

PART I

How Our Actions Create Our Reality.. and How We Can Change It

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"GIVE ME A LEVER LONG ENOUGH.. .AND SINGLE-HANDED I CAN MOVE THE WORLD"

From a very early age, we are taught to break apart problems, to fragment the world. This apparently makes complex tasks and subjects more manageable, but we pay a hidden, enormous price. We can no longer see the consequences of our actions; we lose our intrinsic sense of connection to a larger whole. When we then try to "see the big picture," we try to reassemble the fragments in our minds, to list and organize all the pieces. But, as physicist David Bohm says, the task is futile—similar to trying to reassemble the fragments of a broken mirror to see a true reflection. Thus, after a while we give up trying to see the whole altogether.

The tools and ideas presented in this book are for destroying the illusion that the world is created of separate, unrelated forces. When we give up this illusion—we can then build "learning organizations," organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together.

As Fortune magazine recently said, "Forget your tired old ideas about leadership. The most successful corporation of the 1990s will be something called a learning organization." "The ability to learn faster than your competitors," said Arie De Geus, head of planning for Royal Dutch/Shell, "may be the only sustainable competitive advantage." As

the world becomes more interconnected and business becomes more complex and dynamic, work must become more "learningful." It is no longer sufficient to have one person learning for the organization, a Ford or a Sloan or a Watson. It's just not possible any longer to "figure it out" from the top, and have everyone else following the orders of the "grand strategist." The organizations that will truly excel in the future will be the organizations that discover how to tap people's commitment and capacity to learn at all levels in an organization.

Learning organizations are possible because, deep down, we are all learners. No one has to teach an infant to learn. In fact, no one has to teach infants anything. They are intrinsically inquisitive, masterful learners who learn to walk, speak, and pretty much run their households all on their own. Learning organizations are possible because not only is it our nature to learn but we love to learn. Most of us at one time or another have been part of a great "team," a group of people who functioned together in an extraordinary way— who trusted one another, who complemented each others' strengths and compensated for each others' limitations, who had common goals that were larger than individual goals, and who produced extraordinary results. I have met many people who have experienced this sort of profound teamwork—in sports, or in the performing arts, or in business. Many say that they have spent much of their life looking for that experience again. What they experienced was a learning organization.

The team that became great didn't start off great—it learned how to produce extraordinary results.

One could argue that the entire global business community is learning to learn together, becoming a learning community. Whereas once many industries were dominated by a single, undisputed leader —one IBM, one Kodak, one Procter & Gamble, one Xerox—today industries, especially in manufacturing, have dozens of excellent companies. American and European corporations are pulled forward by the example of the Japanese; the Japanese, in turn, are pulled by the Koreans and Europeans. Dramatic improvements take place in

corporations in Italy, Australia, Singapore—and quickly become influential around the world.

There is also another, in some ways deeper, movement toward learning organizations, part of the evolution of industrial society. Material affluence for the majority has gradually shifted people's orientation toward work—from what Daniel Yankelovich called an "instrumental" view of work, where work was a means to an end, to a more "sacred" view, where people seek the "intrinsic" benefits of work.¹ "Our grandfathers worked six days a week to earn what most of us now earn by Tuesday afternoon," says Bill O'Brien, CEO of Hanover Insurance. "The ferment in management will continue until we build organizations that are more consistent with man's higher aspirations beyond food, shelter and belonging."

Moreover, many who share these values are now in leadership positions. I find a growing number of organizational leaders who, while still a minority, feel they are part of a profound evolution in the nature of work as a social institution. "Why can't we do good works at work?" asked Edward Simon, president of Herman Miller, recently. "Business is the only institution that has a chance, as far as I can see, to fundamentally improve the injustice that exists in the world. But first, we will have to move through the barriers that are keeping us from being truly vision-led and capable of learning."

Perhaps the most salient reason for building learning organizations is that we are only now starting to understand the capabilities such organizations must possess. For a long time, efforts to build learning organizations were like groping in the dark until the skills, areas of knowledge, and paths for development of such organizations became known. What fundamentally will distinguish learning organizations from traditional authoritarian "controlling organizations" will be the mastery of certain basic disciplines. That is why the "disciplines of the learning organization" are vital.

DISCIPLINES OF THE LEARNING ORGANIZATION

On a cold, clear morning in December 1903, at Kitty Hawk, North Carolina, the fragile aircraft of Wilbur and Orville Wright proved that powered flight was possible. Thus was the airplane invented; but it would take more than thirty years before commercial aviation could serve the general public.

Engineers say that a new idea has been "invented" when it is proven to work in the laboratory. The idea becomes an "innovation" only when it can be replicated reliably on a meaningful scale at practical costs. If the idea is sufficiently important, such as the telephone, the digital computer, or commercial aircraft, it is called a "basic innovation," and it creates a new industry or transforms an existing industry. In these terms, learning organizations have been invented, but they have not yet been innovated.

In engineering, when an idea moves from an invention to an innovation, diverse "component technologies" come together. Emerging from isolated developments in separate fields of research, these components gradually form an "ensemble of technologies that are critical to each others' success. Until this ensemble forms, the idea, though possible in the laboratory, does not achieve its potential in practice.²

The Wright Brothers proved that powered flight was possible, but the McDonnell Douglas DC-3, introduced in 1935, ushered in the era of commercial air travel. The DC-3 was the first plane that supported itself economically as well as aerodynamically. During those intervening thirty years (a typical time period for incubating basic

innovations), myriad experiments with commercial flight had failed. Like early experiments with learning organizations, the early planes were not reliable and cost effective on an appropriate scale.

The DC-3, for the first time, brought together five critical component technologies that formed a successful ensemble. They were: the variable-pitch propeller, retractable landing gear, a type of lightweight

molded body construction called "monocque," radial air-cooled engine, and wing flaps. To succeed, the DC-3 needed all five; four were not enough. One year earlier, the Boeing 247 was introduced with all of them except wing flaps. Lacking wing flaps, Boeing's engineers found that the plane was unstable on takeoff and landing and had to downsize the engine.

Today, I believe, five new "component technologies" are gradually converging to innovate learning organizations. Though developed separately, each will, I believe, prove critical to the others' success, just as occurs with any ensemble. Each provides a vital dimension in building organizations that can truly "learn," that can continually enhance their capacity to realize their highest aspirations:

Systems Thinking. A cloud masses, the sky darkens, leaves twist upward, and we know that it will rain. We also know that after the storm, the runoff will feed into groundwater miles away, and the sky will grow clear by tomorrow. All these events are distant in time and space, and yet they are all connected within the same pattern. Each has an influence on the rest, an influence that is usually hidden from view. You can only understand the system of a rainstorm by contemplating the whole, not any individual part of the pattern.

Business and other human endeavors are also systems. They, too, are bound by invisible fabrics of interrelated actions, which often take years to fully play out their effects on each other. Since we are part of that lacework ourselves, it's doubly hard to see the whole pattern of change. Instead, we tend to focus on snapshots of isolated parts of the system, and wonder why our deepest problems never seem to get solved. Systems thinking is a conceptual framework, a body of knowledge and tools that has been developed over the past fifty years, to make the full patterns clearer, and to help us see how to change them effectively.

Though the tools are new, the underlying worldview is extremely intuitive; experiments with young children show that they learn systems thinking very quickly.

Personal Mastery. Mastery might suggest gaining dominance over people or things. But mastery can also mean a special level of proficiency. A master craftsman doesn't dominate pottery or weaving. People with a high level of personal mastery are able to consistently realize the results that matter most deeply to them— in effect, they approach their life as an artist would approach a work of art. They do that by becoming committed to their own lifelong learning.

Personal mastery is the discipline of continually clarifying and deepening our personal vision, of focusing our energies, of developing patience, and of seeing reality objectively. As such, it is an essential cornerstone of the learning organization—the learning organization's spiritual foundation. An organization's commitment to and capacity for learning can be no greater than that of its members. The roots of this discipline lie in both Eastern and Western spiritual traditions, and in secular traditions as well.

But surprisingly few organizations encourage the growth of their people in this manner. This results in vast untapped resources: "People enter business as bright, well-educated, high-energy people, full of energy and desire to make a difference," says Hanover's O'Brien. "By the time they are 30, a few are on the "fast track" and the rest 'put in their time' to do what matters to them on the weekend. They lose the commitment, the sense of mission, and the excitement with which they started their careers. We get damn little of their energy and almost none of their spirit."

And surprisingly few adults work to rigorously develop their own personal mastery. When you ask most adults what they want from their lives, they often talk first about

what they'd like to get rid of: "I'd like my mother-in-law to move out," they say, or "I'd like my back problems to clear up." The discipline of personal mastery, by contrast, starts with clarifying the things that really matter to us, of living our lives in the service of our highest aspirations.

Here, I am most interested in the connections between personal learning and organizational learning, in the reciprocal commitments between individual and organization, and in the special spirit of an enterprise made up of learners.

Mental Models. "Mental models" are deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action. Very often, we are not consciously aware of our mental models or the effects they have on our behavior. For example, we may notice that a co-worker dresses elegantly, and say to ourselves, "She's a country club person." About someone who dresses shabbily, we may feel, "He doesn't care about what others think." Mental models of what can or cannot be done in different management settings are no less deeply entrenched. Many insights into new markets or outmoded organizational practices fail to get put into practice because they conflict with powerful, tacit mental models.

Royal Dutch/Shell, one of the first large organizations to understand the advantages of accelerating organizational learning came to this realization when they discovered how pervasive was the influence of hidden mental models, especially those that become widely shared. Shell's extraordinary success in managing through the dramatic changes and unpredictability of the world oil business in the 1970s and 1980s came in large measure from learning how to surface and challenge manager's mental models. (In the early 1970s Shell was the weakest of the big seven oil companies; by the late 1980s it was the strongest.) Arie de Geus, Shell's recently retired Coordinator of Group Planning, says that continuous adaptation and growth in a changing business environment depends on "institutional learning, which is the process whereby management teams change their shared mental models of the company, their markets, and their competitors. For this reason, we think of planning as learning and of corporate planning as institutional learning."³

The discipline of working with mental models starts with turning the mirror inward; learning to unearth our internal pictures of the world, to bring them to the surface and hold them rigorously to scrutiny. It also includes the ability to carry on "learningful" conversations that balance inquiry and advocacy, where people expose their own thinking effectively and make that thinking open to the influence of others.

Building Shared Vision. If any one idea about leadership has inspired organizations for thousands of years, it's the capacity to hold a shared picture of the future we seek to create. One is hard pressed to think of any organization that has sustained some measure of greatness in the absence of goals, values, and missions that become deeply shared throughout the organization. IBM had "service"; Polaroid had instant photography; Ford had public transportation for the masses and Apple had computing power for the masses. Though radically different in content and kind, all these organizations managed to bind people together around a common identity and sense of destiny.

When there is a genuine vision (as opposed to the all-too-familiar "vision statement"), people excel and learn, not because they are told to, but because they want to. But many leaders have personal visions that never get translated into shared visions that galvanize an organization. All too often, a company's shared vision has revolved around the charisma of a leader, or around a crisis that galvanizes everyone temporarily. But, given a choice, most people opt for pursuing a lofty goal, not only in times of crisis but at all times. What has been lacking is a discipline for translating individual vision into shared vision—not a "cookbook" but a set of principles and guiding practices.

The practice of shared vision involves the skills of unearthing shared "pictures of the future" that foster genuine commitment and enrollment rather than compliance. In mastering this discipline, leaders learn the counterproductiveness of trying to dictate a vision, no matter how heartfelt.

Team Learning. How can a team of committed managers with individual IQs above 120 have a collective IQ of 63? The discipline of team learning confronts this paradox. We know that teams can learn; in sports, in the performing arts, in science, and even, occasionally, in business, there are striking examples where the intelligence of the team exceeds the intelligence of the individuals in the team, and where teams develop extraordinary capacities for coordinated action. When teams are truly learning, not only are they producing extraordinary results but the individual members are growing more rapidly than could have occurred otherwise.

The discipline of team learning starts with "dialogue," the capacity of members of a team to suspend assumptions and enter into a genuine "thinking together." To the Greeks dia-logos meant a free-flowing of meaning through a group, allowing the group to discover insights not attainable individually. Interestingly, the practice of dialogue has been preserved in many "primitive" cultures, such as that of the American Indian, but it has been almost completely lost to modern society. Today, the principles and practices of dialogue are being rediscovered and put into a contemporary context. (Dialogue differs from the more common "discussion," which has its roots with "percussion" and "concussion," literally a heaving of ideas back and forth in a winner-takes-all competition.)

The discipline of dialogue also involves learning how to recognize the patterns of interaction in teams that undermine learning. The patterns of defensiveness are often deeply engrained in how a team operates. If unrecognized, they undermine learning. If recognized and surfaced creatively, they can actually accelerate learning.

Team learning is vital because teams, not individuals, are the fundamental learning unit in modern organizations. This where "the rubber meets the road"; unless teams can learn, the organization cannot learn.

If a learning organization were an engineering innovation, such as the airplane or the personal computer, the components would be called "technologies." For an innovation in human behavior, the components need to be seen as disciplines. By "discipline," I do not mean an "enforced order" or "means of punishment," but a body of theory and technique that must be studied and mastered to be put into practice. A discipline is a developmental path for acquiring certain skills or competencies. As with any discipline, from playing the piano to electrical engineering, some people have an innate "gift," but anyone can develop proficiency through practice.

To practice a discipline is to be a lifelong learner. You "never arrive"; you spend your life mastering disciplines. You can never say, "We are a learning organization," any more than you can say, "I am an enlightened person." The more you learn, the more acutely aware you become of your ignorance. Thus, a corporation cannot be "excellent" in the sense of having arrived at a permanent excellence; it is always in the state of practicing the disciplines of learning, of becoming better or worse.

That organizations can benefit from disciplines is not a totally new idea. After all, management disciplines such as accounting have been around for a long time. But the five learning disciplines differ from more familiar management disciplines in that they are "personal" disciplines. Each has to do with how we think, what we truly want, and how we interact and learn with one another. In this sense, they are more like artistic disciplines than traditional management disciplines. Moreover, while accounting is good for "keeping score," we have never approached the subtler tasks of building organizations, of enhancing their capabilities for innovation and creativity, of crafting strategy and designing policy and structure through assimilating new disciplines. Perhaps this is why, all too often, great organizations are fleeting, enjoying their moment in the sun, then passing quietly back to the ranks of the mediocre.

Practicing a discipline is different from emulating "a model." All too often, new management innovations are described in terms of the "best

practices" of so-called leading firms. While interesting, I believe such descriptions can often do more harm than good, leading to piecemeal copying and playing catch-up. I do not believe great organizations have ever been built by trying to emulate another, any more than individual greatness is achieved by trying to copy another "great person."

When the five component technologies converged to create the DC-3 the commercial airline industry began. But the DC-3 was not the end of the process. Rather, it was the precursor of a new industry. Similarly, as the five component learning disciplines converge they will not create the learning organization but rather a new wave of experimentation and advancement.

THE FIFTH DISCIPLINE

It is vital that the five disciplines develop as an ensemble. This is challenging because it is much harder to integrate new tools than simply apply them separately. But the payoffs are immense.

This is why systems thinking is the fifth discipline. It is the discipline that integrates the disciplines, fusing them into a coherent body of theory and practice. It keeps them from being separate gimmicks or the latest organization change fads. Without a systemic orientation, there is no motivation to look at how the disciplines interrelate. By enhancing each of the other disciplines, it continually reminds us that the whole can exceed the sum of its parts.

For example, vision without systems thinking ends up painting lovely pictures of the future with no deep understanding of the forces that must be mastered to move from here to there. This is one of the reasons why many firms that have jumped on the "vision bandwagon" in recent years have found that lofty vision alone fails to turn around a firm's fortunes. Without systems thinking, the seed of vision falls on harsh soil. If nonsystemic thinking predominates, the first condition for nurturing vision is not met: a genuine belief that we can make our vision real in the future. We may say "We can achieve our vision" (most

American managers are conditioned to this belief), but our tacit view of current reality as a set of conditions created by somebody else betrays us.

But systems thinking also needs the disciplines of building shared vision, mental models, team learning, and personal mastery to realize its potential. Building shared vision fosters a commitment to the long term. Mental models focus on the openness needed to unearth shortcomings in our present ways of seeing the world. Team learning develops the skills of groups of people to look for the larger picture that lies beyond individual perspectives. And personal mastery fosters the personal motivation to continually learn how our actions affect our world. Without personal mastery, people are so steeped in the reactive mindset ("someone/something else is creating my problems") that they are deeply threatened by the systems perspective.

Lastly, systems thinking makes understandable the subtlest aspect of the learning organization—the new way individuals perceive themselves and their world. At the heart of a learning organization is a shift of mind—from seeing ourselves as separate from the world to connected to the world, from seeing problems as caused by someone or something "out there" to seeing how our own actions create the problems we experience. A learning organization is a place where people are continually discovering how they create their reality. And how they can change it. As Archimedes has said, "Give me a lever long enough . . . and single-handed I can move the world."

METANOIA—A SHIFT OF MIND

When you ask people about what it is like being part of a great team, what is most striking is the meaningfulness of the experience. People talk about being part of something larger than themselves, of being connected, of being generative. It becomes

quite clear that, for many, their experiences as part of truly great teams stand out as singular periods of life lived to the fullest. Some spend the

rest of their lives looking for ways to recapture that spirit.

The most accurate word in Western culture to describe what happens in a learning organization is one that hasn't had much currency for the past several hundred years. It is a word we have used in our work with organizations for some ten years, but we always caution them, and ourselves, to use it sparingly in public. The word is "metanoia" and it means a shift of mind. The word has a rich history. For the Greeks, it meant a fundamental shift or change, or more literally transcendence ("meta"—above or beyond, as in "metaphysics") of mind ("noia," from the root "nous," of mind). In the early (Gnostic) Christian tradition, it took on a special meaning of awakening shared intuition and direct knowing of the highest, of God. "Metanoia" was probably the key term of such early Christians as John the Baptist. In the Catholic corpus the word metanoia was eventually translated as "repent."

To grasp the meaning of "metanoia" is to grasp the deeper meaning of "learning," for learning also involves a fundamental shift or movement of mind. The problem with talking about "learning organizations" is that the "learning" has lost its central meaning in contemporary usage. Most people's eyes glaze over if you talk to them about "learning" or "learning organizations." Little wonder—for, in everyday use, learning has come to be synonymous with "taking in information." "Yes, I learned all about that at the course yesterday." Yet, taking in information is only distantly related to real learning. It would be nonsensical to say, "I just read a great book about bicycle riding—I've now learned that."

Real learning gets to the heart of what it means to be human. Through learning we re-create ourselves. Through learning we become able to do something we never were able to do. Through learning we re-perceive the world and our relationship to it. Through learning we extend our capacity to create, to be part of the generative process of life. There is within each of us a deep hunger for this type of learning. It is, as Bill O'Brien of Hanover Insurance says, "as fundamental to human beings as the sex drive."

This, then, is the basic meaning of a "learning organization"—an organization that is continually expanding its capacity to create its future. For such an organization, it is not enough merely to survive. "Survival learning" or what is more often termed "adaptive learning" is important—indeed it is necessary. But for a learning organization, "adaptive learning" must be joined by "generative learning," learning that enhances our capacity to create.

A few brave organizational pioneers are pointing the way, but the territory of building learning organizations is still largely unexplored. It is my fondest hope that this book can accelerate that exploration.

PUTTING THE IDEAS INTO PRACTICE

I take no credit for inventing the five major disciplines of this book. The five disciplines described below represent the experimentation, research, writing, and invention of hundreds of people. But I have worked with all of the disciplines for years, refining ideas about them, collaborating on research, and introducing them to organizations throughout the world.

When I entered graduate school at the Massachusetts Institute of Technology in 1970, I was already convinced that most of the problems faced by humankind concerned our inability to grasp and manage the increasingly complex systems of our world. Little has happened since to change my view. Today, the arms race, the environmental crisis, the international drug trade, the stagnation in the Third World, and the persisting U.S. budget and trade deficits all attest to a world where problems are becoming increasingly complex and interconnected. From the start at MIT I was drawn to the work of Jay Forrester, a computer pioneer who had shifted fields to develop what he called "system dynamics." Jay maintained that the causes of many pressing public issues, from urban decay to global ecological threat, lay in the very well-intentioned policies designed to alleviate them. These problems were "actually systems"

that lured policymakers into interventions that focused on obvious symptoms not underlying causes, which produced short-term benefit but long-term malaise, and fostered the need for still more symptomatic interventions.

As I began my doctoral work, I had little interest in business management. I felt that the solutions to the Big Issues lay in the public sector. But I began to meet business leaders who came to visit our MIT group to learn about systems thinking. These were thoughtful people, deeply aware of the inadequacies of prevailing ways of managing. They were engaged in building new types of organizations —decentralized, nonhierarchical organizations dedicated to the well-being and growth of employees as well as to success. Some had crafted radical corporate philosophies based on core values of freedom and responsibility. Others had developed innovative organization designs. All shared a commitment and a capacity to innovate that was lacking in the public sector. Gradually, I came to realize why business is the locus of innovation in an open society. Despite whatever hold past thinking may have on the business mind, business has a freedom to experiment missing in the public sector and, often, in nonprofit organizations. It also has a clear "bottom line," so that experiments can be evaluated, at least in principle, by objective criteria.

By why were they interested in systems thinking? Too often, the most daring organizational experiments were foundering. Local autonomy produced business decisions that were disastrous for the organization as a whole. "Team building" exercises sent colleagues white-water rafting together, but when they returned home they still disagreed fundamentally about business problems. Companies pulled together during crises, and then lost all their inspiration when business improved. Organizations which started out as booming successes, with the best possible intentions toward customers and employees, found themselves trapped in downward spirals that got worse the harder they tried to fix them.

Then, we all believed that the tools of systems thinking could make a difference in these companies. As I worked with different companies, I came to see why systems thinking was not enough by itself. It needed a new type of management practitioner to really make the most of it. At that time, in the mid-1970s, there was a nascent sense of what such a management practitioner could be. But it had not yet crystallized. It is crystallizing now with leaders of our MIT group: William O'Brien of Hanover Insurance; Edward Simon from Herman Miller, and Ray Stata, CEO of Analog Devices. All three of these men are involved in innovative, influential companies. All three have been involved in our research program for several years, along with leaders from Apple, Ford, Polaroid, Royal Dutch/ Shell, and Trammell Crow.

For eleven years I have also been involved in developing and conducting Innovation Associates' Leadership and Mastery workshops, which have introduced people from all walks of life to the fifth discipline ideas that have grown out of our work at MIT, combined with IA's path-breaking work on building shared vision and personal mastery. Over four thousand managers have attended. We started out with a particular focus on corporate senior executives, but soon found that the basic disciplines such as systems thinking, personal mastery, and shared vision were relevant for teachers, public administrators and elected officials, students, and parents. All were in leadership positions of importance. All were in "organizations" that had still untapped potential for creating their future. All felt that to tap that potential required developing their own capacities, that is, learning.

So, this book is for the learners, especially those of us interested in the art and practice of collective learning.

For managers, this book should help in identifying the specific practices, skills, and disciplines that can make building learning organizations less of an occult art (though an art nonetheless).

For parents, this book should help in letting our children be our teachers, as well as we theirs—for they have much to teach us about

learning as a way of life.

For citizens, the dialogue about why contemporary organizations are not especially good learners and about what is required to build learning organizations reveals some of the tools needed by communities and societies if they are to become more adept learners.

2

DOES YOUR ORGANIZATION HAVE A LEARNING DISABILITY?

Few large corporations live even half as long as a person. In 1983, a Royal Dutch/Shell survey found that one third of the firms in the Fortune "500" in 1970 had vanished.¹ Shell estimated that the average lifetime of the largest industrial enterprises is less than forty years, roughly half the lifetime of a human being! The chances are fifty-fifty that readers of this book will see their present firm disappear during their working career.

In most companies that fail, there is abundant evidence in advance that the firm is in trouble. This evidence goes unheeded, however, even when individual managers are aware of it. The organization as a whole cannot recognize impending threats, understand the implications of those threats, or come up with alternatives.

Perhaps under the laws of "survival of the fittest," this continual death of firms is fine for society. Painful though it may be for the employees and owners, it is simply a turnover of the economic soil, redistributing the resources of production to new companies and new cultures. But what if the high corporate mortality rate is only a symptom of deeper problems that afflict all companies, not just the ones that die? What if even the most successful companies are poor learners—they survive but never live up to their potential? What if, in light of what organizations could be, "excellence" is actually "mediocrity"?

It is no accident that most organizations learn poorly. The way they are designed and managed, the way people's jobs are defined, and, most

importantly, the way we have all been taught to think and interact (not only in organizations but more broadly) create fundamental learning disabilities. These disabilities operate despite the best efforts of bright, committed people. Often the harder they try to solve problems, the worse the results. What learning does occur takes place despite these learning disabilities—for they pervade all organizations to some degree.

Learning disabilities are tragic in children, especially when they go undetected. They are no less tragic in organizations, where they also go largely undetected. The first step in curing them is to begin to identify the seven learning disabilities:

1. "I AM MY POSITION"

We are trained to be loyal to our jobs—so much so that we confuse them with our own identities. When a large American steel company began closing plants in the early 1980s, it offered to train the displaced steelworkers for new jobs. But the training never "took"; the workers drifted into unemployment and odd jobs instead. Psychologists

came in to find out why, and found the steelworkers suffering from acute identity crises. "How could I do anything else?" asked the workers. "I am a lathe operator."

When asked what they do for a living, most people describe the tasks they perform every day, not the purpose of the greater enterprise in which they take part. Most see themselves within a "system" over which they have little or no influence. They "do their job," put in their time, and try to cope with the forces outside of their control. Consequently, they tend to see their responsibilities as limited to the boundaries of their position.

Recently, managers from a Detroit auto maker told me of stripping down a Japanese import to understand why the Japanese were able to achieve extraordinary precision and reliability at lower cost on a particular assembly process. They found the same standard type of bolt used three times on the engine block. Each time it mounted a

different type of component. On the American car, the same assembly required three different bolts, which required three different wrenches and three different inventories of bolts—making the car much slower and more costly to assemble. Why did the Americans use three separate bolts? Because the design organization in Detroit had three groups of engineers, each responsible for "their component only." The Japanese had one designer responsible for the entire engine mounting, and probably much more. The irony is that each of the three groups of American engineers considered their work successful because their bolt and assembly worked just fine.

When people in organizations focus only on their position, they have little sense of responsibility for the results produced when all positions interact. Moreover, when results are disappointing, it can be very difficult to know why. All you can do is assume that "someone screwed up."

2. "THE ENEMY IS OUT THERE"

A friend once told the story of a boy he coached in Little League, who after dropping three fly balls in right field, threw down his glove and marched into the dugout. "No one can catch a ball in that darn field," he said.

There is in each of us a propensity to find someone or something outside ourselves to blame when things go wrong. Some organizations elevate this propensity to a commandment: "Thou shall always find an external agent to blame." Marketing blames manufacturing: "The reason we keep missing sales targets is that our quality is not competitive." Manufacturing blames engineering. Engineering blames marketing: "If they'd only quit screwing up our designs and let us design the products we are capable of, we'd be an industry leader."

The "enemy is out there" syndrome is actually a by-product of "I am my position," and the nonsystemic ways of looking at the world that it fosters. When we focus only on our position, we do not see how our

own actions extend beyond the boundary of that position. When those actions have consequences that come back to hurt us, we misperceive these new problems as externally caused. Like the person being chased by his own shadow, we cannot seem to shake them.

The "Enemy Is Out There" syndrome is not limited to assigning blame within the organization. During its last years of operation, the once highly successful People Express Airlines slashed prices, boosted marketing, and bought Frontier Airlines—all in a frantic attempt to fight back against the perceived cause of its demise: increasingly aggressive competitors. Yet, none of these moves arrested the company's mounting losses or corrected its core problem, service quality that had declined so far that low fares were its only remaining pull on customers.

For many American companies, "the enemy" has become Japanese competition, labor unions, government regulators, or customers who "betrayed us" by buying products from someone else. "The enemy is out there," however, is almost always an incomplete story. "Out there" and "in here" are usually part of a single system. This learning

disability makes it almost impossible to detect the leverage which we can use "in here" on problems that straddle the boundary between us and "out there."

3. THE ILLUSION OF TAKING CHARGE

Being "proactive" is in vogue. Managers frequently proclaim the need for taking charge in facing difficult problems. What is typically meant by this is that we should face up to difficult issues, stop waiting for someone else to do something, and solve problems before they grow into crises. In particular, being proactive is frequently seen as an antidote to being "reactive"—waiting until a situation gets out of hand before taking a step. But is taking aggressive action against an external enemy really synonymous with being proactive?

Not too long ago, a management team in a leading property and liability insurance company with whom we were working got bitten by the proactiveness bug. The head of the team, a talented vice president for claims, was about to give a speech proclaiming that the company wasn't going to get pushed around anymore by lawyers litigating more and more claims settlements. The firm would beef up its own legal staff so that it could take more cases through to trial by verdict, instead of settling them out of court.

Then we and some members of the team began to look more systematically at the probable effects of the idea: the likely fraction of cases that might be won in court, the likely size of cases lost, the monthly direct and overhead costs regardless of who won or lost, and how long cases would probably stay in litigation. (The tool we used is discussed in Chapter 17, "Microworlds.") Interestingly, the team's scenarios pointed to increasing total costs because, given the quality of investigation done initially on most claims, the firm simply could not win enough of its cases to offset the costs of increased litigation. The vice president tore up his speech.

All too often, "proactiveness" is reactivity in disguise. If we simply become more aggressive fighting the "enemy out there," we are reacting—regardless of what we call it. True proactiveness comes from seeing how we contribute to our own problems. It is a product of our way of thinking, not our emotional state.

4. THE FIXATION ON EVENTS

Two children get into a scrap on the playground and you come over to untangle them. Lucy says, "I hit him because he took my ball." Tommy says, "I took her ball because she won't let me play with her airplane." Lucy says, "He can't play with my airplane because he broke the propeller." Wise adults that we are, we say, "Now, now, children—just get along with each other." But are we really any different in the way we explain the entanglements we find ourselves caught in? We are

conditioned to see life as a series of events, and for every event, we think there is one obvious cause.

Conversations in organizations are dominated by concern with events: last month's sales, the new budget cuts, last quarter's earnings, who just got promoted or fired, the new product our competitors just announced, the delay that just was announced in our new product, and so on. The media reinforces an emphasis on short-term events—after all, if it's more than two days' old it's no longer "news." Focusing on events leads to "event" explanations: "The Dow Jones average dropped sixteen points today," announces the newspaper, "because low fourth-quarter profits were announced yesterday." Such explanations may be true as far as they go, but they distract us from seeing the longer-term patterns of change that lie behind the events and from understanding the causes of those patterns.

Our fixation on events is actually part of our evolutionary programming. If you wanted to design a cave person for survival, ability to contemplate the cosmos would not be a high-ranking design criterion. What is important is the ability to see the saber-toothed tiger over your left shoulder and react quickly. The irony is that, today, the primary threats to our survival, both of our organizations and of our societies, come not from sudden events but from slow, gradual processes; the arms race, environmental

decay, the erosion of a society's public education system, increasingly obsolete physical capital, and decline in design or product quality (at least relative to competitors' quality) are all slow, gradual processes.

Generative learning cannot be sustained in an organization if people's thinking is dominated by short-term events. If we focus on events, the best we can ever do is predict an event before it happens so that we can react optimally. But we cannot learn to create.

5. THE PARABLE OF THE BOILED FROG

Maladaptation to gradually building threats to survival is so pervasive in systems studies of corporate failure that it has given rise to the parable of the "boiled frog." If you place a frog in a pot of boiling water, it will immediately try to scramble out. But if you place the frog in room temperature water, and don't scare him, he'll stay put. Now, if the pot sits on a heat source, and if you gradually turn up the temperature, something very interesting happens. As the temperature rises from 70 to 80 degrees F., the frog will do nothing. In fact, he will show every sign of enjoying himself. As the temperature gradually increases, the frog will become groggier and groggier, until he is unable to climb out of the pot. Though there is nothing restraining him, the frog will sit there and boil. Why? Because the frog's internal apparatus for sensing threats to survival is geared to sudden changes in his environment, not to slow, gradual changes.

Something similar happened to the American automobile industry. In the 1960s, it dominated North American production. That began to change very gradually. Certainly, Detroit's Big Three did not see Japan as a threat to their survival in 1962, when the Japanese share of the U.S. market was below 4 percent. Nor in 1967, when it was less than 10 percent. Nor in 1974, when it was under 15 percent. By the time the Big Three began to look critically at its own practices and core assumptions, it was the early 1980s, and the Japanese share of the American market had risen to 21.3 percent. By 1989, the Japanese share was approaching 30 percent, and the American auto industry could account for only about 60 percent of the cars sold in the U.S.² It is still not clear whether this particular frog will have the strength to pull itself out of the hot water.

Learning to see slow, gradual processes requires slowing down our frenetic pace and paying attention to the subtle as well as the dramatic. If you sit and look into a tidepool, initially you won't see much of anything going on. However, if you watch long enough, after about ten minutes the tidepool will suddenly come to life. The world of beautiful creatures is always there, but moving a bit too slowly to be seen at first. The problem is our minds are so locked in one frequency, it's as if we

can only see at 78 rpm; we can't see anything at 33 1/3. We will not avoid the fate of the frog until we learn to slow down and see the gradual processes that often pose the greatest threats.

6. THE DELUSION OF LEARNING FROM EXPERIENCE

The most powerful learning comes from direct experience. Indeed, we learn eating, crawling, walking, and communicating through direct trial and error—through taking an action and seeing the consequences of that action; then taking a new and different action. But what happens when we can no longer observe the consequences of our actions? What happens if the primary consequences of our actions are in the distant future or in a distant part of the larger system within which we operate? We each have a "learning horizon," a breadth of vision in time and space within which we assess our effectiveness. When our actions have consequences beyond our learning horizon, it becomes impossible to learn from direct experience.

Herein lies the core learning dilemma that confronts organizations: we learn best from experience but we never directly experience the consequences of many of our most important decisions. The most critical decisions made in organizations have systemwide consequences that stretch over years or decades. Decisions in R&D have first-order consequences in marketing and manufacturing. Investing in new

manufacturing facilities and processes influences quality and delivery reliability for a decade or more. Promoting the right people into leadership positions shapes strategy and organizational climate for years. These are exactly the types of decisions where there is the least opportunity for trial and error learning.

Cycles are particularly hard to see, and thus learn from, if they last longer than a year or two. As systems-thinking writer Draper Kauffman, Jr., points out, most people have short memories. "When a temporary oversupply of workers develops in a particular field," he wrote,

"everyone talks about the big surplus and young people are steered away from the field. Within a few years, this creates a shortage, jobs go begging, and young people are frantically urged into the field—which creates a surplus. Obviously, the best time to start training for a job is when people have been talking about a surplus for several years and few others are entering it. That way, you finish your training just as the shortage develops."3

Traditionally, organizations attempt to surmount the difficulty of coping with the breadth of impact from decisions by breaking themselves up into components. They institute functional hierarchies that are easier for people to "get their hands around." But, functional divisions grow into fiefdoms, and what was once a convenient division of labor mutates into the "stovepipes" that all but cut off contact between functions. The result: analysis of the most important problems in a company, the complex issues that cross functional lines, becomes a perilous or nonexistent exercise.

7. THE MYTH OF THE MANAGEMENT TEAM

Standing forward to do battle with these dilemmas and disabilities is "the management team," the collection of savvy, experienced managers who represent the organization's different functions and areas of expertise. Together, they are supposed to sort out the complex cross-functional issues that are critical to the organization. What confidence do we have, really, that typical management teams can surmount these learning disabilities?

All too often, teams in business tend to spend their time fighting for turf, avoiding anything that will make them look bad personally, and pretending that everyone is behind the team's collective strategy — maintaining the appearance of a cohesive team. To keep up the image, they seek to squelch disagreement; people with serious reservations avoid stating them publicly, and joint decisions are watered-down compromises reflecting what everyone can live with, or else reflecting one person's view foisted on the group. If there is disagreement, it's

usually expressed in a manner that lays blame, polarizes opinion, and fails to reveal the underlying differences in assumptions and experience in a way that the team as a whole could learn.

"Most management teams break down under pressure," writes Harvard's Chris Argyris—a longtime student of learning in management teams. "The team may function quite well with routine issues. But when they confront complex issues that may be embarrassing or threatening, the 'teamness' seems to go to pot."⁴

Argyris argues that most managers find collective inquiry inherently threatening. School trains us never to admit that we do not know the answer, and most corporations reinforce that lesson by rewarding the people who excel in advocating their views, not inquiring into complex issues. (When was the last time someone was rewarded in your organization for raising difficult questions about the company's current policies rather than solving urgent problems?) Even if we feel uncertain or ignorant, we learn to protect ourselves from the pain of appearing uncertain or ignorant. That very process blocks out any new understandings which might threaten us. The consequence is what Argyris calls "skilled incompetence"—teams full of people who are incredibly proficient at keeping themselves from learning.

DISABILITIES AND DISCIPLINES

These learning disabilities have been with us for a long time. In *The March of Folly*, Barbara Tuchman traces the history of devastating large-scale policies "pursued contrary to ultimate self-interest,"⁵ from the fall of the Trojans through the U.S. involvement in Vietnam. In story after story, leaders could not see the consequences of their own policies, even when they were warned in advance that their own survival was at stake. Reading between the lines of Tuchman's writing, you can see that the fourteenth-century Valois monarchs of France suffered from "I am my position" disabilities—when they devalued currency, they literally didn't realize they were driving the new French middle class toward insurrection.

In the mid-1700s Britain had a bad case of boiled frog. The British went through "a full decade," wrote Tuchman, "of mounting conflict with the [American] colonies without any [British official] sending a representative, much less a minister, across the Atlantic . . . to find out what was endangering the relationship . . ." By 1776, the start of the American Revolution, the relationship was irrevocably endangered. Elsewhere, Tuchman describes the Roman Catholic cardinals of the fifteenth and sixteenth centuries, a tragic management "team" in which piety demanded that they present an appearance of agreement. However, behind-the-scenes backstabbing (in some cases, literal backstabbing) brought in opportunistic popes whose abuses of office provoked the Protestant Reformation.

We live in no less perilous times today, and the same learning disabilities persist, along with their consequences. The five disciplines of the learning organization can, I believe, act as antidotes to these learning disabilities. But first, we must see the disabilities more clearly—for they are often lost amid the bluster of day-to-day events.

3

PRISONERS OF THE SYSTEM, OR PRISONERS OF OUR OWN THINKING?

In order to see the learning disabilities in action, it helps to start with a laboratory experiment—a microcosm of how real organizations function, where you can see the consequences of your decisions play out more clearly than is possible in real organizations. For this reason, we often invite people to take part in a simulation called the "beer game," first developed in the 1960s at the Massachusetts Institute of Technology's Sloan School of Management. Because it is a "laboratory replica" of a real setting, rather than reality itself, we can isolate the disabilities and their causes more sharply than is possible in real organizations. This reveals that the problems originate in basic ways of thinking and interacting, more than in peculiarities of organization structure and policy.

The beer game does this by immersing us in a type of organization which is rarely noticed but widely prevalent: a production/distribution system, the kind responsible for producing and shipping consumer and commercial goods in all industrial countries. In this case, it's a system for producing and distributing a single brand of beer. The players at each position are completely free to make any decision that seems prudent. Their only goal is to manage their position as best they can to maximize their profits.¹

As with many games, the "playing" of a single session of the beer game can be told as a story. There are three main characters in the story—a retailer, a wholesaler, and the marketing director of a brewery.² This story is told, in turn, through each of the players' eyes.

THE RETAILER

Imagine that you're a retail merchant. Perhaps you're the franchise manager of a brightly lit twenty-four-hour chain store at a suburban intersection. Or maybe you own a mom-and-pop grocery on a street of Victorian-era brownstones. Or a discount beverage outlet on a remote highway.

No matter what your store looks like, or whatever else you sell, beer is a cornerstone of your business. Not only do you make a profit on it, but it draws customers in to buy, perhaps, popcorn and potato chips. You stock at least a dozen different brands of beer, and keep a rough tally of how many cases of each are in your back room, which is where you keep your inventory.

Once each week, a trucker arrives at the rear entrance of your store. You hand him a form on which you've filled in that week's order. How many cases of each brand do you want delivered? The trucker, after he makes his other rounds, returns your order to your beer wholesaler, who then processes it, arranges outgoing orders in a proper sequence, and ships the resulting order to your store. Because of all that processing, you're used to a four-week delay on average on your

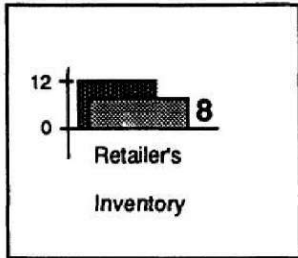
orders; in other words, a delivery of beer generally arrives in your store about four weeks after you order it.

You and your beer wholesaler never speak to each other directly. You communicate only through those check marks on a piece of paper. You probably have never even met him; you know only the truck driver. And that's for good reason: you have hundreds of products in your store. Dozens of wholesalers dole them out to you. Meanwhile, your beer wholesaler handles deliveries to several hundred stores, in a dozen different cities. Between your steady deluge of customers and his order-shuffling, who has time for chitchat? That single number is the only thing you need to say to each other.

One of your steadiest beer brands is called Lover's Beer. You are dimly aware that it's made by a small but efficient brewery located about three hundred miles away from you. It's not a super-popular brand; in fact, the brewery doesn't advertise at all. But every week, as regularly as your morning newspaper deliveries, four cases of Lover's Beer sell from the shelves. Sure, the customers are young—most are in their twenties—and fickle; but somehow, for every one who graduates to Miller or Bud, there's a younger sister or brother to replace him.

To make sure you always have enough Lover's Beer, you try to keep twelve cases in the store at any time. That means ordering four cases each Monday, when the beer truck comes. Week after week after week. By now, you take that four-case turnover for granted; it's inextricably wedded to the image in your mind of the beer's performance. You don't even articulate it to yourself when placing the order: "Oh, yeah," runs the automatic litany. "Lover's Beer. Four cases."

Week 2: Without warning, one week in October (let's call it Week 2), sales of the beer



Week 2

double. They jump from four cases to eight. That's all right, you figure; you have an eight-case surplus in your store. You don't know why they've sold so much more suddenly. Maybe someone is having a party. But to replace those extra cases, you raise your order to eight. That will bring your inventory back to normal.

Week 3: Strangely enough, you also sell eight cases of Lover's Beer the next week. And it's not even spring break. Every once in a while, in those rare moments between sales, you briefly ponder the reason why. There's no advertising campaign for the beer; you would have received a mailing about it. Unless the mailing got lost, or you accidentally threw it out. Or maybe there's another reason . . . but a customer comes in, and you lose your train of thought.

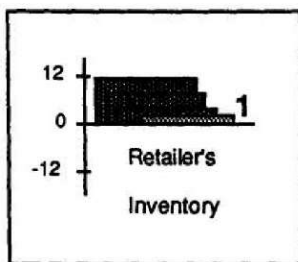
At the moment the deliveryman comes, you're still not thinking much about Lover's Beer, but you look down at your sheet and see that he's brought only four cases this time. (It's from the order you placed four weeks ago.) You only have four cases left in stock, which means—unless there's a drop-back in sales—you're going to sell out all your Lover's Beer this week. Prudence dictates an order of at least eight cases to keep up with sales. Just to be on the safe side, you order twelve so you can rebuild your inventory.

Week 4: You find time on Tuesday to quiz one or two of your younger customers. It turns out that a new music video appeared a month or so back on the popular cable television channels. The video's recording group, the Iconoclasts, closes their song with the line, "I take one last

sip of Lover's Beer and run into the sun." You don't know why they used that line, but

your wholesaler would have told you if there was any new merchandising deal. You think of calling the wholesaler, but a delivery of potato chips arrives and the subject of Lover's Beer slips your mind.

When your next delivery of beer comes in, only five cases of beer arrive. You're chagrined now because you have only one case in stock. You're almost sold out. And thanks to this video,



Week 4

demand might go up even further. Still, you know that you have some extra cases on order, but you're not sure exactly how many. Better order at least sixteen more.

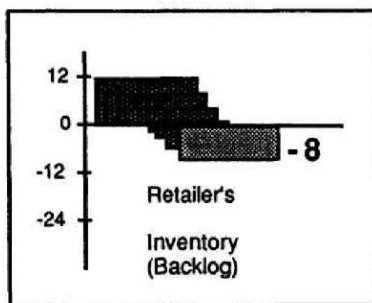
Week 5: Your one case sells out Monday morning. Fortunately, you receive a shipment for seven more cases of Lover's (apparently your wholesaler is starting to respond to your higher orders). But all are sold by the end of the week, leaving you with absolutely zero inventory. Glumly, you stare at the empty shelf. Better order another sixteen. You don't want to get a reputation for being out of stock of popular beers.

Week 6: Sure enough, customers start coming in at the beginning of the week, looking for Lover's. Two are loyal enough to wait for your backlog. "Let us know as soon as it comes in," they say, "and we'll be back to buy it." You note their names and phone numbers: they've promised to buy one case each.

Only six cases arrive in the next shipment. You call your two "backlogged" customers. They stop in and buy their shares; and the rest of the beer sells out before the end of the week. Again, two customers give you their names to call as soon as your next shipment arrives. You wonder how many more you could have sold had your shelves not been empty at the end of the week. Seems there's been a run on the beer: none of the stores in the area have it. This beer is hot, and it's apparently getting more popular all the time.

After two days of staring at the parched, empty shelf, it doesn't feel right to order any less than another sixteen cases. You're tempted to order more, but you restrain yourself because you know the big orders you've been placing will start to arrive soon. But when . . . ?

Week 7: The delivery truck brings only five cases this week, which means that you're facing another week of empty shelves. As soon as you fill your back orders, Lover's Beer is sold out again, this time within two days. This week, amazingly, five customers give you their names. You order another sixteen and silently pray that your big orders will start arriving. You think of all the lost potato chip sales.



Week 8

Week 8: By now, you're watching Lover's Beer more closely than any other product you sell. The suspense is palpable: every time a customer buys a six-pack of that quiet beer, you notice it. People seem to be talking about the beer. Eagerly, you wait for the trucker to roll in the sixteen cases you expect.

But he brings only five. "What do you mean, five?" you say. "Gee, I don't know anything about it," the deliveryman tells you. "I guess they're backlogged. You'll get them in a couple of weeks." A couple of weeks!?! By the time you call your backlogged customers, you'll be sold out before you can sell a single new case. You'll be without a bottle of Lover's on your shelf all week. What will this do to your reputation?

You place an order for twenty-four more cases—twice as much as you had planned to order. What is that wholesaler doing to me, you wonder? Doesn't he know what a ravenous market we have down here? What's going through his mind, anyway?

THE WHOLESALER

As the manager of a wholesale distributing firm, beer is your life. You spend your days at a steel desk in a small warehouse stacked high with beer of every conceivable brand: Miller, Bud, Coors, Rolling Rock, a passel of imported beers—and, of course, regional beers such as Lover's Beer. The region you serve includes one large city, several smaller satellite cities, a web of suburbs, and some outlying rural areas. You're not the only beer wholesaler here, but you're very well established. For several small brands, including Lover's Beer, you are the only distributor in this area.

Mostly, you communicate with the brewery through the same method which retailers use to reach you. You scribble numbers onto a form which you hand your driver each week. Four weeks later, on average, the beer arrives to fill that order. Instead of ordering by the case, however, you order by the gross. Each gross is about enough to fill a small truck, so you think of them as truckloads. Just as your typical retailer orders about four cases of Lover's Beer from you, week after week after week, so you order four truckloads from the brewery, week after week after week. That's enough to give you a typical accumulation of twelve truckloads' worth in inventory at any given time.

By Week 8, you had become almost as frustrated and angry as your retailers. Lover's Beer had always been a reliably steady brand. But a few weeks ago—in Week 4, actually—those orders had abruptly started rising sharply. The next week, orders from retailers had risen still further. By Week 8, most stores were ordering three or four times their regular amount of beer.

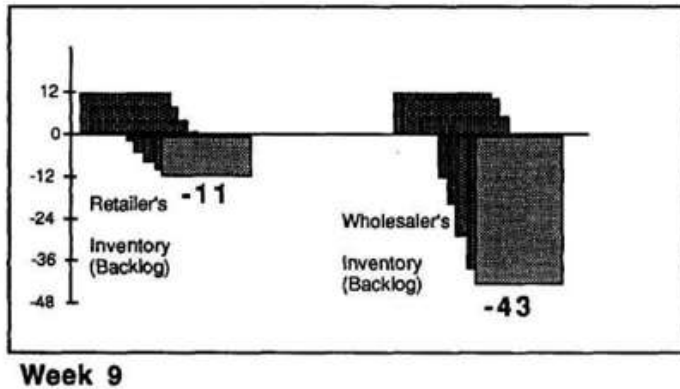
At first, you had easily filled the extra orders from your inventory in the warehouse. And you had been prescient; noting that there was a trend, you had immediately raised the amount of Lover's Beer you ordered from the brewery. In Week 6, after seeing an article in Beer Distribution News about the rock video, you had raised your brewery order still further, to a dramatic twenty truckloads per week. That was five times as much

beer as your regular order. But you had needed that much; the beer's popularity was doubling, tripling, and even quadrupling, to judge from the stores' demand.

By Week 6, you had shipped out all the beer you had in inventory and entered the hellishness of backlog. Each week you sent out what you could, and sent the stores paperwork equivalents of I.O.U.s to cover the rest. A few of the larger chain stores called you and got what preferential treatment you could offer, but the Lover's Beer in your inventory was gone. At least you knew it would be only a couple of weeks more before the extra beer you ordered would begin to arrive.

In Week 8, when you had called the brewery to ask if there was any way to speed up their deliveries (and to let them know that you were upping your order to thirty truckloads), you were dismayed to find out that they had only just stepped up production two weeks before. They were just learning of the increase in demand. How could they be so slow?

Now it's Week 9. You're getting orders for twenty truckloads'



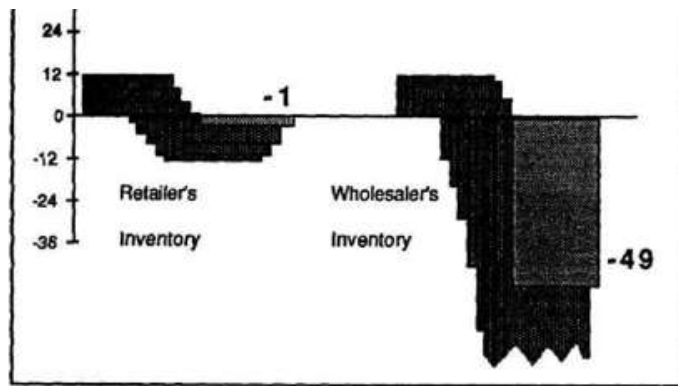
worth of Lover's Beer per week, and you still don't have it. By the end of last week, you had backlogged orders of another twenty-nine truckloads. Your staff is so used to fielding calls that they've asked you to install an answering machine devoted to an explanation about Lover's Beer. But you're confident that, this week, the twenty truckloads you ordered a month ago will finally arrive.

However, only six truckloads arrive. Apparently the brewery is still backlogged, and the larger production runs are only now starting to get shipped out. You call some of your larger chains and assure them that the beer they ordered will be coming shortly.

Week 10 is infuriating. The extra beer you were expecting—at least twenty truckloads' worth—doesn't show. The brewery simply couldn't ramp up production that fast. Or so you guess. They only send you eight truckloads. It's impossible to reach anybody on the phone down there—they're apparently all on the factory floor, manning the brewery apparatus.

The stores, meanwhile, are apparently selling the beer wildly. You're getting unprecedented orders—for twenty-six truckloads this week. Or maybe they're ordering so much because they can't get any of the beer from you. Either way, you have to keep up. What if you can't get any of the beer and they go to one of your competitors? You order forty truckloads from the brewery.

In Week 11, you find yourself tempted to take extra-long lunches at the bar around the corner from your warehouse. Only twelve truckloads of Lover's Beer arrive. You still can't reach anybody at the brewery. And you have over a hundred truckloads' worth of orders to fill: seventy-seven truckloads in backlog, and another twenty-eight truckloads' worth of orders from the stores which you receive this week. Some of those backlog costs come due, and you're afraid to tell your accountant what you expect.



Week 14

By Week 12, it's clear. This new demand for Lover's Beer is a far more major change than you expected. You sigh with resignation when you think of how much money you could make if you only had enough in stock. How could the brewery have done this to you? Why did demand have to rise so quickly? How are you ever expected to keep up? All you know is that you're never going to get caught in this situation again. You order sixty more truckloads.

For the next four weeks, the demand continues to outstrip your supply. In fact, you can't reduce your backlog at all in Week 13.

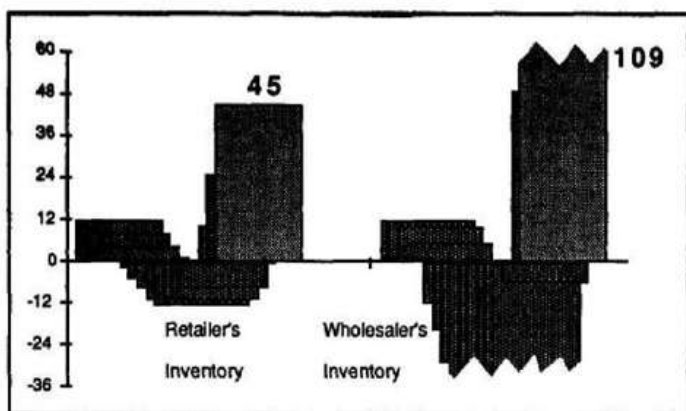
You finally start receiving larger shipments from the brewery in Weeks 14 and 15. At the same time, orders from your stores drop off a bit. Maybe in the previous weeks, you figure, they overordered a bit. At this point, anything that helps work off your backlog is a welcome reprieve.

And now, in Week 16, you finally get almost all the beer you asked for weeks ago: fifty-five truckloads. It arrives early in the week, and you stroll back to that section of the warehouse to take a look at it, stacked on pallets. It's as much beer as you keep for any major brand. And it will be moving out soon.

Throughout the week, you wait expectantly for the stores' orders to roll in. You even stop by the intake desk to see the individual forms. But on form after form, you see the same number written: zero. Zero. Zero. Zero. Zero. What's wrong with these people? Four weeks ago, they were screaming at you for the beer, now, they don't even want any.

Suddenly, you feel a chill. Just as your trucker leaves for the run that includes the brewery, you catch up with him. You initial the form, and cross out the twenty-four truckloads you had ordered, replacing it with a zero of your own.

Week 17: The next week, sixty more truckloads of Lover's Beer arrive. The stores still ask for—zero. You still ask for—zero. One hundred and nine truckloads of the stuff sit in your warehouse. You could bathe in the stuff every day, and it wouldn't make a dent.



Week 17

Surely the stores will want more this week. After all, that video is still running. In your brooding thoughts, you consign every retailer to the

deepest corner of hell; the corner reserved for people who don't keep their promises.

And, in fact, the retailers once again order zero cases of Lover's Beer from you. You, in turn, order zero truckloads from the brewery. And yet, the brewery continues to deliver beer. Sixty more truckloads appear on your dock this week. Why does that brewery have it in for you? When will it ever end?

THE BREWERY

Imagine that you were hired four months ago to manage distribution and marketing at the brewery, where Lover's Beer is only one of several primary products. Yours is a small brewery, known for its quality, not its marketing savvy. That's why you were hired.

Now, clearly, you have been doing something right. Because in only your second month (Week Six of this game), new orders had begun to rise dramatically. By the end of your third month on the job, you felt the satisfaction of getting orders for forty gross worth of beer per week, up dramatically from the four when you started. And you shipped out . . . well, you shipped out thirty.

Because breweries get backlogs too. It takes (in your brewery, at least) two weeks from the time you decide to brew a bottle of beer until the moment when that beer is ready for shipment. Admittedly, you kept a few weeks' worth of beer in your warehouse, but those stocks were exhausted by Week 7, only two weeks after the rising orders came in. The next week, while you had back orders for nine gross and another twenty-four gross in new orders, you could send out only twenty-two gross. By that time you were a hero within your company. The plant manager had given everyone incentives to work double-time, and was feverishly interviewing for new factory help.

You had lucked out with that Iconoclasts' video mentioning the beer. You had learned about the video in Week 3—from letters written by

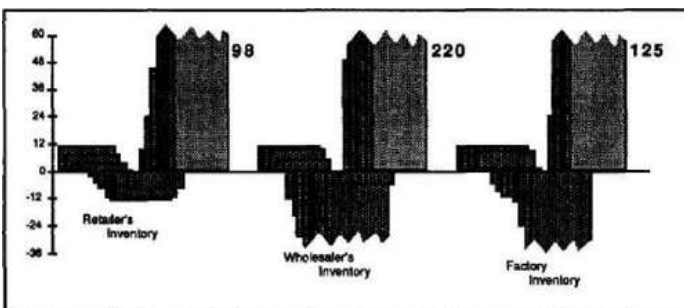
teenagers to the brewery. But it had taken until Week 6 to see that video translate into higher orders.

Even by Week 14, the factory had still not caught up with its backlogged orders. You had regularly requested brew batches of seventy gross or more. You had wondered how large your bonus would be that year. Maybe you could ask for a percentage of the profits, at least once you caught up with back orders. You had even idly pictured yourself on the cover of Marketing Week.

Finally, you had caught up with the backlog in Week 16. But the next week, your distributors had asked for only nineteen gross. And last week, Week 18, they had not

asked for any more beer at all. Some of the order slips actually had orders crossed out on them.

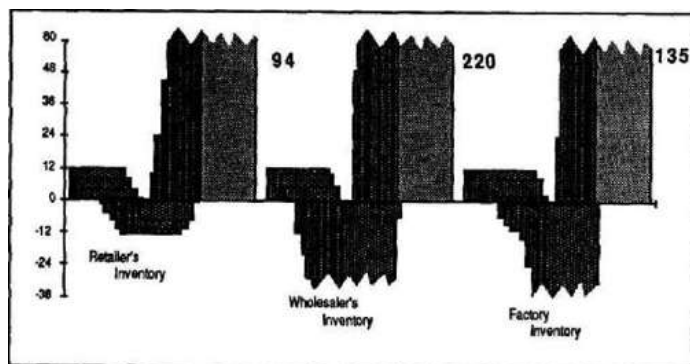
Now, it's Week 19. You have a hundred gross of beer in inventory. And the orders, once again, ask for virtually no new deliveries. Zero beer. Meanwhile the beer you've been brewing keeps rolling in. You place the phone call you've dreaded making to your boss. "Better hold off on production for a week or two," you say. "We've got"-



Week 21

and you use a word you've picked up in business school—"a discontinuity." There is silence on the other end of the phone. "But I'm sure it's only temporary," you say.

The same pattern continues for four more weeks: Weeks 20, 21, 22, and 23. Gradually your hopes of a resurgence slide, and your excuses come to sound flimsier and flimsier. Those distributors screwed us, you say. The retailers didn't buy enough beer. The press and that rock video hyped up the beer and got everybody sick of it. At root, it's the fickle kids—they have no loyalty whatsoever. How could they buy hundreds of cases one month, and nothing at all the next?



Nobody misses you when you borrow the company car at the beginning of Week 24. Your first stop is the wholesaler's office. Not only is it the first time you have ever met face to face, but it is only the second time you have ever spoken. There has never been anything to say until this crisis. You greet each other glumly, and then the wholesaler takes you out to the back warehouse. "We haven't gotten an order for your brand in two months," says the wholesaler. "I feel completely jerked around. Look! We still have 220 truckloads here."

What must have happened, you decide together, is that demand rose rapidly, and then fell dramatically. Another example of the fickleness of the public. If the retailers had stayed on top of it and warned you, this would never have happened.

You are working over the phrasing of a marketing strategy report in your mind on the way home when, on a whim, you decide to stop at the store of a retailer you pass along the way. Fortuitously, the owner of the store is in. You introduce yourself and the retailer's face breaks into a

sardonic grin. Leaving an assistant in charge of the shop, the two of you walk next door to a luncheonette for a cup of coffee.

The retailer has brought along the shop's inventory tally notebooks, and spreads them open across the table. "You don't know how much I wanted to strangle you a few months ago."

"Why?" you ask.

"Look—we're stuck with ninety-three cases in our back room. At this rate, it's going to be another six weeks before we order any more."

Six weeks, you think to yourself. And then you pull out a pocket calculator. If every retailer in this area waits six weeks before ordering any more beer, and then only orders a few cases a week, it's going to be a year or more before they put a dent in those 220 truckloads sitting at the wholesaler's. "This is a tragedy," you say.

"Who let it happen—I mean, how can we keep it from happening again?"

"Well, it's not our fault," says the retailer, after sipping some coffee. "We were selling four cases of beer when that music video came out. Then, in Week 2, we sold eight cases."

"And then it mushroomed," you say. "But then why did it die down?"

"No, you don't understand," says the retailer. "The demand never mushroomed. And it never died out. We still sell eight cases of beer—week after week after week. But you didn't send us the beer we wanted. So we had to keep ordering, just to make sure we had enough to keep up with our customers."

"But we got the beer out as soon as it was necessary."

"Then maybe the wholesaler screwed up somehow," says the retailer. "I've been wondering if I should switch suppliers. Anyway, I wish you'd

do a coupon promotion or something, so I could make back some of my costs. I'd like to unload some of those ninety-three cases."

You pick up the tab for coffee. Then, on your trip back, you plan the wording of your resignation notice. Obviously, you'll be blamed for any layoffs or plant closings that come out of this crisis—just as the wholesaler blamed the retailer, and the retailer blamed the wholesaler, and both of them wanted to blame you. At least it's early enough in the process that you can quit with some dignity. If only you could come up with some explanation to show that it wasn't your fault—to show that you were the victim, instead of the culprit.

LESSONS OF THE BEER GAME

1. Structure Influences Behavior

Different people in the same structure tend to produce qualitatively similar results. When there are problems, or performance fails to live up to what is intended, it is easy to find someone or something to

blame. But, more often than we realize, systems cause their own crises, not external forces or individuals' mistakes.

2. Structure in Human Systems is Subtle

We tend to think of "structure" as external constraints on the individual. But, structure in complex living systems, such as the "structure" of the multiple "systems" in a human body (for example, the cardiovascular and neuromuscular) means the basic interrelationships that control behavior. In human systems, structure

includes how people make decisions—the "operating policies" whereby we translate perceptions, goals, rules, and norms into actions.

3. Leverage Often Comes from New Ways of Thinking

In human systems, people often have potential leverage that they do not exercise because they focus only on their own decisions and ignore how their

decisions affect others. In the beer game, players have it in their power to eliminate the extreme instabilities that invariably occur, but they fail to do so because they do not understand how they are creating the instability in the first place.

People in the business world love heroes. We lavish praise and promotion on those who achieve visible results. But if something goes wrong, we feel intuitively that somebody must have screwed up. In the beer game, there are no such culprits. There is no one to blame. Each of the three players in our story had the best possible intentions: to serve his customers well, to keep the product moving smoothly through the system, and to avoid penalties. Each participant made well-motivated, clearly defensible judgments based on reasonable guesses about what might happen. There were no villains, but there was a crisis nonetheless—built into the structure of the system.

In the last twenty years, the beer game has been played thousands of times in classes and management training seminars. It has been played on five continents, among people of all ages, nationalities, cultural origins, and vastly varied business backgrounds. Some players had never heard of a production/distribution system before; others had spent a good portion of their lives working in such businesses. Yet every time the game is played the same crises ensue. First, there is growing demand that can't be met. Orders build throughout the system. Inventories are depleted. Backlogs grow. Then the beer arrives en masse while incoming orders suddenly decline. By the end of the experiment, almost all players are sitting with large inventories they cannot unload—for example, it is not unusual to find brewery inventory levels in the hundreds overhanging orders from wholesalers for eight, ten, or twelve cases per week.³

If literally thousands of players, from enormously diverse backgrounds, all generate the same qualitative behavior patterns, the causes of the behavior must lie beyond the individuals. The causes of the behavior must lie in the structure of the game itself.

Moreover "beer game"-type structures create similar crises in real-life production-distribution systems. For instance, in 1985, personal computer memory chips were cheap and readily available; sales went down by 18 percent and American producers suffered 25 to 60 percent losses.⁴ But in late 1986 a sudden shortage developed and was then exacerbated by panic and overordering. The result was a 100 to 300 percent increase in prices for the same chips.⁵ A similar surge and collapse in demand occurred in the semiconductor industry in 1973 to 1975. After a huge order buildup and increases in delivery delays throughout the industry, demand collapsed and you could have virtually any product you wanted off any supplier's shelf overnight. Within a few years, Siemens, Signetics, Northern Telecom, Honeywell, and Schlumberger all entered the business by buying weakened semiconductor manufacturers.⁶

In mid-1989, General Motors, Ford, and Chrysler, as the May 30 Wall Street Journal put it, "were simply producing far more cars than they were selling, and dealer inventories were piling up ... The companies already are idling plants and laying off workers at rates not seen for years."⁷ Entire national economies undergo the same sorts of surges in demand and inventory overadjustments, due to what economists call the "inventory accelerator" theory of business cycles.

Similar boom and bust cycles continue to recur in diverse service businesses. For example, real estate is notoriously cyclic, often fueled by speculators who drive up

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prices to attract investors to new projects. "The phone would ring," Massachusetts condominium developer Paul Quinn told the "MacNeil-Lehrer Newshour" in 1989, "in our offices, and we said 'How are we going to handle this? We'll tell everybody to send in a \$5,000 check with their name and we'll put them on the list.' The next thing we knew, we had over 150 checks sitting on the desk." The glut followed quickly on the boom: "It was a slow, sinking feeling," Quinn said, interviewed in a seaside town full of unsold developments. "Now's the time to start building for the next boom. Unfortunately, the people in the real estate

industry are too busy trying to address the problems they have left over from the last one."

In fact, reality in production-distribution systems is often worse than the beer game. A real retailer can order from three or four wholesalers at once, wait for the first group of deliveries to arrive, and cancel the other orders. Real producers often run up against production capacity limits not present in the game, thereby exacerbating panic throughout the distribution system. In turn, producers invest in additional capacity because they believe that current demand levels will continue into the future, then find themselves strapped with excess capacity once demand collapses.

The dynamics of production-distribution systems such as the beer game illustrate the first principle of systems thinking:

STRUCTURE INFLUENCES BEHAVIOR

When placed in the same system, people, however different, tend to produce similar results.

The systems perspective tells us that we must look beyond individual mistakes or bad luck to understand important problems. We must look beyond personalities and events. We must look into the underlying structures which shape individual actions and create the conditions where types of events become likely. As Donella Meadows expresses it:

A truly profound and different insight is the way you begin to see that the system causes its own behavior.⁹

This same sentiment was expressed over a hundred years ago by a systems thinker of an earlier vintage. Two thirds of the way through *War and Peace*, Leo Tolstoy breaks off from his narrative about the history of Napoleon and czarist Russia to contemplate why historians, in general, are unable to explain very much:

The first fifteen years of the nineteenth century present the spectacle of an extraordinary movement of millions of men. Men leave their habitual pursuits; rush from one side of Europe to the other; plunder, slaughter one another, triumph and despair; and the whole current of life is transformed and presents a quickened activity, first moving at a growing speed, and then slowly slackening again. What was the cause of that activity, or from what laws did it arise? asked the human intellect.

The historians, in reply to that inquiry, lay before us the sayings and doings of some dozens of men in one of the buildings in the city of Paris, summing up those doings and sayings by one word —revolution. Then they give us a detailed biography of Napoleon, and of certain persons favorably or hostilely disposed to him; talk of the influence of some of these persons upon others; and then say that this it is to which the activity is due; and these are its laws.

But, the human intellect not only refuses to believe in that explanation, but flatly declares that the method of explanation is not a correct one . . . The sum of men's individual wills produced both the revolution and Napoleon; and only the sum of those wills endured them and then destroyed them.

"But whenever there have been wars, there have been great military leaders; whenever there have been revolutions in states, there have been great men," says history. "Whenever there have been great military leaders there have, indeed, been wars," replies the human reason; "but that does not prove that the generals were the cause of the wars,

and that the factors leading to warfare can be found in the personal activity of one man. ' Tolstoy argues that only in trying to understand underlying "laws of history," his own synonym for what we now call systemic structures, lies any hope for deeper understanding:

For the investigation of the laws of history, we must completely change the subject of observations, must let kings and ministers and generals alone, and study the homogeneous, infinitesimal elements by which the masses are led. No one can say how far it has been given to man to advance in that direction in understanding the laws of history. But it is obvious that only in that direction lies any possibility of discovering historical laws; and that the human intellect has hitherto not devoted to that method of research one millionth part of the energy that historians have put into the description of the doings of various kings, ministers, and generals . . ."

The term "structure," as used here, does not mean the "logical structure" of a carefully developed argument or the reporting "structure" as shown by an organization chart. Rather, "systemic structure" is concerned with the key interrelationships that influence behavior over time. These are not interrelationships between people, but among key variables, such as population, natural resources, and food production in a developing country; or engineers' product ideas and technical and managerial know-how in a high-tech company.

In the beer game, the structure that caused wild swings in orders and inventories involved the multiple-stage supply chain and the delays intervening between different stages, the limited information available at each stage in the system, and the goals, costs, perceptions, and fears that influenced individuals' orders for beer. But it is very important to understand that when we use the term "systemic structure" we do not just mean structure outside the individual. The nature of structure in human systems is subtle because we are part of the structure. This means that we often have the power to alter structures within which we are operating.

However, more often than not, we do not perceive that power. In fact, we usually don't see the structures at play much at all. Rather, we just find ourselves feeling compelled to act in certain ways.

In 1973, psychologist Philip Zimbardo performed an experiment in which college students were placed in the roles of prisoners and guards in a mock prison set up in the basement of the psychology building at Stanford. What started as mild resistance by the "prisoners" and assertiveness by the "guards," steadily escalated into increasing rebelliousness and abusiveness, until the "guards" began to physically abuse the "prisoners" and the experimenters felt the situation was dangerously out of control. The experiment was ended prematurely, after six days, when students began to suffer from depression, uncontrollable crying, and psychosomatic illnesses.¹²

I'll never forget one particularly chilling illustration of the power of structure in international politics. It occurred in a private meeting with a high-ranking member of the Soviet embassy, a few months after the Soviets had sent troops into Afghanistan. The official talked, eloquently and with great sincerity, about how the U.S.S.R. had been the first to recognize the country after its founding. The U.S.S.R. had been the first to come to its aid, repeatedly, when there was internal strife or instability. Beginning in the late 1970s, as threats from guerrilla factions increased, the ruling government asked for increasing Soviet assistance. Modest assistance led to greater needs for broader help. It came to a point, the official explained, where "We really had no choice but to intervene militarily."

As I listened to this tale, I couldn't help but think of how retailers or wholesalers in the beer game will explain, when the game is over, that they really had no choice but to keep increasing their orders. It also brought to mind similar stories of American officials, ten or fifteen years earlier, trying to explain how the United States became entangled in Vietnam.

What, exactly, does it mean to say that structures generate particular patterns of behavior? How can such controlling structures be recognized? How would such knowledge help us to be more successful in a complex system?

The beer game provides a laboratory for exploring how structure influences behavior. Each player—retailer, wholesaler, and brewery — made only one decision per week: how much beer to order. The retailer is the first to boost orders significantly, with orders peaking around Week 12. At that point, the expected beer fails to arrive on time—because of backlogs at the wholesale and brewery levels. But the retailer, not thinking of those backlogs, dramatically increased orders to get beer at any cost. That sudden jump in orders is then amplified through the whole system—first by the wholesaler, and then by the brewery. Wholesaler orders peak at about 40, and brewery production peaks at about 80.

The result is a characteristic pattern of buildup and decline in orders at each position, amplified in intensity as you move "up-stream," from retailers to breweries. In other words, the further from the ultimate consumer, the higher the orders, and the more dramatic the collapse. In fact, virtually all brewery players go through major crises, ending with near-zero production rates only weeks after having produced 40, 60, 100 or more gross per week.

The other characteristic pattern of behavior in the game can be seen in the inventories and backlogs. The retailer's inventory begins to drop below zero at around Week 5. The retailer's backlog continues to increase for several weeks and the retailer doesn't get back to a positive inventory until around Weeks 12 to 15. Similarly, the wholesaler is in backlog from around Week 7 through around Weeks 15 to 18, and the brewery from Week 9 through Weeks 18 to 20. Once inventories begin to accumulate, they reach large values (about 40 for the retailer, 80 to 120 for the wholesaler, and 60 to 80 for the brewery by Week 30)—much larger than intended. So each position goes through an inventory-backlog cycle: first there is insufficient inventory, then there is too much inventory.

These characteristic patterns of overshoot and collapse in ordering and inventory-backlog cycles occur despite stable consumer demand. The actual consumer orders experienced only one change. In Week 2,

consumer orders doubled—going from four cases of beer per week to eight. They remained at eight cases per week for the rest of the game.

In other words, after a one-time increase, consumer demand, for the rest of the simulation, was perfectly flat! Of course, none of the players other than the retailer knew consumer demand, and even the retailers saw demand only week by week, with no clue about what would come next.

After the beer game, we ask the people who played wholesalers and brewers to draw what they think the consumer orders were. Most draw a curve which rises and falls, just as their orders rose and fell.¹⁴ In other words, the players assume that if orders in the game rose and collapsed, this must have been due to a surge and collapse in consumer orders. Such assumptions of an "external cause" are characteristic of nonsystemic thinking.

Players' guesses regarding consumer demand shed light on our deeply felt need to find someone or something to blame when there are problems. Initially, after the game is over, many believe that the culprits are the players in the other positions. This belief is shattered by seeing that the same problems arise in all plays of the game, regardless of who is manning the different positions. Many then direct their search for a scapegoat toward the consumer. "There must have been a wild buildup and collapse in consumer demand," they reason. But when their guesses are compared with the flat customer orders, this theory too is shot down.

This has a devastating impact on some players. I'll never forget the president of a large trucking firm sitting back, wide-eyed, staring at the beer game charts. At the next break, he ran to the telephones. "What happened?" I asked when he returned.

"Just before we came here," he said, "my top management team had concluded a three-day review of operations. One of our divisions had tremendously unstable fluctuations in fleet usage. It seemed pretty

obvious that the division president didn't have what it took to get the job done. We automatically blamed the man, just as each of us in the experiment automatically blamed the brewery. It just hit me that the problems were probably structural, not personal. I just dashed out to call our corporate headquarters and cancel his termination process."

Once they see that they can no longer blame one another, or the customer, the players have one last recourse—blame the system. "It's an unmanageable system," some say. "The problem is that we couldn't communicate with each other." Yet this too turns out to be an untenable position. In fact, given the "physical system" of inventories, shipping delays, and limited information, there is substantial room for improving most team's scores.

REDEFINING YOUR SCOPE OF INFLUENCE: HOW TO IMPROVE PERFORMANCE IN THE BEER GAME

To begin to see the possibilities for improvement, consider the outcomes if each player did nothing to correct his inventory or backlog. Following the "no strategy" strategy, each player would simply place new orders equal to orders he received. This is about the simplest ordering policy possible. If you receive new incoming orders for four cases of beer, you place orders for four. If you receive incoming orders for eight, you place orders for eight. Given the pattern of consumer demand in this game, that means ordering four cases or truckloads every week—until you receive your first order of eight. Thereafter you order eight.

When this strategy is followed unswervingly by all three players, all three positions settle into a form of stability by Week 11. The retailer and wholesaler never quite catch up with their backlogs. Backlogs develop, as in the basic game, due to the delays in getting orders filled. Backlogs persist because the players make no effort to correct them—because the "no strategy" strategy precludes placing the orders in excess of orders received needed to correct backlogs.

Is the "no strategy" strategy successful? Probably, most players would say no. After all, the strategy generates persistent backlogs. This means that everyone throughout the system is kept waiting longer than necessary for his orders to be filled. In real life, such a situation would, undoubtedly, invite competitors to enter a market and provide better delivery service. Only producers/distributors with monopolies on markets would be likely to stick to such a strategy.¹⁵

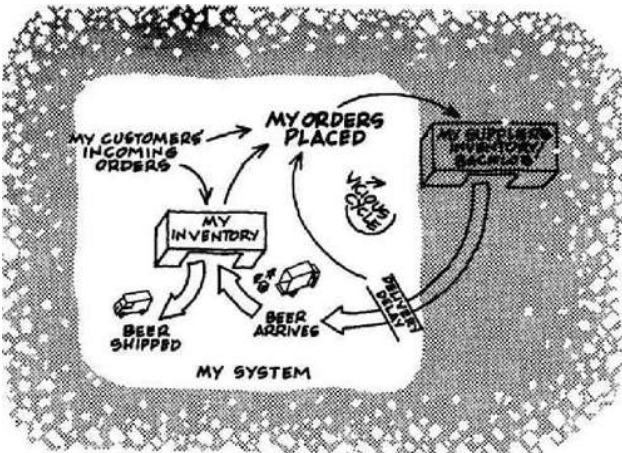
But the strategy eliminates the buildup and collapse in ordering, and the associated wild swings in inventories. Moreover, total cost generated by all positions in the "no strategy" strategy is lower than what is achieved by 75 percent of the teams that play the game! In other words, the majority of players in the game, many of them experienced managers, do much worse than if they simply placed orders equal to the orders they receive. In trying to correct the imbalances that result from "doing nothing," most players make matters worse, in many cases dramatically worse.

On the other hand, about 25 percent of the players score better than the "no strategy" strategy, and about 10 percent score very much better. In other words, success is possible. But it requires a shift of view for most players. It means getting to the heart of fundamental mismatches between common ways of thinking about the game—what we will later call our "mental model" of it—and the actual reality of how the game works. Most players see their job as "managing their position" in isolation from the rest of the system. What is required is to see how their position interacts with the larger system.

Consider how you feel if you are a typical player at any position. You pay close attention to your own inventory, costs, backlog, orders, and shipments. Incoming orders come from "outside"—most wholesalers and brewers, for instance, are shocked by the

implacable mystery of those latter-half orders, which should be high numbers, but instead appear week after week as "zero, zero, zero, zero." You respond to new orders by shipping out beer, but you have

little sense of how those shipments will influence the next round of orders. Likewise, you have only a fuzzy concept of what happens to the orders you place; you simply expect them to show up as new shipments after a reasonable delay. Your perspective of the system looks something like this:



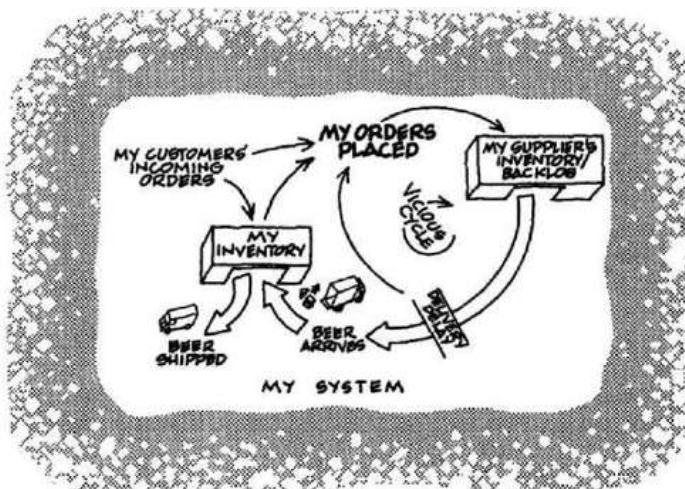
Given this picture of the situation, if you need beer it makes sense to place more orders. If your beer doesn't arrive when expected, you place still more orders. Given this picture of the situation, your job is to "manage your position," reacting to changes in the "external inputs" of incoming orders, beer arrivals, and your supplier's delivery delay.

What the typical "manage your position" view misses is the ways that your orders interact with others' orders to influence the variables you perceive as "external." The players are part of a larger system that most perceive only dimly. For example, if they place a large number of orders, they can wipe out their supplier's inventory, thereby causing their supplier's delivery delay to increase. If they, then, respond (as many do) by placing still more orders, they create a "vicious cycle" that increases problems throughout the system.

This vicious cycle can be set off by any player who panics, anywhere within the system—be he retailer, or wholesaler. Even factories can create the same effect, simply by failing to produce enough beer. Eventually, as one vicious circle influences other vicious circles, the

resulting panic spreads up and down the entire production-distribution system. Once the panic builds momentum, I have seen players generate orders that are twenty to fifty times what is actually needed to correct real inventory imbalances.

To improve performance in the beer game players must redefine their scope of influence. As a player in any position, your influence is broader than simply the limits of your own position. You don't simply place orders which go off into the ether and return as beer supplies; those orders influence your supplier's behavior. Which in turn might influence yet another supplier's behavior. In turn, your success is not just influenced by your orders; it is influenced by the actions of everyone else in the system. For example, if the brewery runs out of beer, then pretty soon, everyone else will run out of beer. Either the larger system works, or your position will not work. Interestingly, in the beer game and in many other systems, in order for you to succeed others must succeed as well. Moreover, each player must share this systems viewpoint—for, if any single player panics and places a large order, panics tend to reinforce throughout the system.



There are two key guidelines for players in the game.

First, keep in mind the beer that you have ordered but which, because of the delay, has not yet arrived. I call this the "Take two aspirin and wait" rule. If you have a headache and need to take aspirin, you don't

keep taking aspirin every five minutes until your headache goes away. You wait patiently for the aspirin to take effect because you know that aspirin operates with a delay. Many players keep ordering beer every week until their inventory discrepancy goes away.

Second, don't panic. When your supplier can't get you the beer you want as quickly as normal, the worst thing you can do is order more beer. Yet, that is exactly what many players do. It takes discipline to contain the overwhelming urge to order more when backlogs are building and your customers are screaming. But, without that discipline, you and everyone else will suffer.

These guidelines are consistently missed by most players because they are evident only if you understand the interactions that cross the boundaries between different positions. The "take two aspirin and wait" guideline comes from understanding the delay embedded in the response of your supplier's shipments to changes in your orders placed. The "don't panic" guideline comes from understanding the vicious cycle created when your orders placed exacerbate your supplier's delivery delay. How well can players do if they follow these guidelines?

It is not possible to totally eliminate all overshoots in orders and all inventory/backlog cycles. It is possible to hold these instabilities to a very modest level, a small fraction of what occurred in Lover's Beer. It is possible to achieve total costs that are one fifth of the "do nothing" strategy, or about one tenth the typical costs achieved by teams. In other words, substantial improvements are possible.

THE LEARNING DISABILITIES AND OUR WAYS OF THINKING

All of the learning disabilities described in Chapter 2 operate in the beer game:

- Because they "become their position," people do not see how their actions affect the other positions.

- Consequently, when problems arise, they quickly blame each other —"the enemy" becomes the players at the other positions, or even the customers.
- When they get "proactive" and place more orders, they make matters worse.
- Because their overordering builds up gradually, they don't realize the direness of their situation until it's too late.
- By and large, they don't learn from their experience because the most important consequences of their actions occur elsewhere in the system, eventually coming back to create the very problems they blame on others.¹⁷
- The "teams" running the different positions (usually there are two or three individuals at each position) become consumed with blaming the other players for their problems, precluding any opportunity to learn from each others' experience.¹⁸

The deepest insights in the beer game come from seeing how these learning disabilities are related to alternative ways of thinking in complex situations. For most, the overall experience of playing the game is deeply dissatisfying because it is purely reactive. Yet, most eventually realize that the source of the reactiveness lies in their own focus on week-by-week events. Most of the players in the game get overwhelmed by the shortages of inventory, surges in incoming orders, disappointing arrivals of new beer. When asked to explain their decisions, they give classic "event explanations." "I ordered forty at Week 11 because my retailers ordered thirty-six and wiped out my inventory." So long as they persist in focusing on events, they are doomed to reactiveness.

The systems perspective shows that there are multiple levels of explanation in any complex situation, as suggested by the diagram below. In some sense, all are equally "true." But their usefulness is quite

different. Event explanations—"who did what to whom"—doom their holders to a reactive stance. As discussed earlier, event explanations are the most common in contemporary culture, and that is exactly why reactive management prevails.

Systemic Structure (generative) Patterns of Behavior (responsive)
Events (reactive)

Pattern of behavior explanations focus on seeing longer-term trends and assessing their implications. For example, in the beer game, a pattern of behavior explanation would be: "Production/distribution systems are inherently prone to cycles and instability, which become more severe the further you move from the retailer. Therefore, sooner or later, severe crises are likely at the brewery." Pattern of behavior explanations begin to break the grip of short-term reactivity. At least they suggest how, over a longer term, we can respond to shifting trends.

The third level of explanation, the "structural" explanation, is the least common and most powerful. It focuses on answering the question, "What causes the patterns of behavior?" In the beer game, a structural explanation must show how orders placed, shipments, and inventory interact to generate the observed patterns of instability and amplification; taking into account the effects of built-in delays in filling new orders, and the vicious cycle that arises when rising delivery delays lead to more orders placed. Though rare, structural explanations, when they are clear and widely understood, have considerable impact.

An exceptional example of a leader providing such insight was Franklin Roosevelt, when he went on the radio on March 12, 1933, to explain the four-day "banking holiday." In a time of panic, Roosevelt calmly explained how the banking system worked, structurally. "Let me state the simple fact that when you deposit money in a bank the bank does not put the money into a safe-deposit vault," he said. "It invests your money in many different forms of credit—bonds, mortgages. In other

words, the bank puts your money to work to keep the wheels turning around ..." He explained how banks were required to maintain reserves, but how those reserves were inadequate if there were widespread withdrawals; and why closing the banks for four days was

necessary to restore order. In so doing, he generated public support for a radical but necessary action, and began his reputation as a master of public communication.

The reason that structural explanations are so important is that only they address the underlying causes of behavior at a level that patterns of behavior can be changed. Structure produces behavior, and changing underlying structures can produce different patterns of behavior. In this sense, structural explanations are inherently generative. Moreover, since structure in human systems includes the "operating policies" of the decision makers in the system, redesigning our own decision making redesigns the system structure.²¹

For most players of the game, the deepest insight usually comes when they realize that their problems, and their hopes for improvement, are inextricably tied to how they think. Generative learning cannot be sustained in an organization where event thinking predominates. It requires a conceptual framework of "structural" or systemic thinking, the ability to discover structural causes of behavior. Enthusiasm for "creating our future" is not enough.

As the players in the beer game come to understand the structures that cause its behavior, they see more clearly their power to change that behavior, to adopt ordering policies that work in the larger system. They also discover a bit of timeless wisdom delivered years ago by Walt Kelly in his famous line from "Pogo": "We have met the enemy and he is us."

PART II

The Fifth Discipline: The Cornerstone of the Learning Organization

4

THE LAWS OF THE FIFTH DISCIPLINE¹

1. Today's problems come from yesterday's "solutions."

Once there was a rug merchant who saw that his most beautiful carpet had a large bump in its center.² He stepped on the bump to flatten it out—and succeeded. But the bump reappeared in a new spot not far away. He jumped on the bump again, and it disappeared—for a moment, until it emerged once more in a new place. Again and again he jumped, scuffing and mangling the rug in his frustration; until finally he lifted one corner of the carpet and an angry snake slithered out.

Often we are puzzled by the causes of our problems; when we merely need to look at our own solutions to other problems in the past. A well-established firm may find that this quarter's sales are off sharply. Why? Because the highly successful rebate program last quarter led many customers to buy then rather than now. Or a new manager attacks chronically high inventory costs and "solves" the problem—except that the salesforce is now spending 20 percent more time responding to angry complaints from customers who are

still waiting for late shipments, and the rest of its time trying to convince prospective customers that they can have "any color they want so long as it's black."

Police enforcement officials will recognize their own version of this law: arresting narcotics dealers on Thirtieth Street, they find that they have simply transferred the crime center to Fortieth Street. Or, even more insidiously, they learn that a new citywide outbreak of drug-related crime is the result of federal officials intercepting a large shipment of narcotics—which reduced the drug supply, drove up the price, and caused more crime by addicts desperate to maintain their habit.

Solutions that merely shift problems from one part of a system to another often go undetected because, unlike the rug merchant, those who "solved" the first problem are different from those who inherit the new problem.

2. The harder you push, the harder the system pushes back.

In George Orwell's *Animal Farm*, the horse Boxer always had the same answer to any difficulty: "I will work harder," he said. At first, his well-intentioned diligence inspired everyone, but gradually, his hard work began to backfire in subtle ways. The harder he worked, the more work there was to do. What he didn't know was that the pigs who managed the farm were actually manipulating them all for their own profit. Boxer's diligence actually helped to keep the other animals from seeing what the pigs were doing.³ Systems thinking has a name for this phenomenon: "Compensating feedback": when well-intentioned interventions call forth responses from the system that offset the benefits of the intervention. We all know what it feels like to be facing compensating feedback—the harder you push, the harder the system pushes back; the more effort you expend trying to improve matters, the more effort seems to be required.

Examples of compensating feedback are legion. Many of the best intentioned government interventions fall prey to compensating feedback. In the 1960s there were massive programs to build low-income housing and improve job skills in decrepit inner cities in the United States. Many of these cities were even worse off in the 1970s despite the largesse of government aid. Why? One reason was that low-income people migrated from other cities and from rural areas to those cities with the best aid programs. Eventually, the new housing units became overcrowded and the job training programs were

swamped with applicants. All the while, the city's tax base continued to erode, leaving more people trapped in economically depressed areas.

Similar compensating feedback processes have operated to thwart food and agricultural assistance to developing countries. More food available has been "compensated for" by reduced deaths due to malnutrition, higher net population growth, and eventually more malnutrition.

Similarly, efforts to correct the U.S. trade imbalance by letting the value of the dollar fall in the mid-1980s were compensated for by foreign competitors who let prices of their goods fall in parallel (for countries whose currency was "pegged to the dollar," their prices adjusted automatically). Efforts by foreign powers to suppress indigenous guerrilla fighters often lead to further legitimacy for the guerrillas' cause, thereby strengthening their resolve and support, and leading to still further resistance.

Many companies experience compensating feedback when one of their products suddenly starts to lose its attractiveness in the market. They push for more aggressive marketing; that's what always worked in the past, isn't it? They spend more on advertising, and drop the price; these methods may bring customers back temporarily, but they also draw money away from the company, so it cuts corners to compensate. The quality of its service (say, its delivery speed or care in inspection) starts to decline. In the long run, the more fervently the company markets, the more customers it loses.

Nor is compensating feedback limited to "large systems"—there are plenty of personal examples. Take the person who quits smoking only to find himself gaining weight and suffering such a loss in self-image that he takes up smoking again to relieve the stress. Or the protective mother who wants so much for her young son to get along with his schoolmates that she repeatedly steps in to resolve problems and ends up with a child who never learns to settle differences by himself. Or the enthusiastic newcomer so eager to be liked that she never responds to subtle criticisms of her work and ends up embittered and labeled "a difficult person to work with."

Pushing harder, whether through an increasingly aggressive intervention or through increasingly stressful withholding of natural instincts, is exhausting. Yet, as individuals and organizations, we not only get drawn into compensating feedback, we often glorify the suffering that ensues. When our initial efforts fail to produce lasting improvements, we "push harder"—faithful, as was Boxer, to the

creed that hard work will overcome all obstacles, all the while blinding ourselves to how we are contributing to the obstacles ourselves.

3. Behavior grows better before it grows worse.

Low-leverage interventions would be much less alluring if it were not for the fact that many actually work, in the short term. New houses get built. The unemployed are trained. Starving children are spared. Lagging orders turn upward. We stop smoking, relieve our child's stress, and avoid a confrontation with a new coworker. Compensating feedback usually involves a "delay," a time lag between the short-term benefit and the long-term disbenefit. The New Yorker once published a cartoon in which a man sitting in an armchair pushes over a giant domino encroaching upon him from the left. "At last, I can relax," he's obviously telling himself in the cartoon. Of course, he doesn't see that the domino is toppling another domino, which in turn is about to topple another, and another, and that the chain of dominoes behind him will eventually circle around his chair and strike him from the right.

The better before worse response to many management interventions is what makes political decision making so counterproductive. By "political decision making," I mean situations where factors other than the intrinsic merits of alternative courses of action weigh in making decisions—factors such as building one's own power base, or "looking good," or "pleasing the boss." In complex human systems there are always many ways to make things look better in the short run. Only eventually does the compensating feedback come back to haunt you.

The key word is "eventually." The delay in, for example, the circle of dominoes, explains why systemic problems are so hard to recognize. A typical solution feels wonderful, when it first cures the symptoms. Now there's improvement; or maybe even the problem has gone away. It may be two, three, or four years before the problem returns, or some new, worse problem arrives. By that time, given how rapidly most people move from job to job, someone new is sitting in the chair.

4. The easy way out usually leads back in.

In a modern version of an ancient Sufi story, a passerby encounters a drunk on his hands and knees under a street lamp. He offers to help and finds out that the drunk is looking for his house keys. After

several minutes, he asks, "Where did you drop them?" The drunk replies that he dropped them outside his front door. "Then why look for them here?" asks the passerby. "Because," says the drunk, "there is no light by my doorway."

We all find comfort applying familiar solutions to problems, sticking to what we know best. Sometimes the keys are indeed under the street lamp; but very often they are off in the darkness. After all, if the solution were easy to see or obvious to everyone, it probably would already have been found. Pushing harder and harder on familiar solutions, while fundamental problems persist or worsen, is a reliable indicator of nonsystemic thinking—what we often call the "what we need here is a bigger hammer" syndrome.

5. The cure can be worse than the disease.

Sometimes the easy or familiar solution is not only ineffective; sometimes it is addictive and dangerous. Alcoholism, for instance, may start as simple social drinking—a solution to the problem of low self-esteem or work-related stress. Gradually, the cure becomes worse than the disease; among its other problems it makes self-esteem and stress even worse than they were to begin with.

The long-term, most insidious consequence of applying nonsystemic solutions is increased need for more and more of the solution. This is why ill-conceived government interventions are not just ineffective, they are "addictive" in the sense of fostering increased dependency and lessened abilities of local people to solve their own problems. The phenomenon of short-term improvements leading to long-term dependency is so common, it has its own name among systems thinkers—it's called "Shifting the Burden to the Intervenor." The intervenor may be federal assistance to cities, food relief agencies, or welfare programs. All "help" a host system, only to leave the system fundamentally weaker than before and more in need of further help.

Finding examples of shifting the burden to the intervenor, as natural resource expert and writer Donella Meadows says, "is easy and fun and sometimes horrifying"⁴ and hardly limited to government intervenors. We shift the burden of doing simple math from our knowledge of arithmetic to a dependency on pocket calculators. We take away extended families, and shift the burden for care of the aged to nursing homes. In cities, we shift the burden from diverse local communities to housing projects. The Cold War shifted respon

sibility for peace from negotiation to armaments, thereby strengthening the military and related industries. In business, we can shift the burden to consultants or other "helpers" who make the company dependent on them, instead of training the client managers to solve problems themselves. Over time, the intervenor's power grows— whether it be a drug's power over a person, or the military budget's hold over an economy, the size and scope of foreign assistance agencies, or the budget of organizational "relief agencies."

Shifting the Burden structures show that any long-term solution must, as Meadows says, "strengthen the ability of the system to shoulder its own burdens." Sometimes that is difficult; other times it is surprisingly easy. A manager who has shifted the burden of his personnel problems onto a Human Relations Specialist may find that the hard part is

deciding to take the burden back; once that happens, learning how to handle people is mainly a matter of time and commitment.

6. Faster is slower.

This, too, is an old story: the tortoise may be slower, but he wins the race. For most American business people the best rate of growth is fast, faster, fastest. Yet, virtually all natural systems, from ecosystems to animals to organizations, have intrinsically optimal rates of growth. The optimal rate is far less than the fastest possible growth. When growth becomes excessive—as it does in cancer—the system itself will seek to compensate by slowing down; perhaps putting the organization's survival at risk in the process. In Chapter 8, the story of People Express airlines offers a good example of how faster can lead to slower—or even full stop—in the long run.

Observing these characteristics of complex systems, noted biologist and essayist Lewis Thomas has observed, "When you are dealing with a complex social system, such as an urban center or a hamster, with things about it that you are dissatisfied with and eager to fix, you cannot just step in and set about fixing with much hope of helping. This realization is one of the sore discouragements of our century."⁵

When managers first start to appreciate how these systems principles have operated to thwart many of their own favorite interventions, they can be discouraged and disheartened. The systems principles can even become excuses for inaction—for doing nothing

rather than possibly taking actions that might backfire, or even make matters worse. This is a classic case of "a little knowledge being a

dangerous thing." For the real implications of the systems perspective are not inaction but a new type of action rooted in a new way of thinking—systems thinking is both more challenging and more promising than our normal ways of dealing with problems.

7. Cause and effect are not closely related in time and space.

Underlying all of the above problems is a fundamental characteristic of complex human systems: "cause" and "effect" are not close in time and space. By "effects," I mean the obvious symptoms that indicate that there are problems—drug abuse, unemployment, starving children, falling orders, and sagging profits. By "cause" I mean the interaction of the underlying system that is most responsible for generating the symptoms, and which, if recognized, could lead to changes producing lasting improvement. Why is this a problem? Because most of us assume they are—most of us assume, most of the time, that cause and effect are close in time and space.

When we play as children, problems are never far away from their solutions—as long, at least, as we confine our play to one group of toys. Years later, as managers, we tend to believe that the world works the same way. If there is a problem on the manufacturing line, we look for a cause in manufacturing. If salespeople can't meet targets, we think we need new sales incentives or promotions. If there is inadequate housing, we build more houses. If there is inadequate food, the solution must be more food.

As the players in the beer game described in Chapter 3 eventually discover, the root of our difficulties is neither recalcitrant problems nor evil adversaries—but ourselves. There is a fundamental mismatch between the nature of reality in complex systems and our predominant ways of thinking about that reality. The first step in correcting that mismatch is to let go of the notion that cause and effect are close in time and space.

8. Small changes can produce big results—but the areas of highest leverage are often the least obvious.

Some have called systems thinking the "new dismal science" because it teaches that most obvious solutions don't work—at best, they improve matters in the short run, only to make things worse in the long run. But there is another side to the story. For systems

thinking also shows that small, well-focused actions can sometimes produce significant, enduring improvements, if they're in the right place. Systems thinkers refer to this principle as "leverage."

Tackling a difficult problem is often a matter of seeing where the high leverage lies, a change which—with a minimum of effort— would lead to lasting, significant improvement.

The only problem is that high-leverage changes are usually highly nonobvious to most participants in the system. They are not "close in time and space" to obvious problem symptoms. This is what makes life interesting.

Buckminster Fuller had a wonderful illustration of leverage that also served as his metaphor for the principle of leverage—the "trim tab." A trim tab is a small "rudder on the rudder" of a ship. It is only a fraction the size of the rudder. Its function is to make it easier to turn the rudder, which, then, makes it easier to turn the ship. The larger the ship, the more important is the trim tab because a large volume of water flowing around the rudder can make it difficult to turn.

But what makes the trim tab such a marvelous metaphor for leverage is not just its effectiveness, but its nonobviousness. If you knew absolutely nothing about hydrodynamics and you saw a large oil tanker plowing through the high seas, where would you push if you wanted the tanker to turn left? You would probably go to the bow and try to push it to the left. Do you have any idea how much force it requires to turn an oil tanker going fifteen knots by pushing on its bow? The leverage lies in going to the stern and pushing the tail end of the tanker to the right, in order to turn the front to the left. This, of course, is the job of the rudder. But in what direction does the rudder turn in order to get the ship's stern to turn to the right? Why to the left, of course.

You see, ships turn because their rear end is "sucked around." The rudder, by being turned into the oncoming water, compresses the water

flow and creates a pressure differential. The pressure differential pulls the stern in the opposite direction as the rudder is turned. This is exactly the same way that an airplane flies: the airplane's wing creates a pressure differential and the airplane is "sucked" upward.

The trim tab—this very small device that has an enormous effect on the huge ship—does the same for the rudder. When it is turned to one side or the other, it compresses the water flowing around the rudder and creates a small pressure differential that "sucks the rudder"

vs of the Fifth Discipline

der" in the desired direction. But, if you want the rudder to turn to the left, what direction do you turn the trim tab?—to the right, naturally.

The entire system—the ship, the rudder, and the trim tab—is marvelously engineered through the principle of leverage. Yet, its functioning is totally nonobvious if you do not understand the force of hydrodynamics.

So, too, are the high-leverage changes in human systems nonobvious until we understand the forces at play in those systems.

There are no simple rules for finding high-leverage changes, but there are ways of thinking that make it more likely. Learning to see underlying "structures" rather than "events" is a starting point; each of the "systems archetypes" developed below suggests areas of high- and low-leverage change.

Thinking in terms of processes of change rather than "snapshots" is another.

9. You can have your cake and eat it too—but not at once.

Sometimes, the knottiest dilemmas, when seen from the systems point of view, aren't dilemmas at all. They are artifacts of "snapshot" rather

than "process" thinking, and appear in a whole new light once you think consciously of change over time.

For years, for example, American manufacturers thought they had to choose between low cost and high quality. "Higher quality products cost more to manufacture," they thought. "They take longer to assemble, require more expensive materials and components, and entail more extensive quality controls." What they didn't consider was all the ways the increasing quality and lowering costs could go hand in hand, over time. What they didn't consider was how basic improvements in work processes could eliminate rework, eliminate quality inspectors, reduce customer complaints, lower warranty costs, increase customer loyalty, and reduce advertising and sales promotion costs. They didn't realize that they could have both goals, if they were willing to wait for one while they focused on the other. Investing time and money to develop new skills and methods of assembly, including new methods for involving everyone responsible for improving quality, is an up front "cost." Quality and costs may both go up in the ensuing months; although some cost savings (like reduced rework) may be achieved fairly quickly, the full range of cost savings may take several years to harvest.

Many apparent dilemmas, such as central versus local control, and happy committed employees versus competitive labor costs, and rewarding individual achievement versus having everyone feel valued are by-products of static thinking. They only appear as rigid "either-or" choices, because we think of what is possible at a fixed point in time. Next month, it may be true that we must choose one or the other, but the real leverage lies in seeing how both can improve over time.⁶

10. Dividing an elephant in half does not produce two small elephants.

Living systems have integrity. Their character depends on the whole. The same is true for organizations; to understand the most challenging managerial issues requires seeing the whole system that generates the issues.

Another Sufi tale illustrates the point of this law. As three blind men encountered an elephant, each exclaimed aloud. "It is a large rough thing, wide and broad, like a rug," said the first, grasping an ear. The second, holding the trunk, said, "I have the real facts. It is a straight and hollow pipe." And the third, holding a front leg, said, "It is mighty and firm, like a pillar." Are the three blind men any different from the heads of manufacturing, marketing, and research in many companies? Each sees the firm's problems clearly, but none see how the policies of their department interact with the others. Interestingly, the Sufi story concludes by observing that "Given these men's way of knowing, they will never know an elephant."

Seeing "whole elephants" does not mean that every organizational issue can be understood only by looking at the entire organization. Some issues can be understood only by looking at how major functions such as manufacturing, marketing, and research interact; but there are other issues where critical systemic forces arise within a given functional area; and others where the dynamics of an entire industry must be considered. The key principle, called the "principle of the system boundary," is that the interactions that must be examined are those most important to the issue at hand, regardless of parochial organizational boundaries.

What makes this principle difficult to practice is the way organizations are designed to keep people from seeing important interactions. One obvious way is by enforcing rigid internal divisions that inhibit inquiry across divisional boundaries, such as those that grow up between marketing, manufacturing, and research. Another is by

"leaving" problems behind us, for someone else to clean up. Many European cities have avoided the problems of crime, entrenched poverty, and helplessness that afflict so many American inner cities because they have forced themselves to face the balances that a healthy urban area must maintain. One way they have done this is by maintaining large "green belts" around the city that discourage the growth of suburbs and commuters who work in the city but live outside

it. By contrast, many American cities have encouraged steady expansion of surrounding suburbs, continually enabling wealthier residents to move further from the city center and its problems. (Impoverished areas today, such as Harlem in New York and Roxbury in Boston were originally upper-class suburbs.) Corporations do the same thing by continually acquiring new businesses and "harvesting" what they choose to regard as "mature" businesses rather than reinvesting in them.

Incidentally, sometimes people go ahead and divide an elephant in half anyway. You don't have two small elephants then; you have a mess. By a mess, I mean a complicated problem where there is no leverage to be found because the leverage lies in interactions that cannot be seen from looking only at the piece you are holding.

11. There is no blame.

We tend to blame outside circumstances for our problems. "Someone else"—the competitors, the press, the changing mood of the marketplace, the government—did it to us. Systems thinking shows us that there is no outside; that you and the cause of your problems are part of a single system. The cure lies in your relationship with your "enemy."

5

A SHIFT OF MIND

SEEING THE WORLD ANEW

There is something in all of us that loves to put together a puzzle, that loves to see the image of the whole emerge. The beauty of a person, or a flower, or a poem lies in seeing all of it. It is interesting that the words "whole" and "health" come from the same root (the Old English hal, as in "hale and hearty"). So it should come as no surprise that the

unhealthiness of our world today is in direct proportion to our inability to see it as a whole.

Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static "snapshots." It is a set of general principles—distilled over the course of the twentieth century, spanning fields as diverse as the physical and social sciences, engineering, and management. It is also a set of specific tools and techniques, originating in two threads: in "feedback" concepts of cybernetics and in "servo-mechanism" engineering theory dating back to the nineteenth century. During the last thirty years, these tools have

been applied to understand a wide range of corporate, urban, regional, economic, political, ecological, and even physiological systems.¹ And systems thinking is a sensibility—for the subtle interconnectedness that gives living systems their unique character.

Today, systems thinking is needed more than ever because we are becoming overwhelmed by complexity. Perhaps for the first time in history, humankind has the capacity to create far more information than anyone can absorb, to foster far greater interdependency than anyone can manage, and to accelerate change far faster than anyone's ability to keep pace. Certainly the scale of complexity is without precedent. All around us are examples of "systemic breakdowns"—problems such as global warming, ozone depletion, the international drug trade, and the U.S. trade and budget deficits — problems that have no simple local cause. Similarly, organizations break down, despite individual brilliance and innovative products, because they are unable to pull their diverse functions and talents into a productive whole.

Complexity can easily undermine confidence and responsibility— as in the frequent refrain, "It's all too complex for me," or "There's nothing I can do. It's the system." Systems thinking is the antidote to this sense of helplessness that many feel as we enter the "age of interdependence." Systems thinking is a discipline for seeing the

"structures" that underlie complex situations, and for discerning high from low leverage change. That is, by seeing wholes we learn how to foster health. To do so, systems thinking offers a language that begins by restructuring how we think.

I call systems thinking the fifth discipline because it is the conceptual cornerstone that underlies all of the five learning disciplines of this book. All are concerned with a shift of mind from seeing parts to seeing wholes, from seeing people as helpless reactors to seeing them as active participants in shaping their reality, from reacting to the present to creating the future. Without systems thinking, there is neither the incentive nor the means to integrate the learning disciplines once they have come into practice. As the fifth discipline, systems thinking is the cornerstone of how learning organizations think about their world.

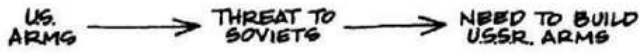
There is no more poignant example of the need for systems thinking than the U.S.-U.S.S.R. arms race. While the world has stood and watched for the past forty years, the two mightiest political powers have engaged in a race to see who could get fastest to where no one wanted to go. I have not yet met a person who is in favor of

the arms race. Even those who regard it as absolutely necessary, or who profit from it, will, in their quieter moments, confess that they wish it were not necessary. It has drained the U.S. economy and devastated the Soviet economy. It has ensnared successive administrations of political leaders, and terrified two generations of the world's citizens.

The roots of the arms race lie not in rival political ideologies, nor in nuclear arms, but in a way of thinking both sides have shared. The United States establishment, for example, has had a viewpoint of the arms race that essentially resembled the following:

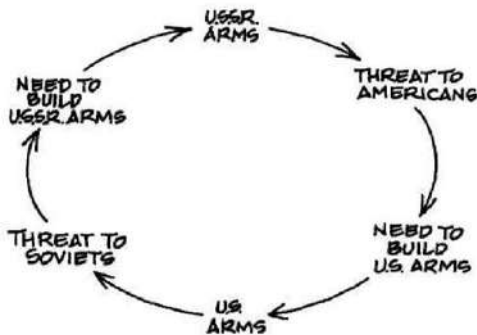


At the same time, the Soviet leaders have had a view of the arms race somewhat resembling this:



From the American viewpoint, the Soviets have been the aggressor, and U.S. expansion of nuclear arms has been a defensive response to the threats posed by the Soviets. From the Soviet viewpoint, the United States has been the aggressor, and Soviet expansion of nuclear arms has been a defensive response to the threat posed by the Americans.

But the two straight lines form a circle. The two nations' individual, "linear," or nonsystemic viewpoints interact to create a "system," a set of variables that influence one another:



The systems view of the arms race shows a perpetual cycle of aggression. The United States responds to a perceived Threat to Americans by increasing U.S. arms, which increases the Threat to the Soviets, which leads to more Soviet arms, which increases the Threat to the United States, which leads to more U.S. arms, which increases the Threat to the Soviets, which . . . and so on, and so on. From their individual viewpoints, each side achieves its short-term goal. Both sides respond to a perceived threat. But their actions end up creating the opposite outcome, increased threat, in the long run. Here, as in many systems, doing the obvious thing does not produce the obvious, desired outcome. The long-term result of each side's efforts to be more secure is heightened insecurity for all, with a combined nuclear stockpile of ten thousand times the total firepower of world War II.

Interestingly, both sides failed for years to adopt a true systems view, despite an abundance of "systems analysts," sophisticated analyses of each others' nuclear arsenals, and complex computer simulations of attack and counterattack war scenarios.² Why then have these supposed tools for dealing with complexity not empowered us to escape the illogic of the arms race?

The answer lies in the same reason that sophisticated tools of forecasting and business analysis, as well as elegant strategic plans, usually fail to produce dramatic breakthroughs in managing a business. They are all designed to handle the sort of complexity in which there are many variables: detail complexity. But there are two types of complexity. The second type is dynamic complexity, situations where cause and effect are subtle, and where the effects over time of interventions are not obvious. Conventional forecasting, planning, and analysis methods are not equipped to deal with dynamic complexity. Mixing many ingredients in a stew involves detail complexity, as does following a complex set of instructions to assemble a machine, or taking inventory in a discount retail store. But none of these situations is especially complex dynamically.

When the same action has dramatically different effects in the short run and the long, there is dynamic complexity. When an action has one set of consequences locally and a very different set of consequences in another part of the system, there is dynamic complexity. When obvious interventions produce nonobvious consequences, there is dynamic complexity. A gyroscope is a dynamically complex machine: If you push downward on one edge, it moves to the left; if you push another edge to the left, it moves upward. Yet, how trivi

ally simple is a gyroscope when compared with the complex dynamics of an enterprise, where it takes days to produce something, weeks to develop a new marketing promotion, months to hire and train new people, and years to develop new products, nurture management talent, and build a reputation for quality—and all of these processes interact continually.

The real leverage in most management situations lies in understanding dynamic complexity, not detail complexity. Balancing market growth and capacity expansion is a dynamic problem. Developing a profitable mix of price, product (or service) quality, design, and availability that make a strong market position is a dynamic problem. Improving quality, lowering total costs, and satisfying customers in a sustainable manner is a dynamic problem.

Unfortunately, most "systems analyses" focus on detail complexity not dynamic complexity. Simulations with thousands of variables and complex arrays of details can actually distract us from seeing patterns and major interrelationships. In fact, sadly, for most people "systems thinking" means "fighting complexity with complexity," devising increasingly "complex" (we should really say "detailed") solutions to increasingly "complex" problems. In fact, this is the antithesis of real systems thinking.

The arms race is, most fundamentally, a problem of dynamic complexity. Insight into the causes and possible cures requires seeing the interrelationships, such as between our actions to become more secure and the threats they create for the Soviets. It requires seeing the delays between action and consequence, such as the delay between a U.S. decision to build up arms and a consequent Soviet counter-buildup. And it requires seeing patterns of change, not just snapshots, such as continuing escalation.

Seeing the major interrelationships underlying a problem leads to new insight into what might be done. In the case of the arms race, as in any escalation dynamic, the obvious question is, "Can the vicious cycle be run in reverse?" "Can the arms race be run backward?"

This may be just what is happening today. Soviet General Secretary Mikhail Gorbachev's initiatives in arms reduction have started a new "peace race" with both sides eager to keep pace with the other's reductions in nuclear arsenals. It is too early to tell whether the shifts

in policy initiated by the Soviets in 1988 and 1989 will initiate a sustained unwinding of the U.S.-U.S.S.R. arms race. There

are many other factors in the global geopolitical system beyond the pure U.S.-U.S.S.R. interaction. But we appear to be witnessing the first glimmer of a genuinely systemic approach.³

The essence of the discipline of systems thinking lies in a shift of mind:

- seeing interrelationships rather than linear cause-effect chains, and
- seeing processes of change rather than snapshots

The practice of systems thinking starts with understanding a simple concept called "feedback" that shows how actions can reinforce or counteract (balance) each other. It builds to learning to recognize types of "structures" that recur again and again: the arms race is a generic or archetypal pattern of escalation, at its heart no different from turf warfare between two street gangs, the demise of a marriage, or the advertising battles of two consumer goods companies fighting for market share. Eventually, systems thinking forms a rich language for describing a vast array of interrelationships and patterns of change. Ultimately, it simplifies life by helping us see the deeper patterns lying behind the events and the details.

Learning any new language is difficult at first. But as you start to master the basics, it gets easier. Research with young children has shown that many learn systems thinking remarkably quickly.⁴ It appears that we have latent skills as systems thinkers that are undeveloped, even repressed by formal education in linear thinking. Hopefully, what follows will help rediscover some of those latent skills and bring to the surface the systems thinker that is within each of us.

SEEING CIRCLES OF CAUSALITY⁵

Reality is made up of circles but we see straight lines. Herein lie the beginnings of our limitation as systems thinkers. One of the reasons for

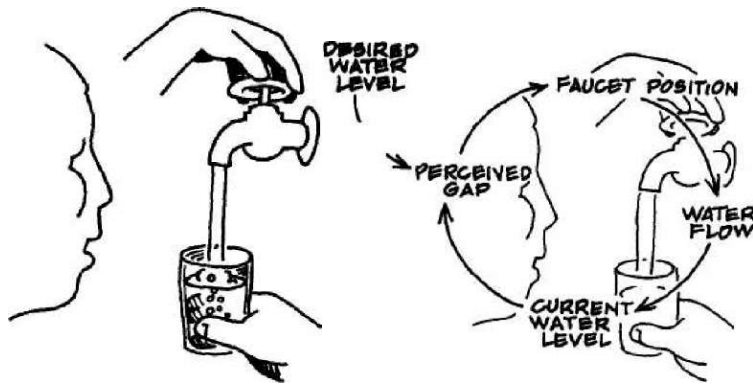
this fragmentation in our thinking stems

from our language. Language shapes perception. What we see depends on what we are prepared to see. Western languages, with their subject-verb-object structure, are biased toward a linear view.⁶ If we want to see systemwide interrelationships, we need a language of interrelationships, a language made up of circles. Without such a language, our habitual ways of seeing the world produce fragmented views and counterproductive actions—as it has done for decision makers in the arms race. Such a language is important in facing dynamically complex issues and strategic choices, especially when individuals, teams, and organizations need to see beyond events and into the forces that shape change.

To illustrate the rudiments of the new language, consider a very simple system—filling a glass of water. You might think, "That's not a system—it's too simple." But think again.

From the linear viewpoint, we say, "I am filling a glass of water." What most of us have in mind looks pretty much like the following picture:

But, in fact, as we fill the glass, we are watching the water level rise. We monitor the "gap" between the level and our goal, the "desired water level." As the water approaches the desired level, we adjust the faucet position to slow the flow of water, until it is turned off when the glass is full. In fact, when we fill a glass of water we operate in a "water-regulation" system involving five variables: our desired water level, the glass's current water level, the gap between the two, the faucet position, and the water flow. These variables are organized in a circle or loop of cause-effect relationships which is called a "feedback process." The process operates continuously to bring the water level to its desired level:



People get confused about "feedback" because we often use the word in a somewhat different way—to gather opinions about an act we have undertaken. "Give me some feedback on the brewery decision," you might say. "What did you think of the way I handled it?" In that context, "positive feedback" means encouraging remarks and "negative feedback" means bad news. But in systems thinking, feedback is a broader concept. It means any reciprocal flow of influence. In systems thinking it is an axiom that every influence is both cause and effect. Nothing is ever influenced in just one direction.

HOW TO READ A SYSTEMS DIAGRAM

The key to seeing reality systemically is seeing circles of influence rather than straight lines. This is the first step to breaking out of the reactive mindset that comes inevitably from "linear" thinking. Every circle tells a story. By tracing the flows of influence, you can see patterns that repeat themselves, time after time, making situations better or worse.

From any element in a situation, you can trace arrows that represent influence on another element:



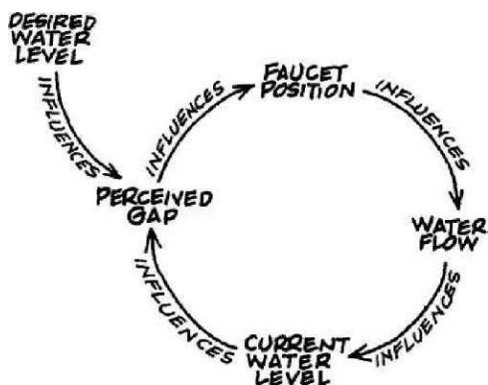
Above, the faucet position arrow points to water flow. Any change made to the faucet position will alter the flow of water. But arrows never exist in isolation:

To follow the story, start at any element and watch the action ensue, circling as the train in a toy railroad does through its recurring journey. A good place to start is with the action being taken by the decision maker:

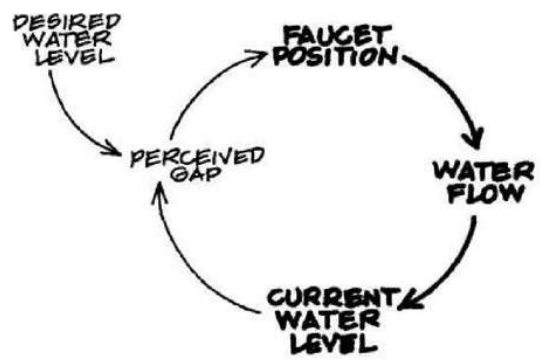
I set the faucet position, which adjusts the water flow, which changes the water level. As the water level changes, the perceived gap (between the current and desired water levels) changes. As the gap changes, my hand's position on the faucet changes again. And so on . . .

When reading a feedback circle diagram, the main skill is to see the "story" that the diagram tells: how the structure creates a particular pattern of behavior (or, in a complex structure, several patterns of behavior) and how that pattern might be influenced. Here the story is filling the water glass and gradually closing down the faucet as the glass fills.

Though simple in concept, the feedback loop overturns deeply ingrained ideas—such as causality. In everyday English we say, "I am filling the glass of water" without thinking very deeply about the real meaning of the statement. It implies a one-way causality—"I

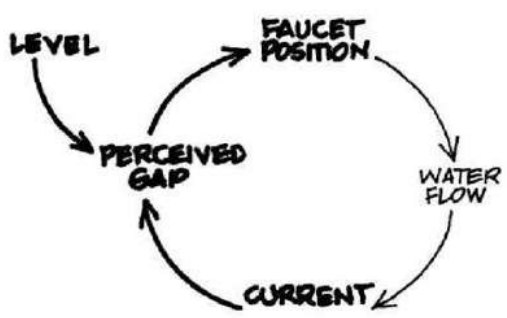


am causing the water level to rise." More precisely, "My hand on the faucet is controlling the rate of flow of water into the glass." Clearly, this statement describes only half of the feedback process: the linkages from "faucet position" to "flow of water" to "water level."



But it would be just as true to describe only the other "half" of the process: "The level of water in the glass is controlling my hand."

But it would be just as true to describe only the other "half" of the process: "The level of water in the glass is controlling my hand."



pesiReo
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WAT6P
level*

Both statements are equally incomplete. The more complete statement of causality is that my intent to fill a glass of water creates a system that causes water to flow in when the level is low, then shuts the flow off

when the glass is full. In other words, the structure causes the behavior. This distinction is important because seeing only individual actions and missing the structure underlying the actions, as we saw in the beer game in Chapter 3, lies at the root of our powerlessness in complex situations.

In fact, all causal attributions made in everyday English are highly suspect! Most are embedded in linear ways of seeing. They are at best partially accurate, inherently biased toward describing portions of reciprocal processes, not the entire processes.

Another idea overturned by the feedback perspective is anthropocentrism—or seeing ourselves as the center of activities. The simple description, "I am filling the glass of water," suggests a world of human actors standing at the center of activity, operating on an inanimate reality. From the systems perspective, the human actor is part of the feedback process, not standing apart from it. This represents a profound shift in awareness. It allows us to see how we are continually both influenced by and influencing our reality. It is the shift in awareness so ardently advocated by ecologists in their cries that we see ourselves as part of nature, not separate from nature. It is the shift in awareness recognized by many (but not all) of the world's great philosophical systems—for example, the Bhagavad Gita's chastisement:

All actions are wrought by the qualities of nature only. The self, deluded by egoism, thinketh: "I am the doer."⁷

In addition, the feedback concept complicates the ethical issue of responsibility. In the arms race, who is responsible? From each side's linear view, responsibility clearly lies with the other side: "It is their aggressive actions, and their nationalistic intent, that are causing us to respond by building our arms." A linear view always suggests a simple locus of responsibility. When things go wrong, this is seen as blame

—"he, she, it did it"—or guilt—"I did it." At a deep level, there is no difference between blame and guilt, for both spring from linear perceptions. From the linear view, we are always looking for someone or something that must be responsible—they can even be directed toward hidden agents within ourselves. When my son was four years old, he used to say, "My stomach won't let me eat it," when turning down his vegetables. We may chuckle, but is his assignment of responsibility really different from the adult who says, "My neuroses keep me from trusting people."

In mastering systems thinking, we give up the assumption that there must be an individual, or individual agent, responsible. The feedback perspective suggests that everyone shares responsibility for problems generated by a system. That doesn't necessarily imply that everyone involved can exert equal leverage in changing the system.

But it does imply that the search for scapegoats—a particularly alluring pastime in individualistic cultures such as ours in the United States—is a blind alley.

Finally, the feedback concept illuminates the limitations of our language. When we try to describe in words even a very simple system, such as filling the water glass, it gets very awkward: "When I fill a glass of water, there is a feedback process that causes me to adjust the faucet position, which adjusts the water flow and feeds back to alter the water position. The goal of the process is to make the water level rise to my desired level." This is precisely why a new language for describing systems is needed. If it is this awkward to describe a system as simple as filling a water glass, imagine our difficulties using everyday English to describe the multiple feedback processes in an organisation.

All this takes some getting used to. We are steeped in a linear language for describing our experience. We find simple statements about causality and responsibility familiar and comfortable. It is not that they must be given up, anymore than you give up English to learn French. There are many situations where simple linear descriptions

suffice and looking for feedback processes would be a waste of time. But not when dealing with problems of dynamic complexity.

REINFORCING AND BALANCING FEEDBACK AND DELAYS: THE BUILDING BLOCKS OF SYSTEMS THINKING

There are two distinct types of feedback processes: reinforcing and balancing. Reinforcing (or amplifying) feedback processes are the engines of growth. Whenever you are in a situation where things are growing, you can be sure that reinforcing feedback is at work. Reinforcing feedback can also generate accelerating decline—a pattern of decline where small drops amplify themselves into larger and larger drops, such as the decline in bank assets when there is a financial panic.

Balancing (or stabilizing) feedback operates whenever there is a goal-oriented behavior. If the goal is to be not moving, then balancing feedback will act the way the brakes in a car do. If the goal is to be moving at sixty miles per hour, then balancing feedback will cause you to accelerate to sixty but no faster. The "goal" can be an explicit target, as when a firm seeks a desired market share, or it can be

implicit, such as a bad habit, which despite disavowing, we stick to nevertheless.

In addition, many feedback processes contain "delays," interruptions in the flow of influence which make the consequences of actions occur gradually.

All ideas in the language of systems thinking are built up from these elements, just as English sentences are built up from nouns and verbs. Once we have learned the building blocks, we can begin constructing stories: the systems archetypes of the next chapter.

REINFORCING FEEDBACK: DISCOVERING HOW SMALL CHANGES CAN GROW

If you are in a reinforcing feedback system, you may be blind to how small actions can grow into large consequences—for better or for worse. Seeing the system often allows you to influence how it works.

For example, managers frequently fail to appreciate the extent to which their own expectations influence subordinates' performance. If I see a person as having high potential, I give him special attention to develop that potential. When he flowers, I feel that my original assessment was correct and I help him still further. Conversely, those I regard as having lower potential languish in disregard and inattention, perform in a disinterested manner, and further justify, in my mind, the lack of attention I give them.

Psychologist Robert Merton first identified this phenomenon as the "self-fulfilling prophecy."⁸ It is also known as the "Pygmalion effect," after the famous George Bernard Shaw play (later to become *My Fair Lady*). Shaw in turn had taken his title from Pygmalion, a character in Greek and Roman mythology, who believed so strongly in the beauty of the statue he had carved that it came to life.

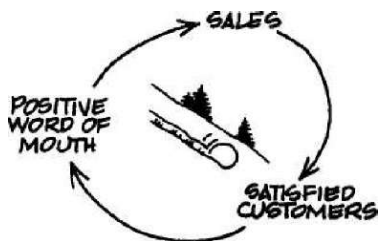
Pygmalion effects have been shown to operate in countless situations.⁹ An example occurs in schools, where a teacher's opinion of a student influences the behavior of that student. Jane is shy and does particularly poorly in her first semester at a new school (because her parents were fighting constantly). This leads her teacher to form an opinion that she is unmotivated. Next semester, the teacher pays less attention to Jane and she does poorly again, withdrawing further. Over time, Jane gets caught in an ever-worsening spiral of withdrawal, poor performance, "labeling" by her teachers, inattention, and further withdrawing. Thus, students are unintentionally

"tracked" into a high self-image of their abilities, where they get personal attention, or a low self-image, where their poor class work is reinforced in an ever-worsening spiral.

In reinforcing processes such as the Pygmalion effect, a small change builds on itself. Whatever movement occurs is amplified, producing more movement in the same direction. A small action snowballs, with more and more and still more of the same, resembling compounding interest. Some reinforcing (amplifying) processes are "vicious cycles," in which things start off badly and grow worse. The "gas crisis" was a classic example. Word that gasoline was becoming scarce set off a spate of trips to the local service station, to fill up. Once people started seeing lines of cars, they were convinced that the crisis was here. Panic and hoarding then set in. Before long, everyone was "topping off" their tanks when they were only one-quarter empty, lest they be caught when the pumps went dry. A run on a bank is another example, as are escalation structures such as the arms race or price wars.

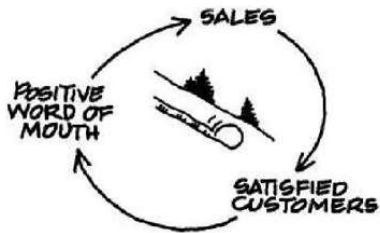
But there's nothing inherently bad about reinforcing loops. There are also "virtuous cycles"—processes that reinforce in desired directions. For instance, physical exercise can lead to a reinforcing spiral; you feel better, thus you exercise more, thus you're rewarded by feeling better and exercise still more. The arms race run in reverse, if it can be sustained, makes another virtuous circle. The growth of any new product involves reinforcing spirals. For example, many products grow from "word of mouth." Word of mouth about a product can reinforce a snowballing sense of good feeling (as occurred with the Volkswagen Beetle and more recent Japanese imports) as satisfied customers tell others who then become satisfied customers, who tell still others.

Here is how you might diagram such a process:



HOW TO READ A

REINFORCING CIRCLE



Reinforcing Sales Process Caused by Customers Talking to Each

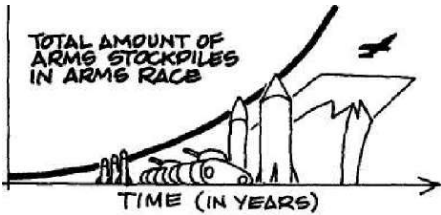
Other About Your Product

This diagram shows a reinforcing feedback process wherein actions snowball. Again, you can follow the process by walking yourself around the circle:

If the product is a good product, more sales means more satisfied customers, which means more positive word of mouth. That will lead to still more sales, which means even more widespread word of mouth . . . and so on. On the other hand, if the product is defective, the virtuous cycle becomes a vicious cycle: sales lead to less satisfied customers, less positive word of mouth, and less sales; which leads to still less positive word of mouth and less sales.

The behavior that results from a reinforcing loop is either accelerating growth or accelerating decline. For example, the arms race produces an accelerating growth of arms stockpiles:

The behavior that results from a reinforcing loop is either accelerating growth or accelerating decline. For example, the arms race produces an accelerating growth of arms stockpiles:



Positive word of mouth produced rapidly rising sales of Volkswagens during the 1950s, and videocassette recorders during the 1980s. A bank run produces an accelerating decline in a bank's deposits.

Folk wisdom speaks of reinforcing loops in terms such as "snowball effect," "bandwagon effect," or "vicious circle," and in phrases describing particular systems: "the rich get richer and the poor get poorer." In business, we know that "momentum is everything," in building confidence in a new product or within a fledgling organization. We also know about reinforcing spirals running the wrong way. "The rats are jumping ship" suggests a situation where, as soon as a few people lose confidence, their defection will cause others to defect in a vicious spiral of eroding confidence. Word of mouth can easily work in reverse, and (as occurred with contaminated over-the-counter drugs) produce marketplace disaster.

Both good news and bad news reinforcing loops accelerate so quickly that they often take people by surprise. A French school-children's jingle illustrates the process. First there is just one lily pad in a corner of a pond. But every day the number of lily pads doubles. It takes thirty days to fill the pond, but for the first twenty-eight days, no one even notices. Suddenly, on the twenty-ninth day, the pond is half full of lily pads and the villagers become concerned. But by this time there is little that can be done. The next day their worst fears come true. That's why environmental dangers are so worrisome, especially those that follow reinforcing patterns (as many environmentalists fear occurs with such pollutants as CFCs). By the time the problem is noticed, it may be too late. Extinctions of species often follow patterns of slow, gradually accelerating decline over long time periods, then rapid demise. So do extinctions of corporations.

But pure accelerating growth or decline rarely continues unchecked in nature, because reinforcing processes rarely occur in isolation. Eventually, limits are encountered—which can slow growth, stop it, divert it, or even reverse it. Even the lily pads stop growing when the limit of the pond's perimeter is encountered. These limits are one form of balancing feedback, which, after reinforcing processes, is the second basic element of systems thinking.

BALANCING PROCESSES: DISCOVERING THE SOURCES OF STABILITY

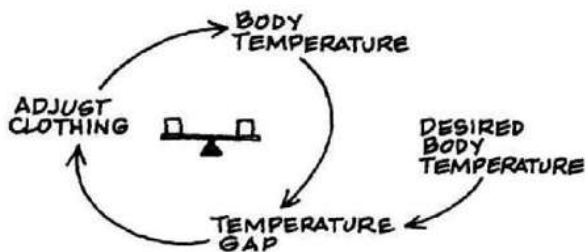
AND RESISTANCE

If you are in a balancing system, you are in a system that is seeking stability. If the system's goal is one you like, you will be happy. If it is not, you will find all your efforts to change matters frustrated—until you can either change the goal or weaken its influence.

Nature loves a balance—but many times, human decision makers act contrary to these balances, and pay the price. For example, managers under budget pressure often cut back staff to lower costs, but eventually discover that their remaining staff is now overworked, and their costs have not gone down at all—because the remaining work has been farmed out to consultants, or because overtime has made up the difference. The reason that costs don't stay down is that the system has its own agenda. There is an implicit goal, unspoken but very real—the amount of work that is expected to get done.

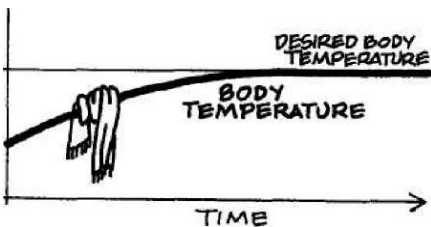
In a balancing (stabilizing) system, there is a self-correction that attempts to maintain some goal or target. Filling the glass of water is a balancing process with the goal of a full glass. Hiring new employees is a balancing process with the goal of having a target work force size or rate of growth. Steering a car and staying upright on a bicycle are also examples of balancing processes, where the goal is heading in a desired direction.

Balancing feedback processes are everywhere. They underlie all goal-oriented behavior. Complex organisms such as the human body contain thousands of balancing feedback processes that maintain temperature and balance, heal our wounds, adjust our eyesight to the amount of light, and alert us to threat. A biologist would say that all of these processes are the mechanisms by which our body achieves homeostasis—its ability to maintain conditions for survival

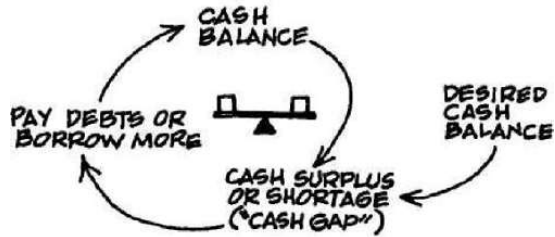


in a changing environment. Balancing feedback prompts us to eat when we need food, and to sleep when we need rest, or—as shown in the diagram above—to put on a sweater when we are cold.

As in all balancing processes, the crucial element—our body temperature—gradually adjusts itself toward its desired level:



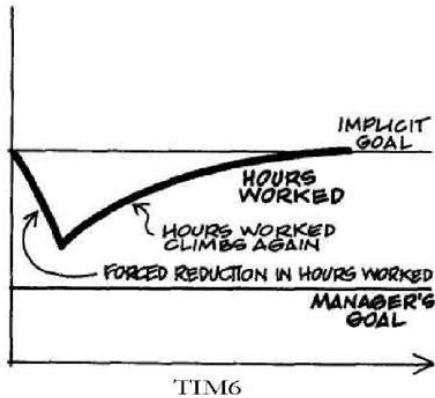
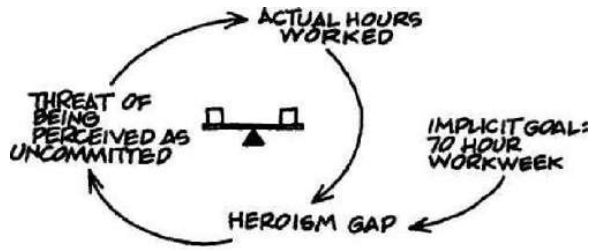
Organizations and societies resemble complex organisms because they too have myriad balancing feedback processes. In corporations, the production and materials ordering process is constantly adjusting in response to changes in incoming orders; short-term (discounts) and long-term (list) prices adjust in response to changes in demand or competitors' prices; and borrowing adjusts with changes in cash balances or financing needs.



Planning creates longer-term balancing processes. A human resource plan might establish long-term growth targets in head count and in skill profile of the work force to match anticipated needs. Market research and R&D plans shape new product development and investments in people, technologies, and capital plant to build competitive advantage.

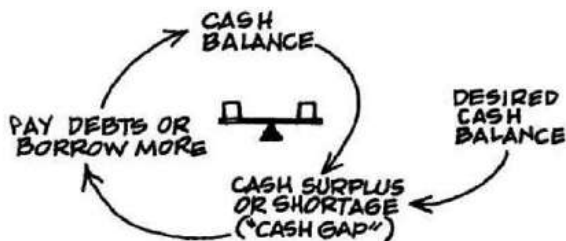
What makes balancing processes so difficult in management is that the goals are often implicit, and no one recognizes that the balancing process exists at all. I recall a good friend who tried, fruitlessly, to reduce burnout among professionals in his rapidly growing training business. He wrote memos, shortened working hours, even closed

and locked offices earlier—all attempts to get people to stop overworking. But all these actions were offset—people ignored the memos, disobeyed the shortened hours, and took their work home with them when the offices were locked. Why? Because an unwritten norm in the organization stated that the real heroes, the people who really cared and who got ahead in the organization, worked seventy hours a week—a norm that my friend had established himself by his own prodigious energy and long hours.



To understand how an organism works we must understand its balancing processes—those that are explicit and implicit. We could master long lists of body parts, organs, bones, veins, and blood vessels and yet we would not understand how the body functions— until we understand how the neuromuscular system maintains balance, or how the cardiovascular system maintains blood pressure and oxygen levels. This is why many attempts to redesign social systems fail. The state-controlled economy fails because it severs the multiple self-correcting processes that operate in a free market system.¹⁰ This is why corporate mergers often fail. When two hospitals in Boston, both with outstanding traditions of patient care, were

HOW TO READ A BALANCING CIRCLE DIAGRAM



This diagram shows a balancing feedback process. To walk yourself through the process, it's generally easiest to start at the gap—the discrepancy between what is desired and

what exists:

Here, there is a shortfall in cash on hand for our cashflow needs. (In other words, there's a gap between our desired and actual cash balances.)

Then look at the actions being taken to correct the gap:

We borrow money, which makes our cash balance larger, and the gap decreases.

The chart shows that a balancing process is always operating to reduce a gap between what is desired and what exists. Moreover, such goals as desired cash balances change over time with growth or decline in the business. Regardless, the balancing process will continue to work to adjust actual cash balances to what is needed, even if the target is moving.

merged several years ago, the new larger hospital had state-of-the-art facilities but lost the spirit of personal care and employee loyalty that had characterized the original institutions. In the merged hospital, subtle balancing processes in the older hospitals that monitored quality, paid attention to employee needs, and maintained friendly relationships with patients were disrupted by new administrative structures and procedures.

Though simple in concept, balancing processes can generate surprising and problematic behavior if they go undetected.

In general, balancing loops are more difficult to see than reinforcing loops because it often looks like nothing is happening. There's no dramatic growth of sales and marketing expenditures, or nuclear arms, or lily pads. Instead, the balancing process maintains the status quo,

even when all participants want change. The feeling, as Lewis Carroll's Queen of Hearts put it, of needing "all the running you can do to keep in the same place," is a clue that a balancing loop may exist nearby.

Leaders who attempt organizational change often find themselves unwittingly caught in balancing processes. To the leaders, it looks as though their efforts are clashing with sudden resistance that seems to come from nowhere. In fact, as my friend found when he tried to reduce burnout, the resistance is a response by the system, trying to maintain an implicit system goal. Until this goal is recognized, the change effort is doomed to failure. So long as the leader continues to be the "model," his work habits will set the norm. Either he must change his habits, or establish new and different models.

Whenever there is "resistance to change," you can count on there being one or more "hidden" balancing processes. Resistance to change is neither capricious nor mysterious. It almost always arises from threats to traditional norms and ways of doing things. Often these norms are woven into the fabric of established power relationships. The norm is entrenched because the distribution of authority and control is entrenched. Rather than pushing harder to overcome resistance to change, artful leaders discern the source of the resistance. They focus directly on the implicit norms and power relationships within which the norms are embedded.

DELAYS: WHEN THINGS HAPPEN

EVENTUALLY

As we've seen, systems seem to have minds of their own. Nowhere is this more evident than in delays—interruptions between your actions and their consequences. Delays can make you badly overshoot your mark, or they can have a positive effect if you recognize them and work with them.

"One of the highest leverage points for improving system performance," says Ray Stata, CEO of Analog Devices, "is the minimization of system

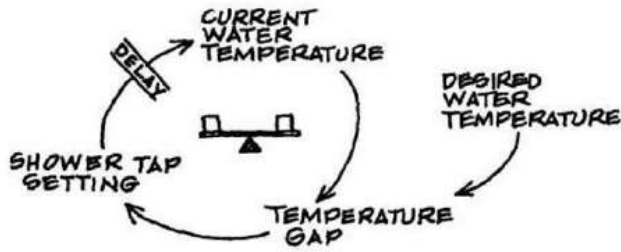
delays." Stata is referring to an increasing awareness on the part of American manufacturers that while they have worked traditionally to control tightly the amount of inventory in warehouses, their Japanese counterparts have concentrated on reducing delays—a much more successful effort. "The way leading companies manage time," says George Stalk, vice president of the Boston Consulting Group, "—in production, in new product development, in sales and distribution—represents the most powerful new source of competitive disadvantage."

Delays between actions and consequences are everywhere in human systems. We invest now to reap a benefit in the distant future; we hire a person today but it may be months before he or she is fully productive; we commit resources to a new project knowing that it will be years before it will pay off. But delays are often unappreciated and lead to instability. For example, the decision makers in the beer game consistently misjudged the delays that kept them from getting orders filled when they thought they would.

Delays, when the effect of one variable on another takes time, constitute the third basic building block for a systems language. Virtually all feedback processes have some form of delay. But often the delays are either unrecognized or not well understood. This can result in "overshoot," going further than needed to achieve a desired result. The delay between eating and feeling full has been the nemesis of many a happy diner; we don't yet feel full when we should stop eating, so we keep going until we are overstuffed. The delay between starting a new construction project and its completion results in overbuilding real estate markets and an eventual shakeout. In the beer game, the delay between placing and receiving orders for beer regularly results in overordering.

Unrecognized delays can also lead to instability and breakdown, especially when they are long. Adjusting the shower temperature,

HOW TO READ A DELAY



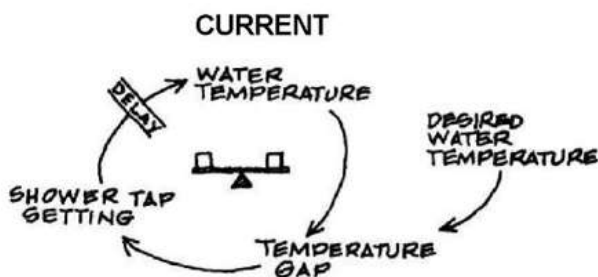
Balancing Process with a Delay: A Sluggish Shower

Here's our earlier "water faucet" feedback diagram again — but this time, with antiquated plumbing. Now there's a significant delay between the time you turn the faucet, and the time you see change in the water flow. Those two cross-hatch lines represent the delay.

Arrows with cross-hatch lines don't tell you how many seconds (or years) the delay will last. You only know it's long enough to make a difference.

When you follow an arrow with a delay, add the word "eventually" to the story you tell in your mind. "I moved the faucet handle, which eventually changed the water flow." Or, "I began a new construction project and, eventually, the houses were ready." You may even want to skip a beat — "one, two"—as you talk through the process.

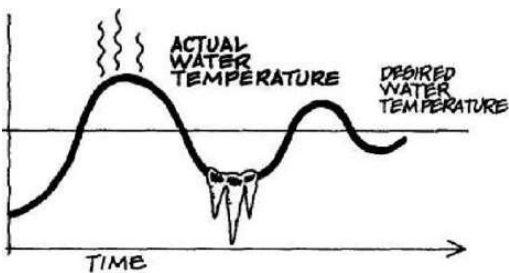
for instance, is far more difficult when there is a ten-second delay before the water temperature adjusts, then when the delay takes only a second or two.



During that ten seconds after you turn up the heat, the water remains cold. You receive no response to your action; so you perceive that your act has had no effect. You respond by continuing to turn up the heat. When the hot water finally arrives, a 190-degree water gusher erupts from the faucet. You jump out and turn it back; and, after another delay, it's frigid again. On and on you go, through the balancing loop process. Each cycle of adjustments compensates somewhat for the cycle before. A diagram would look like this:

The more aggressive you are in your behavior—the more drastically you turn the knobs—the longer it will take to reach the right temperature. That's one of the lessons of balancing loops with delays: that aggressive action often produces exactly the opposite of what is intended. It produces instability and oscillation, instead of moving you more quickly toward your goal.

Delays are no less problematic in reinforcing loops. In the arms race example, each side perceives itself as gaining advantage from



expanding its arsenal because of the delay in the other side's re*
sponse. This delay can be as long as five years because of the time required to gather intelligence on the other side's weaponry, and to design and deploy new weapons. It is this temporary perceived advantage that keeps the escalation process going. If each side were able to respond instantly to buildups of its adversary, incentives to keep building would be nil.

The systems viewpoint is generally oriented toward the long-term view. That's why delays and feedback loops are so important. In the short

term, you can often ignore them; they're inconsequential. They only come back to haunt you in the long term.

Reinforcing feedback, balancing feedback, and delays are all fairly simple. They come into their own as building blocks for the "systems archetypes"—more elaborate structures that recur in our personal and work lives again and again.

6

NATURE'S TEMPLATES: IDENTIFYING THE

PATTERNS THAT CONTROL EVENTS

Some years ago, I witnessed a tragic accident while on an early spring canoe trip in Maine. We had come to a small dam, and put in to shore to portage around the obstacle. A second group arrived, and a young man who had been drinking decided to take his rubber raft over the dam. When the raft overturned after going over the dam, he was dumped into the freezing water. Unable to reach him, we watched in horror as he struggled desperately to swim downstream against the backwash at the base of the dam. His struggle lasted only a few minutes; then he died of hypothermia. Immediately, his limp body was sucked down into the swirling water. Seconds later, it popped up, ten yards downstream, free of the maelstrom at the base of the dam. What he had tried in vain to achieve in the last moments of his life, the currents accomplished for him within seconds after his death. Ironically, it was his very struggle against the forces at the base of the dam that killed him. He didn't know that the only way out was "counterintuitive. If he hadn't tried to keep his head above water, but instead dived down to where the current flowed downstream, he would have survived.

expanding its arsenal because of the delay in the other side's response. This delay can be as long as five years because of the time required to gather intelligence on the other side's weaponry, and to design and deploy new weapons. It is this temporary perceived advantage that

Representation is the tool for adaptation. Simulation is the tool for creating.

In the learning organization of the future, microworlds will be as common as business meetings are in today's organizations. And, just as business meetings reinforce today's focus on coping with present reality, microworlds will reinforce a focus on creating alternative future realities.

18

THE LEADER'S NEW WORK

WHAT DOES IT TAKE TO LEAD A LEARNING ORGANIZATION?

"I talk with people all over the country about learning organizations and 'metanoia,' and the response is always very positive," says Hanover's Bill O'Brien. "If this type of organization is so widely preferred, why don't people create such organizations? I think the answer is leadership. People have no real comprehension of the type of commitment it requires to build such an organization."

Learning organizations demand a new view of leadership. My colleague, organizational consultant Charles Kiefer, tells a story of working with a product development team whose members became committed to a shared vision of a dramatic new product, which they eventually brought to market in one third the normal time required. "Once the vision of the product and how they would develop it began to crystallize," says Kiefer, "the team began to work in an extraordinary way. The energy and enthusiasm were palpable. Each individual felt a genuine sense of responsibility for how the team as a

whole functioned, not just for 'doing his part.' Openness to new ideas shifted dramatically and technical problems that had been blocking their progress began to get solved.

"But a new problem emerged. The prevailing leadership style in the organization was the traditional style—clear directions and well-intentioned manipulation to get people to work together toward common goals. The team leader recognized that the skills and behaviors that had made him an effective leader in the past would now be counterproductive. People with a sense of their own vision and commitment would naturally reject efforts of a leader to 'get them committed.' He literally did not know what to do, now that he had a self-directed team with a clear vision, that was learning how to learn together."

Our traditional views of leaders—as special people who set the direction, make the key decisions, and energize the troops—are deeply rooted in an individualistic and nonsystemic worldview. Especially in the West, leaders are heroes—great men (and occasionally women) who "rise to the fore" in times of crises. Our prevailing leadership myths are still captured by the image of the captain of the cavalry leading the charge to rescue the settlers from the attacking Indians. So long as such myths prevail, they reinforce a focus on short-term events and charismatic heroes rather than on systemic forces and collective learning. At its heart, the traditional view of leadership is based on assumptions of people's powerlessness, their lack of personal vision and inability to master the forces of change, deficits which can be remedied only by a few great leaders.

The new view of leadership in learning organizations centers on subtler and more important tasks. In a learning organization, leaders are designers, stewards, and teachers. They are responsible for building organisations where people continually expand their capabilities to understand complexity, clarify vision, and improve shared mental models—that is, they are responsible for learning.

This new view is vital. When all is said and done, learning organizations will remain a "good idea," an intriguing but distant vision until people take a stand for building such organizations. Taking this stand is the first leadership act, the start of inspiring (literally "to breathe life into")

the vision of learning organizations. In the absence of this stand, the learning disciplines remain mere collections of tools and technique—means of solving problems rather than creating something genuinely new.

LEADER AS DESIGNER

Imagine that your organization is an ocean liner, and that you are "the leader." What is your role?

I have asked this question of groups of managers many times. The most common answer, not surprisingly, is "the captain." Others say, "The navigator, setting the direction." Still others say, "The helmsman, actually controlling the direction," or "the engineer down there stoking the fire, providing energy," or, "the social director, making sure everybody's enrolled, involved, and communicating." While these are legitimate leadership roles, there is another which, in many ways, eclipses them all in importance. Yet, rarely does anyone think of it.

The neglected leadership role is the designer of the ship. No one has a more sweeping influence than the designer. What good does it do for the captain to say, "Turn starboard thirty degrees," when the designer has built a rudder that will turn only to port, or which takes six hours to turn to starboard? It's fruitless to be the leader in an organization that is poorly designed. Isn't it interesting that so few managers think of the ship's designer when they think of the leader's role?

Although "leader as designer" is neglected today, it touches a chord that goes back thousands of years. To paraphrase Lao-tzu, the bad leader is he who the people despise. The good leader is he who the people praise. The great leader is he who the people say, "We did it ourselves."

Lao-tzu also illuminates part of the reason why design is a neglected dimension of leadership: little credit goes to the designer. The functions of design are rarely visible; they take place behind the scenes. The consequences that appear today are the result of work done long in the

past, and work today will show its benefits far in the future. Those who aspire to lead out of a desire to control, or gain fame, or simply to be "at the center of the action" will find little to attract them to the quiet design work of leadership. Not that this type of leadership is without its rewards. Those who practice it find deep satisfaction in empowering others and being part of an organization capable of producing results that people truly care about. In fact, they find these rewards more enduring than the power and praise granted to traditional leaders.

For example, consider the role of systems thinking in a leader's work. Joanne, the president of a new division that is growing rapidly, recognizes a limits to growth structure that could undermine continuing growth: as the number of managers in the new division grows, the diversity of management styles will increase, undermining the coherence of vision and operating values that has made the division a success to date. The "limiting factor" will be the division's capacity to assimilate new managers. Rather than waiting for the problem to arise and then dealing with it, Joanne develops a selection and self-assessment process that helps new managers understand the current vision and values and see if their own style is compatible; and she allocates a significant portion of her own time to working with new managers. The result is continuing growth of the division. Given our normal "leader as hero" viewpoint, this is not leadership. There is no crisis—in fact, there isn't even a problem that gets solved. The "problem" of inconsistency in values and vision simply never develops; it wasn't "solved," it was "dissolved." This is the hallmark of effective design.

As this story illustrates, the design work of leaders includes designing an organization's policies, strategies, and "systems." But it goes beyond that. Designing policies and strategies that no one can implement because they don't understand or agree with the thinking behind them has little effect. To appreciate the new view of "leader as designer," let's return to the DC-3.

The critical design function, without which the DC-3 would never have succeeded, involved integrating the five component technologies. For example, designing the engine specifications required understanding the effects of the variable pitch propellers, the wing flaps, the retractable landing gear, as well as the stress characteristics of the new monocoque body. So, too, did the wing and body design depend on the engine's thrust. The task of integrating the component technologies was more critical to the success of the DC-3 than the task of designing any single component.

Design is, by its nature, an integrative science because design requires making something work in practice. "We would not consider a car well designed," says Herman Miller's Ed Simon, "if it had the best transmission, the best seats, and the best engine, but was terrible to ride in and impossible to control on wet roads. The essence of design is seeing how the parts fit together to perform as a whole."

So too does the crucial design work for leaders of learning organizations concern integration. As background for this chapter I interviewed three leaders who have been part of our MIT research program for several years, Simon, Bill O'Brien of Hanover Insurance, and Ray Stata of Analog Devices. Each pointed to design as a critical function of leadership and each saw design as an integrative task. "The new job description of leaders," according to Stata, "will involve design of the organization and its policies. This will require seeing the company as a system in which the parts are not only internally connected, but also connected to the external environment, and clarifying how the whole system can work better." Or as Simon put it, "We need a new generation of organizational architects. But to get there we must first correct basic misunderstandings about the nature of business design. It's not just rearranging the organization structure. We have to get away from the P&L statement and design for the long term—based on understanding interdependencies. Most changes in organization structure are piecemeal reactions to problems. Real designers are continually trying to understand wholes."

Just as the DC-3 designers had to integrate the five component technologies, crucial design work for leaders of learning organization concerns integrating vision, values, and purpose, systems thinking, and mental models—or more broadly, integrating all the learning disciplines. It is the synergy of the disciplines that can propel an organization to major breakthroughs in learning. As best we can tell so far, all the disciplines are critical and must be developed. Leaders must guard against slipping into a comfortable "groove" of relying on particular disciplines, each of which, in isolation, will prove self-limiting. This is why organizations that get fired up by vision can become "vision junkies," just as organizations that come to "believe in" systems thinking as the answer to life's problems will reach diminishing returns in their ongoing systems analyses.

This does not mean that all the disciplines must be developed simultaneously. Though all are important, there are crucial questions concerning sequencing and interactions among the disciplines. What disciplines should be developed first? How can understanding in one area lead to mastery in another? How do we sustain movement along all critical dimensions and not become self-satisfied with our accomplishments in one area? These are the types of design questions that leaders must ponder.

Most of the leaders with whom I have worked agree that the first leadership design task concerns developing vision, values, and purpose or mission. "Organization design is widely misconstrued as

moving around boxes and lines," says Bill O'Brien. "The first task

of organizational design concerns designing the governing ideas— the purpose, vision, and core values by which people will live." "Designing the organization as a whole," says Stata, "includes the intangible] of even the more subtle values that knit things together."

Building shared vision is important early on because it fosters a longer-term orientation and an imperative for learning. Systems thinking is also important early on because managers are inherently pragmatic and need insights into "current reality" as well as a picture of the future toward which they are moving. Some understanding of mental models and the basics of bringing underlying assumptions to the surface is also important early on. Introducing conceptual tools such as systems thinking in isolation from learning how to work with mental models, both individually and in teams, often proves disappointing. Managers believe that the purpose is to figure out the "system out there," not to discover inconsistencies in their own ways of thinking.

Personal mastery is often one of the later disciplines to emphasize because managers are often, justifiably, cautious in overemphasizing personal growth. Freedom of individual choice is critical in any organization effort to foster personal mastery. As already discussed, what matters most is the visible behavior of people in leadership positions in sharing their own personal visions and demonstrating their commitment to the truth.

These statements are broad guidelines at best. The art of leadership involves sizing up the players and needs in each situation and crafting strategies suitable to the time and setting. For example, some organizations have a high ethic of collaboration, which makes them especially receptive to team learning and shared vision. Yet, in the same organization, people might have difficulties with systems thinking, which they might see as confronting established mental models and operating policies. In a large organization, different combinations of learning disciplines will be developing in different operating units; and leadership is operating at many levels, from local leaders who are bringing the disciplines to bear on current problems, to central leaders who are addressing global issues and organization-wide learning processes.

Even the criteria that you'd bring to bear in making these choices are not yet certain. Do you start with the "easiest disciplines," that is, the

disciplines where there is the greatest readiness and least resistance?
In general, I find people eager to master new learning

disciplines so long as they can connect those skills to important problems and personal learning needs. But if there is resistance to certain disciplines, do you push or do you hold off until you have built up momentum in another area?

Generally, I would counsel against pushing. Usually it is more effective to look for the source of the resistance, either in perceived lack of relevance, fear of failure (i.e., "I won't be competent in the new discipline"—remember we were all schoolchildren once), or perceived threat to the status quo. The leaders who fare best are those who continually see themselves as designers not crusaders. Many of the best intentioned efforts to foster new learning disciplines founder because those leading the charge forget the first rule of learning: people learn what they need to learn, not what someone else thinks they need to learn.

In essence, the leaders' task is designing, the learning processes whereby people throughout the organization can deal productively with the critical issues they face, and develop their mastery in the learning disciplines. This is new work for most experienced managers, many of whom rose to the top because of their decision-making and problem-solving skills, not their skills in mentoring, coaching, and helping others learn. But, as Ed Simon says, this is no reason to turn back: "There is much that we do not know about what will be required to build learning organizations, but one thing is certain— there is new work here, and we must be willing to abandon our whole paradigm of who we are as managers to master this new work."

LEADER AS STEWARD

The interviews that I conducted as background for this chapter led to what was, for me, a surprising discovery. Although the three leaders with whom I talked operate in completely different industries — a

traditional service business, a traditional manufacturing business, and a high-tech manufacturing business—and although the specifics of their views differed substantially, they each appeared to draw their own inspiration from the same source. Each perceived a deep story and sense of purpose that lay behind his vision, what we have come to call the purpose story—a larger "pattern of becoming" that gives unique meaning to his personal aspirations and his hopes for their organization. For O'Brien the story has to do with "the

ascent of man." For Ed Simon, it has to do with "living in a more creative orientation." For Ray Stata, it has to do "with integrating thinking and doing."

This realization came late one evening, after a very long day with the tape and transcript of one of the interviews. I began to see that these leaders were doing something different from just "story telling," in the sense of using stories to teach lessons or transmit bits of wisdom. They were relating the story—the overarching explanation of why they do what they do, how their organization needs to evolve, and how that evolution is part of something larger. As I reflected back on gifted leaders whom I have known, I realized that this "larger story" was common to them all, and conversely that many otherwise competent managers in leadership positions were not leaders of the same ilk precisely because they saw no larger story.

The leader's purpose story is both personal and universal. It defines her or his life's work. It ennobles his efforts, yet leaves an abiding humility that keeps him from taking his own successes and failures too seriously. It brings a unique depth of meaning to his vision, a larger landscape upon which his personal dreams and goals stand out as landmarks on a longer journey. But what is most important, this story is central to his ability to lead. It places his organization's purpose, its reason for being, within a context of "where we've come from and where we're headed," where the "we" goes beyond the organization itself to humankind more broadly. In this sense, they naturally see their organization as a vehicle for bringing learning and change into society.

This is the power of the purpose story—it provides a single integrating set of ideas that gives meaning to all aspects of the leader's work.

Out of this deeper story and sense of purpose or destiny, the leader develops a unique relationship to his or her own personal vision. He or she becomes a steward of the vision.

The best way to appreciate the "leader as steward" in the context of building learning organizations is to see the way individuals committed to such work describe their own sense of purpose. The following are excerpts from my interviews:

Bill O'Brien

President and CEO, Hanover Insurance

PMS: Bill, why are there such pressures for change in management today—is it primarily because of competitive pressures?

O'BRIEN: No. I think there is something beyond competitive pressures.

Our traditional organizations are designed to provide for the first three levels of Maslow's hierarchy of human needs: food, shelter, and belonging. Since these are now widely available to members of industrial society, our organizations do not provide significantly unique opportunities to command the loyalty and commitment of our people. The ferment in management will continue until organizations begin to address the higher order needs: self-respect and self-actualization.

This is the quest we at Hanover have been on for almost twenty years now—to discover the guiding principles, design, and tools needed to build organizations more consistent with human nature.

PMS: How did you get interested in "learning organizations."

O'BRIEN: We weren't focused on organization learning initially. We set out to identify and eliminate the diseases that afflict hierarchical

organizations and make them inconsistent with the higher aspects of human nature.

All of this was based on certain beliefs about people, as are all forms of organization. If you believe that people are most concerned with getting along and putting together coalitions to wield power, that's a political environment. If you believe that once you're on top the secret is staying on top, that's a bureaucratic environment. If you believe, as we did, that there's an enormous reservoir of untapped potential in people that can be channeled more productively than it is, you try to build a value-based, vision-driven environment.

Now, I think that the human being has a deep drive to learning. So, as you create organizations that are more in line with human nature, you are building learning organizations. So, although we started in a different place, we ended up in the same place.

PMS: Why do you think that organizations more consistent with human nature are timely?

O'BRIEN: My personal view is that this has to do with the evolution of consciousness. Mankind's nature is to ascend to greater awareness of our place in the natural order—yet, everywhere we look we see society in a terrible mess of self-centeredness, greed, and nearsightedness. In modern society, business has the greatest potential to offer a different way of operating. The po

tential of business to contribute toward dealing with a broad range of society's problems is enormous. But we must show the way by example not by moralizing. We must learn how to harness the commitment of our people—then our commitment to building a better world will have some meaning.

Ed Simon

President and COO, Herman Miller

PMS: How does your interest in organizational learning relate to changes you see as important for Herman Miller?

SIMON: I believe that we must become a "vision-led" company. That means that our reference point, our anchor, is in the future. I see organizational learning as learning how to accept, embrace, and seek change.

Traditional organizations change by reacting to events. The reason for this, I think, is that the "reference points" for traditional organizations are external, outside ourselves. Usually these reference points are the way things were in the past. Sometimes, they include the way our competitors operate. Change means giving up these reference points. So, naturally, it is resisted.

To be vision-led means that our reference points are internal, the visions of the future we will create, not what we were in the past or what our competitors are doing. Only when it is vision-led, will an organization embrace change.

PMS: Why are more organizations not vision-led, oriented toward learning how to create what they want?

SIMON: I believe that human beings truly seek to live in a more creative orientation. But people don't realize the incredible extent to which traditional organizations are designed to keep people comfortable and to inhibit taking risks. The learning cycle is a continuous process of experimentation. You cannot experiment without taking risks. Despite rhetoric to the contrary, I believe most American businesses are engaged in building "no-risk" environments. Even when they break apart old functional bureaucracies, which clearly avoided risk taking, they create decentralized business units where managers stay in one position for two years. Clearly, their eye is on promotion and the only types of risks they will take are ones with a high probability of producing "success" during their tenure.

PMS: If we must give up some of the safety of a traditional organization, does that mean that a learning organization is in a constant state of turmoil?

SIMON: Our task is to find a new balance. Embracing change does not mean abandoning a core of values and precepts. We must balance our desire for continuity with our desire to be creative. We must learn how to not abandon that core, while simultaneously letting go of past ways of doing things. I think we have learned something about this at Herman Miller in our commitment to the creative process in research and design. Now that commitment to the creative process must be extended to the business as a whole. This requires a new paradigm, a new model of how organizations work—organizations that operate in a continual learning mode, creating change.

Ray Stata

President and CEO, Analog Devices, Inc.

PMS: HOW did you get interested in "organizational learning"?

STATA: Organizational learning as a concept is what emerged at the end of the process we've been going through. The starting point was back in the late '70s and early '80s, when it became increasingly clear that our company, as well as other companies in America, were coming under heavy pressure from Japan. I gradually became convinced that there was a crisis looming of enormous magnitude, a crisis that is still, in my estimation, looming, despite the progress we've made in recent years.

In response to this crisis, we began to get involved with the variety of improvement processes coming out of Japan. But, you quickly get lost with the "alphabet soup" of TQC, JIT, QFD, and all the consultants running around with today's newest acronym. Drawing on the thinking of Shell's Arie de Geus [another participant in the MIT research program], I began to see accelerating organizational learning as an integrating concept for a broad range of improvement tools and

methods. Most importantly, as I tried to illustrate in an article for Sloan Management Review, I began to see that the rate at which organizations learn may become the only sustainable source of competitive advantage, especially in knowledge-intensive businesses.'

PMS: What do you see as the central challenges in building learning organizations?

STATA: The "scientific management" revolution of Frederick Taylor took the traditional division of labor, between workers and managers, and gave us the "thinkers" and the "doers." The doers were basically prohibited from thinking. I believe our fundamental challenge is tapping the intellectual capacity of people at all levels, both as individuals and as groups. To truly engage everyone—that's the untapped potential in modern corporations. This leads me to the notion of an organization as a learning organism.

That is easy to say, but I believe there are significant insights that will be required to make it real. One of the questions that interests me deeply is, "What are the rules of the cognitive processes by which valid learning takes place?" I believe we can use the term organizational learning very loosely and it will end up having little meaning. It will become just another fad. PMS: How do you distinguish between valid learning and specious learning?

STATA: One of the fundamentals is that valid learning does not occur unless you continuously go back to reality. All knowledge is objective in the sense that there must be some correspondence to reality. That seems fairly obvious, but, as Ayn Rand observed, mankind tends to drift toward the primacy of consciousness and to the supremacy of thought, and it's only by discipline that you actually come to accept reality as a judge.

In response to this, the "pragmatists" of modern philosophy take the view that there is no point in worrying about general theory. You should do what works, and whatever works today may not work tomorrow. This view is strongly reinforced in contemporary management with its

emphasis on solving problems. It's so easy to just go from one problem to the next, "from pillar to post," without ever seeing a larger pattern. Pragmatism denies any ability of the human mind to synthesize, to see a bigger picture.

Pragmatism has become dominant, in part, because of the previous dominance of elaborate theoretical systems that had no real correspondence to reality. The nineteenth century was a great time for this; and the obvious failure of these great systems of thought like Marx's world system has been one of the justifications for pragmatism.

Interestingly, just as local workers have gotten stuck as the "doers" in traditional organizations, managers have gotten

stuck as "the thinkers." There is a tremendous tendency of people high in the organization to become remote from reality and the facts, to begin to hypothesize and conjecture without any formal grounding of their theories. The greatest manifestation of the fallacy of this dichotomy between the "thinkers" and the "doers" was the fad in the 60's to create strategic planning staffs separate from operational staffs. Once accepted, this further separated the world of thought from the world of reality.

I think, to some extent, we jump back and forth between these two extremes of over-conceptualization and pure pragmatism because we don't have the tools to connect them. The core challenge faced by the aspiring learning organization is to develop tools and processes for conceptualizing the big picture and testing ideas in practice. All in the organization must master the cycle of thinking, doing, evaluating, and reflecting. Without, there is no valid learning.

Crafting a larger story is one of the oldest domains of leadership. There is indeed a mythic quality about this type of leadership: "The real task of the knights [of the Round Table] now lies before them, wrote Heinrich Zimmer in his book about myth, *The King and the Corpse*. To Zimmer, Merlin was a master in the domain of the "purpose story," "first uniting

the knights in the circle of the Round Table, and then scattering them forth again on the paths of their several transformations." Though the knights travel their separate paths, they are "united in a common bond, and their paths, though predestined for each one of them alone, will meet, cross, and intertwine . . ."2

The purpose stories of the three leaders above each describes a context of deep issues that transcend the problems of any one organization, implies a sense of urgency that makes action imperative, and illuminates their own personal vision. For each, the story involves a new type of organization emerging that is "more consistent with human nature" (O'Brien), enables people to balance "the desire for continuity with the desire to be creative" (Simon), and integrates "conceptualizing the big picture and testing ideas in practice" (Stata).

But the stories are also incomplete. They are evolving as they are being told—in fact, they are as a result of being told. This is the reason that their visions have such special significance to such leaders; the vision is a vehicle for advancing the larger story.

In a learning organization, leaders may start by pursuing their own vision, but as they learn to listen carefully to others' visions they begin to see that their own personal vision is part of something larger. This does not diminish any leader's sense of responsibility for the vision—if anything it deepens it. "The willingness to abandon your paradigm," says Simon, "comes from your stewardship for the vision."

Being the steward of a vision shifts a leader's relationship toward her or his personal vision. It ceases to be a possession, as in "this is my vision," and becomes a calling. You are "its" as much as it is yours. George Bernard Shaw expressed the relationship succinctly when he said:

This is the true joy in life, the being used for a purpose recognized by yourself as a mighty one . . . the being a force of nature instead of a

feverish, selfish little clod of ailments and grievances complaining that the world will not devote itself to making you happy.³

Slightly different in tone and focus, but no less evocative, is the characterization of Lebanese poet Kahlil Gibran, who, in speaking of parents and children, captured the special sense of responsibility without possessiveness felt by leaders toward their vision:

Your children are not your children. They are the sons and daughters of life's longing for itself. They come through you, not from you. And though they are with you, they belong not to you. You may give them your love but not your thoughts, For they have their own thoughts. You may house their bodies but not their souls, For their souls dwell in the house of tomorrow, which you cannot

visit, not even in your dreams. You may strive to be like them, but strive not to make them like you.

For life goes not backward nor tarries with yesterday. You are the bows from which your children as living arrows are

sent forth. The archer sees the mark upon the path of the infinite, and

he

bends you with his might that the arrows may go swift and ^{far}.

Let your bending in the archer's hand be for gladness; For even as he loves the arrow that flies, so he loves the bow that is stable. *

LEADER AS TEACHER

The first responsibility of a leader," writes retired Herman Miller CEO Max de Pree, "is defining reality."⁵ While it is clear that leaders draw their inspiration and spiritual reserves from their sense of stewardship, much of the leverage leaders can actually exert lies in helping people

achieve more accurate, more insightful, and more empowering views of reality.

"Reality" as perceived by most people in most organizations means pressures that must be born, crises that must be reacted to, and limitations that must be accepted. Given such ways of defining reality, vision is an idle dream at best and a cynical delusion at worst — but not an achievable end. By contrast, for painters, composers, or sculptors, creating involves working within constraints—for example, the constraints imposed by their media. If one had but to snap one's fingers and the vision became reality, there would be no creative process. How, then, do leaders help people achieve a view of reality, such as the artist's, as a medium for creating rather than as a source of limitation? This is the task of the "leader as teacher."

Building on the hierarchy of explanation first introduced in Chapter 3, leaders can influence people to view reality at four distinct levels: events, patterns of behavior, systemic structures, and a "purpose story." The key question becomes where predominantly do they focus their and their organisation's attention?

By and large, leaders of our current institutions focus their attention on events and patterns of behavior—and, under their influence, their organizations do likewise. That is why contemporary organizations are predominantly reactive, or at best responsive—rarely generative.

On the other hand, leaders in learning organizations pay attention to all four levels, but focus predominantly on purpose and systemic structure. Moreover, they "teach" people throughout the organization to do likewise.

Systemic structure is the domain of systems thinking and mental models. At this level, leaders are continually helping people see the big picture: how different parts of the organization interact, how different situations parallel one another because of common underlying structures, how local actions have longer-term and broader impacts

than local actors often realize, and why certain operating policies are needed for the system as a whole. But, despite its importance, the level of systemic structure is not enough. By itself, it lacks a sense of purpose. It deals with the how, not the why.

By focusing on the "purpose story"—the larger explanation of why the organization exists and where it is trying to head—leaders add an additional dimension of meaning. They provide what philosophy calls a "teleological explanation" (from the Greek *telos*, meaning "end" or "purpose")—an understanding of what we are trying to become. When people throughout an organization come to share in a larger sense of purpose, they are united in a common destiny. They have a sense of continuity and identity not achievable in any other way.

Leaders talented at integrating story and systemic structure are rare in my experience. Undoubtedly, this is one of the main reasons that learning organizations are still rare.

One person who had the gift was Bill Gore, the founder and longtime CEO of W. L. Gore and Associates (makers of Gore-tex and other synthetic fiber products). Bill Gore was not an especially charismatic speaker. But he was adept at a particular story-telling art: stories that integrated the organization's core values and purpose and its operating policies and structures. Bill was very proud of his highly egalitarian organization, in which there were (and are still) no "employees," only "associates," all of whom own shares in the company and participate in its management. At one talk, he explained the company's policy of controlled growth:

Our limitation is not financial resources. Our limitation is the rate at which we can bring in new associates. Our experience has been that if we try to bring in more than 25% per year increase, we begin to bog down. 25% per year growth is a real limitation; you can do much better than that with an authoritarian organization. However, one of the associates, Esther Baum, went home to her husband and reported the

limitation to him. Well, Professor Baum was an astronomer and a mathematician; he worked at Lowell Observatory, and he said, "That is indeed a very interesting figure." He took out a pencil and paper and calculated and said, "Do you realize that in only 571/2 years, everyone in the world will be working for Gore?"⁶

Through this simple story, Gore explains the rationale behind a key policy, limited growth rate, a policy that undoubtedly caused a lot of stress in the organization. He reaffirms the organization's commitment to creating a unique environment for its "associates" and

illustrates the types of sacrifices that the firm is prepared to make in order to remain true to its vision: "You can do much better [in growth rate] than that with an authoritarian organization." (Recall that one of the failings of People Express was the very absence of policies that controlled growth to a rate commensurate with assimilating new people into its innovative work system.) The last part of the story shows that, despite the self-imposed limit, the company is still very much a "growth company," another aspect of its vision.

Unfortunately, much more common are leaders who have a sense of purpose and genuine vision but little ability to foster systemic understanding. Many great "charismatic" leaders, despite having a deep sense of purpose and vision, manage almost exclusively at the level of events. Such leaders deal in visions and crises, and little in between. They foster a lofty sense of purpose and mission. They create tremendous energy and enthusiasm. But, under their leadership, an organization caroms from crisis to crisis. Eventually, the world view of people in the organization becomes dominated by events and reactivity. People experience being jerked continually from one crisis to another; they have no control over their time, let alone their destiny. Eventually, this will breed deep cynicism about the vision, and about visions in general. The soil within which a vision must take root—the belief that we can influence our future— becomes poisoned.

Such "visionary crisis managers" often become tragic figures. Their tragedy stems from the depth and genuineness of their vision. They often are truly committed to noble aspirations. But noble aspirations are not enough to overcome systemic forces contrary to the vision. As the ecologists say, "Nature bats last." Systemic forces will win out over the most noble vision if we do not learn how to recognize, work with, and gently mold those forces.

Similar problems arise with the "visionary strategist," the leader with a sense of vision who operates at the levels of patterns of change as well as events. This leader is better prepared to manage change, but still teaches people only to see trends not underlying structures. He imparts a responsive orientation, not a generative orientation. Ironically, leaders with a sense of vision and an understanding of major business trends are often held out as models of effective leadership. This is because they are so much more effective than leaders with no vision whatsoever, or leaders who deal only with vision and events.

But leaders of learning organizations must do more than just for

mulate strategies to exploit emerging trends. They must be able to help people understand the systemic forces that shape change. It is

not enough to intuitively grasp these forces. Many "visionary strategists" have rich intuitions about the causes of change, intuitions that they cannot explain. They end up being authoritarian leaders, imposing their strategies and policies or continually intervening in decisions. They fall into this fate even if their values are contrary to authoritarian leadership—because only they see the decisions that need to be made. Leaders in learning organizations have the ability to conceptualize their strategic insights so that they become public knowledge, open to challenge and further improvement.

"Leader as teacher" is not about "teaching" people how to achieve their vision. It is about fostering learning, for everyone. Such leaders help people throughout the organization develop systemic understandings.

Accepting this responsibility is the antidote to one of the most common downfalls of otherwise gifted leaders— losing their commitment to the truth.

When Lyndon Johnson first became President, his "Great Society" inspired full-hearted support throughout the country, despite the tragedy which brought him into office. Johnson was a master enroller, with the patience to take Congress through his proposed legislation one bill at a time, with stunning results; out of ninety-one proposals, Congress only rejected two. His enrollment of the public was no less stunning: "His goals had been the country's goals," wrote historian William Manchester. But the results of Johnson's leadership eventually proved disappointing, in part, because Johnson could not keep his commitment to the truth. When he was told that the United States could not afford the Great Society and the Vietnam War at the same time, he began systematically lying about the costs of the war. "If I [tell Congress] about the cost of the war," he told his advisers, according to Manchester, "old [Senator] Wilbur Mills will sit down there and he'll thank me kindly and send me back my Great Society." Gradually Johnson began to isolate himself from criticism, even from his advisers; soon, many of the members of his Cabinet resigned. Eventually, Johnson's chain of lies found its way to public attention and became the "credibility gap"—so christened by the New York Herald Tribune in 1965. His leadership was effectively over—to the point where he could not run for reelection in 1968.⁷

History, mythology, and business lore abound with examples, from Oedipus to present times, of leaders who fail because they lack commitment to the truth.

As my colleague, organization consultant Bryan Smith puts it, "I have met many leaders who have been destroyed by their vision." This happens, almost always, because the leaders lose their capacity to see current reality. They collude in their and their organization's desire to assuage uneasiness and avoid uncertainty by pretending everything is

going fine. They become speech makers rather than leaders. They become "true believers" rather than learners.

CREATIVE TENSION

Leaders who are designers, stewards, and teachers come to see their core task very simply. "Just as Socrates felt that it was necessary to create a tension in the mind," said Martin Luther King, Jr., "so that individuals could rise from the bondage of myths and half truths . . . so must we . . . create the kind of tension in society that will help men rise from the dark depths of prejudice and racism."⁸ The tension of which King spoke is the creative tension of personal mastery. This tension is generated by holding a vision and concurrently telling the truth about current reality relative to that vision—"to dramatize the issue so that it can no longer be ignored," as King put it.

The leader's creative tension is not anxiety: that is psychological tension. A leader's story, sense of purpose, values and vision establish the direction and target. His relentless commitment to the truth and to inquiry into the forces underlying current reality continually highlight the gaps between reality and the vision. Leaders generate and manage this creative tension—not just in themselves but in an entire organization. This is how they energize an organization. That is their basic job. That is why they exist.

Mastering creative tension throughout an organization leads to a profoundly different view of reality. People literally start to see more and more aspects of reality as something they, collectively, can influence. This is no hollow "belief," which people say in an effort to convince themselves that they are powerful. It is a quiet realization, rooted in understanding that all aspects of current reality—the events, the patterns of change, and even the systemic structures themselves—are subject to being influenced through creative tension. This shift of view, or metanoia, was expressed beautifully by the Hebrew existentialist philosopher Martin Buber:⁹

Our thinking of today has established a more tenacious and oppressive belief in fate than has ever before existed. No matter how

much is said about the laws we hold to be true of life ... at the basis of them all lies possession by process, that is by unlimited causality. But the dogma of process leaves no room for freedom, whose calm strength changes the face of the earth. This dogma does not know the man who surmounts the universal struggle, tears to pieces the web of habitual instincts, and stirs, rejuvenates and transforms the stable structures of history.

The only thing that can become fate for man is belief in fate. The free man is he who wills without arbitrary self-will. He believes in destiny, and believes that it stands in need of him. It does not keep him in leading strings, it awaits him, he must go to it, yet does not know where it is to be found. But he knows that he must go out with his whole being. The matter will not turn out according to his decision; but what is to come will come only when he decides on what he is able to will. He must sacrifice his puny, unfree will, that is controlled by things and instincts, to his grand will, which quits defined for destined being.

Then, he intervenes no more, but at the same time he does not let things merely happen. He listens to what is emerging from himself, to the course of being in the world; not in order to be supported by it but to bring it to reality as it desires.

HOW CAN SUCH LEADERS BE DEVELOPED?

In February 1990, when President De Klerk of South Africa announced the lifting of bans on black political groups and the freeing of political prisoners, I was in the country as part of an initiative to foster a cadre of black and white leaders capable of building learning organizations and learning communities. With the impending release of Nelson Mandela (which came one week later), we shared the following statement from Corazon Aquino of the Philippines. When her husband, Benigno Aquino, left prison, she said:

It seemed clear to those who knew him that much had changed in him. The superb political animal—shrewd, fast, eloquent, and brave—who had placed his immense talents in the service of the Republic in the hope of public honors had evolved into a man for whom love of country was only the other face of his love for God. And I think this is the truest and best kind of patriotism. It is only

on this plane that patriotism ceases to be, as they say, the refuge of scoundrels and becomes, instead, the obligation of a Christian . . .

We cannot, of course, just place an order for such men and women to be or to lead the opposition. Such people are not made to order. They make themselves that way.

If you share, therefore, my growing conviction that it is only by such people that the changes we want will be brought about, then you must also share the conclusion I have come to: the changes will come and victory will be attained—a victory that will mean more than a change of faces—only when there are enough of us who have become like that.¹⁰

One of the most striking aspects of this statement is that "such people are not made to order. They make themselves that way." Most of the outstanding leaders I have worked with are neither tall nor especially handsome; they are often mediocre public speakers; they do not stand out in a crowd; and they do not mesmerize an attending audience with their brilliance or eloquence. Rather, what distinguishes them is the clarity and persuasiveness of their ideas, the depth of their commitment, and their openness to continually learning more. They do not "have the answer." But they do instill confidence in those around them that, together, "we can learn whatever we need to learn in order to achieve the results we truly desire."

The ability of such people to be natural leaders, as near as I can tell, is the by-product of a lifetime of effort—effort to develop conceptual and communication skills, to reflect on personal values and to align personal behavior with values, to learn how to listen and to appreciate

others and others' ideas. In the absence of such effort, personal charisma is style without substance. It leaves those affected less able to think for themselves and less able to make wise choices. It can devastate an organization or a society.

That is why the five learning disciplines developed in Parts II and III are so important to those who would lead. They provide a framework for focusing the effort to develop the capacity to lead. Systems thinking, personal mastery, mental models, building shared vision, and team learning—these might just as well be called the leadership disciplines as the learning disciplines. Those who excel in these areas will be the natural leaders of learning organizations.

In our own work to help people develop their leadership capacities, we stress the "individual disciplines" of systems thinking,

working with mental and personal mastery. These disciplines span

the range of conceptual, interpersonal, and creative capacities vital to leadership. But most of all, they underscore the deeply personal nature of leadership. It is impossible to reduce natural leadership to a set of skills or competencies. Ultimately, people follow people who believe in something and have the abilities to achieve results in the service of those beliefs. Or, to put it another way, who are the natural leaders of learning organizations? They are the learners.

TIME TO CHOOSE

One of the paradoxes of leadership in learning organizations is that it is both collective and highly individual. Although the responsibilities of leadership are diffused among men and women throughout the organization, the responsibilities come only as a result of individual choice.

Choice is different from desire. Try an experiment. Say, "I want." Now, say, "I choose." What is the difference? For most people, "I want" is passive; "I choose" is active. For most, wanting is a state of deficiency

—we want what we do not have. Choosing is a state of sufficiency—electing to have what we truly want. For most of us, as we look back over our life, we can see that certain choices we made played a pivotal role in how our life developed. So, too, will the choices we make in the future be pivotal.

The choice to be part of a learning organization is no different. Whether it is an "organization" of three or three thousand matters not. Only through choice does an individual come to be the steward of a larger vision. Only through choice does an individual come to practice the learning disciplines. Being in a supportive environment can help, but it does not obviate the need for choice. Learning organizations can be built only by individuals who put their life spirit into the task. It is our choices that focus that spirit.

It is not the purpose of this book to convince people that they should choose to build learning organizations. Rather, I have tried to paint the picture of what such an organization would be like and how it might be built—so that people can see the choice that exists. The choice, as is always the case, is yours.

P A R T V

Coda