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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 aero dynamically. 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 take-off 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.

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 *dialogos* 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." AH 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 turnaround a firm's fortunes. Without systems thinking, the seed of vision falls on harsh soil. If non-systemic 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 is 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 very 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 was 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 no-systemic 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 systemically 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 system wide 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 everyone 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



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

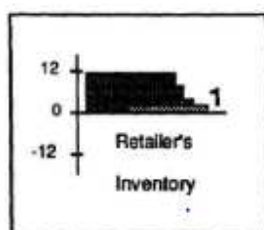
is having a party. But to replace those extra cases, you raise your order to eight. That will bring your inventory back to normal.

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.

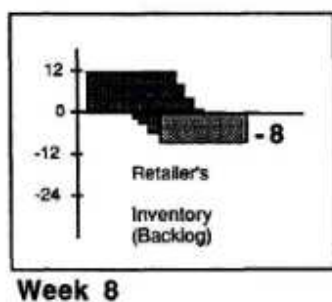
Week 5: Your one case sells out Monday morning. Fortunately, you receive a shipment for seven more cases of Lover's (apparently your wholesaler is starting to respond to your higher orders). But all are sold by the end of the week, leaving you with absolutely zero inventory. Glumly, you stare at the 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: 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.

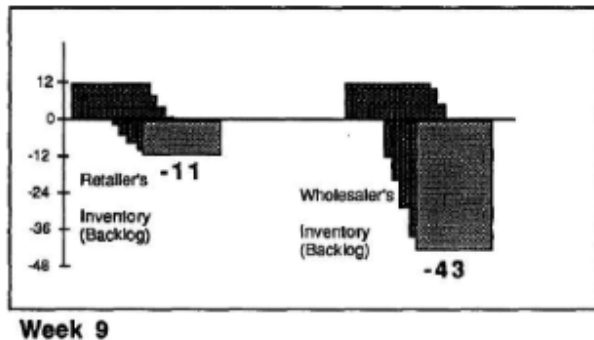
By Week 8, you had become almost as frustrated and angry as your retailers. Lover's Beer had always been a reliably steady brand. But a few weeks ago—in Week 4, actually—those orders had abruptly started rising sharply. The next week, orders from retailers had risen still further. By Week 8, most stores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



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 truck-loads 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.

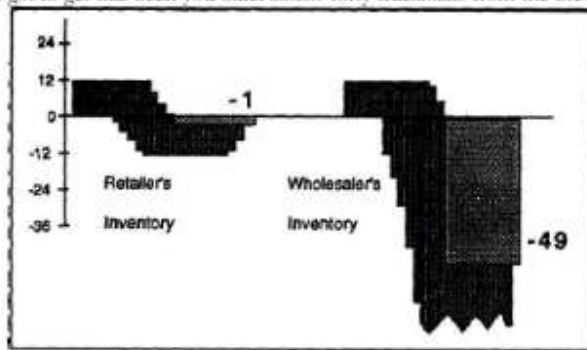
Week 10 is infuriating. The extra beer you were expecting — at least twenty truckloads' worth — doesn't show. The brewery simply couldn't ramp up production that fast. Or so you guess. They only send you eight truckloads. It's impossible to reach anybody on the phone down there — they're apparently all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

You've got to get that beer: you order *another* forty truckloads from the brewery.



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.

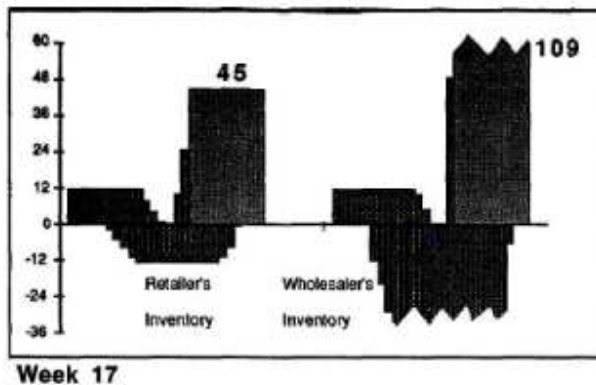
You finally start receiving larger shipments from the brewery in Weeks 14 and 15. At the same time, orders from your stores drop off a bit. Maybe in the previous weeks, you figure, they over ordered a bit. At this point, anything that helps work off your backlog is a welcome reprieve.

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.



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.

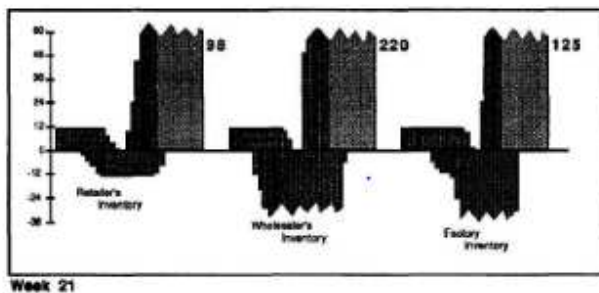
Because breweries get backlogs too. It takes (in your brewery, at least) two weeks from the time you decide to brew a bottle of beer until the moment when that beer is ready for shipment. Admittedly, you kept a few weeks' worth of beer in your warehouse, but those stocks were exhausted by Week 7, only 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.

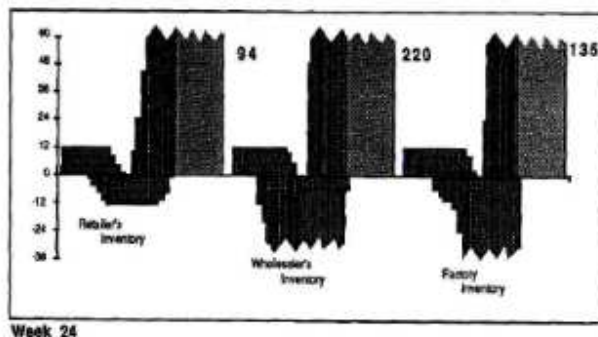
Finally, you had caught up with the backlog in Week 16. But the next week, your distributors had asked for only nineteen gross. And last week, Week 18, they had not asked for any more beer at all. Some of the order slips actually had orders crossed out on them.

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"—



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 anymore."

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 over ordering. 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 over-adjustments, 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 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."⁸

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

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."¹⁰

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, tenor 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 order speaking 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.¹³

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 non-systemic 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.

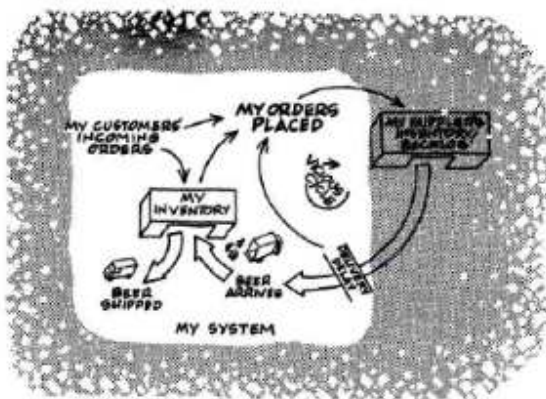
Backlogs persist because the players make no effort to correct them—because the "no strategy" strategy precludes placing the orders in excess of orders received needed to correct backlogs.

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!¹⁶ 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



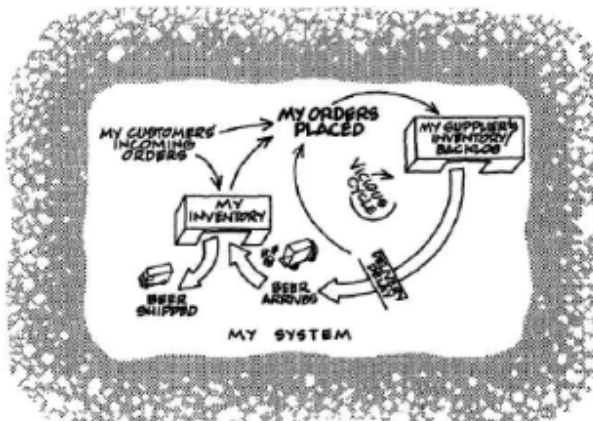
Given this picture of the situation, if you need beer it makes sense to place more orders. If your beer doesn't arrive when expected, you place still more orders. Given this picture of the situation, your job is to "manage your position," reacting to changes in the "external inputs" of incoming orders,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

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.¹⁹

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.²⁰

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."