Behavioral Field Systems Analysis:  
History and Scientific Relatives  

Dennis J. Delprato  
Eastern Michigan University  

Sharpe and Hawkins’s field systems analysis (or behavioral systems analysis; Ray & Delprato, 1989) uses investigative procedures that yield (a) descriptions in terms of (b) multiple concurrent factors (c) operating in real time. Examination of subsequent articles in this issue will reveal researchers who take description to levels rarely exhibited in behavioral research by (a) identifying, defining, and measuring far more than the usual limited number of variables, and (b) tracking the status of these variables on a moment-by-moment basis. The purpose of this paper is to place behavioral field systems analysis (FSA) into perspective historically and in terms of its relationship to behavioral science as a whole.  

Historical Background of FSA  

Sharpe and Hawkins (1990) acknowledged that FSA is based on behavioral systems analysis (Ray, 1983; Ray & Delprato, 1989; Upson & Ray, 1984). Ray and his collaborators have cited the interbehavioral psychology literature as fundamental to their research strategies and tactics. Additional literatures nourishing behavioral systems analysis include ethology, chronobiology, cybernetic control systems, and behavior analysis.  

Kantor and Interbehaviorism  

Interbehavioral psychology is the outcome of the efforts of J. R. Kantor. By the turn of the 20th century perhaps the major message that theorists were beginning to formulate was that the fundamental subject matter of psychology was not mentality, mind, consciousness, or experience but adaptive behavior (Leahey, 1987). This movement took many scholars to what became identified as behaviorism. By the middle of the 1930s, numerous versions of behaviorism appeared.  

At the heart of Kantor’s ambiguous status vis-à-vis psychological thinking has been his early leanings toward and, later, explicit advocacy of field theory. Kantor (1969) argued that despite the many advances associated with behaviorism, its lack of a field character left it open to further emendation. After trying various terms to refer to the approach to psychology he favored, Kantor ended up with interbehaviorism. He added inter to behaviorism to communicate that behavior must always be described in field terms. But what does this mean? For an answer, we must examine changes in how thinkers have approached the world over the centuries.
Several authoritative historical analyses (Dewey & Bentley, 1949; Einstein & Infeld, 1938; Handy & Harwood, 1973; Kantor, 1946, 1969) have agreed on three general stages in the evolution of thinking about the world. Thinkers first assumed that natural events acted under self-contained powers. As noted by Dewey and Bentley (1949), in the time of Galileo the learned view was “that there existed things which completely, inherently, and hence necessarily, possess Being; that these continue eternally in [movement] under their own power—continue, indeed in some particular action essential to them in which they are engaged” (p. 110). Theorists invoked various substances with unique, inherent properties to account for heat (caloric), combustion (phlogiston), light (the ether), biological functioning (vital force, entelechy), and human psychological behavior (soul, spirit, mind). Thus, this initial stage is referred to as substance theory (Einstein & Infeld, 1938), substance-property stage (Kantor, 1946, 1969), and self-actional stage (Dewey & Bentley, 1949).

The mechanical view (Einstein & Infeld, 1938), statistical-correlational stage (Kantor, 1946, 1969), or interactional stage (Dewey & Bentley, 1949) is marked by the work of Galileo and associated with the advent of modern science. This second approach retained substances; however, thinkers interpreted natural phenomena in terms of forces acting between unalterable objects. According to Einstein and Infeld (1938), Newton’s gravitational laws connecting the motion of the earth with the action of the distant sun exemplify the second stage. In this mechanistic stage, theorists advanced the energy construct as a new substance and used it as the basis for transformational descriptions expressed in statistical-correlational laws. This second stage of scientific thinking was the era of the world machine, materialism, causal determinism, and reductionism. The fundamental descriptive/explanatory model was cause → effect. The second stage in the evolution of thinking about the world that served science well for such a long time is aptly named *lineal mechanics*.

To Field Constructions. The world machine notion has gradually faded (Frank, 1955), although with some continued influence (Holton, 1973). According to Einstein and Infeld (1938), the transition from classical mechanics (e.g., Newton’s gravitational laws) to Maxwell’s equations was a critical development in the evolution of a third stage of thinking in physics. Now there are no material actors; the mathematical equations “do not connect two widely separated events; they do not connect the happenings here with the conditions there” (Einstein & Infeld, 1938, pp. 152-153). As Einstein and Infeld (1938) put it, “The field here and now depends on the field in the *immediate neighborhood* at a time *just past*” (p. 153). The mechanical theorist attempted to describe the action of two electric charges only by concepts referring to the two charges, . . . [but] in the new field language it is the description of the field between the two charges, and not the charges themselves, which is essential for an understanding of their action. (Einstein & Infeld, 1938, p. 157)

Although the biological and psychological sciences lagged behind physics in progression through the three stages of science (Kantor, 1946), field thinking definitely is found in contemporary psychology. Kantor (1941) noted several
versions of field theory, including that of the gestaltists. However, the first attempts to take a field perspective in psychology were not sufficiently advanced over earlier lineal mechanical approaches because of their continued adherence to internal principles and dualisms (Kantor, 1941, 1969).

Kantor (1959, 1969) and Kantor and Smith (1975) seem to be the theorists who have done the most to develop the modern field conception per se in psychology. According to Kantor (1969), the psychological field is

the entire system of things and conditions operating in any event taken in its available totality. It is only the entire system of factors which will provide proper descriptive and explanatory materials for the handling of events. It is not the reacting organism alone which makes up the event but also the stimulating things and conditions, as well as the setting factors. (p. 371)

Field thinking has directed explanatory efforts in physics away from mechanism and its search for ultimate causes (e.g., Feigl, 1953; Holton, 1973; Russell, 1953). According to Feigl (1953), the field alternative to the terms cause and effect "is the entire set of conditions [event-field]" (p. 410), and this set represents the cause of an event.

To Systems. Like integrated-field theorists, those advocating a system approach (e.g., Bertalanffy, 1972; Marmor, 1983; Rapoport, 1968) maintain that lineal cause-effect mechanisms must be replaced by dynamic systems (or fields) comprised of interdependent components. Delprato (1987) argued that movement to the integrated-field stage of science underlies the views of theorists who have begun to explore relationships between a system perspective and behavioral development (Denenberg, 1979; Sameroff, 1983). Researchers and critics who have detected that field and system constructs are fundamentally the same have found promise in the integrated-field/system perspective for family therapy (Wahler & Hann, 1987) and for clinical psychology in general (see Ruben & Delprato, 1987).

Further support for the position that system approaches are tied to the third (integrated-field) stage of scientific thinking is their relationship to cybernetic theory. Most who have written on cybernetics have acknowledged connections between cybernetics and the system approach (e.g., Buckley, 1968). As is the case with the integrated-field and system labels, cybernetics pertains to a diverse collection of views, many of which are relatable to the field construct. However, most renditions of cybernetics emphasize closed-loop feedback as an organizing principle.

The pattern of thinking that the field/system perspective replaced is founded on the single-headed arrow that connects cause to effect, stimulus to response, stimulus to cognitive mediator to response, and so on. This arrow defines a one-way causal chain, the identification of which practitioners of classical science aspire to. The field perspective offers the double-headed arrow. Kantor (1959) considered the behavioral segment to be a fundamental component of the psychological field. The behavioral segment is defined by mutually interdependent actions of an organism and a cue (stimulus, object, or signal). The interdependency is summarized by Action ↔ Signal, where instead of a sequence from signal to action separated by a period of time (as given by the single-headed arrow representation), action and signal are simultaneous participating factors of the same unified field event.
Contemporary Scientific Relatives of FSA

At the outset, I summarized Sharpe and Hawkins’s field systems analysis as a way of (a) describing (b) multiple concurrent factors (c) in real time. This tripartite characterization can now be seen as nothing more than the application of field/system thinking to pedagogical research. Lineal mechanical thinking encourages research based on a static view of a minimal number of variables (e.g., a causal variable and an effect variable) with the goal of explanation, which is qualitatively different from description. In contrast, the field perspective considers natural events not as being pieced together or organized by way of causal glue between otherwise independent parts (elementalism) but as being integrated wholes (holism). Thus, description is not an intermediate step on the route to understanding (explaining) events but is the essence of explanation (Frank, 1955; Holton, 1973; Kantor, 1953). Furthermore, description, hence explanation, is incomplete unless it incorporates significant portions of participating and dynamic field factors. That is, the researcher must track multiple variables over time.

It is possible that Ray’s, and Sharpe and Hawkins’s behavioral systems analysis is so far advanced that it has no relatives in contemporary behavioral science. On the other hand, if this historical account is close to being accurate, we might expect to find additional evidence of the field/system perspective. Such is the case. Not surprisingly, few, if any, workers incorporate field thinking to the fullest possible extent. However, once one takes into account implications of the distinction between lineal mechanics and field/system thinking as discussed herein, including the tripartite characterization of Sharpe and Hawkins’s approach, signs of field/system behavioral science become evident. The varied literatures that provide these signs comprise the contemporary scientific context of behavioral FSA.

One of the largest and most active areas with close ties to behavioral systems analysis is sequential analysis (e.g., Altmann, 1965; Bakeman & Gottman, 1986; Gottman & Roy, 1990). This collection of techniques allows quantitative description of events as they occur over time. The major descriptive device is transition probability, estimated from the frequency with which one event of interest follows another event during a particular observation interval.

Social scientists from various disciplines who are interested in the patterning of face-to-face interpersonal communication have referred to their literature by the term interactional rhythms (Davis, 1982a). Davis (1982b) described the area of interactional rhythms as especially based on structural linguistics, systems theory, research on biorhythms, and the rediscovery that the body plays an important role in communication (e.g., Birdwhistell, 1970; Siegman & Feldstein, 1978). Scheflen (1982) noted that discovery and understanding of shared rhythm in human interactions has proceeded hand-in-hand with workers’ movement to a field approach to communication.

Delprato (1986) and Delprato and Rusiniak (1991) have discussed how response pattern analysis relates to field and system approaches to behavior. Several aspects of Ray and Delprato’s (1989) behavioral systems analytic scheme provide descriptions of response patterns, including what they referred to as syntactic kinematics (sequential patterns), concurrency analysis (concurrent patterns), and operational analysis (provides data on changes in kinematic and concurrent organization across time).
Conclusion

I have attempted to set the stage for Sharpe and Hawkins’s innovative approach to pedagogy by providing some key historical background and mentioning other contemporary research outside of pedagogy that shares the same legacy. In doing so, I hope that I assist readers to better appreciate, evaluate, criticize, and build from the pioneering work described herein.

References


