KURT LEWIN MEMORIAL AWARD
ADDRESS—1963

On the Nature of the Environment

Roger G. Barker

Two themes stand out strongly in my memory of Kurt Lewin from the time I was a post-doctoral fellow with his group at the University of Iowa in 1935 and 1936.

One theme was Lewin's vigorous presentation of psychology as a conceptually autonomous science. In his view, psychology is independent of biology, physics, and sociology; its constructs and theories are not reducible to those of any other science. Heider\(^1\) has reminded us that this was a guiding conviction of Lewin from his earliest days, and that it is expressed in his theory of the life space. Kurt Lewin brought this view to Iowa, and under the impact of his brilliance and enthusiasm all who worked with him there operated within its framework. But his conception of the place of psychology among the sciences did not go unchallenged; in fact, it was an explicit and a lively issue. The philosophy of science had recently come to the University of Iowa directly from Vienna. Under these circumstances, Lewin, who would certainly have chosen to let history settle the argument, had to enter into discussions of what, for him, were the familiar issues of positivism, reductionism, and the unity of science. These discussions were landmarks of the Iowa landscape of those days and surely everyone who participated in them, even from the periphery, will always remember them.

The essence of science for Lewin was a system of explicitly stated concepts by means of which exceptionless derivations could be made. Since, in this view, the concepts of physics, biology, and sociology are incommensurable with those of psychology, he concluded that only probabilistic, empirical relations could be discovered between variables of psychology and those of other sciences. It was impossible, as he saw it, to make derivations to behavior from the nonpsychological environ-

---

ment, to use his own term, or the preperceptual or ecological environ-
ment to use Brunswik's terms. It was this that made it essential for
Lewin to limit psychology to an encapsulated system of purely psy-
chological constructs.

My experience at Iowa convinced me that psychology was faced
with a three-way dilemma and that it had to choose between achieving
a truly Galilean psychology of precise derivations, but with the ecologi-
cal environment omitted, accepting a probabilistic functionalism of the
kind advocated by Brunswik, with the ecological environment in-
cluded, or retreating to a fractionated psychology of specialties and
microtheories without conceptual unity. I am now beginning to see the
issues differently. But before turning to this, I must report another
theme that is prominent in my memory of Kurt Lewin and which
helps to define the issue I want to discuss.

This theme is the overriding influence of the ecological environ-
ment in Lewin's own life. How well I remember a summer day I spent
with him in the Sierra Nevada mountains of California. It was a beau-
tiful day. Then the news came over the automobile radio that Hitler's
German armies had invaded Poland. This was an event in the objective
geo-political-social world; this was an occurrence in the ecological
environment. It was hard, indeed, to follow Lewin's scientific tenets
here. It was difficult to think that this occurrence had no certain con-
sequences for him, or for me, or for multitudes of others for whom it
had as yet no life-space representation whatever. Lewin was among
those men who have had to contend in their own lives with the most
striking evidence of the coercive power of the political-social environ-
ment. Indeed, two ecological realities, Jews and Nazis, were in some
way causally implicated in the strange fact that Lewin was carrying
on his work in an Iowa town. He recognized this, of course. He
often emphasized the profound importance for people of nonpsycho-
logical events; but despite their saliency for him personally, he could
not incorporate them into a science of psychology, as he understood
science.

So Lewin led an uneasy life with this dilemma. He saw very
clearly that an adequate applied behavioral science requires conceptual
bridges between psychology and ecology, and even though his con-
ception of science told him that this is impossible, much of his effort
from the Iowa period onward was preoccupied with it. Sometimes he
approached the psychological-ecological breach directly and explicitly,
as in his gatekeeper theory of the link between food habits and food

---

2 Nonpsychological environment, preperceptual environment, ecological en-
vironment and environment are used interchangeably in this essay to mean the
environment as described by the physical and biological sciences, and by those
social sciences that are not adumbrations of individual psychology. Psychological
environment and life space are used interchangeably as Lewin used them.
technology and economics; sometimes he approached it obliquely and implicitly, as in his attempt to treat the social field as a psychological construct. He seemed unable to avoid the interface between ecology and psychology and to work within his own system, as he had done in the earlier studies of tension systems, psychological satiation, and level of aspiration. I think the reason is clear: Lewin's total life experience and his conception of psychology as a science were in irreconcilable conflict. He could not ignore his life experiences, and he could not give up his conception of psychology. It was a painful conflict.

It seems to me that, as psychologists, we are all confronted with the same dilemma today. And for those with the concerns represented by the Society for the Psychological Study of Social Issues the conflict is especially crucial. The environment which man is creating for himself is surely even more threatening (and, also, more promising, if we are able to call the turns) than it was twenty-five years ago. Who can doubt that changes in our environment ranging from new levels of radiation, to increased numbers of people, to new kinds of medicines, and new kinds of social organizations, schools, and governments are inexorably changing our behavior, and that our new behavior is, in turn, altering our environment? Can this total eco-behavioral system be incorporated within an explanatory science? Can we understand and control the total array and flow of what is happening to us, or must the couplings between the environment and behavior always be dealt with fragmentally, probabilistically, empirically, and post hoc? It is to this problem that I should like to direct your attention today.

I shall, first, define the dilemma, or rather the dilemmas, more precisely.

Problems Along the Environment to Environment Circuit

We can trace the round of events in which behavior is involved from distal objects in the ecological environment (say a fly ball in a baseball game) to proximal events at receptor surfaces (the image of the approaching ball on the retinas); to afferent, central, and efferent processes within the silent intrapersonal sector of the circuit (e.g., perceiving the approaching ball); to molecular acts (e.g., raising the hands) and finally to molar actions which alter the ecological environment (catching the ball). This is the environment to environment cir-

---


cuit, the E-E arc, which Brunswik⁵ and others⁶ have considered the fundamental psychological datum.

I have mentioned one dilemma of the E-E arc, namely, that it involves such alien phenomena in its various parts that a conceptually univocal treatment has seemed impossible. But there are other dilemmas.

Most psychologists, including Lewin and Brunswik, have found the ecological environment on the afferent side of the person to be unstable, and to exhibit at best only statistical regularities.⁷ This disordered input has confronted students of the total E-E arc with the difficult problem of accounting for its transformation within the circuit into an ordered output. In consequence, the selective and organizing powers of the intrapersonal segment of the E-E arc, which to quote Leeper, "yield relatively stable effects out of the kaleidoscopically changing stimulation they receive"⁸ (pp. 387-8), has undoubtedly claimed the greatest efforts of psychologists; here fall the problems of perception and learning. This is the second dilemma of the E-E arc.

Furthermore, it is generally agreed by students of perception and learning that the ecological environment does not demand behavior, but that it is, rather, permissive, supportive, or resistive. It is true that a language is often used that implies at least a triggering function for the ecological environment: events in the environment are said to stimulate, to evoke, to instigate behavior. And the fact that experiments are by design usually conducted within environments that are, indeed, stimulating gives support to the language used. However, the fine print of psychological theory always, so far as I have been able to determine, makes the intrapersonal sector of the arc the arbiter of what will be


received as stimuli, and how it will be coded and programmed in the intrapersonal sector before it emerges as output.9 The simple fact is that to function as a stimulus, an environmental variable must be received by the organism. In fact, the S-R formula would be more in line with basic psychological theory if it were recast as an R-S formula: R for reception by the organism followed by S for submission of the coded information back to the environment. It is safe to say that in most psychological thinking, ecological occurrences at the afferent end of the E-E arc are assumed (a) to be indifferent to their ends via the arc, and (b) to be endowed with directedness and purpose only within the intrapersonal sector. This is the problem of motivation, and it is a third dilemma of the E-E arc.

These three dilemmas rest upon certain conceptions of the ecological environment, namely, that it is disordered, that it is without direction with respect to behavior, and that it is conceptually incommensurate with the intrapersonal sector of the E-E arc.

Since psychologists usually consider the environment only insofar as it is propaedeutic to their main concern with behavior, it would appear desirable to examine, again, the ecological segment of the E-E arc as it exists before being received, coded, and programmed within the silent intrapersonal sector of the circuit. Egon Brunswik wrote, in this connection:

... both organism and environment will have to be seen as systems, each with properties of its own, yet both hewn from basically the same block. Each has surface and depth, or overt and covert regions ... the interrelationship between the two systems has the essential characteristic of a "coming-to-terms." And this coming-to-terms is not merely a matter of the mutual boundary or surface areas. It concerns equally as much, or perhaps even more, the rapport between the central, covert layers of the two systems. It follows that, much as psychology must be concerned with the texture of the organism or of its nervous processes and must investigate them in depth, it also must be concerned with the texture of the environment as it extends in depth away from the common boundary10 (p. 5).


I raise the question then: What is the texture of the ecological environment?

Attributes of the Ecological Environment

The physical and biological sciences have amassed almost limitless information about the environment, and some of it bears directly and univocally upon the issues before us. The three environmental attributes I shall mention have been independently affirmed and reaffirmed by many observing techniques and instruments. They are far removed from the human observer; most of them are properties of the environment as revealed directly by photographic plates and recording instruments. They are elementary facts.

1. Order in the Preperceptual Environment. The environment as described by chemists, physicists, botanists, and astronomers is not a chaotic jumble of independent odds and ends, and it has more than statistical regularity. It consists of bounded and internally patterned units that are frequently arranged in precisely ordered arrays and sequences. The problem of identifying and classifying the parts of the environment, i.e., the taxonomic problem, is very great, but the problem is not, primarily, to bring order out of disorder. On the contrary its first task is to describe and explain the surprising structures and orders that appear in nature: within carbon atoms, within DNA molecules, within developing embryos, within oak trees, within baseball games, within hotels (if you will), within nations, within solar systems; and to account for the occasional absence of order and organization, in atomic explosions, in cancerous growths, and in social disorder.

It must be noted, however, that order and lawfulness are by no means spread uniformly across the nonpsychological world; not every entity is lawfully related to every other entity. The preperceptual world is not one system but many, and their boundaries and interconnections have to be discovered.

A frequent arrangement of ecological units is in nesting assemblies. Examples are everywhere: in a chick embryo, for example, with its organs, the cells of one of the organs, the nucleus of one of the cells, the molecular aggregates of the nucleus, the molecules of an aggregate, the atoms of one of the molecules, and the subatomic particles of an atom. A unit in the middle ranges of a nesting structure such as this, is simultaneously both circumjacent and interjacent, both whole and part, both entity and environment. An organ, the liver, for example, is whole in relation to its own component pattern of cells, and is a part in relation to the circumjacent organism that it, with other organs, composes; it forms the environment of its cells, and is, itself, environed by the organism.

2. Direction and Purpose in the Preperceptual Environment. Most
units of the ecological environment are not directionless in relation to their parts. They are, rather, self-regulated entities (or the products of such entities) with control circuits that guide their components to characteristic states and that maintain these states within limited ranges of values in the face of disturbances. Some of the strongest forces in nature and some of the most ubiquitous patterns of events are found within ecological units: in atomic forces and in developmental sequences, for example. The new understanding of cybernetic processes makes it no longer necessary to be skeptical of the reality of target-directed systems within the ecological environment.

There are mutual causal relations up and down the nesting series in which many environmental entities occur; the preperceptual environment is made up of systems within systems. An entity in such a series both constrains and is constrained by the outside unit that surrounds it and by the inside units it surrounds. This means that entities in nesting structures are parts of their own contexts; they influence themselves through the circumjacent entities which they, in part, compose. A beam determines its own strength by its contribution to the structure into which it is built; a word defines itself by its contribution to the meaning of the sentence of which it is a part.

3. Incommensurability in the Preperceptual Environment. The conceptual incommensurability of phenomena which is such an obstacle to the unification of the sciences does not appear to trouble nature's units. The topologically larger units of nesting structures have, in general, greater variety among their included parts than smaller units: an organism encompasses a greater variety of structures and processes than a cell; a river is internally more varied than a brook. Within the larger units, things and events from conceptually more and more alien sciences are incorporated and regulated. In an established pond, a great variety of physical and biological entities and processes are integrated into a stable, self-regulated unit; the component, interrelated entities range from oxygen molecules to predacious-diving beetles. This suggests that within certain levels of nesting structures conceptual incommensurability of phenomena does not prevent integration and regulation. In fact, self-regulated units with widely varied component entities are, in general, more stable than units with lesser variety.11

In summary, the sciences which deal with the entities and events of the nonpsychological environment directly, and not propaedeutically as in psychology, do not find them to be chaotic or only probabilistic in their occurrence. It is within the physical and biological sciences that the greatest order and lawfulness have been discovered, an order and lawfulness much admired by psychologists. These sciences do not find

environmental entities to be without direction with respect to their component parts, and conceptual incommensurability does not prevent the integration and lawful regulation of ecological entities. One cannot avoid the question, therefore: Why has psychology found the ecological environment to be so different?

Let us take seriously the discoveries of the bio-physical sciences with respect to the preperceptual environment, and identify and examine the environment of behavior as they identify and examine the environments of physical or biological entities: of animals, of cells, of satellites. This is neither more nor less difficult than it is to identify and examine the habitat of an animal, the organ in which a lesion occurs, or the planetary system within which a satellite orbits. The investigator first identifies the animal, the lesion, the planet, or, in this case, the behavior unit with which he is concerned, and he then explores the surrounding area until he identifies and then examines the circumjacent environmental unit.

But first we must have a unit of behavior. One cannot study the environment of behavior in general.

The Environment of Behavior Episodes

Psychology has been so busy selecting from, imposing upon, and rearranging the behavior of its subjects that it has until very recently neglected to note behavior's clear structure when it is not molested by tests, experiments, questionnaires and interviews. Following the basic work on behavior structure by Herbert F. Wright,12 Dickman13 has shown that people commonly see the behavior continuum in terms of the units (or their multiples) which Wright identified, namely, behavior episodes. Here, for example, are descriptive titles of consecutively occurring episodes from the behavior stream of six-year-old Belinda Bevan during a 10-minute period beginning at 2:22 p.m., on July 18, 195714:

- Watching bigger girls form a pyramid (gymnastic)
- Taking off her shoes
- Going closer to the big girls
- Putting on her shoes
- Admiring bracelet on Alice
- Poking Alice

---

Looking at Winifred's ladybug
Following Alice
Watching boys
Looking into porch of schoolroom
Closing door of schoolroom
Watching girls play hopscotch
Giving Harry his shoe
Getting bracelet from Alice
Interfering in Delia's and Winifred's fight
Admiring bracelet on Alice

Behavior episodes, such as these, are not arbitrarily imposed divisions of the behavior continuum in the way that microtome slices of tissue and mile-square sections of the earth's surface are imposed divisions. They are, rather, natural units of molar behavior\(^{15}\) with the attributes of constancy of direction, equal potency throughout their parts, and limited size-range. Like crystals and cells which also have distinguishing general attributes and limited size-ranges, behavior episodes have as clear a position in the hierarchy of behavior units as the former have in the physical and organic hierarchies. It makes sense, therefore, to ask what units of the ecological environment encompass behavior episodes.

Consider, for example, Belinda's behavior episode, Looking at Winifred's Ladybug, from the series just given.

The record of this episode of Belinda's behavior stream reads as follows:

Belinda ran toward Winifred from Miss Groves' room.
Winifred had found a ladybug and was walking around with this ladybug saying, "Ladybug, ladybug, fly away home."
Belinda went up to Winifred.
She pulled Winifred's arm down so she could see the ladybug better.
She smiled as she watched the beetle. She watched the ladybug for 10 or 15 seconds.

This episode constitutes an E-E arc originating in the ecological event, "Winifred . . . was walking around with this ladybug" and ending in the ecological events, Belinda, "pulled Winifred's arm down . . . she watched the ladybug . . . ."

The environing unit in which this episode occurred was easily identified. It extended in depth away from the junction points between Belinda and Winifred-with-the-ladybug with a characteristic pattern of people, behavior, and objects which abruptly changed at a surround-

ing physical wall, and at temporal beginning and end points. The environmental unit was Afternoon Break, Yoredale County School Playground, North Yorkshire, England, 2:22-2:31 p.m., July 18, 1957.

We have studied many behavior episodes, and we have always found them within ecological units like the one surrounding the episode Looking at Winifred’s Ladybug. We have called these ecological units behavior settings. Our work in Midwest, Kansas, and Yoredale, Yorkshire, has demonstrated that behavior settings can be identified and described reliably without an explicit theory and by means of a variety of survey techniques. This is of some importance, we think, as an indication that behavior settings are tough, highly visible features of the ecological environment.

There is only a beginning of a scientific literature on behavior settings. Except in their applied phases, the biological and physical sciences have eschewed ecological units with human behavior as component elements. They have stopped with man-free ponds, glaciers, and lightning flashes; they have left farms, ski-jumps, and passenger trains to others. And psychology and sociology, have, for the most part, shied in the other direction; they have avoided whole, unfractuated ecological units with physical objects as well as people and behavior as component parts. So behavior-setting-type units have almost completely fallen between the bio-physical and the behavioral sciences, and this has been a source of serious trouble for the eco-behavioral problem: there have been no solid empirical ecological units. Unbounded, semi-theoretical, semi-empirical units do not provide the firm base an empirical science must have. Floyd Allport has persuasively pointed to one difficulty of such demi-entities: they disappear when the attempt is made to touch them, as is essential if they are to be studied; in their place one encounters individuals. And there is another difficulty: a universal attribute of the environment of a person, whatever its other characteristics may be, is a univocal position in time and space. The units of an eco-behavioral science must have time-space loci. Behavior settings fulfill both of these requirements: they can be encountered, qua environmental units, and re-encountered; and they can be exactly located in time and space.

It is not often that a lecturer can present to his audience an example of his phenomena, whole and functioning in situ—not merely with a demonstration, a description, a preserved specimen, a picture,

---

16 In other cases the boundaries may not be so definite, they may in fact be boundary zones; and there are sometimes alternative bounds to an environmental unit. In these cases detailed judgments have to be made regarding the location of the boundary, but the principle does not change. Barker, R. G., & Wright, H. F. Midwest and Its Children. New York: Harper & Row, 1955. Pp. 45-83.

or a diagram of it. I am in the fortunate position of being able to give you, so to speak, a real behavior setting.

If you will change your attention from me to the next most inclusive, bounded unit, to the assembly of people, behavior episodes, and objects before you, you will see a behavior setting. It has the following structural attributes which you can observe directly:

1. It has a space-time locus: 3:00-3:50 p.m., September 2, 1963, Clover Room, Bellevue-Stratford Hotel, Philadelphia, Pennsylvania.
2. It is composed of a variety of interior entities and events: of people, objects (chairs, walls, a microphone, paper), behavior, (lecturing, listening, sitting), and other processes (air circulation, sound amplification).
3. Its widely different components form a bounded pattern that is easily discriminated from the pattern on the outside of the boundary.
4. Its component parts are obviously not a random arrangement of independent classes of entities; if they were, how surprising, that all the chairs are in the same position with respect to the podium, that all members of the audience happen to come to rest upon chairs, and that the lights are not helter-skelter from floor to ceiling, for example.
5. The entity before you is a part of a nesting structure; its components (e.g., the chairs and people) have parts; and the setting, itself, is contained within a more comprehensive unit, the Bellevue-Stratford Hotel.
6. This unit is objective in the sense that it exists independently of anyone's perception of it, qua unit.

You will note that in these structural respects, behavior settings are identical with bio-physical units.

This, then, is a behavior setting; within it is displayed, for you to see, the finer-grained texture of the environment as it extends around and away from the behavior occurring here. What is this texture and how does it affect behavior? This leads us to the more dynamic characteristics of behavior settings.

Every stable, patterned, and bounded assembly of phenomena (whether this be in the particles of milker's nodule virus, in the lines of a spectrograph, or in the position of chromosomes in meiosis) indicates that some regulator is operating. And where in nature is stable patterning clearer than in a baseball game, a church service, a law court, or a highway, i.e., in behavior settings? The question in all of these cases is: What is the source of the order?

It does not require systematic research to discover that the pat-
terns of behavior settings do not inhere in the people or the objects within them. It is common observation that the same people and objects are transformed into different patterns as they pass from one variety of setting to another. This is exemplified by numerous pairs of behavior settings in Midwest and Yoredale with essentially the same people and objects as component parts but with quite different patterns. For example:

Church Service—Church Wedding
High School Senior Class Play—Senior Graduation
School Playground: Recess—May Fete on School Playground

It is common observation, too, that different sets of people and objects exhibit the same pattern within the same variety of behavior setting. This is exemplified by the almost complete turnover of persons each year in academic behavior settings, with the patterns of the settings remaining remarkably stable. One of the striking features of communities is how, year after year, they incorporate new people, despite the idiosyncratic behavior and personality traits of these people, into the characteristic patterns of their stable behavior settings: of Rotary Club meetings, of doctors' offices, of garages, of bridge clubs. Obviously, whatever it is that impresses the characteristic array and flow of behavior settings upon their interior entities and events is largely independent of the persons who participate in them.

However, these general observations do not tell us the degree of change in the behavior of individuals as they move from setting to setting. It is possible for the patterns of behavior settings to differ greatly without a similar difference in the behavior of the individuals involved. The standing behavior patterns made by the inhabitants of a track meet and by the same people as inhabitants of a ball game are quite different, yet the behavior of most of the individuals within these settings appears to be quite similar: by and large, the runners and throwers run and throw in both, and the cheerers cheer in both settings.

A considerable number of investigators have made quantitative studies of the differences in the behavior of the same persons in different behavior settings.18 I shall not survey this rather extensive

---


Jordan, N. Some formal characteristics of the behavior of two disturbed
The findings are in general agreement on the issue of importance to us here, and they are represented by the research of Raush, Dittmann and Taylor. Working within a therapeutic milieu with disturbed boys, these investigators found that on the behavior dimensions hostility-friendliness and dominance-passivity there was as much variation between behavior settings, with boys constant, as between boys with settings constant.

Altogether, then, there is abundant evidence that behavior settings, like many bio-physical entities, are strongly self-regulated systems which regulate the behavior episodes within them as molecules regulate atoms, as organs regulate cells, and as structures regulate the beams of which they are constructed. To the extent that this is true, it means that the ecological environment of behavior is not passive, is not directionless, is not chaotic or probabilistic.

The Regulation of Behavior Settings

But how do behavior settings regulate themselves, including the behavior episodes within them? How does “the texture of the environment as it extends in depth away from the common boundary” influence individual behavior?

One can ask, of course, why one should bother with the distal texture of behavior settings. Whatever this texture may be, it ultimately has to be translated into input at the junction points with particular persons. Why not, therefore, get down to brass tacks at these junction points, i.e., at the sensory surfaces?

There are a number of reasons why this cannot be done. For one thing, behavior settings have so many richly interconnected elements


10 The interdependence of their parts is of practical, methodological importance. It provides a basis for establishing the limits of behavior settings in those cases where the boundaries are obscure.

that their tremendous complexity at the sensory surfaces of all inhabitants concurrently cannot, at the present time, be dealt with conceptually or practically. Behavior settings are often very large systems, and simplification is necessary. But what may appear to be the most obvious simplification, namely, dealing with the input to single inhabitants, or to a sample of inhabitants, does not reveal behavior settings. It is not only in perception that the attributes of parts differ from those of the whole. In any system with interdependent parts the order obtaining at a point of the system varies with the portion of the total system within which the part is considered. It is easy to overlook how greatly attributes vary with context. Take, for example, a visual target, a spot on the tire of an automobile moving forward at a road speed of 50 miles per hour. The spot will display simultaneously the following motions: (1) a random vertical vibratory motion within the field of a stroboscope focused on the spot at a single point in the wheel’s revolution; (2) a uniform circular motion of about 1000 RPM within the context of the wheel; and (3) a cyclical forward motion varying from zero to 100 miles per hour within the context of the auto-highway traction system. The same state of affairs occurs in a behavior setting. Suppose one were to study input and output of a second baseman in a ball game. By careful observation, all incoming and outgoing balls could be tallied, timed, and their speeds and directions recorded. The input itself would be without a sensible order, and there would be no relation between baseball inputs and outputs. But within the behavior setting, baseball game, the record would be sensible, orderly and lawful. It is important to note that it is not the player who converts this into order, it is the game, the behavior setting. The player acts as the game’s agent and is able to receive and throw the ball in an orderly way because the rules (the program) of the game, and all information about the momentary state of the game available to him through a variety of inputs, guide his actions. However, all the inputs and outputs of a single player, of a sample of the players, or of all the players if considered outside the context of “the game” would be without sensible order. It is important to note, too, that a much greater quantity of information would be required to discover “the game” from the inputs and outputs at the junction points with the individual players than is contained in the program of “the game” itself.  

A special difficulty with the ecological input at the junction points with individuals arises from the difference in the temporal dimensions of the inputs at these points, i.e., of the stimuli, and the behavior output with which we are concerned, i.e., behavior episodes. Stimuli are very short units occurring in unpredictable sequences during the

---

period of any episode, while episodes are much longer units with
direction and interdependence from their points of origin. However,
episodes are not determined by their internal states alone; they are
guided in their details by the ecological environment. To predict a
behavior episode it is necessary to know the prevailing conditions
throughout its entire course, but the ecological input of stimuli during
an episode can only be known at the completion of the episode.
What is needed as an ecological anchor for behavior episodes is a
stable unit with at least as long duration as episodes. Behavior settings,
whole and undismantled, fulfill this minimal requirement; they are
episode-sized ecological units. And behavior episodes are setting-sized
behavior units.

Behavior settings do have unitary textured properties which can
be dealt with as bridge builders deal with the span of a bridge rather
than with its atoms. One such property is number of inhabitants. In
the remainder of this paper, I shall present some evidence that this
ecological variable influences individual behavior and some ideas as
to how it does so.

Behavior Setting Size and Individual Behavior

There is evidence, some of which I have presented to you, for each
of the following statements, but I shall consider them, here, as hy-
potheses that were investigated by the research to be reported. Be-
behavior settings are bounded, self-regulated entities involving forces
which form and maintain the component inhabitants and objects of
settings in functioning patterns with stable attributes. One of the
stable attributes of a setting is its functional level, and another is the
optimal number of inhabitants for maintenance of this level. The
optimal number of inhabitants may be precisely specified by the
setting (a bridge game requires four inhabitants), or may fall within
a range (a First Grade reading class in Midwest functions well with
15 to 25 pupils). When the number of inhabitants of a behavior setting
is below the optimal number (within limits), the homeostatic controls
of the setting maintain the total complement and pattern of the
setting's forces essentially intact, and this produces differences, in
comparison with an optimally populated setting, that ramify to the
level of individual behavior. The differences reach the level of individ-
ual inhabitants by two main routes, one a rather direct route involving
behavior setting structure and dynamics, the other more indirect via
control mechanisms. I shall consider the more direct route first.

Behavior settings with fewer than optimal inhabitants are less
differentiated, and their networks of forces are interconnected through
fewer junction points than otherwise equivalent settings with optimal
numbers of inhabitants. It follows from this that on the level of
individual dynamics, the inhabitants (i.e., the junction points) of the former, or "underpopulated," settings are points of application of more behavior setting forces with wider ranges of direction than are inhabitants of the latter, or optimally populated, settings. Behavior setting forces cause participation in behavior settings, and persons and objects which receive more forces in more varied directions will participate with greater forcefulness in more varied ways. On the level of particular activities, far-reaching differences will result, all characterized by stronger motivation, greater variety, and deeper involvement in the settings with less than the optimal number of inhabitants.

When people are more than optimally abundant in behavior settings, the differences noted will be reversed.

At some point in the linkage between behavior setting population (an ecological fact) and forces upon individual inhabitants (psychological facts) a transformation from nonpsychological to psychological phenomena occurs. But in the present analysis we are not concerned with where or how this takes place, but only with the fact that as between behavior settings with the same number and pattern of forces (however the forces may operate), the settings with fewer than optimal number of inhabitants will bring more forces to bear per inhabitant in more directions than settings with an optimal or greater number of inhabitants. I have elsewhere indicated that while a person's perception is obviously involved in his degree of participation in a behavior setting, he need not be aware of the population of the setting as such.\textsuperscript{21} Prediction can be made from ecological facts to individual behavior via behavior settings without any knowledge of the channels or transformations involved and without previous observation of the phenomena.

The derivations from behavior setting size to individual behavior were investigated recently at the Midwest Psychological Field Station in the behavior settings of high schools. The settings were equivalent in all respects except number of inhabitants, which ranged from below to above optimal. Prototypes of the settings that were studied are the Junior Class Play of a small high school where each of the 22 members of the class participated in presenting the play to an audience of about 350 persons and the Junior Class Play of a large high school where about 100 (14 per cent) of the 700 members of the class had some part in presenting the play to an audience of about 2000 persons. Only behavior settings where attendance was voluntary were included in the studies.

The data showed that the students of the small high schools, in comparison with those of the large school:

entered the same number of behavior settings (although there were fewer available),
held important, responsible, and central positions in a greater number of the settings,
experienced more attractions and more pressures toward participation in the settings,
entered a wider variety of behavior settings, and
held important, responsible, and central positions in a wider variety of the settings.

These differences were not slight. Over the 17 week period of the study, the students of the small high schools participated in central, responsible positions (as members of play casts, as officers of organizations, as members of athletic teams, as soloists, etc.) in over three-and-a-half behavior settings per student, on the average (3.7), while students of the large high school participated in these important roles in 16 per cent as many settings, i.e., in just over one-half setting per student (0.6). The students of the small schools held central, responsible, and important positions in twice as many varieties of behavior settings as the students of the large school. In short, these data showed, as the theory predicted, that the students of the small high schools (with fewer than optimal inhabitants per setting) were more strongly motivated, engaged in more varied activities, and were more responsibly involved than the students of the large school (with more than optimal inhabitants per setting). These are direct symptoms of the predicted differences in the strength and range of direction of forces. There is much additional evidence from research in industry that supports the predictions, and the investigations and theories of Calhoun on population density and behavior velocity in animals are in general accord with the predictions.

There are less direct consequences of behavior setting population differences. When the participants in behavior settings fall below the optimal number and become points of application of more forces, they have increased functional importance within settings, and the situation may be reached where everyone is a key person for the stability, and even for the survival of settings. These are ecological

26 Calhoun, J. B. Unpublished manuscripts.
facts. To the degree that the inhabitants are aware of their own behavior in behavior settings their experiences will pertain to their own efforts, achievements, and contributions to the functioning of settings. In fact, Gump and Friesen\textsuperscript{25} found that the students of the small schools exceeded those of the large schools in satisfying experiences related to the development of competence, to being challenged, to engaging in important activities, and to being involved in group activities. When the number of inhabitants of behavior settings are greater than optimal, when there is a surplus of people, and people are the points of application of fewer forces, the functional importance of all inhabitants is reduced on the average, and the situation will be reached where almost no one will be crucially missed as a contributor to the functioning of settings. Under these circumstances, it is to be expected that the inhabitants' experiences will pertain to behavior settings as detached, independent phenomena, to the performances of others, and to their own standings in comparison with others. In fact, the students of the large school exceeded those of the small schools in number of satisfying experiences related to the vicarious enjoyment of others' activities, to being affiliated with a large institution, to learning about the school's people and affairs, and to gaining "points via participation." These data may be summarized in terms of Dembo's distinction between asset values and comparative values.\textsuperscript{26} The small schools more frequently generated in their students self-valuations based upon how adequately the students saw themselves contributing to behavior settings, i.e., being assets to settings. The large schools more frequently generated in their students self-evaluations based upon the students' perception of their standing in comparison with others. These are fundamental differences: in terms of asset values, everyone in a behavior setting can be important and successful; in terms of comparative values, only a few can be important and successful.

I shall turn next to the connection between behavior setting population and individual behavior via the regulatory systems.

The inhabitants of a behavior setting always have the potentiality, and usually the active tendency, to exhibit a greater variety of behavior than the setting requires or can tolerate. The behavior setting control mechanism reduces this variety to the amount appropriate to the setting, and maintains it within an acceptable range of values. One type of control mechanism found in connection with behavior settings is a direct, deviation-countering servo-mechanism that counteracts any


\textsuperscript{26} Dembo, Tamara, Leviton, Gloria L., & Wright, Beatrice A. Adjustment to misfortune—a problem of social psychological rehabilitation. Artificial Limbs, 1956, 3, 4-62.
deviation beyond the acceptable values; a restaurant hostess who supplies coatless patrons with “appropriate” jackets functions as a deviation-countering homeostat and exemplifies this type of control. Another frequent behavior setting control is a vetoing-type mechanism that provides just two states with respect to the variables it governs: in and out of the setting (member-nonmember, pass-fail, alive-dead, permitted-not permitted, free-trapped). A restaurant hostess who refuses admission to coatless, aspiring patrons exemplifies this control mechanism. In general, deviation-countering controls are more efficient, but they are more difficult to devise and more expensive to operate than vetoing regulators. The latter are abundant in nature, e.g., vetoing the “unfit.”

The regulation of behavior settings is usually a complex process, involving alternative mechanisms, and the continual selection of the most effective regulators for the conditions obtaining. In other words, regulation operates directly on behavior setting patterns and indirectly via the regulators themselves. In general, behavior settings with fewer than the optimal number of inhabitants must use deviation-countering control mechanisms, or they will perish; inhabitants are functionally too important to be vetoed out. I have seen a four-man baseball game of nine-year-olds tolerate and nurse along with carefully applied deviation-countering controls a four-year-old participant, or even a mother. In this case one outfielder, even an inefficient and inapt one, is likely to produce a better-functioning game than a game with no outfielder. On the other hand, if there are 30 candidates for players in the game, a better game will result with less fuss and bother if all four-year-olds, mothers, and other inapt players are vetoed out. And nine-year-olds have ways of doing this, and they regularly do it. Those vetoed out become substitutes, bat-boys, and spectators. In behavior settings with more than the optimal numbers of inhabitants, efficiency usually moves behavior settings toward veto-type control mechanism.

Both deviation-countering and vetoing controls, insofar as they are effective in stabilizing the functioning of behavior settings, apply their differing influences more frequently to marginal inhabitants, likely to engage in deviant behavior, than to focal, conformable inhabitants, unlikely to engage in deviant behavior.

In the case of the high school study we expected that deviation-countering control measures would be more frequent in the small than in the large schools, and that this excess frequency would be greater among the academically unpromising than among the academically promising students. Willems’ data bear upon these issues. He called the deviation-countering influences pressures; they included all the forces toward participation which the subjects reported as originating.

---

outside themselves, e.g., "My friend asked me to go"; "Band players were expected to come," etc. Over all, students of the small schools received two times as many deviation-countering influences as the students of the large school, and academically marginal students of the small schools (i.e., students without academically favorable abilities and motivation) received almost five times as many deviation-countering measures as marginal students of the large school.

Both deviation-countering and vetoing control mechanisms produce uniformity of behavior, but with very different consequences for people. In settings where people are at a premium, uniformity is necessarily achieved as we have seen, by the regulating behavior, without limiting the interests, abilities, and motives of inhabitants. In settings where people are surplus, uniformity is achieved to a considerable degree by vetoing, not behavior, but inhabitants who exhibit deviant behavior; and this amounts, in effect, to selecting inhabitants for conformity and uniformity with respect to personality characteristics, (interests, abilities, motives). There are secondary resultants of these control processes which cannot be considered here; but it is immediately clear that the settings with fewer than optimal inhabitants, within which behavioral uniformity is engrafted upon personality diversity, are desegregated, egalitarian, functionally tolerant settings, while settings that veto the unfit and retain the fit are segregated, uniform, specialized settings.

Data were not secured upon details of the vetoing control processes in the schools. But the consequences were apparent: students who did not participate on a responsible level in any voluntary school activity, i.e., that were vetoed out of all but spectator participation, constituted 2 per cent of the students of the small schools, and 29 per cent of the students in the large school. It is from the nonparticipating students that great numbers of school "drop-outs" come.28

An essential feature of the regulation of behavior settings is that there be two-way communication between a setting and its parts. In particular, it is essential that both a participant and the setting be informed of the adequacy of the participant's functioning. In general, behavior settings are lavish with alternate and emergency circuits to carry these messages. This may be illustrated on a simple, but fundamental level. It is important in a ball game that fly balls be caught, and if not caught, otherwise dealt with; so the ball catcher must know if he did actually catch the ball. Going through the motions is not enough. Consider the player at the moment when his task as a participant in the setting is precisely defined, namely, to catch a fly ball: there is the ball in the sky; the ball's image is on his retinas;

his perception of the ball is veridical; the ball approaches, the player's arms raise, his catching hand encounters the ball, but feedback #1, via proprioceptive channels, reports to the player that the ball is not caught; feedback #2, via visual channels, reports that the ball is not caught, but is rolling along the ground; feedback #3, via auditory channels from the umpire, reports that the ball is not caught (and the batter safe); feedback #4, via auditory channels from the other players and spectators, reports that the ball is not caught (the batter safe and the game in jeopardy). If these channels fail to deliver the message of what happened along this E-E arc, there is delayed feedback. Feedback #5, via the manager's memory storage, his verbal mechanism, and the player's auditory channels, reports 10 minutes later that the ball was not caught (the batter safe, and the game lost); finally feedback #6, via the sportswriter's story in the paper and the player's visual channels, reports five hours later that the ball was not caught (the batter safe, the game lost). The ball game takes no chances in delivering to the player the report of his behavior deviancy. Those who know the plans of the setting Baseball Game know that if the message of the noncaught ball is not received by the player immediately via feedback channels #1, #2, or #3, and if he gives no return message to the game that he has noted his behavior deviancy, the message will be greatly amplified in channels #4, #5, and #6, and radically altered from a factual message to a strong deviation-countering influence.

Behavior settings and their inhabitants are mutually, causally related. Settings have plans for their inhabitants' behavior, and inputs are activated within the limits of the settings' control systems to produce the planned behavior. If one channel to this behavior is closed, the setting "searches" within the life-space arrangements of the subjects for another open circuit. This is the meaning of Willems' findings that the deviation-countering influences of behavior settings were neither uniform for all inhabitants nor randomly distributed among them, but varied systematically with the personal characteristics of the inhabitants.

From this merest beginning of an eco-behavioral science, one is tempted in many directions and challenged by many problems. But the E-E circuits of the present behavior setting inform me that it has completed this phase of its plans, and that deviation-countering homeostats are warming up. So let me close by returning briefly to Kurt Lewin's dilemma, and to our dilemma.

The conceptual breach between psychological and ecological phenomena is, of course, not closed by behavior settings, it is as great

---

29 The term plans is used here as Miller, Galanter, and Pribram have defined it with reference to individuals (see note 6).
as ever. But within the behavior setting context, the problem is restated so that breach can be by-passed on certain levels: the approach is re-directed from the sublime but millenial goal of developing a single conceptual system, and also from the discouraging prospect of mere empiricism, probabilism, and fractionated micro-sciences, to the more modest and hopeful goal of discovering general principles of eco-behavioral organization and control without regard for the conceptual or substantive content of the phenomena regulated.

The recasting of the eco-behavioral problem does not abandon a first approximation to Kurt Lewin's conception of science: it does not abandon derivations; and the life space remains intact. Within a behavior setting a person contributes to the setting by which he, himself, is constrained. The life space is the means by which the setting secures the behavior appropriate to it. And in this connection, it is important to note that in any self-regulated system variety within the system is necessary if varied disturbances outside the system are to be countered. This is true of behavior settings, too, diversity of life space among the inhabitants of a setting makes possible behavior setting unity and stability. One problem of an eco-behavioral science, is to investigate how diversity and uniformity on the level of persons contributes to the unity and stability of behavior settings. In the past, important resources of psychology have been committed to the development of vetoing regulators which reduce diversity within settings. There is great need now to understand how the powerful deviation-countering control mechanism of behavior settings can produce unity and stability in conjunction with variety among its inhabitants.

Behavior settings have their roots in Kurt Lewin's conceptions of quasi-stable equilibria, in his treatment of parts and wholes, in his concern for the total situation, in his teaching that theory always must defer to data, and in his preoccupation with the eco-behavioral problem. How greatly the plant that has grown from these roots would have benefitted from his cultivation and pruning! Whether or not behavior settings prove to be a fruitful approach to the eco-behavioral problem, they serve at least to continue Lewin's multi-directional approach to it, and to emphasize the crucial importance of the eco-behavioral problem for the science of psychology.  

---

30 The following volume which deals with a number of aspects of the environment of behavior became available after this essay was completed: Sells, S. B. (Ed.) *The Stimulus Determinants of Behavior*. New York: Ronald Press, 1963.