Harvard Business Review
www.hbr.org

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Reprint R0504C

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Strategy is about choice. The heart of a company's strategy is what it chooses to do and not do. The quality of the thinking that goes into such choices is a key driver of the quality and success of a company's strategy. Most of the time, leaders are so immersed in the specifics of strategy—the ideas, the numbers, the plans—that they don't step back and examine how they think about strategic choices. But executives can gain a great deal from understanding their own reasoning processes. In particular, reasoning by analogy plays a role in strategic decision making that is large but largely overlooked. Faced with an unfamiliar problem or opportunity, senior managers often think back to some similar situation they have seen or heard about, draw lessons from it, and apply those lessons to the current situation. Yet managers rarely realize that they're reasoning by analogy. As a result, they are unable to make use of insights that psychologists, cognitive scientists, and political scientists have generated about the power and the pitfalls of analogy. Managers who pay attention to their own analogical thinking will make better strategic decisions and fewer mistakes.

When Analogies Are Powerful

We've explained the notion of analogical reasoning to executives responsible for strategy in a variety of industries, and virtually every one of them, after reflecting, could point to times when he or she relied heavily on analogies. A few well-known examples reflect how common analogical reasoning is:

• Throughout the mid-1990s, Intel had resisted providing cheap microprocessors for inexpensive PCs. During a 1997 training seminar, however, Intel's top management team learned a lesson about the steel industry from Harvard Business School professor Clayton Christensen: In the 1970s, upstart minimills established themselves in the steel business by making cheap concrete-reinforcing bars known as rebar. Established players like U.S. Steel ceded the low end of the business to them, but deeply regretted that decision when the minimills crept into higher-end products. Intel's CEO at the

time, Andy Grove, seized on the steel analogy, referring to cheap PCs as "digital rebar." The lesson was clear, Grove argued: "If we lose the low end today, we could lose the high end tomorrow." Intel soon began to promote its low-end Celeron processor more aggressively to makers and buyers of inexpensive PCs.

• Starting in the 1970s, Circuit City thrived by selling consumer electronics in superstores. A wide selection, professional sales help, and a policy of not haggling with customers distinguished the stores. In 1993, Circuit City surprised investors by announcing that it would open CarMax, a chain of used-car outlets. The company argued that the used-car industry of the 1990s bore a close resemblance to the electronics retailing environment of the 1970s. Mom-and-pop dealers with questionable reputations dominated the industry, leaving consumers nervous when they purchased and financed complex, big-ticket, durable goods. Circuit City's managers felt that its success formula from electronics retailing would work well in an apparently analogous setting.

• The supermarket, a retail format pioneered during the 1930s, has served as an analogical source many times over. Charlie Merrill relied heavily on his experience as a supermarket executive as he developed the financial supermarket of Merrill Lynch. Likewise, Charles Lazarus was inspired by the supermarket when he founded Toys R Us in the 1950s. Thomas Stemberg, the founder of Staples and a former supermarket executive, reports in his autobiography that Staples began with an analogical question: "Could we be the Toys R Us of office supplies?"

Each of these instances displays the core elements of analogical reasoning: a novel problem that has to be solved or a new opportunity that begs to be tapped; a specific prior setting that managers deem to be similar in its essentials; and a solution that managers can transfer from its original setting to the unfamiliar context. When managers face a problem, sense "Ah, I've seen this one before," and reach back to an earlier experience for a solution, they are using analogy.

Strategy makers use analogical reasoning more often than they know. Commonly, credit for a strategic decision goes to one of two other approaches: deduction and the process of trial and error. When managers use deduction, they apply general administrative and economic principles to a specific business situation, weigh alternatives, and make a rational choice. They choose the alternative that, according to their analysis, would lead to the best outcome. Trial and error, on the other hand, involves learning after the fact rather than thinking in advance.

Both deduction and trial and error play important roles in strategy, but each is effective only in specific circumstances. Deduction typically requires a lot of data and is therefore at its most powerful only in information-rich settings—for instance, mature and stable industries. Even where information is available, processing a great deal of raw data is very challenging, particularly if there are many intertwined choices that span functional and product boundaries. The mental demands of deduction can easily outstrip the bounds on human reasoning that psychologists have identified in numerous experiments. For this reason, deduction works best for modular problems that can be broken down and tackled piece by piece.

Trial and error is a relatively effective way to make strategic decisions in settings so ambiguous, novel, or complex that any cognitively intensive effort is doomed to fail. In altogether new situations, such as launching a radically new product, there may be no good substitute for trying something out and learning from experience.

Many, perhaps most, strategic problems are neither so novel and complex that they require trial and error nor so familiar and modular that they permit deduction. Much of the time, managers have only enough cues to see a resemblance to a past experience. They can see how an industry they're thinking about entering looks like one they already understand, for example. It is in this large middle ground that analogical reasoning has its greatest power.

Analogical reasoning makes enormously efficient use of the information and the mental processing power that strategy makers have. When reasoning by analogy, managers need not understand every aspect of the problem at hand. Rather, they pay attention to select features of it and use them to apply the patterns of the past to the problems of the present. Imagine, for instance, the challenge facing Charles Lazarus in the fast-changing, complex toy industry of the 1950s. Had he sat down and analyzed all of the interdependent configura-

Giovanni Gavetti (ggavetti@hbs.edu) is an assistant professor and **Jan W. Rivkin** (jrivkin@hbs.edu) is an associate professor in the Strategy Unit of Harvard Business School in Boston.

tions of choices in toy retailing—from marketing to operations, from human resource management to logistics—it is unlikely he would have come up with a strategy as coherent and effective as the one Toys R Us adopted. The analogy he drew to supermarkets was extraordinarily efficient from an informational and cognitive point of view. In one stroke, it gave Lazarus an integrated bundle of choices: exhaustive selection, relatively low prices, rapid replenishment of stock, deep investment in information technology, self-service, shopping carts, and so forth.

Analogical reasoning can also be a source of remarkable insight. Analogies lie at the root of some of the most compelling and creative thinking in business as a whole, not just in discussions of strategy. For instance, Taiichi Ohno, the foremost pioneer of Toyota's famed production system, supposedly invented the *kanban* system for replenishing inventory after he watched shelf-stocking procedures at U.S. supermarkets, and he devised the *andon* cord to halt a faulty production line after seeing how bus passengers signaled a driver to stop by pulling a cord that rang a bell.

Reasoning by analogy is prevalent among strategy makers because of a series of close matches: between the amount of information available in many strategic situations and the amount required to draw analogies; between the wealth of managerial experience and the need for that experience in analogical reasoning; and between the need for creative strategies and analogy's ability to spark creativity. Reflecting these matches, business schools typically teach strategy by means of case studies, which provide an abundance of analogies from which the students can draw. (See the sidebar "Strategic Decision Making and the Case Method.") Similarly, some of the foremost strategy consultants are famed for their ability to draw lessons from one industry and apply them to another. Thus we have ample reason to believe that analogical reasoning is a key implement in the toolbox of the typical real-world strategist.

How Analogies Fail

Though analogical reasoning is a powerful and prevalent tool, it is extremely easy to reason poorly through analogies, and strategists rarely consider how to use them well. Indeed, analogies' very potency requires that they be used wisely. To understand the potential pitfalls, consider for a moment the anatomy of analogy. Cognitive scientists paint a simple picture of analogical reasoning. An individual starts with a situation to be handled—the *target problem* (for Intel, the competition from makers of low-end microprocessors). The person then considers other settings that she knows well from direct or vicarious experience and, through a process of *similarity mapping,* identifies a setting that, she believes, displays similar characteristics. This setting is the

Strategic Decision Making and the Case Method

The case method in business education has often been criticized, most recently by Henry Mintzberg, because it depicts management as an abstract theoretical exercise removed from the reality of managerial work. We believe this criticism misses the cognitive underpinnings of managerial decision making. In their role as strategists, managers often face situations in which thinking by analogy or by case has more power than other forms of reasoning. Thus, teaching managers with cases, and to reason from cases, is an appropriate and powerful approach. In fact, the case method has extraordinary potential to enable managers to draw better analogies, for two reasons.

First, the case method creates a large repertoire of secondhand experiences from which students can reason. During their managerial careers, former business students will seldom, if ever, encounter a situation exactly like one they discussed in the classroom. But having studied and debated hundreds of cases from diverse settings, managers can draw upon a large set of vicarious experiences as they make choices.

Second, the case method gives students extensive experience in deciding what is and what isn't important in a given business situation. This skill is crucial to analogical reasoning. The difference between a superficial and a deep similarity mapping is relevance. A superficial mapping focuses on irrelevant similarity (such as the home state of the president in the experiment described in the main text); a deep one emphasizes similarity along dimensions that truly drive business performance.

It is probably not surprising that two professors at Harvard, the bastion of the case method, would defend it. Yet our support comes with important reservations. Too often, students and managers alike reason loosely and fail to assess whether there is a clear causal mapping of their solution onto the problem. Students who are taught by the case method should be trained in the careful use of analogy—and that, we fear, occurs too rarely. Indeed, that fear was one of the factors that fueled our interest in analogical reasoning.

It is extremely easy to reason poorly through analogies, and strategists rarely consider how to use them well.

source problem (the steel industry). From the source emerges a *candidate solution* that was or should have been adopted for the source problem (a vigorous defense of the low end). The candidate solution is then applied to the target problem.

In a variant of this picture, the solution seeking a problem, an individual starts with a source problem and a candidate solution, then uses similarity mapping to find a target problem where the solution would work well. Circuit City's managers, for instance, had an effective solution in consumer electronics retailing. They then found a new setting, used-car retailing, to which they believed their solution could be applied with success.

Dangers arise when strategists draw an analogy on the basis of superficial similarity, not deep causal traits. Take Ford, for instance. In overhauling its supply chain, the automaker looked carefully at Dell's key strategic principle of "virtual integration" with its suppliers as a possible source for an analogy. On the surface, computer and auto production resemble one another. Both involve the assembly of a vast variety of models from a set of fairly standardized components. It is easy, however, to pinpoint differences between the two industries. In the PC business, for example, prices of inputs decline by as much as 1% per week—much, much faster than in the auto industry. To the extent that rapidly falling input prices play a role in Dell's success formula, overlooking this underlying difference could seriously undermine the usefulness of the analogy. Fortunately, Ford executives thought carefully about the differences between the auto industry and the PC business, as well as the difficulty of changing their existing supply chain, as they used the analogy.

The experience of Enron shows how a seductive but bad analogy can lead to flawed decisions. Many factors contributed to Enron's startling collapse, but headlong diversification based on loose analogies played an important role. After apparently achieving success in trading natural gas and electric power, Enron executives moved rapidly to enter or create markets for other goods ranging from coal, steel, and pulp and paper to weather derivatives and broadband telecom capacity. In a classic example of a solution seeking problems, executives looked for markets with certain characteristics reminiscent of the features of the gas and electricity markets. The characteristics included fragmented demand, rapid change due to deregulation or technological progress, complex and capital-intensive distribution systems, lengthy sales cycles, opaque pricing, and mismatches between long-term supply contracts and short-term fluctuations in customer demand. In such markets, managers were confident that Enron's market-creation and trading skills would allow the company to make hefty profits.

On the broadband opportunity, for instance, Enron Chairman Kenneth Lay told *Gas Daily,* "[Broadband]'s going to start off as a very inefficient market. It's going to settle down to a business model that looks very much like our business model on [gas and electricity] wholesale, which obviously has been very profitable with rapid growth." But Enron's executives failed to appreciate important, deeper differences between the markets for natural gas and bandwidth. The broadband market was based on unproven technology and was dominated by telecom companies that resented Enron's encroachment. The underlying good—bandwidth—did not lend itself to the kinds of standard contracts that made efficient trading possible in gas and electricity. Perhaps worst, in broadband trading, Enron had to deliver capacity the "last mile" to a customer's site—an expensive challenge that gas wholesalers didn't face.

The danger of focusing on superficial similarity is very real, for two reasons. First, distinguishing between a target problem's deep, structural features and its superficial characteristics is difficult, especially when the problem is new and largely unknown. In the earliest days of the Internet portal industry, for instance, it was far from clear what structure would emerge in the business. Players in the market adopted analogies that reflected idiosyncrasies of the management teams rather than deep traits of the evolving industry. The tech-savvy founders of Lycos, for instance, saw themselves competing on a high-tech battlefield and assumed that the company with the best search technology would win. Magellan's founders, the twin daughters of publishing magnate Robert Maxwell, aimed to build "the Michelin guide to the Web" and developed editorial abilities. The pioneers of Yahoo, seeing the portal industry as a media business, invested in the company's brand and the look

and feel of its sites.

But this is only part of the picture. Not only is it difficult to distinguish deep similarities from surface resemblances in some contexts, but people typically make little effort to draw such distinctions. In laboratory experiments conducted by psychologists, subjects—even well-educated subjects—are readily seduced by similarities they should know to be superficial. In a study by psychologist Thomas Gilovich, students of international conflict at Stanford were told of a hypothetical foreign-policy crisis: A small, democratic nation was being threatened by an aggressive, totalitarian neighbor. Each student was asked to play the role of a State Department official and recommend a course of action. The descriptions of the situation were manipulated slightly. Some of the students heard versions with cues that were intended to make them think of events that preceded World War II. The president at the time, they were told, was "from New York, the same state as Franklin Roosevelt," refugees were fleeing in boxcars, and the briefing was held in Winston Churchill Hall. Other students heard versions that might have reminded them of Vietnam. The president was "from Texas, the same state as Lyndon Johnson," refugees were escaping in small boats, and the briefing took place in Dean Rusk Hall. Clearly, there is little reason that the president's home state, the refugees' vehicles, or the name of a briefing room should influence a recommendation on foreign policy. Yet subjects in the first group were significantly more likely to apply the lessons of World War II—that aggression must be met with force—than were participants in the second group, who veered toward a hands-off policy inspired by Vietnam. Not only were the students swayed by superficial likenesses, they were not even aware that they had been swayed.

Strategists will seek evidence that their analogy is legitimate, not evidence that it is invalid. As a result, a company may continue to act on a superficial analogy for a long time.

The implications are unsettling. Thanks to his or her particular history and education, each manager carries around an idiosyncratic tool kit of possible sources of analogies. In choosing among tools or identifying new problems for old tools, the manager may be guided by something other than a careful look at the similarity between the source and the target.

The tendency to rely on surface similarity is made even worse by two other common flaws in how people reach judgments:

Anchoring. Once an analogy or other idea anchors itself in a management team, it is notoriously hard to dislodge. Psychologists have shown that this is true even when decision makers obviously have no reason to believe the initial idea. In a demonstration of this effect, Nobel Prize winner Daniel Kahneman and his coauthor Amos Tversky told experimental subjects they would be asked to estimate the percentage of African countries in the membership of the United Nations. A roulette wheel with numbers from zero to 100 was spun, and after it had stopped, the subjects were asked whether the actual percentage was greater or less than the number showing on the wheel. They were then asked to estimate the correct percentage. Surprisingly, the roulette wheel had a strong impact on final estimates. For instance, subjects who saw 10% on the wheel estimated the real percentage at 25%, on average, while those who saw 65% gave an average estimate of 45%. The roulette wheel knew nothing about the composition of the United Nations, obviously, yet it had a powerful influence on people's judgment. (The current answer: African nations make up 24% of the U.N.'s membership.)

The anchoring effect suggests that early analogies in a company, even if they have taken root casually, can have a lasting influence. This is especially true if decision makers become emotionally attached to their analogies. For years, Sun Microsystems has focused on delivering entire systems of hardware and software even as the computer industry has grown less and less integrated. CEO Scott McNealy often justifies his contrarian position by highlighting an analogy to the automotive industry. "You guys are all focusing on piston rings," he once told reporters. "Go and ask Ford about its strategy in piston rings. And carburetors. You don't. You talk about the whole car." Though Sun has suffered financially, McNealy has been reluctant to shift strategy, and, indeed, he continues to use the auto analogy. Perhaps that is inevitable for an individual whose father worked in the auto industry and whose sons are named after vehicle models—Maverick, Scout, Colt, and Dakota.

Confirmation Bias. The anchoring effect is reinforced by another problem: decision makers' tendency to seek out information that confirms their beliefs and to ignore contradictory data. To some degree, this tendency arises simply because managers like to be right—

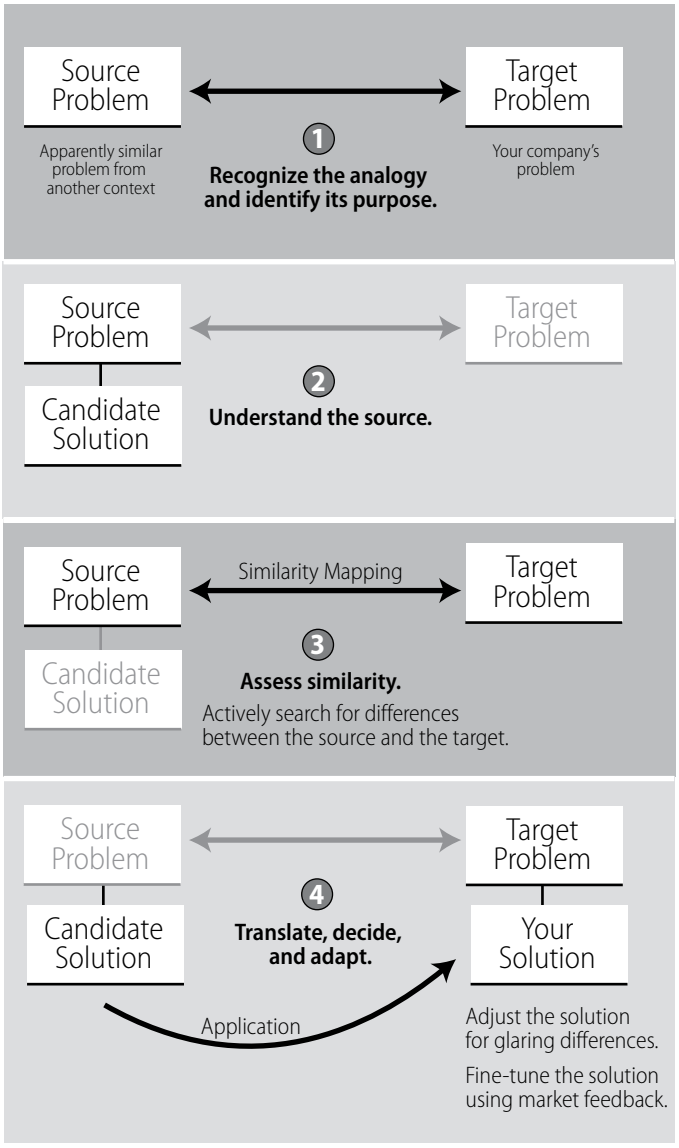
and like to be seen as right. But there is evidence from psychology that people are better equipped to confirm beliefs than to challenge them, even when they have no vested interest in the beliefs.

Consider an illustration. Experimental subjects in Israel were asked during the 1970s, "Which pair of countries is more *similar,* West Germany and East Germany, or Sri Lanka and Nepal?" Most people answered, "West Germany and East Germany." A second set of subjects was asked, "Which pair of countries is more *different,* West Germany and East Germany, or Sri Lanka and Nepal?" Again, most people answered, "West Germany and East Germany." How can we reconcile the two sets of results? The accepted interpretation starts with the fact that the typical Israeli knew more about the Germanys than about Sri Lanka and Nepal. When asked to test a hypothesis of similarity, subjects sought evidence of similarity and found more between the Germanys than between Sri Lanka and Nepal. When asked to test a hypothesis of difference, they sought differences and found more of them between the Germanys. Subjects search for the attribute they are prompted to seek—similarity or difference—and do not look for evidence of the contrary attribute.

Together, anchoring and the confirmation bias suggest real problems for strategists who rely on analogies. Having adopted an analogy, perhaps a superficial one, strategy makers will seek out evidence that it is legitimate, not evidence that it is invalid. Intel's managers will tend to look for reasons that microprocessors really are like steel; Circuit City will try to confirm that consumer electronics and used cars truly are alike. Given the variety of information available in most business situations, anyone who looks for confirming data will doubtless find something that supports his or her beliefs. Thanks to the anchoring effect, any contradictory information may well be disregarded. As a result, a company may continue to act on a superficial analogy for a long time.

Avoiding Superficial Analogies

It's often difficult to tell whether similarities between a familiar and an unfamiliar problem are deep or superficial. Managers facing strategic choices can improve their odds of using analogies well by following these four steps.



How to Avoid Superficial Analogies

Reasoning by analogy, then, poses a dilemma for senior managers. On the one hand, it is a powerful tool, well suited to the challenges of making strategy in novel, complex settings. It can spark breakthrough thinking and fuel successes like those of Toys R Us and Intel. On the other, it raises the specter of superficiality. Can managers tap the power of analogy but sidestep its pitfalls? The bad news is that it is impossible to make analogies 100% safe. Managers are especially likely to rely on analogical reasoning in unfamiliar, ambiguous environments where other forms of thinking, like deduction, break down. In those settings, it's

hard to distinguish the deep traits from the superficial. The good news is that four straightforward steps can improve a management team's odds of using analogies skillfully. (See the exhibit "Avoiding Superficial Analogies.")

Before laying out these steps, we must acknowledge our debt to political scientists, especially Harvard's Ernest May and Richard Neustadt, who found that analogical reasoning often leads policy makers astray. The approaches they developed to train such people to make better use of history have informed our thinking.

Recognize the analogy and identify its purpose. To defend against flawed analogies, a management team first must recognize the analogies it is using. Sometimes they are obvious. It is hard to forget that "digital rebar" is a reference to the steel industry, for instance. In other cases, influential analogies remain hidden. They often come from executives' backgrounds. Though Merrill Lynch's distinctive approach to retail brokerage owed much to the years that Charlie Merrill spent in the supermarket business, only occasionally did Merrill confess that "although I am supposed to be an investment banker, I think I am really and truly a grocery man at heart."

It's also important to identify *how* a company is using any analogies it recognizes. Managers use analogies for a variety of purposes, after all—to brainstorm, to communicate complexity, and to motivate employees, for example. (For thoughts on the uses of analogies, see the sidebar "A Versatile Tool.") Often, analogies are used to spark ideas and emotions. In such cases, creativity and impact may be more important than strict validity. But when a company moves from brainstorming to deciding, and when resources are at stake, managers need to ask tough, objective questions about whether the analogy is more than superficial. To answer these questions well, strategists must analyze chains of cause and effect. It is useful to break this task into three further steps.

Understand the source. Begin by examining why the strategy worked in the industry from which the analogy was drawn. The classic tools of strategy analysis are extremely useful here. Indeed, the key is to lay out in-depth analyses that are familiar to strategists, particularly analyses of the source environment, the solution or strategy that worked well (or that failed) in the original context, and the link between the source environment and the winning (or losing) strategy.

Consider Circuit City's effort to apply its retailing solution to the used-car business, and start by analyzing the source environment. When the company began its rise to prominence in the 1970s, the consumer electronics industry was dominated by mom-and-pop retailers of varying quality and efficiency. Burgeoning demand kept the retailers afloat, despite three negatives: Consumers were more committed to the national brands than to the retailers, the cost to switch from one retailer to another was low, and customers often feared that retailers were preying on their ignorance of high-tech products. The environment was marked by untapped efficiencies (for example, few economies of scale were exploited) and unmet customer needs (each store carried a limited selection of brands, and products were often out of stock).

Circuit City devised a highly effective strategy that took advantage of the opportunities and neutralized the threats in this setting. Key to the strategy was a series of fixed investments: large stores that could stock an exhaustive selection of consumer electronics, information technology that could track sales

A Versatile Tool

This article focuses on the use of analogy as a tool for choosing among possible solutions to strategic problems, but managers also use analogies for other purposes. Most important, analogies can be catalysts for generating creative options. Seeking outside-the-box ways to speed customers through gas stations, for instance, Mobil executives looked far afield—at the operations of race-car pit crews. And to improve service, they examined the world-class operations of the Ritz-Carlton hotel chain. Similarly, a management team might choose a company it deeply admires in a distant business and ask itself, "What would it mean to be the Wal-Mart or GE or Dell of our industry?" We see little danger in using analogies this way—as long as managers test any analogy carefully when they move from generating options to choosing among them.

Analogies are also powerful tools for communicating complex messages quickly. When the executives turning around Ducati began to speak of the legendary Italian motorcycle maker as an entertainment company comparable to Disney, they made it clear, to insiders and outsiders, that they planned to invest more in the experiential aspects of the brand and less in the physical product. Chosen well, analogies have an emotional impact that can rally a management team. By referring to cheap PCs as "digital rebar," Andy Grove sharpened his colleagues' fears that Intel could go the way of U.S. Steel. Sports and military analogies are often used in this way, to motivate teams.

patterns closely, automated distribution centers that were tied to the sales-tracking technology, and brand-building efforts. The company differentiated itself from competitors on the basis of selection, availability, and consumer trust. It simultaneously drove down costs. Circuit City's low prices and its other strengths led to extraordinarily large sales volumes, which reduced unit costs. Those cost reductions permitted lower prices, which drove even greater volume, and so on in a virtuous cycle.

Note how well this strategy matched the demands of the external environment. By meeting consumer needs and by building a brand that shoppers valued, Circuit City made it less attractive for customers to switch from store to store. As Circuit City's brand rose to prominence, as sales volume grew, and as customers came to rely on the recommendations of Circuit City's salespeople, the company became far more powerful in negotiations with suppliers. Investments in branding, distribution, information technology, and large stores raised new barriers to entry. And scale-driven cost advantages gave the company a powerful way to overcome smaller rivals.

The preceding three paragraphs lay out a chain of cause and effect that explains why Circuit City's original strategy worked in the consumer electronics environment. The strategist's goal is to figure out whether the causal logic holds up in the target environment. In preparing to make that analysis, the strategy maker will find it useful to compile two lists of industry features: those that play a crucial role in the causal logic and those that don't. In the Circuit City example, the list of crucial elements includes the following features of the pre–Circuit City electronics retailing industry:

- unsatisfied customer needs, especially for product selection, product availability, and trustworthy retailers;
- untapped economies of scale and latent, but largely unrealized, barriers to entry;
- a fragmented base of rivals, many of them weak;
- unexploited opportunities to apply information and distribution technologies for better inventory management;
- branded, powerful, reliable suppliers;
- modest switching costs among consumers; and
- an absence of goods that are close substitutes at the high end of the market.

At least one notable feature of the industry appears *not* to have played a major role in the causal logic, according to our analysis. Demand for consumer electronics was growing rapidly when Circuit City became a success, but the industry growth rate does not loom large in the causal story. The sheer size of the industry plays a role—without a critical mass of demand, economies of scale cannot be tapped—but the growth rate does not seem critical.

Assess similarity. The strategist now maps similarities between the source and the target and determines whether the resemblance is more than superficial. The understanding of the source that he or she has built up is crucial in this step. Rather than wrestling with the entire target problem, which is much less familiar than the source, the strategist can focus on the key features of the causal logic. The question is whether the source and the target are similar or different along these features.

Similarities usually spring to mind quickly. But the team must also *search actively for differences*, seeking evidence that each essential feature of the source problem is absent in the target. This process rarely comes naturally—it is often thwarted by the confirmation bias. The team should also do something else that doesn't come naturally: *ask whether the similarities are largely superficial*. The list of industry features that are *not* crucial in the causal logic

Background of the Work

Field research sparked our interest in analogical reasoning. While exploring the origins of strategies in the Internet portal industry, we were struck by the prevalence of analogies. Discussions with managers and academic colleagues, along with personal reflections, led us to recognize the broader significance of analogical reasoning in strategy making. This recognition fueled a series of efforts, including a review of the literature on analogy in psychology, cognitive science, political science, and linguistics; an initiative to examine and improve the use of analogical reasoning in the MBA classroom; and development, with Wharton's Daniel Levinthal, of a simulation in which computer-modeled "managers" use analogical reasoning to solve strategic problems. Perhaps the crucial ingredient in the research is that we—the authors of this article—come from very different academic backgrounds. One of us was raised within Wharton's behavioral approach to management, which emphasizes the limits on human reasoning, and the other comes from Harvard's strategy tradition, which stresses the power of rational economic choice. Analogical reasoning lies in the middle ground between the two of us. It is a form of reasoning that is potent because it makes the most of bounded cognitive abilities.

is very useful in this step. If many of the similarities are on this list rather than the list of crucial correspondences, the management team should sound an alarm. The analogy may be based on superficial similarity.

Circuit City's entry into the used-car market illustrates the process of assessing similarity. In many ways, the target industry in the 1990s resembled the consumer electronics retailing industry of the 1970s:

- Many customers were unsatisfied with, and distrustful of, current retailers.
- Economies of scale and barriers to entry were limited.
- The industry was fragmented.
- Information and distribution technologies remained fairly primitive, even though the inventory was highly diverse.
- Consumers incurred few costs if they switched from one retailer to another.

Note that all of these similarities match crucial elements of the causal logic in electronics retailing. This bodes well for the analogy. On the other hand, there were important differences:

- In consumer electronics, Circuit City could rely on a large base of dependable, reputable suppliers. In contrast, most used-car dealers bought their autos from individual sellers or from wholesalers, some reliable and some not.
- The inventory of used cars was even more diverse than that of consumer electronics. It would be difficult to keep a predictable range of products in stock. This might make it hard for CarMax to detect sales trends quickly and adjust its inventory to meet demand. Moreover, the distribution expertise Circuit City had developed might not be useful in the used-car industry.
- It was not clear whether economies of scale existed or barriers to entry could be built in auto retailing.
- The used-car retailing market had an important substitute at the high end of the market: new-car dealers.

Translate, decide, and adapt. The final step is to decide whether the original strategy, properly translated, will work in the target industry. This step requires, first, that the management team say clearly what the strategy would look like in the new setting. Precisely what would it take to be the Circuit City of the used-car industry or the supermarket of toys? This requires some adjustment. Even the best analogies involve some differences between the source and the target settings. By now, executives have a sense of the most important differences, and, in translating the strategy, they try to make adjustments that deal with them. After the translation comes a go-no-go decision on whether to pursue the analogy in the marketplace. This involves a clearheaded assessment of whether the translated strategy is likely to fare well in the new context. If executives opt to pursue the analogy, they face another round of adjustment—adapting in the marketplace in response to feedback from customers, rivals, suppliers, and others. It is here, in the market, that managers truly learn how good their analogies are.

Circuit City's translated strategy bore a close resemblance to the company's electronics retailing operation. On lots of up to 14 acres, each CarMax superstore offered an unusually broad inventory of 200 to 550 vehicles. CarMax went to special lengths to foster customers' trust. It sold cars at fixed, posted prices, with no haggling. It hired salespeople with retailing experience, but *not* auto retailing experience, and gave them extensive training. CarMax compensated salespeople with a flat fee per vehicle sold rather than a fraction of the revenue they generated. The company also put in place a sophisticated inventory tracking system that mirrored the electronics retailing system, and it offered money-back guarantees and warranties that resembled those in Circuit City stores.

At the same time, CarMax adjusted the Circuit City formula to reflect the differences between the two settings. This required, for instance, that the company find reliable sources of used cars. Toward this end, CarMax placed well-trained buyers in each of its stores and offered to buy used cars directly from consumers, even those who did not intend to buy a vehicle from CarMax. The company started to sell new cars at some sites, in part to generate used cars from trade-ins. By 2002, individual consumers were CarMax's single largest source of used cars. Regardless of source, all CarMax used cars were thoroughly inspected and reconditioned before they were resold.

The diverse inventory of used cars presented a new challenge. No single used-car lot could show the full array of vehicles in CarMax's inventory. So CarMax developed a computer system that allowed consumers to peruse the company's full inventory. The system told

customers what was available nationwide and what it would cost to transfer a desired car to the customer's locale.

CarMax was neither an immediate nor an unmixed success. It took Circuit City most of a decade to tailor its formula to the used-car market. The company built some stores that were too large and adopted an overly ambitious rollout plan, and price wars in the new-car market and expansion by other used-car superstores occasionally hurt its stock price. Nonetheless, the effort to reproduce Circuit City's success in the used-car industry has produced a viable company with revenue of $4.6 billion in fiscal year 2004, a return on sales of 2% to 3%, a multibillion-dollar market capitalization, and equity whose returns have roughly matched the S&P 500's since the IPO in 1997. This positive outcome reflects the close resemblance between the electronics retailing industry and the used-car industry, especially in features pertinent to the causal logic of the original success. It also reflects the company's careful attention to the essential differences between the industries—or at least the company's ability to adapt to those differences.

A critical question in this final step is how much a company should translate the candidate solution, on the basis of forethought alone, before launching it in the marketplace. In studying the transfer of best practices within companies, say from one bank branch to another, Insead's Gabriel Szulanski and Wharton's Sidney Winter have found that managers overestimate how well they understand cause and effect relationships and, accordingly, adjust too much on the basis of forethought. This lesson applies to analogies, too. It makes sense to adjust a candidate solution beforehand to account for glaring differences between the target and the source. But in novel, uncertain environments, where strategists rely the most on analogies, it is often wise to hold off on fine-tuning the solution until the market can give its guidance.

Toward Better Strategic Choices

Analogies lie on a spectrum. At one end lie perfect analogies, where the source and target are truly alike on the dimensions that drive economic performance. The toy retailing industry of the 1950s deeply resembled the grocery business, much to the benefit of Toys R Us, and the demands on Toyota's kanban system closely mirrored those related to supermarket reshelving. At the opposite end of the spectrum are profoundly problematic analogies, such as Enron's comparison of broadband and natural gas trading, that are based on superficial similarities yet plagued by underlying differences. The vast majority of analogies fall somewhere in between—they're imperfect but useful. The challenge is to get the most out of them. In our experience, the best users of analogy harness deduction and trial and error to test and improve the analogies that lie in the middle of the spectrum. Intel's analogy involving the steel industry, for instance, was supported by a deductive theory of cause and effect—Clayton Christensen's ideas about disruptive technologies. It also drew strength from trial-and-error experiments that gradually refined Intel's approach to the low end of the microprocessor market, much as Circuit City's adjustments served to fine-tune CarMax's strategy. Managers who wish to tap the great power of analogy and sidestep its pitfalls must master multiple modes of thought.

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