THE INTERBEHAVIORIST

A Newsletter of Interbehavioral Psychology

Volume 19 1991 Number 2

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ISSN 8755-612X

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ISSN 8755-612X

Linda J. Hayes, Editor
Department of Psychology
University of Nevada
Reno, Nevada 89557, U.S.A.
702-784-1137

THE INTERBEHAVIORIST publishes news, information, discussion, journal and book notes, book reviews, comments, and brief articles pertaining to interbehavioral psychology — a contextualistic, integrated-field approach to the natural science of behavior.

The newsletter also publishes professional communications that fall between informal correspondence and colloquia, and formal archival publication. As such, the newsletter supplements contemporary journals dedicated to basic and applied research, to the history and philosophy of the behavioral sciences, and to professional issues in the field. The newsletter strongly encourages submission of notes about current professional activities of its subscribers, news and observations about interbehavioral psychology and related perspectives, comments on journal articles and books of interest, more extended book reviews, and brief articles. All submissions should be sent in duplicate hard copy and a single computer disk copy (any major word processor; any Mac or IBM disk format) to the editor and should conform to the style described in the Publication Manual of the American Psychological Association (3rd edition).

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Call for News

THE INTERBEHAVIORIST publishes news about subscribers' activities and information about others' activities that may be of interest to readers. If you have published an article, chapter, or book with an interbehavioral orientation, or have read one published by someone else, particularly if the source is obscure, please let us know about it.

The Agora

Conference Announcements

Association for Behavior Analysis
San Franscico, May 24-28, 1992

The 1992 ABA convention will be held at the Hyatt Regency Hotel. This meeting is a good opportunity for interbehaviorists to get together as the program always includes a number of interbehaviorially oriented presentations and a fair number of interbehaviorists usuallly attend the meeting. For further information about registration and hotel accomodations, contact: Shery Chamberlain, ABA, Wood Hall, Western Michigan University, Kalamazoo, MI 49008.

Nevada Conference on the Varieties of Scientific Contextualism
Reno, Nevada, January 3-5, 1992
Organizers: Steven Hayes, Linda Hayes, Hayne Reese & Ted Sarbin

A number of interbehaviorists are participating in a working conference on contextualistic positions in psychology. The papers will be published in a volume of proceedings by Context Press. For more information on the conference or the proceedings, contact Steven Hayes, Psychology Department, University of Nevada, Reno, NV 89557.

First International Congress on Behaviorism and the Sciences of Behavior
Guadalajara, Mexico, October 5-9, 1992
Organizers: Emilio Ribes Inesta and Peter Harzem.

Emilio Ribes has organized a special symposium on interbehavioral research and practice for this meeting featuring talks by both English and Spanish speaking interbehaviorists. The congress also features behavioral work of a theoretical and philosophical sort. For more information, contact: Peter Harzem, Psychology Department, Auburn University, Auburn, AL 36849.

That Little Extra

A number of additional subscribers made donations beyond their regular subscription fees for 1991. We thank: Patrick Ghezzi, Linda & Steve Hayes and James Herrick

E-Mail Addresses

The Interbehaviorist wishes to solicit E-mail addresses of its subscribers. Some were published in the last issue. To that list, we add the following:

Stephen Brown (this is a correction):
SBROWN@KENTVM
Linda Hayes
HAYES@EQUINOX.UNR.EDU

Interbehaviorists at ABA
Meeting Minutes, Atlanta, May 24, 1991

A small group of interbehaviorists took part in the annual meeting of **Interbehaviorists in ABA** held at the annual convention of the Association for Behavior Analysis in Atlanta. Linda Hayes chaired the meeting. The following items were discussed:

1. Election of Officers:

Hayes attempted to recruit a Communications and Membership chairperson to help build the membership base. There were no volunteers. There were no volunteers to serve as the ABA Program coordinator.

Debra Fredericks agreed to serve as a Student Coordinator for the group. She agreed to help organize an informal discussion among interbehaviorists at the 1992 convention.

2. ABA Program:

Members agreed that the Interbehavioral sessions had been well attended. A number of symposum topics were suggested for 1992 including: Private Events, to be chaired by Mark Swain and Interbehavioral Research Methodology, to be chaired by Tom Sharpe. Evolution, Ecology and Linguistics were also mentioned as possible topics by Sid Bijou and Noel Smith. Linda Hayes agreed to help Debra Fredericks organize an informal discussion among the group to follow the annual meeting.

Article

Seventy Years of the Interbehavioral Approach to Nature-Nurture

Harry C. Mahan
Oceanside, CA

The following paper presents a number of quotations from various sources covering the development of the interbehavioral approach to the heredity-environment controversy since 1921. It was prompted by the *Encyclopaedia Britannica* article entitled "Innate Factors in Human Behavior" by the late behavior geneticist, W. R. Thompson (Thompson, 1986). In the first paragraph of his article, Thompson makes the statement that, "One's hereditary endowment (genotype) predisposes one to become bright or dull, or to be prone to show specific personality traits fully as much as to be tall or short, or to have dark or light hair" (p. 718). Thompson begins, however, by discussing bodily characteristics and then moves on to genetically transmitted diseases such as sickle cell anemia, hemophilia, and enzyme defects, covering under psychological characteristics sensory limitations in gustation, vision, and audition.

It is hoped that the present paper will clarify some hitherto confusing differences between the nature of a psychological event and the biological equipment, including sensory, physiological, and biochemical functioning which are necessary for that event to occur.

> One of the first descriptions of the interbehavioral position relative to heredity vs. environment was in 1921 (Kantor, 1921) although reference was made to an earlier paper which had appeared the year before (Kantor, 1920). In the 1921 article Kantor states that: All complex responses are the operation of reaction systems gradually evolved through the integration of simpler reactions....The first forms of psychological behavior are very simple acts organized very gradually in the prenatal growth of the organism; these constitute the sole innate reactions of the organism and according to our way of thinking furnish a hypothetically inadequate basis for the belief in innate capacities and other fundamental types of reactions (p. 248).

This statement demonstrates that interbehavioral psychology is definitely a developmental psychology and that its subject is human action as it evolves during the life (both prenatal and postnatal) of a particular individual.

Several pages later in the same article Kantor emphasizes that he is not an environmentalist by saying:

> Let it be understood that one should not draw the conclusion from our argument that we are denying the potency of heredity in favor of the strength of the environment. Our argument assumes that the condition for adjustment is the presence of both the stimulating object and the reaction system (pg. 255).

For Kantor the subject matter of psychology was always the interaction between these two and for this interaction to take place one is as necessary as the other. No interaction can be fully understood without an understanding of its history.

Three years later Kantor (1924) clarified his concept of the ways in which biological equipment, which is indeed subject to heredity influences, can affect behavior. He discusses this as follows:

> Since we are dealing with the actual individual and his various responses, it is obvious that the psychological personality has a very definite biological foundation (p. 70)....The biological factors of personality exert a negative influence upon its development and operation. A person of slight stature will not be able to build up behavior equipment to perform certain actions which one of heavier

> stature will be able to acquire and perform....Again, an individual who has defective ear mechanisms should not attempt to develop musical traits for which normal organs are requisite; an individual having color blind retinae should not attempt to prepare himself for a career in which the distinction between hues is a prominent element. All of these biological factors clearly do influence personal development and operation but only in a negative way, for observe that the mere possession of the anatomical characteristics of an athlete does not mean that the individual will be an athlete, but rather that he will not be (biologically) prevented from being one. No evidence at all exists which indicates that a persons particular anatomical or physiological makeup determines in any sense his type of positive development, his intelligence, skills, capacities, etc. (p. 78).

Two years later in the second volume (1926) Kantor went on to discuss the relationship between the development of behavior capabilities and biological maturation:

> On the basis, then, of what kind of organism we have and its correlation with certain kinds of psychological phenomena we must consider the stage of maturity of the organism. Whatever possibilities originally exist in a certain organism for the development of psychological phenomena [behavior capabilities] we find that the specific development of its behavior circumstances is tied up with the individual's stage of maturation. The immature individual is unable to do various things which the mature organism is especially well fitted to perform.
>
> Once more we must give heed to our psychological defenses [our interbehavior principles]. The maturation of the organism must in no sense be thought of as an actual biological basis for psychological phenomena [interaction] whether the latter be assumed to be mental powers or processes, or actual responses to stimuli. Especially must we eschew any suggestions that psychological phenomena are functions of biological structures. It is impossible to disregard the fact that biological variations can only affect biological conditions....
>
> But all the time we have biological and psychological activities performed by the same organism. The more complex psychological action develops out of less complex psychological action. But naturally such developments must wait upon biological maturation (p. 367).

Shortly after the publication of his *Principles* Kantor (1929) published a volume on social psychology in which he presented interbehavior principles for this special field. One chapter is entitled "The Biological Implications of Cultural Conduct" (pp. 65-100) and in it he extends and elaborates the points which he had covered previously in the references from which the above quotations have been taken. There is also one additional point which should be touched on here since it is in direct disagreement with Freudian instinct theory which has recently (Cole & Cole, 1989) been cited as grounds for considering Freud's orientation biological in nature. Kantor's comments on instinct theories such as Freud's are as follows:

> We suggest that we must guard ourselves vigilantly against thinking that the limitations provided by complex evolutionary biological development are teleological processes and forces which are assumed to be responsible for the existence of specific human reactions. Even rigid scientists have been guilty of this intellectual crime. It appears exceedingly easy to ascribe all sorts of particular human actions to hypothetical structures and functions, upon the presumed analogy of genuine biological conditions of psychological phenomena. This type of thinking always goes further than merely assuming that biological structures and functions account for psychological conduct in general. It presupposes in addition that specific actions are actually caused by or founded upon particular biological structures and their functions.
>
> We recall a notable example of how behavior possibilities are translated into

> powers or forces of development. We refer to the theory that once was hailed as a revelation, namely that man in all his conditions of behavior is influenced by two so-called fundamental forces or biological functions, namely food and sex. While such a suggestion bespeaks an abstractionist philosophy, its insidious influence lies precisely in the circumstance that it may be easily connected with actual facts, namely the fundamental character of alimentary and sexual phenomena in biological events (pp. 71-72).

Actually, the concept of instincts, drives, and inborn motives is only remotely related to behavior genetics, but since drive theorists always tie their forces to biology and to the species wide presence of such forces it is a collateral subject worthy of discussion. During the past three quarters of a century it has been thought that instincts as governors of human behavior had been laid to rest on several occasions but they seem to creep back under different guises (see Maslow, Abraham, 1986) and with the widespread seductive influence of Freudian infiltration into mainstream psychology, new generations of psychologists fail to be on guard.

In 1933 Kantor published his introductory text in general psychology in which he continued to attempt to convince his readers that he was not an environmentalist (pp. 74-75). His argument was weakened, however, by his failure to include what he had already pointed out elsewhere, namely, that there are hereditary biological differences between individuals within species as well as between species. It remained for Kuo (1967) to independently develop exactly the same heredity—environment position as Kantor but this time it was made much clearer than before.

> Unlike Kantor, Kuo performed hundreds of experiments on behavior development in animals. He was well known as an animal behaviorist working in California until the 1920's when he moved his studies to China and eventually to Hong Kong, publishing once again in English in 1967. Although his volume published then was small, it included descriptions of his China studies in considerable detail and brought out several major premises of his theoretical position, which, although developed during observations of animal behavior, applies as well to humans. With respect to heredity environment, Kuo's thesis is that in scientific investigations of behavior development the concept of neither category is acceptable nor can they be made acceptable by joining them together. The subject matter of behavior epigenesis is behavior and to demonstrate how behavior shows it development under concrete historical conditions. This position is almost identical with that of Kantor except that Kuo goes farther into biological development. After devoting several pages to the castigation of the instinct theory (for which he became very well known in the 1920's) he turns to the nature/nurture problem as follows (references omitted from quotation):
>
> It must be clear that the concepts of nature and nurture are equally obsolete. Whatever an animal of any species is capable of doing is natural inasmuch as it is also a result of nurture. ...Is it not natural that parrots in the wild utter only wild noises, but vocalize human voices when brought up with human companions? The same Asian song thrushes can grow up to be eaters of small birds, but they can also become friendly or even protective to them. This has been accomplished without punishment or reward.
>
> In all these studies, it is not our purpose to determine which behavior is due to nature and which to nurture, or show how much to nature and how much to nurture, but rather to explore the potentials and limitations in creating new patterns. Statements like the following: (1) heredity and environment are both essential and inseparable in ontogeny, that is, one is complementary to the other in development, or (2) certain types of behavior patterns (such as the calls of parrots or mynahs in the wild) are natural or instinctive, that is,

not learned, while other patterns (such as human vocalizations when parrots or mynahs are brought into the house) are acquired, all beg the question and are beyond experimental verification. They add nothing to our understanding of the causes or origin of behavior, and they close the door to future experimental investigation. For this reason alone, I have called the concepts of instinct and heredity "a finished psychology."

The chief concern of the behavioral epigeneticist is the problem of development. And development is the process of interaction between the "organism and its environment, internal as well as external. As Lehrman has clearly stated, this is not interaction between "heredity and environment." Let us put the issue in very plain language. The earnest plea of the behavior epigeneticist is: Let us drop both the concepts of nature and nurture. Give us a zygote and we will follow up from stage to stage its morphological chances (cellular, histological, and gross structures), their physiological (biochemical and biophysical) accompaniments, and the zygote's overt movements. All these are integral aspects of one single event, the interwoven interaction through inputs and feedbacks of the developing organism with its environment (pp. 116-117).

The next several pages are devoted to descriptions of experiments which Kuo states refute the nativist position and the chapter is concluded with several more pages devoted to a scathing criticism of behavior genetics and behavior geneticists. These criticisms make those of Kantor on various subjects over a period of many years appear extremely gracious and restrained. Their tone is reminiscent of the early days of behaviorism in the 1920's when Kuo, Knight Dunlap, and H. M. Johnson were literary hatchet men for John B. Watson. Development of the interbehavioral approach to environment - heredity finally arrived at a point of summarization and conclusion with the appearance of Kantor and Smith's text, *The Science of Psychology: An Interbehavioral Survey,* in 1975. This volume contains separate chapters on the relationship of psychology to other sciences such as physics, chemistry and biology. The chapter on psychology and biology contains a section entitled "Behavioral Genetics" with lengthy paragraphs devoted to the problem of heredity and psychological development and behavioral genetics. The entire discussion is far too lengthy to be included here but assurance can be given that it covers the interbehavioral position with a degree of clarity which is incomplete in previous presentations. Although it is not free from criticizing opposing positions, it is remarkably restrained which makes its argument even more effective. It is impossible to summarize, but two of its sentences can be quoted to make a major point:

> Geneticists know that there is no transmission of traits or characters in biological heredity, but only the potentiality that lies in the fertilized ovum and the molecular patterns that are contained in the zygote. While in fact the unmutated cellular substance of offspring continues the species line of the reproducing organisms, the particular structures and functions of both the biological and psychological traits depend upon the interactional influences of environing things and events (p. 459).

As one looks back on the 70 years during which the interbehavioral position relative to the environment-heredity controversy has been presented many many times, one wonders whether this position has, by any chance, gained general acceptance. Particularly since psychological sources are unlikely to agree, a neutral source would seem to be the *Encyclopaedia Britannica*, an article from which (but by a behavior geneticist) got this paper started. This time we will look under the heading Heredity-Environment controversy (Vol. 6, p. 870) for an answer to our question. Here the following is stated: Though once a heated point among scientists, it is now generally conceded that the genetic background provides certain limitations within which the environment acts to allow individual expression. Summed up in one short sentence, this seems to be what the inter-behavioral approach has said from the beginning!

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Article

Interbehavior: A Teacher Education Perspective

Thomas L. Sharpe
University of Nebraska

All things prepare the event. Watch.
T. S. Eliot (Murder in the Cathedral, p. 183).

A fundamental assumption underlying interbehavioral, or field systems, work in educational research is that such tactics are desireable, and even necessary, in order to enhance understanding of applied settings in general, and teaching expertise in particular. However, to adopt alternatives indiscriminately is a dangerous practice. No one engaged in any scientific enterprize can ever be assured that all alternative forms of research are created equal. Therefore, it is important to illustrate field systems implementation tactics, as well as convey epistemological arguement. This is particularly salient in light of the oft sighted criticism that interbehaviorism and its host of semantic couterparts, are mearly philosophies in search of methodology (cf., Midgley, 1988). Such a commentary has been facilitated by the behavior analysis community's perception of inordinate complexity of a systemic conceptual orientation. Though clearly a specious reproach, technological ease of implementation must be presented in a readily understood fashion for acceptance within the methodological community. For only when systemic investigated tactics are precieved to be feasible, non-aversive, and of resultant utility — will they not be dismissed as the voice of the cuckoos (cf., Skinner, 1988). Once tactically portrayed, it is equally important to relate the utility of interbehavioral research outcomes to the technology of a particular discipline. By traditional interpretation, a scientist must necessarily be judged in part by the useful benefits of empirical knowledge generated to the culture at large. Hence, a summary of current research applications on the preparation of preservice teachers is in order.

Foundations

To discuss educational field systems tactics with efficacy, familiarity with the philosophy of science, the temporal and contexual constraints of the behavior analysis tradition, and the epistemological considerations within which interbehavioral methods have evolved is assumed. These issues should be well understood to evaluate properly research results produced thusfar and to iliustrate the need for such an alternative. Bertalanffy (1972), Delprato (1986), Ray and Delprato (1989), Sharpe and Hawkins (In Press), Smith, Mountjoy, and Ruben (1983), and Upson and Ray (1984) provide excellent reference points.

Causation in systemic research is essentially viewed via Cook and Campbell's (1979) conception, which avoids an essentialist explanation and settles for probing probabilistic causal connections using description as the fundamental analytic vehicle. This begets the proposition that all one knows scientifically is gleaned from sensory experience. Coupled with the judgment that experience tells one that something is, rather than how or why it is (Hendel, 1963), gives rise to the possibility that science is very similar to description rather than the provision of incontrovertible explanation. A concomitant proposition upon which educational systems research stands is that "good" science is one which is deemed useful, or pragmatic. Especially germane to educational circles is the belief that the best scientific theories are those that offer practical advantages for the teacher in the classroom (Metzler, 1989).

Toward an Interbehavioral Alternative

Finn (1988), and Shavelson and Berliner (1988) have emphasized the need for alternative pedagogy research methodologies which draw from the advantages of multiple research perspectives. It could be argued that any lack of public respect for behavior analytic research

is related to the lack of paradigmatic communality which functions to limit effectiveness. Though each particular paradigm often claims a different philosophical route to authority which is mediated in a different way and arises from differing sources, each has particular benefits which may often complement one another. Methodological repprochement may be supported, for example, by the coupling of an ecology's ability to uncover subtle influences in a setting context with a behavior analytic emphasis upon organismic relationships, and connecting the relationships in time across both domains (cf., Schroeder, 1990).

Recommendations

Schutz (1989) has cautioned that strong advocacy of one particuiar paradigm could encourage researchers to adopt the "have method, need problem system" (p. 31). Researchers should stress the need for research question development prior to framing it within a methodological context. J. R. Kantor (1979) advocated that any science which insists on the priority of methodology is not yet true science. That the research question ought to dictate the method of investigation is perhaps the most self-evident, yet most often ignored, principle of genuine science.

It is recommended, therefore, that greater understanding be attained by experimenting with alternative research strategies. One approach, an interbehavioral strategy illustrated by Ray and Delprato (1989) and extended to educational research by Sharpe and Hawkins (In Press), may serve to surmount current methodological constraints while leaving their strengths intact. At the very least, an inductive field systems perspective may give researchers a greater methodological comparative base, providing advocacy for further alternatives.

A Systems Approach

Though a systems orientation may be extended to many areas of the social sciences, the instructional setting is used in illustration as it exemplifies a complex interactive system. The consensus among mainstream contemporary pedagogical researchers is that traditional scientific attempts to analyze teaching as a preplanned or predictive process are difficult and time consuming undertakings as multiple events come and go with astonishing rapidity (Jackson, 1968). Morris' conceptualization of the interbehavioral field: "[that] response form cannot be identified independently of the other factors in the behavior segment, and . . . response form-response function relationships exist in wide dynamic variability and multiplicity" (1988, p. 36) eloquently sums the longstanding dilemma which has plagued pedagogy research and consequent teacher education.

It is not an easy task to determine just what comprises successful teaching, for multiple organismic, contextual, and historical variables are extant (Ornstein, 1986). Failure to control accurately for multiple variables and their temporal interaction effects leads to inconsistent findings and difficulty in recommending behavioral taxonomies for "good" teaching. Additionally, what works in some situations may not work in others with variable settings, lesson content, students, and goals. Many believe teaching to be so complex that it is better evaluated in terms of a single content and setting. Thus, investigation may be better focused upon which variables produce optimal effects within the unique context of a particuiar classroom, rather than attempts to determine which may be superior in a universally generalizable sense (Cruickshank, 1976; Johnston, 1988).

Arnold (1987) has advocated a descriptive/analytic paradigm for its ability to provide a wealth of detailed, objeciive information. Exhaustive descriptive data, he argued, should make educators more acutely aware of what they are doing within a particular lesson and how to change their behavior toward more optimal instruction for that same lesson in future.

An interbehavioral strategy seems ideally suited to provide an exhaustive account of particular instructional settings. Priority is placed upon the interaction and interdependence among setting and behavioral events in this form of analysis, rather than the behaviors or events themselves (Lichtenstein, 1983). Advantages regarding this approach include: (a) it provides a systemic or holistic view, allowing for representaiton of an entire instructional sys-

tem in action and interaction; (b) it deals directly with temporal locus and extent of elements tracked; (c) it is predicated upon induction; and (d) category systems are developed from setting-specific verbal description providing an element of objectivity in data-collection and interpretation.

Strategies and Tactics

Comparison of expert and novice teachers in discerning instructional effectiveness is well documented (cf., Berliner, 1986; Metzler, 1989; Siedentop, 1989). According to Metzler (1989), research and development models that better integrate a teacher's experiential history, the content being taught, the observable context, behavioral process, and student outcomes within particular instructional settings are the models which hold promise for validating and furthering pedagogical knowledge. Systemic description and comparison should glean much needed information in better determining the characteristics of instructional expertise.

In application, an attempt is made via exhaustive verbal description to categorize and track all environmental stimuli and specific behavioral elements as they actually appear within a particular classroom setting, as well as provide an organismic and environmental history which inherently impact upon that setting. Data are presented in alternative formats and interpretation is couched in systemic terminology designed to accurately describe the relationships in time among elements (cf., Ray & Delprato, 1989; Sharpe, 1990; Sharpe & Hawkins, 1990, in press).

Category System Construction

The historical portion of category system construction is important from a generality perspective and in gaining a better understanding of past environmental and organismic characterisitcs which impact the current instructional situation. The current interaction portion of the category system is synthesized from a complete narrative chronology of the actual investigative setting. As many elements may overlap or occur simultaneously, mutually exclusive conceptually related subsystems are generated, across which many elements may conceivably ocurr in concert. Though differential category system elements across studies may raise a generality concern, many previously unaccounted for teacher and student behavior, and contextual elements may be discovered in this manner, allowing for more accurate data representation.

Data Presentation

After a category system is temporally collected via the appropriate technology (cf., S&k Computer Products, Ltd.; Sharpe, Wood, & Bahls, 1991); data are represented in multiple formats in providing a systemic characterization. First, a summary is used to present multiple dimensions of all discrete environmental stimuli and specific behavioral elements. This step is quite similar to traditional behavior analytic techniques. However, multiple characteristics of each element are simultaneously available, allowing for a multi-dimensional elemental depiction.

A dual chain temporal matrix is next constructed, representing the frequency and relative probability of all preceding and succeeding behavior and context elements in a system. This step comprises the foundation for an interbehavioral analysis, thus departing from the traditional lineal mechanics perspective. It should be noted that given a complete ASCII data file, this matrix and all further systemic representations and analyses are generated by menu driven logical parameters and "push button" technology.

The matrix thus portrays an initial sense of elemental relationships in time, or which elements tend to cluster around other contiguous elements temporally. Further, this data representation relates a sense of the complexity (i.e., number of elements necessary for system description), rhythm (i.e., repetitive or consistency of element pattern occurrence), velocity (i.e., frequency of elemental change), and coherence (i.e., predictability of temporal relationships — many matrix cells are left unfilled which could conceivably have occurred and elements tend to cluster within particular cells with high frequency) of a particular system.

For example, Figure 1 shows a window of a complete matrix. It may be discerned that for this teacher/subject, the relationships among the seven elements (#12-specific observation,

Succeeding Elements

Preceding Elements	#12	#17	#19	#21	#24	#26	#31	Aggregate Probability
#12		16 .16	25 .26	6 .6	2 .2	18 .19	14 .14	.83
#17	10 .03	25 .09	38 .14	32 .10	11 .04	70 .25	47 .17	.83
#19	9 .04	36 .18	7 .04	18 .09	12 .06	30 .15	41 .21	.77
#21	2 .02	27 .17	5 .03	10 .06	24 .15	27 .17	38 .24	.84
#24	4 .04	19 .20	11 .11	22 .23		12 .12	17 .17	.87
#26	11 .03	59 .18	31 .09	22 .07	15 .05	41 .12	85 .25	.79
#31	24 .07	59 .17	37 .10	33 .09	19 .05	80 .23	30 .08	.79

Figure 1. Teacher/subject probability matrix window

#17-content specific encouragement, #19-verbal instructional prompts, #21-skill statements, #24-individual modeling, #26-positive instructional feedback, and #31-positive non-verbal communication) occurred as a function of one another in time with a high degree of frequency and probability relative to the remaining 27 behaviors and contexts emitted.

Once a matrix is built, various forms of kinematic flow charting are used to portray the relationships in time among elements (cf., Sharpe, 1990). Within a kinematic context, (a) packages of high frequency and probability elements post trigger element (i.e., primary or initial element of interest) inclusive of frequency, relative probability, and aggregate relative probability information for succeeding element clusters; (b) macroscopic tree structure views of how particular elements flow through time; and (c) nesting packages which cluster around particuiar trigger elements with regularity, may be represented.

Systemic graphic depiction of the actual relationships in time for multiple elements within a given field are also avaiiable (cf., Sharpe, 1990; Sharpe & Hawkins, In Press). Many interbehavioral characteristics pertinent to systemic analysis are available from graphic representation such as: (a) variable time parameter slices of the complete experimental setting, (b) duration and frequency of occurrence in relation to other contiguous elements for a time parameter of interest, and (c) depiction of multiple elements as they are actually emitted across time, allowing for clear representation of complex elemental temporal relationships, as well as differential characteristics of the same element over time.

The advantage of systemic graphic representation lies in its ability to circumvent traditional data portrayals which have typically isolated individual elements of interest from the larger temporal and contextual stream in which they reside. An illustration may be drawn between this graph and musical composition. Merely counting the frequency or duration of a particular note within a particuiar composition, or musical system, does not adequately portray the characteristics of that composition. Exemplary musical scores are better characterized by the differential relationships and emphases over time among particular clusters of notes as they repeatedly appear throughout a musical piece. It is therefore plausible that complex interactional systems, organismic or otherwise, would be more accurately portrayed, not simply by counting occurrences of one or two dimensions of particular elements, but by portraying the variable relationships in time among all elements within a system.

Comparative analyses are also uniquely facilitated by systemic graphic representation of similar elements across differential systems. For example, Figure 2 represents relatively long periods of specific observation, interspersed with more frequent/short duration encouraging statements for a four minute slice of an expert

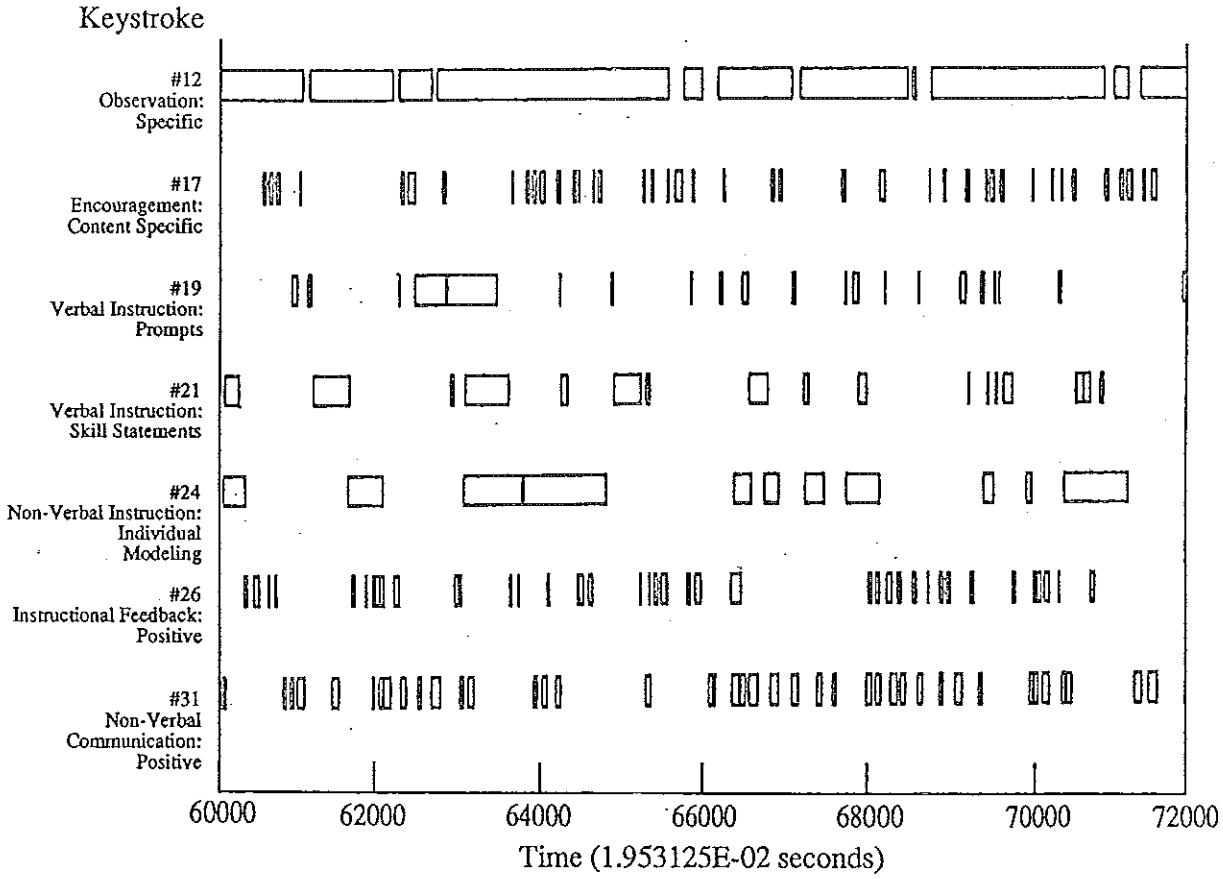

Figure 2. Expert 4 minute class segment across specific observation (#12), content specific encouragement (#17), verbal instruction (#19: prompts, #21: skill statements), individual modeling (#24), and positive communication elements (#26: instructional feedback, #31: non-verbal).

teacher/subject instructional repertoire. These encouraging statements are temporally followed by verbal instructional prompts. Instructional prompts are followed by longer duration skill statements, and when necessary even longer duration individual modeling episodes. These instructional clusters are then consistently followed by high frequency/short duration feedback statements and positive non-verbal cues. It is also clear — if one were to draw a vertical line through portions of the graph — that the expert subject is capable of emitting three to six elements in concert, inferring a contingency managed repertoire emitted automatically, numerically akin to short-term memory storage capabilities.

A contextually similar four-minute depiction of a novice teacher/subject across the same elements (see Figure 3) clearly differs. First, occurrences of individual elements markedly differ in terms of lower frequency and differential durations. Additionally, far greater lag times are evident between individual occurrences of a particular element. Second, a clear temporal relationship does not appear to exist with respect to these seven elements. In other words, the system is better characterized as chaotic or random, rather than coherent and rhythmic. Third, the novice teacher does not appear to be able to emit more than two elements in concert. This infers a more rule governed system with much more time needed to search past instructional schemes to determine an appropriate repertoire for the present setting.

From a comparison of these two graphs marked differences across the two teachers are clearly demonstrated, which would not have

been as easily discerned by simply tracking one or two dimensions of a particular teacher behavior and viewing other operative elements as extraneous. Though only an overview of field systems analysis with selected teacher behavior data, many previously undiscovered behavioral and contextual elements have the propensity to be identified and more accurately portrayed temporally via an applied interbehavioral strategy. Further, it should be emphasized that contemporary technology is only now allowing the behavior analytic community to tap into complex systemic analyses, with the future holding great promise for even more time efficient and complex investigative techniques.

Teacher Preparation Utility

Again, a primary indicator of scientific merit lies in its utility to a particular discipline and the culture at large. In this regard, it is appropriate to shed light upon the relationship among the more complex field systems analysis of instructional expertise in particular, and its utility to the preparation of preservice teachers in general. A first step is presentation of a simplified interbehavioral model specific to instructional systems (see Figure 4).

It is important not only to provide teacher trainees with a linear package of interactive instructional responses. It is also critical to provide insight into the interconnected, contextual nature of the representative field systems in which they reside. Otherwise, instruction may become misleading and even frustrating. Frustration may be due to the inappropriate use of instructional responses in the context of the unique class setting in which a particular teacher operates. These inappropriate responses may flow from a lack of understanding of the

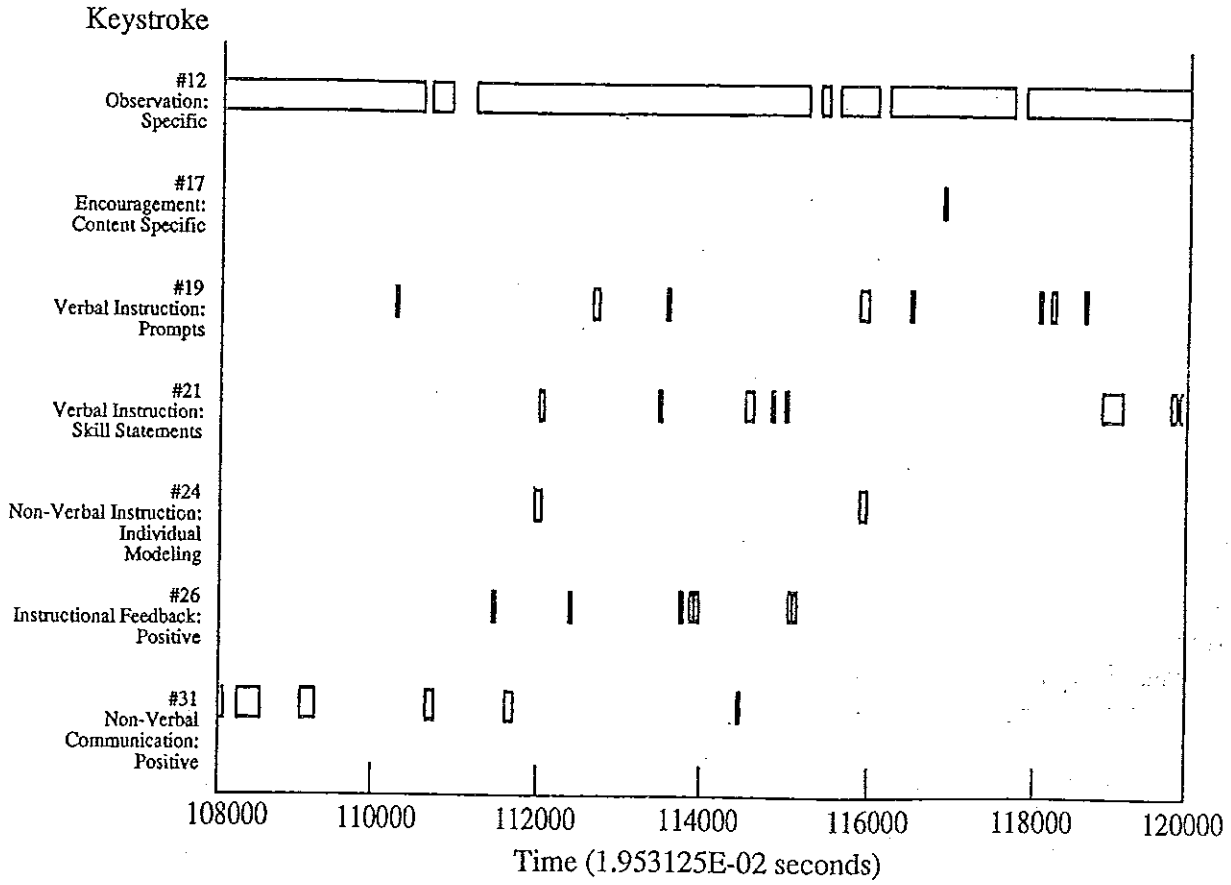

Figure 3. Novice 4 minute class segment across specific observation (#12), content specific encouragement (#17), verbal instriuction (#19: prompts, #21: skill statements), invidiual modeling (#24), and positive communication elements (#26: instructional feedback, #31: non-verbal).

larger context of a complete instructional field system, including the many operative extraneous variables, which are virtually always present in applied settings. The advantage of a systemic model lies in its unique ability to enable teachers to conceptualize more adequately their enterprise in its interdependent, interconnective framework, and accordingly, operate more effectively within a particular context.

Once a holistic model is conceptualized it is equally important to provide preservice teachers with microscopic schemes or repertoires within each of the Setting Specific Process boxes (refer to Figure 4). Table 1 highlights selected behavioral results from an exemplary comparative study which fit within the Specific Teacher Behavioral Elements box for one novice and expert teacher comparison. It is apparent from this model that further interbehavioral study is warranted to provide a more complete account of each of the systemic educational model's subunits, as well as extending specific teacher behavior knowledge.

Once a generic field systems model and accompanying data-based subunit taxonomies have been introduced in the didactic portions of undergraduate methods classes, a simplified evaluation and feedack system may be utilized to facilitate a common terminological ground in which to systematically track particular practicum instructional episodes and provide systems oriented feedback. Similar data collection techniques are implemented, the critical difference between the science and technology of field systems tactics occurring in the relative simplification of the category system to allow live recording of preservice teacher practicum experiences.

Collapsed, more simplistic versions of managable category sytems are used in tracking preservice teachers. Multiple dimensions (e.g., frequency, duration, percentage of the total observation time, rate per minute, standard deviations, etc.) across teacher and student behaviors are tracked as well as inclusion of lesson context elements felt to be of great import. Software technologies also allows for

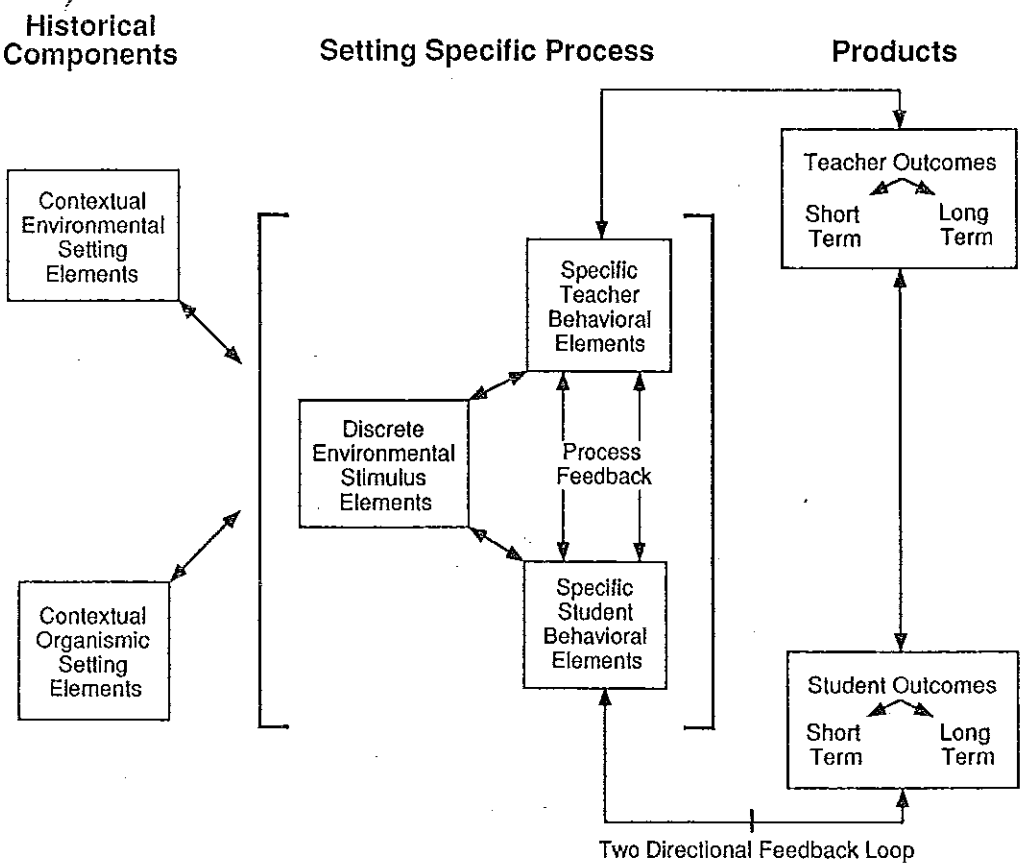

Figure 4. Field systems closed loop instructional model.

Table 1

Expert and Novice Teacher Interbehavioral Taxonomy

Novice

1. Lack of clear temporal sequences for #1: preview, #2: instruction, #3: review.
2. Behavioral chains appear scripted, not student and context dependent.
3. Low frequency and duration of instructional elements (#17, #19, #20-26, #36), interspersed with long periods of instructional inactivity.
4. Longer periods of peripheral (#10) versus central (#9) positioning.
5. Low frequency and long duration of genral (#11) and specific (#12) observation coupled with low velocity of observational change.
6. High frequency management (#14-16) elements throughout lesson, coupled with a narrow classroom focus.
7. Primary emphasis on class control, though lacking in managerial efficacy as determined by lack of management (#15) -- transition (#13) temporal contiguity.
8. Frequent indecision (#33) when behavioral elements are of high velocity.
9. Instruction/management ratio is low.
10. Low frequency encouraging (#17, #18), reinforcing (#28, #31), and correcting (#26, #27) behaviors.

Expert

1. Clearly defined preview (#1), instruction (#2) and review (#3).
2. Behavioral emissions are context dependent, drawn from a complex instructional repertoire.
3. Remains in a central (#9) position with respect to class activity.
4. Active supervision pattern as evidenced in the observational elements (#11, #12), ensuring multiple contact with all of the gymnasium.
5. Knows all pupils by name and talks with all outside of the content focus (#18, #28).
6. Quick and efficient managerial (#14-16) behaviors of low frequency, as evidenced by brief, immediate transitions (#13).
7. Management cues reach entire gymnasium.
8. Displays a clear "can do", positive (#26, #28, #31) attitude, coupled with a complete lack of indecision (#33).
9. Frequent episodes of individual modeling (#24) and physical guidance (#25).
10. Frequently ties in skill content to be learned with life-situations (#36).
11. High frequency and immediacy of encouraging (#17, #18), positive correction (#26), and reinforcing (#28, #31) behaviors which surround all instructional activity.
12. Lack of negative (#27, #30, #32) interactive behaviors.
13. Ties beginning and end of class with high frequency non-task positive (#28) interaction, though non-task positive interactions also frequent in the instructional portions.
14. Great range of high frequency non-verbal (#31, #32) expression.
15. Great fluency, complexity, rhythm, velocity, and coherence to a largely sequential instructional repertoire. Clearly maintains a constant "leadership" role with respect to class momentum.

differential categories systems definitions and notations for atypical or new behaviors as particular instructional episodes may dictate.

Current technology enables recording of on sight behavior and context relationships in time. Software applications allow for immediate listing of all contiguous element sequences within specified chain length and lag time of element occurrance parameters post observation. Given the information described above, goals for instructional improvement which directly relate to a systemic conception and a particilar context may be given immediately post practice teaching episode.

Kinematic and graphic representations of preservice teaching episodes are also readily available in relating alternative depictions of what actually occurred within a particular instructional. A composite evaluation portfolia is thus created within the context of a systemic approach, which provides conceptually similar systematic data records across multiple practicum teaching episodes for preservice teachers throughout their educational experience. In this manner, a common linguistic ground is furnished for both teacher educator and preservice instructor, providing a systemic picture of what is actually occurring across multiple instructional episodes in better facilitating behavioral change.

Conclusions

Locke (1989) has stated that "... any kind of science can be done as rigorous and systematic inquiry, just as any can be done as a careless or dishonest contribution to the pollution of knowledge.... superiority rests not in the method, but in the match with particular problems" (p. 11). While true, this observation begs the question of whether traditional methods of inquiry, done rigorously and systematically, still leave one with an inadequate understanding of social science settings. In this light, alternative approaches are still necessary to surmount the current constraints which plague pedagogical research. The fact must be recognized that there are alternative approaches and applications of formalized data analyses, though problems, criticisms, and unresolved methodological questions may remain. Indeed, problems, criticisms and unresolved methodological questions abound even in the currently accepted traditions. A larger repertoire of available research methods can therefore only serve to enhance an understanding of the research enterprise.

The fact that the underlying assumptions of any paradigm pose limits to the knowledge which has been generated is well demonstrated (Schempp, 1987). Further, subscription to one dominant mode of inquiry could be of dire consequence to the development of any disciplinary body of knowledge. Regarding teacher effectiveness research, Good (1979) has stated that alternative conceptualizations of variables and alternative measures are sorely needed. This, coupled with the inherent disadvantages of current research traditions, lead one to believe that the pursuit of alternative strategies is warranted. If longitudinally demonstrable, a more substantive foundation may be realized in establishing an interbehavioral perspective as a legitimate pedagogy research eiterprise.

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Comments

Brief Commentary on Lipkens' "Idealism, Realism, Coherence, and Correspondence in Kantor's Interbehavioral Philosophy"

Dennis J. Delprato
Eastern Michigan University

I wish to thank Lipkens' for the paper of the above title that appeared in the first number of the 1991 issue of this newsletter. What follows are some of my reactions. As far as idealism and realism, I view Kantor as a radical naturalist who takes the very distinction between idealism and realism as based on the notion of a world without/beyond time and space. It seems that to argue whether or not something is real is to tacitly lend credence to the unreal. Thus, I do not find Kantor holding to, for example, realism, naive realism, or neorealism. (I am not sure what Lipkens means by direct realism when she concludes this best describes Kantor's position on p. 15.) Furthermore, Kantor's naturalism certainly is not one that views mind and spirit as reducible to the material—how Lipkens apparently views naturalism (p. 13). To me, Kantor's naturalism is simply that there is but one world— the spatiotemporal. His position is neither materialism nor idealism.

Perhaps Lipkens' presentation on realism and idealism would have been somewhat different had she examined Kantor's *The Logic of* Modern Science (1953) and Psychology and *Logic* (1945, 1950).

On truth, or epistemology: First, I think Lipkens accurately represents Kantor's position when she notes that the observer's history always participates in knowing interactions, thus making pure knowing impossible. It is this point that has led less naturalistic thinkers to conclude that individual knowers construct events. I do not know how she justifies the statement that Kantor's position makes impossible the distinction between descriptive and interpretative constructs, on the one hand, and events themselves, on the other. To me, one of the important lessons from Kantor is the crucial distinction between events and constructs. I may be mis-reading Likens here. I take Kantor's epistemological position to be one of pragmatism (effective action). Lipkens notes this aspect of Kantor's views on p. 17 but seems to take "impure coherence" theory as more reflective. I don't follow. To me, Kantor was much influenced by the same stream that influenced the great American pragmatist, Dewey.

I congratulate Lipkens for taking on the topics she did. These are important areas that we need to discuss and debate from a radically naturalistic viewpoint.

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THE INTERBEHAVIORIST
A Newsletter of Interbehavioral Psychology
Department of Psychology
University of Nevada
Reno, NV 89557-0062

Bryan D. Midgley
HUm Dev & Fam Life, University of Kan:
Lawrence, KS 66045-2133