Organizational Learning from Performance Feedback

A Behavioral Perspective on Innovation and Change

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1 Introduction

This book is about how organizations react to performance feedback. It presents a theory of organizations learning from their experience by collecting performance measures, creating aspiration levels based on their own past performance or that of other organizations, and changing organizational activities if the performance is lower than the aspiration level. The mechanism is one of simple self-regulation by attempting to reach a goal not currently met but not seeking, in the short run at least, to go further than the level that just achieves it. Organizations with performance below the aspiration level of their managers have higher rates of strategic change, R&D expenditure, innovation, and investment. These activities influence the performance and risk of the organization, but otherwise they have little in common. All are affected by the organizational performance because managers are willing to try a wide range of strategic actions to solve a problem of low performance.

We can see this reaction to performance feedback reflected in the behavior of individual firms. After the Japanese car makers had great successes in the 1980s US auto market, General Motors was still the world's largest auto maker and the dominant firm in the USA. It was doing less well than it had in the past, however, with its domestic market share in cars falling from 49% in 1980 to below 40% in 1987.[1] During this period, General Motors implemented a remarkable series of projects to make up for the perceived shortfall. It continued a massive investment program in its factories that had been announced in 1979 and aimed to make GM's manufacturing more automatized than that of any other car maker. This program would eventually cost $40 billion, making it perhaps the largest non-government investment program in history. GM started collaborative manufacturing with Toyota in the now-famous NUMMI plant, and took equity positions in foreign car makers such as Suzuki, Isuzu, Nissan, and Daewoo. GM supported this push into Asia by building a

[1] This paragraph is based on information in three Harvard Business School cases (Badaracco 1988; Green 1993; Keller 1994).

Japanese-style supply network complete with equity positions in key suppliers and a supplier association, departing from its usual practice of obtaining supplies internally or from competitive bidding. It made the new car brand Saturn, which was managed by a subsidiary that incorporated several innovative design, manufacturing, and marketing practices, and was located in Tennessee, outside GM's Midwest manufacturing belt. The facility investment program was initiated before the falling market share had become a palpable problem, but was continued unwaveringly after the reduced sales might have suggested that it would lead to excess capacity. The other change activities were initiated after the fall of market share had become a problem, and seemed to be ways of searching for solutions to it. In particular, both Saturn and the Asian alliances focused on the small car market, where General Motor's market share decline was particularly pronounced.

General Motors is an extremely large organization, so the scale and scope of its change activities would be difficult for others to match. The basic pattern of changing in response to disappointing performance is well known across many industries and organizational sizes, however, so it is clearly not special for GM. Intel shifted its market strategy from computer memories to microprocessors after finding itself losing the battle over market share, and thus economies of scale, in each successive generation of computer memory (Burgelman 1994). In 1988, the small Japanese company Nichia Chemical started research on blue LEDs (light-emitting diodes), a technology that had frustrated the development efforts of much larger firms, after having entered successive markets with semiconductor products and found itself beaten by established competitors every time (Johnstone 1999). It would eventually become the first company to commercialize a blue LED, and its success in developing this technology is as remarkable as the fact that such a small company attempted a research project with so high risk and expense in the first place.

The routine of searching when the organization is doing poorly but not when it is doing well is a central part of managerial lore. When the search for solutions succeeds it is called a "turnaround," and it is a milestone event in the career of the responsible manager (Dumaine 1990). When the firm fails after searching for solutions but not finding any that work, the search may be referred to as "floundering" and, with the benefit of hindsight, seen as misdirected or futile (Saporito 1998). These post hoc judgments based on the outcomes obscure the similarity of the behavior: troubled firms seek to change (Bowman 1982), and since the result of strategic changes is nearly always uncertain, large gains or losses are both possible. Turnaround and floundering are different post hoc evaluations, but they start the same way.

Searching for solutions when doing poorly is one side of the coin; the obverse side is the failure of successful organizations to search for ways to improve. This is called the "competence trap" (Levitt and March 1988) or "paradox of success" (Audia, Locke, and Smith 2000), and a good indicator of its prevalence is all the talk about the importance of continuous improvement in the managerial literature. Rigid adherence to a high-price, low-volume strategy with no licensing of the operating system proved to be Apple's bane in the late 1980s (Carlton 1997), but the immediate profits of this strategy were so large that management did not consider its long-term consequences. The strategy conceded so much market share that Intel and Microsoft gained strong footing for launching their Wintel challenge, leaving Apple with a long uphill battle for higher market share which, as one might expect, it started after the performance fell. Such lack of foresight is not a sign of unusual managerial ineptness, but seems common in firms that are doing well. A well-known symptom of competence traps is the late and tepid response of successful firms to new technologies that threaten their market (Christensen and Bower 1996; Cooper and Schendel 1976; Tushman and Anderson 1986).

While the cases suggest a general pattern of changing in response to low performance, they leave many important details open to question. The first issue is what exactly is meant by low performance. The feeling of crisis in General Motors was triggered by a fall in market share, but GM was still the largest automaker in the US and the world by a wide margin. This was not good enough for GM's managers, however, as the experience of being the world's dominant automaker since the 1920s (Carroll and Hannan 1995a) had left them expecting a higher market share than their competitors. Similarly, GM's profits were still high at the time that many of its change efforts started, but not as high as they had been. It turns out that there is no clear delineation of high and low performance on the measures that managers use to evaluate their organizations, only rough rules of thumb. Managers set their own standards for what level of performance is desired. Such standards, which will be called aspiration levels here, are influenced by the organization's history and its competitors' performance. The mechanisms for adjusting aspiration levels are an important part of research on performance feedback in organizations.

The second issue is whether organizational responses to low performance are as strong as they should be. There is ample evidence of organizations failing to change even when their performance is low (Lorenz 1994; Meyer and Zucker 1989; Starbuck and Hedberg 1977), contrary to the suggestion that adversity spurs change (Ocasio 1995). Indeed, General Motors was criticized for passivity in spite of all the changes it made in response to the fall in market share (Green 1993). Such criticism sometimes seems unfair, but it raises an important point. Organizations

may change in response to low performance, but still not change *enough* to solve the problem. Whether organizations make enough changes or not is a question of the functional form of the relation from performance to organizational change. The critique that organizations make insufficient changes in response to low performance does not mean that they do nothing, but rather means that organizational failure spurs change less effectively than organizational success reduces change. As will become clear later in the book, improved performance will often cause the rate of organizational change to drop by a considerable amount, but a deterioration of performance of the same size results in a barely perceptible increase in the rate of change. This asymmetry in the response to success and failure suggests that organizations react conservatively to negative performance feedback: managers seem willing to believe that all is well until they have been presented with strong proof to the contrary. Organizations and individuals have powerful defenses against radical changes (Hannan and Freeman 1977; Kuran 1988), and these make it possible for organizations to change without changing enough.

Third, one may wonder whether it makes sense for successful organizations to be inert. Should managers "leave good enough alone" and only fix the organization when it is broken? The case for recommending changes in successful firms is usually built on environmental changes, such as changes in markets and technologies. Environmental changes can cause the competitive strength of a successful firm to erode if it does not adapt. This argument is true, but it is limited to highly dynamic environments. A more general case for changing successful firms can also be made. Managers of successful firms may have ideas for how to press their advantage so that the firm can become even more successful. The ideas may be untried and risky, but so are changes done in unsuccessful firms. Why are such ideas often rejected in successful organizations? The answer is that the same amount of risk is less appealing to managers of successful firms than managers of unsuccessful firms. Later I will show that this risk aversion in successful firms makes sense in some competitive environments, but not in others.

Finally, there is a question of how general the pattern of changing in response to low performance is. Case studies are suggestive, but do not prove that performance feedback is a mechanism of change. There are so many organizations in the world that it would probably be possible to find cases supporting any theory of why organizations change, including weird theories like sunspot cycles.[2] To present a strong case for performance

[2] There *is* a theory of sunspot cycles and economic activity. It does not suggest that sunspot cycles directly cause economic cycles, but rather that beliefs in economic cycles that follow sunspot cycles can cause them to happen through behaviors that cause the expectations to be self-confirming.

feedback as a regulator of organizational change, it is necessary to analyze the behavior of broad samples of firms under a variety of conditions. One of the aims of this book is to present systematic evidence on how search and risk taking is guided by performance feedback. The evidence gets depth from covering the behavior of individuals, organizational subunits, and whole organizations, and it gets width from covering multiple nations, industries, and change behaviors. Performance feedback effects on risk taking, research and development expenses, innovations, and market niche changes have been studied extensively. All are potentially important for the performance of organizations, so it is reasonable to expect that managers will change them in response to performance feedback.

The mechanism of initiating search and change activities when the organizational performance falls below the aspiration level is very simple and intuitive. The simplicity is part of the appeal of this theory, but it is not its sole basis. The second appeal of the theory is that it appears to be true: it has been tested repeatedly with highly supportive results. The third is that it is general: performance feedback affects many behaviors of many different organizations and environments. The final and perhaps decisive appeal of the theory is that it is important. The behaviors that are affected by performance feedback are uncertain and consequential strategic choices; they rank among the most important decisions a manager can make.

Performance feedback theory has direct precursors in both the organizational and the psychological literature, and thus integrates ideas that have been pursued by a diverse set of researchers. Performance feedback has been on the agenda of organizational researchers since the behavioral theory of the firm (Cyert and March 1963). Psychologists have been interested in performance feedback effects on risk taking and other adaptive behaviors (Kahneman and Tversky 1979; Locke 1978), and have investigated how individuals seek to evaluate themselves by creating aspiration levels from available information (Lewin et al. 1944). Economists have examined how performance feedback affects the economic adaptation of individuals (Crawford 1995). This deep rooting in different research traditions also makes performance feedback theory noteworthy. Researchers interested in how organizations behave should be reassured by seeing that so many theoretical assumptions are supported at the level of individual decision making. Researchers interested in how individuals behave should be gratified by seeing experimental findings confirmed by research on high-stakes decisions made by professional managers. Most importantly, the convergence of findings from research done by many different methods and in many different contexts offers additional assurance that this is a good model of how organizations behave.

The work presented here has been motivated by curiosity about how individuals and organizations react to success and adversity. Many puzzles in human behavior have caused researchers to wonder what kinds of thinking processes cause them and why these differ from some of our normative ideas of how rational persons should react. Similar puzzles in organizational behavior have made us speculate about the mechanisms that can cause an apparent need to change a given organization and the actual change to become so loosely coupled. Though driven by curiosity about how individuals and organizations function rather than a specific desire to repair them, the research has clear implications for how organizations should collect and interpret measures of performance. It turns out that the responses to performance feedback predicted by this theory have a form that can give organizations adaptive results such as a high chance of survival and high performance. The basic behavioral rules are not defective. They can be fine-tuned, however, and how these rules are applied can make an important difference to an organization's life span and performance. This gives the theory considerable practical value for those who design and manage organizations.

Although performance feedback theory can offer useful advice, it also points out some organizational dilemmas. Managers face some decision-making problems where uncertainty about future conditions leaves them with no options that are clearly best, only a tradeoff between different forms of risk. The tradeoff is remarkably similar to the tradeoff between type I and type II errors in scientific research: the error of overlooking something (type I) and the error of falsely detecting something (type II). It is seen in the choices of how often to evaluate the performance of the organization and how to react to small deviations from the aspiration level. Frequent evaluation and reaction to small deviations would create hair-trigger management with changes in response to small performance signals. Managers would be very quick to discover actual deterioration of performance, but would also be prone to implement changes in response to low performance caused by incorrect measurement or singular events in the environment. They would rarely overlook problems, but would often react to problems that do not exist. Conversely, managers can evaluate performance in ways that cause them to react only when a real problem exists, but to overlook many problems. The tradeoff between these approaches to evaluating organizational performance depends on the relative costs of errors of omission and commission, which are unknown to managers because they are borne in the future and depend on the types of errors made.

Another tradeoff is seen in the choice of how specific the performance measurements should be. It is possible to have rough measures of overall

performance that will tell a manager that something is amiss, but not exactly what. The overall profitability of an organization would be such a measure. It is also possible to have very specific measures that suggest which organizational process is causing the problem. Testing the quality of inbound parts and outbound products in a factory, for example, gives specific measures on the quality of the production process. Current advice to managers is to have many specific measures so that problems can be identified and solved quickly (Kaplan and Norton 1996), which represents a return to the roots of cost accounting after a period of management by overall financial measures (Johnson and Kaplan 1987). There is a tradeoff here, however, because very specific measures could signal a problem in a different part of the organization's operations than the one with the actual problem. Organizations are bundles of interdependent activities, so problems in one process can affect the output of related processes. For example, the quality of outbound products is not determined by production management alone, but also by factors such as product design and human-resource management. The tradeoff between general and specific performance measures depends on how the costs of not knowing where to search for problems compare with the costs of searching for problems in the wrong places.

A third dilemma lies in the different uses of performance feedback systems in organizations. Throughout this book, performance feedback is analyzed as a diagnostic tool that managers use to discover problems in the organization and initiate search and decision-making activities. Performance feedback as a diagnostic tool relies on a theory of managers as boundedly rational actors who are seeking to improve the organizations under conditions of uncertainty. There is also another view of performance feedback. Performance feedback systems in actual organizations are often found as a part of incentive schemes that reward managers for reaching certain performance levels, as in stock-option grants and bonuses linked to accounting measures of performance. Performance feedback as an incentive device relies on a theory of managers who are rational enough to know how to improve the organization, but will only do so if they are rewarded for it. Theories of incentive systems design exist (Milgrom and Roberts 1992), but have difficulty incorporating issues of bounded rationality. The result is that the diagnostic and incentive views of performance feedback yield conflicting advice, so managers need to make choices between these two uses of performance feedback.

It should be clear that performance feedback theory speaks to important issues in the management of organizations. Before drawing more detailed implications, however, we need to get into the core of the argument. The book is organized as follows. In chapter 2, the foundations

of the theory of performance feedback are discussed. The theory is an outgrowth of the behavioral theory of the firm (Cyert and March 1963), and section 2.1 explains this theory and its concepts of organizational goals, aspiration levels, and search. These are central concepts in the explanation of how organizations respond to performance feedback. The theory has also benefited from psychological theories of goal-oriented behavior, which are reviewed in section 2.2. These theories reinforce the ideas of the behavioral theory of the firm, but they have inspired an additional concern with the role of risk taking in organizational change. Learning from performance feedback is also becoming an important issue in economics, and some recent economic experiments are reviewed in section 2.3.

Chapter 3 develops the theory in detail, and explains why aspiration levels are important and how they are formed (section 3.1) and affect organizational change (section 3.2). This chapter integrates the ideas of chapter 2 and develops a single model of organizational response to performance feedback that will be used to interpret the research in chapter 4. In addition, simulation models of how aspiration levels affect organizational change and performance are covered in section 3.3. This section introduces an important idea of this book: learning based on performance feedback and aspiration-level adjustment can help the organization adapt to its environment. Section 3.4 completes the theory by describing how managers select goal variables for the organization.

Chapter 4 reviews research on the effect of performance feedback on important organizational behaviors. First, the direct effects of performance relative to aspiration levels on risk taking by managers and organizations are reviewed in section 4.1. Next, processes that reflect organizational search are treated. Research and development intensity, which is the most direct organizational indicator of search, is considered in section 4.2. The launching of innovations results both from successful organizational search for alternative behaviors and from managerial acceptance of risk, and is thus a good opportunity to see how these processes work in tandem. Effects of performance feedback on the rate of innovation are shown in section 4.3. Similarly, investments in production facilities reflect both search processes and risk preferences, and are treated in section 4.4. Finally, change of the organization's product-market strategy is one of the most fateful decisions a manager can make, and should strongly reflect risk preferences and search processes. It is treated in section 4.5.

Chapter 5 treats some advanced topics of interest to researchers on performance feedback in organizations. Section 5.1 reviews the basic methods for estimating performance feedback effects directly from data on aspiration levels or indirectly from data on organizational changes in

behavior. Section 5.2 discusses how to estimate social aspiration levels based on the performance of other organizations and historical aspiration levels based on the focal organization's past performance. It also introduces the problem of estimating how quickly the organization updates its historical aspiration level and presents methods for solving this problem. Section 5.3 gives a general discussion of how performance feedback studies should be designed, and sections 5.4 and 5.5 describe the radio station and shipbuilding data used in chapter 4.

Chapter 6 gives concluding remarks. In section 6.1, the practical implications of the theory are developed further with reference to the empirical findings. This section covers the important questions of how adaptive the observed behaviors are and how organizational decision making can be designed to take advantage of learning from feedback. The dilemmas mentioned earlier in this chapter are again addressed there, but now with the added knowledge from empirical research on performance feedback. Section 6.2 discusses the links between the theory of performance feedback and other theories of strategy and organizational change. Performance feedback theory predicts the timing and form of organizational change, which are important issues in other theories of organizational learning and cognition, as well as in institutional theory and population ecology. These theories can be developed by incorporating the insights of performance feedback theory, and performance feedback theory can also learn from them. Section 6.3 discusses gaps in our current knowledge and makes suggestions for research needed to fill them. It gives a road map for how performance feedback theory can be improved by better theory and additional empirical research.

The book contains a variety of material, and there are many ways of reading it. Chapter 3 is the core of the argument, and some readers may wish to read it first. The cost of doing so is the loss of chapter 2's introduction to the theoretical problems that chapter 3 seeks to resolve, but the benefit is to reach the main argument more quickly. The sections in chapter 4 are ordered according to my judgment on how the behaviors studied fit on the search and risk dimensions. Pure risk and pure search are treated first, followed by outcomes that incorporate both of these dimensions. The sections of chapter 4 do not build on each other, so they can be read in any order. Readers with a strong interest in one of the subjects can go directly from chapter 3 to their favorite section. Chapter 5 is rather technical, and is put before chapter 6 mainly to follow the convention of placing conclusions last. Many will wish to look at chapter 5 after reading chapter 6. Especially impatient and practically oriented readers may wish to go directly to section 6.1, but will probably find this discussion easier to follow after reading chapter 3.