EXECUTIVE INFORMATION SEARCH, PERCEPTUAL ACCURACY AND FIRM PERFORMANCE

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ABSTRACT

A firm’s intangible competencies such as how its executive team gathers information and makes sense of it have implications for strategic management and performance. In this study we examine consequences of executives’ information search behaviors using a combination of survey and archival data gathered from 89 top executive teams. We find a direct association between information search and subsequent firm performance and no support for the argument that executives’ perceptual acuity mediates the relationship. The results show an inverse u-shaped relationship or a predominantly negative association between the intensity of executive team scanning and return on sales and change in profits, respectively. Executive teams of higher performing organizations gathered a broader range of information, using personal sources in stable environments, and a balance of personal and impersonal sources in volatile environments. Executive teams that gathered a broader range of information and used impersonal information sources more accurately perceived aspects of their resource environment. But surprisingly, the association between accuracy and firm performance was negative. The findings challenge the idea that effective strategic management requires primarily detached information processing by top executives and suggest that an executive team’s information acquisition routines can be a source of competitive advantage.

Key Words: environmental scanning, executive information search, environmental perception, firm performance
Strategy scholars have long emphasized the importance of executives’ information search behaviors, suggesting that executives who effectively scan their firm’s environment enhance firm performance (e.g., Child, 1972). A central mechanism through which information search practices are thought to confer competitive advantage is via decision-makers’ knowledge of environmental conditions. The logic is that better information search practices result in more accurate appraisals of the environment, which in turn enable timely and appropriate action (Pfeffer and Salancik, 1978: 267). This logic holds whether executives decide to adapt to the environment or attempt to change it. Effective scanning practices may thus be part of a firm’s ‘dynamic capabilities’ that allow it to sustain competitive advantage (Eisenhardt and Martin, 2000).

Based on this premise, studies of executive level information acquisition have shed light on antecedents of scanning activities, on contextual factors that favor particular search behaviors, and on the design of organizational scanning systems. Recent studies of executive information acquisition have, for example, focused mostly on motivational antecedents such as the strategic uncertainty that executives perceive (Daft et al., 1988) and the importance they attach to particular issues (Boyd and Fulk, 1996). Others have investigated the design of scanning systems, structures and information processes (e.g., Yasai-Ardekani and Nystrom, 1996; Sutcliffe, 1994). A general trend is toward models that distinguish specific information acquisition tactics and account for contextual moderators. For example, Garg, Walters, and Priem (2003) investigated how the volatility of a firm’s competitive environment conditions the relative importance that a CEO places on gathering information from different internal and external domains. Other researchers have pointed out the role of institutional environments on those and other choices (e.g., Elenkov, 1997; May, Stewart, and Sweo, 2000), while McDonald and Westphal (2003) studied how firm performance influences the sources from which executives seek information.
But empirical evidence is surprisingly sparse on two other critical aspects of executive information search: on the consequences of scanning practices for performance, and on the mechanisms linking scanning practices to performance. The theoretical case for expecting performance implications is quite strong. As Garg and colleagues (2003: 726) note, the assessments gleaned from scanning the environment are a critical input to the processes of strategy formulation and implementation. From a resource-based perspective, competence in the information acquisition part of the strategic decision making process may thus be part of a firm’s ‘dynamic capabilities’ in that the timely adjustment of strategies allows the company to sustain competitive advantage over time (Eisenhardt and Martin, 2000). For, example, McDonald and Westphal (2003) found that executives’ focus on information from close personal sources inhibited their propensity to change corporate strategies and thus dampened subsequent performance. Residing in often tacit behaviors that are hard to imitate, an executive team’s skill at acquiring and making sense of information about its environment should therefore be a resource for competitive advantage (Peteraf and Bergen, 2003; von Krogh, Roos, and Slocum, 1994). And yet, empirical support for performance benefits of scanning is inconsistent. Some evidence shows that acquiring more information about the external environment enhances firm performance (see Daft, Sormunen, and Parks, 1988; Grinyer and Norburn, 1975), particularly for some types of firms under some conditions (Garg et al., 2003). Other studies, such as research by Fredrickson and Mitchell (1984), show a negative association between comprehensive information gathering and firm performance especially in unstable environments.

Even fewer empirical studies have addressed the mechanism that purportedly links information acquisition behaviors to the actions that executives take and to subsequent performance: that information search practices affect the quality of an executive team’s appraisal of the firm’s environment. Many organization theorists argue that the key property of environmental assessments is their accuracy. Different amounts, types, and sources of information influence the acuity of executives’ representations of key factual environmental dimensions, which in turn prompts better
strategic decisions and performance (Pfeffer and Salancik, 1978: 276). The desirability of accuracy is also implicit in perspectives that see the effectiveness of resources and strategy types as contingent on environmental factors such as industry structure and volatility (e.g., Eisenhardt and Martin, 2000).

An alternative school of thought argues, however, that the more critical quality of environmental appraisals is the way executives interpret and give meaning to the acquired information (Kiesler and Sproull, 1982; Daft and Weick, 1984; Starbuck and Milliken, 1988). The accuracy of assessments is secondary because the meaning of environmental information for the organization is often ambiguous. This view shifts the emphasis from the perceptual to the interpretive aspects of strategic sensemaking (Daft and Weick, 1984; Weick, 1995). Top executives act based on their subjective evaluation of both their competitive environment and of their own firm. They use “their market knowledge to define firm-specific productive capabilities, and then shift their firm’s activities toward unique market opportunities that they believe their productive capabilities make possible” (Porac and Rosa, 1996: 384). Whether accurate perceptions matter for performance net of interpretations is an empirical question, since to our knowledge no tests of these ideas have been published. The scarcity of empirical evidence on this point begs for work that systematically examines how information search tactics affect a team’s knowledge of its environment and its performance across a variety of industries (Boyd and Fulk, 1996).

This study thus examines the consequences of executives’ scanning tactics, particularly their influence on executives’ knowledge of their firm’s environment and on firm performance. We extend existing work in three ways. First, we empirically examine how the intensity of search, the target of search, and the source of information influences the accuracy of executive teams’ perceptions of key dimensions of their external context, and whether the effectiveness of these practices depends on the volatility of the firm’s environment. Second, we test empirically whether scanning influences performance through the acuity with which executives perceive their external context. Third, we
examine the extent to which accurate knowledge of environmental conditions (i.e., perceptual acuity) matters for performance, net of executive’s interpretations about the information they collect.

**BACKGROUND**

We ground our theorizing in the research on organizational scanning, which emphasizes comprehensive information acquisition from multiple sources so that a firm’s top executives can create accurate knowledge about its context. This perspective, which grew out of classical strategic management (e.g., Hofer and Schendel, 1978) and organization theory (e.g., Duncan, 1972; Pfeffer and Salancik, 1978), suggests that effective executives monitor contingencies and constraints in the external resource environment, and use these data to select or tailor organizational strategies and designs that match these conditions (Bourgeois, 1985). The imagery of a “hard” environment rests on the notion that some environmental attributes pose constraints and demands that are largely independent of the firm’s own actions, and, in this sense, the environment is experienced as “objective”. Effective managers take into account these contingencies and constraints in their actions.

A rich history of theory and research in this paradigm identifies environmental dimensions that are critical contingencies for effective strategic management. The volatility (e.g., instability), munificence, and complexity of the industry’s resource environment are such attributes over which firms have little direct control, but which they need to take into account in their strategies and designs (Aldrich, 1979; Dess and Beard, 1984: 54; Keats and Hitt, 1988). For example, executive teams who perceive the environment as more munificent than it is may erroneously pursue aggressive expansion strategies.

The rising prominence of the resource-based view of the firm (e.g., Barney, 1991), with its emphasis on understanding a firm’s internal strengths in the strategy making process, does not diminish the value of information about the external environment. The analytic context of the
industry environment frames executives’ perceptions of their firm’s competitive capacities (King and Zeithaml, 2003) and executives’ assessment of the external resource environment influences decisions about investing in particular internal resources (Bogner and Thomas, 1993; Peteraf and Bergen, 2003; Porac et al., 1995). The accuracy with which executives assess their environment can therefore be expected to influence the types of capabilities that the firm invests in (Garg et al., 2003; McNamara, Luce, and Thompson, 2002). Yet, the internal capabilities needed to succeed, for example, in a munificent and volatile environment are different from those in a less munificent and stable environment (Eisenhardt and Martin, 2000). Hence, the effectiveness of internal resource investments hinges at least in part on an accurate assessment of external conditions. The notion that accurate knowledge of an objective environment is a desirable competence is thus central to current research in strategic decision making and forecasting (e.g., Bukszár, 1999; Durand, 2003) and search and adaptive learning (e.g., March, 1991; Gavetti and Levinthal, 2000).

An obvious way for decision-makers to develop accurate knowledge of their industry environment is to acquire information. Few firms have formal units dedicated to collecting strategic-level environmental information (Boyd and Fulk, 1996), and consequently, top executives acquire much information about the environment through their own scanning efforts (Aguilar, 1967; Ritvo, Salipante, and Notz, 1979). Because members of the top executive team routinely are required to communicate (with each other and more widely) and transform knowledge resources into consequential decisions, we are concerned specifically with the collective behaviors and knowledge of this group (King and Zeithaml, 2003: 764).

**INFORMATION ACQUISITION AND ENVIRONMENTAL PERCEPTION**

The way a top executive team acquires information can help or hinder its ability to accurately discern the firm’s resource environment. The literature converges on three critical dimensions in this regard: How much effort do executives put into scanning? What is the information they look at about? And how do they access it? Scanning intensity, the time and effort spent on acquiring
information, determines the amount of information obtained (Hambrick, 1982). More information enables more accurate appraisals of the environment because assessments become more reliable, fine grained and comprehensive. In addition, executives that scan more intensively develop skills for selecting stimuli from a large flow of information (Daft et al., 1988; Kefelas & Schoderbeck, 1973). With greater competence in identifying relevant bits in a busy information context, the team can formulate a better collective representation of their firm’s environment when observations are pooled.

Conceivably, there are diminishing returns to information-acquisition activities. As a result of more information people are likely to grow less sensitive to and neglect familiar stimuli (Starbuck & Milliken, 1988). More information may only marginally increase the acuity of a team’s environmental models beyond a certain threshold, while at the same time creating information overload and straining its information processing capacity. Although this is a plausible line of argument, just when these negative effects start to dominate is unclear. Empirical studies have not found support for curvilinear effects (see Daft et al., 1988). Thus, while we will check for a curvilinear relationship, our hypothesis follows the empirical evidence:

**H1**: The greater the intensity of executives’ information acquisition, the more accurate an executive team’s environmental perception.

Beyond the sheer intensity of their information acquisition efforts, executives can put a broad or narrow range of environmental information on their radar screen. Organizational environments span multiple domains, including task or industry competitive environments (e.g., Bourgeois, 1980; Dill, 1958), technological environments (Tushman and Anderson 1986; McGrath 1997), institutional environments (Scott 1995), and other socio-political contexts (e.g., Reger, Duhaime, and Stimpert, 1992). How executives allocate their information gathering efforts across multiple domains will influence how accurately they assess the overall volatility, munificence and complexity of their resource environments. Given limited time and cognitive capacity, it may seem efficient for
executives to concentrate on those domains that ostensibly have the most immediate effect on their particular firm’s operations and goals. Some studies seem to support this line of thinking (e.g., Garg et al., 2003). However, other evidence suggests that chief executives of high performing firms scan a broader range of targets than their lower performing counterparts (Daft et al., 1988). Executive teams that use more narrow data might miss trends and issues that seem distant but ultimately drive more proximate concerns (March, 1991; Rosenkopf & Nerkar, 2001). In addition, when executives gather bits of information from a wide range of sectors, they can integrate information into a rich network of factors that affect their firm’s operations. With this more systematic understanding of the dynamics that underlie environmental attributes, their ultimate assessments of these attributes are likely to be more accurate. Thus we hypothesize:

H2: The more balanced the targets of information acquisition, the more accurate an executive team’s environmental perception.

A third dimension of information acquisition practices is the channel through which executives access information. Top executives access information through personal and impersonal modes of communication (Aguilar, 1967; Daft et al., 1988). The mode of access affects the richness and as a result, the accuracy of the assessment that executives form (Aguilar, 1967; Daft and Lengel, 1984). Personal sources refer to direct communication with other individuals inside or outside the organization. Impersonal sources include written documents both internally generated, such as formal reports and the output of management information systems, and externally generated, such as news information services or government reports. Research suggests that top executives prefer face-to-face communications and tend to seek environmental information from personal sources (Daft and Lengel, 1984; McDonald and Westphal, 2003), but that executives of higher performing firms combine the different channels (Daft et al., 1988: 136). The richness and flexibility of personal communications enable executives to resolve ambiguity and to understand tacit aspects of the environment (Daft et al., 1988), whereas written sources provide more systematic aggregate data to
track trends, crystallize discrete events and ‘objectify’ facts (Daft et al., 1988). Executives who rely solely on formal sources can miss out on tacit information that is difficult to codify and may not fit established formats and channels, while those that rely on personal sources risk falling prey to confirmation and selectivity biases. Hence, executives who combine both modes are expected to formulate more accurate views of their environment. We hypothesize:

**H3:** The more balanced the modes of information acquisition, the more accurate an executive team’s environmental perception.

**The Moderating Role of Volatility**

In our general model, information acquisition behaviors directly influence the accuracy of a top team’s environmental knowledge. Yet, the level of environmental volatility may complicate this picture (Garg et al., 2003). Executive teams in volatile environments face two problems in formulating an accurate picture of the environment: The volume and diversity of data to process is greater, and the data are more ambiguous (Daft and Huber, 1987). In terms of the volume and diversity of data, when environments change frequently, there is simply more for top executives to know and more distant information to integrate into decisions (Huber, 1984). Thus, more intense information acquisition efforts and a greater breadth of information are required to reach the same level of accuracy in dynamic environments (Milliken, 1987). This suggests,

**H4a:** The more volatile the environment, the more positive the association between information acquisition and perceptual accuracy.

**H4b:** The more volatile the environment, the more positive the association between balanced targets of information acquisition and perceptual accuracy.

The information ambiguity in volatile environments has less obvious implications for the intensity of scanning and the balance of targets. Ambiguity means that the same information has multiple meanings. Very dynamic environments provide unclear, messy signals, so that people can draw different yet equally plausible conclusions from the same data (Daft et al., 1993). Thus,
ambiguity cannot easily be resolved through more intensive or broader scanning. Resolving ambiguity has more to do with the modes by which information is gathered. In stable environments, relevant information is more codified and more easily locatable, which means that impersonal sources will provide an accurate enough picture. In unstable environments, by contrast, information to assess industry conditions is more tacit and more dispersed. Consequently, interpersonal networks provide the richer media required for effective sensemaking in ill-structured information contexts (Daft et al., 1993). This leads us to hypothesize:

**H4c**: The more volatile the environment, the more personal modes of information acquisition are associated with greater perceptual accuracy.

**INDIRECT AND DIRECT EFFECTS OF SCANNING ON PERFORMANCE**

When a firm’s top management holds inaccurate views of key environmental attributes, it may make poor strategic decisions. A long line of studies suggest that the effectiveness of particular organizational designs and strategies hinges on how unstable, munificent, and complex a firm’s resource environment is, and that organizational leaders need to correctly perceive these environment conditions to initiate appropriate action (e.g., Lawrence and Lorsch, 1967; Pfeffer and Salancik, 1978; Keats and Hitt, 1988). For example, top executives who underestimate environmental dynamism may pursue strategies and create structures and processes with insufficient flexibility. Their firm is punished by poor performance or failure. Accordingly, existing theory (e.g., Duncan, 1972; Pfeffer and Salancik, 1978: 267) and two small-sample studies (e.g., Bourgeois, 1985; Dess and Keats, 1987) suggest that perceptual acuity on those dimensions and performance will be positively associated. This account implies that scanning practices affect performance primarily through executives’ perceptual accuracy and the resulting quality of strategy choices.

Yet, while information acquisition activities can improve the accuracy of executives’ environmental knowledge, that accuracy itself has a price. The trade-off is between obtaining greater accuracy and tying up cognitive and organizational resources that could be applied elsewhere. For
example, the quest for highly accurate knowledge may inhibit action-taking on imperfect information. That in turn may hinder learning processes and innovative strategies that break the conventional rules for a given environment (Weick, 1995; Porac and Rosa, 1996). At some point, the costs of arriving at ever more accurate assessments may outweigh the benefits of this accuracy. This “optimal level” of accuracy can only be identified within an empirical context. In today’s information-rich environment, all executives assess their environment to some minimal extent. It would therefore seem likely that within the observable range of accuracy performance is indifferent to modest deviations from accuracy. Only comparatively large misjudgments have negative consequences that outweigh the cost of improving accuracy. We hypothesize more generally:

**H5:** There will be an inverse u-shaped relationship between the accuracy of executives’ environmental perception and firm performance.

Statistically, H5 states that perceptual accuracy mediates the associations between the scanning practices discussed in H1-H4 and firm-level performance outcomes. Yet obviously, factors other than information search tactics affect accuracy, for example how this information is processed (e.g., Sutcliffe, 1994). Similarly, executives’ scanning practices may influence performance net of enabling accurate perceptions, e.g. by instilling a sense of vigilance and awareness in the rest of the organization, or by permeating an information addiction that stifles creativity and initiative. In fact, two small sample correlational studies suggest direct positive correlations between economic performance and executives’ scanning behaviors (Daft et al., 1988; Grinyer and Norburn, 1975). We do not elaborate these alternative links in detail as the focus of this paper is on accuracy as the implicit linchpin between executive information search tactics and performance in many strategy models. However, we know enough to suspect that perceptual accuracy will not fully mediate this relationship. Stated formally:
**H6a:** Perceptual accuracy will partially mediate the association between the intensity of executives’ information acquisition and firm performance.

**H6b:** Perceptual accuracy will partially mediate the association between the targets of executives’ information acquisition and firm performance.

**H6c:** Perceptual accuracy will partially mediate the association between the mode of executives’ information acquisition and firm performance.

**CONTROLLING FOR INTERPRETATIONS**

As discussed in the introduction, the idea that accurate environmental knowledge matters for a firm’s performance is not uncontested. The interpretative perspective on strategy-making emphasizes how managers interpret environmental data once they are acquired (Daft and Weick, 1984, Gioia and Thomas, 1996). That is because strategic decisions rarely come as defined issues and because environmental facts do not speak for themselves. Problems must be bracketed from an amorphous stream of experience, be identified as relevant to the firm, and made meaningful before they can fuel strategic action (Barr, 1998). The interpretive view privileges interpretative dispositions over accurate representations of factual environmental attributes as the quality of environmental appraisals that constitute valuable competences for a firm.

Variations in interpretation systems rather than variations in perceptual accuracy may explain why executives facing the same environment respond to it differently (e.g., Milliken, 1990; Barr and Huff, 1997), and experience different performances (e.g., Meyer, 1982; Milliken, 1990). In fact, some studies show that executives’ interpretations are more firm-specific than assessments of more “objective” environmental attributes such as volatility, munificence, and complexity, suggesting that interpretations may well be a source of competitive advantage (Sutcliffe and Huber, 1998). Variations are not random or fickle, as a number of studies identify systematic and persistent variations in executives’ environmental interpretations (see Dutton, 1993; Meyer, 1982; Milliken and Lant, 1991; Starbuck and Milliken, 1988, Daft and Weick, 1984: 286). Thus, to assess the importance
of accurate assessments of the environment, we need to control for an executive team’s systematic
differences in *interpretive orientations*, which we conceptualize as cognitive structures that are to
some degree consistent over situations and time (Fiol, 1995).

The two most robust interpretation categories in organization studies are “threat” and
“opportunity”. But studies show that top decision makers in profit-seeking organizations often
interpret information about their firm’s environment using attributes that underlay these categories
(Thomas, Clark, and Gioia, 1993; Fiol, 1995): a notion of controllability and positive/negative
expectations. Controllability reflects executives’ generalized beliefs about their firm’s ability to
control its environment and is embedded in the firm’s competence and availability of resources. A
positive mind-set refers to executives’ generalized interpretations about and stance toward
environmental demands, and reflects the view that the majority of situations encountered is positive
to the firm and provides opportunities rather than threats. In this paper, we focus on the role of
accuracy in theories of information acquisition, and we merely aim to assess the relevance of
accuracy, net of executive’s interpretive orientations, and hypothesize:

**H7**: The effects of accuracy on performance will be independent of an executive team’s
interpretive orientations (i.e., controllability/uncontrollability and positive/negative).

We would like to emphasize that the claims for accuracy and interpretive orientations as being
critical are not incompatible, despite the seeming gap in recent years between the scanning and
interpretation perspectives. Perceptions of particular aspects of environments need to be interpreted
as much as interpretations need to be interpretations of something. Hence, the accuracy with which
environmental dimensions are assessed and the interpretive orientations that are brought to bear on
the same information are qualities of the same sensemaking process. Supposedly, the divide in the

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2 Dutton and Jackson (1987) originally proposed that three attribute dimensions differentiate threats and
opportunities: negative/positive, loss/gain, and low control/high control. Subsequent empirical work by separate
groups of researchers (see Thomas and McDaniel (1990), Thomas, Clark, and Gioia (1993) and Sutcliffe (1994))
literature stems from different ontological assumptions about the environment. Barr and Huff (1997: 338), for example, assert that studies of interpretations became more popular “after Weick’s (1979) statement that the environment is not an objective ‘thing’ to be known, but rather the product of interpretation and action.” For Smircich and Stubbart (1985: 725), the idea of an objective environment presumes that organizations are embedded within external independent environments that “constitute some thing or some set of forces to be adapted to, coaligned with, controlled, or controlled by”. Interpretivist strategy research rejects the notion that environments are objective and see them as products of participants’ subjective interpretations and enactments. Hence, management’s goal is to dominate other participants by imposing their frames on the environment (Porac and Rosa, 1996).

This may accurately reflect the intellectual roots of the perspectives. What sometimes gets lost in this debate is that the relevance of accuracy for strategy makers does not so much rest on an ontological assumption about the nature of the environment, but on the pragmatic notion that it is beneficial to pay close attention to aggregate representations of collective enactments. The issue is not whether, for example, the trend of an industry’s aggregate sales is “objective fact” or “collective enactment”, the question is whether knowing this bit of information with some fidelity helps an organization’s performance. The implication for the researcher is a similar one (Weick, 1995:34-35): Divergent ontological roots of theories should not get in the way of assessing their respective predictive utility.

Figure 1 summarizes the hypotheses developed in this section.

does not support a clear differentiation of the negative versus positive dimension from the loss versus gain dimension.
METHOD

Data and Sample

We tested the hypotheses using a combination of survey and archival data. We used a mail questionnaire to gather data from the top executive team members of a randomly selected sample of business units and independent firms. The firms were drawn from a sampling frame of a diverse set of industries at the four-digit Standard Industry Classification (SIC) level. We studied the cognitions of the key executive and his or her team of managers; the top executive team, rather than the individual manager, is the unit of analysis in this study. The top executive level is the point at which strategic information converges, is interpreted, and acted upon. Consistent with other researchers studying top management teams (see Hambrick, 1982), we defined team members as those individuals whom the chief executive identified as part of the top management team. This definition is preferable to alternatives, such as job titles, as it identifies those actually involved in top decision-making processes. We contacted 502 firms in 35 industries. Over 370 managers in 89 firms from 32 industry groups responded. We received one to thirteen questionnaires per organization with a mean of five. Because some questionnaires were incomplete, the sample for this study consists of data from 329 top executives in 86 organizations drawn from 32 industries, an inclusion rate of 17% of organizations and 91% of industries. We gathered matching archival data from the Compustat Business Industry Segments database (BIS).

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3 All organizations in the sample were independent single-sector firms, autonomous subsidiaries, or autonomous divisions, as contrasted with multi-divisional firms. We used a two-step stratified procedure to select the random sample of organizations from the Standard and Poors’ Compustat Business Industry Segments database. First, we stratified the population of business units in the database along industry lines and then randomly selected a sample of industries subject to the constraint that each industry selected included at least 20 business segments (e.g., firms). We then randomly selected individual firms within each industry.
The participating firms ranged in size from 29 to 62250 employees, and averaged 3042 employees with a standard deviation of 8631. The median number of employees was 678. Approximately 63 percent of the organizations were involved in manufacturing activities while the remaining 37 percent were involved in service activities. We used chi-square analyses to assess a possible response bias and to determine whether the firms and industries ultimately included were representative of those asked to participate. In terms of size, the included firms were not significantly different from those asked but not included. In terms of type of activity (i.e., service vs. manufacturing) and industry conditions (i.e. volatility, munificence and complexity) the represented industries were not significantly different from those missing. The inclusion rate of organizations within each industry category also did not correlate with industry conditions.

Measures

Firm performance. We collected financial data for each organization from the BIS database. We used two accounting based measures to ensure the robustness of our findings: average percentage change in operating income over the two years following the survey (change in profits), and return on sales (R.O.S.) two years after the survey. To control for industry effects, we standardized both measures by each firm’s four-digit SIC industry segment average. Hence, we measure if an organization performs better, equally well, or worse than other firms competing in the same industry. Measures based on operating profits indicate the extent to which a firm deploys its resources in a cost effective way. We did not use returns on equity or stock market based measures, because the data needed to calculate them are unavailable or unreliable for part of our sample, i.e. independent business units operating within larger holding corporations.

The measure of change in profits reflects a dynamic notion of performance. It indicates whether a firm’s relative share of the profits generated in the industry increases or deteriorates. For example, if profits increased by 10 percent for firm X, but by only 5 percent on average in its industry, the firm’s share of the overall profit pie increased. As a measure of change, however, the variable could be seen
as biased through a process of regression to the mean: It may be easier for less profitable firms to
grow to average levels than for highly profitable firms to become even more profitable. We therefore
included a control variable for the firm’s industry standardized profits at time zero.

As a measure of overall profits, this first measure combines profit increases as a result of greater
revenues with a steady rate of return, with profit increases as a result of increasing returns at steady
revenues. We therefore used the second measure, of time-lagged return on sales, to capture solely the
efficiency (as opposed to the growth) aspect of performance. We again controlled for R.O.S. at the
time of the survey to account for firms’ different starting profitability. Appendix B provides a
complete description of the method we used to calculate the performance measures.

Information acquisition practice. We assessed three aspects of executive scanning and search for
information. We measured the overall intensity of executives’ information acquisition with seven
questionnaire items on seven-point scales based on the work of Hambrick (1982). We averaged the
items to create the variable (see Appendix A for the items). We operationalized what we refer to in
H2 as balanced targets of information as the degree to which executives sought information across
different environmental sectors. We computed the absolute difference of each item from the overall
mean, and summed these differences to create a measure of variability. We inverted this raw measure
into a variable reflecting balance by subtracting the raw score from the sample maximum.4 Hence,
while the intensity measure reflects how much overall effort goes towards information acquisition,
the balance measure captures whether this effort is targeted on selective environmental sectors or is
spread evenly. The final variable captures the mode of information acquisition (personal vs.
impersonal). The use of personal sources were assessed using six questionnaire items and impersonal

4 An alternative measure using the standard deviation from the mean instead of the distances yielded identical
results. Garg et al. (2003) used a similar set of items to create scales that divide the environment into only two
sectors: task and general environment. While this makes sense for their theoretical perspective, our measure uses
more of the information. To make our findings comparable to those reported in their article, we tested a measure of
balanced scanning targets composed of the ratio of task over task + general environment. The quadratic term of that
sources were assessed with four questionnaire items, both on seven-point scales based on the work of Daft and Lengel (1984). We created a measure that reflects the extent to which executives emphasize personal over impersonal sources by first averaging the respective scores for personal and impersonal sources and then computing the proportion of personal over the total. The higher the value of the variable, the more executives prefer personal sources. Adding a squared term of the variable in the models captures the idea of balance between the two modes.5

Perceptual accuracy. To assess the accuracy of executives’ perceptions we created archival measures of those aspects of a firm’s task environment assessed in the survey: volatility, munificence and complexity. We then assessed the congruence between the alternative measures.

Archival environmental measures. We followed current practice to create the archival measures of a firm’s task environment from data at the level of the four-digit SIC industry segment (see Dess and Beard, 1984, Sutcliffe, 1994; McNamara, Vaaler, and Devers, 2003). Each industry’s volatility, munificence and complexity were assessed with data from the BIS data file following the definitions of Dess and Beard (1984) and others (e.g., Aldrich, 1979; Keats and Hitt, 1988; Wholey and Brittain, 1989). To create the environmental measures, annual data were analyzed for all firms within an industry over a four-year period prior to survey data collection. Each organization in the sample was assigned its industry's volatility, munificence, and complexity scores.

Environmental volatility captures unsystematic changes or variability around the aggregate trend in an industry. We measured volatility by taking the mean of three indices based on industry sales, capital expenditures, and net assets. These dimensions capture the availability of the key industry resources, customer demand, capital, and capacity, and were correlated between 0.89 and 0.92 at the industry level. We computed the three indices by regressing sales, capital expenditures, and net assets

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5 An alternative specification using the algebraic difference between scores for personal and impersonal sources yields substantially the same results.
on the year of the observation. The volatility measures are the standard errors of the regression, standardized by the mean level of the respective dependent variable.

Environmental munificence equally refers to the resources available in an industry. Munificence captures the industry trend and therefore reflects the extent to which the environment is supportive of sustained growth. We averaged the same three indices – sales, capital expenditures, net assets – to create an industry-level munificence measure. We computed munificence indices by dividing the unstandardized regression coefficients from the time-trend regression analyses described above by the mean of the dependent variable of the regression. This measure captures the extent of growth (or decline) in the industry. The steeper the regression slope, the higher the level of growth.

Complexity theory suggests that the complexity of an environment is a function of the number of different elements it contains and the structure of relationships amongst them (e.g. Axelrod and Cohen, 2000; Luhmann, 1995). Such environments cannot be easily grasped with few linear concepts (Gell-Mann, 1995). In industrial applications, the more fragmented resources are among many competitors, the more competitive contingencies a focal firm has to take into account. The simplest measure of complexity is then the number of firms in an industry, used, for example, by Williamson (1975) and Huber (1984). However, this measure ignores industry concentration, the inequality in the distribution of resources between these actors (Ogilvie, Glick and Miller, 1991, Sharfman and Dean, 1991). Everything else equal, environments with clear market share leaders are less complex, because the main competitive contingencies are controlled by fewer players (Ogilvie, Glick and Miller, 1991: 17; Pfeffer & Salancick, 1978: 50; Scherer, 1980). We therefore measured complexity using the Herfindahl-Hirschman index ($I_{HH}$), which is calculated as the sum of the squared market shares for all firms in an industry (Herfindahl, 1950). The $I_{HH}$ is bounded between 0 and 1. A smaller number of firms or disproportionate market shares will move the index towards 1, many firms and an equal distribution of market shares will move the index towards 0. As with measures of volatility and munificence, we averaged three indices based on sales, capital expenditures and net assets to create
this variable. Although some researchers have suggested that complexity is greatest at medium index values (e.g. Boyd, 1990), we follow the most common argument that complexity increases with the number of firms and the equality of market shares in an industry.

**Perceptual environmental measures.** We assessed all perceptual variables with questionnaire items adopted or adapted from previous studies. The questionnaire was pilot tested and refined based on the pilot test results. The measures described below were created at the executive team level by averaging individual scores and meet the standard criteria for scale development (Mulaik, 1972; DeVellis, 1991). We assessed perceived volatility with seven Likert-type questionnaire items on seven-point scales based on the work of Duncan (1972) and Bourgeois (1985), perceived munificence through seven questionnaire items adapted from Glick et al., (1990) and perceived complexity was assessed through two questionnaire items, a reduced scale based on the work of Dess and Beard (1984) and Sutcliffe and Huber (1998). For a summary of the scale items see Appendix A.

We then created the **measures of perceptual accuracy** for each environmental attribute. We first standardized the perceptual and archival scores on these variables to z-scores. We then subtracted archival from perceptual measures and took the absolute value of the difference. Our measures therefore simply capture if archival and perceptual assessments concur; they do not indicate whether executives under- or over-estimated environmental attributes. Finally, converted divergence into congruence measures by subtracting the absolute differences from the maximums of each measure. Higher scores thus stand for greater accuracy, matching variable names. Because they are created from z-scored components, the accuracy variables can be interpreted as the degree to which the perceived industry conditions, relative to those in other industries, agree with archivally assessed

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6 This conversion is not only required to match the scales of both components. Implicit in this transformation is that there is no natural scale or zero-point for either perceptual or archival assessments of abstract dimensions of the environment and that any assessment is based on an implicit comparison group. A very likely comparison in assessing an industry’s conditions is other industries. Z-scoring converts both scores into assessments relative to all 32 industries in the sample.
conditions of the same industry, relative to those in the same other industries. To reduce collinearity, we re-centered variables at their mean before creating quadratic terms.

We created an omnibus measure of accuracy by averaging the three congruence measures. This variable assesses the overall accuracy of executives’ perceptions of the environment. We performed several tests to verify that we did not lose important information by collapsing the three measures. We first regressed performance on the three separate accuracy variables and tested whether the three coefficients were different from each other, and performed the same tests with the quadratic terms. The average p-value for these Wald tests was 0.68, with a range of 0.52 to 0.98. Secondly, we used multivariate regression to regress the three measures on the information search variables and their quadratic terms, again testing whether the coefficients for each independent variable behaved differently. The average p-value was 0.59, with a range of 0.21 to 0.97. None of these tests thus suggested significant differences in the relation of the three variables with our key dependent variables. In addition, we checked whether substituting the omnibus variable for the three separate measures affected the direction or significance of other coefficients. It did not. We thus report all models with the omnibus measure of accuracy.

Interpretive orientations. A notion of controllability and positive/negative expectations underlay the framings of “threat” and “opportunity” which are most common interpretive labels for-profit settings (Thomas, Clark, and Gioia, 1993; Fiol, 1995). We assessed the more systematic interpretive orientations of controllability and positiveness with six questionnaire items each, based on the work of Thomas and McDaniel (1990).

Controls. We controlled for size, industry volatility, and past performance, all of which have been shown previously to influence performance in some way. For size we used the natural log of employees, for industry volatility the archival measure calculated in constructing the accuracy variable. The organization's recent performance history was operationalized in the change in profit models as the industry adjusted operating income, and in the return on sales models as the industry
adjusted R.O.S., both in the year of the survey was administered (t0). We also tested a control for perceived managerial discretion, using six questionnaire items based on the work of Hambrick and Finkelstein (1987). Discretion may be necessary to take action on environmental appraisals. The variable was, however, non-significant in all models, and is excluded in the reported tables.

**Analyses and Results**

Although many of the measures had been validated and published previously we examined the psychometric properties of the survey measures of perceptions and information acquisition. Since our sample size of 86 is too small to perform a confirmatory factor analysis of our entire measurement model we used exploratory factor analyses with principal axis factoring and direct oblimin rotation and found good support for the a priori factors. We also assessed the intraclass correlation of the perceptual measures, ICC (1,k). The ICC measures the extent to which responses within a team agree with each other and differ from other teams (Shrout and Fleiss, 1979; Kenny and LaVoie, 1985). The average intraclass correlation across the constructs was .62 for teams with more than two respondents suggesting sizeable agreement among top executive group members in their responses. This lends support to our decision to include organizations with fewer respondents. In addition, we tested if the number of respondents affected the findings for the dependent variables. We entered the logged number of respondents, which did not affect the sign and magnitude of other coefficients. We therefore feel confident that TMT size or within-team missing values did not bias our results.

We tested the hypotheses with a series of regression models and mediated regression tests. We examined residual plots for all variables in the regression equations and found no major violations of distributional assumptions. Variance inflation statistics indicated that multicollinearity was not an issue. To obtain correct standard error estimates and accurate significance tests in the face of possible heteroscedasticity, all models report robust standard errors using the White correction (Gujarati, 1995: 379-383). Descriptive statistics, including means, standard deviations, Pearson zero-order correlations, and Cronbach's alphas are presented in Table 1.
We first regressed perceptual accuracy on the information acquisition variables (Table 2). Because of the limited number of observations, we followed a stepwise model selection procedure to test and eliminate variables before specifying a combined performance model. Table 3 shows the results of these analyses. We first identified the appropriate model separately for accuracy and information acquisition variables, specifying linear, then quadratic and finally interaction models. We then combined the reduced models from each set of variables into an overall model, to which we finally added the two interpretive variables. We followed Baron and Kenny's (1986) procedure to assess mediation, with and without the moderating effect of environmental volatility. The relevant models are included in the full models of tables 2 (models 1 and 3) and 3 (models 3 to 8). We also performed mediation tests, with performance models in without the control variables included. The results are the same as for the full models shown.

As table 2 shows, hypothesis 1, which predicted a positive association between accuracy and the intensity of executives’ information acquisition, was not supported. 7 We found support for hypothesis 2, which predicted that the more balanced the targets of information acquisition, the more accurate a team’s perceptions. Hypothesis 3 predicts that the more balanced the modes of information acquisition, the more accurate executives’ perceptions. The quadratic term in model 2 in table 2 is not significant, however, the linear term in model 1 is significant. Contrary to hypothesis 3, the more executives rely on information from personal sources, the less accurate their perceptions.

Hypothesis 4a predicts that dynamism will moderate the positive association between accuracy and the intensity of information acquisition. As shown in Table 2 (model 3), the interaction term is

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7 As Table 2 shows, the quadratic term was not significant in model 2 of Table 2.
significant at p < .10 providing tentative support for H4a. Hypothesis 4b (balanced information) was not supported. Hypothesis 4c which predicted that dynamism will strengthen the association between personal information sources and accuracy was supported (model 3), but the main effect and moderation effect were opposite to what we predicted.

Hypothesis 5 predicts an inverse u-shaped association between firm performance and the accuracy of executives’ perceptions. As shown in table 3, the quadratic term for the accuracy measure is not significant in models 1 and 2 providing no support for H5. Surprisingly, more accurate executives’ perceptions were consistently associated with lower future profits (models 1, 7 and 9) and lower future R.O.S. (models 2, 8 and 10).

In hypotheses 6a, 6b, and 6c, we predicted that accuracy would partially mediate the association between information acquisition variables and firm performance; but using the Baron and Kenny criteria for mediator tests we found no support for mediation (models 3 - 8 in table 3, models 1, 2 in table 2). Instead, the analyses suggest robust relationships between information acquisition behaviors and performance that are not mediated by perceptual accuracy. The intensity of scanning is related to both performance variables in an inverse u-shaped form (models 3, 4), although the relationship is tilted to the negative in the profit change model. More balanced targets are associated with greater improvements in profits and greater R.O.S. (models 3, 4, the t-value of 1.68 is significant at 0.1 for a two-tailed test and at 0.05 for a one-tailed test). Balancing personal and impersonal modes of information acquisition improved subsequent profit growth but not R.O.S (quadratic terms in model 3, 4). The associations of both the intensity of scanning and the mode of information acquisition with performance are moderated by the level of environmental volatility (models 5, 6, discussed below).

Finally, hypothesis 7 in which we predicted that accuracy’s effect on performance would be independent of an executive team’s interpretive orientations was supported. Models 9 and 10 in Table 3 show the negative effect for accuracy unchanged after controlling for interpretations.

Figure 2 provides an overview of the relationships that were empirically supported.
Exploring the Effect of Accuracy

We conducted two post hoc analyses to test the robustness of the unexpected negative effect of accuracy on performance. First, one could argue that what matters most when it comes to perceiving environmental attributes is not being accurate with regard to the past and present, but having accurate expectations about the future state of the environment (e.g., Durand, 2003). In our survey, we elicited general perceptions of environmental attributes, and matched these perceptual assessments with historical archival measures to gauge their accuracy, because logically, one can only perceive and make sense of what has already occurred. If, however, accuracy is primarily relevant for expectations and if industry environments change rapidly, our results for inaccuracy may reflect the datedness of the archival measures vis-à-vis relevant future expectations rather than “true” inaccuracies. Although we cannot assess this possibility conclusively with the data at hand, we performed an indirect test. We calculated a measure of “prospective accuracy” by matching the perceptual measures from the survey with measures of the industry environment taken over the years following the administration of the survey. We calculated this variable using analogous procedures to those described before and entered it in place of the congruence measure presented above.

We regressed the measure of prospective accuracy on the three scanning behaviors and found the same coefficient patterns to those presented in Table 2. Accuracy was enhanced when executives used impersonal sources of information and collected a broader range of information. However, the balance of information targets showed an insignificant main effect and a significant interaction with environmental volatility. With respect to performance, if accurate expectations were associated with performance, one would also expect that organizations whose general perceptual assessments happened to closely resemble future states of their environment should perform better irrespective of
how the matching perceptions came about. Parallel to the main analysis, prospective accuracy was negatively and linearly related to performance (only marginally so for the change in profits variable).

Second, the performance implications of accurate perceptions of environmental dimensions may conceivably depend on the state of that environment. For example, an accurate assessment may be beneficial in stable environments, but detrimental in turbulent ones. To test this possibility, we created interaction terms between the accuracy variable and the archival measures of volatility, munificence and complexity. We added each of these variables separately to the partial and full regression models shown in table 3 (models 1, 2, 7 and 8), controlling for the main effect of the respective environmental variable. The interactions with environmental volatility and complexity were non-significant. The interaction with munificence was negative for the ROS variable only \((p=0.06)\). The negative main effect of accuracy, as well as all other findings held up. We conclude that the performance effect of accuracy is not contingent on the characteristics of the environment. If anything, accuracy is associated with even weaker performance in very munificent environments.

**DISCUSSION, LIMITATIONS, AND CONCLUSIONS**

An executive team’s information gathering competencies and in particular its ability to accurately discern its environment can be critical to its success. To investigate these widespread assertions we examined three aspects of executive information acquisition behaviors and articulated the rationale for how these behaviors relate to executives’ environmental appraisals and firm performance. We tested our hypotheses in a systematic sample across a variety of industries. The results point on the one hand to a more nuanced understanding of information acquisition behaviors and their consequences and on the other hand they challenge some basic premises of classic strategic management theory.

The first set of findings adds specificity to existing research suggesting that dimensions of information search differentially shape the accuracy of executives’ perceptions. As expected, volatility mattered for the optimal effort put into scanning the external environment: In unstable
industries, assessing industry conditions with accuracy requires greater scanning effort. In stable environments, industry conditions are more easily assessed, thus, more intensive scanning may create information overload and confusion rather than accuracy. Also as we expected, executive teams that scan broadly across environmental domains develop a more accurate view of key environmental attributes. This is consistent with our contention that accuracy results from assembling bits and pieces of information gathered from multiple environmental sectors. The hypothesis that this relationship is moderated by volatility, however, was not born out in our sample. It thus seems wide information search strategies universally lead to more accurate assessments of environmental conditions. Regarding how information is acquired, we hypothesized that a balance of personal and impersonal modes would enhance executives’ accuracy, with unstable environments rewarding greater use of personal sources. The rationale was personal communications allow executives to access more tacit, unstructured and dispersed information. But, we found the opposite: The more volatile the environment, the more detrimental were personal information acquisition practices for making accurate assessments of environmental attributes. Although rich interpersonal sources may help executives to arrive at judgments about their firm’s environment in the first place, those judgments are not more accurate. Consistent with the work of McDonald and Westphal (2003), this may be because top executives’ personal information sources are likely to be homologous and reinforce executives’ existing beliefs. A less-biased—more accurate—view seems to result from less personal information sources. Impersonal information sources may serve as a “reality check.” They effectively convey objective knowledge to increase perceptual acuity about general well-defined attributes of the resource environment. By contrast, the debate, clarification, and discussion associated with personal communication may shape a more idiosyncratic view of these environmental dimensions (Daft, Bettenhausen, and Tyler, 1993; Daft and Huber, 1987). Ironically, however, a more accurate picture is not as central and desirable a quality as rational decision-making theories imply.
The second set of findings sheds light on these indirect and direct effects of scanning behaviors on firm performance. The results prove provocative in light of existing theory about executive cognition’s role in strategic decision making. We address indirect effects first. We expected (1) that the accuracy of a team’s environmental perceptions mediates between search behaviors and firm performance, (2) that the association between acuity and firm performance will be an inverse u-shaped curve, and (3) that the association between perceptual accuracy and performance will persist after controlling for an executive team’s interpretative orientations. Yet, we did not find any mediating effects, and counter our hypothesis we found a strongly negative association between perceptual accuracy and both measures of firm performance. The findings for this sample show that this performance effect holds net of executives’ interpretive biases.

This pattern of results points to a pragmatic, cost-benefit-oriented role of information search behaviors and of the acuity of industry knowledge in real-world organizations. Our results may simply suggest that the benefits of perceptual acuity are rarely worth the costs of achieving it. In today’s information-rich environment, some executive teams may feel obliged to develop extremely accurate assessments even when there is little benefit to it. The benefits of such accuracy may in fact not be so great: Highly accurate perceptions of environmental patterns may lead firms to confuse signal and noise, over-reacting to small environmental signals and expending resources unnecessarily (Pfeffer and Salancik, 1978: 268). And executive teams that seek very accurate assessments of their industry environment perhaps also apply established strategic recipes, insufficient for gaining ground on competitors (remember that our performance measures industry standardized). On the cost side, achieving accuracy consumes scarce organizational resources such as time, money, and attention, all of which could be deployed more effectively for other purposes. It is quite possible that accurate knowledge of key industry attributes at the executive team level, achieved through time-consuming scanning, great scrutiny and extensive analyses, conflicts with making swift decisions, taking action and mobilizing collective energy. The result is a tradeoff of speed, creativity and learning for
accuracy and precision. Our findings for executives’ scanning behaviors are consistent with this account, as are the supplementary analyses of prospective accuracy.

Instead of mediation, we found strong direct effects of information acquisition on performance. Three findings stand out. First, executive teams of higher performing organizations scan more broadly. Second, contrary to theory (e.g., Daft et al., 1988, and Grinyer and Norburn, 1975), more intense scanning by executives at the top is mostly detrimental to future firm performance; executive teams of higher performing organizations either moderate their quest for information or match their efforts to the volatility of the environment (see also Garg et al., 2003). We found an inverted u-shaped relationship between the intensity of information acquisition and performance, which for the profit variable was more pronounced at low levels of environmental volatility. This tentatively suggests that the cost-benefit argument for moderate scanning works best in relatively stable environments. However, as volatility increases, scanning intensity has little effect on performance.

Finally, the findings show that volatility moderates this direct association between mode of information acquisition and both measures of performance. Note that this effect dominates the indirect path in which more personal modes of scanning reduce the accuracy of environmental perceptions, which in turn enhances performance. When both paths are taken into account, the net effect of using more personal sources is positive for low and average volatility and only slightly negative under very high volatility (> + 1 S.D.). This seemingly contradicts the negative performance effects of using personal contacts found by McDonald and Westphal (2003). However, their study focused on information from similar others, while our measure included all personal contacts. Thus, a reliance on information from personal sources may be beneficial if executives’ networks are entrepreneurial (composed of diverse others) but detrimental if they represents a homogenous clique. Moreover, in highly unstable environments, a greater balance of personal and impersonal sources appears to be required, reflecting perhaps the unique challenges of ambiguous environments where
the “reality check” of impersonal information gains importance. In this setting, information is scarce and fragmented so that personal and impersonal sources yield complementary information, while in more stable industries they act as substitutes, which yield the same information. In that case, the richness of personal modes becomes the more dominant factor for performance.

**Limitations**

This study is of course not without limitations. First, our results are based on a small sample of US corporations, and although the sample was random, stratified, and the industries represented diverse, the results need to be viewed with caution as they may not automatically generalize to different periods, institutional settings, and countries. For example, the range of accuracy we could observe may have excluded very low accuracies, eliminating the “left leg” of the inverted U-shape we expected for accuracy’s relationship with performance. Such observations may be found more frequently in periods when public information was not as abundant as in today’s information society, or in samples of managers of very small firms in emergent industries. Second, although we selected and constructed the variable of perceptual accuracy from existing theory, our resulting measure does not constitute an exhaustive characterization of the external environment. Hence, accurate knowledge of other competitive and environmental factors may still be critical for performance. Third, we controlled for executives systematic interpretive orientations because they appear most closely linked to a firm’s dynamic capabilities. However, we cannot rule out that skills in more situational and flexible interpretive labeling have stronger performance implications. Finally, our model is both general and simple, perhaps at the price of accuracy (Thorngate, 1976). Undoubtedly there are other factors that mediate the relationships between the different components of our model.

**Future Research Directions**

The empirical results of this study suggest that future studies investigate the aspects of executives’ information acquisitions behaviors that may constitute dynamic capabilities, and revisit the mechanisms that link them to performance. First, our findings invite more investigations into the
outcomes of executive scanning, rather than its antecedents, which have predominated in the literature. Our rejection of accurate environmental knowledge as a link to firm performance and the scarcity of existing research (cf. Garg et al., 2003) combine for this call. It is often taken for granted that since the environment is a critical contingency for organizations, information search is critical. This “normative wisdom” permeates our information society. Yet, it is possible that extensive environmental scanning is unnecessary. Pfeffer and Salancik (1978: 268) two decades ago argued the advantage of ignoring the environment and its changes: “Knowing about the change puts the organization in the position of having to respond to it. It may be better to ignore changes rather than risk over responding to every small, insignificant fluctuation.” Given that we found no evidence for the often-assumed mediating mechanism of perceptual accuracy, future studies should investigate alternative linkages. Perhaps scanning promotes or inhibits executive team and organizational action taking which more directly influences performance. Our results and those of other recent studies (e.g., Garg et al., 2003) identify volatility as a moderator. However, not all aspects of information acquisition behaviors were contingent on this environmental condition. Future work should investigate other possible moderators and continue to de-bundle different aspects of search practices with a view to identifying which behaviors are robust sources of firm performance. Perhaps under conditions such as greater internationalization more intense information search is critical to performance. Scanning may even be more effectively handled by other parts of the organization.

A second research avenue concerns the types of information that need to be assessed. Within the broader literature of information search, we drew primarily on the established literature on executive scanning, which holds aggregate attributes of the resource environment to be the relevant foci of environmental assessments (Aldrich 1979, Dess and Beard 1984). This focus, however, is not universally agreed upon. Noting that attention to specific kinds of information may be crucial for survival in specific situations (D’Aveni and MacMillan, 1990), recent scanning studies (e.g., Garg et al., 2003) stress the need to assess particular sectors of the external environment together with
internal capabilities. Scholars grounded in the resource-based view suggest executives conduct broad-based competitor identification (Peteraf and Bergen, 203), while work on adaptive learning has stressed the need to assess aggregate technological and knowledge “landscapes” (Gavetti and Levinthal 2000; Suarez and Utterback 1995), and network researchers have emphasized quality of network perceptions (Krackhardt 1990, Casciaro 1998). Game theoretical strategy perspectives note how perceptions of competitors’ intentions and perceptions may be a source of competitive advantage (Porter 1980: 59; Zajac and Bazerman 1991). And although recent work has begun to investigate attention structures in and around organizations (Hoffman and Ocasio 2002, Ocasio, 1997), we know little about when and how selecting particular foci of attention influence firm performance.

Overall, we suspect that studies on information acquisition are actually on the rise but that researchers frame these studies differently. We see most promise in studies that skillfully draw together the commonalities and contributions of these literatures. For example, McDonald and Westphal’s (2003) study of CEOs’ advice and information networks directly examines the link between information sources, strategic change and performance. Thus it may be useful to pursue research combining what we know about the optimal composition of executives’ advice network with ideas on media richness, which suggests that personal modes of accessing information in a network induce deeper and more fine-grained processing of environmental information (Daft et al., 1993; Daft and Lengel, 1984).

Finally, although our findings suggest that the accuracy with which executives perceive their resource environments is perhaps detrimental to performance and that interpretations are of little consequence, the central question of what qualities of the strategic sensemaking process are critical remains. If anything we need more conceptual elaboration of alternative perspectives. Porac and Rosa (1995: 39) provocatively argue that long-term strategic success stems from a firm’s ability to impose its frame on the environment, not from adapting it to the environment. Thus, accuracy would
TMT Information Search, Perceptual Accuracy, and Firm Performance

not seem to matter for top executives who craft firm strategy. However, some enactment attempts are clearly more successful than others and what makes them more imposing is not always clear. It seems reasonable to think that the quality of strategic actions is determined not only by the internal mobilization capacity of executives, but also by the degree to which they adequately understand systematic interdependencies and other actors’ interests and abilities to resist strategic moves. The issue is not one of objectifying a socially constructed environment or vice versa. It is one of human agents representing the structure and dynamics of a system of interdependent perceivers, interpreters, and enactors adequately enough so that their enacted strategies encounter minimal resistance and generate competitive advantage for their firm. Thus, “better” information processing may be characterized not so much by trade-offs between accurate images and misperceptions, but rather by the ability to enhance plausibility and choose competently between different misperceptions.

CONCLUSION

The external environment is a significant contingency for organizations. Thus it is logical to assume that top executive teams that develop competence at acquiring information and making sense of it will formulate more accurate views of the external environment. It is also logical to expect that because these executive teams will be better positioned to act on the information, that they will reap the benefits and be higher performing. This line of thinking has persisted for decades, in part because there have been so few empirical tests of these ideas. Our goal was to provide a systematic test of these arguments across industry contexts. Our findings indicate that the relationship between scanning, perceptual acuity and performance is more complex than scholars have theorized. Our results, while partly surprising, can be used as a platform to enrich existing theories of executive information search and cognition as they relate to competitive advantage.
TMT Information Search, Perceptual Accuracy, and Firm Performance

REFERENCES


McDonald ML, Westphal JD. 2003. Getting by with the advice of their friends: CEOs' advice networks and firms' strategic responses to poor performance. *Administrative Science Quarterly* 48(1)


TABLE 1
Descriptive Statistics, Cronbach’s α, and Zero-Order Correlations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
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<th>16</th>
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<tbody>
<tr>
<td>1 Comparative growth in profit</td>
<td>0.03</td>
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<td>2 Industry standardized ROS t+2</td>
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<td>3 Industry standardized profit t0</td>
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<td>4 Industry adjusted ROS t0</td>
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<td>5 Environmental instability (archival)</td>
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<td>6 Size (natural log)</td>
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<td>7 Perceptual accuracy: Volatility</td>
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<td>-0.18</td>
<td>-0.33</td>
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<td>8 Perceptual accuracy: Munificence</td>
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* N = 86. Correlations > 0.27 are significant at p < 0.01, > 0.21 significant at p < 0.05, and > 0.18 significant at p < 0.1.
Cronbach’s alpha reliabilities reported in diagonal; Reliabilities for congruence variables refer to perceptual measures.
**TABLE 2**
Regression Analyses for Perceptual Accuracy

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<th>Variable</th>
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<tr>
<td>Environmental volatility (archival)</td>
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<tr>
<td>Intensity of information search</td>
<td>-0.07</td>
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<tr>
<td>Intensity of information search^2</td>
<td>-0.10</td>
</tr>
<tr>
<td>Balance of information targets</td>
<td>0.20</td>
</tr>
<tr>
<td>Personal mode / all modes</td>
<td>-0.19</td>
</tr>
<tr>
<td>Personal mode / all modes ^2</td>
<td>-0.01</td>
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<tr>
<td>Volatility x Intensity of search</td>
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<tr>
<td>Volatility x Balance of targets</td>
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<tr>
<td>Volatility x Mode of acquisition</td>
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</table>

| Model F value                                      | 4.48  | 3.90  | 3.70  |
| R2                                                 | 0.17  | 0.18  | 0.21  |
| adjusted R2                                        | 0.12  | 0.11  | 0.13  |
| Observations                                       | 86    | 86    | 86    |

* p < 0.1   ** p < 0.05   *** p < 0.01; two tailed tests.
All tests with robust standard error estimates
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<tr>
<th>Variable</th>
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<th>ROS (4)</th>
<th>ChPr (5)</th>
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<td>0.16 *</td>
<td>0.31 **</td>
<td>0.02</td>
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<td>0.19 *</td>
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* p < 0.1  ** p < 0.05  *** p < 0.01;  two tailed tests.
All tests with robust standard error estimates
FIGURE 1

Hypothesized Relationships Between Information Acquisition, Accuracy and Performance

Intensity

Balanced Targets

Personal Mode

Perceptual Accuracy

Financial Performance

Environmental Dynamism

Interpretive Orientations

Information acquisition practices

Environmental Assessments

Firm Performance
FIGURE 2
Empirical Relationships Between Information Acquisition, Accuracy and Performance
APPENDIX A
Questionnaire Items for Variables

Reverse coded items are starred: *

**Information Acquisition – Intensity, Target of Information:** On average, to what extent do you spend time learning about trends or events concerning:
- your competitors?
- your customers?
- technology?
- government regulation?
- economic issues?
- political and social issues?
- general industry issues?
*Scale anchored from 1 (not at all) to 7 (to a great extent)*

**Personal mode of information acquisition:** How often do you use each of the following sources to acquire information about the external forces that may affect your firm’s operations?
- Your subordinates
- Sales people/staff
- Your peers
- Business associates
- Customers
- Other TMT members
*scale anchored from 1 (very seldom, if ever) to 7 (at least once a day)*

**Impersonal mode of information acquisition:** How often do you use each of the following sources to acquire information about the external forces that may affect your firm’s operations?
- External information services
- Internal documents (e.g. memos)
- Special organizational studies/reports
- Company management information systems (MIS)
*Scale anchored from 1 (very seldom, if ever) to 7 (at least once a day)*

**Perceived Volatility:** How strongly do you agree or disagree with each of the following statements?
1. Customer demand and preferences are relatively stable in your industry.*
2. Your firm must frequently change the way it produces its goods or services in order to be competitive.
3. The total value of assets for firms in your industry varies a lot from year to year.
4. Capital expenditures within your firm’s principal industry are relatively constant from year to year.*
5. The actions of major suppliers change very little from one year to the next.*
6. The volume of sales for firms in your industry fluctuates very little from year to year.*
7. Your firm frequently changes its technology to keep up with competitors.
*Scale anchored from 1 (very strongly disagree) to 7 (very strongly agree)*

**Perceived Munificence:** How accurate are the following statements?

---

*All items were measured on 7-point Likert-type scales. The items were averaged to create a variable score since there was no theoretical grounding for using weighted averages in the development of the variables.*
(1) Demand for the products/services of your principal industry is growing and will continue to grow...
(2) The investment or marketing opportunities for firms in your principal industry are very favorable at the present time...
(3) The opportunities for firms in your principal industry to expand the scope of their existing products/markets are extremely limited*...
(4) Resources for growth and expansions are easily accessible in your industry...
(5) In your industry, sales have been growing and are likely to grow...
(6) The total value of assets for the firms within your industry are declining and will continue to decline*...
(7) Capital expenditures in your firm's principal industry are growing and will continue to grow.

Scale anchored from 1 (not very accurate) to 7 (very accurate)

Perceived Complexity: How strongly do you agree or disagree with each of the following statements?
(1) Your firm faces a complex external environment.
(2) Your firm’s external environment is difficult to understand.
Scale anchored from 1 (very strongly disagree) to 7 (very strongly agree)

Controllability: How strongly do you agree or disagree with the following statements?
(1) Resources are accessible to resolve most situations
(2) The firm has the competence to address most situations.
(3) Most situations can be controlled.
(4) The firm manages most situations instead of situations managing it.
(5) The situations the firm encounters often place it in jeopardy.*
(6) The firm's responses are constrained largely by other organizations, groups, or individuals.*

Positiveness: How strongly do you agree or disagree with the following statements?
(1) The situations that arise are frequently favorable to the firm.
(2) Most situations are positive for the firm.
(3) The situations the firm encounters present numerous favorable opportunities.
(4) There is a lot to gain from most situations.
(5) Losses and not gains are likely from most situations.*
APPENDIX B

Performance Measures

We used the Standard and Poors' Compustat industry segment database to construct both performance measures. We extracted financial performance data for each of the organizations participating in the survey and also created industry level averages, both for a four-year period starting in the year before the survey was executed.

Annual R.O.S. is simply operating income divided by net sales for a given year. We created industry averages for the primary 4-digit SIC industry in which the firm operated as the unweighted average of all firms in the category. To create the measure of changes in profits, we first calculated consecutive annual percentage changes in operating profits for each organization in the sample as well as annual averages for the primary 4-digit SIC industry in which the firm operated. We computed the averages by identifying all business units that reported performance data for a given industry over two consecutive years and first computed the percentage change for each firm. These yearly firm-level changes were then averaged for each industry represented in the sample. We standardized the firm-level measures by subtracting the industry average change from the firm’s change.

We wanted to reduce undue influence of single-year extreme values in both performance measures. The effect of outliers is particularly hazardous for dependent variables in OLS regression with relatively few observations. In our case, outliers may be due to exceptional events such as major restructuring or acquisitions, inconsistent reporting practices in the Compustat file, and scaling effects of the two ratio variables for which the denominator can be very close to zero.

We used a partial re-imputation approach to achieve this goal. We first identified two types of observation at the firm and industry segment level: those that either showed a highly deviant percentage change in a single year compared to the trend line over four years, and those single year values more than 3 standard deviations from the mean of all observations within that industry and year. As a result, we excluded 15 single-year performance observations of organizations or segments, equivalent to 7% of all observations entering the performance measures. However, because partial data was available in each
case, we re-imputed missing values rather than use listwise deletion and bias our estimates by eliminating observations unnecessarily. We used a stochastic regression approach to estimate these missing performance values for single years (Little and Rubin, 1987) that is, we imputed values for the components of the measures (sales, operating income) by using the predicted value of the full regression model and adding an error term drawn randomly from a normal distribution. Adding the error term avoids biasing the standard error of the regression model (a problem associated with mean and trend imputation) while making full use of available information. The replacement values were then used to re-compute the ratio measures (change, r.o.s.) for the firms with suspicious data.

For the change in profits variable, we finally averaged two year-to-year scores derived in this manner to further reduce possible exceptional effects of any year-to-year comparison. This produces a measure of change in financial performance over the two years following the year the survey data were gathered.

We performed two tests to ensure that the imputation approach did not affect our findings. First, we tested a dummy variable for those observations in our regression model that contained imputed values to check for systematic differences. The dummy code was not statistically significant indicating the expected neutral effect of the imputation procedure on the regression results. Second, we ran the analyses without the observations for which some component of the performance measure was excluded (7 observations for the change measure, 4 for the ROS measure). Coefficient signs were identical to the reported models. P-values were also roughly the same but slightly lower, with the exception of a drop in significance for the volatility interactions in the full model for profit change. We are tempted to attribute this difference to a loss in statistical power with fewer observations.