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CONCLUSION

The HPT approach described in this chapter is unique, powerful, and proved. At the heart of its uniqueness and effectiveness is the holistic view or "anatomy of performance" that guides HP technologists as they thoroughly and systematically gather data, analyze and identify causes of performance problems, and prescribe comprehensive treatments to improve performance. If their clients are willing to invest beyond the quick fix, they will be the beneficiaries of long-term performance improvement. The value of the HPT approach goes beyond closing performance gaps, however. It also has the potential to serve as a blueprint for building an overall high-performance environment within an organization, an environment in which the traditional HP issues never arise. Realizing this potential for HPT will be the challenge of the new millennium.

References


General Systems Theory and Behavioral Psychology

Dale M. Brethower

General systems theory and behavioral psychology provide a knowledge base for Human Performance Technology (HPT). The knowledge base supports powerful methods for constructing instructional systems and performance management systems that improve individual and organizational performance; enable people to learn effectively both on and off the job; connect the interests of individuals, groups, and organizations; and support the achievement of results that benefit the individual, the organization, and the customer.

HPT helps individuals and organizations achieve better results. HPT helps people both to learn how to perform competently and to perform competently once they do know how. Today, over thirty-five years into the development of the field, it is becoming clear that HP technologists fundamentally do only two things: they work with others to build instructional systems (which help people learn how to perform well) and to build performance systems (which help people perform well once they do know how).

When an organization embarks on a major initiative, HPT can help design or build the instructional systems and performance systems that are needed for successful implementation. The instructional systems might include classroom training, on-the-job training, job aids, and on-the-job coaching. The performance systems might include feedback systems, incentive systems, and systems for work processes. Some of the systems might be built from the ground up in their entirety; others might be built from components already in place.
HPT is not restricted to classroom training in which the instructor "knows the answers" at the beginning. Performance-based instructional systems can support real learning, in real organizations, in real time. For example, facilitating the work of a strategic planning group is powerful real-time instruction. When HPT practitioners facilitate strategic planning, they help people learn the answers to such questions as "How can Ecotech prosper in the future?" Once the group learns or creates answers to questions involving strategic planning, HPT practitioners can help establish the performance systems that will be required in implementing the given strategy.

THE KNOWLEDGE BASE OF HPT

HPT grew from a foundation in general systems theory and behavioral psychology. General systems theory provides basic concepts that integrate ideas from many different disciplines and subdisciplines that are relevant to HPT. These include not only behavioral psychology (which contributes to an understanding of human beings and the many complex variables affecting individual performance) but also economics, psychology, sociology, accounting, the cognitive sciences, finance, management, compensation practice, and benefits administration.

A major irony of the Information Age is that ignorance grows more rapidly than knowledge. Collectively, more is known than ever before; at the same time, people individually are falling farther behind the knowledge curve. For example, a manager in a high-technology corporation must learn more and more to keep up with the industry, but knowledge is still growing too rapidly for personal mastery to keep up; similarly, a professional in a health maintenance organization will fall behind even while learning a great deal. The old solution to this problem—greater specialization—can work only if specialists communicate with other specialists, but specialists all speak in the languages of their specializations and often cannot communicate effectively with others. The HP technologist who knows general systems theory can help.

General Systems Theory

General systems theory was created in response to practical problems emerging from the knowledge explosion. General systems theory enables people with different sets of specialized knowledge to work together toward common goals. The driving force among early general systems theorists was the quest for important similarities across specialized disciplines (see Bertalanffy, 1968; Laszlo, 1972; and Mesarovic, 1964).

One similarity is illustrated by the concept of the system. There are (among many other kinds) physical, biological, electronic, governmental, heating, communication, family, social, sociotechnical, and ecosystems. General systems theory is about figuring out what they all have in common.

General Systems Principles. There are many common points that are useful to know about. Seven principles based on system commonalities are described in the passages that follow.

1. The principle of open systems. All systems, from the simple amoeba to the human being and the commercial organization, are open systems (see Miller, 1978). This means that they must import energy to survive. For example, biological systems must acquire food and convert it to energy. Commercial systems must acquire economic resources and put them to useful purposes. Electronic systems must have electrical energy. Families, as systems, must acquire economic resources, converting them to food and shelter and to opportunities for learning. No matter what the type of system, there is an energy "overhead" that must be paid to keep the system going. Thus systems are open, not hermetically sealed, perpetual-motion machines.

2. The principle of information processing. Every biological system has specific mechanisms for processing information as well as for absorbing matter and converting it to life-giving energy (Miller, 1978). Flowcharts can be used to describe information processing systems and matter/energy processing systems, to help promote an understanding of how they work, repair them when they are defective, and redesign them when external conditions change. A description of how work, information, and energy flow through an organization is a very important aspect of any major organizational change effort.

3. The principle of guided systems. Many open systems are also guided systems; that is, their energies can be redirected toward the achievement of specific goals. For example, families can spend less on recreation and more on education, or less on food and more on medicine. Commercial enterprises can spend more on advertising and less on production, or they can put more into the profit margin for shareholders and less into employee development.

4. The principle of adaptive systems. Many open systems are also adaptive systems; that is, they can change their goals and redirect their energies from the old goals to the new ones. For example, commercial organizations can move from emphasizing their products to emphasizing their services, or from increasing shareholder value to increasing market share.

5. The principle of energy channeling. All open systems must have mechanisms for channeling energy. For example, electronic systems can be designed to power down in a crisis so as to preserve specific functions. Energy channeling is a fundamental motivational process. Commercial organizations, like individual human beings, cannot be all things to all people; they must set priorities: With whom will they align? Whom will they serve? To whom will
they go to for help should the need arise? Individuals must have mechanisms for setting the priorities that are related to their personal and professional lives. Setting and following through on priorities are the cognitive and behavioral components of motivation.

6. The principle of environmental intelligence. An open system functions most effectively when it has and can process good information about its environments because it is then more likely to survive if the environment changes. For example, commercial organizations do well to have information about market trends, international economic trends, local political trends, and social trends. Successful individuals require good information about the social, economic, and workplace trends that affect their lives. This principle has strong implications for the practice of HPT: poor information interferes with good performance and supports poor performance. Successful projects for performance improvement involve improving information processing, whether by establishing feedback systems, performance-support systems, or systems for tracking quality.

7. The principle of subsystem maximization. An open system operates within the constraints imposed by the external environment and, therefore, by the available resources. These constraints give rise to the principle of subsystem maximization, which concerns the impossibility of maximizing the functioning of both a subsystem and the total system at the same time. This principle represents the basis in systems theory of many vexing practical problems in organizations. It describes why priority setting is essential, and why internal competition can be extremely harmful. It also describes why vaguely insisting on "high standards" of performance can be counterproductive: a much better performance standard is one that says, "Keep your performance within this range, and help others keep their performances within specified ranges." This principle has major implications for efforts to align individual and organizational goals, reduce internal conflict, set operational and strategic goals, and develop high-performance teams. Indeed, this extremely important principle comes into play in any major organizational design or development initiative.

How the Systems Principles Can Be Used. HP technologists can use these seven principles to quickly learn fundamental things about an organization. The most straightforward way is to use them as an interviewing guide. With a little practice, interview questions can be tailored to specific types of organizations or to specific industries. The questions can be asked in structured interviews or in casual conversations. (In fact, a good way to practice is to ask such questions informally, in conversations with the stranger in the adjacent seat on a plane or with people at receptions, business lunches, or social events.)

Validation of the Systems Principles. Brethower (1970) has demonstrated that real public school classrooms can be described as adaptive systems and that student performance can be improved through a systems approach to self-management of teacher and student performance. Brethower's research validates the Total Performance System model shown in Figure 4.1, which depicts a performance system as an adaptive system. The Receiving System and the external feedback loop symbolize an adaptive interdependence with a larger environment (performance system with Receiving System). The internal feedback loop symbolizes all the many internal guidance systems that enable the system to produce the outputs (goods and services) required by the Receiving System. If any of the seven components of an adaptive system (mission, inputs, processing system, outputs, internal feedback, receiving system, external feedback) are defective, an adaptive system will not function properly (Brethower, 1970, 1995; Brethower and Smalley, 1998).

The validation research was part of a comprehensive effort that took a systems approach to running a reading clinic at the University of Michigan. Staff members analyzed the clinic in systems terms, defining the mission, establishing goals and measuring them, clarifying the primary service processes, and providing feedback to staff members as part of staff development and process improvement.

The principle of subsystem maximization guided the work. This principle, as already discussed, involves the realization that no one can do everything well, all at once, all the time, and with limited resources. For example, had staff attempted to maximize the staff training function, that would have interfered with service delivery and with research. Similarly, an attempt to provide the best possible service to the largest number of clients would have interfered with the goal of providing the best possible service to special categories of clients. Thus, because most of the clients were university students who were relatively easy to serve, putting most of the clinic's resources into serving them would have meant

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**Figure 4.1. An Adaptive System Model.**
reducing services to university students who were experiencing difficult problems, to elementary school students who could not be served by local schools, to institutionalized young adults, and to adults whose reading performance was limited by their lack of basic literacy. Moreover, leaving out any of these populations would have seriously harmed staff development programs because one important goal was to train staff to serve these special populations. It would also have harmed the research programs.

The clinic staff established goals that were balanced across several subsystems and over short- and long-term considerations. For example, staff scheduled peak levels of service to children at times when there was a lower demand for services to university students. There were also priorities established to balance the subsystems. For example, one summer the major priority was to achieve high gains in services to children, and that summer the average gain was six months' worth of increased reading skill for each month of instruction. The next summer, because of different external demands, the major priority was for key staff members to complete their graduate degree requirements, and so more progress was made toward degrees than had been made the previous summer, and the average gain for clients fell to three months' worth of increased reading skill for each month of instruction. (Staff considered this gain acceptable because the "industry standard" for improvement in the population served was less than one month's worth of improvement per month of instruction.) The systems issue in this case was not "Should we sacrifice staff development to support client development?" but rather "How can we balance staff development and client development over time so that both are achieved at a high level?" Both goals were attained over a two-year period, and unsatisfactory compromises were avoided.

Behavioral Psychology

Behavioral psychology, like general systems theory, is an important source of the knowledge base of HPT (Brethower, 1995; Dean and Ripley, 1997). Like other psychologists, behavioral psychologists study behavior; what makes behaviorists unique is that they seek to identify the variables that can be used to improve the performance of specific persons in specific settings at specific times. Behaviorists do research to identify essential variables, and they use that knowledge to modify variables and improve performance in real settings.

Behavioral clinical psychologists help clients identify functional and dysfunctional behaviors relevant to life tasks, and they help clients increase the functional behaviors and decrease the dysfunctional ones. The research literature demonstrating the effectiveness of behavioral approaches to clinical issues is enormous, and it grows significantly every year (Azrin, McMahon, Donohue, and Besalel, 1994; Franks and Wilson, 1973–1996; Lovaas, Freitag, Gold, and Kassorla, 1965). Behavioral psychologists also help clients improve their per-

formance in educational settings. There is a very large and rapidly expanding research literature demonstrating the effectiveness of behavioral approaches in schools (Binder and Watkins, 1990; Gardner and others, 1994; Heiman and Slomianko, 1992; Johnson and Layng, 1994; Lindsley, 1991). Behavioral psychologists help clients improve their performance in the workplace as well, and a large and growing research literature demonstrates the effectiveness of behavioral approaches in public and private organizations (Abernathy, Duffy, and O'Brien, 1982; Bennett, 1988; Brethower and Rummel, 1966; Daniels, 1989; Eichhoff, 1991; Feller and Sulzer-Azaroff, 1984; Fox, Hopkins, and Anger, 1987; Frederiksen, 1962; Gilbert, 1996; Gordon, 1992; Konaki, 1986; Konaki, Barwick, and Scott, 1978; Kopelman, 1986; Marr and Roessler, 1994; McNally and Abernathy, 1995; McSweeney, 1995; O'Brien, Dickinson, and Rosow, 1982; Rummel and Brache, 1995).

Its focus on improving the specific performance of specific individuals in specific situations sets behavioral psychology apart, as does the range of validated applications across settings and populations. No other approach can match the breadth and depth of the behaviorist approach.

In other approaches, experiments are conducted that yield probability statements about how a typical person might perform in a typical environment. These approaches use research designs in which two groups of people are studied under two different treatment conditions, and results are stated in terms of statistical differences pertaining to one or two of the data points collected from each group. Thus the research methodology yields results that simply do not tell anyone very much about how a specific person will perform in a specific environment.

By contrast, behavioral psychologists use time-series research designs in which many data points are collected with respect to each person's performance. Collecting many data points before, during, and after an intervention allows a researcher to make specific statements about specific instances of performance in specific environments.

Behavioral psychology contributes specific principles about the interaction of individual and environment. For example, the law of effect states that actions leading to immediate positive consequences are likely to be repeated (conversely, actions leading to immediate negative consequences are less likely to be repeated). This law is important in the design of systems for motivation, recognition, supervision, and compensation. Immediacy is an important but often neglected aspect of the law of effect: most formal systems for rewards and recognition systems set up rewards or recognition that may occur days, weeks, or months after the successful performance in question, but delayed recognition is much less powerful than immediate positive consequences. (Everyone has experienced this phenomenon, perhaps in struggling to align long-term goals with daily urgencies or to balance the delayed gratification of weight loss with the immediate gratification of a delicious dessert.)
Another contribution of the behaviorist approach is the principle of conceptual learning, which states that conceptual learning "requires direct interactions with multiple examples and non-examples" (Brethower, 1995, p. 30). This principle, also adopted by cognitive psychologists, is violated by most textbooks and most training materials; there are too few examples and far too few nonexamples. For example, this failure in instructional design contributes to outcomes in which people can recite the words they have been taught but do not understand them well enough to apply what they have learned or transfer their learning to other settings.

A Link Between Behavioral Psychology and General Systems Theory

The link is very close: just as organizations are systems, so too are individuals (Ford, 1987). Information processing (as a foundation for intelligence) and matter/energy processing (as a foundation for health) are both important to individuals. People who are better able to learn and process information are better suited to survive and prosper in the modern world. Much of education and training is intended to enable people to acquire and process information intelligently. The principle of subsystem maximization holds true for individuals, as everyone knows who has attempted to balance family matters, health, friendships, and a career over long periods of time.

Behaviorists know a lot about how to change behavior. But how does anyone know what behavior to change? Which behaviors are functional, and which are dysfunctional? It is surprisingly difficult to tell them apart. Experienced practitioners can guess what is functional with reasonable accuracy, but the only real test is to look and see what the behaviors are accomplishing in a larger system. Behaviors that get good results over long periods of time are functional; those that interfere or get bad results are dysfunctional. Whether a behavior is functional or dysfunctional depends on the larger social system. For example, if making eye contact improves communication with clients, perhaps by making it easier to get issues into the open, improve the quality of solutions to problems, or close sales, then making eye contact is functional. In some cultures, however, making eye contact would be dysfunctional. Similarly, praising people in public is functional in some cultures and dysfunctional in others, as is voicing criticism of someone's ideas. The point is that, in any culture, whether a behavior is functional or dysfunctional is determined by the results or consequences of the behavior within a larger system, not by the behavior per se. That is one reason why skills (behaviors) should be taught and learned in context, not in isolated classroom exercises that provide no support for transfer of the skills.

Taken together, general systems theory and behavioral psychology provide a firm foundation for HPT. People and organizations are systems, and they function as systems. Knowing and using the principles that underlie the performance of individuals and organizations can help HPT add value.

GENERAL SYSTEMS THEORY AND OTHER APPROACHES

General systems theory is designed to show what a variety of "special" systems theories have in common. It is not an approach that says that a special systems theory is wrong but rather an approach that seeks to identify essential elements that systems have in common. That, indeed, is what management theories try to do. For example, Peters and Waterman (1982) attempt to show what excellent organizations have in common, and their book rather brilliantly identifies key characteristics of excellent organizations; unfortunately, many of the excellent organizations have not survived into the 1990s, which shows that the search for excellence has not concluded. Collins and Porras (1994), by looking backward, circumvent the embarrassment of having their putative excellent companies fail. They attempt to sort out the essential characteristics of organizations that last by pairing enduring organizations with organizations that did not endure over the same time period. By seeking to discover key differences between the organizations that survived and those that did not, the authors attempt to tease out the characteristics that help organizations thrive and prosper.

A strength of both is that they are not theorical. They both try to analyze real organizations—and to do so without the blenders and biases of a specific theory. But that strength is also a weakness: it derives from a method that required the authors of these two books to begin with as blank a slate as possible, looking at all possible similarities and differences between exemplary organizations and those that fail. That is an arduous task, and one that sets aside prior knowledge; it does not build on what has gone before, at least not in a planned way.

General systems theory takes a different approach. General systems theorists seek to avoid specific blenders by using concepts that have stood the test of time across many different situations, and across many different disciplines. General systems research is about the discovery of the systemic similarities among all forms of systems, especially biological systems. HPT professionals can and should analyze organizations to determine whether a few key systemic functions are being performed adequately. The systemic similarities can be thought of as the deep structure of organizations, and the deep structure can be found only if one knows where to look and what to look for—only, that is, through analysis. For example, consider a sports event, whose surface structure is composed of many unique features that can be captured with video cameras or audio recorders. They are what a play-by-play announcer would see and report,
and they are important, but they are not fundamental. The deep structure of a sports event is what a good sports analyst would see and report.

Management books, in the main, are consistent with general systems theory. The notion of managing an organization as a system is almost explicit in some management books; for example, see Kaplan and Norton (1996). Nevertheless, management practices are shaped by variables of the surface structure—and therein lies an opportunity for HPT. The variables of the surface structure obscure the deep structure, and so it is easier for harmful practices to creep in: "empire building" (subsystem maximization), rewarding what looks good more than what works, benchmarking against inappropriate practices, rewarding hard but ineffectual work, or rewarding loyalty more than contributions. These practices distract attention from important organizational variables and generate confusion, political infighting, and poor communication. The HPT practitioner who can cut through the confusion to focus attention on the basic organizational variables can perform an enormous service.

BEHAVIORAL PSYCHOLOGY AND OTHER APPROACHES

Behavioral psychology, like cognitive, humanistic, or psychodynamic psychology, seeks answers to this question: "Why do people act the way they do?" Why do some succeed in a task, whereas others fail? Why are some people cheerful and others grumpy? Why does Aunt Maude hate cats, whereas her twin sister loves them? Psychologists agree on the broad-brush answer to such questions: what a person does and who the person is are functions of inherited characteristics and environmental experiences.

Psychologists also agree that what is known about a person is learned through observation of that person's behavior, or of the results or products of that behavior. The products of behavior might be the artifacts left behind by a prehistoric culture, or the products might be paintings or symphonies or novels or scholarly treatises or widgets. The behavior might be measured by direct observation or by standardized tests or clinical interviews. In any case, psychologists agree that behavior is what is being measured.

Psychologists differ in what they want to know about the behavior they study. Some are interested in current behavior for what it can tell them about the person. For example, a clinical psychologist might look at how a person responds to items in a battery of psychological tests to learn more about the person's current state of emotional development. A school psychologist might look at a different set of tests to learn more about a person's intellectual development.

Introductory textbooks and pop-psychology books make much of the differences in surface structure among psychological approaches. These differences, however, like differences between brand names of dishwashers, are overblown in the marketplace in an effort to attain market share. (Market share in academia is measured by numbers of research grants, faculty positions, job opportunities, textbook sales, consulting fees, and the like. If market share drops, so do faculty incomes.) HPT professionals can look beyond the differences of the surface structure and let themselves be guided by the similarities of the deep structure.

HPT'S APPLICATION IN MULTIPLE CULTURES

General systems theory is part of HPT. General systems theory is also used and understood in many of the physical, biological, social, and behavioral sciences, which encompass such areas as economics, computer science, engineering, and management. HPT has much to gain by adopting both the language and the concepts of general systems theory. Many of HPT's intellectual leaders already do so (see, for example, Dean and Ripley, 1997).

General systems theory's language and concepts are translatable not only among disciplines and theories but also, and readily, into French, German, Spanish, and so forth. Describing HPT in systems language (see Langdon, 1995) has the advantage of making HPT easy to translate into languages all around the world. But only the concepts and principles of the deep structure are translatable; specific tactics of the surface structure are not. Cookie-cutter approaches do not work very well anywhere, but the basic principles of HPT work well everywhere. For example, the people in two different U.S. companies might all benefit from better incentives, clearer goals, and better feedback, but the best tactics for improving incentives, goals, and feedback will not be the same in the two companies. One may have a history of punitive management, so that "improvement" attempts will be viewed with suspicion; the other may have a history of "programs of the month," so that improvement attempts will be viewed as random acts of managerial ineptitude. Similarly, the tactics that work in the U.S. division will not roll out to the Argentine or Hong Kong divisions. The same concepts and principles will work in all cultures, but the specific tactics will have to evolve from within the specific culture of each division. Thus HPT can provide useful tools for organizations as they move into international markets and toward globalization of their operations. HPT can contribute in emerging nations, in a world economy, and across cultures, if practitioners focus on the principles of the deep structure and avoid the trap of confusing those principles with manifestations of the surface structure.

A LOOK TOWARD THE FUTURE

HPT is about performance. Behavioral psychology and general systems theory interrelate to provide guidance that HPT practitioners can use to ensure that instructional systems are connected to performance, and that performance is
supported by performance systems. General systems theory helps identify the
types of performance which are beneficial for improvement efforts. Behavioral psychology helps identify the performance supports which will be necessary if people are to be able to learn and, having learned, to perform. Business sense (and general systems theory) will help answer, at the organizational level, these two questions:

1. What are we doing now to add value (or that harms) customers and the world in general?
2. What could or should we be doing in the future to add value (and reduce harm)?

These two questions are at the heart of formulating strategy, identifying current business issues, and identifying current and future performance gaps. Harm is not a trivial business issue; business sense helps identify economic value and economic costs, but general systems theory should also be used to identify other types of impact. Environmental impact studies are becoming a necessity in some areas of business, but that is not enough. For example, businesses are concerned with the impact on communities of opening a new plant or closing an old one. Businesses must be concerned about product liability. HPT practitioners and organizational leaders should learn from sociology, political science, economics, environmental studies, and other disciplines to ensure that what gets done contributes as much value and as little harm as possible. HPT can help organizations learn in the classroom and proactively so that they are less often focused on learning reactively in the school of hard knocks.

THE RESPONSIBILITY OF ADDING VALUE

A key leadership responsibility is to ensure that the organization adds value. Adding value is also a key responsibility of every person in the organization; it is everyone’s primary job. Therefore, two questions should be asked by every individual, from the CEO to the custodian:

1. What am I doing now to add value (or that harms) customers and the organization?
2. What could or should I do in the future to add value (and reduce harm)?

Helping individuals answer these questions is an important task for human resource development. The questions are key to the development of each person and are a prime element of the implementation of strategic plans. It is no secret that the strategic development of human resources (see Odiorne, 1984) is a constraint and an enabler of organizational success. Once human resource development is viewed strategically, the two central tasks of HPT come into focus: establishing instructional systems that enable people to learn how to perform to high standards, and establishing performance systems that enable people actually to perform to those high standards. Each is a never-ending task, for the characteristics of desired performance and the standards for performance change rapidly. Each person must repeatedly acquire new knowledge, skills, and attitudes, and workplaces must be repeatedly reengineered to support performance.

The research base and the theory base exist for effective team development, effective learning of knowledge-skills-attitudes complexes, and establishment of effective motivational systems. HPT practitioners can use it to develop the instructional systems and the performance systems necessary to meet the demands of the global economy, the business community, and society.

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