THE FOG OF FEEDBACK: AMBIGUITY AND FIRM RESPONSES TO MULTIPLE ASPIRATION LEVELS

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This study examines firms' responses to performance assessments relative to multiple aspiration levels. We argue that comparisons of performance to multiple aspiration levels over time affects the interpretative clarity of feedback and, consequently, shapes a firm's responsiveness. We further conceptualize the relationship between performance relative to social and historical aspirations as ambiguous, inconsistent, and consistent performance feedback. Empirically, we examine the effects—on firms' responsiveness—of weak, negative, and positive correlations between performance relative to social and historical aspirations, where responsiveness is measured in terms of new product introductions. We find that both inconsistent and consistent feedback increase a firm's responsiveness, whereas ambiguous feedback dampens responsiveness. Our focus on this type of feedback ambiguity is novel, and it establishes the functional form of the relationship between feedback clarity/ambiguity and responsiveness. This paper augments the behavioral theory of the firm and research on performance feedback; it also extends previous work on ambiguity in strategic decision making. Copyright © 2014 John Wiley & Sons, Ltd.

INTRODUCTION

The notion that an organization's performance relative to aspiration levels has an effect on strategic decision making is consistent with many studies and observations of organizations (Bromiley, 2005; Gavetti *et al.,* 2012; Shinkle, 2012). In determining when and how they should respond to changes in the environment, decision makers must interpret the performance outcomes of their organization. Toward that end, they compare the firm's current performance with multiple aspiration levels—typically with its past performance and with the performance of its peers (Cyert and March, 1963). Decades' worth of empirical research has used performance aspiration comparisons to explain a variety of strategic actions: organizational change (Greve, 1998; Lant and Hewlin, 2002), strategic positioning (Audia, Locke, and Smith, 2000; Park, 2007), corporate transactions (Haleblian and Rajagopalan, 2005; Shimizu, 2007), and new product introductions (Audia and Brion, 2007; Gaba and Joseph, 2013).

This extensive body of research draws its insights from the behavioral theory of the firm (BTOF), and implicitly assumes that performance is unambiguous once it has been interpreted with the help of an aspiration level. This assumption stands in contrast with studies that place greater emphasis on ambiguity (e.g., March and Olsen, 1976), and are united in common observations that ambiguities in the relationships among outcomes, aspirations, and actions exist (Levinthal and Rerup, 2006; March, 2010). Evaluation of performance relative to historical (own) and social (peer) aspirations may induce varying perceptions of achievement and thus ambiguity with regard to performance feedback.

Past feedback research has treated this issue as a conflict in aspiration levels at one point in time (Baum *et al.,* 2005; Kahneman, 1992). We introduce the notion that ambiguous feedback arises from an unclear pattern of historical and social performance assessments over multiple time periods. Clarity over time is consequential—given that managers retrospectively rationalize strategies based on patterns of prior actions and performance outcomes and then rely on those patterns to make forward-looking decisions (Mintzberg, 1985).

Following a host of scholars (e.g., Feldman, 1989; March, 1994; Weick, 1995), this paper distinguishes *ambiguity*, which implies that feedback is open to multiple interpretations, from *uncertainty*, which is understood as the lack of information. A key difference between these two concepts is that the latter may be resolved by obtaining more information whereas the former requires decision makers to arrive at a collective understanding of the feedback in question. Our focus on ambiguous performance feedback differs from—yet is related to—the ambiguity surrounding goals (Hu and Bettis, 2014) or the causality of events (Powell, Lovallo, and Caringal, 2006). In all these cases, interpretation is required and may well influence subsequent decision making (March and Olsen, 1976). However, little is known about how behavioral theory's "feedback-reactive" decision procedures are affected by ambiguity, as may arise from performance comparisons to multiple aspiration levels over time. We seek to address this gap in the literature and to answer the following questions: How does ambiguity in performance feedback affect an organization's response to that feedback? How does this case differ from the cases of clearly inconsistent and consistent feedback?

Using the mobile device industry as an empirical setting, we examine the relationship (i.e., correlation) that exists between performance relative to historical and social aspiration levels and the effect of that relationship on responsiveness. Specifically, we examine performance assessments that yield three types of feedback—ambiguous feedback (weak correlation), inconsistent feedback (negative correlation), or consistent feedback (positive correlation)—and explore how these assessments affect the introduction of new products. The continual launch of new products is necessary for firm adaptation and survival (Brown and Eisenhardt, 1995) and is also a typical response of firms facing performance problems (Martin and Mitchell,

1998). Studies have shown that comparisons of performance to a single aspiration level (Greve, 2003a) or to multiple reference targets at a point in time (Giachetti and Lampel, 2010) affect new product introductions, making this an ideal setting in which to augment existing theory.

We find that inconsistent and consistent feedback yield similar results: both have a positive effect on the firm's responsiveness. However, ambiguous feedback dampens a firm's responsiveness. Our main thesis is that, because ambiguous feedback is open to interpretation, it affects the firm's problem-solving behavior. When feedback is ambiguous, decision makers may interpret problems in ways that allow the organization to stay inert, and—in the face of divergent perspectives and internal debate—delay action.

Our study makes three contributions. First, we augment the BTOF research on adaptive behavior amid ambiguity. Although recent conceptual and qualitative work has begun to examine organizational behavior following outcomes that are not distinctly classified as successes or failures (Rerup, 2006; Weick and Sutcliffe, 2001; Weick, Sutcliffe, and Obstfeld, 1999), there has been no research examining the behavioral implications of ambiguity created by performance assessments relative to multiple aspiration levels over time. This is an important omission, because feedback that can be variously interpreted may uniquely explain a range of behavioral outcomes.

Second, we contribute to performance feedback theory. Prior studies (e.g., Baum *et al.,* 2005) have examined either independent or joint performance feedback at a given moment in time, which renders them unable to account for the relationship between historical and social performance aspirations over multiple periods. Unlike prior studies, our approach allows us to distinguish the effects of ambiguous feedback from those of inconsistent and consistent feedback. This distinction is important because ambiguity, and not inconsistency, may serve as the greatest impediment to adaptive responses.

Third, our study contributes to perspectives of strategizing under conditions of ambiguity. Although some scholars of strategy and organizations have considered the relation between ambiguity and adaptation, the focus of that work has been on the ambiguity arising from resource inputs (Lippman and Rumelt, 1982; Mosakowski, 1997). We augment this stream of research by shifting the locus of ambiguity from firm competencies

to the cues provided by performance feedback. Our approach reflects the view that casual ambiguity resides in managerial perceptions (Powell *et al.,* 2006), and allows us to examine the functional relationship between degrees of feedback clarity/ambiguity and new product introductions, a source of firm heterogeneity.

THEORY AND HYPOTHESES

The behavioral theory of the firm acknowledges that, with regard to performance assessment, decision makers have limited attention (Ocasio, 1997). For this reason, their attempts to improve the organization are not continuous and are initiated only when performance falls short of aspiration levels. Differences between performance and aspirations shift attention to problems and motivate greater effort toward goal achievement (Lant, Milliken, and Batra, 1992).

Performance assessments typically depend on comparisons with two aspiration levels: a historical aspiration level and a social aspiration level (Cyert and March, 1963; Greve, 2003b). *Historical* aspiration levels reflect the firm's past performance and may serve as a forecast of future performance. *Social* aspiration levels involve comparisons with comparable peer organizations (Massini, Lewin, and Greve, 2005) and provide a good indicator of the firm's capabilities vis-à-vis competitors.

Research has established that performance is often evaluated using some combination of historical and social aspiration levels (Cyert and March, 1963). The different specifications of various aspiration-level models reflect different theoretical assumptions regarding information processing in organizations (Washburn and Bromiley, 2012). Some studies (e.g., Greve, 1998) assume that the firm has one aspiration level for a given performance measure and so postulate a single aspiration level as an additive function of prior aspiration level, prior performance, and social comparison. Other studies (e.g., Audia and Greve, 2006) assume that historical and social aspirations serve as independent constraints on decision making and hence calculate two separate indicators of performance-aspirations comparisons. Still others (e.g., Baum *et al.,* 2005; Kim, Finkelstein and Halebian, 2014) use historical and social performance feedback jointly to predict strategic decisions because dual comparisons may provide

more information than would either comparison alone.

Despite their broad acceptance and useful insights, such expressions of performance assessment do not fully capture a key component of decision making: the *relationship* between historical and social performance feedback. Researchers have long recognized that strategy manifests as a sequence of decisions that reflect an underlying cognitive pattern adopted by an organization for dealing with problems (Mintzberg, 1978). Managers' evaluations of performance, and the firm's response to those evaluations, do not occur in isolation with no consideration of what transpires beforehand and afterward. The implication is that decision makers cannot develop a complete understanding of the comparison between historical and social feedback within a single period (Lant and Hurley, 1999). Multiple periods of observations are needed in order to interpret this relationship and to understand whether and how they covary.

The strength of the relationship (i.e., the correlation) between historical and social feedback may inform or confound responses beyond that of isolated comparisons of performance and aspirations. This is because the degree to which these comparisons covary may shape the problemistic search process—that is, "search that is stimulated by a problem … and is directed toward finding a solution" (Cyert and March, 1963: 121). The strength of the correlation may affect how decision makers attend to feedback, make sense of "what happened," and reach agreement about the nature and extent of problems. Because interpretation occurs in advance of choosing among solutions, it may alter how cognitive templates and financial resources are applied to problem resolution (Weick and Sutcliffe, 2006).

Ambiguous, inconsistent, and consistent feedback

The potential for variations in the comparison of performance feedback opens the possibility that feedback may be ambiguous as well as inconsistent or consistent. That is, performance in terms of historical and social aspirations can be weakly correlated (ambiguous), negatively correlated (inconsistent), or positively correlated (consistent). A positive correlation, for example, suggests that historical and social performance-aspirations assessments have yielded similar feedback over time. A strong negative correlation exists when
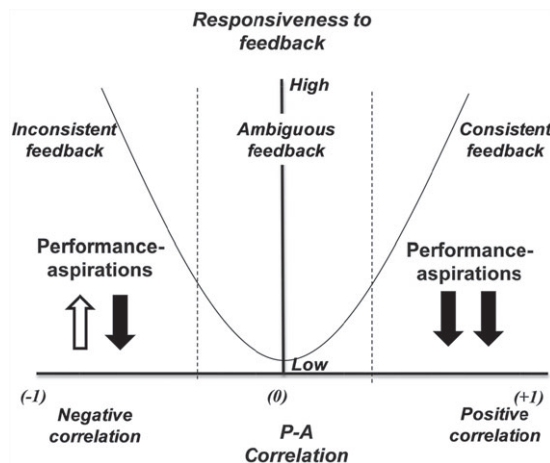
Figure 1.   Firm responsiveness to three types of feedback (ambiguous, inconsistent, and consistent)

one feedback type is improving and the other is declining. When there is only a weak correlation, the feedback will be ambiguous. Figure 1 plots our proposed functional form of the relationships between firm responsiveness and the three feedback types. In what follows, we develop hypotheses to guide our examination of these relationships.

Ambiguous feedback and firm responsiveness

Ambiguous feedback is characterized by performance comparisons that are *weakly* correlated over time. Performance in this case might fall short of historical aspirations in one period, fall short of social aspirations in the next period, yet exceed both in the period after that. For example, in 2008, Sony Ericsson's market share declined below the industry mean in the second quarter (−0.6%), increased above the mean in the third quarter (+0.1%), and fell below it again in the fourth quarter (−0.2%). During this same period, Sony Ericsson's second-quarter market share increased 0.3 percentage points over the first quarter (from 7.9 to 8.2%), increased again in the second quarter (+0.3%), but declined in the fourth quarter (−0.2%). In this case, comparisons over multiple periods did not provide a clear signal of its overall performance pattern.

Because ambiguous feedback may not provide a definitive assessment of performance, decision makers must first make sense of the feedback information. Decision makers are generally averse to ambiguity (March, 1994), and ascribe meaning to ambiguous feedback in order to simplify decision making (Weick, 1979). The process of feedback interpretation—what we call *ambiguity resolution*—may in turn affect firm responsiveness to feedback given the implications of that interpretation for the process of problemistic search. Ambiguous feedback may be encoded in a manner that obscures the case for changes in organizational behavior (Rerup, 2006; Weick and Sutcliffe, 2001) and may induce small adjustments to current activities, rather than investment in new ones.

When feedback signals from dual aspiration comparisons are intertemporally mixed and weakly correlated, the pattern of performance is neither distinctly "improving" nor "declining." Success and failure are intermingled over multiple periods and, in the extreme, reflect a performance pattern that appears to be stochastic with respect to historical and social aspirations.

Accordingly, no single-period performance-aspiration gap may be especially remarkable because, as in the Sony Ericsson example, performance relative to both aspiration levels is improving at least some of the time.

In general, such conditions make it easier for managers to engage in self-enhancing behavior (Jordan and Audia, 2012), and reinterpret the feedback in a favorable light (Sutton and Kramer, 1990). Research suggests that, following ambiguous outcomes, performance problems may be conceived as temporary (Weick and Sutcliffe, 2001) or recoded so as to avoid perceptions of failure (Audia and Brion, 2007). Hence, they are not likely to lead to a universal conclusion that the organization's health is at stake (Rerup, 2006). The ambiguity reduction demonstrated by managers' ability to twist ambiguity to fit adaptive notions of success may lead to behavioral rigidity, since responsive actions are less likely when the organization does not perceive performance as poor.

At the same time, interpretive efforts aimed at ambiguous feedback may amplify perceived differences of opinion within the firm (March, 2010), which may further attenuate the problem-solving process. Variations in perceptions may fuel debate concerning the best course of action in response to the feedback (Denis *et al.,* 2011; Kaplan, 2008) and limit the firm's capacity to uniformly channel attentional and financial resources toward potential solutions in a coordinated manner (Rerup, 2009). These outcomes could, for instance, forestall major capital projects or investments in new research, products, or manufacturing capacity that would otherwise have

been undertaken in response to low performance. Clearly, such delays could have a negative effect on downstream activities and commercialization.

In short, interpretative processes resulting from ambiguity in performance feedback do not create a compelling need for change. Managers may respond to ambiguity by persisting with current products and curtailing important investment activities. That response could, in turn, delay or impair the introduction of new products while promoting the status quo of products already on the market. Since we regard feedback as ambiguous when the correlation between the two performance comparisons is neither obviously positive nor obviously negative, our first hypothesis predicts the following:

> *Hypothesis 1 (H1): There is a U-shaped relationship between the correlation of performance relative to historical and social aspirations and the firm's responsiveness (new product introductions).*

Inconsistent feedback and firm responsiveness

Inconsistent feedback is characterized by a negative correlation between multiple performance assessments over time. When feedback is inconsistent, intertemporal comparisons of current performance relative to past and peer performance diverge systematically. Historical feedback may suggest that performance is improving while social feedback suggests performance is declining—or vice versa.

Unlike ambiguous performance feedback, inconsistent feedback does not suffer from interpretation problems and so does not impede the process of problemistic search. Improving social performance coupled with declining historical performance signals that the entire industry is suffering through a downturn and that, although the focal firm is somewhat better off than its competitors, the firm finds it increasingly difficult to improve upon its own past performance. Conversely, improving historical performance coupled with declining social performance is indicative of a growing industry in which the focal firm improves its performance but not enough to keep pace with its competitors. In either case, there is a clear motivation to alter activities in response to the feedback.

As the two types of performance feedback become more inconsistent (i.e., as their correlation becomes more negative), declining performance is likely to garner sustained attention. Decision makers may debate potential solutions, but they will be relatively less inclined (in comparison with the case of ambiguous feedback) to forestall implementing those solutions because problems will be viewed as chronic rather than temporary. What room may exist for self-enhancing behavior (Jordan and Audia, 2012) may prove to be short-lived. Self-enhancement will likely diminish in the presence of mounting inconsistent feedback, as managers are hard-pressed to downplay strong signals that performance is declining—irrespective of whether the decline is relative to own performance or to peer performance.

Declining performance relative to *historical* aspirations suggests that the firm might not meet future growth expectations and may not have enough resources to expand its activities. Over multiple periods, such declines would make it difficult for the firm to meet analyst expectations or to compete effectively. The firm may therefore be prompted to streamline product development, improve manufacturing, and/or shift human capital from long-term projects to more current products that are closer to shipping (Hambrick and Schecter, 1983). Declining performance relative to *social* aspirations indicates that the firm's competitive position is slipping (Wiseman and Bromiley, 1996). In a dynamic environment or in an industry characterized by rapid technological change, that fate reflects the erosion of distinctive product market capabilities and indicates the need to develop new ones (Leonard-Barton, 1992). This type of decline is likely to increase responsiveness because greater product variety is required to accommodate consumer preferences (Kekre and Srinivasan, 1990), which in volatile environments—such as the mobile device industry—change rapidly.

For example, Research in Motion (RIM) experienced highly inconsistent feedback in 2004 and 2005. Although the firm's market share was improving relative to historic levels (from 0.1% in first quarter (Q1) 2004 to 0.7% in 2006 Q1), the industry average was growing faster; competitors such as Nokia and Motorola were taking market share from floundering rivals such as Samsung. Hence RIM recognized that, although successful with enterprise customers, it was only a niche player when compared to other major manufacturers that were capturing most of the consumer purchasers (*Businessweek*, 2005). In response, RIM expanded its product portfolio to target the mass market.

In sum, we argue that inconsistent feedback provides diagnostically useful information and encourages sustained attention to declines in historical or social performance over time. Thus, inconsistent feedback limits the debate and delay associated with ambiguous feedback even as it increases the efforts devoted to responding to performance problems. Thus, we have the following hypothesis:

> *Hypothesis 2 (H2): As the correlation between performance relative to social and historical aspirations becomes more negative, there is an increase in the firm's responsiveness (more new product introductions).*

Consistent feedback and firm responsiveness

Consistent feedback reflects a strong positive correlation between performance relative to historical and social aspirations. That is, both historical and social performance feedback indicate either improving or declining performance over time. Consistent feedback conforms to well-established patterns of aspiration performance. It provides decision makers with a reliable signal of whether (or not) to initiate, alter, or expand activities; such feedback can therefore serve to focus attention and effort within the organization.

Consistent feedback is naturally perceived as being more accurate than ambiguous feedback. It is also considered to be more useful (Stone and Stone, 1985), because consistent feedback verifies managerial concerns that changes are needed (when both comparisons reflect declining performance) or establishes that current programs and products are sufficient (when both comparisons reflect improving performance). As a result, consistent feedback may reinforce the inclinations commonly affirmed by a single type of performance-aspirations comparison (i.e., it reinforces decision rules), thereby increasing acceptance of and responsiveness to the feedback. Thus, the effects of consistent feedback are similar to those of inconsistent feedback: in both cases, there is no need for reinterpretation or internal debate over the firm's performance.

However, the precise effects of consistent performance feedback on problemistic search processes depend on whether performance is improving or rather deteriorating over time. Consistent feedback that indicates *improving* historical and social performance may severely limit responsiveness. A positive correlation between these two types of feedback precludes doubting that the trajectory of the firm's strategies and activities is favorable. Performance feedback research indicates that, when indicators signal increasing performance, there is little motivation to change (Greve, 1998). Moreover, a positive correlation between two indicators that both reflect improved performance supports the organization's view that its competencies are valuable and that its managers have been making the right decisions (Milliken and Lant, 1991). In other words, if performance relative to both historical and social aspiration levels is improving, then managers are not motivated to engage in problem solving and will persist with current strategies, activities, and products.

In contrast, if consistent feedback reflects *deteriorating* historical and social performance over time, then this double threat serves as a powerful signal to decision makers that drastic action is needed. Toward this end, decision makers may focus on efforts aimed at better utilizing assets, improving efficiency, and increasing new product output. Feedback clarity, when combined with the sustained attention that results from consistent feedback, will likely motivate decision makers to persist with current activities and products or seek to augment them—according to whether performance is improving or declining. These considerations lead to our final hypotheses:

> *Hypothesis 3a (H3a): Consistent feedback that arises from declining performance relative to both social and historical aspirations will lead to increased firm responsiveness (more new product introductions).*
> *Hypothesis 3b (H3b): Consistent feedback that arises from improving performance relative to both social and historical aspirations will lead to reduced firm responsiveness (fewer new product introductions).*

METHODS

Research setting

The setting for this study is the global mobile phone industry. This setting is ideal for several reasons. First, it is characterized by a high rate of new product introductions and technological advances

(Giachetti, 2013). Mobile device development time is measured in months, which means that rapid product development cycles and frequent phone launches are critical to success. Second, the identities of the major players do not change during the study period. Thus, the reference group against which focal performance is compared remains constant; the market leader (Nokia) likewise does not change. Third, the primary goals—including, in particular, market share—of firms in this industry are widely shared and closely monitored by all market participants and industry analysts. Fourth, studying a single industry limits the variance in decision interactions and upstream development, especially since the process of introducing a mobile device is roughly similar across firms. Finally, we have access to quarterly data and so there is sufficient variation over time (in our dependent and independent variables) to enable identification of the hypothesized effects.

Sample

The sample covers the largest cellular phone manufacturers, including the makers of all cellular phones introduced during the period 2002–2008 (inclusive). The analysis covers the world's 11 largest cellular phone manufacturers: Alcatel, LG, Motorola, Nokia, Palm, Philips, RIM, Sagem, Samsung, Siemens, and Sony Ericsson. Together these firms accounted for more than 85 percent of worldwide mobile phone sales during the study period. Our primary sources of product data are the World Cellular Information Service, the Informa World Cellular Handset Tracker, and the Strategy Analytics SpecTRAX database of mobile phones. To ensure accuracy, we supplemented and checked our data against data from GfK (an industry consulting firm) and against data publicly available on the Web (see, e.g., gsmarena.com and cdnet.com).[1] The data were analyzed by quarter, which yielded a total of 264 company-quarter observations. Market share data were obtained through Gartner and Strategy Analytics, and firm financial data were acquired through Compustat and the firms' quarterly reports.

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[1] We were able to collect information on 22 mobile phone manufacturers, but 11 were eventually excluded from the study because of missing data on accounting variables that we use as controls. However, the 11 excluded firms are small and together accounted for less than 1 percent of worldwide mobile phone sales during the study period.

Measures

Dependent variable

Our dependent variable is *New product introductions*, measured as the number of new phones introduced during each quarter in a year. Firms in the mobile phone industry operate in a dynamic competitive environment characterized by short product life cycles, and there is unrelenting pressure on handset manufacturers to ensure a continuous stream of new products. New product introductions exemplify an adaptive response to feedback, since they enable firms to improve their performance and increase the chances for survival.

Performance measure and aspirations

Worldwide market share is our focal performance variable. In the mobile device industry, market share is undoubtedly the performance measure tracked most closely by both manufacturers and analysts, which makes it ideal for the present study. A highly institutionalized and standardized measure of performance, market share for each of the major industry competitors is reported regularly and is carefully monitored by all affected firms—as confirmed in conversations with industry experts and by examination of each competitor's earnings calls presented to market analysts. The global market shares of the major mobile device manufacturers are plotted in Figure 2 for the period of our study.

We calculated two different aspiration levels based on market share: the historical aspiration level, derived from the historical market share of the focal firm; and the social aspiration level, derived from the market share of rival firms in the industry (Greve, 1998). Historical aspirations of firm i are expressed as an exponentially weighted moving average of its past performance. Let HA_{it} denote the historical aspirations of firm i at time t, and let P_{it} denote performance in terms of the market share of firm i at time t. Then, historical aspiration is given by $HA_{it} = \alpha P_{it-1} + (1-\alpha)HA_{it-1}$, where α is an adjustment parameter: higher α implies giving greater weight to more recent than to more distant performance. The weight α was determined by searching over all possible values (in increments of 0.1) and then using the value that yielded the maximum log-likelihood in a baseline model that includes only control variables. That procedure yielded a value of $\alpha = 0.6$, which indicates relatively quick updating of the aspiration level; this is exactly
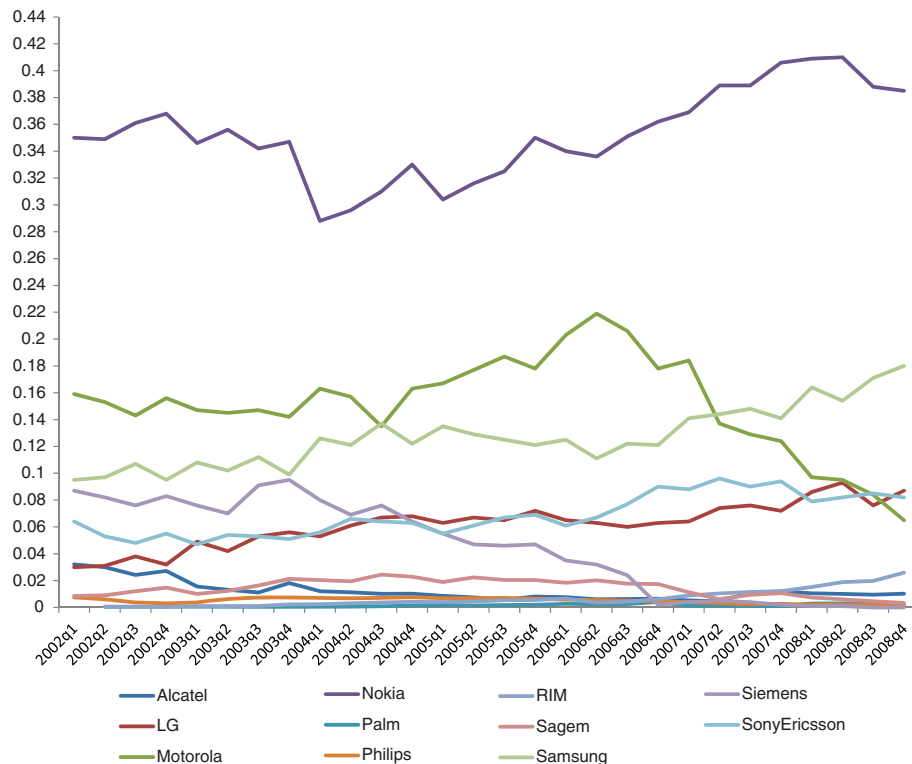
Figure 2.   Global market share of major mobile phone companies (2002–2008)

what we would expect in a highly dynamic industry such as the one for mobile phones. Next, we constructed social aspiration levels at time t (SA_{it}) as the simple average of the market share of every other firm: $SA_{it} = \sum_{j \neq i} \dfrac{P_{jt}}{N}$, where P_{jt} is the performance of firm j at time t and $N = 10$ is the total number of firm i's competitors.[2]

Performance-aspirations correlations.

We use correlations to measure the level of clarity/ambiguity in performance feedback. This approach allows us to highlight the functional form of the relationship of feedback clarity/ambiguity and responsiveness. The empirical model is specified so that the parameter estimates can yield the full range of feedback clarity/ambiguity-responsiveness relationships. In particular, it allows us to plot consistent, inconsistent, and ambiguous feedback as a continuum. To construct a measure for this correlation, we first calculated measures of performance relative to historical aspirations and to social aspirations. Such performance is defined as the difference between current performance and (respectively) historical and social aspiration levels; thus, we write $P_{it} - HA_{it}$ for historical aspirations and write $P_{it} - SA_{it}$ for social aspirations. These terms allow us to calculate the correlation between the two performance-aspirations measures. The variable *Performance-aspirations correlation* is measured as a five-quarters' rolling correlation between the focal firm's performance relative to historical and social aspirations. Positive correlations imply that the focal firm's performance is either declining or increasing relative not only to its rivals but also to its own past performance; negative correlations indicate that performance is increasing relative to one aspiration level but declining relative to the other. (Sensitivity analyses reveal little change when we instead calculate three- and four-quarters' rolling correlations.) The mean of *Performance-aspirations correlation* is 0.53; its value ranges from −0.93 to +0.99,

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[2] Because we were able to collect complete mobile phone data on 22 industry firms, we also constructed the social aspirations measure based on how all 21 of firm i's competitors performed as a robustness check. All of our results remain qualitatively unaffected by this change.

so we have sufficient variation in terms of consistent, inconsistent, and ambiguous performance feedback.

In testing H1, we used two different specifications to increases the validity of our results: (1) *Performance-aspirations correlation* and *Performance-aspirations correlation squared*, and (2) *Performance-aspirations correlation (positive and negative)*. For the latter, we use a spline function to compare the effects of the positive and negative correlations by splitting the correlation into two variables. Thus *Performance-aspirations correlation (positive)* takes the value of the actual correlation (if positive) and is set equal to 0 otherwise, while *Performance-aspirations correlation (negative)* takes the value of the correlation (if negative) and is set to 0 otherwise. The spline function results in the coefficient for correlations changing sign at the zero-correlation point, which allows us to determine whether greater positive correlations and greater negative correlations have distinct effects on new product introductions. Finally, since positive correlations can arise regardless of whether measures are both increasing or both decreasing, we coded a dummy variable set equal to 1 when both performance-aspirations measures are increasing (and to 0 otherwise). This dummy variable is interacted with the *Performance-aspirations correlation (positive)* variable to test both H3a and H3b.

Control variables

To account for alternative explanations, we include a comprehensive set of control variables. First, we include two separate variables for performance relative to historical and social aspirations, thereby accounting for any direct performance feedback effects. We also splined each of the independent performance-aspiration measures into performance above aspirations and performance below aspirations (and used these splined measures as a robustness check in one of the specifications). Second, we include a number of controls that account for our sample's comprising firms that vary in terms of size, performance, scope, and age. Our variable *Size* is measured as the (logged) sales of the firm. Because our sample includes multidivisional firms, the *Return on assets* variable is a measure of overall firm performance. We include an "entropy" measure of *Diversification* (Chatterjee and Blocher, 1992). Third, we control for *R&D intensity* and the number of *Mobile patents* applied for by the focal

firm. Higher levels of R&D intensity lead to greater stocks of knowledge and hence to more new products and technologies (Cohen and Levinthal, 1990); a greater number of mobile patents signify new features and technologies that translate into new phone introductions. Patent data have been drawn from Thompson Innovation Index and consist of worldwide patents for mobile device technologies.[3] Fourth, we control for *Slack* resources measured as the ratio of current assets to liabilities, a metric that captures excess, uncommitted liquid resources as a proxy for the firm's ability to meet current obligations. Finally, we measure *Age* in number of quarters since the focal firm's founding (this variable is also logged).[4] All the main independent and the control variables are lagged by one quarter.

Finally, all our specifications include firm-specific dummies in addition to year and quarter dummies. This approach ensures a demanding specification since firm dummies absorb all unobserved, time-invariant, firm-specific heterogeneity, time dummies account for common global and industry time effects, and quarter dummies capture seasonal variations in demand for mobile products. Table 1 provides the summary statistics and also presents correlations between the predictor variables.

Model specification

Our dependent variable, *New product introductions*, is a count variable that takes nonnegative integer values. Either a Poisson or a negative binomial model specification is appropriate when, as here, the dependent variable is a count measure. The mean value for new product introductions is 12.75 but the variance is 217.1, which indicates overdispersion in the data. However, once we incorporate firm and time (year and quarter) fixed effects into a Poisson model, standard tests for overdispersion (Cameron and Trivedi, 2005) fail to reject the null of no overdispersion. We therefore use a Poisson specification; this has the advantages of yielding consistent estimates, avoiding the "incidental parameters" problem associated with negative binomial models

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[3] Since mobile patents are difficult to separate from the rest of the company's patent data and since nearly all of the firms in our sample are multidivisional firms, we reviewed (with an industry expert) each of the Derwent class codes to ensure the relevance of considered patents to the mobile device industry.

[4] Because age is measured in quarters and logged, it is not perfectly collinear with our year dummies.

Table 1. Summary statistics and correlations

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Correlation	0.532	0.498	1													
2. Correlation (negative)	−0.070	0.190	0.826*	1												
3. Correlation (positive)	0.602	0.358	0.954*	0.620*	1											
4. Both increasing dummy	0.371	0.484	0.235*	0.200*	0.221*	1										
5. Performance−SA	0.011	0.117	0.257*	0.223*	0.240*	0.146*	1									
6. Performance−HA	0.001	0.014	0.118	0.088	0.118	0.395*	0.228*	1								
7. Size[a]	9.955	3.383	0.225*	0.169*	0.223*	0.096	0.200*	0.219*	1							
8. Diversification	1.003	0.644	−0.027	−0.060	−0.006	0.017	0.130*	0.170*	0.391*	1						
9. Return on assets	0.021	0.050	0.070	0.041	0.075	0.135*	0.199*	0.186*	0.227*	0.094	1					
10. R&D intensity	0.096	0.047	0.094	0.097	0.079	0.04	0.157*	−0.055	−0.369*	−0.203*	−0.111	1				
11. Mobile patents[a]	6.162	1.746	0.074	−0.020	0.113	−0.001	0.438*	0.083	0.651*	0.528*	0.258*	−0.279*	1			
12. Slack	2.096	1.043	0.178*	0.113	0.188*	0.11	0.203*	0.206*	0.357*	0.146*	0.335*	−0.031	0.192*	1		
13. Age[a]	5.612	0.777	−0.050	−0.082	−0.026	−0.043	0.331*	−0.136*	0.069	0.213*	−0.031	0.171*	0.506*	−0.410*	1	
14. Correlation (using market leader)	0.169	0.572	0.443*	0.445*	0.381*	0.117	0.450*	0.092	0.194*	0.089	0.096	0.088	0.053	0.173*	0.018	1

Correlation is the correlation between historical and social performance-aspirations. *Age* is given in number of quarters since the firm's founding.
[a] The values for *Size*, *Mobile patents*, and *Age* are given in natural logarithms.
$*p < 0.05$

(Greene, 2003), and remaining robust to the presence of serial correlation (Wooldridge, 1999).

RESULTS

Table 2 reports the fixed effects Poisson estimates of the total number of new product introductions by our sample of mobile device firms. Model 1 includes only control variables, Model 2 adds the correlation between performance relative to historical and social aspirations via a quadratic specification, Model 3 continues with the quadratic specification but splines (at 0) independent effects of performance relative to aspirations into performance above and below aspirations, Model 4 splines the correlations at 0, and Model 5 interacts the positive correlation with a dummy variable set equal to 1 only if performance is *increasing* relative to both social and historical aspirations. All models are highly significant (Wald tests yield *p*-values of less than 0.01) and, in each case, a log-likelihood test shows a significant improvement in overall model fit compared with the baseline model (Model 1).

Model 1 shows that a subset of controls affects new product introductions. We find that an increase in firm *Diversification* leads to more new product introductions. Both *R&D intensity* and *Mobile patents* are associated with significant increases in new product introductions.[5] It is noteworthy that older firms do not exhibit more inertia and instead introduce newer products at a faster rate than do newer firms. The coefficient estimates for *Size*, *Return on assets*, and *Slack* have the right sign, but none of these estimates are statistically significant. Finally, *Performance−Historical aspirations* (*HA*) and *Performance−Social aspirations* (*SA*) do not independently affect new product introductions. However, splining these variables into performance above and below aspirations reveals that the prediction of behavioral theory is supported—but only for performance improvement above historical aspirations. That is, performance improvement exceeding historical aspiration levels results in fewer new product introductions. Yet, performance declines

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[5] The coefficient estimates in Model 1 imply that an increase of one *S.D.* in R&D spending increases new product introductions by 14 percent (1.9 more new phones) and that a one *S.D.* increase in mobile patents increases new product introductions by 28 percent (3.6 more new phones).

Table 2.   Performance-aspirations correlations and new phone introductions

	Model 1	Model 2	Model 3	Model 4	Model 5
Quadratic variables					
Performance-aspirations correlation		−0.115*	−0.126*		
		(0.068)	(0.076)		
Performance-aspirations correlation squared		0.374***	0.367***		
		(0.124)	(0.108)		
Splined variables					
Performance-aspirations correlation (negative)				−0.374*	−0.501**
				(0.227)	(0.217)
Performance-aspirations correlation (positive)				0.288*	0.458***
				(0.154)	(0.151)
Dummy = 1 if performance relative to both aspirations is increasing					0.199
					(0.177)
Performance-aspirations correlation (positive) × both increasing dummy					−0.366
					(0.239)
Control variables					
Performance−SA	4.367	4.513		4.478	3.778
	(2.806)	(2.895)		(2.922)	(3.049)
Performance−HA	−2.647	−2.560		−2.650	−0.252
	(3.795)	(3.710)		(3.769)	(3.895)
Performance−SA (below)			13.879***		
			(3.878)		
Performance−SA (above)			1.283		
			(1.346)		
Performance−HA (below)			8.509**		
			(3.820)		
Performance−HA (above)			−6.653**		
			(2.981)		
Size	−0.122	−0.089	−0.045	−0.103	−0.124
	(0.142)	(0.129)	(0.164)	(0.129)	(0.126)
Diversification	0.245*	0.247**	0.092	0.244**	0.239**
	(0.127)	(0.113)	(0.106)	(0.117)	(0.112)
Return on assets	−0.119	−0.063	−0.022	−0.080	−0.021
	(0.268)	(0.263)	(0.207)	(0.288)	(0.298)
R&D intensity	3.133***	3.777***	4.326***	3.571***	3.441***
	(0.868)	(1.058)	(1.195)	(1.034)	(0.913)
Mobile patents	0.163***	0.146***	0.108*	0.150***	0.136***
	(0.045)	(0.051)	(0.060)	(0.052)	(0.047)
Slack	0.044	0.042	0.036	0.041	0.049
	(0.037)	(0.031)	(0.025)	(0.032)	(0.031)
Age	2.849***	2.506***	3.283***	2.562***	3.038***
	(0.941)	(0.815)	(0.814)	(0.856)	(0.884)
Observations	264	264	264	264	264
Number of firms	11	11	11	11	11
Log-likelihood	−676.855	−666.94	−654.77	−669.86	−665.15

Robust standard errors are reported in parentheses. All independent variables are lagged by one quarter. All columns include firm, year, and quarter dummies.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$

below aspiration levels (both social and historical) lead to fewer new product introductions. Several studies have documented similar findings (e.g., Audia and Greve, 2006; Gaba and Bhattacharya, 2012; Greve, 2003a). All of our year, quarter, and firm dummies are significant (results not reported),

which confirms that excluding them would result in a misspecified model.[6]

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[6] These quarter dummies show that most new products are introduced in the fourth quarter, which coincides with the holiday season.
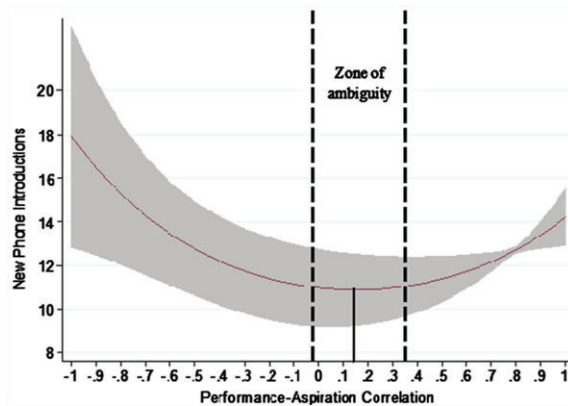
Figure 3. Estimated relationship between new phone introductions and performance-aspirations correlation

Model 2 in Table 2 adds the correlation between performance relative to social and historical aspirations in a quadratic specification, in order to test for the hypothesized U-shaped relation between *Performance-aspirations correlation* and *New product introductions*. We obtain a negative and significant coefficient for *Performance-aspirations correlation* and a positive and significant coefficient for the quadratic term, which confirms the existence of a U-shaped relationship. The coefficient estimates indicate that, as the correlation increases from -1 to 0.15 (the critical value at which the marginal effect of *Performance-aspirations correlation* switches sign), the rate of new product introduction declines. Subsequent increases in the correlation increase the rate of new product introductions. The estimated relationship between *New product introductions* and *Performance-aspirations correlation* is graphed in Figure 3. On the horizontal axis of this figure, we plot the correlation over the range of values that it takes in the data. On the vertical axis, we plot (based on Model 2) the predicted number of new phone introductions. The shaded area of the graph depicts the 95 percent confidence interval for the expected number of such introductions. We observe a U-shaped relationship whereby new phone introductions are at their minimum when *Performance-aspirations correlation* is equal to 0.15. These results support H1: when correlations are extremely positive or extremely negative, new product introductions are high; in the intermediate range, where feedback is ambiguous, new product introductions are at a minimum.

Given the estimates reported for Model 2 in Table 2, we can use the delta method to calculate a 95 percent confidence interval around the critical level at which the relationship between correlations and new product introductions changes sign. Figure 3 shows this "zone of ambiguous feedback" spanning correlations ranging from -0.02 to 0.33, so the case of zero correlation falls within the 95 percent confidence interval.

Model 3 reproduces the quadratic specification of Model 2 but splines the two performances relative to aspiration variables at 0. Comparing Models 2 and 3, we find that the coefficient for both the correlation variable and the correlation-squared variable remain unchanged in terms of their signs and significance. More importantly, the critical value (0.17) at which the relationship between firm responsiveness and correlated feedback shifts from negative to positive remains virtually unchanged from the corresponding value (0.15) in Model 2.

Model 4 in Table 2 splines the correlation between social and historical performance aspirations into positive and negative values, which allows us to estimate separate coefficients depending on which type of correlation is evident. The negative and significant coefficient for *Performance-aspirations correlation (negative)* suggests that, when feedback is inconsistent and correlations become more negative, firms increase their introduction of new products. This finding supports H2. At the same time, the positive and significant coefficient for *Performance-aspirations correlation (positive)* suggests that, when correlations are more positive and increasing, firms also increase their introduction of new products. The implication of combining these two results is that a *weak correlation* (when ambiguity is greatest) is the most detrimental for new product introductions. That said, we acknowledge that the splined correlation permits a direct test of H2 at the expense of forcing the relationship between *Performance-aspirations correlation* and *New product introductions* to switch at exactly the point where this correlation is zero. The quadratic formulation used in Model 2 is a more general specification, but even here the zero-correlation point lies within the 95 percent confidence interval of the critical value where the relationship switches sign. In other words, Hypothesis 2 is supported by the quadratic specification in Model 2 and also by the splined correlations in Model 4. In terms of the magnitude of effects, we estimate that a one standard deviation (*S.D.*) increase in a positive

correlation increases the rate of new product introductions by 10.31 percent.[7] A one *S.D.* decline in a negative correlation increases the rate of new product introductions by 7.11 percent.

Model 5 accommodates both ways in which *Performance-aspirations correlation* may be positive: when performance relative to both social and historical aspirations is increasing and also when performance relative to both aspirations is declining. We expect an increase in new product introductions only in the latter, declining case. As hypothesized in H3a, only the positive correlations that are generated by declining performance (relative to both social and historical aspirations) should accelerate new product introductions. This means that, as proposed by H3b, positive correlations generated by improving performance (relative to both social and historical aspirations) should reduce firm responsiveness (i.e., lead to fewer new product introductions).

To check this hypothesis, we code a dummy variable set equal to 1 when performance relative to both aspiration types is increasing and then interact this dummy with *Correlation of performance-aspirations (positive)*. When this dummy variable takes the value 1, the regression captures performance improvements relative to both social and historical aspirations.[8]

In Model 5, we obtain a positive and significant coefficient for *Performance-aspirations correlation (positive)* and an insignificant coefficient for the interaction between *Performance-aspirations correlation (positive)* and the dummy variable. When the dummy takes the value 0, performance is not increasing relative to both social and historical aspirations. In this case, a one *S.D.* increase in positive correlation increases new phone introductions by 16 percent—an effect that is both statistically and substantively significant. This calculation is based on the coefficient 0.458 for the stand-alone term. When the dummy variable takes the value 1, both performance-aspiration gaps are increasing and the

relevant coefficient for the effect of correlation is $0.458 - 0.366 = 0.092$. Here a one *S.D.* increase in correlation increases new phone introductions by 3 percent; however, this effect is neither substantial nor statistically significant.[9] The insignificant estimate implies that, when performance relative to both aspirations is increasing, positive correlations do not affect new product introductions. Overall, then, only H3a (and not H3b) is supported. Finally, the negative coefficient for the dummy variable provides some directional evidence that there are fewer new product introductions when performance improves relative to both social and historical aspirations.

ROBUSTNESS CHECKS

We performed a variety of robustness checks to analyze the sensitivity of our findings.[10] Recall that market share served as our measure of performance. Yet since the market share of all competing firms must sum to 1,[11] it could be argued that this performance measure is inherently social in its construction. So, as a first evaluation of the robustness of our results, we used alternative performance measures such as mobile phone sales, firm return on assets, and firm return on equity. To a large extent, our results were replicated when using any of these measures of performance.

Next, we observed that Nokia was the undisputed market leader for the entire duration of our study. One might argue that the market leader is less likely (than its competitors) to use the industry mean as a social reference point when assessing its own performance. Hence, as a second robustness check, we reran Models 2 and 4 from Table 2—with exactly the same social and historical aspiration measures in quadratic and splined specifications—while *omitting* Nokia from the sample. Regression results for the models without Nokia are reported in Table 3. We continue to find support for a U-shaped relation between correlated feedback and firm responsiveness; moreover, coefficients for the splined correlations exhibit identical signs and are

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[7] A one *S.D.* change in positive correlation equals 0.358 from Table 1, while the coefficient estimate on positive correlation in Table 2 is 0.288. Therefore, a one *S.D.* increase in positive correlation changes the log of the count of new products by $0.358 \times 0.288 = 0.1031$. Since the coefficients in a Poisson specification are semi-elasticities, the count of new products increases by 10.31 percent.

[8] This indicator variable takes the value 1 if $\Delta(P_{it} - H_{it}) > 0$ and $\Delta(P_{it} - S_{it}) > 0$ (and takes the value 0 otherwise), where Δ is the first-difference operator.

[9] The standard error and *p*-values of these effects are also calculated using the delta method.

[10] We thank the two anonymous reviewers for bringing up these issues. Results are available from the authors upon request.

[11] Since our data do not span all firms in the world, market shares do not sum to 1 for our sample.

Table 3. Performance-aspirations correlations and new phone introductions (Nokia as market leader)

	Model 1	Model 2	Model 3	Model 4
Quadratic variables				
Performance-aspirations correlation	−0.130*		−0.149*	
	(0.075)		(0.089)	
Performance-aspirations correlation squared	0.376***		0.395**	
	(0.126)		(0.154)	
Performance-aspirations correlation (using market leader)			0.014	
			(0.070)	
Performance-aspirations correlation squared (using market leader)			−0.075	
			(0.088)	
Splined variables				
Performance-aspirations correlation (negative)		−0.370*		−0.368*
		(0.220)		(0.213)
Performance-aspirations correlation (positive)		0.289*		0.294*
		(0.173)		(0.160)
Performance-aspirations correlation (negative) (using market leader)				0.029
				(0.070)
Performance-aspirations correlation (positive) (using market leader)				−0.077
				(0.120)
Control variables				
Performance−SA	5.959	5.679	6.363	5.932
	(4.707)	(4.658)	(4.691)	(4.919)
Performance−HA	−3.309	−3.080	−3.695	−3.111
	(6.218)	(6.077)	(6.079)	(6.203)
Size	−0.194	−0.205	−0.182	−0.094
	(0.151)	(0.174)	(0.145)	(0.202)
Diversification	0.215*	0.218	0.206*	0.213
	(0.127)	(0.139)	(0.125)	(0.143)
Return on assets	−0.086	−0.099	−0.068	−0.100
	(0.298)	(0.322)	(0.313)	(0.309)
R&D intensity	4.573***	4.830***	4.437***	4.812***
	(1.063)	(0.733)	(1.002)	(0.704)
Mobile patents	0.176***	0.173***	0.171***	0.159***
	(0.055)	(0.039)	(0.048)	(0.036)
Slack	0.014	0.015	0.011	0.023
	(0.029)	(0.029)	(0.030)	(0.025)
Age	2.492*	2.526*	2.361*	1.983
	(1.423)	(1.454)	(1.401)	(1.397)
Observations	236	236	236	236
Number of firms	10	10	10	10
Log-likelihood	−582.70	−585.67	−582.21	−584.08

Robust standard errors are reported in parentheses. All independent variables are lagged by one quarter. All columns include firm, year, and quarter dummies.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$

of similar magnitude and statistical significance. Since the sample sizes for these models differ from those of our previous models, we used the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) to compare models. Both the AIC and the BIC indicate a better fit (lower value) when we drop Nokia.

Third, it may be argued that social aspirations may also be upward focused (Moliterno *et al.,* 2014) and that firms may use both the market leader and the industry mean as reference targets (Giachetti and Lampel, 2010). Therefore, we constructed a second measure of social aspiration, using the market share of the industry leader. We calculated the correlation between performance relative to the market leader and performance relative to the firm's own past performance termed *Performance-aspirations correlation (using market leader)*. We then augment the quadratic and splined specifications (Models 2 and 4 from Table 2) with

this additional correlation measure.[12] Models 3 and 4 in Table 3 show that, for both the quadratic and the splined specifications, we continue to find support for hypothesis H1 and H2—the sign, significance, and magnitude of our variables remain unaffected. At the same time, correlation between performance relative to market leader and historical performance-aspirations gap is not significant, either in a quadratic or a splined specification. Overall, our results suggest that aspirations in terms of the industry mean are the basis for evaluating consistent vs. inconsistent vs. ambiguous feedback, while feedback calculated on the basis of performance relative to the market leader does not seem to matter, consistent with other studies (e.g., Massini *et al.*, 2005). One possible reason is that intertemporal comparisons of performance to historical market share and to that of the market leader do not create any interpretive ambiguity, especially in our context where there is no shift in the identity of the market leader. Alternatively, the results suggest that, once we account for consistent vs. inconsistent vs. ambiguous feedback with respect to social (which incorporates the market leader's performance) and historical comparisons, there is limited additional influence of the clarity of feedback solely with respect to the market leader.

DISCUSSION AND CONCLUSION

The primary objective of this study was to examine how firms respond to ambiguous, inconsistent, and consistent performance feedback. Much of BTOF research implicitly assumes that performance is unambiguous once it has been interpreted with reference to a particular aspiration level. Yet, when firms evaluate performance relative to multiple aspiration levels, perceptions of achievement can vary and so feedback may be ambiguous. We reasoned that firm responsiveness varies with the interpretation of performance feedback received because interpretative processes affect problemistic search, an important precursor to changes in firm behavior. Specifically, we argued that managers interpret ambiguous feedback in a manner that limits the perceived need for change and delays

resource allocation to new products, thereby limiting firm responsiveness. Inconsistent and consistent feedback enhance responsiveness because they provide clear signals on whether change is required and activate repertoires that promote new product introductions. Our analysis provides broad support for these predictions.

This study offers several contributions to the literature. First, it extends the work on the BTOF, performance feedback, and ambiguity by considering the decision-making "fog" attendant upon the relationship between historical and social performance comparisons. Although research has increased our understanding of how firms respond to feedback evaluated in terms of multiple aspiration levels (cf. Shinkle, 2012; Blettner *et al.,* 2014), there has been no systematic treatment of the relationship between performance assessments based on historical and social aspirations. In particular, our paper answers the call for research that moves "beyond theories that single out specific reference targets, to frameworks that examine how firms use multiple reference targets" (Giachetti and Lampel, 2010: 364); it also complements the emerging focus on the role of multiple reference points in strategic decision making (Labianca, *et al.,* 2009; Hu, Blettner, and Bettis, 2011).

In addition, research on the behavioral implications of striving to meet more than one type of aspiration has progressed separately from research on learning from ambiguous outcomes. The former outlines the interpretive problems associated with consistent or inconsistent feedback (Baum *et al.,* 2005) but has largely excluded the potential for ambiguity. The latter has provided rich descriptions of behavior following ambiguous and unusual outcomes (Lampel, Shamsie, and Shapira, 2009) but has not considered the role that multiple aspiration levels play in creating the ambiguity from which problem solving must proceed. Rerup's (2006) conceptual insight regarding the "gray zone" between success and failure (e.g., near-failures) is a step in the right direction, although it remains anchored in the notion of performance deviations from a particular aspiration level. Our study is important because it directly links the problem of multiple aspiration levels to the problem of ambiguous outcomes—and also explains the interpretive consequences of their combination. The research reported here suggests that, beyond any separate or additive processes of performance comparisons, the

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[12] Please note that, since Nokia is consistently the market leader, it once again drops out when we construct this new correlation measure. This implies that all models in Table 3 have the same sample and are comparable.

relationship between historical and social feedback is a key driver of organizational behavior.

Also, this study distinguishes among consistent, inconsistent, and ambiguous feedback over time in terms of their implications for firm decision making. In making these distinctions, which are missing from prior studies, we support the notion that it is feedback clarity (i.e., irrespective of consistency) that enables adaptive behavior. Our work illustrates the implications for managers who must assign meaning to performance feedback that does not neatly fit into the familiar success–failure dichotomy. Although we do not directly measure the interpretive activities of managers, a large body of work has demonstrated the link between ambiguity and sensemaking (cf. Weick, Sutcliffe, and Obstfeld, 2005), and firms' lack of responsiveness under conditions of ambiguity cannot be easily explained in other terms. Of course, more research is needed to understand this phenomenon and, in particular, the link between individual and organizational conceptions of ambiguity and action. By extension, we are reminded that feedback ambiguity may arise from other sources. Future research should continue to explore such factors as environmental decline (Cameron, Kim, and Whetten, 1987), geographic dispersion (Audia, Sorenson, and Hage, 2001), diversification (Aime, McNamara, and Kolev, 2011), and new technologies (Weick, 1990).

Our study also has implications for research on causal ambiguity in strategic decision making. Strategy scholars have long posited that the causal connections between performance outcomes and particular firm-level variables is sometimes ambiguous (Mosakowski, 1997). Much of the extant research focuses on the consequences of causal ambiguity while claiming that it is grounded in the complex nature of most activities and the tacit nature of most knowledge (Reed and DeFillippi, 1990). Researchers (e.g., Powell *et al.,* 2006) have begun to acknowledge the cognitive origins of causal ambiguity and its possible effect on firm performance, but the functional relationship between ambiguity and heterogeneous outcomes has been given little attention. We augment this field of research by shifting the locus of ambiguity from management's perception of competencies to its perception of feedback. In so doing, we offer evidence of the functional form underlying the relationship between feedback clarity/ambiguity and responsive action. The U-shaped finding is novel and important because it suggests that

ambiguity and clarity lie along a continuum and the line between the two may be difficult to draw. It also supports the notion that more mindful attention (Levinthal and Rerup, 2006; Rerup, 2009) and multiple gradations of feedback categories may aid managers in establishing meaning and catching problems that may run deep (Rerup, 2006; Weick and Sutcliffe, 2001).

Finally, it is worth noting that the effects of ambiguous feedback on strategic decision making are not apparent *a priori*. In fact, research offers contrasting predictions for the effect of ambiguity on decision making as a function of the type of ambiguity under study. Ambiguity in rhetorical strategies (Zbracki, 1998), strategic planning (Denis *et al.,* 2011), and technologies (Pontikes, 2012) predicts dysfunctional effects. However, ambiguous strategic goals (Ring and Perry, 1985) and ambiguous competencies (Lippman and Rumelt, 1982) have favorable implications. Ambiguous feedback is similar to ambiguous goals in that both can offer interpretive leeway to senior decision makers in their construction of meaning for the organization. Yet, it can also create debate over the firm's direction and thus could interfere with collective action. Hence, the strategic decision-making implications vary with the locus of ambiguity, and clarifying this relationship in the case of feedback is an important contribution of our study.

This paper augments the growing base of research on ambiguity and strategic decision making from a behavioral perspective. A greater focus on ambiguity may yield additional insights into how individuals manage decision making as they attempt to satisfy the myriad organizational demands characteristic of a complex organization, an area of research just under way (Hu and Bettis, 2014). We know that ambiguity may characterize not only feedback but also preferences, experience, understanding, and organization, (March and Olsen, 1976). The implication for strategy and organizational scholarship, and for a better understanding of managerial cognition in a complex world, is that a renewed focus on ambiguity—in all its incarnations—is needed.

REFERENCES

Aime F, McNamara G, Kolev K. 2011. Corporate strategy and the BTOF: examining the moderating influence of diversification on firm actions in response to attainment discrepancy and slack resources. In Paper Presented at the Academy of Management Conference, San Antonio, TX.

Audia PG, Brion S. 2007. Reluctant to change: self-enhancing responses to diverging performance measures. *Organizational Behavior and Human Decision Processes* **102**(2): 255–269.

Audia PG, Greve HR. 2006. Less likely to fail: low performance, firm size, and factory expansion in the shipbuilding industry. *Management Science* **52**(1): 83–94.

Audia PG, Locke EA, Smith KG. 2000. The paradox of success: an archival and a laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal* **43**(5): 837–853.

Audia PG, Sorenson O, Hage J. 2001. Tradeoffs in the organization of production: multiunit firms, geographic dispersion and organizational learning. *Advance in Straegic Management* **18**: 75–105.

Baum JAC, Rowley TJ, Shipilov AV, Chuang YT. 2005. Dancing with strangers: aspiration performance and the search for underwriting syndicate partners. *Administrative Science Quarterly* **50**(4): 536–575.

Blettner DP, He ZL, Hu S, Bettis RA. (2014). Adaptive aspirations and performance heterogeneity: Attention allocation among multiple reference points. *Strategic Management Journal*. (Forthcoming)

Bromiley P. 2005. *The Behavioral Foundations of Strategic Management*. Blackwell Publishing: Malden MA.

Brown SL, Eisenhardt KM. 1995. Product development: past research, present findings and future directions. *Academy of Management Journal* **20**(2): 343–378.

BusinessWeek. 2005. Is RIM ready to rumble?. *BusinessWeek* 5 August. Available at: http://www.businessweek.com/stories/2005-08-09/is-rim-ready-to-rumble. (accessed 21 July 2014)

Cameron KS, Kim MU, Whetten DA. 1987. Organizational effects of decline and turbulence. *Administrative Science Quarterly* **32**(2): 222–240.

Cameron AC, Trivedi PK. 2005. *Microeconometrics: Methods and Applications*. Cambridge University Press: New York, NY.

Chatterjee S, Blocher J. 1992. Measurement of firm diversification: is it robust? *Academy of Management Journal* **35**(4): 874–888.

Cohen WM, Levinthal D. 1990. Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly* **35**(1): 128–152.

Cyert RM, March JG. 1963. *A Behavioral Theory of the Firm*. Prentice-Hall: Englewood Cliffs, NJ.

Denis JL, Dompierre G, Langley A, Rouleau L. 2011. Escalating indecision: between reification and strategic ambiguity. *Organization Science* **22**(1): 225–244.

Feldman M. 1989. *Order without Design: Information Production and Policy Making*. Stanford University Press: Stanford, CA.

Gaba V, Bhattacharya S. 2012. Aspirations, innovations, and corporate venture capital: a behavioral perspective. *Strategic Entrepreneurship Journal* **6**: 178–199.

Gaba V, Joseph J. 2013. Corporate structure and performance feedback: aspirations and adaptation in m-form firms. *Organization Science* **24**(4): 1102–1119.

Gavetti G, Greve HR, Levinthal DA, Ocasio W. 2012. The behavioral theory of the firm: assessment and prospects. *Academy of Management Annals* **6**(1): 1–40.

Giachetti C. 2013. *Competitive Dynamics in the Mobile Phone Industry*. Palgrave Macmillan: Basingstoke, UK.

Giachetti C, Lampel J. 2010. Keeping both eyes on the competition: strategic adjustment to multiple targets in the UK mobile phone industry. *Strategic Organization* **8**(4): 347–376.

Greene W. 2003. *Econometric Analysis*. Prentice Hall: Englewood Cliffs, NJ.

Greve HR. 1998. Performance, aspirations, and risky organizational change. *Administrative Science Quarterly* **43**(1): 58–86.

Greve HR. 2003a. A behavioral theory of R&D expenditures and innovations: evidence from shipbuilding. *Academy of Management Journal* **46**(6): 685–702.

Greve HR. 2003b. *Organizational Learning from Performance Feedback: A Behavioral Perspective on Innovation and Change*. Cambridge University Press: Cambridge, UK.

Haleblian J, Rajagopalan N. 2005. Top managerial cognitions, past performance, and strategic change: a theoretical framework. *Advances in Strategic Management* **22**: 63–91.

Hambrick DC, Schecter SM. 1983. Turnaround strategies for mature industrial-product business units. *Academy of Management Journal* **26**(2): 231–248.

Hu S, Bettis RA. 2014. Multiple organizational goals, feedback interdependency, and cognition. Working paper, University of Arizona, Tuscon, AZ.

Hu S, Blettner D, Bettis RA. 2011. Adaptive aspirations: performance consequences of risk preferences at extremes and alternative reference groups. *Strategic Management Journal* **32**(13): 1426–1436.

Jordan AH, Audia PG. 2012. Self-enhancement and learning from performance feedback. *Academy of Management Review* **37**(2): 211–231.

Kahneman D. 1992. Reference points, anchors, norms, and mixed feelings. *Organizational Behavior and Human Decision Processes* **51**(2): 296–312.

Kaplan S. 2008. Framing contests: strategy making under uncertainty. *Organization Science* **19**: 729–752.

Kekre S, Srinivasan K. 1990. Broader product line: a necessity to achieve success? *Management Science* **36**(10): 1216–1232.

Kim JYJ, Finkelstein S, Haleblian J. (2014). All aspirations are not created equal: the differential effects of

historical and social aspirations on acquisition behavior. *Academy of Management Journal* (Forthcoming).

Labianca G, Fairbank JF, Andrevski G, Parzen M. (2009). Striving toward the future: aspiration—performance discrepancies and planned organizational change. *Strategic Organization* 7(4): 433–466.

Lampel J, Shamsie J, Shapira Z. 2009. Experiencing the improbable: rare events and organizational learning. *Organization Science* 20(5): 835–845.

Lant TK, Hewlin PF. 2002. Information cues and decision making the effects of learning, momentum, and social comparison in competing teams. *Group & Organization Management* 27(3): 374–407.

Lant TK, Hurley AE. 1999. A contingency model of response to performance feedback escalation of commitment and incremental adaptation in resource investment decisions. *Group & Organization Management* 24: 421–437.

Lant TK, Milliken FJ, Batra B. 1992. The role of managerial learning and interpretation in strategic persistence and reorientation: an empirical exploration. *Strategic Management Journal* 13(8): 585–608.

Leonard-Barton D. 1992. Core capabilities and core rigidities: a paradox in managing new product development. *Strategic Management Journal* 13(1): 111–125.

Levinthal D, Rerup C. 2006. Crossing an apparent chasm: bridging mindful and less-mindful perspectives on organizational learning. *Organization Science* 17(4): 502–513.

Lippman SA, Rumelt RP. 1982. Uncertain imitability: an analysis of interfirm differences in efficiency under competition. *Bell Journal of Economics* 13(2): 418–438.

March J. 1994. *A Primer on Decision Making: How Decisions Happen*. The Free Press: New York.

March J. 2010. *The Ambiguities of Experience*. Cornell University Press: Ithaca, NY.

March JG, Olsen JP. 1976. *Ambiguity and Choice in Organizations*. Universitetsforlaget: Oslo, Norway.

Martin X, Mitchell W. 1998. The influence of local search and performance heuristics on new design introduction in a new product market. *Research Policy* 26: 753–771.

Massini S, Lewin AY, Greve HA. 2005. Innovators and imitators: organizational reference groups and adoption of organizational routines. *Research Policy* 34: 1550–1569.

Milliken FJ, Lant TK. 1991. The impact of an organization's recent performance history on strategic persistence and change: the role of managerial interpretations. In *Advances in Strategic Management*, Dutton J, Huff A, Shrivastava P (eds). JAI Press: Greenwich, CT; 129–156.

Mintzberg H. 1978. Patterns in strategy formation. *Management Science* 24(9): 934–948.

Mintzberg H. 1985. The organization as political arena. *Journal of Management Studies* 22(2): 133–154.

Moliterno TP, Beck N, Beckman CM, Meyer M. 2014. Knowing your place: social performance feedback in good times and bad times. *Organization Science* (Forthcoming).

Mosakowski E. 1997. Strategy making under causal ambiguity: conceptual issues and empirical evidence. *Organization Science* 8(4): 414–442.

Ocasio W. 1997. Towards an attention-based view of the firm. *Strategic Management Journal* 18(1): 187–206.

Park KM. 2007. Antecedents of convergence and divergence in strategic positioning: the effects of performance and aspiration on the direction of strategic change. *Organization Science* 18: 386–402.

Pontikes EG. 2012. Two sides of the same coin: how ambiguous classification affects multiple audiences' evaluations. *Administrative Science Quarterly* 57: 81–118.

Powell TC, Lovallo D, Caringal C. 2006. Causal ambiguity, management perception, and firm performance. *Academy of Management Review* 31(1): 175–196.

Reed R, DeFillippi RJ. 1990. Causal ambiguity, barriers to imitation, and sustainable competitive advantage. *Academy of Management Review* 15(1): 88–102.

Rerup C. 2006. Success, failure and the gray zone: how organizations learn or don't learn from ambiguous experience. In *Academy of Management Proceedings* (Volume 1). Academy of Management: Briarcliff Manor, NY; BB1–BB6.

Rerup C. 2009. Attentional triangulation: learning from unexpected rare crises. *Organization Science* 20(5): 876–893.

Ring PS, Perry JL. 1985. Strategic management in public and private organizations: implications of distinctive contexts and constraints. *Academy of Management Review* 10: 276–286.

Shimizu K. 2007. Prospect theory, behavioral theory, and the threat-rigidity thesis: combinative effects on organizational decisions to divest formerly acquired units. *Academy of Management Journal* 50(6): 1495–1514.

Shinkle GA. 2012. Organizational aspirations, reference points, and goals building on the past and aiming for the future. *Journal of Management* 38(1): 415–455.

Stone DL, Stone EF. 1985. The effects of feedback consistency and feedback favorability on self perceived task competence and perceived feedback accuracy. *Organizational Behavior and Human Decision Processes* 36(3): 167–185.

Sutton RI, Kramer RM. (1990). Transforming failure into success: Spin control in the Iceland arms control talks. In Kahn RL, Zald MW. (Eds.), *Organizations and nation states: New perspectives on conflict and cooperation* (pp. 221–245). San Francisco: Jossey-Bass.

Washburn M, Bromiley P. 2012. Comparing aspiration models: the role of selective attention. *Journal of Management Studies* 49(5): 896–917.

Weick KE. 1979. *The Social Psychology of Organizing* (2nd edn). McGraw-Hill: New York.

Weick KE. 1990. Technology as equivoque. In *Technology and Organizations*, Good-man P, Sproull L (eds). Jossey-Bass: San Francisco, CA; 1–44.

Weick KE. 1995. *Sensemaking in Organizations*. Sage: Thousand Oaks, CA.

Weick KE, Sutcliffe KM. 2001. *Managing the Unexpected: Resilient Performance in and Age of Uncertainty*. Jossey-Bass: San Francisco, CA.

Weick KE, Sutcliffe KM. 2006. Mindfulness and the quality of organizational attention. *Organization Science* **17**(4): 514–524.

Weick KE, Sutcliffe KM, Obstfeld D. 1999. Organizing for high reliability: processes of collective mindfulness. In *Research in Organizational Behavior* (Volume **21**), Staw B, Sutton R (eds). JAI Press: Greenwich, CN; 81–123.

Weick KE, Sutcliffe KM, Obstfeld D. 2005. Organizing and the process of sensemaking. *Organization Science* **16**: 409–421.

Wiseman RM, Bromiley P. 1996. Toward a model of risk in declining organizations: an empirical examination of risk, performance and decline. *Organization Science* **7**: 524–543.

Wooldridge JM. 1999. Distribution-free estimation of some nonlinear panel data models. *Journal of Econometrics* **90**(1): 77–97.

Zbracki M. 1998. The rhetoric and reality of total quality management. *Administrative Science Quarterly* **43**: 602–663.