified if science is to advance (see 69).

"Problems and questions originally are formulated in relatively non-operational terms, but they must eventually be operationally defined if science is to advance. It is a basic methodological requirement that no body of empirical knowledge should be built up without operational definition

of the terms used. However, there exists a tendency to illegitimately apply the 'operational criterion' in criticizing theoretical attempts. This was especially prevalent in the early days of its formation, when it was somewhat uncritically accepted as valid. Operationism can have its intended beneficial effects...only if the meaning of 'operational' is confined in its application to the definition of empirical concepts." (13:501)

The interest in operationalism arose from the need of (a) purifying the scientific method by eliminating pre- and non- scientific elements and (b) of understanding more clearly the meaning of the highly complex concepts used in the more abstract and constructive levels of scientific theory. "The value of operationism in psychology ...lies in the assistance which it can give in the construction of concepts and theories. It is here, in this field of inference and induction, that the bad pitfalls of psychology are to be found. At the level of initial observations, the pitfalls are not nearly so dangerous and they can usually be avoided...." (67:109)

Operationism, however, cannot be brought to the defense of any particular definition of the subject matter to be studied, and indeed it should not have to be. "Operational definition...is only one small step in the process of theory construction...Nothing resembling theory begins to appear until certain functional relationships between the concept are asserted. Theory appears when these laws or assumptions...are stated in such a way that testable consequences may be deducted and subjected to experimental verification...this process of throwing the sentences relating certain concepts into the form of a postulate...[is] implicit definition." (30:127) Feigl (13:506) has stated the proper place of operational criteria when he wrote, "Operationism wisely understood and applied, must take account, and render account of the level of precision, completeness, and fruitfulness reached at the given stage of concept formation."

2. LOGICAL POSITIVISM AND THE UNITY OF SCIENCE

Brown (6:482) has stated the criterion which the neopositivists have set for concept in a psychological theory, taking as a basis concepts used in the physical sciences. Such concepts "...must be operationally definable, intersubjective, and lead to theories which may be subjected to critical experiments." He objects to the present application of the "scientific idealism" or extreme physicalism (22) in its application to psychology.

Feigl (15) has clarified the issue by outlining three definitions of the term "unity of science". The first is (a) the unity of the language of science. This is a "...logically revised and refined formulation of the essential basis of empiricism and operationism...." (15:382) The second meaning (b) is the thesis of naturalism. pproximately it amounts to the belief that all explanatory constructs of all sciences need not go beyond the spatio-temporal-causal frame work. The third meaning (c) is physicalism in the strict sense. This is the one that Brown is objecting to. It postulates the potential derivability of all scientific laws from the laws of physics. Whether biology, psychology, and the social sciences are ultimately reducible to physical theory is very much open to question at the present time.

Brown's belief in this matter is that Gestalt theory does not require that the data statements of psychology be immediately translatable into physical language; rather that they be put into the language of constructs and these constructs may have no immediate physical correlates. These constructs are the "topological and nonmetrical dynamical" concepts. "Statements about experience (language of data) are ordered to theoretical constructs (language of constructs), without insisting that these concepts be given physical meaning." (6:483) This means essentially, to me, that

"psychological and social" are actually physical events (necessarily so) and that no particular advantage is gained in putting them in the language of physics.

3. THEORETICAL CONSTRUCTS IN PSYCHOLOGY

Spence (71) believes that, in general, there are two main types of variables. (a) R-variables; the measurements of the behavior of organisms; the dependent variables. (b) S-variables; the measurements of the environment, physical and social; the independent manipulable variables. The numerical laws which the psychologist seeks, are represented by the formulation R=f(s). The problem then becomes (a) to discover the relevant S-variables and, (b) to discover the nature of the functional relations between the S and R variables. In general two positions have been taken by scientists in solving this problem; (a) those who wish to introduce theoretical constructs and (b) those who would refrain from using any inferred constructs (the positivists). We have no need of theory when the response is the same under given environmental conditions or, if with systematic variation of the environmental variables, we find a simple functional relationship.

Rarely does this occur in psychology. It is at this point that constructs are introduced and the response is said to be a function of both environmental (X) variables and some added factors, (I_a, I_b, ...); That is R = f (X, I_a, I_b, ...). Using the manner in which these added factors are defined, Spence was able to single out four categories of intervening constructs:

1. Animistic conception. These are incapable of test and therefore are not worthy of consideration.

2. Neurophysiological theories. These concepts are not strictly hypothetical in so far as they can be observed on the lower level of examination. Neurophysiological terms are used in psychological theories but these are usually defined in terms of behavioral events.

3. Response - referred theoretical constructs. The fact that behavior varies under the same conditions, has led some theorists (Lewin, Snygg) to say that the environment must be interpreted as the organism sees it, and that it cannot be formulated in objective terms only. Lewin (43) believes that the objectivists have failed completely to account for behavior in terms of the objective environment alone, and he therefore introduces his "psychological situation", to account for behavior. This type of "psychological" approach is characteristic of the field-Gestalt theorists. Koffka (32) uses the construct of "behavioral environment" and the more inclusive "psycho-physical field".

Koehler (31) refers to the "phenomenal field" and to "brain-field". These authors differ from Lewin in that they introduce physiological terms into their constructs. The use of the phenomenological type of introspection (7) however, is used in determining the structure of all these various types of fields. Lewin's "life space" construct represents the totality of facts which determine the behavior (B) of an individual at any moment. It includes two additional constructs; the person (P) and his psychological environment (E). To represent this Lewin makes use of certain concepts of surface topology and dynamics, which he combines into his own brand of "psychological geometry" called "Hodology" or the geometry of paths.(35) It is a term invented by Lewin to designate the system of concepts (or "geometry") of direction, distance and relations between directions, within the life space. "Hodological definitions are adaptations from the more general concepts of topology." (33:209) Using coordinating definitions (51:213), Lewin relates these mathematical constructs to empirical concepts.

Little, if any, use is made of the S-variables in Lewin's theorizing. The question arises as to what type of law Lewin arrives at. Some writers (25) believe that he actually has no laws on which to base a prediction. The Lewinian system depends heavily upon either the phenomenological introspections of their subjects or themselves. These verbal or "perceptual" responses are substituted for the S-variables in the S = f(R) formulation. Lewin provides laws mediating between two different responses of the subject or in some cases between the experimenter's perceptual response and the subjects' subsequent response. We arrive at laws of this type: $R_1 = f(R_2)$ laws are formulated by the use of introspection, it is possible to make further laws between overt behavior items. "By and large...the field theorist depends heavily upon phenomenological introspection in introducing his theoretical constructs. In order to understand the field of the subject, he asks him to describe how he perceives the situation, or he infers it on the basis of his own introspections." (71:76) In Spence's opinion the theory of field psychologists plays a much less significant role than is sometimes credited to it. "There is...nothing wrong with...phenomenological introspection; it has often served as a means of formulating interesting and valuable experiments. In such instances, however, the credit should not be given to a theory." (71:85)

4. Theoretical constructs introduced as intervening variables between S and R variables. This is an allegedly objective approach. The intervening variables are introduced when we either do not know all the important variables or the nature of the interrelating function is not known.

Marx (64), in regard to MacCorquodale and Meehl's distinction between "hypothetical constructs" and "intervening variables" (61), regards them as lying on a single continuum, each serving a useful function at some stage in theory development. The intervening variable then, is defined as any intervening construct that has a maximum amount of operational validity and the hypothetical construct has a relatively low degree.

The history of logical constructs can be traced from a pre-scientific, speculative origin, up through the preliminary scientific formulations where specific and meaningful questions are asked, termonological problems are cleared, and attempts at symbolic representation are made, up to the advanced scientific analysis stage; this is the final stage. Here the hypothetical constructs may have three outcomes; (a) the most frequent is to remain as a hypothetical construct, (b) they may serve as suggestions for empirical research, (c) or they may be transformed into intervening variables. This is the ultimate form and must be obtained if psychology wishes to become truly scientific.

Brown (6) using terms adapted from Lewin (36, 51) separates scientific language into two parts; (a) the language of data (phenotypic description) and (b) the language of constructs (genotypic description). Phenotypic descriptions are then, statements about experience in the language of experience, (i.e., phenomena) while the genotypic descriptions are statements about logical constructs (i.e., theories and working hypotheses). The advantage is that many phenotypes may be understood as instances of one genotype. Phenotypic description is similar to Lewin's use of the word "abstraction." (51)

4. THE POSTULATIONAL TECHNIQUE

A. Systematic Empirical Theory

Hull (26) has singled out three portions of a systematic natural science theory; (a) a set of definitions of the critical, indispensable terms employed, (b) a set of postulates dealing with the proposed relationships among the phenomena represented by the terms (natural laws), and (c) a hierarchy of derived theorems. The validity of this system is then dependent on the extent of actual agreement between the theorems and the empirical phenomena.

Koch (30) approaches the problem from a different angle and analyzes what he calls the postulational technique into two main parts:

(a) a formal system which consists of (1) a postulate set (implicit definitions). A postulate is "...any sentence which is asserted for the purpose of exploring its consequences." (30:17); (2) a group of explicit definitions of certain concepts appearing in the postulates. These are "...rules stating that certain symbols may be substituted for other symbols occurring in the postulates."; (3) rules of inference which "...state how we may proceed from one sentence to another in making derivatives." (30:18); (4) finally the theorems which are "...the sentences that are derivable from the postulates and the explicit definitions by the aid of the rules of inference." (30:18).

(b) The second part is the empirical system which is the formal system interpreted with empirical data. The interpretation consists of correlating to each term of the postulate set, a term having some factual reference. A term has factual reference (scientific meaning) when there is a rule correlating it to some observable state of affairs. This correlation is what is meant by "coordinating definition."

Koch also distinguishes between four types of definitions. (30:22) (a) implicit definitions delineate the properties assigned to a term by the postulates in which it occurs and functional relationships connecting terms are stated. (b) explicit definition is a rule of substitution permitting the replacement of any occurrence of a given term in the postulate set, by any other. (c) coordinating definitions correlate empirical constructs and formal terms in the postulate set, and thus make the transformation of the formal system into the empirical system. (d) operational definitions correlate the constructs to some set of observables.

b. Inductive And Hypothetico-Deductive Method

Brown (67:32) contrasts the inductive method with the hypothetico-deductive; both start with experience, but proceed in a reverse manner. In the inductive method (a) measurement leads to (b) laws (expressions of correlations between events measured) which are summarized in (c) theories (if necessary). In contrast the hypothetico-deductive method starts with (a) a hunch about nature (leading to a precise definition of concepts) which gives rise to (b) a working hypothesis leading to (c) a law, which is verified in (d) experiment. From here arises the (e) ability to measure. The best scientific method is considered to be the hypothetico-deductive or constructive method. It is the method through which all phenotypical statements are translated into genotypical statements.

5. SCIENTIFIC EXPLANATION

Marx (63) differentiates two major types of explanation (a) Reductive, where events at one level are functionally related to those on another (molar-molecular) and (b) Constructive, where events are described in terms of more abstract, more inclusive, higher order constructs and hypotheses. In either case explanation is done through an interlocking of the variables being described. When the variables used are drawn from observations of another level of description, the explanation is reductive. Likewise, if the variables are on the same level the explanation is constructive.

Feigl states (14:511) that "The top level at any given stage of theoretical research (in the ideal case) simply covers all relevant and available descriptive data." This would be mostly true of the constructive form of explanation upon which Lewin places much emphasis. In different levels of explanation "the empirical laws which function as premises in the deductive derivation of strictly descriptive conclusions, may in turn become the conclusions of a super-ordinated deductive derivation from higher theoretical assumptions." (14:511) The order is, therefore, from description, through empirical laws, to theories of progressively higher orders. (14:512)

6. THE CONCEPT OF CAUSE

"The clarified (purified) concept of causation is defined in terms of predictability according to law or ...set of laws." (12:408). "This purification consisted in the elimination of...metaphysical...connotations that had traditionally obscured..." the only fruitful meaning of cause. (12:408)

Feigl then distinguishes the classes of laws under these rubrics:

a. Types:
   (1) Deterministic -- strict and precise predictability of individual events.
   (2) Statistical -- predictability on the basis of frequency-ratios.
b. Forms:
   (1) Qualitative.
   (2) Semi-quantitative (topological).
   (3) Fully quantified (metrical) -- equality of intervals, zero points and units, in addition to the topological ordering of greater or less than and equal to.
c. Domains:
   (1) Temporal (sequential) -- the most common type.
   (2) Co-existential (simultaneous) -- the regular co-presence of certain phenomena.
d. Levels:
   (1) Macro. (molar).
   (2) Micro (molecular).

This is a relative distinction; there may be as many levels as it is methodologically fruitful to distinguish.

It should always be kept in mind that the cause of an event is actually a set of conditions. When we say "A causes B", what actually is meant is that "The more the actual condition A' approximates the conceived (ideal) condition A, the more the actual effect B' will approximate the (ideal)effect B." (12:410)

7. LEVELS OF EXPLANATION (MOLAR-MOLECULAR) AND THE FIELD THEORETICAL APPROACH

A. Units Of Description

It needs to be said concerning this topic, that "...theoretical-experimental attacks upon the problems of behavior are needed at all levels of explanation, and that regardless of the level at which the theory is constructed, the general principles of scientific theory construction must be followed." (63:18) A rather stale controversy has developed between the relative merits of the field-theoretical and the stimulus-response types of theory and experiment. The two should be considered supplementary and complementary. "A major emphasis in recent methodology, is that (molar-and molecular) theories are contingent and that scientific description may take many forms. This view...implies that...(theories) may be differentiated in terms of the units of description they employ. By using these units as a criteria of communicability between theories, many conflicts have been resolved." (59:144)

For this reason, Littman and Rosen (59) believe that the molar-molecular distinction has lost its usefulness. The situation in physiology is some what analogous to the molar-molecular distinction in psychology. The physiologist may concentrate upon detailed and refined analysis of a problem, or he may study the more molar interrelations of systems. "There seems to have been no wholesale or concentrated effort within physiology to dispense with either approach, or even to treat them as in any way opposed to each other." (63:16)

b. The Field Concept

One encounters two main difficulties in attempting an exposition of the Gestalt-field concept. (a) There is no single spokesman for the field theory in psychology; it has been a cooperative development and (b) the exposition of the system has not been carried out in precise technical terms. The general orientation is given, but the development is represented in such broad strokes and such popular language that an exact interpretation is difficult to apply.

MacColl (60) gives a summary of the development of the field concept in physics. One obvious fact is that the field concept in physics has undergone rather extensive changes. The notion is by no means new and it has had different meanings under the different conceptions of nature. She lists three different stages in the development of the field concept:

Newtonian field concept. This was a mechanical conception, described in terms of forces of attraction, mutually exercised by substantial bodies upon each other. The forces were assumed to act at a distance.

Classical mechanical field concept. The attempt was made to reduce action at a distance, to action by contact. A substantial medium was assumed to intervene between substantial bodies. So the field was now considered to be both medium and body.

Electro-dynamic field concept. This view was introduced to replace the unsatisfactory attempts to reduce electrical and magnetic forces to mechanical forces. The fundamental concepts of electrical charges and electric field were substituted for the concept of mass and fields of mechanical force. What actually is implied in the change, is an intellectual revolution. In the electrodynamical view, the whole emphasis shifts from the substantial to the functional. The field is assumed to be basic in

the sense of providing a basic system of relations. "Bodies" have the primary position of "relata." They have importance for the system, not on the basis of their possible "substantial being," but on the basis of the function or change by means of which they are distinguished from, and related to one another. Field in general logical terms means today: "...a system of relations such that there are conditions throughout which may be described by relata which serve as the terms of specific dimensional relationships. These relata are functions of the differentiations of dimensions within the system of relations. The relata by which the field is determined are, therefore, functionally defined. Changes of relata, within the system of relations, are to be determined by references to their functional relationships to one another, i.e., by functional laws. These laws will describe a process which is continuous within the system of relationships taken as the constructive frame." (60:40)

The concept of field might be applied to Lewin's system, but the question of the specific relation of the concept of "life-space" to any of the various interpretations of field in physics is a very complex problem. Lewin has made no explicit attempt to apply any particular field interpretation to psychology, and the dynamic concepts he uses are used for their convenience rather than their value in a consistent field construct.

Koffka, on the other hand, does claim that he has attempted to apply a field concept to psychology and summarizes his opinion of what the field concept means in physics in these terms: "...the field and the behavior of a body are correlative. Because the field determines behavior of bodies, this behavior can be used as an indication of the field properties. Behavior of the body...means, not only, its motion with regard to the field, it refers equally to the changes which the body will undergo." A field then is "...a system of stresses and strains which will determine real behavior." (32:42) His concept of field in psychology is roughly this: the behavioral environment, acting as the determinant and regulator of behavior, is endowed with forces, for there is no change of movement without a force. The behavioral environment must be described adequately by including the objects and their dynamic properties. Lewin believes that his mathematical concepts furnish a method of adequately describing the "behavioral environment."

Koffka conceives the task of Gestalt psychology as: (32:67) "...the study of behavior in its causal connection with the psychological field." The systematic logic of Koffka's field concept appears to be that of the electrodynamical view where the basic reality is the field itself. There is an assumption that this system of relations will have universal validity throughout natural science. The psychological field may then be defined as the universal field taken from the point of view of the individual, and it is both personal and environmental in character. The entities he speaks of, seem to have the position of functionally defined "relata", initially dependent for their scientific existence on their own interrelationships. The psychological field of Koffka is a constructive system of relations, with the purpose of the orderly arrangement of those facts which are pertinent to the study of psychology.

A comparison of the systems of Koffka and Lewin reveals certain similarities, but also some basic differences. In Lewin the conditions of "life space" determine behavior and likewise, conditions in Koffka's "psychological field" are said to define or determine psychological behavior (that taking place in the "behavioral environment"). The observable behavior can only be understood and predicted in the light of the conditions and laws of the "psychological field." Lewin's "life space" and Koffka's "psychological field" are alike in that in both cases, the attempt is made to apply to psychology certain concepts developed in physics. Lewin attempts to apply certain concepts developed under the various mechanical conceptions of nature, while Koffka emphatically denies the sufficiency of mechanical properties or positional relations as concepts descriptive of the

psychological field. Lewin's formulation is largely in terms of material or substantial properties of the elementary units of his system, the "regions" of "life space". The relations with which he deals seem to be those between substantial properties and the spatial relationships of the entities to which these properties belong. In contrast Koffka's formulation attempts to express the functional relationships within and between distinguishable functional units. The concept of field in Lewin's system is secondary, signifying the distribution of spatial regions (primary) at a given time. The concept of field is primary in Koffka's system and signifies the rational system upon whose principles the organization of the functional units depends.

Brown (6), in his characteristically dichotomous manner, distinguishes between what he calls "field" and "class" theory. Again he relies on Lewin (36, 51) for this distinction. "The organismic philosophy of biology, hypothetico-deductive method, and the language of constructs are all related and represent...the most fruitful scientific method,...the field-theoretical approach. Opposed to this, is the combination of the atomistic-mechanistic philosophy, the inductive method, and the language of data which may be called the class-theoretical approach." (6:34-35)

Criteria for class theory	**Criteria for field theory**
The behavior of objects is determined by:	
1. the class to which they belong.	the structure of the field of which they are a part.
The force directing behavior shows:	
2. the properties of an entelechy.	the properties of a vector.
3. there is local determination.	there is no local determination.
The concepts used are:	
4. primarily substantial.	primarily functional.
The method of scientific analysis is:	
5. primarily structural	primarily functional. (relational)
The analysis is in terms of:	
6. historically and geographically conditioned regularities.	a-historical-typical laws.
The method is:	
7. primarily empirical.	hypothetico-deductive.
The analysis allows:	
8. dichotomies.	no dichotomies
9. tends to use evaluative concepts.	insists on non-evaluative concepts.
10. attempts to answer a metaphysical "why?"	attempts to answer a scientific "how?"

In regard to this dichotomy, it should be noted that it represents two ends of a continuum. I do not believe that Brown wishes to give the impression that he is being "Aristotelian" or "class theoretical" in his distinctions.

c. The Probability View Of Psychology

Brunswick's view (8) is fundamentally different from both Hull's (27) and Lewin's (39) in that he believes "...that the probability character of the causal (partial cause-and-effect) relationships in the environment calls for a fundamental all-inclusive shift in our methodological ideology regarding psychology... the relationships existing between organisms and the geographical environment at large, will have to be approached...by correlational statistics." (8:193) "...psychology, as long as it wishes to deal with the vitally relevant molar aspects of adjustment and achievement, has to become statistical throughout, instead of being statistical where it seems to be hopeless to be otherwise, and cherishing the nomothetic ideals of traditional experimental psychology as far as relationships between geographic stimulus variables and response are concerned." (8:194)

In discussing this view, Hull (27) states that scientific theory is concerned with natural laws which are thought of as being uniform. The question now at hand is, do such isolatable uniformities exist in behavior study. Hull and Lewin believe that this is so. Brunswick believes not; the best we may achieve is correlations among phenomena which will always fall short of 1.00. Hull believes that Brunswick has given up the search for uniformity in behavior, because he has confused the technical difficulties of finding such uniformities with the existence of an underlying lack of uniformity. Variability of behavior can be accounted for without assuming any lack of uniformity of the laws involved. Indeed the uncertainty may lie in the conditions and not at all in the laws.

Brunswick (8) in his discussion of the Lewinian system agrees in principle that statistics or averages of repeated observations are not used in a nomothetic or systematic discipline. If all the relevant conditions are known then truly only one observation is needed to establish the law. This is Lewin's "technique of the pure case." However, Brunswick believes that Lewin has "encapsulated" his theory into the "central layer of the individual" and consequently is only able to predict in the "field of the person in his life space." The life space is "post-perceptual and pre-behavioral;" it represents a cross section in time; it has a dynamic character where events are defined as starting points for action or locomotion. But, according to Brunswick, action is of secondary importance for Lewin and thus there are no criteria for directedness of action which are worked out explicitly and therefore predictions, strictly speaking, cannot be tested. In Lewin's criticisms of achievement and of the "historic-geographic" conception of psychology, again one can see his interest in "preparation for action, rather than action itself." However in regard to the value of the Lewinian system, Brunswick states (8:198) "Encapsulation into the central layer, with dynamics leading out of it, may be the least harmful of all the limitations which possibly could be imposed upon psychology. It may actually mean concentration upon the most essential phase in the entire process of life and of its ramifications...In his topological psychology, furthermore, Lewin has probably developed the most adequate conceptual tool for dealing with the central layer."

d. Phenomenological Psychology

Snygg (69) makes an appeal for the recognition of the important role which phenomenological introspection plays in the field type theories. The objective approach, while successful in the physical sciences, is inadequate for the prediction of the behavior of organisms. Behavior varies even when the objective conditions are the same. But accurate prediction is possible only when the causal entities are open to inspection. "A common and necessary assumption of the objective way of search has been that the apparent irresponsibility of living organisms to physical causation is due to the gross character of the units studied." (69:325)

Therefore from the objective viewpoint the behavior which was not considered pertinent to the situation was viewed as random and indeterminate. But to predict, one must assume lawfulness, and lawfulness necessitates the use of causal concepts. (This of course means individual prediction and not a probability type of gross prediction.) If these concepts remain inaccessible they can be assigned any suitable attributes and are well fitted to act as explanatory concepts. However if they remain unseen, a gap exists in the system and this will introduce inaccuracy in prediction. Since these unseen causal factors are usually introduced to explain individual differences, the objectivists tend to restrict themselves in practice, to normative concepts.

There are three basic assumptions and three additional principles in a phenomenological system.

Basic assumptions:

(a). All behavior is lawful; a necessary condition of any behavior system which wishes to deal with the individual case as does Lewin.

(b). Behavior is completely determined by, and pertinent to the p.f. (phenomenological field) of the behaving organism. The p.f. is the universe as experienced by the behaver, This is quite similar to Lewin's "psychological environment."

(c). There is some relationship between the p.f.'s of different individuals. Control is not possible if an individual is unable to affect another's field. However, the locus of the relationship is not open to observation.

Principles:

(a). Greater precision of behavior (learning) is concomitant with greater differentiation of the p.f.; p.f.'s are also fluid and shifting.

(b). The characteristics of the parts of the p.f. are determined by the character of the field itself. The direction and degree of differentiation are determined by the phenomenological needs of the behaver.

(c). Differentiation in the p.f. takes time.

The problem of prediction: Since behavior is determined by the behaver's p.f. and this is not open to direct observation, the process of prediction involves two steps; (a) the securing of an understanding of the subject's field by inference or reconstruction, (b) the projection of the future field. From assumption (b) it follows that any variation in behavior is indicative of simultaneous variation in the p.f. Prediction therefore requires two important conditions: (a). In order to reconstruct an individual's field from his behavior, it is necessary to know what p.f.'s are like and (b). to project the future field, one must understand how fields change. In answer to these questions Snygg gives the following: The nature of the field: the p.f. is the world of naive, immediate experience in which each individual lives. How fields change: differentiation is defined as knowing a difference; it is the manifestation of the continuous process by which the integrity and organization of the field are maintained. Differentiation is assumed to be the only process of change in the p.f. Lewin would undoubtedly disagree with this oversimplification. He goes into much more detail in discussing how the structure of the field changes (34, 41, 45, 50, 53, 65).

III. SOME ASPECTS OF LEWIN'S SYSTEM

A. THE INTERPRETATIVE AND TELESCOPIC PROCEDURES IN THE CONSTRUCTION OF AN EMPIRICAL SYSTEM

1. INTERPRETATIVE PROCEDURE

This procedure is the one most commonly used in physics and is the one which Lewin uses. "On the originally intuitive assumption that the principles of mathematical topology serve admirably for the description of psychological processes, Lewin proceeds to coordinate psychological constructs to topological terms..." (30:20) The method is essentially this: (a) the investigator thinks that an already developed formal system of pure mathematics may serve as a tool for ordering his data; (b) he then coordinates, by the use of coordinating definitions, certain of the constructs occurring in his field, to the terms of the postulate set of the formal system. If the formal system is isomorphic with the empirical data, every theorem deducible from the system will hold for the subject matter. The interpreted postulate set will increase in probability of correctness directly with experimental verification of the theorems.

2. TELESCOPIC PROCEDURE

This procedure is rarely used in physics; Hull's system is one of this type. The elaboration of the formal and empirical aspects of the system go on simultaneously and the interpretation of an existent postulate set is therefore dispensed with. The chief difference between the two procedures is then "...the interpretation of some formal system, as an explicit step in the process of theory building is included in the interpretive approach while the telescopic procedure dispenses with this." (30:21)

B. LEWIN'S TECHNIQUE OF THEORY BUILDING

Lewin uses an interpretative procedure where empirical constructs, operationally defined, are correlated through the use of coordinating definitions, to a pre-existing formal system. For his purposes Lewin has developed two general sets of constructs to explain behavior: (a) Topological psychology deals with the geometrical aspects of behavior. Topology is "...the most general science of the spatial relations of sets of groups of elements, based on the relationship between elementary part and whole, or...on the relationship between point and surrounding area." (60:15) (b) Vector psychology deals with the dynamics of behavior or the potential motion of bodies. The contribution Lewin wishes to make is the formulating of a constructive system which will make it possible to deal with psychological facts on a level, and in a manner comparable to the treatment of facts in physics.

There is no legitimate objection to such a transportation of concepts from one frame of reference to another, provided it is done in a "reasonable" manner. The "reasonableness" of the transportation (the isomorphism of the interpretation) must be considered on two counts. (a) It is necessary to show that the basic properties of the psychological concepts are comparable to the basic properties of the geometrical-mechanical concepts used. (b) The relationships involved within each frame of reference must be shown to be of the same general order. However, it is not necessary to assume that the specific concepts and relations are identical.

Under the Lewinian system the assumption is necessary that psychological facts are similar to those of macroscopic physical mechanics. This involves assuming that an item is presented directly, through a number of avenues of experience and that we may, in practice, neglect the fact that the definition of a fact is actually dependent upon the relationship between observer and observed; we thereby arbitrarily define the nature of the item itself. However it may be argued (Koffka, 32) that the case of psychology is closer to microscopic physics
where the data are presented indirectly and identification of the item is made in terms of the relations. If this view is taken of the nature of psychological facts, then the Lewinian transportation of concepts is not fully justified.

Lewin's topological psychology can be thought of as an empirical interpretation of topology. However, Koch has pointed out that "...Lewin has failed to state...the particular postulates of topology which he is interpreting by means of his...coordinating definitions..." (30:148) He goes on to say that a "...fundamental reason for Lewin not stating the particular topological postulates 'into' which he performs his coordinations, derives from the consideration...that interpretation of a formal system usually involves extensive modification of its postulates. Now, although topology appears to be an excellent conceptual tool for Lewin's purposes, there is little point at this stage in 'freezing' his interpretation in a final formulation of a topological psychology. The more cautious procedure, in advancing a first approximation, is to abstract out of the principles of topology, those properties which seem most fruitful for the purpose at hand." (30:148) It is interesting to note in this connection that Lewin says (51:vii) "The main difficulty has not been the mastering of the mathematical problems as such...After several attempts to employ the more complicated concepts of topology, I found it both sufficient and more fruitful to refer to the most simple topological concepts only."

Lewin's vector psychology is also constructed by the interpretative method. Again, Lewin has not stated his logic of dynamics and while "...it is logically possible to disregard a logic of dynamics, it is practically fruitful to proceed with its aid." (30:149) In regard to this Koch writes (30:149) "The 'logic of dynamics' is evidently a highly abstract formal system, of such a character that its interpretation by appropriate empirical constructs from any science, will yield the dynamical laws for that science." However, the logic of dynamics as yet is not be to found. "There is no objection to Lewin's constructing his dynamic psychology along interpretive lines;...but he must accept the responsibility of making known the postulates and theorems of his logic of dynamics or describe its properties more specifically." (30:150) In this regard he could either (a) set up a logic of dynamics or (b) proceed telescopically a la Hull.

What is Lewin's relation to field theory? As MacColl (60) has pointed out, he has made no explicit attempt to apply any particular field concept, as used in physics, to his psychology. As a rule, his constructs are employed for their convenience. However, there are some "field like" conceptions in his system. All behavior is conceived as a change of some state of a field in a given unit of time (dx/dt). The field which the psychologist must deal with is the "life space" of the individual. Lewin's concepts represent a "mechanical field" and his formulation is mostly in terms of the substantial properties of the regions of "life space." He attempts to deal with the relationships between these properties and the spatial relations between the regions of life space. Lewin has "defined" field theory writing that it "...can hardly be called correct in the same way as a theory in the usual sense of the term. Field theory is probably characterized as a method: namely, a method of analyzing relations and of building scientific constructs." (39:45) And again he writes (47:25) "The basic statements of a field theory are that (a) behavior has to be derived from a totality of co-existing facts, (b) these co-existing facts have the character of a 'dynamic field' in so far as the state

of any part of this field depends on every other part of the field." Both of these statements are probably accepted, implicitly at least, by all psychologists and they approach what Madden (62) means by the general definition of field.

Lewin (45) also singles out what he believes are the principal attributes of field theory: "the use of a constructive, rather than classificatory method; an interest in dynamic aspects of events; a psychological rather than physical approach; an analysis which starts with the situation as a whole; a distinction between systematic and historical problems; a mathematical representation of the field." (45:60) Along the same line, Lewin has stated the "main desiderata" for an efficient empirical theory (34:242, see also 26) "(1) constructs which (a) are linked to observable facts (systems) by a so-called operational definition, or by a number of operational definitions, corresponding to the possibilities of observation under different circumstances; and which (b) have clearly defined conceptual properties. These properties are coordinated to certain mathematical (logical) concepts. Such a coordination is a prerequisite for logically strict derivations. (2) The laws (that is the relation between behavior, on the one hand, and the field characterized by certain constructs, on the other, or between various factors determining the field) should be verified by experiment. A law should be accepted as valid only if it is not contradicted by data in any branch of psychology. In this sense, a law should always be general."

C. DEFINITIONS

Lewin states (35:98) "every dynamical construct in psychology needs a definition of its conceptual properties and a coordinating definition." Again, when speaking of the purpose of constructs as that of being able to derive observable processes, he says (35:13), "Such a scientific derivation is possible, only if (1) the conceptual properties of the dynamical facts are clearly defined (i.e., if the logical-mathematical properties of these constructs are clear), (2) and empirical process of operation is defined which permits one to determine whether or not, in a concrete case, the dynamical fact exists." The use of "conceptual definition" here appears to be a combination of what Koch (30) calls implicit and explicit definitions, and the "operational definition," a combination of coordinating and operational definitions.

Koch believes that a definition in terms of conceptual properties consists "...in the specification of the properties which the sentences of a psychologically interpreted topology and a psychologically interpreted dynamics, attributes to the constructs which they relate..." (30:150) Lewin explicitly defines a coordinating definition as (51:213) "Certain observable facts are correlated to certain mathematical concepts." This contains characteristics of both the operational definition and the coordinating. Koch in his very lucid manner writes (30:151-152) "...certain observable facts...are first correlated to empirical constructs by operational definition, and the now defined empirical constructs are then correlated to 'mathematical concepts (formal terms), through coordinating definitions."

In regard to Lewin's operational definitions, Koch says (30:152-153) "...Lewin is no less and no more rigorous with regard to the operational definitions of his terms than any of his professional colleagues who write meaningfully. His practice is the customary one of either assuming that the reductive assumptions for the empirical constructs which he uses are known by his audience, or informally indicating some of the operations which define his terms in the general discussion surrounding their introduction...Despite the fact that this procedure is perfectly permissible, one might still wish that Lewin explicitly provided operational definitions of his crucial constructs...all of Lewin's constructs are operationally definable. But there is a distinction between a definable

construct and a defined one: in the latter case the writer can fix his meaning to any degree of precision desired, in the former the reader is presented with several degrees of freedom for misinterpretation."

Lewin's procedure would be much more lucid if there were a sharper distinction between operational and coordinating definitions. "(1) For one thing he would achieve closer harmony between what he does and what he says he does. (2) For another it would tend to make the interpretative character of his constructs more explicit. (3) Finally it would reduce the probability of his readers (and critics) becoming confused about the place of operational definitions in his procedure." (30:153)

D. CONSTRUCTS IN PSYCHOLOGY

Lewin defines his much used term "construct" as (51:213) "A dynamic fact which is determined indirectly as an 'intervening concept' by way of 'operational definition'." This is synonymous with "conditional-genetic concepts" (6:33-34; 36:11) or "dynamic concepts." The term designates "...concepts of general factors not directly observed, but hypothesized from observed data as a means of correlating a broad range of data that have some basic functional similarity, despite perhaps marked superficial differences." (33:205)

The R = f(S) formula (71) is staunchly considered insufficient. (c.f. 69) "The task of psychology is that of conceptually representing and deriving psychological processes. Oddly enough such derivations...are not possible if one attempts to link with other observable facts...the behavior...which has to be explained. It is becoming increasingly clear that it is necessary to introduce a number of concepts or 'constructs'...Only in relatively rare cases is there a direct one to one relationship between the directly observable pehnomenological facts and dynamical facts. In these cases the observable facts can be used as symptoms, and eventually as measuring instruments for the dynamical facts." (51:11)

Obviously, if there were a one to one correlation between observable facts and the causes of behavior there would be no need of a theory (69). The introduction of dynamic constructs involves theory and further more it is folly to think that one can exclude theory. Theories in physics serve a different function from those in the behavior sciences. In physics, they have an interrelative function bringing together previously isolated realms of data; in the behavior sciences, they serve mainly for the formation of empirical laws (71).

Lewin desires to unify the whole field of psychology with his constructs, and so speed the approach of psychology to the level of scientific sophistication which physics has reached. "The system of concepts capable of bringing together the different fields of psychology in an empirical manner, would have to be rich and flexible enough to do justice to the enormous differences between the various events and organisms with which it must deal...it would have to be equally suitable for the representation of general laws, and of the characteristics of the individual case." (51:5)

These concepts must unify without undue simplification, as is done in phenotypical abstraction. "Psychology cannot try to explain everything with a single construct...A variety of constructs has to be used. These should be interrelated, however, in a logically precise manner...Bringing together the total field of psychology, and doing that in a logically consistent manner, might well be viewed as one of the basic purposes of our approach." (47:78) In regard to Feigl's three meanings of the unity of science (15:328), Lewin would agree with the attempt to unify the language of science. Indeed,

this is one of the main purposes of his constructive system and his emphasis on conditioned-genetic concepts. He would also be in agreement with the thesis of naturalism. However, he would probably agree with Brown (6), that both physics and psychology can be stated in the same language and not necessarily reduce psychology to physics .

E. THE CONSTRUCTIVE METHOD

The method of construction was first used in mathematics "to consider qualitatively different geometrical entities...as the products of a certain combination of certain 'elements of construction'...has since the time of the Greeks been the secret of this method. It is sometimes called the method of 'genetic definition.'
It is able, at the same time, to link and to separate; it does not minimize qualitative differences and still lays open their relation to general quantitative variables. Cassire has shown how the same method proved to be fruitful in empirical sciences where the 'elements of construction' are mathematically described empirical entities..." (44:32)

The essence of the constructive method is the representation of an individual case, with the help of a few "elements" of construction. Lewin (51:6 and 16) has listed several characteristics of his application of the method to psychology.

(1). An attempt is made to build a framework within which one can conceptually represent and derive psychological processes and, at the same time, derive all forms of behavior as it actually occurs.
(2). The constructs should be logically consistent.
(3). They should represent both the person and the environment.
(4). Such a derivation of the total possible behavior must proceed from the life space as a whole.
(5). Interest is centered on functional relations between objects (regions) in the life space.
(6). No more assumptions (postulates) should be made than are actually required.
(7). The actual procedure is the method of successive approximation, which is essentially what Brown (6:32) calls the hypothetico-deductive technique. It represents a method of progressing, wherein the research is closely tied with the hypotheses. The method proceeds from a hunch about what are the relevant factors, to a working hypothesis which leads to a law, which is tested experimentally; this leads to the ability to measure the hypothesis by systematic variation of variables.

F. CAUSE

Lewin believes it is necessary to distinguish between systematic (co-existential) and historical (temporal) concepts of cause; Aristotelian thought does not draw this distinction. Systematic causation means "An event is considered as a function of the total situation at a particular time. The cause of an event is always the interrelation between several facts." (51:213) This is the only type of cause science should deal with, using historical causation as a means of studying the systematic. The event "...is traced back to the dynamic characteristics of the momentary situation. The 'cause' of the event consists in the properties of the momentary life space or of certain integral parts of it." (51:30) Historical causation, on the other hand, means "An answer is given to why an individual situation, at a certain historical time, and at a given geographical position, has these particular properties." (51:213) It takes into account the relationship between the successive conditions of a single spatial region. Lewin, in his distinction, essentially believes in the separation of space and

time in psychology. In physics, however, it was found that one had to deal with a space-time continuum. Also Lewin believes that psychological behavior is strictly determined and dependent upon continuous causation, whereas in physics, certain developments have led to the formulation of the "principle of indeterminacy." In these two respects Lewin's systematization is in conflict with modern physics. Using Feigl's rubrics (12) we may classify Lewin's laws as deterministic, semi-qualitative, and existential.

1. THE PRINCIPLE OF CONTEMPORANEITY

"The field-theoretical principal of contemporaneity in psychology...means that the behavior (b) at the time (t) is a function of the situation (S) at the time (t) only..." (39:48) MacColl (60) distinguishes between three interpretations that have been given to the concept of cause; (1) the concept which implies the notions of "production, efficiency, and creation", a "primitive" concept of cause. (2) The Humian concept of cause, implying contiguity and succession with the notion of production, and also of any intrinsic relationship, between cause and effect, eliminated. (3) The functional concept of cause which expresses a correlation of characteristics (Feigl's 'purified' concept of cause, 12).

Lewin wishes to deny both the necessity and sufficiency of the Humian concept, while trying to incorporate both the "primitive" and the functional concepts. "...in discarding the Humian concept, Lewin...not only seems to deny the validity of the concepts of contiguity and succession as definitive of cause, but he seems ready to dispense with any consideration of temporal relationships whatsoever." (60:21) Lewin's treatment of cause is essentially dependent on functional relations, with temporal relations largely omitted. Therefore, the problem for Lewin is how do you determine the "situation at a given time."

He gives two different approaches to this problem:

> (a). One may proceed by "anamnesis" and base conclusions on history. This, for Lewin, is about all the use he has for the past history of an event or situation; as a diagnostic device. However, he believes this is less satisfactory than strict use of the present, because it involves two doubtful steps: "The testing of certain properties in the past...and the proof that nothing unknown has interfered in the meantime; in other words that we have to deal with a 'closed system'." (39:49) However, even if there are no outside influences, inner changes occur and consequently the laws governing the inner changes must also be know. These considerations make the second method much more profitable.
>
> (b). This procedure is called simply "diagnostic tests of the present." (39) He modifies and clarifies his statement of the "situation at a given time" by stating as a basic fact that"...an adequate description of a situation at a moment is impossible without observation of a certain time-period. This observation has to be interpreted according to the 'most plausible' assumption and our knowledge of the physical laws) in a way which permits its transformation into a statement of the 'state of affairs at the time (t)'." (39:50)

However, he does not believe that this recognition of the "practical" aspects of the principle of contemporaneity alters the principle in "theory". As he states it "without altering the principle of contemporaneity as one of the basic propositions of field theory, we have to realize that to determine the psychological direction and velocity of behavior (i.e., what is usually called the 'meaning' of the psychological event), we have to take into account, in psychology, as in physics, a

certain time-period. The length of this period depends, in psychology, upon the scope of the situation. As a rule, the more microscopic the situation is which has to be described, the longer is the period which has to be observed to determine the direction and velocity of behavior at a given time." (39:52)

2. THE PRINCIPLE OF CONCRETENESS (EXISTENCE)

"Effects can be produced only by what is 'concrete', i.e., by something that has the position of an individual fact which exists at a certain moment." (51:33) That which acts now, must exist, and that which does not exist, cannot act now. Lewin apparently has equated the causal with both what is present in time and with what is existential in state. However, he also believes that the causal is the functionally related. Combining these three, McColl concludes that "Lewin is forced to conclude that no functional relations are possible, except as involve both present time and the existential in state. Thus, there is no functional distinction between the present, in time and the state of being...There can be no distinction on the basis of the functional-nonfunctional dimension." (60:23)

In Lewin's system duration and temporal continuity have a very small place and are inserted only in his practical considerations (39). The determinism or continuity of which he speaks is essentially spatial. It seems that an instance of temporal continuity or sequence stands in no fundamental opposition to other types of relationships. A temporal relationship of any sort is only one of the many types of relations between chosen events. Assuming that events never occur in isolation, temporal or spatial, the problem is that of expressing the relationships which define the event.

G. SOME CONCLUSIONS CONCERNING THE LEWIN AND HIS SYSTEM

Lewin was primarily a psychologist and he made his major contributions in this field. However, the influence of his work extended far beyond the limits of traditional psychology into the realms of social psychology, sociology and the social sciences in general (40, 48, 49, 54). One reason for the breadth and scope of his work is his concern in outlining the methodological and conceptual prerequisites for a mature and integrated science of behavior. His earliest work in Berlin dealt with the comparative theory of science (36, 37). He has developed, as a consequence, one of the most elaborate and extensive systems of behavioral constructs to be found.

The topological and vector psychology he outlines is not strictly a theory but a conceptual tool, a framework for a theory, which promises to give unity and coherence to psychology. "This has been the primary task of all systems of psychology, but few system-builders have been so critically aware as Lewin of the nature of their task." (30:141) The starting point of topological and vector psychology is the phenomenal fact, the phenotypical data; but in order to understand this one must go on and discover the genotypial facts, the conditioned-genetic properties. It was definitely Lewin's expectation that topological and vector psychology would help break down the barriers between branches of psychology and create a unified theory. It is notable that "those adopting Lewin's systematic position tend to think of all psychological phenomena as a continuum, and they tend to search for formulations of lawfulness applicable to all behavior". (11:982) Indeed, many of the principles of Lewin are no longer identifiable as belonging to one school.

Lewin's most basic attitude toward science was a practical one, and he was on guard against the enthusiasm for a formal system which might lead to the substitution of verbalisms for an empirically descriptive system. This is all evident in his method of "successive approximation" where only questions are asked that can be answered by the existing methods of research. In this

way the formalization of constructs builds up, starting with description, and each successive step is built on the one proceeding.

Formalization and mathematization in psychology, if done prematurely, may lead to the building of "logical superhighways" leading no where. This is one of the best answers to Spence's complaints (71:85) that the experiments are not too dependent on theory in this type of approach. It is true that there is nothing wrong with phenomenological introspection introducing experimental problems or in formulating theory. The origin may serve as a predictive device, to tell ahead of time whether it will be fruitful or not. (More often it reinforces a particular prejudice). If using the objective environment proves more adequate for prediction of behavior, then phenomenological introspection or any other basis of theory building automatically loses its relative importance.

In regard to the evaluation of the system, it seems important to separate Lewin the man from his system. Lewin was a brilliant researcher and had deep insight into the problems of psychology. He served as an impetus for many important movements, such as group dynamics. The question is, can a comparable amount of work be done, using his concepts and formulations as a framework, by others? This may be asking too much of any current theory in psychology, i.e., to run on its own steam without push from a leader, but it is one of the ways of separating the actual deductive value of the theory from the light that shines on from a brilliant man.

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