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**Superstitious Learning in Strategic  
Events: Theory and Evidence from  
Corporate Acquisitions**

# Superstitious Learning in Strategic Events: Theory and Evidence from Corporate Acquisitions

by  
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# Superstitious Learning In Strategic Events: Theory And Evidence From Corporate Acquisitions

## Abstract

In this paper, the notion of superstitious learning is extended to encompass both causal ambiguity (Levit and March, 1988) and outcome ambiguity phenomena. I argue that superstitious learning is a particularly relevant problem in strategic events not only because causal linkages between actions and outcomes might be poorly inferred, but for the more basic reason that their performance outcomes are often very difficult to assess in objective ways. Experience accumulation, in these conditions, not only might not be helpful but could even hurt the learning process, with negative performance consequences. The conditions defining the boundaries of the phenomenon are then considered: two mitigating factors are identified in the heterogeneity of the stock of accumulated experience and in deliberate learning processes. I test these arguments with a sample of US bank mergers and find evidence that managers' self-attributions of success in previous acquisitions is negatively related to the actual performance of the focal merger, and that this effect *increases*, rather than reducing, as they accumulate experience. Consistent with the theoretical arguments developed, the effect is significantly attenuated as the stock of experience becomes more heterogeneous and knowledge is systematically articulated and codified.

**Keywords:** Organizational learning, Superstitious learning, Over-Confidence, Learning curves, M&A, Mergers, Acquisitions, Knowledge codification, Experience heterogeneity, Banking

## INTRODUCTION

Superstitious learning was introduced as an organizational level phenomenon by Levitt and March (1988), who defined it as a situation in which “the subjective experience of learning is compelling, but the connections between actions and outcomes are misspecified” (Levitt and March, 1988: 325)<sup>1</sup>. Despite the potential seriousness of the phenomenon for our organizational learning and evolution models, we are currently still missing a complete theory of superstitious learning. We do not have, in fact,: (a) a generalizable and researchable conceptualization of the phenomenon, since the current definition might exclude important aspects of the problem (see below); (b) a description of the mechanisms underlying it, its possible antecedents, and of the its consequences; (c) any clear guidance on how to operationalize the construct, how do we know that superstitious learning about a specific task exists in a specific company at a given time? Finally, we are missing (d) an appreciation of the boundaries of the phenomenon, that is an identification of the factors that might exacerbate or reduce the likelihood of its occurrence and/or its effects.

In this paper, I intend to contribute to our current understanding of superstitious learning in the context of rare and complex organizational tasks in different ways. First, by adding to the current conceptualization of the phenomenon, based on causal ambiguity an additional, complementary, one based on *outcome* ambiguity, defined as the degree of uncertainty related to the assessment of the outcomes consequent to a given decision or to the execution of a given task. It is clear that causal ambiguity is a secondary order problem to that of outcome ambiguity, in the sense that outcome ambiguity causes causal ambiguity but the reverse is not true. Of course, both types of ambiguity can (and do) co-exist, and they are

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<sup>1</sup> The notion is itself rooted in a long research tradition in psychology, dating back to the first experiments B.F. Skinner (1948) conducted with pigeons. The startling result of that early study was that, as food was dropped in the cage at regular time intervals, the animals started to develop patterns of behavior connected to whatever they were doing before the first few times the food appeared. Apparently, they were connecting their behavior (e.g., pecking in a certain part of the cage or walking in circles) to the desired outcome of receiving food.

normally difficult to dis-entangle. In this paper, I submit that superstitious learning, consequent to both causal and outcome ambiguity, is a particularly problematic phenomenon in the context of complex and rare strategic decisions such as acquisitions, partnerships and reorganizations.

Second, by developing a model of the conditions under which one would expect the superstitious learning problem to be more or less severe, from which a set of testable hypotheses are derived. In particular, I will argue that under conditions of high outcome ambiguity (and consequent causal ambiguity), experience accumulation will likely exert a negative effect on performance outcomes, since overconfidence effects might overtake the competence building processes that can potentially be generated by increasing stocks of experience.

Third, by offering a first empirical test of the model in the context of a particularly complex and relatively infrequent organizational task, such as the management of corporate acquisitions. The model includes one constraining condition related to the magnitude of the stock of prior experience and two enabling conditions related to the degree of investment in deliberate learning processes and the heterogeneity of the stock of prior experience.

#### SUPERSTITIOUS LEARNING FROM OUTCOME AMBIGUITY

The theory development will be presented along the following four steps. First, I draw on the cognitive psychology and decision science literature to develop the basis for a specific type of superstitious learning based on outcome, rather than causal, ambiguity. Then, this notion of superstitious learning is applied to the context of rare and complex events, arguing that this type of aberrant learning process might be especially problematic with these types of tasks or decisions. Finally, a model is derived with both enabling and countering factors offered for empirical validation.

## **An Outcome-Based Type of Superstitious Learning**

The problem of overconfidence in one's own competencies has been extensively studied at the individual level of analysis in psychology and in decision sciences by assessing the relationship between the accuracy of judgment and the judge's degree of confidence in the quality of her own decisions. The typical result is that the gap between the accuracy levels of their judgments and their confidence levels in their accuracy is significant (Lichtenstein and Fischhoff, 1977; Dunning et al., 1990; Vallone et al. 1990; Ayron and McLeiland, 1997), although its magnitude depends on several factors including the type of task performed and the way the confidence assessment is measured (Klayman et al., 1999; Soll and Klayman, 2004). Interestingly, experience levels do not seem to influence the magnitude of overconfidence (Oskamp, 1965); the correlation between accuracy and confidence has been found to be invariant to experience levels (Lichtenstein, Fischhoff and Philips, 1982)<sup>2</sup>. For example, experts in crucial judgment tasks such as medicine (Goldberg, 1959; Oskamp, 1965) and witness testimony (Deffenbacher, 1980) show invariant levels of overconfidence in the quality of their judgments with respect to their level of expertise and low correlation between the overconfidence levels and the degree of actual accuracy. That means that in certain complex tasks, experience does not attenuate the overconfidence problem, and even the actual competence level (measured in terms of accuracy of judgment, rather than simply proxied by the stock of experience) might not reduce it.

However, some experts do seem to exhibit little or no overconfidence effects. They are those related to professions with extremely frequent and precise performance feedback

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<sup>2</sup> Note that even if overconfidence is high, say a difference between accuracy and confidence levels of 20%, the correlation between the two measures can still be very low (the magnitude of confidence varies wildly depending on the accuracy levels) or close to perfect correlation (e.g. the gap remains constant at 20% no matter the level of accuracy). Clearly, a positive correlation is a "second-best" desirable feature, with the absence of overconfidence being the "first best" feature of a decision-maker. If there has to be a decision-making bias in excessive confidence levels, at least let it be of stable (and somewhat predictable) magnitude at different levels

mechanisms, like whether forecasters and book-makers (Ronis and Yates, 1987). The difference, therefore, between positive and negligible effects of experience accumulation on the quality of individual decision-making might be connected to the frequency and the precision of the performance feedback. In tasks characterized by fuzzy, or even undefined, performance metrics, therefore, one could expect that experience accumulation might create overconfidence vis-à-vis one's own competence levels, that is, generating superstitious learning of a different type from the one that March and Levitt (1988) described in their application of individual overconfidence theory to organizational level learning processes. A type of superstitious learning based on the difficulty to accurately assess the *outcomes* of a given task, rather than on the difficulty to specify its the cause-effect linkages.

### **Superstitious Learning in Strategic Decisions**

The intuition based on the findings reviewed above from the cognitive psychology and decision science literature is that the characteristics of the task, and particularly the quality of the performance feedback, might influence in a significant way the role that the experience accumulation plays in the quality also of organizational decision-making, the development of collective competencies, in brief it might influence the quality of the organizational learning process.

The central argument in this paper is that the quality of the learning process might be particularly poor<sup>3</sup> in the context of strategic decisions. Consider, for example, the decisions on how to expand in a given product or geographic market, the launch of a major restructuring or cultural change plan, the structuration of a partnership with another organization, or the design of a post-acquisition integration plan. There are several reasons why organizational learning processes that should improve, in time, the expected performance

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of accuracy in the judgment task.

<sup>3</sup> By quality of the learning process I mean, prima face, the effect of experience accumulation on the

outcomes of these decisions, might be impaired. First, these events are *rare* compared to those that characterize the standard operating life of an organization (production, procurement, sales, administration, etc.), which clearly reduces the availability of observations necessary to test the (implicit or explicit) assumptions managers carry on “what works and what doesn’t” in the execution of a given plan (Brown and Duguid, 1991; March, Sproull and Tamuz, 1991). Second, strategic decisions, even if they belong to the same “type”, are often highly heterogeneous in nature. This engenders significant barriers to learning processes, due to the difficulties that decision-makers are expected to face when they adopt analogical thinking to prior experiences to the focal decision (Gavetti, 2005; Gavetti, Levinthal and Rivkin, 2005). Third, they might be *complex* in the sense that the interdependence between multiple decisions as well as implementation actions is often particularly high. In other words, each of them influences a whole host of outcomes that are also influenced by many other decisions and actions. This makes it very hard to tease out which decision or action caused which outcome, and thus creates the *causal ambiguity* that March and Levit (1988) refer to when they describe the superstitious learning phenomenon.

However, there is at least one more reason why strategic decisions might generate aberrant learning processes. This has to do, as the intuition developed above at the individual level proposes, with the quality of the performance feedbacks in these strategic tasks. What is the performance of a re-organization process, exactly? How do we know that a cultural change program worked? What does it mean that a given strategic move, say repositioning the firm from a cost efficiency-based towards a differentiation-based competitive position, has “created competitive advantage” (let alone of sustainable nature)? Many strategy implementation processes, such as acquisitions and partnerships, for example, are characterized by fairly fuzzy performance outcomes if one moves beyond the single task level

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performance of a given task, in the spirit of the learning curve literature (Yelle, 1979; Argote, 1999)

(e.g. integrating the information systems, or creating a common brand). Labeling most acquisitions or alliances a “success” or a “failure”, in fact, typically requires extra-ordinary inquisitive efforts and normally generates contentious argumentations among all the various functional groups involved to form a common view (Haspeslagh and Jemison, 1991).

The typical situation is that a major strategic decision generates, almost by definition, a large array of outcomes, most of which not even known to the organizational members unless an extra-ordinary learning effort is undertaken, and even those “known” are subjectively assessed by multiple parties with different viewpoints, interests and experiences. The consequence is that managers engaged in a strategic decision normally do not really know how well they have done with prior decisions and therefore they might be unable to put any effective learning process in motion, even before the “causal ambiguity” problem kicks-in. They are first of all blocked in their learning efforts by the fuzziness of the performance metrics, by “outcome ambiguity”.<sup>4</sup> It is worth noting that this phenomenon will typically be at the origins of, but is not logically influenced by, the presence of superstitious learning generated by causal ambiguity. The degree of fuzziness in the performance metrics will, in fact, exacerbate the problems connected to the specification of the cause-effect linkages (March and Levitt, 1988), but the opposite is not true (causal ambiguity does not influence the fuzziness of the performance metrics).

If this is the case, then it is both interesting and important to address the following questions: (1) how can we detect the presence of superstitious learning in the context of strategic events, typically generated by a combination of causal and outcome ambiguity? (2) what factors might influence (positively or negatively) the extent to which superstitious learning phenomena operate?

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<sup>4</sup> This is akin to the case of the expert witness studies (Deffenbacher, 1980), where the “goodness” of a trial decision is hardly assessable, penalizing the experts’ ability to diagnose their own capacity to offer

## **A Model of Superstitious Learning in Strategic Events**

These research questions require the careful development of a series of causal argumentations, that are summarized in the model presented in Figure 1.

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Insert Figure 1 about here  
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The first, and fundamental, causal linkage presented in the proposed model ties in a negative relationship the perception of prior success in past strategic decisions with the “actual” performance of the focal decision. To see why this is the first necessary condition for the presence of superstitious learning, consider the two extreme cases in which a group of managers are either convinced that their past decisions in the same type of strategic events have been either extremely successful or fared very poorly. In the former case, the overconfidence effect created by the excessively positive assessment of the quality of their prior decisions will increase the likelihood of poor decisions in the focal context, with negative performance implications. For example, in the context of corporate acquisitions, a group of managers convinced of having developed a sophisticated capacity to design and execute an integration plan might incur in mistakes such as trying to integrate either too much, or too fast, or too aggressively, the acquired company in the focal strategic event. This is clearly likely to generate poor performance from the focal acquisition, offering the first element of logical support to the negative causal linkage in the proposed model. At the opposite extreme, the conviction of having done poorly in past strategic events is likely to spur a search process for improved or superior post-acquisition integration process. This further corroborates the hypothesized effect of a negative correlation between the perception of past success and the actual performance of the focal event.

Putting together both arguments developed at the extreme of the distribution of perceived past

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**sound opinions, and thus stalling improvement potential over time.**

success, the negative sign of the linkage between perceived past successes and actual performance outcomes in the current environment generates the following testable proposition:

**H1: Perceptions of success in prior strategic decisions will negatively influence the actual performance of the focal one.**

One relatively simple critique to H1 consists in the observation that the hypothesized effect might be due to a “regression to the mean” phenomenon, which would also produce a negative correlation between the perception of past performance outcomes and the actual performance of the focal decision (Greve, 2000; 2003). Also, one can observe that learning processes are only described as mechanisms for the negative impact in H1 to occur, but no direct effect of experience accumulation or other learning processes is explicitly considered.

To this end, the model proposed offers a more stringent condition to ascertain the presence of superstitious learning in organizational contexts. That condition requires that the negative association between perceptions of past success and the actual performance of the focal event should be enhanced, rather being attenuated, by the accumulation of experience in the strategic event. Learning will thus be superstitious not only when perceptions of one’s competences are systematically poorly assessed, but when this in addition occurs more and more as experience accumulates. How can that happen? Recall that outcome ambiguity does not allow managers to know with sufficient confidence the performance of their past decisions and actions. Under these conditions, experience accumulation can have a negative effect because the more uncertain is the measurement of the performance variable, the more likely it will be that the actors will adopt the stock of experience accumulated as a proxy for their competence level. Since they are not really sure if the previous trials sorted a positive or a negative outcome, managers might revert to the sole sure piece of information they have: the number of prior experiences accumulated in the execution of the given task, which then might

become a convenient proxy of their self-assessed level of competence.

If there are no particularly strong negative feedback signals from their past experiences, then the fact of “having done it already” a number of times in the past might be sufficient to claim the achievement of superior competence levels. The consequence is that experience accumulation in the same type of strategic decision will reinforce the problem described above. The overconfident group keep on strengthening their unfounded beliefs about their competencies, whereas, in the opposite case, the underconfident group will keep on searching for better solutions (at a given search cost) even though the need to search would be diminishing as the actual performance would actually improve.

This scenario, building primarily on the outcome ambiguity assumption, would be the ultimate test for the presence of superstitious learning at an organizational level, and can be stated in the following formal terms:

**H2: The greater the firm’s prior experience in a given strategic decision, the stronger the negative effect of perceptions of success in prior strategic decisions on the performance of the focal decision is expected to be.**

### **Boundaries of Superstitious Learning**

If these are the necessary conditions to detect the presence of superstitious learning of both causal and outcome ambiguity type, what might be the “boundary conditions” of the phenomenon? Surely it would be hard to imagine that, once fallen into this loop, any organization will keep on seeing matters getting worse and worse. A complete model of superstitious learning calls also for the presence of counteracting forces to those described above.

A number of such contingencies have been described in prior literature and related to the characteristics of the management team, the organization and the environment in which the organization operates. The degree to which managers adopt a participative and open style,

for example, should mitigate the tendency to self-attribute successes or superior competence levels (Wiersema and Bantel, 1992; Keck and Tushman, 1993). Organizational traits, such as high tolerance for diversity and risk and low centralization of authority, will in general, attenuate the negative effects of increasing confidence levels (Sitkin, 1992; Miller, 1993; Ocasio, 1995). Finally, environmental conditions characterized by higher degrees of uncertainty (Milliken and Lant, 1991), velocity in change dynamics (Brown and Eisenhardt, 1997) and heterogeneity in rivals' competitive profiles (Miller and Chen, 1994 and 1996) might facilitate multiple points of view and avoid biases in attributions of competence and success.

Although these arguments are compelling, it is interesting to observe that the factors closest to the problem — those related to the learning process itself — have not been given research attention. In an attempt to fill this gap, I submit that two factors might be important moderators of the link between perceptions of past performance and the actual task performance: (1) the degree of intentionality in the learning process; and (2) the breadth of search as reflected by the heterogeneity in the stock of experience.

The intentionality dimension can be assessed by studying the degree to which firms invest in the articulation and codification of their understanding of how to manage the task at hand. Deliberate learning processes can, and normally do, operate simultaneously with learning-by-doing processes, and it is inherently interesting to test for the relative efficacy of these mechanisms in different learning contexts (Zollo and Winter, 2002).

The second potential moderating factor — the breadth of experiential search — can be modeled by taking into account the degree of heterogeneity in the stock of experience accumulated at any given point in time. In synthesis, one could argue that both deliberate learning investments and experience heterogeneity tend to counteract the negative

consequences of experience accumulation, described above as confidence traps. The rationale for this argument is as follows.

**Deliberate Learning Processes.** Investing in deliberate learning processes can potentially counterbalance the negative effects of experience accumulation. Articulation and codification processes facilitate inference for a number of reasons. First, the measurement of both performance outcomes and decision/action inputs is improved. Because of the need to develop a collective articulation, and eventually, a codified view of the process, agents will have to share their own segmented experiences, contributing to the development of better assessments of both activities and results. While there are inherent limitations to these measurement improvements, their impact will be particularly strong given the initially poor representation of these causal linkages. Second, the development, refinement and transfer (Zander and Kogut, 1995) of “theories” on causal linkages (what works, what fails, under what conditions and why) is sometimes explicitly stated as the objective of post-event debriefing sessions or more formal internal auditing processes. More often, these objectives are not explicitly stated but are implicitly achieved. As managers share the nature of the problems they had to tackle and how they went about doing so, the collective appreciation of what needs to be done in future repetitions of the task to avoid either the occurrence of the problem or mistakes in its handling, grows. Winter and Szulanski (2001) make a similar argument with respect to the progressive discovery of the “Arrow core” (i.e., tacit know-how of strategic relevance) in routine replication processes, although they focus on procedural, rather than causal, knowledge.

In the acquisitions example, deliberate learning processes might take the form of extracting valuable lessons from prior experiences through postmortem reports, as well as developing and frequently updating manuals, decision-support software and project-management software. These documents are important tools supporting and facilitating

the decision-making and execution activities during the various stages of the acquisition process. Activities such as post-mortem audits are in fact designed specifically to obtain an assessment of the performance of past acquisitions as precise as possible; moreover, in the best examples of post-mortem audit reports, one can expect them to uncover the causal linkages between actions and performance outcomes. Finally, the development of tools such as integration manuals typically has unintentional, yet powerful, learning implications. The production of guidelines related to the management of integration processes, in fact, requires managers to clarify causal relationships between actions and performance outcomes. In this respect, the codification of knowledge can be viewed in part as retrospective sense-making (Weick, 1979, 1995). In both cases, agents are forced to expose the logical steps in an argument, unearth any hidden assumptions and make causal linkages explicit. These requirements of the knowledge codification process serve to mitigate the effects of superstitious learning, of both causal and outcome ambiguity nature, in the M&A context. Although both types of superstitious learning are expected to be moderated by the investment in deliberate learning processes, it needs to be noted that the reduction of outcome ambiguity, related to a better understanding of the performance implications of a given completed acquisition, is significantly more frequent and, overall, more easily attainable compared to the reduction of causal ambiguity.

Finally, although the costs of these activities can be significantly higher than tacit experience accumulation, the benefits of these efforts will also be higher under conditions of causal ambiguity (Zollo and Winter, 2002). These considerations lead me to specify the following hypothesis:

**H3: The greater the firm's investment in deliberate learning processes, the weaker the negative effect of perceived success in prior strategic decisions on the actual performance of the focal decisions is expected to be.**

**Experience heterogeneity.** The breadth of scope in search processes generates a wide variety of implications, some of a positive nature (e.g., enhanced variation processes, higher creativity levels due to exposure to diverse contexts, etc.) and others negative (e.g., higher cognitive burden in distilling generalizable rules of conduct). There is currently little consensus on the sign and magnitude of the net effect. On balance, however, the limited literature available seems to point to evidence of a positive effect on decision-makers' psychological biases, including those at the origins of over- or under-confidence.

Whereas homogeneous experience tends to promote myopia, complacency and simplicity (Miller and Chen, 1996; Miller, 1999), heterogeneity can be beneficial in presenting managers with a variety of potential solutions (Haunschild and Ni, 2002). Heterogeneity in the stock of experience reduces the redundancy in experiences obtained by the firm and also serves as an antidote to competency traps (Lant and Mezias, 1990; Levitt and March, 1988). Related research on group composition also emphasizes that heterogeneity is useful in contributing greater creativity despite decreased efficiency (Eisenhardt and Tabrizi, 1995; Hambrick, Cho and Chen, 1996; Watson, Kumar and Michaelson, 1993). This stream of research also indicates that heterogeneity promotes healthy skepticism (Wiersema and Bantel, 1992; Keck and Tushman, 1993), which can mitigate the development of confidence ahead of competence, thereby curbing the probability of confidence traps.

In the context of high causal ambiguity and poor measurability of inputs and outputs, however, higher levels of heterogeneity in the stock of accumulated experience might generate a beneficial net effect on the gap between perceived and actual competence levels. This is because inferences made on the basis of wider breadth of expertise will be more likely to generate different viewpoints in framing the issues, a wider variety of potential solutions to identified problems, and more powerful tests of the causalities between decisions/actions and performance outcomes.

An important observation is that the arguments made might work with inverse effects under the context of lower causal ambiguity and better measurability of inputs and outputs. For example, in these conditions experience heterogeneity might generate excessive levels of variation and therefore harm the selection process, making it harder to distinguish the good proposed solutions from the poor ones. Also, the returns to deliberate investments in knowledge articulation and codification will decrease, enhancing the relative attraction of learning-by-doing processes.

Taken together, these considerations support the following hypothesis to be put forth for empirical validation:

**H4: The greater the heterogeneity of the firm's experience in a given strategic decision, the weaker the negative effect of perceived success in prior decision on the actual performance of the focal decision is expected to be.**

## RESEARCH DESIGN AND MEASURES

*The desire to acquire is a very common and natural thing; and when a man who is capable of doing it makes the attempt, he will generally be praised, or at least not blamed; error and blame arise when a man lacks the necessary ability and still wants to make the attempt at all costs.*

Niccolò Machiavelli, *The Prince*  
Chapter 3, Mixed Principalities

### **M&A as Empirical Context to Study Superstitious Learning in Strategic Events**

To explore these issues empirically, I focus on the study of corporate acquisitions for a number of reasons related to the characteristics of the organizational task. First, acquisitions are relatively low frequency tasks even for highly experienced acquirers, compared to “core” operating tasks. Second, they are also characterized by high complexity levels given both perceived (since they are typically considered non-standard projects) as well as actual, given the long vector of performance dimensions to optimize and the huge number of highly inter-

dependent decisional variables that influence the outcomes vector. Finally, and most importantly for our study, the performance of acquisitions is highly ambiguous in its measurability. Knowing with any degree of precision what happened to the acquired company's client base or to the motivational levels of its employees, or even to its profitability, especially after the completion of the integration process, is extremely difficult. Therefore, in addition to inherent complexity given by causal ambiguity reasons, we can expect to find a significant level of ambiguity related to the perception of performance generated in prior acquisition experiences, and therefore potential for outcome-based superstitious learning to arise.

The question of whether or not firms learn from their acquisition experience has been the subject of interest in a relatively small number of prior studies, but it has received increased research attention over the last few years. The evidence is still very mixed. An early study by Kusewitt (1985), for example, reported a significant negative relationship between the acquisition rate and the long-term financial performance of acquiring firms. This result was interpreted in terms of post-merger integration costs stemming from unjustifiable M&A fever. Subsequent studies, however, supported a positive relationship between an acquirer's experience and its acquisition performance (e.g., Fowler and Schmidt, 1989; Bruton, Oviatt and White, 1994). More recently, Haleblian and Finkelstein (1999) relied on a behavioral learning perspective, and their results indicated a U-shaped relationship between acquisition experience and performance. They interpreted this finding as evidence that acquirers initially apply prior experience to acquisitions that appear to be similar to, yet are inherently different from, previous deals, and only after a threshold level of experience is attained do firms start to appropriately discriminate between, and generalize across, deals thereby realizing positive experience effects.

With respect to the phenomenon of aberrant learning behavior, a few studies focused on studying the effect of experience accumulation on the decision to acquire, finding strong support for significant inertial effects (Amburgey and Miner, 1992; Halebian et al. 2006). If the inertia is interpreted through the lenses of prospect theory, where negative feedback is attributed to external causes and positive performance is attributed to one's own action, these results come close to paint a superstitious learning scenario where experience accumulation reinforces a blindsided view of future strategic decision-making.

Moving beyond the testing of simple learning curve effects, however, recent literature has started to consider also the characteristics of the stock of experience, in addition to its mere size. Haunschild and Beckman (2002), for example, consider the heterogeneity in the experience of acquisition counterparts and find that it is useful to mitigate overbidding hazards. Close to this paper's objectives, Hayward (2002) studies the performance of prior acquisitions as a predictor of success in the focal transaction. He tests Sitkin's (1992) theory on learning from small mistakes and finds support for it, as the presence of small losses in the firm's stock of M&A experience leads to better performance for the focal acquisition, compared to gains in prior acquisitions.

## **Sample**

The hypotheses developed above were tested by investigating acquisitions taking place in the US commercial banking industry between 1985 and 1995. This industry setting and the historic period chosen was deemed attractive for the purposes of the study for several reasons. First, the commercial banking industry underwent a period of significant consolidation during that decade, owing in part to regulatory changes that allowed firms to cross state lines to become regional or national players. The de-regulation wave started in 1990, so that the period surveyed is a balanced interval before and after the regulatory change.

These developments created attractive conditions for survey research, as they brought about a sufficiently large population of observations in a relatively compact time frame. Second, the relevance of acquisitive growth in the commercial banking industry facilitated fieldwork and survey participation, since the principal decision-makers were interested in collaborating with academia to learn how to improve their chances of success. Third, this industry was among the most active in acquisitions during that decade in the US, allowing for the conditions for experiential learning, as well as deliberate learning investments, to occur and eventually to display their effects on performance outcomes.

The research design involved three phases. In the first phase, fieldwork was conducted at 12 banks that were active acquirers in order to develop a greater understanding of acquisition practices in the commercial banking industry. Based on interviews of 45 decision-makers during this first stage, a questionnaire-based survey was developed and fine-tuned to ensure measurability and clarity. The survey was conducted in 1996 on the 250 largest bank holding companies in the US, which collectively represent over 95 percent of the industry's assets. The smallest institution in the target population had total assets of approximately US\$400 million, implying that further extensions of the survey frame to even smaller banks would likely have garnered sparse and less comparable observations. The final phase of the research design involved collecting more detailed questionnaire data on a subset of the acquisitions surveyed for construct validity purpose and collecting archival data on firm size and financial performance.

The survey consisted of two main parts: an acquisition history profile and an acquiring bank questionnaire. The first portion of the survey requested respondents to list all the acquisitions conducted by the bank and collected basic information about each acquisition, such as asset size, the degree of market relatedness, pre-acquisition profitability, level of integration and top management team replacement. The acquiring bank questionnaire

provided information on the acquiring firm's structural arrangements for the management of the acquisition process, including information on ad-hoc tools developed, such as integration manuals, due diligence checklists, systems conversion manuals, product mapping models, branch staffing models and training packages.

Of the 250 bank holding companies contacted, 70 did not experience an acquisition after 1985, and 16 were acquired during the invitation period. Of the remaining 164 banks, responses were obtained from 51 banks, corresponding to a 31.7% response rate. This response rate was considered satisfactory given the seniority of respondents and the complexity of the survey, and was attributable in part to the salience of the topic to industry participants in addition to the in-depth pretesting of the survey instrument (Fowler, 1993; Groves, Cialdini and Couper, 1992). The survey was sent to the most knowledgeable respondent at each bank, who was identified through a round of phone calls that preceded the mailing. Specifically, the key informants were the managers responsible for corporate development or for the M&A group (25 cases), the coordinator of post-acquisition integration processes (this position existed in 14 of the institutions surveyed), the CFO (9 cases), or the CEO (3 cases). Respondents were motivated to complete the questionnaire by the opportunity to benchmark their acquisition practices with those of other firms in the industry as well as by assurances that their individual responses would be kept confidential.

Of the 51 bank holding companies responding to the survey, four had to be excluded from the analysis due to incomplete responses and 18 more had to be excluded from the final analysis to construct our measures of experience heterogeneity, which required a minimum of 5 completed acquisitions to be measured (see below). Standard mean comparison tests for nonresponse bias indicated that responding organizations were not different from the original set of 250 bank holding companies in terms of return on assets, return on equity or efficiency ratios, yet responding firms tended to be larger in terms of total assets ( $p < 0.05$ ).

In terms of number of observations, the relevant unit of analysis for the study, the 29 acquiring banks completed 167 observations during the period under observation. The range of observations (acquisitions) per firm was between 5 and 45, having selected out all firms that had less than 5 acquisitions complete. The sample also varied between 0 and 5 acquisitions per year per firm.

### **Measures and Data**

**Dependent Variable.** As any student of M&A processes knows, there is simply no perfect measure of performance and the choice of the dependent variable is always driven by a careful assessment of various trade-offs, and ultimately by the purpose of the study. In the case of this paper, I needed to choose a measure that could satisfy the following criteria: First, post-integration. The measure chosen needs to be assessed after the completion of the integration process, since it has to incorporate information about the degree of success of the post-acquisition activities. This rules out the use of short-term event studies. Second, objectivity. The measure must be as objectively quantifiable as possible, since it needs to contrast with the subjective assessments made by managers about the performance of their company's prior acquisitions. This rules out subjective assessments by managers about the degree to which their goals have been met. Also, the use of post-integration assessments would also lead to significant single-method biases, since that is precisely the way the main explanatory variable is measured (average degree of success in prior acquisitions, subjectively assessed by managers). Third, non-manipulability. For similar reasons, the metric should not be easily manipulable by managers, that is it should be fundamentally determined by external actors. This gives long-term stock returns an advantage over long-term accounting variations.

Given these selection criteria, the chosen performance metric was measured as the acquiring firm's cumulative abnormal returns (CARs) following the acquisition. A stock market return measure has been preferred to accounting measures because of the higher

precision of monthly (rather than yearly) clocks, as well as because of new advancements in the measurement of long term event studies. Following Ikenberry, Lakonishok and Vermaelen (1995) and Rau and Vermaelen (1998), cumulative abnormal returns were calculated relative to a size- and market-to-book (MTB)-based benchmark. The variable is computed as the cumulative difference between the acquiring firm's monthly stock return and the return in the equal-weighted size- and MTB-ranked portfolio to which the firm belongs, over a period of 36 months<sup>5</sup>. An alternative computation method was adopted following a "buy & hold" assumption throughout the period for both the acquiring bank's stock and the benchmark portfolio, with results that are virtually identical to those using CARs and which will be therefore omitted given the stronger behavioral assumptions required on the part of the investors<sup>6</sup>.

The use of the firm size and market-to-book criteria is based on recent asset pricing research by Fama and French (1992, 1993, and 1996) that highlights the value of multifactor asset pricing models incorporating these two criteria rather than just the market return variable appearing in the traditional capital asset pricing model. Every month this portfolio is rebalanced, and the classification of each bank in the (Size x MTB) matrix is reevaluated using data on all companies that are traded on the New York Stock Exchange and the American Stock Exchange and that have accounting data available in Compustat. One hundred benchmark portfolios were constructed based on the cross-product of 10 size deciles and 10 MTB deciles. Stock return data for these performance measures were obtained from the universe of firms in the Center for Research in Security Prices (CRSP) data files.

**Explanatory Variables.** Respondents were asked to assess the degree to which past acquisitions conducted by the firm were successful. Specifically, past acquisitions were coded

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<sup>5</sup> The analysis has been replicated with a 48 month window without significant variations in the results (see below)

<sup>6</sup> The results of the estimated models with the "buy & hold" measure of the dep. var. are available from the author

along the following scale: -2 for “many problems,” -1 for “some problems,” 0 for “average,” 1 for “OK,” and 2 for “great.” Acquisitions that were evaluated as 1 or 2 were considered to be successful, and the measure *Past Success* was then defined to be the proportion of the firm’s prior acquisitions deemed to be successful. The firm’s *Acquisition Experience* was computed as simply the number of acquisitions completed by the acquirer prior to the focal acquisition.

In order to calculate a measure of experience heterogeneity, I needed to classify prior acquisitions conducted by the firm to ascertain their similarities or differences as a collection. In order to do this, I asked respondents to judge the pre-acquisition quality of the acquired firm, since prior research has established that the target’s quality is likely to influence the way the acquisition is managed as well as the performance of the acquisition itself (Capron, 1999). For instance, acquiring firms may manage the integration of a well-performing firm by accessing and leveraging its knowledge assets and routines, although these inverse knowledge redeployment processes are fraught with motivational and behavioral hurdles on the part of both firms (Haspeslagh and Jemison, 1991; Capron, 1999). By contrast, if the quality of the acquired bank is poor, acquirers will tend to replace the existing organizational routines and redeploy their own resources and procedures in an effort to improve the acquired firm’s performance. This shift in mindset necessary to plan and execute the appropriate transfers of procedures and redeployment of resources is likely to require significant cognitive investments and is therefore a suitable candidate for testing the moderating effect experience heterogeneity is supposed to have according to hypothesis 4. Bank quality was measured using an assessment of the pre-acquisition profitability of the target, which is coded on a five-point scale for each acquisition (Shanley, 1994). *Experience Heterogeneity* was then defined as the average difference among all past acquisition events as follows:

$$(1) \text{ Experience Heterogeneity} = \frac{1}{\binom{n}{2}} \sum_{i \neq j} |\text{Quality}_i - \text{Quality}_j|,$$

where  $i$  and  $j$  are two acquisitions in the firm's experience stock and  $\binom{n}{2}$  is the total number of combinations of acquisitions to compare in terms of quality. In order to compute this variable, all acquisitions with fewer than four prior observations by the same acquiring bank had to be excluded from the analysis.

The last theoretical variable is the level of codification of acquisition-specific knowledge that the acquiring firm has reached at the time of the focal acquisition. *Codification* was measured as the number of tools specific to the management of the acquisition process that the acquirer had developed *at the time of the focal transaction* (e.g., documents, models and manuals, including due diligence checklist, due diligence manual, systems conversion manual, affiliation/integration manual, systems training manual and products training manual; and quantitative models, including financial evaluation, staffing models, product mapping, training/self-training packages and project management tools). This measure varied not only by firm but also by year, since the stock of codified M&A tools grew as firms developed new ones. For each tool, in fact, the survey asks for the year of creation and thus allows for the computation of a stock of existing tool for each year.

**Control Variables.** To account for heterogeneity in acquiring banks and their performance, a number of control variables that are likely to have some bearing on acquiring firms' performance levels and also may relate to the theoretical variables of interest were included in the model.

To capture target firm effects, I included a measure of the target's resource quality, as defined above. Note that it was not possible to use a quantitative measure of target's firm performance due to a very scarce frequency of publicly listed banks during the decade of

observation (remember that most acquired companies were small community banks). For this reason, we had to utilize a qualitative assessment of the type of bank acquired in terms of its competitive strength.

I also incorporated a control for the relatedness between the acquirer and the target firm's resources. This variable has been viewed as a key antecedent to acquisition performance, yet empirical evidence on the relatedness-performance relationship has been mixed (Chatterjee, 1986; Lubatkin, 1987; Singh and Montgomery, 1987; Seth, 1990). Given the importance of geographic location as a key competitive factor in this industry and given the rationalization of branch networks in the process of creating value through efficiency enhancement, it is important to control for the degree of geographic overlap as a proxy for resource relatedness (Healy, Palepu and Ruback, 1992). The sample consists of acquisitions that are either perfectly horizontal (i.e., a bank buys a competitor located in the same geographic area, known as an "in-market" transaction in banking jargon) or market extension ("out-market") transactions. *Market Relatedness* was thus measured as 1 for in-market transactions and 0 for out-market acquisitions.

A variable to incorporate the way in which the target firm was integrated into the acquiring firm's operations was also deemed important to control for heterogeneity in the complexity of the task at hand. *Integration* was measured on a single scale from 0 to 3, where 0 corresponds to no integration, 1 to a minor degree of integration, 2 to a major degree of integration and 3 to complete integration of the acquired firm within the acquiring bank (Datta and Grant, 1990). The scale was the answer to a question on the degree to which procedures were aligned, information systems were converted and products were standardized.

Finally, two controls were added to capture the effects of the size of acquiring and target firms. *Acquirer Size* was measured as the acquirer's total assets in billions of dollars for the year before the acquisition. *Relative Acquisition Size* was measured as the size of the

acquired firm relative to the size of the acquiring bank, stated as a percentage based on total assets (Datta, 1991). This variable was incorporated as a control since comparatively small acquisitions are easier to integrate, yet also are less likely to have a material affect on acquirers' market valuations.

### **Model Specification**

The model specification used to test the hypotheses developed earlier is the following:

$$(2) \text{ Acquisition Performance} = \alpha_0 + \beta_1 \text{ Past Success} + \beta_2 \text{ Past Success*Acquisition Experience} + \beta_3 \text{ Past Success*Codification} + \beta_4 \text{ Past Success*Experience Heterogeneity} + \text{controls} + \varepsilon.$$

Because acquisition experience-related attributes (i.e., experience, past success and experience heterogeneity) enter the model multiple times as direct effects and interaction terms, z-scores for these variables were used to mitigate multicollinearity. After these transformations, the maximum variance inflation factor (VIF) for all of the variables for the estimated models is 1.97, which is substantially below the rule of thumb cutoff of 10 used to indicate multicollinearity problems (Neter, Wasserman, and Kutner, 1985).

The other possible violation to the normal distribution assumption of the error terms in the OLS estimates was due to multiple observations (acquisitions) per respondent (acquiring bank). The introduction of dummy variables to control for firm effects in the cases with most frequent acquisition activity does not change substantially the results reported below. The use of dummy variables for the purpose of this study is, however, problematic since the core theoretical variables (experience, knowledge codification, average perception of past success) are all firm-level effects as well. Thus, part of the fixed effects might actually capture measurement error from the theoretical variables. In the section below, therefore, I report the results of the model estimations without fixed effects<sup>7</sup>. No other violations to standard normality assumptions, such as heteroschedasticity, were detected in the data.

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<sup>7</sup> Results for the complete models are available from the author.

## RESULTS

The first and simplest indication of a disconnect between the perceptions of acquisition performance comes from the correlation between the ex-post qualitative assessments made by respondents and the measure of firm performance adopted to proxy the 3-year post-acquisition stock returns. The correlation is 0.063, largely non-significant. Even poorer results are obtained if the proxy for the “objective” post-acquisition performance is computed with a “buy and hold” assumption (corr. = -.004). This is only a preliminary approximation, though, since it does not consider the cumulative effect of subjective assessments on the performance of prior acquisitions.

Table 1 reports descriptive statistics and a correlation matrix for the variables used in this study. The long-term stock returns, our dependent variable, correlates strongly and negatively with the measure of past success ( $p < .001$ ), offering preliminary support for hypothesis 1.

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Insert Table 1 about here  
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Table 2 presents the results of the OLS estimates from multiple regression analyses. Model I is the baseline specification consisting of the control variables. Model II adds the direct effects of the theoretical variables: perceptions of past success, acquisition experience, experience heterogeneity and the degree of deliberate learning through knowledge codification. Finally, model III represents the full model, including the interaction effects of the learning variables with past success. All models are significant at the 0.001 level. Hierarchical F-tests revealed that the direct effect models improve on the explanatory power of the baseline specifications (i.e.,  $F=7.24$ ,  $p < 0.001$  for Model II vs. Model I), and similar tests reveal that the interaction terms are jointly significant (i.e.,  $F=7.77$ ,  $p < 0.001$  for Model

III vs. Model II). Another indication of good descriptive power of the models comes from R-squared coefficient, rising from 12% to 24% from the baseline to Model II, and reaching 34% for the full model.

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Insert Table 2 about here  
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Regarding the formal test of the hypotheses advanced in the theory section, the direct effect of past success is negative in Model II ( $p < 0.001$ ), suggesting that acquiring firms' perception of their past performance is systematically and inversely correlated with the performance in the focal acquisition. Strong support is therefore evident for the first hypothesis. However, this effect could be confounded by regression to the mean processes or simple problemistic search in the case of perceived low performance in past acquisitions. The stronger test advanced in the theory section (H2) calls for a negative coefficient in the interaction term between experience accumulation and the measure of past success. Model III shows a significant and negative coefficient ( $p < .001$ ) of that interaction term, supporting the second hypothesis advanced in the theory development section. To the extent that the two tests are credible indicators of superstitious learning due to fundamental outcome ambiguity in the measurement of acquisition performance, the data seem to reveal evidence of this problem in the context observed.<sup>8</sup>

In addition to the presence of superstitious learning, though, I was interested in testing the relative efficacy of moderating variables related to the learning process itself. In terms of main effects, deliberate learning in the form of knowledge codification positively influences acquisition performance ( $p < 0.05$  in Model II), but there is no evidence of learning curves from experience accumulation. The degree of heterogeneity in the stock of experience, instead, shows evidence of a positive direct impact ( $p < .05$  in Model II).

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<sup>8</sup> Robustness checks were run for these results also using quadratic specifications of the experiential learning and past success variables, without any significant coefficient to report.

Hypotheses 3 and 4 are tested through the interaction effects of deliberate learning and experience heterogeneity with the perception of past success. The two interaction terms explore, in fact, contingencies shaping the relationship between self-assessments of acquisition performance and the actual performance of the focal acquisition. Consistent with hypothesis 3, firms that have invested in deliberate learning processes through knowledge codification can mitigate the negative effect of perceptions of past success on current acquisition performance ( $p < 0.01$  in Model III). By contrast, firms that have not undertaken such efforts to identify and evaluate the factors affecting M&A performance tend to experience greater problems the more they believe that their prior acquisitions were successful. In addition, the magnitude of this effect is empirically and practically relevant. The relatively large size of the parameters (.19 standardized coefficient in Model III) indicates that firms with knowledge codification levels one standard deviation above the mean do not experience superstitious learning problems, in the sense that the negative impact of the perceptions of past success is fully counterbalanced.

Just as deliberate learning processes in the form of knowledge codification appear to mitigate the effects of superstitious learning, more heterogeneous experience also appears to temper the adverse effects of superstitious learning through confidence traps. Specifically, consistent with predictions (H4), previous successes are not as prone to engender inappropriate confidence in firm capacity to manage acquisitions for firms that have heterogeneous experiences, but are particularly harmful for firms with homogeneous M&A experience ( $p < 0.05$  in Model III). Heterogeneous experience reduces, or slows down, the routinization process and offers contrasting evidence to test implicit or explicit theories on how acquisitions should be managed.

With respect to the control variables included in the model, it is worth mentioning the stable, significant and negative effect of target resource quality on performance, in line with

similar tests in the received literature (Capron, 1999; Zollo and Singh, 2004). Also, acquirer's size shows a stable negative effect, which might be interpreted as corroborating the overall picture of problematic learning processes in this industry for firms that have achieved larger size through frequent use of the acquisitive growth tool.

## **DISCUSSION**

This study set out to further develop the conceptualization of superstitious learning in strategic events from pioneering work in psychology (Skinner, 1948) and economic sociology (Levitt and March, 1988), and to examine the conditions under which it emerges in organizations. In a way, it focuses on the conditions underlying aberrant learning phenomena in which firms do not really know what they think they know, despite (and even because of) the accumulation of experience.

In doing so, it departs from the received literature in several ways. First, the definition and conceptualization of the core construct is now based on the distinction between causal and outcome ambiguity and the role of overconfidence vis-à-vis the organization's competence. Second, the attention of the theoretical modeling of the phenomenon was focused on the specific case of outcome-based learning, which is expected to be a particularly salient phenomenon in strategic tasks characterized by low frequency and poor performance feedback. Third, the development of a double test for the presence of outcome-based superstitious learning that controls for the confounding effect of regression to the mean phenomena (Greve, 2003). Finally, the development of a theoretical understanding of the boundaries of the phenomenon, with the identification of contingent factors potentially influencing its expected salience. The paper offers, in fact, the first empirical validation for the presence of superstitious learning in an organizational context and for the moderating role

played by deliberate learning processes and experience heterogeneity to counter the negative implications of confidence traps.

The data analyzed, drawn from an extensive survey of acquisition processes in the US banking industry, shows evidence of the presence of superstitious learning, according to the tests developed. Of particular salience is the fact that experience accumulation worsens, rather than alleviate, the problem connected to a negative impact of subjective assessments of past acquisition experience on the focal acquisition performance. In addition, both moderating factors act in a significant way to reduce the negative consequences of experience-driven confidence, although deliberate learning seems to be somewhat more powerful than experience heterogeneity in this respect. The impact of investments in deliberate learning is in fact so strong as to eliminate the superstitious learning problem in all cases with a level of investment larger than one standard deviation above the mean.

The combination of the theoretical discourse developed and the empirical evidence unearthed can potentially contribute to the current debates in a number of domains. The organizational learning literature could benefit from the characterization of experience accumulation processes as both competence and confidence development mechanisms. Further, the refinement of the superstitious learning concept, one of the major barriers to effective learning according to Levitt and March (1988), is important in that it allows more precise theoretical discourse based on both causal and outcome ambiguity. Empirically, the simple fact that the presence of superstitious learning has been detected in a large-scale empirical study of a complex organizational endeavor is, in and of itself, a step forward since no empirical evidence for the presence of the phenomenon was shown thus far.

For the literature in evolutionary economics, the theoretical and empirical contributions of this paper could represent an important, and somewhat challenging, opening of new avenues for further research. To begin with, the notion that routines can be *generated*

by aberrant learning behavior, rather than, or in addition to, the well-known inertial consequences of routinization, has to be taken seriously. The current articulation of the theory, in fact, is premised on the virtuous role of routinization processes as producers of continuous learning. On the positive side, though, this study highlights the virtuous role of deliberate learning processes and of heterogeneous stocks of experience in reducing the hazards of excessive confidence. More generally, the conceptualization of experience accumulation as both a competence- and confidence-building process deserves attention to the extent that it might map the boundaries of the applicability of the theory, at least in its current formulation. The assumption, based on Polanyi's work, that the fundamental problem in competence building consists in the fact that firms are not aware of what they know (Winter, 1987; Kogut and Zander, 1992; Nonaka, 1994) might be seriously challenged if it turned out that there are important instances where the problem is the inverse, i.e., firms do not really know what they *think* they know. Understanding when each of the two conditions applies seems to be a crucial (missing) piece in the complex puzzle of organizational capability building for both evolutionary economists and strategy scholars.

Another area where the present study might contribute is, of course, the literature on mergers and acquisitions. First of all, by distinguishing between "automatic" (e.g. learning-by-doing) and deliberate learning processes as well as between different dimensions of experiences (e.g., perceived successes versus failures and homogeneous experiences versus heterogeneous ones), the findings can potentially explain why some of the results on experiential learning in the M&A literature are so mixed. The reason might be that these different dimensions of the learning process could have distinct implications for acquisition performance, and their unique effects can be masked in the more aggregate treatments of experiential learning that are common in M&A studies. Deliberate and tacit learning mechanisms exhibit very different effects in the data analyzed, and the findings also show that

the nature of previous experiences in the firm's experience base (both in terms of its heterogeneity and of its perceived quality) matters above and beyond the mere number of previous acquisitions. More broadly, the presence of superstitious learning might be a novel explanation for the high failure rate in these types of business endeavors, but even more importantly an explanation of the persistence of these failure rates over time and across regions and industries. Finally, a methodological point: the presence of superstitious learning processes calls for serious caution in the use of perceptual measures to proxy performance in corporate activities characterized by high levels of causal ambiguity and poor (if any) ad-hoc performance metrics. The outcome ambiguity problem, and the implication it has for the reliability of subjective performance assessments, might in fact help explaining why the literature finds it hard to converge on generally accepted results, even after decades of replicated work.

For managers involved in mergers and acquisitions, the results of this paper should offer opportunities for reflection on the way these important activities are tackled. First of all, the notion that M&A is "an art" that can be mastered only through the accumulation of experience is in contrast with the data collected. The magnitude of experience not only does not help improve performance, but it can actually hurt the outcomes of future acquisitions. This is increasingly possible if the organization does not invest in deliberate efforts to extract the valuable lessons from the growing number of experiences accumulated. The boosting of self-confidence, unmatched by increasing levels of real competence<sup>9</sup>, can severely lessen the odds of success without much of an opportunity to root out the cause of the problem.

But the chief ambition of this paper is to inform our collective thinking about how groups of individuals within organizations learn how to perform rare and complex tasks, in particular those tasks characterized by strong strategic value and high levels of ambiguity in

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<sup>9</sup> Recall that the direct effect of knowledge codification is positive and significant, whereas that of the stock of prior acquisition experience is nonsignificant.

their performance outcomes. In that sense, this study can only be viewed as an initial foray into the dark side of experiential learning, particularly in its potential effects on confidence levels. Limitations to the validity and generalizability of these results abound, starting from the specificity of the context studied (US bank mergers in a period of falling regulatory barriers to acquisitive growth) and ending with the potential biases derived from single respondents and ex-post recollections of the success of past acquisitions. Future scholars might want to consider, for example, building a research design that directly measures the discrepancy between the subjective assessment and the objective quantification of acquisition performance for individual observations, which was not possible to do in the current design. Also, one could consider mirroring the empirical designs in decision science's work on over-confidence and add a crucial question on the degree of confidence that the respondent has in the quality of her own qualitative assessment; a measure that would allow for a better calibration and a direct assessment of over-confidence effects.

Much more needs to be understood about the deviant effects of experience accumulation in organizational contexts: under what condition are they of more serious harm? What factors might be able to curb their negative consequences? What task and organizational characteristics can tame, or even eliminate, them? These are some of the questions that are left unexplored by this study and offered for future work. Our hope is that in doing so, we will be able to reduce the asymmetry between the confidence and the competence effects of experience accumulation in our complex tasks, and thus proceed towards more effective and real learning. For academics and managers alike.

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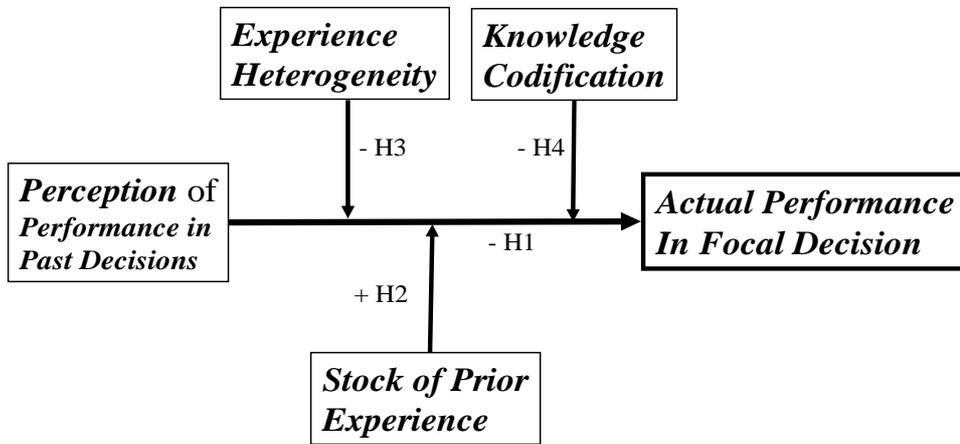
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Fig. 1 - A Model of Outcome-Based Superstitious Learning



**TABLE 1**  
**Descriptive Statistics and Correlation Matrix<sup>a</sup>**

Variable	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Acquisition performance	-.13	.55	---								
2. Resource quality	1.96	1.09	-.33***	---							
3. Market relatedness	.62	.49	.23***	-.22***	---						
4. Integration	2.64	.69	.13*	-.22***	.40***	---					
5. Acquirer's size	2.64	1.13	-.07	-.08	.25***	.15**	---				
6. Relative acquisition size	1.06	1.64	.13*	.08 <sup>†</sup>	-.17***	-.03	.02	---			
7. Past success	.48	.38	-.23***	.02	-.03	-.14**	.19***	.00	---		
8. Acquisition experience	11.11	10.17	.03	.04	.16***	.10*	.43***	.01	.04	---	
9. Codification	4.81	3.67	.04	.20***	.01	.07	.43***	.08	.17***	.46***	---
10. Experience heterogeneity	.65	.66	.04	-.04	.12*	.09 <sup>†</sup>	.41***	.02	.47***	.22***	.22***

<sup>a</sup> Sample sizes in the cells range from 166 to 530. The variables *past success*, *acquisition experience*, *experience heterogeneity*, and *codification* appear in unstandardized form. <sup>†</sup> p<0.10; \* p<0.05; \*\* p<0.01; \*\*\* p<0.001.

**TABLE 2**  
**OLS Estimates for Acquisition Performance**  
**Performance: Benchmark Portfolio Adjusted Cumulative Abnormal Returns<sup>b</sup>**

Variable	Cumulative Abnormal Returns		
	I	II	III
Intercept	.30 (.19)	.61** (.20)	.46* (.19)
Resource quality	-.12*** (.03)	-.14*** (.03)	-.13*** (.03)
Market relatedness	.10 (.09)	.08 (.09)	.07 (.08)
Integration	-.02 (.06)	-.06 (.06)	-.07 (.06)
Acquirer's size	-.08* (.03)	-.12** (.04)	-.08* (.04)
Relative acquisition size	.03 (.03)	.03 (.03)	.02 (.03)
Past success	---	-.21*** (.05)	-.14* (.05)
Acquisition experience	---	.04 (.05)	.07 <sup>†</sup> (.04)
Experience heterogeneity	---	.10* (.04)	-.05 (.07)
Codification	---	.10* (.05)	.02 (.05)
Past success * Acquisition experience	---	---	-.18*** (.04)
Past success * Codification	---	---	.19** (.07)
Past success * Experience heterogeneity	---	---	.14* (.06)
Model F	4.43***	5.46***	6.57***
R-squared	.12	.24	.34
N	167	167	167

<sup>b</sup> All variables comprising the interaction effects were standardized prior to forming the multiplicative terms. Standard errors appear in parentheses. <sup>†</sup> p<0.10; \* p<0.05; \*\* p<0.01; \*\*\* p<0.001.

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