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MANAGERS' STORIES**

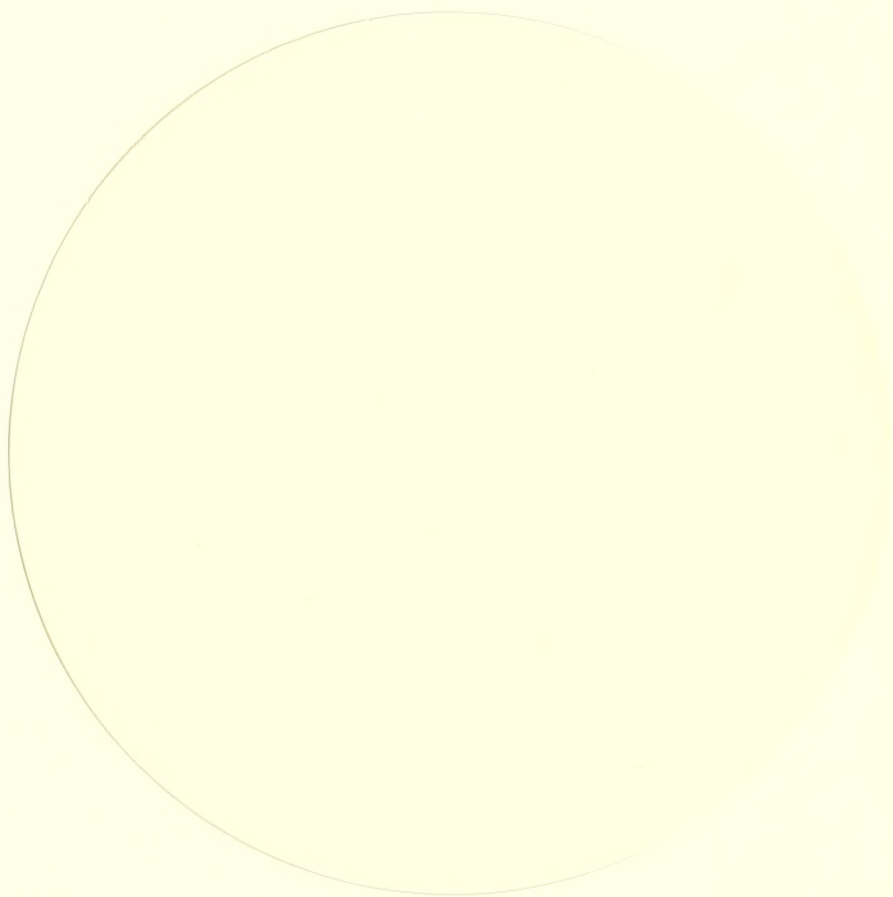
**David K. Goldstein**

**April 1992**

**CISR WP No. 234  
Sloan WP No. 3426-92**

**Center for Information Systems Research**

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## **COMPUTER-BASED DATA AND ORGANIZATIONAL LEARNING: THE IMPORTANCE OF MANAGERS' STORIES**

While many organizations are investing large amounts of money to provide computer-based data to their managers, little is known about how, or even whether, managers use these data to learn about the business environment. This issue is explored by examining how grocery product managers use supermarket scanner data to learn about changes in the marketing environment. Managers' stories play a central role in the four step process used by one product management organization as it learns from analyzing computer-based data. First, a manager examines the data and looks for unexpected results—findings that contradict one or more of her stories about the marketing environment. If a surprise is found, the manager carries out a relatively unstructured, multi-stage process to make sense out of the unexpected result. This process can be viewed as a dialogue between the result and a set of tools at the manager's disposal (including analyses of computer-based data). Next, the manager tells the story to share her insights with peers and superiors, developing a common understanding. Finally, the manager creates an official story, that is used to 'sell' new marketing approaches to people outside the product manager organization—the sales force and supermarket buyers.

**Keywords:** Organizational Learning, Decision Support, Marketing Information, Managerial Learning, Stories, Storytelling



## Introduction

Making sense of the business environment is becoming a more important organizational task, as rapid organizational and technological changes increase environmental complexity and dynamism (Boynton and Victor, 1991). This task is facilitated by the same phenomenon that has increased its importance—the computer. Organizations now have access to detailed data on their operations captured by their own, and sometimes their customers', transaction processing systems. These data can play an increasingly significant role in organizational learning, by helping managers both to better understand the effect of their actions. These managers can then react more rapidly and accurately to changes in customer needs or competitor actions.

While many organizations are investing large amounts of money to provide computer-based data to their managers, little is known about how, or even whether, managers use these data to learn about the business environment. The goal of this paper is to explore the role of computer-based data in organizations' understanding of their world. Since organizations learn only when their individual members learn (Simon, 1991; Nonaka, 1991), I will first investigate how managers learn about the environment and organize their knowledge. I will then explore the role of computer-based data in managerial learning. Finally, I will examine how the managers share their insights both within and outside the organization.

My insights derive primarily from two sources—from studies of cognition in practice carried out by anthropologists and organizational researchers and from interviews with grocery product managers. Managerial understanding of the environment is a problem that can benefit from study *in situ*—through the examination of how managers use computer-based data as part of their day-to-day work. Since cognition in practice differs significantly from cognition in artificial settings (Brown and Duguid, 1991; Lave, 1988), insights provided by anthropologists (e.g., Orr, 1990) who have studied problem solving in the workplace and by organizational researchers who have observed managerial cognition (e.g., Isenberg, 1986) in practice will help us understand the role of computer-based data in managerial learning.

The examination of this research is supplemented by interviews carried out with product managers in grocery product manufacturers. Most of the data for this paper come from interviews with six product managers and two information support personnel at Butler<sup>1</sup>, a relatively small (sales under \$200 million), independently run subsidiary of a major grocery manufacturer. These interviews were conducted as part of a larger study of the use of computer-based data by product managers at five grocery manufacturers (Goldstein and Cho,

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<sup>1</sup>Company name as well as details about specific products are disguised.

1991; Goldstein, 1990; Goldstein and Zack, 1989). They focused on how the product managers used a new data source—purchased data collected from supermarket scanners—and what they learned from their analyses. The visit took place six months after Butler purchased scanner data for the first time and three months after it began using the data as part of company-wide state-of-the-brand reviews (presentations to senior management on the status of each Butler product).

Product managers are responsible for developing marketing programs (e.g., consumer promotions) for a particular product line (e.g., Duncan Hines Brownie Mixes). They set prices, plan marketing activities, introduce new product varieties, and monitor competition. Computer-based data play a key role in product managers' understanding of their environment (McCann, 1986). These managers integrate information produced by their firm on sales, shipments, and inventory, with purchased data on their and competitors' performance.

The data available to product managers greatly increased when supermarket scanner data became available. Butler purchased, for its product managers, monthly data for each of fifty U.S. regions on each category (e.g., baking mixes) in which the company sold products. These data included retail price, sales volume in dollars and units, and promotion activity (e.g., percentage of merchandise sold in supermarkets with an end-aisle display or with a large or small ad in a supermarket circular). These data were for each item in the category (including both Butler and competitor products) with a unique Universal Product Code (e.g., Duncan Hines Deluxe Brownie Mix). Butler product managers could access hundreds of megabytes of data. By analyzing scanner data, product managers could increase the accuracy and timeliness of the feedback they receive about causal relationships in the marketing environment. They could better understand the impact of the 4Ps of the marketing mix—price, promotion, place, and product—on sales for their and their competitors' products.

## **The Role of Stories in Managerial Learning**

Researchers have proposed several frameworks to describe how people organize their understanding of their world. People have scripts (Schank and Abelson, 1977) that contain event sequences for frequently occurring actions, for example ordering a meal in a restaurant. They have schema (Minsky, 1975) that hierarchically structure knowledge about a given topic based on its attributes, for example the characteristics of birds and of a specific type of bird. In addition, people have stories to organize their knowledge about experience (Schank, 1991).

Stories are a type of narrative that contain settings, characters, a plot—with a problem or conflict and its resolution (Bower, 1976). They can describe one incident or an agglomeration of several incidents. Stories also have a moral—a rule, lesson, theme or



general inference—that the person has derived from the story. This moral is used to understand current events (Martin, 1982). When a person hears a story, he tries to match that story (and its moral) to one he already knows. If he finds a match, he believes that he understands the story (Schank, 1991).

There is ample evidence that people maintain some of their work-related knowledge as stories. They use stories to understand their world both within and outside the organization. For example, senior managers develop a plausible understanding of current events by comparing them to stories of specific previous events (Isabella, 1990; Isenberg, 1986). In assessing the reasoning behind a competitor's early announcement of a new product, an executive relates it to stories she knows about previous early product announcements. She might remember a story about a comparable announcement by another company one year earlier. The lesson of that story was that the early announcement was a market signal. Therefore, she would determine that the current announcement served the same purpose. Similarly, photocopier technicians recall stories of previous repairs as they diagnose and correct copier malfunctions (Orr, 1990). Stories are also used by workers in other cultures. Midwives in the Yucatan recall and retell stories of births to determine how to handle difficult deliveries (Jordan, 1989).

In my interviews with product managers, they recalled stories about the impact of changes in the 4Ps of the marketing mix on sales for their and competitors' products. For example, a manager might recall a story about a \$10 per case wholesale price reduction, whose setting was the Phoenix region last September. The story's characters would be consumers, supermarket buyers, competitors, and members of the organization's sales force. Its plot would be a description of the rationale behind the price reduction (was it in response to a competitor's action?) and the reaction to it by the sales force (how aggressively did they communicate the change and its rationale to buyers?), by buyers (how much did they purchase and did they pass the savings onto consumers?), by competitors (did they match the reduction?), and by consumers (how did it affect retail sales?). The moral of the story might be that a \$10 price drop in Phoenix should only be used to increase purchases by supermarkets, since they do not pass the savings onto consumers.

As a second example, consider this story told by a Butler product manager about a company that recently introduced a line that directly competed with her product:

*[The competitive line] had better distribution. This was their first refrigerated product and they paid top dollar to get into the dairy case, but now they're having problems. They are losing distribution in the West Coast and in Philadelphia. They have two strong and two weak items in their line, while we*

*have three strong and one weak item. We also have better sales per point of distribution. [Sales volume per store in which the items are carried.]*

In this story, the main character was a company—the competitor. Other characters included Butler and the supermarkets in the various regions. The setting was the U.S. grocery market at the time of the product introduction. The plot described the company's attempts to convince supermarkets to stock the four items in its new product line. The story had two lessons: 1) the competitor is not doing well with this new product and is vulnerable; 2) therefore, Butler's sales force should attempt to convince the supermarkets to swap out some or all of the competitor's items and stock more of Butler's items.

Another key characteristic of the above story—and product managers' stories in general—is its detail. Not only do we know that the competitor paid money to the supermarkets to get them to stock its new product, we also know why—it was the company's first dairy product and they were committed to making it a success. This detail increases the story's impact (Martin, 1982). When compared to abstract information, people both can recall detailed stories more accurately (Reyes, Thompson and Bower, 1980) and are more likely to act upon them (Kahneman and Tversky, 1973; Borgida and Nisbett, 1977).

## **Managers' Use of Computer-Based Data to Confirm and Modify Stories**

Stories play an important role in how a product manager changes his understanding of the marketing environment through his analysis of computer-based data. When a product manager studies computer-based data, he is attempting to relate it to stories he knows about his product and its environment. Consider a product manager who examines the latest scanner data and finds that both sales in Seattle were down by 15% and that the city's largest supermarket chain raised the retail price of his product by 10%. The product manager would try to match this data to stories about previous price changes. The manager might recall a story about the last time the same chain raised its price, or he might remember the impact of price increases by similar chains in Seattle or in other cities. The product manager would say that he understands the data, if they confirmed one of his stories. If the manager were surprised by the data, he would try to make sense of them—at the same time modifying one of his stories.

Analysis of computer-based data plays a key role in the product managers' sense making process. It provides the raw material they use to confirm or modify their stories. Product managers at Butler used scanner data to learn about the impact of changes in the 4Ps of the marketing environment on key outcome measures, such as sales and market share, for Butler products and its competitors.

Product managers noted that analyzing computer-based data helped them monitor the environment<sup>2</sup>. They tracked sales, distribution, price, and promotions for their product and its key competition. They often focused their attention on new products or new varieties. Product managers studied the country as a whole and important markets—usually either markets that accounted for a large proportion of sales or new or test markets for Butler or a competitor. They analyzed data to evaluate their performance and to anticipate questions from superiors. One product manager<sup>3</sup> discussed the arrival of monthly market share data:

*The data is hand-delivered to the president [of the subsidiary], the executive vice president, the director of marketing, and the product managers. It arrives at 10 A.M. on a Tuesday. People wait for the mail person. It's pretty intense.*

*The managers tend to look at market share for the total U.S. and for a few key markets. I often get notes from them asking, 'why did this happen? what's going on?' It's my job to know that our Denver numbers are off, because our competitor ran a coupon. By 2 P.M. that day, a report is on the desk of the division president at corporate. It contains market share data plus trends for the year.*

If the manager just tracked trends but did no further analysis, he would say that he understood the data and learned nothing new. These data *confirmed* one his stories about the product and its environment (see Table 1). For example, one product manager closely followed the introduction of a new, and relatively spicy, variety of his product line. In his analysis of the previous month's scanner data, two of his stories were confirmed. First, he found that sales for all varieties increased 11.1% and sales of the new variety were up 11%. In discussing this new variety, he noted that it was 'tracking'—selling as well as the average variety. Hence, these new data confirmed a portion of his story about the new variety. Second, he noted that the new variety was selling best in the Southwest. This confirmed one aspect of his story about regional differences in consumer tastes—that Southwesterners prefer spicier foods.

Frequently an event occurs that is surprising to a manager. The event is "discrepant from predictions" and hence "trigger[s] a need for explanation" (Louis, 1980, p. 241). The manager has decided to 'notice' the event (Starbuck and Milliken, 1988). She must switch from monitoring, which is characterized as a more automatic or scripted mode of cognitive

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<sup>2</sup>Rockart and De Long (1988) also note that computer-based data play an important role in monitoring the environment.

<sup>3</sup>This manager was not at Butler, but was at one of the company's that participated in the first phase of this study.



**TABLE 1: USING COMPUTER-BASED DATA TO CONFIRM MANAGERS' STORIES**

confirm story about..	how managers used computer-based data
impact of <b>promotions</b> on sales	Track promotions run for product and its principal competitor for entire country and for key markets
regional differences in sales ( <b>place</b> )	Track sales for product and competitor for entire country and for key markets
<b>pricing</b> of the product and price differential with competitor	Track price for product and competitor for entire country and for key markets
success of introduction of new varieties ( <b>product</b> )	Track sales for new varieties or competitor's new varieties

processing, to a more active, sensemaking mode (Louis and Sutton, 1990). The latter mode involves a process of *modifying* one or more of the manager's stories.

There were several ways that a surprise was brought to a product manager's attention. She might have noticed it herself, while carrying out routine monitoring of computer-based data. Alternatively, a senior manager might have inquired about the status of her product line or about a specific result. If the product manager felt that her existing stories could not adequately explain the anomaly, she would start the sense making process. Finally, a sales manager might have surprised the product manager by making a claim with which she does not agree. The sales manager might state, for example, that a competitor is making significant inroads in a key market and, therefore, he wants to spend additional funds in that market.

Product managers noted three distinct ways in which they utilized computer-based data to modify their stories (see Table 2). In its simplest use, the manager identified a problem or an opportunity. Scanner data, for example, provided detailed information on the percentage of stores in a region that carried a product on their shelves. In the past, the product manager only knew whether a supermarket chain authorized distribution of its product. Hence, one product manager was surprised to find that while almost all stores in a region were authorized to carry a product, only a small percentage actually had it on their shelves. The manager then contacted the appropriate regional sales manager and developed a plan to solve the problem.

Product managers also analyzed computer-based data to determine why a specific outcome occurred or to understand the impact of a previous action. Detailed data on pricing, distribution, and promotions per month and per region assisted the product managers in this causal analysis. Through examining these data, product managers assessed the impact of lowering price during promotion, placing ads of various sizes in supermarket circulars, offering coupons in free-standing inserts in Sunday newspapers, and displaying products at the end of supermarket aisles. In addition, the managers assessed the impact of the interactions



among these elements on product sales. The following example illustrates the process followed by one product manager as she analyzed computer-based data and modified her stories about the impact on sales of promotions.

*One Butler product manager was surprised that her winter holiday promotion was not as effective this year as the year before. Her hunch was that the growth in private label products [products marketed under the supermarket's own label] over the past year reduced the impact of her promotions. She attempted to verify this hunch by comparing scanner data on sales of her product for the promotion period in regions that had strong private label sales with data for other regions. She found that overall her promotion was less effective in regions with strong private label sales.*

*While carrying out her analysis, the manager noticed that there were large differences in the effectiveness of her promotions among those regions with strong private label sales. This prompted her to investigate further. She looked within those regions comparing regions in which her promotion was effective with those in which it was not. The manager found that when the supermarkets with private labels promoted their products during the weeks right before the Thanksgiving and Christmas holidays their promotions were very effective at generating increased sales, otherwise they were not.*

*The product manager modified her story about the impact of promotions on the sales of her product, adding that selecting the appropriate week for promotions was critical. She explained this phenomenon by noting that her product was purchased to be eaten with holiday meals and that it was a relatively expensive, impulse purchase. Hence the promotions were most effective when timed to bring the product to the purchasers' attention during the week before they were most likely to consume it.*

The above example illustrates that the story modification process is a relatively unstructured one. It can be viewed as a dialogue between the set of tools (including various types of analysis of computer-based data) at the manager's disposal and her knowledge of the environment and of how to use the tools. A process referred to as *bricolage* by Levi-Strauss (1966)<sup>4</sup>. In the above example, the product manager's tools were the specific analyses of scanner data that she performed to test her hunch about private label products and to examine the differences between regions in which her promotion was successful and those in which it was not. The manager's knowledge about the environment was organized as stories about the impact of changes in the marketing mix on sales. She also possessed stories, gained from

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<sup>4</sup>Levi-Strauss describes how the *bricoleur* (handyman) enters into a dialogue with the materials available to him and his knowledge about how to use them when attempting to repair something.

**TABLE 2: USING COMPUTER-BASED DATA TO MODIFY MANAGERS' STORIES**

type of story modification	aspect of marketing mix studied	use of computer-based data
identify problem or opportunity	promotion	Determine that trade promotions were not passed through to consumers
	place—sales & distribution by region	Identify voids—regions where product is authorized to be in supermarkets, but is not on their shelves. Also identify markets with high sales for product category, but low sales for product
	price	Examine average retail and wholesale prices for product and its competitor to determine that product's lower wholesale price is not passed on to consumers
	product/varieties	Determine that competitor is phasing out one of its products. Identify varieties with stronger and weaker sales for product and its competitor.
learn why outcome occurred	promotion	Examine differences in way promotions are executed between best and worst regions
	place	Determine why one region lagging in sales for a specific product variety.
	product/varieties	Determine why some varieties are selling better than others when compared to competitor
learn impact of action	promotion	Examine the impact of characteristics of promotions—displays, ad size, price, coupons—and their interactions on sales.
	place	Examine the impact of regional differences in competitor marketing tactics on its performance.
	price	Examine the impact on sales of product price increase that was not matched by a key competitor.

years of experience in marketing, about how to use computer-based data to investigate surprises and to modify stories.

The first step in the story modification process is retrospective (Levi-Strauss, 1966). The manager takes advantage of the knowledge she already has (her stories) to speculate about the cause of the surprise (Isenberg, 1986). In the example, the product manager guessed that the growth in private label brands reduced the effectiveness of her promotions. These speculations become tentative hypotheses that the manager attempted to verify by conducting a "very selective" search of external data (Isenberg, 1986)<sup>5</sup>.

The manager selects from among the tools available to her—some of which involve the analysis of computer-based data—to test the hypothesis. This process has been described both

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<sup>5</sup>elSawy (1985) observed a similar phenomenon in his study of senior managers. He noted that they engaged in collection of specific information in reaction to a threat or opportunity. He called this assimilation information and contrasted it to accommodation information that managers collected while monitoring the environment.

as a dialogue between tools and knowledge (Levi-Strauss, 1962) and as a dialectical process in which the gap "between resolution characteristics and information and procedural possibilities" is closed (Lave, 1988, p. 145). Levi-Strauss and Lave emphasize that both the use of tools and the definition of the problem affect each other; each changes as the dialogue proceeds.

In the example, the product manager initially defined the problem as one of private label growth and hypothesized that the difference in the effectiveness of her holiday promotion could be explained by the increase in private label sales. The tool she used to test her hypothesis was an analysis of scanner data in which she compared the impact of her promotion in regions with strong private labels with its impact in other regions. Her analysis partly supported her hypothesis. As her dialogue proceeded, the manager redefined the problem as one of promotion timing. She tested a new hypothesis—supermarkets' promotions were more effective when they promoted their private label product the week before either Thanksgiving or Christmas—using a new tool. While she still relied on scanner data, now she focused her analysis on the impact of promotion timing on sales.

A second example illustrates the use of multiple sources of information to learn why a specific outcome occurred. It shows how talking with peers and market research can be combined with analysis of computer-based data. This example also supports the view that the story modification process can be characterized as a dialogue between a set of tools and a problem.

*Another product manager at Butler did not know why sales of a new variety—light—were poor in the South region. His first step toward creating a story to explain this event was to ask the regional sales manager. The sales manager guessed that Southerners did not consume as many of this variety as people in other areas. With this serving as his tentative hypothesis, the product manager then entered into a dialogue. The first tool that he used was an analysis of scanner data, comparing sales of Butler and competitor products of this variety in the South and in other regions. The manager found that Southerners consumed about as many of the competitors' light variety as people in other regions.*

*The product manager then redefined the problem as one of taste. He came up with a hunch of his own—Butler's light variety does not taste as good as its competition to Southern consumers. The manager tested this hunch using a new tool. He hired a market research firm to conduct blind taste tests. These tests showed no differences between Butler and its competitors in flavor.*

*The product manager finally accepted a third hypothesis—that the South regional sales force was doing a poor job convincing supermarkets to stock Butler light variety. This hypothesis was supported by the scanner data, since*



*they showed that sales of light were relatively poor in the South. He believed this to be true, because he believed there was no plausible alternative. As a result of this sensemaking process, the manager modified his stories about regional differences in product sales, about the taste of his product, and about the effectiveness of the South regional sales force at introducing new varieties.*

In this example, the product manager first relied on discussions with the regional sales manager to develop a hypothesis about poor sales of the light variety in the South. The manager used analysis of scanner data as his tool to test the tentative hypothesis. When this hypothesis was not verified, he developed a new one—that Butler light variety did not taste as good as its competition—and used another tool—a market research study—to test it. The manager ended the story modification process when he developed a plausible explanation, which is consistent with Isenberg (1986) who notes that managers strive for believable explanations rather than optimal solutions.

As in the first example, the manager used a set of tools to close the gap between the problem and a plausible solution. During this gap closing process, the problem itself was reformulated three times and the tools used to solve the problem were changed twice. This provides further evidence of a dialogue in which both the problem and the tools use to solve it affect each other. They both are modified as the process progresses.

Finally, a third example illustrates how a product manager used a naturally occurring experiment as a tool during story modification. While managers routinely conduct experiments on product taste or packaging using market research techniques, they also can use computer-based data to examine the impact of a natural experiment. Consider the following example:

*A third Butler product manager wanted to understand what level of price reduction was needed to make his promotion effective. Would sales increase about as much with a 99¢ promotion price as with a 79¢ price? The manager went back through scanner data. He noted that when there had been both 79¢ and 99¢ prices accompanied by features (ads in the supermarket circular) and end-aisle product displays in the same regions at different times, sales were similar. He summarized the lesson that he learned, stating, "We learned that price is not what drives sales. It's getting the feature and the display. We'd move just as many cases at 99¢ with feature and a display as at 79¢."*

When product managers analyze scanner data they increase the accuracy and timeliness of feedback they receive about causal relationships in the marketing environment. This is a necessary condition to facilitate organizational experiments (Huber, 1991). Each marketing action taken by a product manager, or by a colleague or competitor, can be viewed as a naturally occurring experiment, from which the product manager can gather valuable insights.

There was one type of tool missing from the story modification process followed by the Butler product managers. They performed almost no statistical analyses to help them make sense of computer-based data. The product managers had the training (many had M.B.A. degrees) and the computer software needed to perform these analyses. Further, many of the surprises they encountered could be studied using statistical techniques. For example, product managers could have used regression to determine which of several causal variables (price reductions, coupons, ads in supermarket circulars) were significantly related to sales. They could also perform analyses of variance to identify significant differences in sales among regions.

Only one manager tried to perform a statistical analysis. He described his attempt:

*I wanted to find out what drives sales of my product. I first tried running a regression, but it didn't tell me much. Then I decided to compare my top and bottom three markets. I looked at the full set of scanner measures. I found that the top three had much deeper price cuts, they were on price reduction more often, they had more AB features [larger ads in supermarket circulars].*

The simple analysis performed by the product manager was an easier way for him to build a rich, detailed story about the factors that affected sales of his product. The story that the product manager developed was also more easily communicated to his superiors and to the sales force as will be discussed in the next section.

## **Sharing Stories Based on Analysis of Computer-Based Data**

Managers share the insights they have gained from analysis of computer-based data by telling stories. Sharing insights is critical to managers who interpret their environment by exchanging information and developing a common understanding (Daft and Weick, 1984). It is also critical to organizations, permitting multiple interpretations of the same event and richer organizational learning (March, Sproull, and Tamuz, 1991) and facilitating the development of a community memory—a set of stories about the organization and its environment (Brown and Duguid, 1991).

People in organizations like to tell and listen to stories. Telling stories helps workers and managers identify themselves as competent practitioners. As story tellers, people in organizations have a desire to share their achievements with others. As listeners, workers and managers like to hear stories; they have a "deep and abiding interest in the characters and social dramas of their world" (Orr, 1990, p. 75).

## Telling Stories to Others Members of the Organization

Product managers share stories that are based on their analyses of computer-based data. They tell stories to each other, to their managers, and to sales managers. This story telling might be in response to a specific inquiry from a superior or a sales manager, in a formal review of product performance presented to senior marketing management, or in less formal settings—such as over lunch or coffee.

At Butler, many stories based on analyses of computer-based data were shared during presentations to management. The vice president of marketing strongly encouraged the product managers to use the newly acquired scanner data as part of their state-of-the-brand review. The managers developed detailed stories about their product and its marketing environment and told them at the presentation. They supported these stories with numbers from their analyses, presented in charts and graphs. For example, the manager who developed the story about factors that affected sales of his product discussed at the end of the last section supported this story with charts comparing size and number of price cuts and number of large supermarket circular ads in the three regions with the best and worst sales.

Another product manager was singled out by her peers and superior for the quality of her state-of-the-brand presentation. She told a story about why sales of her product declined steeply over the last two years. She stated that there were too many varieties of the product, all but a few were doing very poorly, and only one was selling well. The product manager also observed that while her product was a fad food and experienced rapid sales growth when introduced about four years ago, the product category was now aging and had become more price sensitive. She also noted that her product was performing well relative to its competition; it had higher per store sales. Finally, she pointed out that there were large seasonal variations in sales and in the effectiveness of promotions.

Based on this story, the product manager developed a detailed marketing strategy. This included dropping many product varieties and focusing on the best selling one. She also eliminated all promotions from the first quarter when sales were low. Most importantly, the product manager attracted management support for her brand. She stated:

*We got corporate commitment back to the business, because we could explain a great deal more to them. We could tell them a story. We could tell them what we don't know. Before [we analyzed the scanner data] we didn't even know what we knew and what we didn't. We got commitment to grow the business—despite seeing a 20-30% sales decline over the last 2 years, because the presentation was impressive. Before they were looking the other way when I walked in the hallway. Now they're letting us spend money behind the business.*



There was a second major benefit of the state-of-the brand analyses. The product managers and their superiors found commonalities among the products. They found and elaborated on patterns present in organizational events (Boje, 1991). The product managers developed a joint understanding about the impact of price, promotions, competition, and marketing mix on sales. One product manager described the story that had been developed about promotions of Butler products through analyses of computer-based data by several of her colleagues:

*We're a small brand. The trade [supermarkets] will only give us so many promotions per quarter and most things need to be supported quarterly. Since we're an impulse-driven, trade-intensive category, we're very dependent on promotions. Frankly, we have more than our fair share based on our size.*

*We learned that we don't have deep enough pockets to support all of our product categories. We can't support 14 categories, we can support at most 6. Therefore, we will be doing joint promotions of several products.*

Another product manager added to the promotion story:

*We found that C ads [the smallest ads in supermarket circulars] do next to nothing. Two C ads cost the same as one A ad [the largest size ad], but don't bring the same results. End aisle displays with A ads are 50% more effective than A ads alone. Further, joint consumer and trade are much more effective than separate ones.*

This learning led to a change in promotion strategy. Product managers identified those products that could be linked together with a joint promotion (through further analysis of computer-based data). Brokers<sup>6</sup> were instructed to strive for larger 'A' ads and not to participate in 'C' ads. They were also instructed to make trade promotions (price reductions to supermarkets) contingent on getting both end aisle displays and A ads in circulars and to time promotions to coincide with coupons for consumers that appear in free-standing inserts in Sunday newspapers.

### **Official Stories Told to People Outside the Organization**

The product managers also developed 'official stories' (Schank, 1990) to describe the marketing environment to people outside of the organization—brokers and supermarket buyers (Butler's customers). These stories were not used to make sense of the environment. Rather, they were used to enact change (Boje, 1991). The official stories were often versions of the stories developed for management or peers. They were also supported by charts and graphs obtained from analyses of computer-based data. Since brokers met with supermarket buyers

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<sup>6</sup>Butler sold its product through independent regional brokers, not a dedicated sales force.

primarily to convince them to participate in a promotion or to discuss shelf space (facings), the official stories told to brokers and supermarket buyers involved explaining changes in promotion strategy, obtaining facings for a new or existing product, or defending shelf space from a competitor's product. See Table 3 for a summary of these stories.

A marketing manager at another company described these stories as essential to 'fact-based marketing.' He viewed storytelling, supported by appropriate computer-based data, as an alternative to reducing price or other incentives to get a supermarket to stock a product or participate in a promotion. His view supports the idea that having more information is a symbol of organizational competence (Feldman and March, 1981) and, therefore, makes the manufacturer 'look better' to the supermarket buyer.

The story about joint promotions described above was packaged for telling to the buyers. The brokers were given the new 'party line' about joint promotions and no C ads. They were also given the numbers (based on scanner data analysis) to support the story. One Butler product manager described a part of this story:

*We'll tell the trade [buyers] that last year we asked you to execute 6 separate promotions in October and it was too much. Our promotion [for one product] was executed in only 22% of all supermarkets. We'll try to convince the trade that one big promotion [involving several product categories] is the way to go. We'll show them that C ads did nothing for [another product]. We prefer one joint promotion with an A ad for [each of two sets of related products].*

These stories were sometimes biased, since they were used to put Butler's products in as favorable a light and competitor products in as unfavorable a light as possible. The stories about competitor products always focused on problems (e.g., a new product introduction was not successful, or the competitor was getting out of a certain product line). Sometimes information was purposely omitted when it did not support the official story. For example, the product manager who compared his best and worst markets found that most of his insights supported the official story about Butler promotions. He did note, however, that smaller C ads were used relatively more frequently in regions with high sales of his product than in low sales regions. He noted, "We left that off the chart, because it didn't add to our argument."



**TABLE 3: OFFICIAL STORIES TOLD TO BROKERS OR  
SUPERMARKET BUYERS**

told to..	lesson of story	story
brokers	increase distribution by filling voids	I developed a proposal for a sales contest to increase distribution. It included a prize for brokers with 65% distribution on certain products. I knew that I needed four facings in 65% of the stores to stay in business. Otherwise consumers won't see the product. So I told brokers to get 4 facings in 65% of the stores.
	get supermarkets to stock a specific variety	I developed a story for the sales force. 'In virtually every market [the competitor] has its top 3 [varieties in wide distribution]. Their sales per point of distribution [sales per store] for [two of the varieties] is way below ours, while [the third] is way above ours. What's the problem?
	describe rationale for allocating spending by market	I realized that I can't afford to spend [the same amount as the principal competitor]. I'll lose. So what I've got to do is out-think her. I've got to be like little bolts-zipping around her all the time and taking little pieces here and there. I can now say to the broker in Atlanta. You're too expensive. I'm going to spend my money in NY or Boston where they're doing a good job.
buyers	sell buyers on new strategy with fewer, larger joint promotions	C ads do nothing for croissants. I'll tell the trade that they're wasting their money on C ads. We'd prefer one joint promotion with an A ad. There would be an A ad for [one type of products] and an A ad [the other type]. We'll show them that last year we asked you to execute 6 separate promotions in October and it was too much. We got 22% [of the stores] promoting [one product]. We'll try to convince the trade that one big promotion is the way to go.
	show that competitor is not out-performing Butler in test markets	Analysis shows that [the competitor] outperform us only on a case basis (because their cases are smaller) and not on a dollar per [store] basis.
	show that new competitor is not doing well	[The competitor] spent a lot of money behind a big roll-out and got better distribution than Butler, but Butler sells better per store.
	inform buyers that competitor is phasing out product; go after its shelf space	[The competitor] is getting out of [the product category], so tell buyers to get them off their shelves and put in more Butler products. We're moving better than competitor products, so we should take their slots [shelf space].
	inform buyers of relative benefits of Butler products	Data on [the competitor] told us how much better we're moving cases and dollars than them, because they've underpriced. We're moving better per store. If you factor in the dollars and we're killing them.
	convince trade in new markets to stock product	I developed a story for the trade on why their markets were chosen to enter—what kind of sales dollars and margins to expect.

## Discussion

The Butler product management organization followed a four-step process in learning about their environment from the analysis of computer-based data. First, a manager examines the data and look for unexpected results—findings that contradict one or more of her stories about the marketing environment. If a surprise is found, the manager carries out a relatively unstructured, multi-stage process to make sense out of the unexpected result. This process can be viewed as a dialogue between the result and a set of tools at the manager's disposal (including analyses of computer-based data). Next, the manager tells the story to share her insights with peers and superiors, developing a common understanding. Finally, the manager creates an official story, that is used to 'sell' new marketing approaches to people outside the product manager organization—the sales force and supermarket buyers.

While the product managers made extensive use of large amounts of computer-based data as they attempted to understand changes in their environment, they used almost no formal statistical methods in their analyses. This is somewhat surprising in that statistical methods are designed to assist people in summarizing and drawing inferences from large data sets. The Butler product managers preferred to develop rich, detailed stories which could be easily told to and understood by their peers, superiors, and customers. In these stories, the data played a supporting role. The managers used the data to confirm the stories or as a tool in story modification. They also used the data to make the stories more credible—charts and graphs reinforced the message of the stories.

Another example of the process of creating stories from large data sets, without using complex statistics, can be found in the financial pages of *The Wall Street Journal* and *The New York Times*. Reporters create stories that explain the changes in stock, bond and currency prices that occurred the previous day. Consider the following story:

*A report that showed only a small increase in inflation was ultimately ignored by credit market participants yesterday as traders sold Treasury securities and interest rates moved higher. Prices of notes and bonds rose sharply immediately after the Government announced that its Producer Price Index rose by a modest two-tenths of a percent last month, and only one-tenth of a percent when volatile energy and food prices were excluded. But the gains, which amounted to as much as  $\frac{3}{4}$  point on some securities, could not be sustained, as sellers emerged at the higher price levels. Selling of short- and intermediate-term notes was particularly heavy. Rather than focus on the good inflation news, memories of stronger January and February retail sales figures reported on Thursday continued to linger. And preliminary results of a University of Michigan survey reinforced that economic recovery is under way. [Kenneth G. Gilpin, *The New York Times*, March 14, 1992].*

The reporter created a rich story to explain the change in the bond market. He did not use statistical analyses to correlate producer prices or retail sales and bond prices. Rather, he created a plausible explanation and supported it with both several sets of data and text.

This study has provided insights into one aspect of organizational learning—how organizations make sense out of large amounts of data—and a perspective on the organizational learning process. Its findings are strikingly similar to those of March, Sproull, and Tamuz (1991) who studied how organizations learn from single events and small amounts of data. Those authors noted that organizations learn most when the event is a surprise. When confronted with single critical events, organizations create a detailed history to explain it. They then share this history to allow for multiple interpretations and richer learning. The theme of creating and sharing stories runs through both studies.

There are also important lessons for researchers who study stories. Cognitive psychology researchers have compared the impact of rich, detailed stories with abstract numerical information on decision making and have found that people were more influenced by stories (Kahneman and Tversky, 1973; Borgida and Nisbett, 1977). Butler product managers used data to support their stories to influence their superiors and colleagues. Rather than studying the differences between abstract data and stories, it could be more beneficial to examine the degree to which adding supporting data to stories increases their credibility and impact.

The study also highlights the importance of making sense out of computer-based data when managers must understand changes in the business environment. While many researchers and practitioners have discussed the benefits of organizational learning (e.g., Senge, 1990; Stata, 1989), the role of computer-based data in organizational learning has been all but ignored by information systems, functional area (e.g. marketing or operations management), and organizational behavior researchers<sup>7</sup>. Information systems researchers have focused on the value of more sophisticated tools, such as expert systems, in facilitating learning and in storing organizational knowledge (e.g., Sviokla, 1990). In a similar vein, functional area researchers have tried to use computer-based data to develop complex models to explain underlying business processes (e.g., Kalwani, Yim, Rinne, and Sugita, 1990). Most organizational behavior researchers seem to recognize the value of stories and storytelling in organizational learning, but they have focused their attention on the role of stories for transmitting norms and values (e.g., Martin, Feldman, Hatch, and Sitkin, 1983).

Much more research is needed on organizational learning in general and on the role of computer-based data in the organizational learning process. We need to better understand how

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<sup>7</sup>Zuboff (1988) is a notable exception.



organizations interpret their environment (Huber, 1991) and the role of computer-based data in this process. The techniques employed by cognitive anthropologists (e.g., Hutchins, 1991, Orr, 1990, Lave, 1988) can play an important role in this process. Using these techniques, we can observe how managers analyze computer-based data, what they learn from these analyses, and how they share this knowledge with others. Research is also needed to quantify the impact of computer-based data on organizational performance. While some evidence exists that information technology investment is linked to organizational performance (Harris and Katz, 1991), little is known about the causality of this link. Through the intervening process of organizational learning, we can study how an investment in information technology might improve organizational performance.

Finally, managers need guidance in designing organizations that encourage learning, specifically through the analysis of computer-based data. Some researchers have suggested that organizations can promote learning by fostering communities of practice (Brown and Duguid, 1991) and by building overlap into responsibilities and rotating work assignments (Nonaka, 1991). Little is known, however, about how to develop and share insights gained from the analysis of computer-based data. The formal state-of-the-brand analyses employed by Butler is one mechanism to encourage organizational learning. Others must be found. At the same time, we must consider the danger of 'analysis-paralysis.' With too many formal mechanisms in place, organizations might over-analyze data and hence move too slowly to meet changes in the business environment.

At a strategic level, organizations must constantly adapt to survive in an environment characterized by rapid product changes and the diverse demands of a wide variety of customers. Toward that end, they must gather, interpret, and disseminate knowledge about changing market conditions and customer needs. Analysis of computer-based data can play a key role in managing these organizational 'knowledge assets' (Boynton and Victor, 1991). The more detailed data that are collected about the environment and factors that influence organizational performance, the more important it will be to use these data to provide insights into the changes that organizations might make and to evaluate the impact of these changes. This paper has provided initial insights into how organizations might go about mining computer-based data to improve their performance.

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