



Operations Research

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

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To cite this article:

P. L. Yu, (1991) Habitual Domains. Operations Research 39(6):869-876. <https://doi.org/10.1287/opre.39.6.869>

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HABITUAL DOMAINS

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(Received July 1990; revision received September 1991; accepted October 1991)

This paper offers an introductory view of the concept of habitual domains. It describes how they affect behavior, discusses their formation, dynamics, stability, and application, and points out how to expand and enrich them. Finally, this concept is related to the operations research profession to suggest how its habitual domains can be expanded and enriched to make OR workers more effective, both individually and collectively.

As part of his development a person acquires a set of ways of thinking, judging, and responding, as well as the knowledge and experience on which they are based. This paper speaks of this set as the person's *habitual domain* (HD); it accompanies him in all that he experiences and does.

Consider, for example, the corporation chairman about to retire who has chosen *A* and *B* as possible successors. Since the two candidates are equally skillful horseback riders, they are invited to the chairman's ranch, where he gives them horses to ride. After laying out the course for a race, the chairman says to the candidates: "Starting at the same time, whoever's horse is slower in completing the course will succeed me as chairman." After a short period of reflection, *A* jumps on *B*'s horse and rides furiously around the track, leaving *B* surprised and puzzled. By the time *B* realizes what *A*'s tactic means, it is too late—and *A* becomes the new chairman.

In this example, both *A* and *B* bring habitual domains to the ranch that say the winner of the race will be the faster horse. *A* is the first to expand his habitual domain to include the new idea that the chairman presents, and he is therefore able to formulate an appropriate course of action.

As a second example, consider Napoleon's rise and fall. Early in his career his brilliant strategies succeeded, at least in part, because they forced his enemies outside their habitual domains, so that they lost before they could develop appropriate responses. On the other hand, his successes stabilized his own habitual domain, which allowed his enemies

to expand theirs and develop new strategies outside Napoleon's, which centered on brilliantly fought battles: Wellington's guerrilla warfare in Spain drained French resources, and Kutuzov's strategy of avoiding a pitched battle and retreating deep into Russia stretched the French army until it broke.

When we are presented with problems related to concepts in our habitual domains we can respond in accustomed ways, but problems calling for concepts outside our HDs may bewilder us until we expand them. In particular, a good leader must not only have a large habitual domain but also be able and willing to expand it quickly to respond to new situations promptly and effectively.

Several years ago a group of minority students at a large university occupied the administration building to protest an administration policy. The university head's surprising first act was to send the occupying group some food and fruit. His habitual domain had been formed in part by experiences as a young man in the labor movement, and he had himself walked picket lines and participated in strikes, so that he knew the discomforts first hand. His demonstration of personal sympathy and support helped to expand the occupying group's habitual domain by showing them that the university head, while perhaps not agreeing with their political position, cared about them as persons. It helped to open them up to the discussions that brought the confrontation to a satisfactory conclusion.

Simon (1958) has observed that in actual practice human rationality is bounded: in making decisions

Subject classifications Decision analysis high-stake decision making and conflict resolution. Philosophy of modeling: habitual domains in decision making and problem solving. Professional, OR/MS philosophy: expanding and enriching OR habitual domains for success.

people satisfice, that is, they seek satisfying courses of action based on limited concepts and information rather than maximizing an expected multivariate utility over all possible information, contingencies, and courses of action. In the terminology of this paper, they act on the basis of bounded habitual domains. Few of us bring sophisticated concepts of utility, probability, or maximization to bear on our day-to-day decisions; nor do we often do enough research to have in-hand a complete option set or information base for what we do.

Since one's habitual domain forms an important basis for behavior, it is worthwhile exploring the concept, with a view toward improving strategies and decisions. The purpose of this introductory paper is to begin this process in the hope of attracting attention to its importance. To this end, it describes the HD concept, discusses ways of expanding and enriching an HD, and relates this concept to the OR profession.

Section 1 discusses the HD concept, its formation, dynamics, and stability; it also sketches the implications of stability for high-stakes decisions, preferred solutions, and conflict resolution. Section 2 describes two methods and two principles for expanding and enriching HDs. Section 3 relates these ideas to operations research by describing four areas in which OR workers can become more effective, both individually and collectively.

More complete discussions of the mathematical foundations and applications can be found in Yu (1985, 1990), Chan and Yu (1985), and Yu and Zhang (1989, 1990).

1. HABITUAL DOMAINS

It has been recognized that each person has habitual ways of responding to stimuli, sometimes called conditioned or programmed behavior patterns. For example, each of us has habitual ways of eating, dressing, and speaking. Some habitually emphasize economic gains, while others pay more attention to social reputations. Some habitually persist in their pursuit of goals, while others change their objectives often. Some are habitually positive and optimistic, while others are negative and pessimistic. Some habitually pay attention to details, others only to generalities.

The collection of these habitual ways of perceiving, thinking, responding, and acting, together with their formation, dynamics, and basis in experience and knowledge, is called one's *habitual domain* (HD). In what follows, we shall see how one's HD affects judgment and action.

Consider an example adapted from Alinsky (1972, pp. 86–87). This great social movement leader wanted to teach his followers a basic lesson. Looking tough, and without a tie or coat, he walked down a busy Los Angeles street, offering a ten-dollar bill to anyone who came along, saying "Here, take this." He got responses like these:

"I'm sorry, I don't have any change."

"I'm sorry, I don't have any money on me right now."

"I'm not that kind of girl."

"I don't come that cheap."

"What kind of con game is this?"

Limited HDs exist even among OR professionals: Churchman (1979, p. 50) describes the analyst who saw the world as a mathematical program; Rosenhead (1989, p. 12) characterizes operations research as optimization based on problem formulations recognizing only a single objective. One is reminded of the psychologist Maslow's remark: "If the only tool you have is a hammer, you tend to see every problem as a nail."

These examples are intended to support the observation that people understand, judge, and react on the basis of their HDs, which are functions of their experience, knowledge, and states of mental and physical health.

The concept of an individual's HD can be extended to other living entities, such as companies, social organizations, and groups in general.

1.1. Elements in Habitual Domains

A habitual domain consists of four elements:

1. The *potential domain* (PD)—the collection of ideas and actions that can potentially be activated.
2. The *actual domain* (AD)—the set of ideas and actions that are actually activated.
3. The *activation probabilities* (AP)—the probabilities that ideas and actions in PD also belong to AD.
4. The *reachable domain* (RD)—the set of ideas and actions that can be attained from a given set in an HD.

The relation between the AD and the PD is similar to that between the realized value and the sampling space of a random variable. The concept of the RD arises from the fact that ideas can generate other ideas and that actions can prompt other actions. The concept of the RD plays an important role in human cognition and the recognition of suggestions.

For example, consider a case in which someone is frustrated because he has failed unexpectedly to meet

a goal. Many possible ideas (members of his PD) may be activated in his mind. One could be the question "Why did I fail?" Once activated, it is a member of his AD. This thought can lead to a number of other ideas (members of his RD), such as "because I was not adequately prepared," or "because someone did not support me," or "someone doesn't like me." On the one hand, these newly activated ideas can affect both his mood and his judgment of the experience; on the other, they may activate other related ideas.

Now suppose that, instead of asking "Why did I fail?" he asks, "what can I learn from this experience?" or "how do I make it work?" (new elements of his AD). Then he will reach a new set of ideas (in his RD), and his mood and judgment of the experience will be different.

Note that the elements of an AD influence judgments and moods, and that an AD is only a small part of a PD. How to control one's AD to influence better decisions, judgments, and emotions is a critical question in controlling one's HD—and one's life (some attempts and results are reported in Yu 1990, Chapters 6–14). Later in this paper I will sketch some effective methods for enriching and expanding HDs.

Since an HD can change over time, it is dynamic, as are its four elements: PD, AD, AP, and RD. While this fact poses difficulties, it is also possible for an HD to reach a stable state, so that human behavior can be seen as predictable to some degree.

1.2. The Existence and Implications of Stable HDs

An HD can stabilize over time in the sense that its potential domain and its activation probability converge to a fixed set and a distribution function, respectively (Chan and Yu 1985). This possibility for an individual may arise from three causes: 1) the more one learns the less the probability that an arriving message or experience is new; 2) as existing memory is utilized to interpret arriving messages and experiences there is a tendency toward consistency; and 3) the environment may tend toward a regular rhythm and thus yield regularity in its input of information and experience. Thus, in the absence of extraordinary events, a person's PD and AP may stabilize and develop habitual ways of thinking, judging, acting, and reacting.

As an example, consider the professional HD of a student of operations research. It expands rapidly during the years of graduate study leading to a Ph.D. degree, but may stabilize shortly thereafter if the student stays in the field in which he wrote his thesis. On the other hand, if he finds himself in a varied and

demanding practice, his HD may again expand considerably both in its craft and theory elements.

Once the PD and AP reach their stable states, one can also expect a stable AD. Thus, when these elements of the HD become stable, one can expect habitual ways of thinking, responding, and reacting to stimuli and events. In summary, personality, attitudes, and conditioned behaviors are formed.

Since we have argued that behaviors and responses depend on HDs, the existence of stability in them has significant implications for high-stake decision problems, preferred solutions, conflict resolution, career management, and leadership forms.

High-Stake Decision Problems. Such problems have, either implicitly or explicitly, four elements: alternatives, criteria, perceived outcome possibilities, and preferences related to these outcome possibilities. Furthermore, these elements can change with time, the surrounding situation, the available information, and the psychological states of the decision makers.

In a broad sense, as each person perceives these four elements they are part of his habitual domain. As they change, so do the perceptions in the HD. Thus, while both the elements of the problem and their perceptions are changing it would be unwise to push toward a solution to a problem. Rather, the person involved could become better off by seeking to expand the HD through the sort of inquiry with which OR workers are familiar: seeking new and improved alternatives, adducing better and sharper criteria, deriving more confident views of outcomes, and therefore educating the preferences (and possibly changing them as a result).

As the chairman and the Napoleon examples in the Introduction show, creative solutions can sometimes be found outside the existing HD. Thus, a good problem solver must scan not only the problem situation, but also the HDs of those involved to be sure that the relevant HDs are comprehensive enough to include recognition of the best and most creative solutions. The lesson for OR workers is obvious. To fit a solution in accordance with an HD that is too restrictive is to cut the foot to fit the shoe.

Preferred Solutions. As decision processes depend on the evolution of the HD, so do the resulting decisions and courses of action. While an HD can be in a stable state much of the time, it can vary, and so can the preferred solutions emerging from it. This can be the case when changes occur in the members of the sets of alternatives, criteria, perceptions of possible outcomes, and preferences. This potential variability

suggests that a preference may be valid only over a given time interval; in other words, today's preference may be inferior at a later time, and hence not survive beyond a certain time horizon (see Yu 1979, pp. 152–158, for further details).

If we consider that a decision is rational if and only if it is comprehensible as preferable within a person's HD, and recognize that another person's HD may differ, then we can see that what appears to be rational to one person may seem irrational to another. For example, while utility theory may offer a useful concept as a partial basis for choice for an OR worker, he is imprudent if he presses it on a decision maker whose HD does not comprehend it, for to the practical man it may yield results that appear to him to be irrational.

Gaming and Conflict Resolution. Each person involved in a game or a conflict has a unique HD. Thus, it is clear that understanding not only one's own HD but also that of the other person's is important if one is to be confident of devising a winning strategy or proposing a basis for resolving a conflict. The Napoleon example in the Introduction is a case in point; the Pearl Harbor disaster, because of the U.S. admiral's miscalculation, offers another (see Janis and Mann 1977, pp. 120–133, for a discussion of this case).

In games or conflict situations that are partly cooperative and partly competitive (such as international trade), it may be desirable to reach an agreement in which each player can see an advantage, and thus declare some form of victory. Here it is vital not only to know each player's HD but also to have some sort of idea of how it might be induced to evolve by proposing new alternatives, creating new conceptions of criteria, and suggesting possible desirable outcomes. Such evolution to compatible HDs may be essential if an agreement is to be reached.

Classically, an OR worker may be tempted to frame a conflict in the terms of traditional game theory (von Neumann and Morgenstern 1944, Isaacs 1965), which assumes that the players' strategy sets, payoffs, and game rules are almost fixed. However, the concepts of *second-order games*, which allow restructuring the HDs involved to allow each player to declare a victory, can be used to resolve nontrivial games and conflict situations (Yu 1979, 1985, pp. 348–356, 1990, pp. 281–345). The following example, adapted from Dale Carnegie (1940, p. 43), illustrates these points.

Andrew Carnegie, one of the great entrepreneurs of American history, heard that his sister-in-law was upset about not hearing from her two sons, who were

studying at Yale. Apparently the boys were too busy with college life to respond to their mother's letters.

Carnegie came up with an idea for resolving the situation. To add a little excitement, he offered to wager \$100 that he could elicit a response from each nephew without even asking for one; his bet was promptly covered.

Carnegie then wrote a brief but chatty letter to each of his nephews in which he mentioned sending a ten-dollar bill (real money in those days!)—but he did not include the bill. Shortly thereafter he received a letter from each boy thanking him for his thoughtful note.

The original game involved just the mother and her two sons. Within the existing HDs the mother was powerless and unhappy and the boys were thoughtless. The situation remained unresolved; the mother did not get her victory. With Carnegie's entry into the situation, two new players were added and the game situation changed. Carnegie's notes (a new strategy) stimulated each boy to respond in the hope of receiving the omitted ten-dollar bill (a new perspective). The game ended with Carnegie winning his bet, the boys writing for their missing bills, the mother learning a new way of getting her boys to write home, and the person losing the bet learning a valuable lesson. All parties were victorious.

2. EXPANDING AND ENRICHING HABITUAL DOMAINS

In order to make effective decisions and achieve resolutions of conflicts it is important to expand and enrich the relevant habitual domains. According to Yu (1990, pp. 133–147, 272–279), there are eight basic methods for expanding a habitual domain and nine principles for enriching it. Here I will discuss only two of each.

2.1. Two Methods for Expanding Habitual Domains

A habitual domain can be expanded by projection and association.

Projection. This way of expanding an habitual domain occurs when a person considers the functions, problems, and outlooks of someone in a different position. In an organizational structure, it is especially useful to consider these matters from the point of view of someone in a higher position, as well as someone in a lower one. For example, a production manager can expand his HD by considering the president's problems of marketing, finance, personnel management, public relations, and so on. Similarly, he can

expand his HD by considering the situation of a production worker. In general, by projecting his thinking to other important functions of the company, a middle manager can expand his HD to include most of the major concerns of the organization; indeed, such an expansion makes him suitable and eligible for promotion to more challenging responsibilities.

As another example, an OR worker in an organization can—and should—expand his HD by considering the concerns, problems and outlooks of a variety of its executives, as well as its other staff members. If he does so, he will have an HD large enough to envision all of the important dimensions of the organization's problems, and thus be able to bring appropriately broad analyses and solution proposals to bear on them.

Furthermore, since such considerations will encompass wide classes of problems (for example, in a manufacturing company, those of production, marketing, finance, and human factors) they will bring to the analyst's HD a wide spectrum of intellectual structures, many of which can prompt new theoretical research, as well as the opportunities of bringing findings to bear on the practical problems of the organization. In summary, expanding their HDs through projection is especially important for OR workers, both in and out of hierarchical organizations.

Association. This way of expanding an HD occurs when a person finds similarities, differences and connections among various objects or ideas, and uses these observations to generalize, and thus condition later responses. A manager who has experienced and survived one crisis can take a more objective view of the next one than someone who has never lived through one. A person who has seen benefits from significant organizational change is more likely to take a positive view of proposed new changes than one who has never had such an experience. A leader can use association to expand not only his own HD but also that of the people in his organization.

While association can be used to expand one's HD with positive effect, it also has pitfalls, as Yu (1990, pp. 78–95) points out. For example, the cock may think that he causes the sun to rise because it rises each morning when he crows.

2.2. Two Principles for Enriching Habitual Domains

This subsection discusses the deep-and-down and alternating principles.

The Deep-and-Down Principle. In our daily lives we are continuously presented with routine—and occa-

sionally urgent—events and problems, and our attention is thus forced to shift to them as they come to our attention. Against this background it is easy to imagine that some good ideas stored in our potential domains may not catch our attention, and thus may not contribute to enriching our actual domains.

To overcome this neglect, and to prepare our HDs for better responses to nontrivial problems, we need to let our minds be peaceful and open—that is, go deep and down—to allow ideas in the potential domain to catch our attention, and thus move to the actual domain. It is a commonly reported experience that good ideas often surface during the common routines of life, such as taking a shower or a walk, or during times set aside for quiet thought.

The other inference that should be drawn from this principle is that it is useful to assume a low and humble posture, thus making it easy for other people to offer ideas and suggestions. Such an open environment stimulates new and creative ideas. Lao Tze, a Chinese philosopher, put it this way: “Why is the ocean the king of all rivers? Because the ocean assumes a lower position and thus allows all the water to flow into it easily.”

The Alternating Principle. Just as a door that is always closed or always open loses its function as a door, so an assumption that is always either imposed or omitted loses its value. To counteract the common tendency always to make the same assumptions as part of our HDs, this principle urges that they be changed from time to time to see what new ideas can emerge.

A linear program typically has a single criterion and a fixed set of feasible solutions defined by linear inequalities. But the single criterion can be replaced by multiple criteria (MC), and an MC-simplex method can be developed. Similarly, the fixed sets of feasible solutions can be replaced by a flexible set defined by the multiple constraints (also denoted by MC) of several levels of inequalities. These two changes lead to the development of an MC²-simplex method (Yu 1985, pp. 219–263).

Solving a linear program finds an optimal solution to a given system. By removing the assumption that the system is given a priori, one can begin to develop preferred system designs and their associated contingency plans (Lee, Shi and Yu 1990).

The alternating principle is also useful in daily life, where it can suggest new ideas or help to solve complex problems. Businesses now recognize that complaints from workers and customers, formerly brushed off as painful nuisances, are actually bearers of important

new information that can usefully be pondered and acted on. Persons would do well to appreciate the same point. Such complaints cannot only become the bases for solving problems important to the complainers, they can also suggest new and improved forms of service.

2.3. An Application

In 1987 I undertook a consulting engagement with United Telecom dealing with its corporate strategic positioning. In each of my interviews with the officers (president, executive vice presidents, vice presidents, and so on) I stated this approach: "You have been very successful and have an important position in the corporation. You are very intelligent and knowledgeable, especially about your business of telecommunications. Thus, you are qualified to be my teacher. Will you please be so kind as to treat me as your student?" The resulting process, which applied the deep-and-down principle, gave me a broad, deep, and detailed knowledge of the company.

Each mentor offered a different personal HD and a different HD for the company. Using projection, association, and the alternating principle (as well as other ways of achieving deep knowledge), hard work led to an expanded HD for the firm that integrated those of its officers and staff. This new HD enabled me to see—and suggest to the managers—some new ideas that had formerly been outside their HDs. That the experience was a rewarding success was due in large measure to the leadership and support of Paul Henson, Telecom's Chairman.

This experience suggests a general idea: Developing a corporate strategic position can be seen as developing the corporate HD in such a way that the new concepts can be comprehensive and flexible enough to include and take advantage of a wide spectrum of possible business opportunities, many of which can be only dimly perceived at a given time. Such an expanded and enriched corporate HD can also help in avoiding business difficulties.

3. MAKING OR MORE EFFECTIVE

Under the leadership of many outstanding scholars and practitioners OR has achieved considerable maturity. Today's abundant and varied literature exhibits not only a rich set of theories and techniques but also solutions to many important practical problems. Nevertheless, OR faces important questions: Has it realized its growth potential fully? In the terminology of this paper, has its actual domain expanded and been enriched to such an extent that its potential

domain is fully captured in its habitual domain? Or, to put it another way, does OR's present HD incorporate fully its reachable domain?

If, as many commentators in recent years have suggested (see, for example, White 1991), the answers to these questions are in the negative, how can OR expand and enrich its HD more than it already has in order to increase the significance of its contributions to society? In what follows, I use the framework of this paper to suggest four areas in which expanding and enriching OR's habitual domain can help.

3.1. Decision Making

Why are some hunters not afraid of tigers? Because they have acquired and mastered thoroughly the skills needed to detect their presence and act quickly to protect themselves. Why is a newborn baby not afraid of tigers? Because the baby's remembered experiences do not include any information about tigers or how they might engender fear. The baby's HD does not yet include any experience or knowledge about tigers; the unafraid hunters have HDs that include a large and varied amount of information about how to detect tigers, judge their potential behavior, and respond appropriately.

For every task that a person faces (from tiger hunting to corporate strategic planning) there is a *perceived competence set* (Comp) consisting of the knowledge and skills that the person conceives to be necessary to complete it successfully. On the other hand, for each task there is a *true competence set* (Tr) that the successful completion of the task demands. The issue for a person facing a task, therefore, is whether or not his Comp is large enough to encompass the Tr for the task.

For a decision maker facing a high-stake problem the issues are clear: What is the true competence set Tr for an adequate solution to the problem? Does the decision maker's competence set Comp encompass the problem's true competence set Tr? If the answer to this last question is negative, then the decision maker must expand and enrich his Comp until its scope does encompass the Tr; when it does, then the decision maker has an adequate foundation for choosing a course of action. If the problem is very complicated, of course, he may have to call on advisers and analysts for help.

If the decision maker's Comp (and therefore his HD) falls considerably short of encompassing the Tr for his problem, and if he does not recognize this, then he is more like the baby facing the tiger than the hunter. To proceed when the Comp is significantly smaller than the Tr is to risk disaster, as Napoleon

discovered (his Comp did not encompass the Tr associated with Kutuzov's strategic retreat into the wintry steppe).

Effective decision making, therefore, demands that the decision maker expand his Comp to the Tr for the problem that he is facing, and that he master the new elements in his Comp. Thus, he first must deal with personal set-expansion and set-covering problems.

The OR analyst's roles are defined as: 1) helping the decision maker solve the personal problems of expanding his Comp and mastering the new elements in it, so that he can move on to deal with the external problems that he faces, and 2) then helping the decision maker structure his approach to the external problem. In rising to these challenges, the analyst must use approaches appropriate to the problems; they may involve the classical techniques, many of which involve some sort of numerical ordering; or, what is more likely, as demanded by the set-covering concept, they may require more comprehensive models synthesizing many intellectual elements, ranging from higher mathematics to human psychology. The challenge to the OR profession is to expand and enrich its HD to match that of the decision makers it serves (particularly those striving to deal with strategic issues), and to enlarge its palette of approaches to encompass the wholes of the problems faced by decision makers.

Finally, we observe that, while the preceding discussion has sounded as though the Tr for a problem can be known, this is often not the case. This poses problems of unknowns and risks, or, in the terminology of this paper, acquired and unacquired—as well as unacquirable—competence sets (see Yu and Zhang 1989 for an introduction). But such problems often have to be dealt with, and analysts must learn to deal with them appropriately, even when their HDs—along with those of their clients—are perform incomplete.

3.2. Transitions

In the world's increasingly complex and interactive social, governmental, and business environments, each organization must be aware of environmental changes and adapt to them if it is to remain viable. Innovation and transition are inevitable. Thus, a successful leader must be able to assess the current HD of the organization (denoted by HD^o); identify the improved HD that the organization should move to (denoted by HD^*); and plan and carry out the activities required to move the organization's HD from HD^o to HD^* .

In each of these three steps OR can make important contributions. The scale of possibilities can be suggested by the recent value of one of the possible

methods of transition: in 1988 there were 3,300 merges in the United States with a value of \$220 billion (Mergers and Acquisitions 1989). Even a fraction of a percent of improvement achieved in this field through appropriate analyses would yield tremendous gains.

Most OR techniques and approaches, however, are suitable for analyzing problems in which the operations have become reasonably stable. What this field needs is approaches to situations involving dynamic change; both intellectual constructs and craft skills of application are needed. HD analysis can help (see Yu 1990, Chapters 11 and 12, for further discussion).

3.3. People Skills

People are what make up society, and they are therefore ubiquitous in its operations, which form the field in which operations research theorizes and practices. People can help solve problems, and they can be parts of problems. Thus, any OR analysis team addressing a real problem is, *a fortiori*, involved with people in a variety of ways.

It follows that OR workers, to be successful, must have people skills, which include the abilities to communicate effectively, build good relationships, create a cooperative spirit, and create enthusiasm for common effort. Without good people skills in his HD, an analyst: 1) may not be able to discover the core issues in a problem situation; 2) may not be able to acquire the information needed to appreciate the core issues; 3) may not be able to engender the cooperation necessary to conduct a thorough study; 4) may miss opportunities to make contributions, both during the work and after it is finished; 5) may find his progress impeded; and 6) may lose the ability to influence the persons who are able to set the problem situation to right.

Some people seem to be born with the talent to acquire good people skills but most need to learn them. Since they are, as we have argued, so essential to success in OR, it is obvious that their development should be part of OR education and training, both for theoreticians and practitioners.

In summary, people skills form an important part of an OR worker's HD; indeed, most of us could well expand our HDs beyond where we are now in this regard (see Yu 1990, Chapters 10 and 13, for further discussion).

3.4. Changing Environments

The last several decades have witnessed dramatic changes in technology and society, changes that affect our relationships and attitudes as well as the way we

do things. For example, the telecommunication revolution has put the world at our fingertips and on our television screens. Business is becoming globalized and people with differing HDs are becoming involved. New products with world-wide markets capture our attention. Abundant data produced by scanning machines, cash registers, and computers offer new ways of understanding markets and consumer behavior (Little 1991). And so on. All of these developments force those involved to expand and enrich their HDs in order to respond effectively.

The challenge to OR is not only to help decision makers expand their HDs appropriately, but also to work with them to respond effectively to the problems that the changing environments pose.

4. CONCLUSIONS

This paper has introduced the basic concept of an HD and its principal components, and suggested how this concept relates to OR work and workers and their growth in influence. For more details and further applications, see Yu (1990).

In closing, I paraphrase Sun Tzu, a great military strategist: By knowing our own HDs and those of our enemies we will lose no battles in a hundred fights; knowing our own HDs but not the enemy's or knowing the enemy's but not our own, we will win half and lose half of the battles; by not knowing either our own HD or that of our enemy, we will lose all the battles.

From the experience of Napoleon we know that the area outside our HD is not a void. To escape being surprised and bewildered by new experiences and events, we need to expand and enrich our HDs continually—and absorbing elements from others is an important way to do this. If there were some happy, perfect state in which our HD encompassed all of everyone else's, the exterior of our HD would indeed be void, and we would know the voids of others.

ACKNOWLEDGMENT

The research behind this paper was partially supported by NSF grant No. IST-8863 and a grant from United Telecommunications, Inc. This paper was given as a plenary address at the 1990 Annual Conference of the Canadian Operational Research Society in Ottawa; part of it was also given as a Tutorial Lecture at the 1988 ORSA/TIMS meeting in Denver.

The author is grateful to H. D. Ratliff of the Georgia Institute of Technology for valuable advice. He also thanks P. H. Henson of United Telecommunications, Inc., V. Chankong of Case Western Reserve Univer-

sity, M. Zeleny of Fordham University, G. E. Kersten and W. Michalowski of Carleton University, and J. B. Spector and D. Zhang of the University of Kansas for their helpful comments and encouragement. I am especially grateful to the Area Editor for his assistance in preparing the manuscript for publication.

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