Disability Research Methods:
An Argument for the Use of Galileian Modes of Thought in Disability Research

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This paper offers a suggestion that many disability studies lack relevance and usefulness because investigators ignore, or are unfamiliar with, an old debate between Aristotleian and Galileian philosophies. It provides a brief review of the distinctions Lewin (1931) made between Aristotleian and Galileian modes of thought, as well as a brief description of the theory of Somatopsychology as an application of Field Theory to understanding and remediating problems encountered by people with disabilities. Finally, the authors present some methods for conducting research that are in keeping with the assumptions of Lewinian Field Theory and a Galileian approach to scientific investigation.

Contrary to the hopes and expectations of many investigators and practitioners, a greatly increased research effort in the past half century has led to only limited progress in understanding the social psychological forces affecting people with physical disabilities. Research findings, per se, seem not to have contributed appreciably to improving the living conditions of people with physical disabilities. Such a conclusion is not new. Over two decades ago, Meyerson (1971) wrote:

> In much current research on disability...variables are not manipulated in any experimental way. Instead, relatively unmanipulable characteristics or conditions such as age, sex, intelligence, kind or degree of disability, personality, and other global descriptions are simply counted, measured, correlated, or compared. This kind of research results in the continued piling up of static information that is no longer sufficient, particularly needed, or helpful. (p. 62)

Fifteen years later, Witt (1986) would produce a scathing critique of articles published in recent years in the major research journal of the field

of rehabilitation psychology. He also decried the frequency with which investigators engaged in what Meyerson and Michael (1962) called "sheep and goats" research. Using disability as an independent variable, investigators spend great effort assessing characteristics of disabled and nondisabled people and documenting that, on the average, people with disabilities often have a variety of other "deficits." Such research yields no information about the conditions under which the problems of these social "goats" can be remediated so they may take their places as productive, contributing members of society.

Similarly, Fine and Asch (1988), editors of a special issue on the social psychology of physical disability, criticized the tendencies of researchers to assume that the presence of a disability overrides all other variables and to view groups of people with disabilities as if they were all alike. Different disabilities, as well as different degrees of physical impairment within a single disability group, foster differences in functional limitations and in abilities. These variations receive insufficient attention from many investigators who use physical disability as an independent variable. They may view "the disabled" as a unitary, undifferentiated group who are relatively incompetent, powerless, victimized, suffering, dependent, and/or needy.

Researchers often neglect variations in the many other individual characteristics, social status, abilities, skills, and achievements that may influence how an individual is perceived by others and how a person thinks, feels, and behaves. More frequently than not, investigators fail to perceive the effects of the environment in creating (or alleviating) problems. They fail to perceive that a disability can remain constant while beliefs, feelings, and behavior can change as a function of other person and/or environmental variables.

Perhaps the harshest critic of such fruitless research is Beatrice Wright (1983), who examined and refuted many harmful "myths" about disability. She has been particularly critical of professionals—especially researchers—who, however unconsciously, have woven their prejudices and mistaken beliefs about disabilities into a tapestry of research designs, results, and interpretations which create a misleading cloak of scientific objectivity. Dembo (1969), too, has charged that what passes for scientific objectivity is often only the subjective opinion of a professional who is an "outsider" to the experience of disability.

Perhaps one of the reasons sociopsychological research has not contributed as much as it might to altering the living conditions of people with disabilities is that researchers may have failed to ask the right questions. In the words of Joseph Witt (1986), "research in rehabilitation psychology seems to occur more in response to *convenient* questions than

important questions" (italics added). In our opinion, the present state of research on disability has not arisen purely from investigators' ignorance of disability, unconscious motivations, or disregard of the social psychological realities of people with disabilities. Instead, it is a natural and inevitable consequence of adhering to an Aristotleian, rather than a Galileian, philosophy of science.

If the thinking and research of social scientists about disability has not improved over the years, the reason may lie in the fact that much social science—and psychology in particular—has remained "Aristotleian." One remedy may lie partly in reconceptualizing "disability problems" as "minority problems" (Barker et al., 1953; Fine & Asch, 1988). Today's researcher in disability should also review and reconsider the implications of Kurt Lewin's (1931) classic paper *The Conflict Between Aristotleian and Galileian Modes of Thought in Contemporary Psychology.*

TWO STRATEGIES FOR SCIENTIFIC RESEARCH

A current appreciation of Lewin's philosophy and theory—not only on an abstract philosophy of science level, but also on a more concrete "nuts and bolts" research design level—may help social scientists avoid some pitfalls while enhancing theoretically sound and practically useful research.

In his 1931 paper, Lewin discussed the development and progression of scientific thought in the area of physics, comparing Aristotle's theories with those of Galileo. Both Aristotle and Galileo wished to understand and explain the physical world; however, the two began with very different philosophical premises about the laws of physical nature. Aristotle was prone to view causes and effects from the perspective of the characteristics of the object itself. He did not place any import upon the characteristics of the environment of the object. Conversely, Galileo studied the *interaction* between the characteristics of the object and the characteristics of its environment.

Convinced that the Aristotleian way of thinking would be no more productive in psychology than it had been in physics, Lewin proceeded to describe Galileo's notions of how to search for "truth" in the physical world, and he suggested that psychologists would benefit by adopting an analogous approach to the study of human behavior. Lewin's article makes clear that the philosophy of science that researchers adopt determines their conceptions of (a) lawful behavior; (b) causal variables; (c) useful research variables; (d) productive research questions; (e) appropriate data analyses; and (f) criteria for positive results. Today, this would be called a paradigm (Kuhn, 1962). Table 1 gives an overview of what

TABLE 1   Aristotleian and Galileian Philosophies of Science[a]

	Aristotleian	*Galileian*
Lawfulness of Behavior:	The frequent is lawful (only behavior that occurs in many people is lawful; the unusual or individual case is chance)	All behavior is lawful (seek laws that have exceptionless validity, both individual and and frequently occurring cases are lawful; no chance behavior)
Behavior "caused" by:	Person	Person-environment interaction
Kinds of variables studied:	Historical Evaluative Phenotypic/physical	Contemporaneous Non-evaluative Genotypic/psychological
Research Questions:	About behavior of groups that share common person characteristics	About conditions under which individual behavior occurs
Data Analyses:	Group statistics (Differences between groups; correlation of variables in groups)	Single-organism design (Subject as own control with replication)
Positive Evidence:	Reject null hypothesis (Results did not occur by pure chance)	"If-then" hypothesis supported by every case studied.

[a]*Adapted from K. Lewin (1931) and J.F. Brown (1936).*

Lewin described as critical differences between Aristotleian and Galileian modes of thought.

As can be seen from the table, Aristotleian-style psychologists are more interested in categorizing an individual by reference to a group to which he belongs. For example, a child's score on a test of intelligence has meaning only by reference to the child's age. On the other hand, Galileian-style psychologists are more concerned with single organism research and establishing the conditions under which the same organism can alter performance in varying environments. This type of research philosophy has been used by a variety of investigators, including Lewin (life space and field theory and the formula B = f(P,E)), Skinner (reinforcement in behaviorism), Piaget (assimilation and accommodation in cognitive developmental theory), and Bronfenbrenner (multiple interactions in systems theory). Even though these theorists are very different

from one another, their theories are alike in that they are based on the same philosophy of science. Each theory meets the criteria of Galileian philosophy; each is concerned about person–environment interaction.

Following is an analysis and critique of disability research based on each type of scientific philosophy.

An Aristotleian Approach to the Study of Disability

The Aristotleian formulation generates research designed to determine what behaviors (feelings, attitudes, abilities, actions, or characteristics) frequently occur in groups of people with and without disabilities; those who have different degrees or severities of disability; in groups with different kinds of disabilities, or different ages of onset, and the like. Sometimes an effort is made to determine what other personal or experiential characteristics may be correlated with kind or severity of disability. The results are then described as "typical" behavior of "the disabled" (e.g., "The disabled" suffer more than "the normals;" or "the more severely disabled a person is, the greater the suffering").

A researcher who thinks like an "Aristotleian" does not attend to the unique constellation of characteristics present in each person, study the effects of the environment on individual behavior, nor show the interaction between a complex environment and a complex person. "Exceptions to the rule" are tolerated or ignored.

Fine and Asch (1988) criticized research about people with disabilities primarily because (a) all "the disabled" were assumed to be alike—physically and psychologically; (b) characteristics of the person, other than the disability, were ignored; (c) the environment was ignored; and (d) the possible conditions for change (improvement of the life situation of individuals with disabilities) were not studied. These "oversights" are inevitable consequences of adopting and implementing an Aristotleian philosophy of science in the search for knowledge.

Implications of Aristotleian Research for the Resolution of Disability Problems

Research based on Aristotleian concepts can generate many interesting facts about the "average" behavior of groups who share a common characteristic. Although, such research will yield little information about how to solve individual problems, it may appear at first glance that the assumptions and procedures of Aristotle would be ideal for social scientists who wish to study groups as collective entities. Even when the goal of research is to obtain an idea of the "typical" behavior of a group, there are a number of pitfalls that can render the results of an Aristotleian research design rather useless for those who hope to use the findings as a guide for resolving a real problem.

People—not arithmetic means—have attitudes. Suppose, for example, a scientist's long-term goal was to reduce the reluctance of employers to hiring people with physical disabilities. A first step in studying the problem might be a descriptive study to determine the magnitude of the discrimination among prospective employers. They might be asked to rate on a 7-point scale, for example, how favorably disposed they are to hiring people with different disabilities. A mean and standard deviation of the resulting distribution of scores might be used to describe the "size" of the problem. However, the mean score of the group, would offer no information about how many employers would hire the disabled people described in the study.

If the practical goals of a descriptive study were to establish whether employers are reluctant to hire people with disabilities, the "size" of the problem could be more clearly communicated by stating *how many or what proportion* of the employers sampled would hire a person with a disability.

Static vs. manipulable variables. If descriptive research is to lead to identification of variables amenable to later experimental research, classification of subjects into groups must begin with potentially manipulable variables. For example, employers might be more willing to hire the disabled after exposure to competent people with disabilities. That hypothesis could be tested by using "amount of exposure" as a potentially manipulable independent variable. The results would be more useful than those derived from studies employing favorite Aristotleian variables such as static person characteristics, historical, or phenotypic variables (e.g., employer gender, age, years of experience). Scientists who wish to solve social problems can make most rapid progress, even in descriptive studies, by attempting to isolate the conditions under which behavior can change. Shurka, Siller, and Dvonch (1982), for example, found that attitudes of college students toward a disabled subject were significantly more positive when the person was presented as "coping" than when he was portrayed as "succumbing." Coping skills can be learned and thus constitute potentially manipulable variables. On the other hand, type of disability, another Aristotleian favorite in attitude studies, is a static variable that cannot be altered.

Relevance of the exceptional case. An Aristotleian mode of thought encourages researchers to ignore "exceptions to the rule." This practice is particularly unfortunate for socially conscious researchers who wish to find solutions to problems faced by minority groups. The "typical" situation of the person with a disability, for example, often may be one of unemployment, suffering, helplessness, or incompetence. In short, the very problem to be solved is the "frequently occurring event." Yet, in

every group, there may well be at least a few people with disabilities who are thriving. These are the crucial people who may give the researchers leads about the conditions under which "weakness" in the physical domain does not spread to cognitive, economic, or social domains.

Common and frequent but unwarranted (and presently unlawful) conclusions. Results of group research should not be used to make decisions about the individual case. Introductory statistics books warn that the arithmetic mean does not necessarily describe any single person in the group, and that predicting the behavior of an individual on the basis of the "typical" behavior of his or her group is unwarranted.

At a more practical level, consideration of group findings when making decisions about individuals is unlawful and violates a host of civil rights laws. It may be very interesting to discover that "on the average," women do less well in mathematics than men. It is unlawful, however, to deny a woman a job that requires mathematics skills on the basis that women as a group are less competent mathematicians than men. Similarly, although research may show that people in wheelchairs "as a rule" require more time to accomplish certain physical tasks than able-bodied people, it is illegal to deny a wheelchair user employment on the basis of an untested belief s/he will be as slow as the average "cripple."

For many years, the general society was controlled by Aristotleian beliefs (real or imagined) about groups. It was commonplace to judge individuals in terms of their membership in one or another group (i.e., blacks are poor students and should be denied admission to college; women are weaker than men and should not be drafted; women live longer than men and should receive less payment per month from retirement funds; people with disabilities are poor safety risks and should not be hired; people over 35 years of age are not physically fit to become police officers). The whole civil rights movement can be conceptualized as a reaction against primitive Aristotleian concepts. Records of many discrimination cases that have gone to trial are sagas of the continuing conflict between Aristotleian (defense) and Galileian (prosecution) modes of thought.

In summary, a strictly Aristotleian approach to research is not likely to generate information that will help solve important social problems faced by individuals or by groups in the real world.

A GALILEIAN APPROACH TO THE STUDY OF DISABILITY

Research studies that demonstrate the conditions under which problems can be solved are likely to make practical contributions to an applied field. Piagetian, Skinnerian, and Lewinian theories, all examples of

Galileian philosophy, have each generated useful research and practice in rehabilitation psychology.

For example, working within the framework of Piagetian theory, Hans Furth devoted a career to the study of cognitive development in deaf children. Valuable contributions have resulted, not only for the education of deaf children (Furth, 1964) but for general education (Furth & Wachs, 1975), and the refinement of the theory itself (Furth, 1969).

Skinnerian operant conditioning principles were applied early to improve physical and social behaviors of people with developmental and other physical disabilities (Meyerson & Michael, 1962, 1963; Meyerson, Michael, Mowrer, Osgood, & Staats, 1963; Meyerson, Kerr & Michael, 1967; Bailey & Meyerson, 1970). Literally thousands of research studies have demonstrated the usefulness of behavior modification techniques in education and rehabilitation. The practical impact is that behavior modification principles have become the primary teaching strategy for developmentally disabled people. Today, in every state of the Union legislation requires that these students—many of whom were previously thought "too disabled to learn"—have an Individualized Educational Program.

Similarly, in Field Theory, Kurt Lewin's (1935) experimentation and interpretations of the behavior of mentally retarded people are as relevant now as when they were done. Several of Lewin's students and colleagues became the "core" group of psychologists who conceptualized the problems of physical disability in terms of field theoretical concepts. Notable among these are Tamara Dembo, Beatrice and Eric Wright, Gloria LaDieu-Leviton, Roger Barker, and Lee Meyerson, all of whom have made unique contributions to a theoretical analysis of relationships between physique and behavior. The implications of Field Theory for research and practice in Rehabilitation Psychology are the focus of the remainder of this article.

Somatopsychology: An Application of Field Theory to the Study of Disability

For more than forty years, research on people with disabilities, most of which has been of Aristotleian design, has yielded a three sets of consistent findings which need to be explained and reconciled theoretically:

1) When groups of disabled and able-bodied people are compared on almost any variable imaginable, the distribution of scores for the physically disabled group usually has a lower (poorer) mean than the distribution for able bodied people. It does not matter what variable is studied—I.Q., economic status, amount of education, degree of adjustment, self-esteem, acceptance by peers, amount of stress, to name a few—the findings generally show two overlapping distributions of scores with the

disabled in the inferior position. Therefore, empirical research continues to affirm, as it did decades ago (Barker, Wright, Meyerson & Gonick, 1953), the common sense observation that, on the average, people with disabilities experience more problems, more frequently, than do their able-bodied counterparts. What accounts for that persistent group difference?

2) In studies comparing disabled and able-bodied groups, there is almost always a *distribution* of scores in each group. Some people with disabilities score very high on whatever is being measured, and some able-bodied people score low. What accounts for the fact that among people with the same disability, some function well and others function poorly?

3) The research indicates that even though the disability remains constant, people often change from one time to another. A poorly adjusted person may become well adjusted; someone who at one time had high self-esteem, may become filled with self-doubts. What accounts for the fact that a myriad of other variables can change over time while the disability remains constant?

The second and third sets of very stable findings should be sufficient to refute the common sense notion that disability per se causes anyone to think, feel or behave in the particular ways that are of interest to social psychologists. These findings do *not* permit one to say, "John has low self-esteem, is not accepted by his peers, or is poorly adjusted, because he is disabled." Nor would they permit a conclusion that Robert has high self-esteem, is popular with his peers, or is well-adjusted, *because* he has a disability. Nevertheless, the first set of findings—the different distributions of scores between people with and without disabilities—does not permit a conclusion that disability is irrelevant to important psychological variables.

Some indirect relationships must exist between disability and psychological variables. Rehabilitation psychologists need research based on theory (a) to discover what those relationships are, and, most important, (b) to discover the conditions under which "problem" feelings, thoughts, and behavior can be remediated—even when the disability is permanent.

Lewin's Field Theory provides an optimal framework for meeting these two needs. Basic assumptions of Field Theory dictate that there can be no "special psychology of disability." If the laws of human behavior have exceptionless validity, then people with disabilities are governed by the same principles as everyone else.

There is a body of writing which demonstrates specifically how Lewinian theory can be applied to understanding people with disabilities. Under the rubric of Somatopsychology (the study of the relationships

between physique and behavior, particularly social behavior), the most direct theoretical presentations are to be found in the writings of Barker, Wright, Meyerson and Gonick (1953) and Meyerson (1963). These and other writings by this group remain among the most frequently cited works in rehabilitation psychology today (Elliott & Byrd, 1986).

Proponents of Field Theory may have had more impact on actual practice than on the generation of scientific research. The early issue of the *Journal of Social Issues* (Meyerson, 1948) that was devoted to disability concerns, for example, suggested enactment of a federal law prohibiting discrimination, and defined the notion of mainstreaming children with disabilities into the public schools. Beatrice Wright's (1983) crusade against use of devaluating nomenclature when discussing people with disabilities has resulted in a change of editorial policy of many professional journals (no longer does one write about "epileptics," for example), and in name changes of such large organizations as the National Easter Seal Society (formerly, The National Society for Crippled Children and Adults). Nevertheless, Field Theory in general, and Somatopsychology in particular, continue to have high potential for facilitating valuable scientific research.

Of special import in Somatopsychology, highlighted by Meyerson (1963), are four central points:

1) Application of Field Theory takes the disability out of the person and describes the ability or inability to perform an act in terms of the *interaction* between the person and the environment. If there is a good "match" between the person and the environment, the disabled person will be able to function—physically, socially, and emotionally.

2) Field Theory, because it relies on contemporaneous rather than historical variables to understand a problem, often suggests what must be changed to solve a problem. There is a difference between what is, and what must be.

3) A disability (with the possible exception of physical damage or chemical imbalances in the brain or endocrine system) is a physical, phenotypic variable which, according to Field Theory, does not and cannot directly cause behavior. Behavior must be explained in terms of the psychological situation (life space) and the perceived interaction between the person and environment that lies therein. It is the person's perception of a situation that controls how s/he thinks, feels, and behaves. Perceptions can change—even when a disability remains constant. Often the disability cannot be changed; but how the person feels about it can be changed.

4) By invoking the psychological situation as an explanatory concept and analyzing its properties, the three major sets of research findings about people with disabilities can be attributed, not to the physical

disability, but to differences in the structure of the life space. The frequency of problems and distress a person experiences depends on the frequency with which s/he experiences New, Overlapping, and Excluding Psychological Situations (Barker et al., 1953). To the degree that New Situations can be structured, Overlap reduced, and Barriers removed in the Psychological Situations, the person can be freed from the problems and pursue his/her goals.

In short, Field Theory provides a framework on which practical, useful research about disability problems can be based. One would anticipate that in the ensuing years, a large body of scientific evidence would have accumulated—data that would demonstrate the conditions under which problems of people with disabilities could be solved, and data that would hone and refine the theory itself. However, as is the case with other social/psychological domains, Field Theory has not generated a large mass of scientific, data-based research.

Paucity of Disability Research Based on Field Theory: What Went Wrong?

Lewin made one assumption in his classic 1931 paper that has proven very wrong. He assumed that, when psychologists adopted Galileian strategies for research, precise methods for measuring relevant psychological variables would emerge. He envisioned the day when psychologists, like their counterparts in the physical sciences, would systematically design one experiment after another—"teasing out" the controlling variables until a statement could be made about the conditions under which a particular behavior would or would not occur in a particular situation. By replicating those theoretical conditions, in increasingly varied and complex phenotypic situations, a general genotypic statement—backed by concrete data—could be made and the question under study would be answered.

However, such systematic, step-by-step application of the scientific method—the strategy that allowed scientists from other fields to progress from the Wright brothers' first flight to landing a man on the moon—requires systematic measurement, recording, and analysis of data. Social scientists cannot hope to discover, test, and refine hypotheses to the point of establishing psychological laws that have "exceptionless validity" if they do not produce measurable data.

The lack of measurement techniques for Field Theory research has resulted in three outcomes. First, some researchers continue to cast the important "process" or "interaction" variables into "person" variables. They form groups of subjects, and proceed with Aristotleian designs and statistical analyses which camouflage the very data that might establish

the conditions under which a problem could be solved (see Barker et al., 1953; Shontz, 1970).

Second, some "Galileian" researchers—convinced of the importance of the individual case and dubious about the usefulness of group statistical procedures—have forsaken any systematic attempt to gather data, to measure variables, or to summarize and report their findings fully and precisely. For example, some interview studies describe the conclusions the authors drew. Excerpts that support the investigators' point of view are quoted, but independent evaluation of the data is not possible. Although such articles are interesting, they are of limited value. The perceptions of the authors cannot be distinguished from those of the subjects. It becomes a matter of faith whether the conclusions are justified, or the authors are suffering from selective perception.

Finally, some investigators, Meyerson and Kerr to name but two, have continued to use Field Theory as a productive way to think about problems but have turned to another Galileian theory—Skinnerian Operant Conditioning—as a framework for conducting data-based research (see Kerr, 1976). Skinner's postulates are stated in terms of operationally defined concepts, and the methods for observing and recording changes in behavior are precise and well delineated. The restrictive aspect of operant research, however, is that the methods lend themselves best to active experimental (rather than descriptive) studies, and to the analysis of overt behavior (rather than more phenomenological perceptions, feelings, thoughts, and meanings).

New Horizons for Field Theory Based Research

The time may be ripe for Field Theorists in general, and rehabilitation psychologists in particular, to enhance a highly useful theory by making concerted effort to develop research designs and measurement methods that will:

(a) facilitate understanding of the ways people—even those with disabilities— interact with their environments,

(b) generate solutions to real problems—including those unique to the disability experience, and

(c) permit refinement of Field Theory itself.

There is cause for optimism. Good examples of Galileian research based on Field Theory, though not abundant, are scattered throughout the literature and can be consolidated to provide guidelines for further development of methods. For example, *The Lewin Legacy* (Stivers & Wheelan, 1986) contains several chapters on methodological developments useful for Field Theory research. *Ecological Psychology* (Reynolds, Gutkin, Elliott, & Witt, 1984), based on Roger Barker's (1965, 1968) work, has been helpful to many in educational circles. Increasingly, formal courses

on qualitative research methods are included in the training of psychologists. The methods of other Galileian theories, such as Skinner's single-organism design, can be expanded to handle descriptive and phenomenological data. The development and demonstration of "Galileian" uses of statistical procedures are within reach.

Characteristics of "Good" Methods for Field Theory Based Research in Rehabilitation Psychology

Psychologists well-indoctrinated in Aristotleian research design, sometimes ask, "If I wanted to use a Field Theory approach to answer a question about people with disabilities, how would I design a study in the Galileian mode?" The options are so numerous that there are no pat answers to the question. The following list of suggestions is only a rough approximation to the characteristics based on what one might expect to find in a "good" Field Theory design. There is no intention to imply that they constitute either necessary or sufficient conditions for the conduct of useful research. Nevertheless, they may stimulate thought about how better to characterize research that remains true to the postulates of a Lewinian approach to the study of human behavior.

1. *Be willing to obtain more information about fewer people than in a typical Aristotleian design.*

An individual interview procedure is preferable to "paper and pencil" measures administered to groups. Consider greater use of open ended questions rather than forced choice, and place more emphasis on learning *why* responses are made.

For example, Leviton (1973) studied professional/disabled client relationships, by conducting in-depth interviews with 6 groups of clients and professionals to discover their feelings about 7 rehabilitation issues (who should control the decision making during rehabilitation, how great a value should be placed on independence, safety vs. risk taking, etc.). Responses to open-ended questions first were coded to show each person's position on each issue; and second, the reasons why each position was adopted were enumerated.

Even when the scope of inquiry is more restricted, the interview is usually preferred. For example, Tackett (1986) asked children with disabilities and their mothers, in independent interviews, to list stressors the child experienced. The interview format allowed fuller elaboration than if the person had been asked to write a list or complete a prepackaged inventory.

Harper, Wacker, and Cobb (1986) used individual interviews even when the task was for children with and without disabilities to rank pictures of children with different disabilities as suitable companions for several in different activities. The reasons they gave for making specific choices were as instructive as the actual rankings themselves.

2. *Emphasize full and accurate recording and reporting of the observed behavior and/or statements made by the subject.*

In disability research, in particular, investigators are apt to hold many unconscious stereotypes about the significance of disability. It is especially important to safeguard against the premature intrusion of interpretation into data.

One such safeguard is the use of an open-ended interview format because it allows maximal opportunity for the person to say what is on his/her mind. Forced choice questionnaires are much more vulnerable to investigator bias. For example, one study described the researcher's attempt to determine how life changes when a person begins to use dialysis. The questionnaire about activities, family, friends, goals, etc., required the subject to place a check mark on a continuum that ranged from "no change" to several degrees of disaster. The instrument did not allow for the possibility that positive changes might occur in the person's life.

A second safeguard is using verbatim recordings or videotapes of behavior as the data of a study instead of notes made by the investigator. When these raw data are summarized or coded into response categories, any biases of the data collector are minimized.

Although published studies rarely report the methods employed for forming response categories for interview material, our experience has demonstrated the construction of categories and the coding of individual statements into categories is one of the most likely places that investigators' beliefs and values may creep into the data. If for example, investigators truly believe that the many stressors a disabled person experiences are caused directly by the disability, they are apt to set up a category of "stresses caused by disability" and sort many more responses into it than the actual statements of subjects warrant.

To reduce the incidence of such problems, we have adopted the following procedures. Two or more investigators, including whoever conducted the interviews, define the categories on a logical basis and compose written descriptions of the kinds of responses to be included in each category. These descriptions must be very specific to evaluate adequacy of categories and reliability of the coding. Two independent raters, who know nothing about the subjects, their physical limitations, or the aims of the study, are then asked to code the responses into those categories and a measure of reliability is computed.

3. *Choose variables to study that are likely to be genotypic/psycho-logical rather than phenotypic/physical.*

Because behavior is a function of the person's perception of a situation (person and environment), independent variables are likely to

reflect some aspect of the life space: *Perceived* needs, skills, expectations, values, barriers, or goals. Nonpsychological variables such as sex, race, amount of education, socioeconomic or marital status, type or severity of disability, are phenotypic/physical variables. Although interesting to report, they are rarely controlling variables in Lewinian theory, and therefore, should not be the focus of study.

Researchers with an Aristotleian bent have shown repeatedly that, on the average, young, white, wealthy, well-educated, married females make better adjustments to disability than older, black, low-income, poorly educated, single males. Of course there are always exceptions: Some of the former are miserable and some of the latter are quite happy. These findings are of little use to rehabilitation workers, who seek the conditions under which any disabled person can function optimally with a disability. There is no way to change an old, black man into a young, white woman even if that were desired. The study of static, nonmanipulable variables does not lead to problem resolution.

A Lewinian might conceptualize adjustment to misfortune as Dembo, Leviton, and Wright (1948) did—as a change in values. Some relevant research questions might be: Under what conditions does the value one places on "normal" physique become less important to the person? Under what conditions can a person with a disability reach his/her goals?

Because the Psychological Situation (Life Space) is altered only through experience (covert or overt), variables such as age, time since onset of disability, length of hospitalization, or place of residence (rural/urban, institution/home) are also phenotypic (i.e., associated but irrelevant) variables. Clock time and geographic space are simply the "containers" in which experience occurs. As such, they are not logical causal, independent variables. However, disruptions in *perceived* time and space, as Ainlay (1988) so aptly demonstrated, may have important consequences in altering the life space.

The phenotypic/genotypic distinction is also clear in studies of assessment of adjustment to disability. Typical Aristotleian measures of adjustment often take the form of inquiries into whether the person with a disability does the same things that the investigator does. For example, if the person has a job, is married, and does not change residence very often, he or she is apt to be considered well-adjusted.

One of many possible Lewinian measures of adjustment stemmed from the notion that for the "adjusted" person, the disability becomes less psychologically central. Life no longer revolves around the disability, and the disability is no longer blamed for everything that may go wrong. Tackett et al. (1990), when assessing stressors as perceived by children with disabilities and their mothers, asked each participant to rate each

stressor on a continuum that ranged from "the disability has nothing to do with this problem" to "this problem is caused by the disability." She found that each child and his or her mother varied in their perceptions of the effects of the child's disability. Although this procedure for measuring "centrality of disability" remains to be validated, Tackett's findings suggest that it holds promise both for assessing and measuring changes in adjustment to disability.

4. *Whenever possible, as in Lewinian research, focus on, and measure directly, the interaction between the Person and the Environment (physical or social) rather than on either P or E alone.*

Because behavior is a function of the *interaction* between the person and the environment, there is merit in measuring the interaction itself and employing changes in the interaction "score" to predict changes in behavior. For example, Tackett et al. (1990) used a correlational technique to compare the degree to which each mother could identify what her child with a disability found stressful. A -1.0 correlation represented a mother who believed the child was subject to a whole set of stressors that were not reported by her child, and, at the same time, failed to note any of the stressors that the child did report. Conversely, a correlation of +1.0 represented a mother who perceived only the stressors that her child reported and none that the child did not report. The individual correlation derived between each mother and her child became a "dyad score" which reflected how well each mother comprehended what troubled her child. The dyad scores were then correlated (for the whole group), with each child's assessment of the amount of stress he or she experienced. Those data permitted a test of the hypothesis that children of mothers who understand what bothers them experience less stress than children of less perceptive mothers.

Changes in dyad scores can also be used to assess the effectiveness of interventions designed to help mothers gain a better understanding of what stresses their children. Over a period of time, the concrete (phenotypic) problems would be expected to change (as a function of new experience), but the dyad score would remain a measure of how well the mother identifies her child's problem at any given moment.

Measuring the outcome of episodes (positive, neutral, or negative) is a long-standing method for measuring the interaction variable (Barker, 1968). By definition, an episode encompasses an interaction between a person and the environment. Episode outcomes were measured (Fehr, Dybsky, Wacker, Kerr, & Kerr, 1979) to determine the conditions under which a person in a wheelchair would, or would not, obtain appropriate, desired, help from strangers in a shopping center—a push up a ramp, a door opened, an item from a high shelf, etc. An episode was defined as

follows: A person who used a wheelchair would attempt a task when at least 10 potential helpers (shoppers) were nearby. If no help was received within one minute, the person in the wheelchair "gave up" and went to another part of the shopping center (negative outcome). If help was given in a pleasant and efficient manner, the outcome was scored positive. Four hundred episodes were run under several conditions. For example, the person in the wheelchair sat and struggled to do the task without looking around or the person looked around and made a direct polite request of a stranger who made eye contact. The number of positive outcomes under each condition were reported, and chi-square statistics supported the belief that the variations in percent of successful outcomes under different conditions did not occur because of uncontrolled variations in the different shoppers available in each episode.

The Psychological Situation (Life Space) itself is an ideal interaction variable because, by definition, it encompasses the person's perception of self in an environmental context. Until recently, it was not easy to discover a way to state, for research purposes, the kind of psychological situation a person was in with any degree of validity or reliability. It is relatively easy for a subject to describe a concrete (phenotypic) stress or satisfaction. But Field Theory holds that the same concrete event may put one person in a new psychological situation and another in an overlapping or excluding one. It is not the prerogative of an investigator to tell a person how s/he feels about the event, or how s/he perceives it. However, our efforts to induce subjects to conceptualize concrete events in terms of one or more psychological situations met with failure because lay people did not readily understand all those Lewinian "bathtubs."

Underwood (1987) approached this problem by translating into cartoon-like pictures, the psychological situations that Meyerson and Kerr had suggested represent all possible combinations of Happy and Stressing Psychological Situations (Kerr, 1976). In Underwood's study, the person depicted is a caricature of a real person; positive and negative valences are represented by smiling suns and lightning with rain clouds similar to those which appear on TV weather maps. Pathways may contain jagged rocks or a smooth surface lined with flowers; barriers are brick walls. Results show that adults had little difficulty assigning their stresses and satisfactions to a particular picture and giving logical reasons for their choices. Also, subjects have called our attention to an additional picture that is needed: For some people, a hurdle in the pathway could be viewed as a positive challenge rather than as a negative barrier. Through this beginning exploration of the method, we were made aware of a possible Psychological Situation that we had not considered previously.

Finally, there are endless ways to arrange experimental situations in

a way that requires the consideration of a person in a context. The Harper, Wacker, and Cobb (1986) study cited earlier is one such example. The preference rating used there is a single "score" that denotes a judge's assessment of a particular disabled person in a particular context.

Another example was provided by Beatrice Wright. Unlike the Aristotleian-type results often reported when a professor requests students in rehabilitation to become "disabled for a day" so they obtain some understanding of what it is like, Beatrice Wright (1983) asked her students to use a wheelchair to accomplish two tasks on the university campus—go to the Student Union for lunch, and find a book in the library and check it out. She insured that one task could be accomplished in a barrier free environment and that the other took the student on a route filled with architectural barriers. Even such brief experience made students very aware that the significance of disability depends, in part, on whether one tries to function in a friendly or a hostile environment. Although this procedure has not yet been used in formal research, its possibilities as a means of studying people with disabilities in a context are obvious.

5. *Emulate Lewinian researchers by studying contemporaneous rather than historical variables.*

Because Field Theory explains behavior in terms of "here-and-now" variables, and suggests what must be changed in the Life Space to solve a problem, the findings of Field Theory-based research are likely to have immediate applicability to real-world problems. Even purely descriptive studies yield data that can be useful in practice.

For example, the findings of Tackett's (1986) study showed that most mothers were quite unaware of stressors their children reported as important. If one wished to teach mothers how to help their children manage and overcome the stressors they experience, an obvious first step in such training would be to improve communication about problems between parents and children.

6. *Use Lewinian methods for reporting data, emphasizing the total range of responses made by subjects.*

Because, in Field Theory, the unusual case is as important as the frequently occurring one, data are likely to be presented in graphs or tables that allow the reader to see how each person responded. For example, Makas (1988) showed a table of the percentage of people with disabilities who did and did not object to being considered a "saint." Leviton (1973) generated bar graphs to show how many people in each of six groups took a pro-, con-, or neutral stand on each of several issues.

In short, in Field Theory research, *all* of the data are important and worth reporting. It is the process of discovering what differentiates the

exceptional case from the frequently occurring one that will ultimately yield the most useful answers to questions about the problems of disability.

7. *Remember that Galileian proof is more demanding than what is commonly accepted in Aristotleian studies.*

Because Field Theorists search for laws (or even support for single hypotheses) that have no exceptions, the most critical data to report are statements of *how many* (or what percentage) of the people under study performed in a similar way. If a finding holds for 90% of the people or episodes recorded, then one might predict that in a similar situation, the hypothesis would again be confirmed in 9 of 10 cases. The next research might then seek to discover what is different about the 10th case. In other words, each case or episode represents a single, complete "experiment." A possible relationship between two variables can be confirmed or disconfirmed for each case. Each additional case is a replication of the original "N = 1 experiment." There is no rejection of a null hypothesis; even *one* disconfirming case must call the hypothesis or law into question.

For example, in the study about obtaining help from strangers, in the condition in which the person in a wheelchair made a direct request, help was forthcoming in 200 consecutive episodes (100%). A hypothesis that a direct request would elicit appropriate help was confirmed and supported by 200 consecutive replications, even though other aspects of the situation varied from one episode to the next, other behaviors of the person in the wheelchair were systematically altered, five different tasks were employed, and the potential helpers were different people in each episode. The prediction from these data is that if a person in a wheelchair desires small amounts of help in a public place, the probability that a direct request *will not* produce a positive outcome is zero.

When the person in a wheelchair simply struggled to perform the task, help was offered in only 50% of the episodes. Therefore, a hypothesis that struggling unsuccessfully with a task will elicit help was not supported, and further research would be needed to discover why "struggling" produced such mixed responses. The prediction from the existing data to similar situations is that there is a 50/50 chance of receiving an offer of help under "struggling" conditions.

8. *Field Theory researchers need not be "anti-statistical."*

Although an answer to the "How many..." question just described is the most important evidence to present, there is nothing wrong with showing, in addition, that two groups or conditions differ from each other in a statistically significant way. Some granting agencies and editors require a show of statistical significance. Some readers, embedded in Aristotleian thought, do not know what meaning to assign to data that

have not been subjected to traditional statistical analyses. By considering the wishes of others, the Field Theory researcher can reach and communicate to larger audiences than might otherwise be possible.

In addition to knowing how many participants in a study supported a hypothesis, it may be desirable to know, in some instances, which group performed better on the average. The group statistic answers a different question than does the "how many..." question. For example, the most important question of the study on obtaining help, was "Under what conditions can a person in a wheelchair obtain help whenever he or she needs or wants it?"

The secondary—and different—question was: Is one set of conditions better than another for eliciting help? The number of episodes (200) run under each of the major conditions (request and struggling) was so large and the differences in the percentages of successful outcomes was so great, that a statistic was not necessary to answer the question and the chi-square was shown only to increase the comfort of Aristotleian readers. However, in studies where Ns are small and uncontrolled variables may not be fully randomized, it is necessary to demonstrate that the different proportions of confirming responses shown by two groups is greater than would be expected by chance. In the help study, for example, chi-square statistics showed that the difference between 100% and 50% constituted a statistically significant, as well as meaningful, difference. If the number of episodes had been very small (e.g., four episodes in each condition), a variation between 50% and 100% could easily occur as a function of different shoppers who were nearby in each episode. In that case, any conclusion that one strategy was more effective than another would be unwarranted.

In the context of Field Theory, statistical methods can provide valuable information about relationships between individual dyads (e.g., mother/child perceptions, already mentioned) and between variables within a person or environment. For example, Tackett (1986) sought to determine whether the amount of stress a child experienced about each problem was associated with the degree to which the child thought the stressor was caused by the disability. She computed a correlation for each of 20 children between his/her "amount of stress" per item and "contribution of disability" for the same item. The results showed that the individual correlations ranged from -.60 (most stressful problems associated with nondisability problems) to +1.00 (major stressors associated with problems caused by the disability). The implication for rehabilitation personnel is that whether a given child believes his or her most stressful problems stem from disability is highly idiosyncratic; and that information, if desired, should be obtained from each child with whom the professional works.

9. *Consider that the unit employed for measuring variables in Field Theory research is likely to be more molar (high/medium/low; positive/negative, etc.) than in Aristotleian research designs; there is likely to be frequent use of nominal and ordinal scales, rather than interval scales; and the meaning of a "score" on a variable is likely to be criterion-referenced rather than normative.*

A technical analysis of the details of measurement is beyond the scope of this discussion. However, only if researchers insist on measuring psychological variables in logically meaningful units, will we advance toward the ultimate goal of establishing THE CONDITIONS UNDER WHICH behavior of the individual case can be accurately explained, predicted, and changed.

CONCLUSION

Over sixty years ago, Kurt Lewin contrasted Aristotleian and Galileian philosophies of science. At that time, he speculated that "psychology...is not far from the time when the dominance of Aristotleian concepts will be replaced by that of the Galileian mode of thought" (Lewin, 1931). While some psychological researchers have embraced Galileian philosophy, others have tended to continue along Aristotleian lines, with many of today's psychologists equating Aristotleian methods with "true science." As a result, only limited progress has been made in understanding social psychological aspects of disability. Perhaps because of an adherence to Aristotleian philosophy,

> Studies of disability and personality often appear to be investigations of convenience, rather than programs of investigation designed to pursue to the end the answer to some particular question. As a result, much valuable time and talent is wasted, not only in the conduct of unproductive research, but also in the rapid accumulation of uninstructive reports which others must periodically take the time to review. (Shontz, 1970, p. 62)

Present and future researchers need to be well-versed in *both* Aristotleian and Galileian philosophies and be careful to tailor their research (with its underlying philosophy) to the question and the purpose.

The Aristotleian approach may be useful in answering many questions about disability. For example, the Aristotleian approach may be most appropriate for finding answers to public health questions; e.g., how prevalent is a particular health problem in a community? How should administrators best address the problem and with what resources? The beginning focus of these questions is the group. The end focus of these questions is the group. Another example in which the Aristotleian approach may be most appropriate is in determining the attitudes of the non-

disabled population toward the disabled. Explorations seeking a statistical mean are best conducted using the Aristotleian approach.

The Galileian approach may be most useful in the exploration of characteristics about the individual at the "tails" of a statistical distribution. In addition, the Galileian approach is most important in research involving the individual's interaction with the environment or in comparing the individual's reactions to differing environments. Research that is conducted to seek answers about what environments are optimal for an individual is best conducted with a Galileian focus.

The difference between the two approaches lies in the focus of the questions and answers sought. When the focus of the question and answer is the group or the mean of the group, an Aristotleian approach may be most relevant and useful. When the focus of the question and answer is the individual within a group or in relation to an environment, the Galileian approach is optimal.

Reliance on Aristotleian methods needs to be balanced with Galileian methods, as both Aristotleian and Galileian designs have an equally valid place in disability research. Both philosophies can be characterized as "true" or "hard" science. When researchers have as clear an understanding of Galileian philosophy as they currently have of Aristotleian philosophy, they will learn that Galileian research is useful for more than just pilot work. Perhaps then, real progress will be made in this area, and people with disabilities will be the ultimate benefactors.

REFERENCES

Ainlay, S. (1988). Aging and new vision loss: Disruptions of the here and now. *Journal of Social Issues, 44*(1), 79–94.

Bailey, J., & Meyerson, L. (1970). Effect of vibratory stimulation on a retardate's self-injurious behavior. *Rehabilitation Psychology, 17,* 133–137.

Barker, R. (1965). Explorations in ecological psychology. *American Psychologist, 20,* 1–14.

Barker, R. (1968). *Ecological psychology.* Stanford, CA: Stanford University Press.

Barker, R., Wright, B.A., Meyerson, L., & Gonick, M. (1953). *Adjustment to physical handicap and illness: A survey of the social psychology of physique and disability.* New York: Social Science Research Council.

Brown, J.F. (1936). *Psychology and the social order.* New York: McGraw-Hill.

Dembo, T. (1969). Rehabilitation psychology and its immediate future: A problem of utilization of psychological knowledge. *Rehabilitation Psychology, 16,* 63–72.

Dembo, T., Leviton, G.L., & Wright, B.A. (1975). Adjustment to misfortune: A problem of social psychological rehabilitation. *Rehabilitation Psychology, 22,* 1–100.

Elliott, T.R., & Byrd, E.K. (1986). Frequently cited works, authors, and sources of research in Rehabilitation Psychology. *Rehabilitation Psychology, 31*(2), 111–115.

Fehr, M., Dybsky, A., Wacker, D., Kerr, J., & Kerr, N. (1979). Obtaining help from strangers. *Rehabilitation Psychology, 26,* 1–6.

Fine, M., & Asch, A. (1988). Disability beyond stigma: Social interaction, discrimination, and activism. *Journal of Social Issues, 44*(1), 3–21.

Furth, H.G. (1969). *Piaget and knowledge.* New Jersey: Prentice-Hall.

Furth, H.G., & Wachs, H. (1975). *Piaget's theory in practice: Thinking goes to school.* New York: Oxford University Press.

Harper, D.C., Wacker, D.P., & Cobb, L.S. (1986). Children's social preferences toward peers with visible physical differences. *Journal of Pediatric Psychology, 11,* 323–342.

Kerr, N. (1976). Field theory and behavior modification in rehabilitation: Tools for twin tasks. *Rehabilitation Psychology, 23*(4), 97–100.

Kuhn, T.W. (1962). *The structure of scientific revolutions.* Chicago: University of Chicago Press.

Leviton, G.L. (1973). Professional and client viewpoints on rehabilitation issues. *Rehabilitation Psychology, 20,* 1–80.

Lewin, K. (1931). The conflict between Aristotleian and Galileian modes of thought in contemporary psychology. *Journal of General Psychology, 5,* 141–177.

Lewin, K. (1935). *A dynamic theory of personality.* New York: McGraw-Hill.

Makas, E. (1988). Positive attitudes toward disabled people: Disabled and non-disabled persons' perspectives. *Journal of Social Issues, 44*(1), 49–61.

Meyerson, L. (Ed.). (1948). The social psychology of physical disability. *Journal of Social Issues, 4,* 2–111.

Meyerson, L. (1963). Somatopsychology of physical disability. In W. Cruickshank (Ed.), *Psychology of exceptional children and youth* (2nd ed., pp. 1–52). Englewood Cliffs, NJ: Prentice-Hall.

Meyerson, L. (1971). Somatopsychology of physical disability. In W. Cruickshank (Ed.), *Psychology of exceptional children and youth* (3rd ed., pp. 1–74). New York: Prentice Hall.

Meyerson, L., Kerr, N., & Michael, J.L. (1967). Behavior modification in rehabilitation. In S.B. Bijou & D.M. Baer (Eds.), *Child development: Readings in experimental analysis.* New York: Appleton-Century-Crofts.

Meyerson, L., & Michael, J.L. (1962). A behavioral approach to counseling and guidance. *Harvard Educational Review, 32, 382–402.* (Reprinted in Ulrich, Mabry, & Stackwick (Eds.), Control of human behavior. Glenview, IL: Scott.)

Meyerson, L., & Michael, J.L. (1963). The measurement of sensory thresholds in exceptional children: An experimental approach to some problems of differential diagnosis and education with special reference to hearing. (Office of Education, Cooperative Research Project No. 418). *Monographs in Somatopsychology, 1960, 4,* 1–58. (Also in *Proceedings, International Congress on the Education of the Deaf.* Washington, D.C.; Gallaudet College, 1963.)

Meyerson, L., Michael, J.L., Mowrer, O.H., Osgood, C., & Staats, A.W. (1963). Learning, behavior, and rehabilitation. In L. Lofquist (Ed.), *Psychological research and rehabilitation* (pp. 68–111). Washington DC: American Psychological Association.

Reynolds, C.R., Gutkin, T.B., Elliott, S.N., & Witt, J.C. (1984). *School psychology, essentials of theory and practice.* New York: John Wiley.

Shontz, F.C. (1970). Physical disability and personality: Theory and recent research. *Psychological Aspects of Disability, 17*(2), 51–69.

Shurka, E., Siller, J., & Dvonch, P. (1982). Coping behavior and personal responsibility as factors in the perception of disabled persons by the nondisabled. *Rehabilitation Psychology, 27,* 225–233.

Stivers, E., & Wheelan, S.A. (Eds.). (1986). *The Lewin legacy.* New York: Springer-Verlag.

Tackett, P.A. (1986). *Stresses as perceived by physically disabled children and their mothers.* Unpublished master's thesis, Arizona State University, Tempe, AZ.

Tackett, P.A., Kerr, N., & Helmstadter, E. (1990). Stresses as perceived by children with physical disabilities and their mothers. *Journal of Rehabilitation, 56*(3), 30–34.

Underwood, K.A. (1987). *A theoretical analysis of stresses and satisfactions of elementary school teachers.* Unpublished master's thesis, Arizona State University Library.

Witt, J.C. (1986). *Theoretical and empirical commonalities between rehabilitation psychology and school psychology.* Paper presented at the 94th Annual Meeting of the American Psychological Association, Washington, DC.

Wright, B.A. (1983). *Physical disability: A psychosocial approach* (2nd ed.). New York: Harper & Row.