We invite the reader to accompany us on a visit to the highly regarded Big City Hospital, a 500-bed acute care facility located in a major metropolitan area.

This hospital has a reputation as an innovator in making high-end medical technology available to both surgical and medical patients, is designated as a magnet hospital helping to attract dedicated and highly skilled nurses, and was most recently acknowledged as one of the top 100 hospitals in the nation by a well known business publication.

While not immune from its share of concerns with organized labor, shrinking reimbursement and the difficulties of keeping up with increasing demand for services in a campus that has not expanded since 1977, the board, the administration and the staff of Big City Hospital has been generally content with their ability to provide health services to their community.

Two years ago, the CEO of Big City Hospital was informed of an incident that called into question many of the assumptions held about the quality of care provided by the hospital. A patient had been admitted for a routine surgery involving a total replacement of the left hip. Unfortunately, only after the original hip joint had been removed did the surgical team discover that they had operated on the healthy right hip.

The medical malpractice action brought against the surgeon, affiliated physicians and the hospital, coupled with the news reports in the local paper detailing the pain and suffering of the patient, brought the board of directors to call for a retrospective chart audit to determine if there had been any other errors that had occurred but had not been reported and the seriousness of those errors.

A team of investigators pored over the records of almost 10,000 patient admissions over a three-year period. What they discovered proved to be almost too shocking to be true. Of the 10,000 admissions, the researchers estimated at least one adverse event had occurred for nearly one out of 10 of their patients!
Unfortunately, the results of the follow-up were discouraging. Despite the investment in training and education, adoption of best practices in critical areas, reporting of near misses and a commitment by all employees and clinical staff to high quality clinical care, there were no significant improvements in any of the key areas targeted for improvement.

Rates of medication error, incorrect tests and procedures, missed diagnoses, and even wrong-site surgery had not declined. Literally hundreds of thousands of dollars in personnel time alone had been invested in research, meetings, staff travel, training and systems changes with little or nothing to show in return. At the same time, pressure continued to grow from patients, their families, the community and the board to find an answer, fix the problems and quickly implement needed changes.

While this particular story is fictional, it is nevertheless a highly plausible organizational scenario. Indeed, the sort of systemic problems described not only continue to occur at hospitals around the world but are endemic to organizations and clusters of organizations in general.

However, rather than default to the standard practice of blaming staff members for their incompetent behavior or throwing money at highly paid consultants who do nothing more than recommend implementing the latest management “flavor of the month,” we propose a radically different strategy.

Seeing systems

One of the more common phrases used in the health care industry these days is that of a “health care system.” For most of us, this implies a collection of physicians, nurses, technicians, public and private delivery organizations, payers, regulators, suppliers and others who are somehow organized into a coherent whole that is there to take care of patients.

For most of us, our focus is on one part of the system, the other parts being largely invisible to us. We have little or no knowledge of what is going on in the rest of the system. In particular, we do not see our potential role in contributing to and helping to sustain the very conditions we deplore.

This results in an unintended, but very real inability to see the whole system, what Barry Oshry aptly terms “the dance of blind reflex.” Yet for persons caught in such dances, there are perfectly reasonable and straightforward (linear) explanations for the system as they see it. Figure 1 illustrates two such explanations presupposed by Big City Hospital’s “problem solving processes.”

Note that in both instances, explanations of human behaviors are linear, arranged in a line. The inevitable result of such explanations is blame. From this tempting and pervasive way of framing problems from the outset, we seek to identify “causes” for the failures in a system from a host of perfectly reasonable candidates—e.g., errors made by individual workers, inadequate numbers of staff and poor technology.

Rather than trying to solve problems within systems, we first explore the very real possibility that the system itself is the problem. In such cases, trying to solve problems
within systems is not merely an exercise in futility but can end up making matters even worse.

**A model and the method**

To get a visceral understanding of a “dance of blind reflex,” consider Figure 2. This describes an organizational system made up of several levels where information passes through the system.

Start with any box. When you move forward, say “therefore” and when you move backward, say “because.” Move both forward and backward until you have circled through all the loops in this system. At this point, you can almost literally “feel” how information favored by the system serves to support, sustain and promote the system whereas unfavorable information has much more difficulty coming up let alone surviving.

Also note how irrelevant “blame” becomes. For what this model literally illustrates is how good people find good reasons to behave as they do within such a context. Indeed, this is what such contexts do: they provide reasons for some kinds of behaviors and not others.

Please take the time to work through Figure 2 now. Otherwise you will probably fail to comprehend the core arguments presented in this article.

Now, suppose that you confront various individuals in the system with evidence of information...
Participants’ Responses to Investigative Questions

<table>
<thead>
<tr>
<th>Person in System (Figure 1)</th>
<th>Questions Addressed to Person</th>
<th>Answer to Question from Person Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Level Manager</td>
<td>Why didn’t you consider the unfavorable information your staff produced?</td>
<td>I’m not familiar with the information that you are talking about. I can assure you that my decisions were based on the best information available to me.</td>
</tr>
<tr>
<td>Mid-Level Manager</td>
<td>Why didn’t you pass the unfavorable information up to your superiors?</td>
<td>I can’t pass everything up to them. Based on the information available to me, it seems appropriate to have this information reevaluated and checked over.</td>
</tr>
<tr>
<td>Project Professional</td>
<td>Why wasn’t the unfavorable information checked out and sent back up to your superiors?</td>
<td>That wasn’t my job. I had other tasks to do and deadlines to meet.</td>
</tr>
<tr>
<td>“Troublemaker”</td>
<td>Why didn’t you follow up on the information that you presented?</td>
<td>I only worked on part of the project. I don’t know how my particular information was used after I turned it in. I did my job. Even if I had all the information, which I didn’t, there was no way that I could stop this project.</td>
</tr>
<tr>
<td>Higher Level Manager</td>
<td>Why was the source of unfavorable information (the troublemaker) removed from the project?</td>
<td>I hardly know the person. A lot of people have worked on this project. I must, of course, make decisions to keep this organization running, but there has been no “plot” to suppress people! On the contrary, my decisions have been objectively based on the available information and the recommendations of my staff.</td>
</tr>
<tr>
<td>Mid-Level Manager</td>
<td>Why was the source of unfavorable information removed from the project?</td>
<td>I don’t like your implications! I’ve got tasks to complete and deadlines to meet with limited resources. I can’t let everybody do “their own thing,” we’d never finish anything. I base my recommendations and assignments on the best available information!</td>
</tr>
<tr>
<td>Project Professional</td>
<td>Why was the source of unfavorable information removed from the project?</td>
<td>I’m not sure about the details because I don’t work with him. I guess that it had something to do with a reorganization or a new assignment. He is a bright person, somewhat of an eccentric, but I’ve got nothing personal against him.</td>
</tr>
<tr>
<td>“Troublemaker”</td>
<td>Why were you removed from the project?</td>
<td>My assignment was completed and I was assigned to another project. I don’t think that anybody was deliberately out to get me. My new job is less of a hassle.</td>
</tr>
</tbody>
</table>
distortions. Study the answers given in Table 1 and then ask yourself, wouldn’t you—or we—give the same answers?

Indeed, can’t we assume that all the individuals involved are hard working, well-intended and honest and still get the same results, the same radical disjunctions between “Micromotives and Macrobehavior”? In such systems, blame games—linear causality and reduction to individual causes—are exercises in futility.

(Linear causality and reductionism go hand in hand, for once you admit to more complex interactions than discrete events ordered in time, you get “patterns of interactions” which cannot be fully understood by reducing things to their ultimate, indivisible parts.)

Obviously information can also be distorted through the willful intentions of individuals. But such intentions are not necessary to generate such distortions. Information distortion can also emerge as a systemic problem that cannot be reduced to the intentions of individuals.

But just how common are such systemic distortions of information?

In fact, the above model has an interesting history. Figure 2 and Table 1 were first developed in the late 1970s to explain the experiences of professionals involved in the assessment of environmental impacts. Their experience led to frustration because information was continually distorted in ways favorable to the organizations producing it. Cynicism became an occupational hazard, particularly for those most competent and concerned.

The model of systemic distortions of information was developed in response to their stories of frustration. In the ensuing years, this model has been peer reviewed and validated by practitioners from a sufficiently wide range of disciplines that it probably qualifies for the status of a “systems archetype.”

For example, after the space shuttle explosion in 1986, copies of Figure 2 and Table 1 were sent to physicist and Nobel Laureate, the late Richard Feynman, who served on the commission investigating the shuttle Challenger disaster. Feynman wrote back: “I read the Table [1] and am amazed at the perfect prediction of the answers given at the public hearings. I didn’t know that anybody understood these things so well and I hadn’t realized that NASA was an example of a widespread phenomena [sic].”

Ironically, the method for revealing such contextual complexities is disarmingly simple. Figure 2, for example, is based on two common sense presumptions: all enduring behaviors must have reasons (as shown by the incoming arrow) and all enduring behaviors must have consequences (as shown by the outgoing arrows). Note, however, that where you can observe behaviors and their consequences, you must discover reasons by asking people “Why?” they are doing what they are doing.

Perhaps it is also common sense that if every behavior has a reason(s), sooner or later you are going to uncover feedback loops and that many of these loops settle into self-maintaining patterns. Combined, reasons and self-maintaining patterns of feedback loops can be viewed as meaningful social networks.

Put in terms of the emerging science of networks, this method’s combination of behaviors and reasons fuses external (read “objective”) and internal (read “subjective”) dynamical networks.

In addition to listening to people’s reasons for behaving as they do, it is also critical to listen to more than a select few. This serves to ensure that the reasons given don’t merely reduce to individual perceptions or other individual differences. Instead, they are reasons any normal, well-intended, and competent person would be likely to offer in this context.

It is also critical to listen to people from different organizational roles to ensure that the model doesn’t end up merely reflecting the construct of a particular role. For example, in too many cases there is a disconnect between the way that senior management believes a system is operating and the way that frontline workers understand the system.

(For instance, think about the ubiquitous phrase, “open door policy.” While senior managers believe that they are open to both workers and clients, providing them with critical and unfiltered feedback, the reality is that the exact opposite is often the case. Watch the body language from co-workers the next time you hear that particular phrase.)

So, you must validate the model with workers and senior management as well as other roles involved. What, then, might we discover were we to involve health care providers in applying this method where they actually work?

Testing the method

The authors conducted meetings with four groups of nurses and a group of emergency department physicians over a one-month period. Groups were further subdivided into teams of no more than three people.

In each case, the nurses and physicians were given a brief introduction to sketching systems along with the heuristic that boxes within the system must be connected by arrows that are read forward as “therefore” and backward as “because.” All the groups were given a common system to start with in order to practice the discipline of sketching.

The diagram was critiqued to assure that there was internal consistency and that the sketch
accordately described the system. Once that was accomplished (typically in no more than 15 minutes), teams were asked to identify a problem common in their workplace.

In order to keep the diagram from becoming overly complex, groups were limited to around 10 boxes on a single sketch—a useful heuristic that has been validated over the years. After approximately 30 minutes, each team presented their sketch to the other teams who were asked if the diagram made sense and to point out any inconsistencies.

In every case, the participants noted that their sketches and those of other teams, allowed them to see and understand the system in ways that had not previously been available. And they all agreed that this new understanding was of considerable value.

**Application to medical errors**

Returning to our fictional example of Big City Hospital, we now offer a systemic explana-
### Table 2

**Reasoning of Participants within the Context Sketched In Figure 3 During the Investigation of the Wrong Site Hip Replacement**

<table>
<thead>
<tr>
<th>Person in the system</th>
<th>Question</th>
<th>Assumed answer to question</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chief executive officer</strong></td>
<td>Have you taken measures to address the problems, such as the wrong site hip surgery at the hospital?</td>
<td>Yes! We have responded to problems and have developed extensive administrative procedures. Based upon the information available to me, these problems have been addressed.</td>
</tr>
<tr>
<td><strong>Surgery department manager</strong></td>
<td>Why didn’t you question the decision to operate on the wrong hip?</td>
<td>My job is to make sure the ORs are scheduled and properly staffed and cleaned. I have no responsibility for surgical decisions.</td>
</tr>
<tr>
<td><strong>Scrub nurse</strong></td>
<td>Why didn’t you question the decision to operate on the wrong hip?</td>
<td>I assumed that everyone else had checked and besides, the surgeon is ultimately in charge. Besides, I was working a double shift that day and I had to check up on housekeeping since they were also understaffed that day.</td>
</tr>
<tr>
<td><strong>Orthopedic surgeon</strong></td>
<td>Why did you not check the chart records and the X-rays to verify that you were operating on the correct hip?</td>
<td>I was called in at the last moment when the scheduled surgeon became ill. This was my third surgery of the day. I was beat!</td>
</tr>
<tr>
<td><strong>Director of quality assurance</strong></td>
<td>Have you taken measures to address the problems, such as the wrong site hip surgery at the hospital?</td>
<td>Based on the information available to me we are doing an outstanding job through established administrative procedures.</td>
</tr>
<tr>
<td><strong>Public affairs manager</strong></td>
<td>Is there anyone in this hospital who takes the time to listen to workers at all levels?</td>
<td>We have well-established counseling programs for staff who have problems.</td>
</tr>
<tr>
<td><strong>Anesthesiologist</strong></td>
<td>Why didn’t you question the decision to operate on the wrong hip?</td>
<td>I assumed that everyone else had checked and besides, the surgeon is ultimately in charge. Besides my job is just to make sure the patient is sleeping and vital signs are stable.</td>
</tr>
<tr>
<td><strong>Medical director</strong></td>
<td>How do you explain the problems that have occurred at Big City Hospital?</td>
<td>Unfortunately, there have been some people who have cut corners, don’t take time to think and don’t check up on one another. We have taken administrative procedures to address these problems.</td>
</tr>
<tr>
<td><strong>Nursing union representa- tive</strong></td>
<td>Why had you not taken your concerns and those of staff nurses directly to superiors in the hospital?</td>
<td>Staff shortages, poor morale, and uncaring management make any complaint or concern seem like whining. What’s the use?</td>
</tr>
<tr>
<td><strong>OR scheduling office</strong></td>
<td>Why do you appear so overwhelmed with paperwork?</td>
<td>We are absolutely overloaded with paperwork. I wish the people who develop these new forms would listen to us before shoving them down our throat.</td>
</tr>
</tbody>
</table>
tion in order to understand what was going wrong. After working through the various loops in Figure 3, do you find this explanation as plausible and as revealing as did the actual health care providers at their place of work in the immediately preceding example?

Note that in this case, medical errors do not occur because of bad or poorly trained employees but because of underinvestment in the human and technological resources of the organization.

Thus, another plausible addition to the loops in Figure 3 would be to acknowledge that medicine is imperfect and that in spite of all the policies and procedures, in-service trainings and self-regulation, mistakes can and do occur. More generally, in organizations characterized by such “interactive complexity,” normal accidents happen.5

Questions and answers are provided in Table 2. As you read them, ask yourself (again), do their answers strike you as the same answers you would be likely to offer were you in their situation?

After all, it has been nearly 40 years since Karl Weick observed that, “Most managers get into trouble because they forget to think in circles” and that “If you become obsessed with interdependence and causal loops, then lots of issues take on a new look.”6

What interferes with our ability to make sense of systems? It may be useful to cluster obstacles to seeing systems into “how-to,” “want-to,” and “able-to” dimensions.7

Probably the most powerful explanation for the causal chain’s historical dominance is deductive logic that is above all, a rigorous chain of reasoning. Indeed, it is hard to overestimate its historical influence.
For example, since any chain has a first link, there must be a first premise, a first cause, an unmoved mover, a rational actor. Moreover, thinking in circles is made still more difficult since “language commonly stresses only one side of any interaction” and since nouns—“entities with attributes”—are what is really “real.”

Another strand of this how-to dimension might be considered almost childish. You don’t really need a computer to numerically approximate sets of non-linear differential equations when you can sketch pictures or trace out, for example, the dynamics of self-fulfilling prophecies, or of escalation, or of systemic distortions of information.

More generally, the sheer efficiency and effectiveness of, for example, Visual Explanations should disabuse anyone who continues to hold that drawing a picture is only for children and primitive peoples. It should therefore come as no surprise that grades K through 12 imprint the “chain” in our brains by breaking things down into parts with respect to both analytical methods and curricular content and then either explicitly drilling us in causal chain thinking or merely adding things up.

Unfortunately, how-to obstacles pale by comparison to wanting-to obstacles. Peter Senge perhaps puts it best when he notes that “systems thinking is especially prone to evoking defensiveness because of its central message, that our actions create our reality.”

And yet it is only at the very end of Barry Oshry’s acclaimed Seeing Systems that we learn that “people do not appreciate the possibility that they have been wrong. This is a very big deal. You must see that!” For it turns out, that “people are emotional beings” who “have investments in preserving the past and the present.”

Robert Ornstein succinctly states the larger point: “What matters is that emotions...set our agenda. And they do so largely without our being aware of them. Far from being disorganizing, they are the focal point of the mental system’s activity: They govern our choices, they determine our goals, and they guide our lives. We are, for the most part, in most of life their servants, and we are usually not conscious of them.”

Unfortunately, we remain largely illiterate with respect to the significances of emotions, both those emotions that interfere with clear thinking and those emotions that drive clear thinking.

But perhaps the scholar who has devoted the most attention to “defensive reasoning”—those emotions that kick in either when others are looking at us with blame in their eyes or when we sense that we are part of the problem—is Chris Argyris. At the individual level, we revert to defensive reasoning when we feel embarrassed, threatened, incompetent or under critical scrutiny. We then seek to shift the blame elsewhere and we hide from ourselves the fact that we are defending ourselves.

However, this phenomenon does not merely occur at the individual level. Argyris also underscores the significance of “organizational defensive routines” that prevent individuals in organizations from being able to engage in the “double-loop learning” necessary for seeing systems, a type of learning that is increasingly significant in today’s increasingly complex world for businesses in general, including health care management.

Organizational defensive routines parallel individual defensive reasoning in two instructive ways.

First, blaming others takes the organizational form of assigning primary responsibility to management. The realities of chains of command are reinforced, in turn, by what Argyris identifies as the nearly exclusive use of “extrinsic” motivation. Combined, top-down command-and-control management plus carrot-and-stick motivators reinforce causal chains with a vengeance.

Second, the organization hides from itself, so to speak, the fact that it is defending itself, for causal chains are embedded in accounting metrics, in decision-making processes, in office designs, in social and professional hierarchies (e.g., physicians and nurses), and in argumentation characterized by advocacy rather than inquiry.

The net result of such able-to obstacles to seeing systems is that they themselves become self-fulfilling prophecies. Ironically, the system itself blinds us to the system itself; the context itself defends itself from being recognized as problematic.

Given this state of affairs, probably the single most important strategy for surviving, let alone thriving, is listening. To illustrate the power of “seeking first to understand,” consider what might be termed a “hierarchy of awareness.”

These levels of awareness were formulated by the late Wilfred Cantwell Smith, a professor of the history of religion at Harvard University, and culminate in what he termed the ideal type for the “humane sciences.” We find them highly provocative.

Note what becomes possible as individuals, groups, organizations and nations move from one level to the next. And note that the highest level of awareness reflects what becomes possible when you systematically engage in the method we have presented.

Talking about it.
Talking about them.
We are talking about them.
We are talking about you.
We are talking with you.
We are all talking about us.
The case of Big City Hospital is clearly hypothetical and is not intended as a pejorative reflection on any real health care organization. However, the broad issues and concerns that make understanding systems so vexing should be a concern to all of us.

Caring for the health of those in our communities is far too important a task. It is unacceptable to continue hoping that meaningful change in systems will occur by attempting to study and interact with them in ways we have always used. The tools and techniques that seek to understand systems as linear, predictable and quantifiable are not just outmoded but are completely wrong.

We recommend a more holistic and organic approach to seeing systems that is based on the understanding of those closest to the system and requires us to carefully listen to those who understand the system best. To do less is simply unacceptable.

Leonard H. Friedman, PhD, MPH is an associate professor in the Department of Public Health at Oregon State University in Corvallis, Ore. He can be reached at 541-737-2323 or leonard.friedman@oregonstate.edu

Jonathan B. King, PhD is an emeritus associate professor in the College of Business at Oregon State University.

David Bella, PhD is an emeritus professor in the College of Engineering at Oregon State University.

References

7. These three dimensions correspond to Kurt Lewin’s renowned and enduring model of change: “unfreezing, changing, refreezing.” We have reversed the first two merely for ease of exposition.