
In search of the élite: revising a model of adaptive emulation with evidence from benchmarking teams

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We revise Strang and Macy's model of adaptive emulation through inspection of empirical efforts at innovation. Self-reports of managers participating in benchmarking teams are consistent with the argument that innovation is problem-driven, focused on performance and draws heavily on success stories. But managerial accounts also indicate close attention to prestigious firms, an orientation that broadens prior arguments about imitation of top performers. We develop a version of adaptive emulation where firms imitate members of a corporate élite whose prestige is related to but not reducible to performance. Computational modeling indicates that socially oriented emulation is collectively adaptive but that it also widens the range of innovations that experience faddish careers.

1. Introduction

Two lines of argument are central to sociological treatments of organizational diffusion. The Carnegie School's analysis of decision-making treats organizations as boundedly rational adaptive agents engaged in problem-driven search (March and Simon, 1958; Cyert and March, 1963). Institutional studies of organizational change argue that firms emulate more legitimate or successful others (DiMaggio and Powell, 1983). Together, these ideas provide accounts of the intensity and direction of search.

In recent work, Strang and Macy (2001) combine choice-theoretic and institutional arguments in a formal model of adaptive emulation. Innovation efforts are adaptive, they argue, in that managers tend to abandon current practices and search for new ones when organizational outcomes are poor. They are also emulative, in that when managers look outside the boundaries of their organization they tend to mimic highly successful firms. Computational models based on these behavioral assumptions can generate a range of collective trajectories, including turbulent heterogeneity, faddish cycles and the emergence of dominant designs.¹

¹Trajectories depend upon model parameters. For example, a combination of worthless innovations and sceptical decision-makers produces turbulent heterogeneity (where no innovation gains popularity and there is much turnover at the firm level); slightly worthwhile innovations produce fads, and more

This paper does two things. First, we confront Strang and Macy's (2001) model with detailed information on 21 benchmarking teams organized by Global Financial, an elite bank headquartered in the United States. Managers on these teams were charged with developing plans for corporate innovation in areas as disparate as the internet, work/life balance and foreign exchange. We look for consistencies and inconsistencies between their innovation efforts and the behavioral assumptions underlying adaptive emulation. For example, did real managers focus on performance, or were they more oriented towards conformity with key reference groups? Was there a strong tendency towards learning from success stories, or was a wider range of outcomes treated as informative?

The second part of the paper uses lessons from benchmarking teams to build a better model. One of the great advantages of a simulation-based approach is the rapid feedback cycle between developing an idea, formalizing it and discovering its implications. We construct a version of adaptive emulation that reflects (in stylized fashion) what managers at Global Financial told us about the empirical process of innovation. We then conduct computational experiments to investigate the implications of this model for collective trajectories of adoption and abandonment.

We should note at the outset that a focus on one firm's benchmarking program might be misleading. The cognitive frame imposed by corporate benchmarking bears an explicit resemblance to adaptive emulation, as Strang and Macy (2001: 175) recognized, and may lead managers to evaluate innovations in unusual ways. In addition, innovation efforts at Global Financial might not resemble those occurring in other industries, other banks or even another global money center. We return to these issues in the discussion section, since they are informed by an understanding of how benchmarking worked at Global Financial.

Since the goal is to improve a model, however, identifying a 'representative' sample of innovation efforts is less important than getting close to the action. Most managers most of the time are not concerned with evaluating innovations, as we learned in an initial series of interviews at Global Financial—they are busy doing their work. From our perspective, the great virtue of benchmarking projects is that they take experienced managers out of their ordinary roles and give them a mandate to develop a plan for corporate innovation. This activity was intense and meaningful enough (several managers described it as the highlight of their career at Global Financial) that we are able to investigate it in depth.

This paper's research setting also reflects our sense of the strengths and weaknesses of contemporary diffusion research. The last decade has witnessed rapid growth in the application of diffusion models to organizational change, with advances in methodological rigor, theoretical precision and comparative breadth (for a somewhat dated review, see Strang and Soule, 1998). But analytic sophistication often comes at the price

worthwhile innovations are quickly institutionalized. Strang and Macy emphasize faddish cycles, an outcome produced by a fairly narrow range of conditions but also one not generated by most arguments about innovation diffusion.

of diminishing contact with the behavior that models are supposed to represent.² Reports from the field provide a useful corrective.

2. Behavioral assumptions in adaptive emulation

Strang and Macy's (2001) model of 'adaptive emulation' makes three core assumptions about interorganizational imitation. These are:

1. problem-driven external search;
2. learning from performance;
3. success bias.

Problem-driven external search means that firms search for new innovations when their competitive performance is poor. Competitive performance may be low either in an absolute sense (as when the firm's survival is threatened) or in a relative sense (when aspirations set by prior outcomes are not met). Strang and Macy assume that firms search externally, by looking at other firms, rather than internally through refinement of present practice.

Learning from performance means that firms are influenced not by what other firms do, but by what happens when they do it. Evidence that an innovation is associated with favorable outcomes elsewhere promotes adoption. Innovators are unswayed by popularity within the business community or usage within key reference groups like competitors or business partners.

Success bias means that firms attend to the upper tail of the outcome distribution. Firms seek to 'catch the leader' while the average performance of innovation users and instances of dramatic failure go unnoticed. Strang and Macy (2001) imply that an innovation that posts a mediocre overall record but is graced by a single case of extraordinary success is more likely to be mimicked than an innovation whose overall record is superior but where no dramatic success story arises.

The organizational literature provides support for each of these arguments. Research by the Carnegie School emphasizes concrete problem-solving rather than unceasing optimization (March and Simon, 1958; Cyert and March, 1963); Lant (1992) and Greve (1998) show how aspirations depend on prior outcomes. Learning from performance is supported by diffusion research showing that success is more contagious than failure (Holden, 1986; Conell and Cohn, 1995; Haunschild and Miner, 1997). And the notion that firms learn from success is grounded in research on confirmation bias (Gilovich, 1993) and empirical observation of the way success stories dominate the business literature (Burns and Wholey, 1993; Abrahamson and Fairchild, 1999).

But each assumption also raises concerns. Problem-driven search need not be external. Organizational failure might instead generate local exploration in the direction of current practices (Levinthal and March, 1981; Gavetti and Levinthal, 2000), with

²Ingram (2002: 655) captures this well when he notes that "There is no doubt that the central question yet unanswered regarding interorganizational learning is "just how does it happen?"

organizations innovating through incremental change. Further, failure may produce not external search but rigidity and defensive disattention to the achievements of others (Staw *et al.*, 1981; Ocasio, 1995; Martin and Kambil, 1999).

While learning from performance is plausible, diffusion research provides more evidence of mimicry of behavior. For example, empirical studies point to imitation of competitors (Fligstein, 1985), industry leaders (Haveman, 1993) and corporate contacts (Greve, 1996). Economic models of cascades emphasize the signal sent by what others do rather than its consequences (Banerjee, 1992; Bikhchandani *et al.*, 1992).

Finally, the model's emphasis on success stories may be overdrawn. In technical fields like airplane safety, for example, failure rather than success provides the lesson (Haunschild and Sullivan, 2002). And within the realm of strategic management, Miner *et al.* (1999: 196–198) point to cases where firms learn vicariously from the failure of competitors. Airlines witnessing the bankruptcy of Braniff and People's Express moved away from competition on price and towards a strategy emphasizing customer service (Kharbanda and Stallworthy, 1985).

It is not surprising that the organizational literature is informative but not dispositive: other studies were designed to answer other questions. The survey analysis of benchmarking teams presented here addresses the relevant issues directly. We measure the weight managers ascribe to innovative practices located inside and outside the firm, and ask whether the balance shifts with Global Financial's track record. We look at the extent to which managers report being influenced by outcomes versus usage. And we examine whether success stories count more heavily than other kinds of evidence.

3. The benchmarking process

Benchmarking is generally traced to the work of Robert Camp at Xerox, who provides a working definition: 'the search for industry best practices that lead to superior performance' (1989: 12). Like many of the hot management innovations of the 1980s and 1990s, benchmarking grew out of efforts to deal with strong price and quality competition from Japan. Engineers at Xerox took apart the copy machines of Japanese manufacturers and built an alliance with Fuji to gain insight into the competition.

As a corporate activity, benchmarking was legitimated by its incorporation in the Malcolm Baldrige National Quality Award as a requisite activity of 'world-class organizations'. While benchmarking was initially defined as the gleaning of rivals' practices, its definition broadened over time to embrace efforts to learn from unexpected sources. Manufacturers visited L.L. Bean to study order fulfillment, an airline benchmarked an Indianapolis 500 pit crew, and telecommunications companies like AT&T went to Ford to learn how to deal with multiple suppliers. The American Productivity & Quality Center, which created the International Benchmark Clearinghouse in 1992, defined benchmarking as 'the process of identifying, understanding, and adapting outstanding practices and processes from organizations anywhere in the world to help your organization improve its performance' (O'Dell, 1994). By 1995, when Global Financial

began planning its benchmarking efforts, the concept and methodology associated with benchmarking was mature and customizable.

3.1 Overview of the benchmarking process at Global Financial

Global Financial established 'Team Challenge' in 1996. Teams examined broad issues facing the company—'the things that keep the CEO up at night', according to one manager. Over a two-and-a-half year period, 21 teams participating in five Team Challenges were formed to make recommendations to senior management on 13 strategic issues. Team members traveled across the globe, visiting both external companies and business units at Global Financial. Benchmarked topics varied from methods of data warehousing to corporate quality to marketing strategies like the cross-selling of financial products.

Team Challenge was organized within the executive development arm of Human Resources. It had the twin aims of providing strategic input to the bank and furthering the career development of those selected to take part. From 12 to 20 managers served on each identified 'challenge', with groups generally divided into two teams. Participants were rising managers with bright prospects in the company. Diversity of business unit representation, national background and gender was sought. In general, team members did not possess special expertise in the area of the challenge.

All teams met at a site away from their regular workplace and were briefed by the chief financial officer and other senior executives. The first several days were devoted to team-building and familiarization with the innovation domain. Briefing books provided a selection of discussions from the business press as well as internal literature from surveys, newsletters and personal communications. External consultants and academic researchers also made presentations.

Managers then spent two weeks visiting benchmarked organizations and conducting interviews at Global Financial. Some teams also set up internal websites soliciting opinions and conducted surveys of bank employees online. After gathering information, participants reassembled to formulate recommendations that they presented to the bank's chief executive officer (CEO) and top management team. While the response of top management varied across issues, by all accounts benchmarking teams played a substantial role in the bank's planning. According to one manager, 'Eighty percent of the proposals were accepted.' After the team's presentation, individual team members were sometimes asked to head up or be involved in implementation, but most returned to their regular duties.

3.2 Managerial self-reports

Between December 1998 and April 1999 we sent a 12-page mail survey to all members of Global Financial's benchmarking teams. Ninety-four of 156 participants returned the survey (a response rate of 61%). We later learned of 12 managers who had left Global Financial by the time of our mailing, indicating a response rate of at least 66% among those who received our survey. Prior to questionnaire construction we con-

ducted structured interviews with Team Challenge organizers and ten team members, which clarified issues, suggested questions and aided in the interpretation of survey results.

A comparison of background characteristics of survey respondents and all team members showed no significant differences. Nineteen percent of respondents were women, compared to 18% in benchmarking teams overall. Sixty-eight percent of respondents were located in the United States (versus 70% overall). Further data based on personnel records was available only for those located in the United States. Of this group, both respondents and all benchmarking participants had an average tenure of ten years at Global Financial. Average salary was \$163 655 for respondents, \$163 101 for all members of benchmarking teams.

4. Model assumptions and empirical evidence

4.1 Problem-driven external search

If poor performance drives external search, innovative practices used by visited companies will influence benchmarking teams more strongly where Global Financial has experienced failure than where it has experienced success. For example, the bank's Foreign Exchange Challenge involved an area in which Global Financial is a national and worldwide leader, while the High Performance Work Environment Challenge involved aspects of 'soft' corporate culture where Global Financial is perceived (by its managers) as less effective. Strang and Macy's (2001) argument implies that teams examining the corporate work environment would stress external models more than would teams examining foreign exchange.³

Two sets of survey questions are relevant. We first asked team members about the influence of 'visits to external companies' versus 'internal interviews and contacts.' Respondents scored their influence on a scale of 1 (= no influence) to 5 (= extremely influential) for three aspects of the policymaking process ('helped team conceptualize issues', 'impact on recommendations' and 'helped make the case for team recommendations'). Responses were strongly associated across aspects of policy development ($\alpha = 0.93$ for *external visits*, and $\alpha = 0.89$ for *internal interviews*), so we form two three-item scales. We also compute their difference, subtracting the impact of internal interviews from that of external visits.

The survey also asked managers how they attended to outcomes. To probe internal lessons we inquired about the impact of 'past successes at Global Financial' and 'past failures at Global Financial', while external experience was probed with items on the impact of 'specific examples of success elsewhere', 'specific examples of failure elsewhere' and 'financial or other publicly available data comparing many firms'. We

³Strang and Macy's (2001) computational model treats each firm as characterized by a single innovation at any given time, and so links the firm's evaluation of the innovation to its overall performance. Since Global Financial innovates simultaneously on multiple dimensions, we assume here that it evaluates its performance with respect to each innovation area.

Table 1 Influence of internal and external sources of best practice on benchmarking teams (self-reports by team members, $n = 94$ managers)

	All teams	Domains where benchmarking firm has a weak record	Domains where benchmarking firm has a strong record	<i>F</i>
Impact of information sources				
Visits to external companies	3.92	4.11	3.53	8.18***
Internal interviews	3.93	3.93	3.91	0.01
External visits versus internal interviews	0.00	0.17	-0.36	4.03**
Impact of innovation results				
External results	3.60	3.66	3.45	1.52
Internal results	3.56	3.38	3.90	7.32***
External results versus internal results	0.04	0.27	-0.41	11.3***
No. of teams	21	11	10	

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$.

form a scale of the impact of *internal results* (combining success and failure at Global Financial, $\alpha = 0.73$) and of *external results* (combining success, failure and comparative data, $\alpha = 0.77$), and again take their difference.

The first column in Table 1 gives the mean influence of these sorts of information across all benchmarked teams and domains. Overall, teams attended closely to all four types. For example, 62% of benchmarking managers described external visits as very or extremely influential, while 64% described internal interviews in the same terms.

The key question is whether the balance shifts with Global Financial's performance. We differentiate innovation domains by perceptions of Global Financial's record in each area benchmarked. Managers were asked to rate (1 = strongly disagree, 5 = strongly agree) whether '<their benchmarking domain> . . . is an area where Global Financial has historically excelled.' Since an analysis of variance indicates that responses vary more across issue domains than within them ($F = 10.1$, $\eta^2 = 0.60$), we average responses within teams and dichotomize at the mean.⁴ Table 1 distinguishes innovation domains where benchmarking managers agreed that Global Financial had historically excelled ('strong track record', 10 teams) from those where managers disagreed ('weak track record', 11 teams).

⁴Perceptions of the impact of external visits, internal interviews, and internal and external results similarly show more variation across than within groups. ANOVAs conducted at the team level yield P values of 0.10 or less for all four indicators, while ANOVAs at the issue level yield p values below 0.01.

Columns 2–4 show that Global Financial's track record affects the salience of different sorts of information. External visits counted for more where the bank had done less well. Attention to internal results rose and attention to external results fell where the bank had a strong track record (though only the former is statistically significant). The two difference measures also move significantly in the expected direction.

Interviews with benchmarking managers reinforce this picture. The most clearcut case of the internal transfer of best practice was the Treasury team's identification of Global Financial Japan as a model for corporate-wide reorganization. And participants on the Treasury Challenge viewed the bank's record as very strong. Teams working in domains like total quality and corporate culture where the bank was seen as weaker were replete with references to firms like General Electric, Federal Express and Disney. (While our measure is drawn from Team Challenge surveys, we found that the views of benchmarking managers consistently paralleled those of the many other Globalbankers we interviewed at other stages of this research.)

Table 1 also indicates that the reported influence of internal interviews does not vary with the bank's past performance. Our discussions with benchmarking managers indicated that they used these contacts not only to learn about internal best practice, but also to ascertain the position of senior executives within the bank. And the views of senior managers are always relevant, both in the development of a constituency for change and for more narrowly political reasons. As a participant on the Corporate Center Team told us, 'issues came up where we would say "What if we get rid of this guy's department? He'll kill us."'

While Table 1 dichotomizes Global Financial's track record for simplicity, the association is very robust. The correlation between perceptions of the firm's track record and the impact of benchmarking visits is -0.31 , and that with internal results is 0.33 (both significant at the 0.01 level, $n = 94$ managers). Regression analyses controlling for other innovation characteristics show the bank's track record to be a strong and consistent predictor of internal versus external benchmarking.⁵

4.2 Learning from performance

We here compare the influence of what other companies do with what happens when they do it. Team members reported the extent to which team policies were influenced by four reference groups: 'highly regarded organizations', 'other firms in financial services', 'customers and business partners of Global Financial' and 'widespread use in the business community'. Table 2 contrasts the mean influence of each of these sources with the measure of attention to external results discussed above.

Managers appear to have attended closely to both usage and results. About half of all respondents describe information about the outcomes experienced by external firms as very or extremely influential, and only 5% rated this sort of information as having had

⁵These characteristics include whether innovations are technical or administrative, involve a product or a process, are seen as strategically important, raise concerns about sharing information, are highly complex, and involve great uncertainty (see Strang and Still, 2003).

Table 2 Attention to external performance and usage by benchmarking teams (self-reports by team members, $n = 94$ managers)

	Mean	% no influence or slightly influential	% very or extremely influential
Results			
External	3.60	5	48
Usage by . . .			
Many firms	2.95*	29	27
Prestigious companies	3.82	8	70
Financial services firms	2.96*	35	36
Customers or business partners	3.21*	25	42

*Mean level of influence significantly lower than most influential category of the same type, $P < 0.01$.

little or no influence on their team. The average impact of innovation usage is smaller but still substantial, with each of the four reference groups viewed as very or highly influential by at least one-quarter of team participants.

This combined focus on 'who does what' and 'what happens when they do it' is consistent with much research on the timing of organizational adoption. Holden (1986) finds that airplane hijacking rates were boosted by recent hijackings and even more by recent successful hijackings, and Conell and Cohn (1995) demonstrate a 'success dividend' for mining strikes. Haunschild and Miner's (1997) identification of frequency, trait and outcome-based imitation is paralleled here in managerial accounts of the influence of multiple reference groups.

What is most striking about Global Financial managers, however, is their close attention to the corporate élite. Seventy percent of team members described the practices of highly regarded firms as very or extremely influential. Prestigious firms were judged as having a significantly larger impact than direct competitors within financial services, customers and business partners, and the business community as a whole.

A focus on visible and celebrated firms also surfaced in interviews. Participants repeatedly described their positions with reference to leading corporations like General Electric, Microsoft and Federal Express. Team reports to senior management led with references to these sorts of firms in building a case for change. In fact, a number of these references were to companies that had not been formally visited.

By contrast, managers reported that other reference groups had much less influence. One manager told us that paying attention to popularity would enshrine the status quo. Managers also sharply rejected the notion that Global Financial should focus closely on its competition, one noting of a rival money center ' . . . we didn't feel we could learn anything from them'. The practices of Global Financial's customers appear to have

carried more weight, perhaps because long-term business relationships promoted trust and a deeper exchange of information.

Since imitation of the 'herd' or of rivals was counter-normative at Global Financial, survey respondents probably understated its role in team decision-making. But we do not think elimination of this potential source of bias would produce a qualitatively different picture. Data-gathering efforts and team recommendations suggest no effort to assess the overall popularity of different innovations. Firms in financial services were not often visited and were not particularly influential when they were benchmarked.

4.3 Success bias

Assumptions about success story bias can be evaluated by unpacking the measure of external results into its three components: specific examples of success, specific examples of failure, and comparative data. We ask if the influence of success stories is larger than that of other kinds of information, and if so by how much.

Table 3 indicates that external success stories are the single most influential sort of information about innovation outcomes. Four-fifths of the managers on benchmarking teams regarded specific examples of success as very or highly influential. The same tendency was also apparent in phone interviews and team reports. In developing a plan for corporate quality, for example, benchmarking teams focused on the gains realized by Baldrige winners like Motorola rather than the problems experienced by a Florida Power & Light or the many firms where TQM programs that produced meagre results (American Quality Foundation and Ernst & Young, 1991).

More generally, however, any form of anecdotal information was more compelling to benchmarking managers than financial or other comparative data. While 82% saw success stories as very or highly influential, 67% said the same thing of specific examples

Table 3 Attention to different measures of performance by benchmarking teams (self-reports by team members, $n = 94$ managers)

	Mean	% no influence or slightly influential	% very or extremely influential
External results			
Specific examples of success	4.06	7	82
Specific examples of failure	3.63*	19	67
Comparative data	3.10*	23	31
Internal results			
Past successes	3.41*	12	52
Past failures	3.71	20	63

*Mean level of influence significantly lower than most influential category of the same type, $P < 0.01$.

of failure. By contrast, less than a third of managers saw quantitative data in the same light. Almost a quarter regarded quantitative data as having no or a slight influence on team recommendations, something hardly ever reported about examples of success.

This discounting of hard data—the sort of information social scientists regard as most telling—is striking. The work of one of the world's premier banks is organized around the measurement of risk and return across financial opportunities, and benchmarking managers were comfortable with quantitative analysis. But they approached corporate innovation by learning from particular cases and compelling stories. And when they spoke to the bank's top management team they retold these stories. Comparative data or demonstrations of bottom-line benefits was seldom part of the presentation.⁶

Much cognitive and social psychological research reaches similar conclusions. Nisbett and Ross (1980) detail the power of vivid, case-based information, demonstrating it to be memorable and consequential for inference. Nisbett and Ross also show that people disattend to more pallid sorts of information and ignore baseline probabilities. Managers act in the same fashion when they look at success stories rather than the proportion of successful outcomes.

Table 3 also disaggregates internal results into its components: specific examples of success and specific examples of failure.⁷ The two were once again compelling, with more than half of benchmarking managers reporting that examples of success and failure were very or extremely influential. But the relative salience of success and failure was reversed when managers looked inside their own firm. Team members said that they were more influenced by Global Financial's failures than by its successes.

This reversal argues against explanations of the power of 'success stories' that refer to fundamental cognitive processes like confirmation bias (Gilovich, 1993). An external focus on success may have more to do with how communication is structured, since failures can be more easily hidden from outsiders than from insiders. We also suspect that internal failure leaves an organizational scar that shapes perceptions of viable choices—it is hard for an organization to allow itself to make the same mistake twice. News of the misfortunes of others can be more easily shrugged off.

4.4 Summary

We find broad consistency between the core assumptions of adaptive emulation and central tendencies in the way benchmarking teams at Global Financial evaluated innovations. Attention to external companies rose where the bank had a weaker track

⁶Lest we seem to disparage corporate executives, we should note that when the first author was on a university committee to 'reorganize sociology', the major data collection effort involved assembling descriptions of departments at Harvard, Stanford, and the University of Wisconsin. No analysis of the putative benefits of alternative departmental structures was attempted.

⁷When we constructed the survey we assumed that quantitative data internal to Global Financial would not affect team recommendations much, and so failed to include it as a category. In hindsight this seems an unfortunate omission.

record. Managers were performance-minded to a fault. And external success stories influenced benchmarking managers more than any other sort of information (though tales of failure were not far behind).

Global Financial's managers diverged most dramatically from Strang and Macy's (2001) model in their choice of exemplars. Strang and Macy (2001) assume mimicry of the current period's 'top performer'. Bank managers were centrally oriented towards an elite group of highly regarded, or prestigious, organizations.

While performance is an important source of prestige, the two are not the same. As an integrative judgement of relative standing or worth, prestige is a broader evaluation that includes criteria like product quality, functional importance, a reputation for treating employees well, and for being a place where exciting advances are made. Prestige is also a function of age, size and network position, since reputations are a function of visibility and the reputations of others (Schrum and Wuthnow, 1988; Benjamin and Podolny, 1999).⁸ Models of prestige emphasize dynamic relationships between prior outcomes, perceptions of those outcomes, and effects of the resulting evaluations on future organizational strategy and rewards (Podolny, 1993).

Benchmarking efforts at Global Financial also point to tendencies that are orthogonal to this paper's focus on adaptive emulation, but which are relevant to more general issues in innovation diffusion. Close attention to the views of the bank's CEO and top executives underscores the highly political nature of corporate innovation. And the chilling impact of internal failures suggests a type of corporate immunity to 'reinfection' that has implications for the ability of discarded innovations to make a comeback.

More generally, evidence from benchmarking teams is consistent with recent moves towards theoretically richer models of innovation diffusion. In a major step in this direction, Haunschild and Miner (1997) investigate the joint operation of frequency-, trait- and outcome-based imitation. While they find that all three occur in different firms, Haunschild and Miner also note that 'we have not shown that any single organization uses all three imitation modes' (1997: 496). But it is clear that all three modes of imitation were in use at Global Financial, as some benchmarking managers attended to overall popularity, some to prestigious firms, and some to outcomes. In fact, some managers used all three imitation modes!

5. An 'elite following' version of adaptive emulation

Close knowledge of an organizational process is of modest value unless it tells us something about outcomes of interest. This is particularly true when our knowledge of the process comes from a single firm. We want to know what would happen if the orientations of Global Financial's managers were quite general.

To investigate, we develop a model of innovation adoption and abandonment where

⁸We use terms like prestige, reputation and status interchangeably. See Merton (1970) and Hope (1982) for related discussions of scientific and occupational prestige.

firms imitate highly prestigious organizations.⁹ This idea is consistent with the institutional notion of emulation: as DiMaggio and Powell (1983: 152) argue, 'organizations tend to model themselves after similar organizations in their field that they perceive to be more legitimate or successful'. In fact, since prestigious firms tend to be both legitimate and successful, emulation of the elite is undoubtedly closer to the spirit of DiMaggio and Powell's argument than the purely efficiency-oriented 'top performer' specification offered by Strang and Macy.

This sort of revision of adaptive emulation is also straightforward to construct. We work from the computational model presented in Strang and Macy (2001), core elements of which we briefly summarize.

Adaptive emulation treats firms as boundedly rational actors who do not know the stochastic rule that generates performance but seek to learn from the outcomes they observe. The probability that a firm will abandon its current innovation is inversely related to its performance under the innovation. If a firm does decide to abandon its current innovation, it either draws randomly from the pool of possible alternatives or imitates the choice of another firm. The modification developed here involves this final step—what sort of firm is emulated? While Strang and Macy (2001) assumed imitation of the top performer, here we postulate imitation of prestigious firms.

Formally, firms experience performance outcomes that are driven by a combination of firm-specific quality (K_f), the effectiveness of the firm's chosen innovation (V_i), and luck:

$$O_{ft}(i) = \alpha K_f + \beta V_i + (1 - \alpha - \beta) \epsilon_{ft} \quad (1)$$

The effectiveness of innovations (β) is thus a parameter that can vary across simulations, as is the impact of firm-specific differences (α), the size of a firm's memory window, and the strength of decision-making tendencies towards inertia and scepticism.

To model the emulation of prestigious firms, we need to consider sources of organizational prestige. Given the feedback process at issue, however, a distinction between the effects of performance versus 'everything else' is sufficient—we do not need to know what makes up 'everything else.' We thus model the prestige of each firm as

$$P_{ft} = \alpha' S_f + \beta' O_{ft}(i) + (1 - \alpha' - \beta') \epsilon'_{ft} \quad (2)$$

where S indexes stable sources of organizational reputation unrelated to performance, $O_{ft}(i)$ summarizes the recent performance of firm f , and ϵ' is random noise (temporally changing sources of prestige unrelated to S or O). A firm's prestige thus varies from period to period (unless $\alpha' = 1$). While the structure of equations (1) and (2) mirror each other, all parameters are distinct. For example, β gives the contribution of

⁹While the models presented here center on following the elite, Global Financial's benchmarking teams suggest other avenues for model revision as well. For example, managerial reports of the influence of specific examples of failure implies that firms might not only mimic exemplars but avoid the practices of firms that experience dramatic failure.

innovations to firm performance, while β' gives the contribution of performance to a firm's prestige.

Regression analyses of *Fortune's* annual rankings of the most admired companies provide a strategy for determining plausible values of α' and β' .¹⁰ In particular, Fombrun and Shanley (1990), McGuire *et al.* (1990), and Brown and Perry (1994) find that roughly half of the variance in *Fortune* rankings (Brown and Perry, 1994: 1348) can be explained via a complex of financial measures: corporate earnings, return on investment, return on assets, annual growth in sales, relative market to book value and investment risk. These studies thus propose $\beta' = 0.5$, though it is unclear whether to interpret this as a lower bound (because performance is measured with error) or an upper bound (since some omitted factors are correlated with performance, and because prestige and performance may be reciprocally related).

Given a rule for determining prestige, we define a corporate *élite* of size E at time t as the E firms with the greatest prestige in round $t-1$. Emulators mimic the innovation of a randomly selected member of this *élite*. *Élite* firms emulate other *élite* firms, with the proviso that they cannot imitate themselves.

5.1 Computational experiments

We simulate three different worlds, each reflecting a different assumption about the sources of corporate prestige. In the first, firms emulate a 'social *élite*' whose reputations are unrelated to performance ($\beta' = 0$). In the second, firms emulate a 'Fortune *élite*' where half of a firm's reputation is derived from its recent performance ($\beta' = 0.5$); the Fortune *élite* is so named because it reflects a straightforward interpretation of what empirical analyses of *Fortune* rankings tell us about the business community. In the third, firms emulate a 'pure performance *élite*' defined solely by prior outcomes ($\beta' = 1$).

Strang and Macy (2001) find that innovation effectiveness—the extent to which the firm's current innovation drives its performance—is the key factor in differentiating diffusion dynamics. We thus focus on its impact across the three *élite* types. Computational experiments also manipulated the size of the *élite* (between 1 and 12 for a population of 100 firms) and whether non-performance drivers of prestige are fixed ($\alpha' = 1 - \beta'$) or temporally fluctuating ($\alpha' = 0$). We comment on these analyses, but for simplicity report results for an elite of size five with no firm-specific fixed sources of prestige.¹¹

Collective dynamics are reported in terms of the 'leading innovation': the innovation that is followed by the largest number of firms in each round. We summarize behavior under each model as innovation effectiveness (β in equation 1) is varied from

¹⁰*Fortune's* list ranks large corporations on eight attributes based on a survey sample of some 8000 executives, directors, or market analysts judging firms within their industry. Conducted since 1983, these rankings provide the most thorough assessment of corporate reputations available.

¹¹Other parameters are fixed at values that permit a wide range of collective dynamics to arise (Strang and Macy, 2001), Market stratification and skepticism are set to 0, inertia to 0.5, and memory to 10.

0 to 100%. Figure 1 gives the popularity (percent of followers) of leading innovations; Figure 2 their turnover (the rate at which new leading innovations emerge); Figure 3 the optimality ratio (the ratio of the effectiveness of leading innovations to that of the optimal innovation in the pool).

We begin with the simplest case, but also an anomalous one—that of entirely worthless innovations ($\beta = 0$). Here assumptions about the sources of éliteness are irrelevant. Since the choice of innovation has no effect on performance, all strategies for selecting which firm to mimic produce the same unhelpful result. The three models generate modest bandwagons that decay rapidly, since firms are likely to abandon the innovations they draw from exemplars.

When innovations are more effective, emulation of all three types of élites shift in the same direction. The popularity and optimality of leading innovations rises while the rate of turnover falls. As innovations affect performance more strongly, the firms that are emulated are increasingly likely to have themselves made good choices. And when emulators adopt effective practices they tend to hold them longer, producing larger and more long-lived bandwagons.

But the three models differ in their sensitivity to innovation effectiveness. As we increase the contribution of the innovation to firm outcomes, emulation of the 'pure performance élite' leads to sharply rising levels of bandwagoning (i.e. popularity) and around leading innovations that are almost optimal. A 'Fortune élite' model responds more slowly, and a 'social élite' model more sluggishly still. Even when innovations are responsible for most of the variance in outcomes, worlds of social emulation show only modest increases in the popularity of the leading innovation and modest decreases in the rates of turnover.

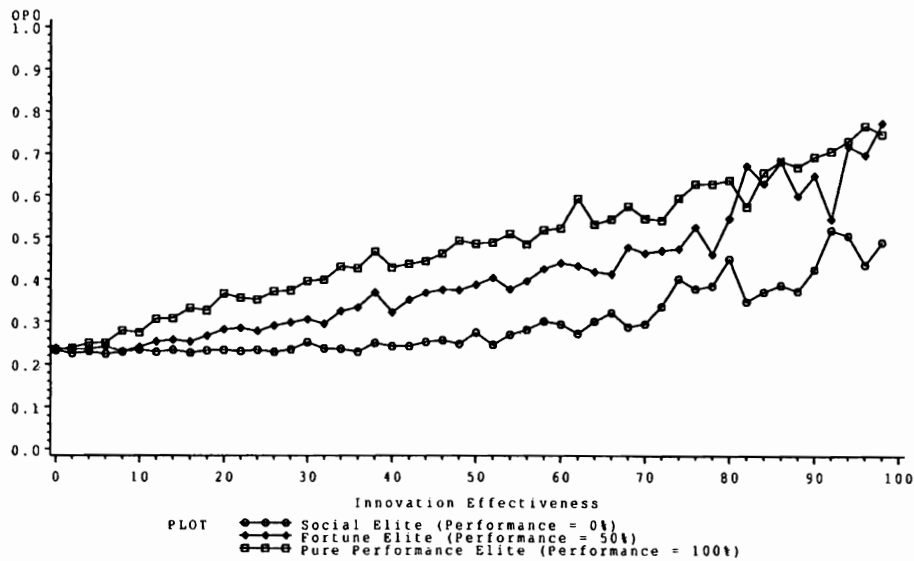


Figure 1 Popularity of leading innovations.

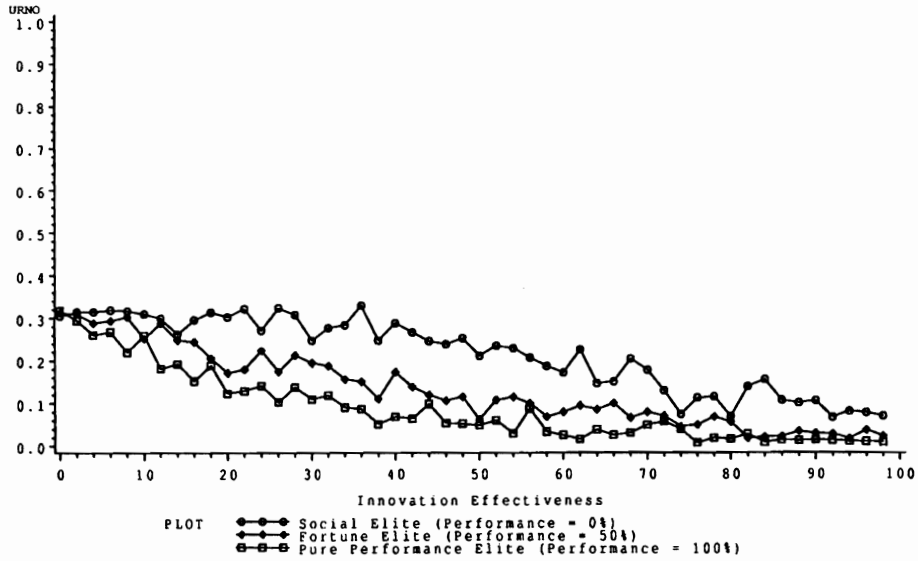


Figure 2 Turnover of leading innovations.

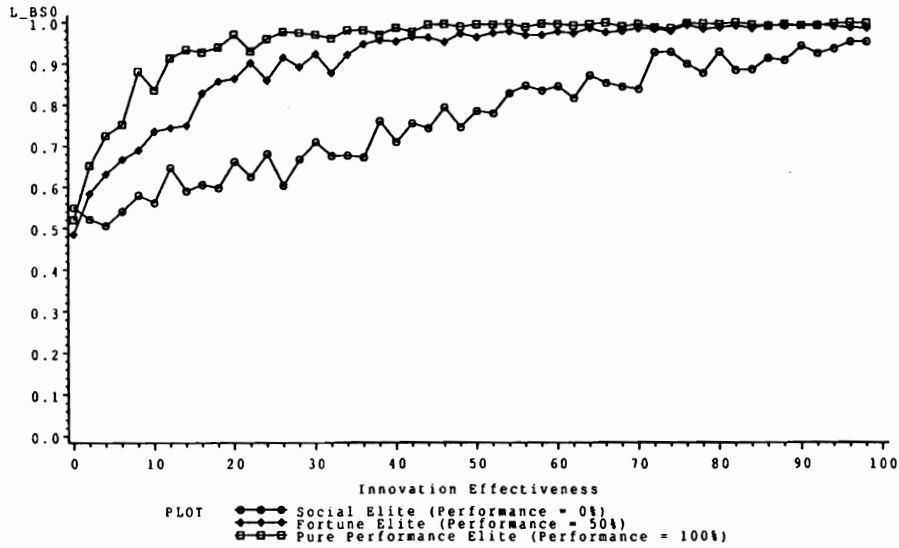


Figure 3 Optimality of leading innovations.

These differentials reflect the degree to which effective innovations tend to dominate the practices of each type of elite. Purely performance-based elites are the strongest instrument for locating good innovations, although an ineffective but lucky innovation has some chance of rising to the fore. When prestige is a mixture of performance and non-performance-based factors (the 'Fortune elite'), effective innovations are still

over-represented but less markedly so. Here an innovation must pass through two screens—first a stochastic relation to outcomes, and second a stochastic relation to reputation. Finally, the distribution of innovations held by a ‘social *élite*’ exactly mirrors usage in the population.

We partition the collective dynamics of innovation adoption and abandonment into three regions: turbulence (a regime of incessant change where leading innovations rise and fall very rapidly), faddish cycles (where some innovations have distinct but short periods of popularity), and institutionalization (where a single innovation gains great popularity and maintains it over time). Strang and Macy (2001) find that the major factor differentiating these regions is the effectiveness of the innovations: worthless innovations tend to produce turbulence, modestly effective innovations produce faddish cycles, and more effective innovations produce institutionalization.¹²

To show the implications of *élite* following models of adaptive emulation, Figure 4 displays these regions for the social, Fortune and pure performance *élites*, and for the ‘top performer’ model examined by Strang and Macy (2001). We code collective dynamics as ‘turbulent’ when turnover of leading innovations is 0.25 (leading innovations are prominent for fewer than four rounds on average); as ‘faddish’ when turnover lies between 0.25 and 0.05; and as ‘institutionalized’ when turnover is .05. These precise cut-offs are artificial, but the qualitative variations they distinguish are not.

As Figure 4 indicates, the range of innovations that experience faddish careers widens as the relationship between performance and prestige weakens. The ‘top performer’ model quickly yields institutionalization: if innovation choice is responsible for more than a quarter of the variance in outcomes, popular practices almost never lose their hold on the population. But where firms follow *élites*, and particularly where *élite* status is loosely related to performance, the tendency to imitate ineffective innovations grows. And since ineffective practices are more readily abandoned, the result is turbulence or short-lived fads.

As well as innovation effectiveness, we also explored the impact of two additional factors: the size of firm-specific differences in prestige, and the size of the corporate *élite*. Both factors have discernible but modest effects on collective adoption and abandonment. Popularity increases and turnover decreases when the non-performance component of prestige has a larger firm-specific component. A stable *élite*, even one composed of mediocre performers, leads emulators to continually return to the same mediocre innovations. By contrast, popularity is inversely related to *élite* size: if firms independently draw from a larger set of prestigious firms, they are less likely to converge. These two factors work with greater force on social *élites* (where the scope for fixed sources of prestige is larger, and which are less affected by the narrowness of the *élite* pool), and so they moderate but do not reverse the differentials shown above.

¹²Decision-making variables and exogenous performance differentials adjust the boundaries between the regions, with scepticism, inertia and market stratification raising the amount of innovation effectiveness needed to move from one region to the next. For example, worthless innovations can produce faddish dynamics if managerial scepticism and inertia are low.

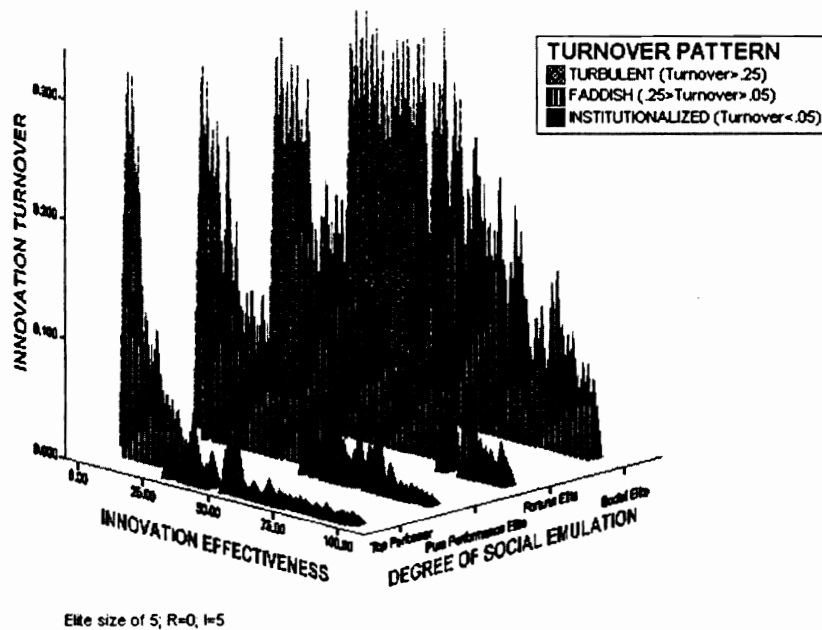


Figure 4 Dynamical regions by who is emulated.

Finally, we highlight the non-intuitive implications of imitating a 'social élite'. We might expect purely social emulators to be poor decision-makers, unable to locate and converge on effective innovations. After all, the 'social élite' model is identical to a popularity contest where the chance that an innovation will be emulated is directly proportional to its frequency in the population. Why then does the popularity and optimality of leading innovations rise with the impact of innovations on outcomes, and why does turnover decline?

The reason is that all firms are adaptive decision-makers who discard innovations that do not work for them. Imitating the practices of a randomly chosen member of the population is better than drawing randomly from the pool of available innovations, because emulators sample from a subset of innovations that have proved satisfactory to other firms. If firms were non-adaptive agents who abandoned innovations with some fixed probability regardless of outcomes, a 'social élite' would produce identical results for worthless and highly worthwhile innovations.

Further, emulation of a randomly drawn 'social élite' produces better choices than would adaptive decision-making without emulation. If dissatisfied firms simply drew randomly from the pool of possible innovations when they experience failure, they would fail to capitalize on the lessons learned by their fellows.¹³ Social emulation beats

¹³Of course, adaptive experimentation without emulation would also show entirely different collective dynamics, and in particular would produce no tendency for even temporary convergence around popular practices.

independent experimentation if all members of the population act in a retrospectively discriminating manner.

6. Discussion

This paper has sought to do two things: to confront a formal model of innovation diffusion with empirical efforts at innovation, and to use the discrepancies to revise and (hopefully) improve the model.

6.1 Empirical findings

Benchmarking teams at Global Financial acted in ways broadly consistent with the assumptions underlying adaptive emulation. External search intensified in domains where the bank had a weaker track record. Managers were strongly oriented to performance. And the sort of outcome they found most compelling was the external success story.

But bank managers did not locate success stories by scanning the financial pages for the quarter's 'high performer'. Instead, they fastened their closest attention on highly regarded organizations. Firms were treated as consequential less because they had done well recently than because they had established reputations as one of the world's great companies.

For modelling purposes, we have distinguished prestige from performance by its broader scope. From a more interpretive stand-point, however, the important thing about prestige is the social embeddedness that it implies. While performance can be conceived as an objective index accessible by outsiders, prestige refers to a collective judgement arising within the business community. In short, Global Financial's managers approached the identification of best practice sociologically, showing more imagination than Strang and Macy!

A parallel embeddedness in the organizational politics and culture of Global Financial was evident as well. Interviews made it clear that benchmarkers were well attuned to the clash of different perspectives within the bank, and used this awareness to position their innovation proposals. Managers also held a strong conception of the particular identity of Global Financial (as an élite bank, a technological leader, a competitive place to work, and more), and this conception framed much about their efforts at innovation. The substantive insights of the 'old institutionalism' as well as the 'new institutionalism' seem highly relevant.

The broadest lesson we draw from benchmarking teams is the compatibility of social embeddedness with a strong performance orientation. Much social scientific theory begins by distinguishing *Homo sociologicus* from *Homo economicus*. But benchmarking managers were both at once, most vividly in seeking to learn from highly regarded organizations.

6.2 Limitations

A study examining one firm's benchmarking program has obvious limitations. On the

positive side, coverage of 21 benchmarking teams and 13 issue domains means that the central tendencies we observe are not limited to a particular innovation or intra-firm constellation of interests. But the relationships observed here might be specific to an organizational activity named 'benchmarking' or to a firm labelled 'Global Financial'. We thus want to consider how the research setting studied here may have shaped the patterns we observe.

A first question is whether this paper's empirical analysis simply reflects the 'best practice' orientation of corporate benchmarking. Perhaps managers attended to external success stories because that is what Team Challenge was supposed to do. If so, we may mainly discovered the power of the cultural frame surrounding a benchmarking project.

While we can only speculate, it seems significant that managers at Global Financial often threw the benchmarking script away. Instead of Robert Camp's 'search for industry best practices' or even the APQC's 'organizations anywhere in the world,' benchmarking teams focused on the corporate élite. Teams were attentive not just to external best practice but to internal outcomes and internal politics. And although when managers visited other firms they looked for best practice, when they conducted internal interviews they were more sensitive to stories about failure.

Managers at Global Financial seem to have followed benchmarking principles when they viewed them as natural and productive, while violating principles that appeared artificial. The core audience for the managers studied here was the bank's CEO and top management team. We think they based recommendations on anecdotal reference to élite corporations not because they were participants on Team Challenge, but because that language was compelling and persuasive to top management.

A second important limitation of this study is its focus on a single firm. Global Financial is an élite bank, and this surely affects how its managers attend to external companies. In particular, we suspect that Global Financial's status led its managers away from focusing attention on competitors, and towards a more abstract reference group defined around corporate prestige. Attention to prestigious firms resonated with and confirmed Global Financial's self-perception as an élite organization, one that could learn much more from other great companies than from other banks.

While there is little systematic research on variation in reference groups, key studies indicate a similar pattern. Walker's (1969) analysis of public policy diffusion among the American states argues that most states follow a regional leader, and that regional leaders take their cues from each other. And Han's (1994) study of accounting choice finds that middle-range firms mimic larger firms while industry leaders engage in 'mutual shunning.' In both cases, organizations are able to look 'up' or 'outside' a prestige hierarchy for a model to emulate, but not 'across' (at immediate rivals) or 'down.'

These considerations suggest a two-step flow of influence (Katz and Lazarsfeld, 1944). While most firms emulate leading firms within their industry, élite firms like Global Financial model themselves on other élites in other industries. The resulting

collective dynamics should be consistent with those shown here, since influence runs from the élite to followers but not back again.

6.3 Theoretical Implications

Models of emulation can vary two main things: (1) the conditions that lead to mimicry, and (2) who is mimicked. The lessons we took from benchmarking teams did not lead us to modify (1), since benchmarking managers seemed clearly adaptive in turning to external firms when their organization's track record was weak. But their close attention to prestigious firms led us to experiment with alternative formulations for (2). Computational modeling of a variety of 'élite following' versions of adaptive emulation suggested three key findings.

Finding 1. The collective dynamics of adaptive emulators are robust when we vary the bases of prestige, and thus who is emulated. Under all conditions, increasing innovation effectiveness leads bandwagons to become larger, longer lived and better targeted at worthwhile practices. The most realistic formulation, where prestige is related to but not reducible to performance, produces patterns of innovation adoption and abandonment that are almost the same as those implied by a pure performance élite. Even simulations that treat prestige as unrelated to performance generate qualitatively similar collective trajectories.

For a simulation-based approach, this robustness is reassuring. Relative to formal proof, a disadvantage of computational modeling is the unknown generality of simulation results. And since any point estimate of the relationship between performance and prestige is bound to be off target, it is important that model implications hold across a wide range of parameter values.

Finding 2. All of the varieties of emulation studied here are collectively adaptive. This extends the efficiency argument that imitation is cheap (Conlisk, 1980). It is not surprising, of course, that imitation of high performers improves outcomes within the population as a whole—this sort of mimicry has obvious parallels to evolutionary dynamics. But we did not anticipate that purely social emulation would produce better outcomes than independent experimentation.

These results of our computational experiments contrast with the unfavorable social welfare implications of economic analyses of informational cascades. Bikchandani *et al.* (1992) and Banerjee (1992) assume that decision-makers take what others do so seriously that they ignore their 'private signal' and become likely to herd (or cascade) in the wrong direction. Both models tend to produce outcomes that are inferior to those that would be produced by independent choice, and argue for the utility of restricting knowledge of the choices that others make.

By contrast, adaptive emulation assumes a backward-looking iterated process where poor choices are disciplined by experience, and firms respond to failure by abandoning even popular innovations. In other words, while adoption is emulative, abandonment is

adaptive. This retrospective rationality ensures that all choices are informative, and allows emulators to benefit from the experience of others.

Finding 3. Despite these important resemblances, different decisions about who to emulate produce qualitatively distinct collective trajectories. The weaker the relationship between prestige and performance, the faster bandwagons rise and fall and the broader the range of innovations whose popularity is fleeting. The possibility of institutionalized persistence diminishes, and even highly effective innovations experience a mere fifteen minutes of fame.

This might seem unsurprising if it did not cut against the grain of so much of the literature. In a seminal theoretical statement, DiMaggio and Powell (1983) suggest that an important mechanism underlying organizational homogeneity is imitation of 'more legitimate or successful' organizations. The argument is attractive and accessible, and has been employed fruitfully in much diffusion research.

But models of adaptive emulation reach different conclusions. Limiting attention to mimicry of 'highly successful' firms, Strang and Macy (2001) found that widespread usage was only maintained over time if innovations provided performance benefits. The broader class of models examined in this paper make a stronger claim. Imitation of 'more legitimate or successful firms' (i.e. firms whose prestige is related to but not reducible to their performance) leads effective as well as ineffective innovations to experience faddish careers. The ethos of rational adaptation and social emulation are not incompatible—indeed, benchmarking teams at Global Financial exemplify both—but they militate against temporally stable isomorphism.

Computational models simply explicate the implications of theoretical arguments, of course. To the extent that the models of adaptive emulation presented here adequately represent DiMaggio and Powell (1983), we conclude that institutional arguments about mimicry explain faddishness but not stable patterns of convergence. To place this within the context studied here: Global Financial's benchmarkers may promote corporate homogeneity by advocating the innovations of prestigious firms. But since these practices will often fail to solve Global Financial's problems, new benchmarking teams will be formed later on who advocate other innovations used by other élites, contributing to the demise of one bandwagon and the beginning of another.

The faddish careers that many innovations experience (Abrahamson, 1996) are important outcomes to model and explain in their own right. But the deeper insight of DiMaggio and Powell (1983) is that populations do in some respects settle down into stable patterns where one or a few organizational forms dominate. The possible contribution of 'adaptive emulation' to explanations of this outcome is to insist that problemistic search plus imitation of more legitimate or successful models is not enough. Explanations of institutional isomorphism require, we think, a more substantive analysis of institutionalization—of why innovators pour old wine into new bottles, for example, or of why some practices once adopted cannot be readily abandoned.

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References

- Abrahamson, E. (1996), 'Management fashion,' *Academy of Management Review*, **21**, 254–285.
- Abrahamson, E. and G. Fairchild (1999), 'Management fashion: lifecycles, triggers, and collective learning processes,' *Administrative Science Quarterly*, **44**, 708–740.
- Banerjee, A. V. (1992), 'A simple model of herd behavior,' *Quarterly Journal of Economics*, **107**, 797–817.
- Benjamin, B. A. and J. M. Podolny (1999), 'Status, quality, and social order in the California wine industry,' *Administrative Science Quarterly*, **44**, 563–589.
- Bikhchandani, S., D. Hirschleifer and I. Welch (1992), 'A theory of fads, fashion, custom, and cultural change as informational cascades,' *Journal of Political Economy*, **100**, 992–1026.
- Brown, B. and S. Perry (1994), 'Removing the financial performance halo from Fortune's 'most admired' companies,' *Academy of Management Journal*, **5**, 1346–1359.
- Burns, L. R. and D. R. Wholey (1993), 'Adoption and abandonment of matrix management programs: effects of organizational characteristics and interorganizational networks,' *Academy of Management Journal*, **36**, 106–138.
- Camp, R. C. (1989), *Benchmarking: The Search for Industry Best Practices that Lead to Superior Performance*. ASQC Quality Press: Milwaukee, WI.
- Conell, C. and S. Cohn (1995), 'Learning from other people's actions: environmental variation and diffusion in French coal mining strikes, 1890–1935,' *American Journal of Sociology*, **101**, 366–403.
- Conlisk, J. (1980), 'Costly optimizers versus cheap imitators,' *Journal of Economic Behavior and Organization*, **1**, 275–293.
- Cyert, R. M. and J. G. March (1963), *A Behavioral Theory of the Firm*. Prentice-Hall: Englewood Cliffs, NJ.
- DiMaggio, P. J. and W. W. Powell (1983), 'The iron cage revisited: institutional isomorphism and collective rationality in organizational fields,' *American Sociological Review*, **48**, 147–160.
- Fligstein, N. (1985), 'The spread of the multidivisional form,' *American Sociological Review*, **50**, 377–391.

- Fombrun, C. and M. Shanley (1990), 'What's in a name? Reputation building and corporate strategy,' *Academy of Management Journal*, **33**, 233–258.
- Gavetti, G. and D. Levinthal (2000), 'Looking forward and looking backward: cognitive and experiential search,' *Administrative Science Quarterly*, **45**, 113–137.
- Gilovich, T. (1993), *How We Know What Ain't So*. Free Press: New York.
- Greve, H. R. (1996), 'Patterns of competition: the diffusion of a market position in radio broadcasting,' *Administrative Science Quarterly*, **41**, 29–60.
- Greve, H. R. (1998), 'Performance, aspirations, and risky organizational change,' *Administrative Science Quarterly*, **43**, 87–126.
- Han, S.-K. (1994), 'Mimetic isomorphism and its effect on the Audit Services market,' *Social Forces*, **73**, 637–663.
- Haunschild, P. R. (1993), 'Interorganizational imitation: the impact of interlocks on corporate acquisition,' *Administrative Science Quarterly*, **38**, 564–592.
- Haunschild, P. R. and A. S. Miner (1997), 'Modes of interorganizational imitation: the effects of outcome salience and uncertainty,' *Administrative Science Quarterly*, **42**, 472–500.
- Haunschild, P. R. and B. N. Sullivan (2002), 'Learning from complexity: effects of prior accidents and incidents on airlines' learning,' *Administrative Science Quarterly*, **47**, 609–637.
- Haveman, H. A. (1993), 'Follow the leader: mimetic isomorphism and entry into new markets,' *Administrative Science Quarterly*, **38**, 593–627.
- Holden, R. T. (1986), 'The contagiousness of aircraft hijacking,' *American Journal of Sociology*, **91**, 874–904.
- Hope, K. (1982), 'A liberal theory of prestige,' *American Journal of Sociology*, **87**, 1011–1031.
- Ingram, P. (2002), 'Interorganizational learning,' in J. A. C. Baum (ed.), *Companion to Organizations*. Blackwell: Oxford, pp. 642–663.
- Katz, E. and P. F. Lazarsfeld (1964), *Personal Influence*. Free Press: New York.
- Kharbanda, O. P and R. A. Stallworthy (1985), *Corporate Failure: Prediction, Panacea, and Prevention*. McGraw-Hill: London.
- Lant, T. K. (1992), 'Aspiration level adaptation: an empirical exploration,' *Management Science*, **38**, 623–644.
- Levinthal, D. and J. G. March (1981), 'A model of adaptive organizational change,' *Journal of Economic Behavior and Organization*, **2**, 307–333.
- March, J. G. and H. A. Simon (1958), *Organizations*. Wiley: New York.
- Martins, L. L. and A. Kambil (1999), 'Looking back and thinking ahead: effects of prior success on managers' interpretations of new information technologies,' *Academy of Management Journal*, **42**, 652–661.
- McGuire, J., T. Schneeweis and B. Branch (1990), 'Perceptions of firm quality: a cause or result of firm performance,' *Journal of Management*, **16**, 167–180.
- Merton, R. K. (1970), *The Sociology of Science*. University of Chicago Press: Chicago, IL.
- Miner, A. S., J.-Y. Kim, I. W. Holzinger and P. Haunschild (1999), 'Fruits of failure: organizational failure and population-level learning,' in A. S. Miner and P. Anderson (eds), *Advances in Strategic Management* **16**. JAI Press. Stamford, CT, pp. 187–220.

- Nisbett, R. E. and L. Ross (1980), *Human Inference: Strategies and Shortcomings of Social Judgment*. Prentice Hall: Englewood Cliffs, NJ.
- Ocasio, W. (1995), 'The enactment of economic adversity: a reconciliation of theories of failure-induced change and threat-rigidity,' in *Research in Organizational Behavior* 17. JAI Press: Greenwich, CT, pp. 287–331.
- O'Dell, C. (1994), 'Out-of-the-box benchmarking,' in *Continuous Journey: The Magazine for Continual Improvement*. American Productivity & Quality Center: Houston, TX, pp. 25–28.
- Podolny, J. M. (1993), 'A status-based model of market competition,' *American Journal of Sociology*, 98, 829–872.
- Rogers, E. M. (1995), *Diffusion of Innovations*. Free Press: New York.
- Schrum, W. and R. Wuthnow (1988), 'Reputational status of organizations in technical systems,' *American Journal of Sociology*, 93, 882–912.
- Staw, B. M., L. E. Sandelands and J. E. Dutton (1981), 'Threat-rigidity effects in organizational behavior: a multilevel analysis,' *Administrative Science Quarterly*, 26, 501–524.
- Strang, D. and M. W. Macy (2001), 'In search of excellence: fads, success stories, and adaptive emulation,' *American Journal of Sociology*, 107, 147–182.
- Strang, D. and S. A. Soule (1998), 'Diffusion in organizations and social movements: from hybrid corn to poison pills,' *Annual Review of Sociology*, 24, 265–290.
- Strang, D. and M. C. Still (2003), 'Does uncertainty promote or hinder imitation? An empirical study of benchmarking teams,' working paper, Department of Sociology, Cornell University.
- Walker, J. L. (1969), 'The diffusion of innovations among the American states,' *American Political Science Review*, 63, 880–899.