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The growth of the firm: An attention-based view

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Research summary: Although most theories of growth presume that growth varies with the focus and limits of managerial attention, the actual role played by attention has remained largely implicit. In contrast, this article explicitly considers attention structure and the processes that place sustained focus on growth issues. We explain how attention structure—specialized attention within a particular unit and integrated attention between units—affects both bottom-up (stimulus-driven) and top-down (schema-driven) attentional processing of new issues. We also examine the relationship between attention structure and divisional interdependencies, identifying conditions under which different attentional patterns generate organizational tensions that lead to architectural elaboration: the delineation of new organizational units. This logic is illustrated with examples from Motorola, a large telecommunications equipment provider, during a period of sustained growth. In linking theories of growth with the attention-based view (ABV), we augment both perspectives and offer an approach that provides a better understand growth's cognitive underpinnings.

Managerial summary: We examine how, within a multidivisional firm, the pattern of organizational attention affects firm growth. We highlight the attention focus within and between divisions and the corporate office and specific processes that shape the intensity and direction of attention in the firm's constituent units. In particular, we examine how corporate interventions, appointment of managerial resources, prototyping, and corporate charters direct managerial attention and the identification and advancement new opportunities in support of growth. Our approach also considers how attention patterns and formal organizational structure interact to cause tensions between managers, and when these tensions lead to the delineation of new subunits. To illustrate our logic, we use examples drawn from Motorola, a large telecommunications equipment provider, during a period of sustained growth. Our approach offers managers insights into attentional design of the multi-divisional firm.

KEYWORDS

attention, growth, organizational conflict, organizational design, structure

1 | INTRODUCTION

Firm growth is a central concern of strategy. Research on the management processes underlying firm growth has attracted considerable interest (e.g., Foss, 2002; Kor & Mahoney, 2000; Nason & Wiklund, forthcoming) and has renewed the focus on Penrose's (1959) central logic: that excess managerial capacity drives purposive strategic action aimed at increasing growth (Rugman & Verbeke, 2004; Tan & Mahoney, 2005). This dynamic vision of the firm—a perspective that implicitly assumes managers *qua* managers collectively apply excess resources to a given set of opportunities (Foss, 1998)—stands in contrast to behavioral theories, which place cognitive limits on managers (Simon, 1947) and observe that strategic action depends on the allocation of attention to problems and opportunities among different interests (Cyert & March, 1963).

Prior research has overlooked the effect of attentional processes on growth. Yet, according to the attention-based view (ABV), the context in which cognition and action are situated determines what aspects of the environment managers attend to and which opportunities are retained within the firm (Ocasio, 1997; Ocasio & Joseph, 2005). Attention-based perspectives recognize that attention within a complex organization is not always uniform and that members often have both imperfect and divergent understandings of environmental signals (Rerup, 2009; Weick & Sutcliffe, 2006). So even though excess capacity may help firms pursue a growth agenda, attention allocation may help explain variation in the opportunities actually pursued (Salvato, 2009). As Pitelis (2007, p. 487) noted, our understanding of firm growth would benefit from integrating the views of Penrose and those of the Behavioral Theory of the Firm (BTF). A modern extension of the BTF, the ABV is a useful lens through which to examine that possibility.

This article accordingly develops an attention-based view of firm growth. We follow Ocasio (1997) in defining attention as the noticing, encoding, interpreting, and focusing of time and effort by organizational decision makers on both problems and solutions (more generally, on "issues"). Together, these issues constitute the firm's agenda, which guides subsequent patterns of firm activities (Mintzberg, 1979). We explain how *attention structure*—that is, specialized attention within a particular unit and integrated attention between units—affects both the bottom-up (stimulus-driven) and top-down (schema-driven) attentional processing of new issues. In addition, we explore how attention structure is related to formal structure. Doing so enables us to outline how growth follows from the organizational tensions generated by the overlap in attention patterns amid interdependencies between divisions.

We consider a variety of growth outcomes, but focus mainly on a particular expression of organic growth: the delineation of new organizational subunits, or *architectural elaboration*.

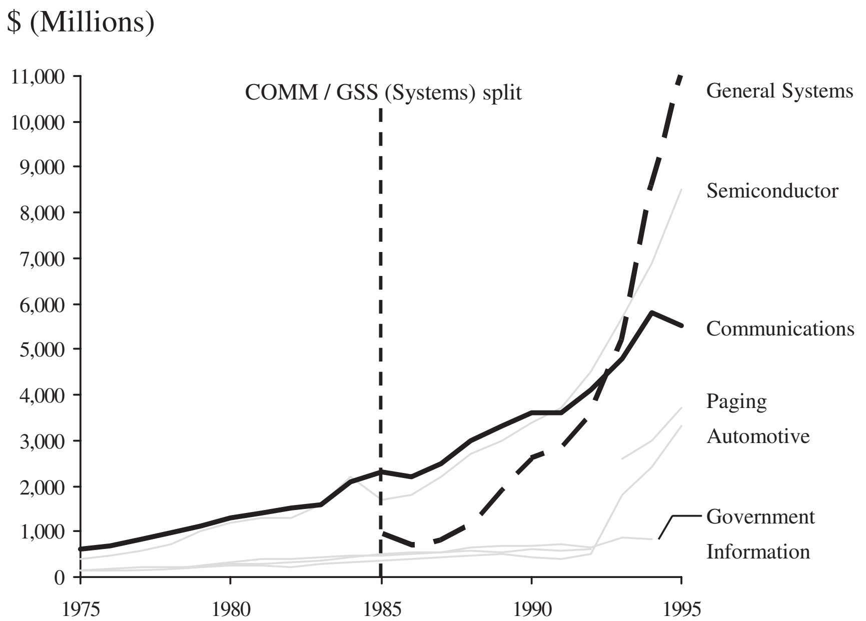

FIGURE 1 Sales by sector in Motorola, 1975–1995. Source: Motorola Annual Reports

Subunits or "administrative structures" (Penrose, 1959/1995) are essentially a bundle of assets, routines, human capital, and communication channels formalized via corporate charter (Galunic & Eisenhardt, 2001) and intended to expand or develop new technologies, products, and geographic markets. Not all new subunit bundles constitute growth; our interest is in those that do.[1] We focus, in particular, on organic (rather than acquisition-led) growth and abstract from the dynamics of inertia and decline, which have been explored elsewhere (e.g., Whetten, 1980).

To help illustrate our theory, we make use of examples drawn from Motorola, a large manufacturer of telecommunications equipment, during a period of sustained growth. The examples are intended not to build or test theory, but rather to illustrate, in real-life terms, the conjectured relationships: that of the attention structure and processes at a growing firm. In the 1970s, Motorola began a two-decade expansion geared to an array of new technologies—most notably, those related to cellular communications. Sales of the firm grew from $1.4 billion in 1974 to $27 billion in 1995, and the number of its U.S. employees grew from 51,000 to 142,000; over the same period, the firm expanded from 5 to 105 units. Figures 1–3 plot (respectively) the company's sales, employees, and units—by sector—over these two decades.

This article's goal is to augment our understanding of theories of growth and attention. First, we integrate the attention-based view with theories of growth to help articulate the theoretical mechanisms underlying the phenomenon of firm growth. Penrose argued that the pursuit of new opportunities is not a choice among given alternatives, but rather a function of the way managers interpret their environment (Foss, 1998). For Penrose, the environment is "an 'image' in the entrepreneur's mind of the possibilities and restrictions with which he is confronted" (1959, p. 5). That perspective has lead Penrosian scholars to view growth as a top-down process driven by top management beliefs

[1]Davidsson, Delmar, and Wiklund (2006) argued that a better understanding of the growth process requires that one identify when and how firms delineate a new and distinct business activity or related set of activities (e.g., a particular technology, product, product line, or geographic area). Thus, architectural elaboration—our primary focus—reflects new resource delineations or bundles that may include the *formation*, *deletion*, *merger*, *acquisition*, and/or *splitting up* of existing subunits.

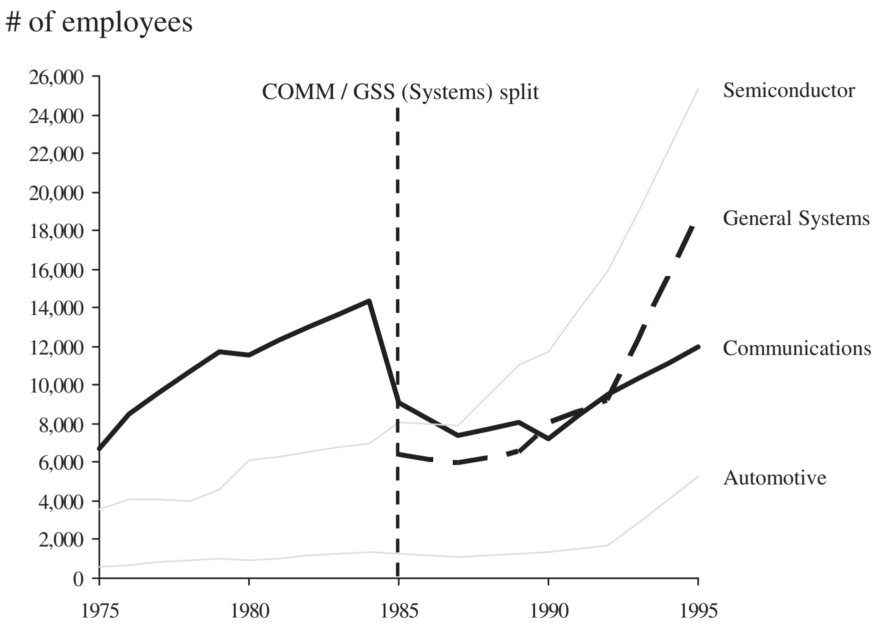

FIGURE 2 U.S. employees by sector in Motorola, 1975–1995. Source: Motorola Corporate Directories 1974–1996. Data interpolated for missing years (75, 77, 81–83, 86, 88, 91, 93–95). Precise data unavailable for paging, government, and information sectors

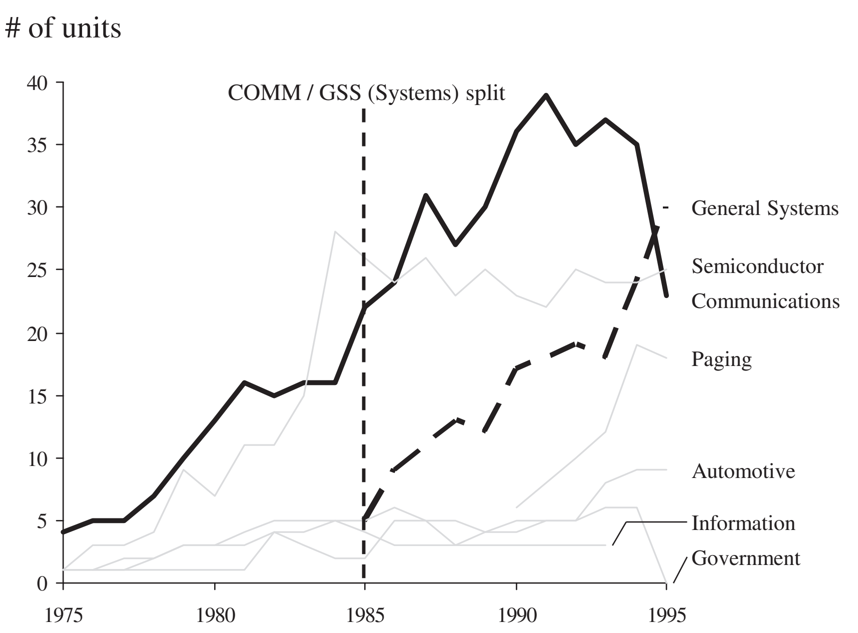

FIGURE 3 Total number of units by sector in Motorola, 1975–1995. Source: Motorola Archives

about the opportunities for growth along market and product dimensions (e.g., Foss, Klein, Kor, & Mahoney, 2008; Kor, Mahoney, & Michael, 2007; Mishina, Pollock, & Porac, 2004). Yet, in emphasizing collective managerial experience, prior research on growth offers a limited explanation of how firms identify and pursue new paths of expansion. An attention lens provides logic for both a top-down and a bottom-up processing of opportunities (Ocasio, 2011), and in doing so, offers a more complete expression of how firms notice, encode, and focus on new opportunities that may not conform to existing beliefs. Because the attention structure can lead to organizational tensions, we also accommodate the possibility of intra-organizational conflict affecting how firms respond to growth opportunities. As Pitelis (2007, p. 483) noted, intra-organizational conflict is notably absent from Penrose's theory—a lacuna given the coordination needed for growth. Organizational tensions provide a rationale beyond efficiency-based explanations for understanding when organizations grow with attention to new issues over time.

Second, we extend prior work by Ocasio and colleagues. Prior ABV studies have examined the effect of attention structures on decision making (e.g., Bouquet & Birkinshaw, 2011; Joseph & Ocasio, 2012; Maula, Keil, & Zahra, 2013; Ocasio & Joseph, 2005; Salvato, 2009; Tuggle, Sirmon, Reutzel, & Bierman, 2010) as well as the top-down and/or bottom-up attentional processing in support of firm behavior (e.g., Kaplan & Tripsas, 2008; Nadkarni & Narayanan, 2007; Rerup, 2009; Shepherd, McMullen, & Jennings, 2007; Shepherd, McMullen, & Ocasio, 2017; Zbaracki & Bergen, 2015). However, these two research streams have largely proceeded along separate lines. This article brings them together and examines how attention specialization and integration affect top-down and bottom-up attentional processing, thereby giving us an improved understanding of how firms break away from established patterns of attention to focus on new issues. Because we also consider the moderating influence of formal structure (i.e., divisional interdependencies) on the relationship between attention patterns and growth, our approach reflects the potential for organizational tensions to arise and to create pressures that further differentiate attention patterns within the firm. Thus, we establish organizational tensions as both a consequence and cause of the structural distribution of attention. In this way, we augment the extant ABV literature, which largely presupposes the structural distribution of attention (e.g., Barnett, 2008; Joseph & Ocasio, 2012; Vuori & Huy, 2015) and overlooks the role played by organizational tensions in the relationship between attention focus and response to issues.

2 | GROWTH OF THE MULTIDIVISIONAL FIRM

Penrose's (1959/1995) *Theory of the Growth of the Firm* has drawn attention from scholars in a variety of fields, and it is widely viewed as part of the intellectual foundation of strategic management (Coad, 2009). The cornerstone of Penrose's theory is the idea that growth is a logical outgrowth of two key mechanisms: managerial information-processing capacity and managers' perceptions of new uses for excess resources (Foss, 2002; Kor & Mahoney, 2000; Mahoney, 1995). First, Penrose posited that an expanded information-processing capacity frees resources and enables their application to new areas. Her theory suggests that the firm's information-processing capacity increases as individuals learn more about (a) the particular usefulness of firm resources and (b) the processes via which productive activity can be coordinated with other firm members. As the capacity of managers to conduct these activities increases, there is pressure to expand and make use of those free resources.

Second, Penrose treated the internal and external environment as an "image" in the decision maker's mind (1959/1995, p. 42). It follows that resources can be applied to a productive opportunity only when managers recognize it as such (Kor et al., 2007); that is, opportunities do not arise simply as a function of the environment's objective state (Foss, 1998). This perspective has been adopted by strategy scholars who argue that a firm's particular use of excess managerial capacity reflects the centrality—in managers' cognitive representations—of different opportunities for growth (Foss et al., 2008; Foss & Ishikawa, 2007). For example, Mishina et al. (2004) found that variation in beliefs about which expansion paths are feasible for a firm affects its short-term growth in revenue.

Although these mechanisms are crucial for Penrosean growth, they do not account for the situated nature of attention in complex organizations. Despite its focus on large firms, her theory does not directly consider consequences associated with the variation that exists—within a multi-divisional firm—in the allocation of attention (Bouquet & Birkinshaw, 2008). From an ABV perspective, more important than information-processing capacity are the issues that decision makers perceive to be critical and on which their attention is focused at a particular time and place. Within a multi-divisional firm, the distribution of attention is not uniform and the relevance of particular elements in the external environment varies according to the structural position of decision makers. The corporate hierarchy segments the attention of decision makers, and it shapes the problems identified and the solutions considered (Gaba & Joseph, 2013).

Another distinction of the ABV is that it presumes neither the influence of ubiquitous beliefs nor that the parameters for directing attention and decisions are widely shared. According to the ABV, the processing of issues is both top-down and bottom-up (Nigam & Ocasio, 2010; Ocasio, 2011). Top-down processing reflects schema-based attentional processes whereby the cognitive representations of managers induce the actions of organizational members and influence where those members should invest time and resources (Dutton & Jackson, 1987). Here, the emphasis is on managerial cognitive representations and not on any particular focus of top managers, though the two are closely associated. Bottom-up processing emphasizes stimulus over structure: Managers focus their attention on particular environmental signals and allow those signals to guide their actions. The key aspect of bottom-up processing is that attention is emergent—guided more by local demands of the situation than by universal beliefs (Shepherd et al., 2007).

3 | ATTENTION STRUCTURE AND ATTENTIONAL PROCESSING

Explicating the relationship between attention and growth requires that we understand how the organization directs and sustains attention to new issues, and away from routine patterns of attention, across the organization and across time, what is referred to as attentional engagement (Ocasio, 2011). For this purpose, we consider the relationship between attention structure and the top-down and bottom-up processes of allocating cognitive resources to new technology-related issues (Ocasio, 2011). Attention to such issues may be especially important for growth because it may result in the expansion into new technological or product market areas—what Penrose (1959/1995, p. 33) referred to as "enterprise."

Drawing from prior work on the ABV, we consider two critical aspects of attentional structure: the specialization and the integration of attention (Crilly & Sloan, 2014; Joseph & Ocasio, 2012). The *specialization of attention* is defined as the selective focusing of attention on new issues within a unit; the *integration of attention* is defined as the coupling of—or joint attention given to—the same issues by different units. Vertical coupling is the shared attention to issues between headquarters and the firm's constituent units, while horizontal coupling is the shared attention to issues between divisions or functions. The firm's attention structure is likely to echo its formal structure, although not precisely because there may be attentional overlap even in the absence of direct contact between units. We shall consider both bottom-up and top-down attentional processing.[2] We then consider the conditioning impact of the formal structure—the interdependencies that exist between divisions (Thompson, 1967)—on the relationship between attention patterns and growth.

3.1 | Motorola and cellular systems

So that we can better illustrate the relationship between a firm's growth and its attentional structure and processes, we offer examples from a case study of Motorola's Communications Sector (COMM) during the early period of that firm's cellular systems development. These examples—which accord with the logic that we present—are drawn from interviews, public sources, and historical documents from a 20-year span of the firm's corporate archives including Petrakis's comprehensive history of the firm (Petrakis, 2003).

The concept of cellular telephony was conceived at AT&T just after World War II. In 1968, AT&T proposed the cellular system design to the FCC and petitioned the commission for 75 MHz of spectrum—in the 800–900-MHz range—to replace its existing car telephone service, the Improved Mobile Telephone Service (IMTS). The proposal languished at the FCC for years, but in 1977, AT&T was granted an FCC license for a trial cellular system in the Chicago area. Motorola's COMM countered AT&T's move to develop a cellular system by securing a license to build a trial system in the Washington D.C.–Baltimore area.

At the time, COMM's primary focus was two-way radio telephony equipment for fleet management (e.g., taxis) and early responders (e.g., police). In 1975, COMM sales were $562 million and earnings exceeded $91 million. The COMM sector was divided functionally into three major divisions: Radio Products (product engineering), C&E (distribution), and Systems. The Systems division, which was charged with developing the cellular plan, manufactured components and custom equipment for the existing mobile telephone service (AT&T's IMTS) and for the sector's two-way radio products. By 1985—the year in which the firm's General Systems Sector (GSS), which housed cellular, was separated from COMM—sales and earnings had reached $2.3 billion and $243 million, respectively.

3.2 | Attention specialization and bottom-up processing

Attentional specialization focuses the attention of organizational actors on discrete segments of the information environment. Although this selectivity filters out peripheral environmental stimuli (Levinthal & March, 1993), it also increases the intensity (Li, Maggitti, Smith, Tesluk, & Katila, 2013) and "mindfulness" with which focal issues are processed (Levinthal & Rerup, 2006; Weick & Sutcliffe, 2006). Greater attentional intensity may be especially useful for integrating extant knowledge when novel situations are encountered—and also for figuring out how novel information can be applied within a familiar situation. For example, Dahlander, O'Mahony, and Gann (2014) found that an external search for information is conducive to innovation only when paired with intensive allocation of attention to those information sources. Volumes of external information requires a significant investment of time (i.e., attention) in order to understand how the information fits within the focal firm's particular context (Piezunka & Dahlander, 2015). Thus, attentional intensity makes it more likely that managers will identify and utilize information that might otherwise be filtered out because it is not in line with prior experience (Shepherd et al., 2017).

[2]Prior work has considered these processes as distinct (e.g., Levinthal & Rerup, 2006; Shepherd et al., 2017) or as two ends of a spectrum (Weick & Sutcliffe, 2006). We view the two processing types as related, but our primary concern is the relationship of each to attention structure and the role of each in firm growth.

As result, greater intensity in attention improves an organization's sensitivity to relevant but subtle cues in the organizations' internal and external environment (Levinthal & Rerup, 2006). Specialization increases sensitivity to environmental trends, patterns, and variation while making it more likely that managers will utilize that information for developing new knowledge and products (Li et al., 2013; Salvato, 2009). For example, specialized attention within COMM's Systems division yielded insights into technological changes in the environment that the industry's service providers had failed to recognize. Systems managers were especially mindful of the convergence of trends with component technologies, which highlighted the idea that portability could be applied to a mobile (car) cellular system. They recognized that the combination of increasingly smaller components, greater processing power and multiple low-power receiver/transmitter sites (cells), made it possible to develop smaller, low-power devices with longer battery life. As stated in the firm's Radio telephone system patent, the technology could solve a number of key problems of the existing radio telephone service including poor utilization of spectrum and interference between units caused by the high power of the units (U.S. Patent No. 3906166A)—and provide for practical, portable cellular handsets. As one engineer noted, "I don't think a lot of other people outside of a few radio companies understood that convergence. I mean they were still talking about car phones at AT&T" (Motorola Oral History).

Because under such conditions, decision makers are more capable of combining novel or discrepant information with held knowledge, specialized attention may yield a stream of new issues. In other words, intensive and stable attention to new issues usually spawns additional issues—what Langley, Mintzberg, Pitcher, Posada, and Saint-Macary (1995) termed an "issue stream"—within which attention to issues (or problems) can lead to solutions, to new issues, and/or to previously unrecognized combinations of issues (Feldman, 2000). Efforts such as research and development are rarely linear (Daft, 1983), so problems in new areas often lead to novel questions, to the discovery of new causal patterns, or to rethinking prior solutions (March, 2006). Under such conditions, attention to new issues is likely to be both self-reinforcing and cumulative; that dynamic drives the proliferation of problems and solutions into a new cognitive space. For example, focus on portable handsets created a number of important new issues—most notably, the need to develop cellular switching technology.

Cellular switches, or electronic mobile exchanges (EMX), were large computers that connected cellular stations to the public telephone network (landlines); these exchanges were among the most complex and critical elements of the entire cellular system. Switch manufacturers (e.g., AT&T) would not sell to Motorola because it was viewed as a potential competitor. In response, an EMX manufacturing operation was created and was tasked with the problem of designing state-of-the-art switches. The specific problem, as stated in their patent for the technology, was that a more complex switching network was required that could handle a large number of remotely located base stations and a large number of both vehicular and portable radiotelephones (U.S. Patent No. 4268722A). The switch was developed, and in turn, spawned a variety of new problems during the field trial, which included system failures during peak usage hours and interference during the coverage area exit, which caused dropped calls during handoff between cells (U.S. Patent No. 4811380A).

A stream of emergent issues will ultimately result in problem-solving behavior that is more efficient, formalized, and routinized, an evolution that reduces the attentional load on managers (Castellaneta & Zollo, 2014; Rerup & Feldman, 2011). These routines eventually occupy a favored position in the cognitive maps of decision makers (Barr, 1998; Cyert & March, 1963; Weick, 1995) and so become part of the repertoire of solutions that are considered in later decision making. The beneficial consequences are (a) an improved ability to recombine those routines with resources to deal with new or unexpected problems, and (b) an increased capacity to process additional stimuli

(Davis, Eisenhardt, & Bingham, 2009). There is, of course, a limit—the maximum attentional load—to the number of issues an organization can consider simultaneously without compromising its performance; yet until that limit is reached, increasing attentional efficiency will expand the organization's capacity to process additional new issues.

3.3 | Attentional specialization and top-down processing

The increase in the quality of attention that accompanies greater attentional specialization, in turn, allows managers to go beyond the superficial aspects of incoming stimuli, and thereby, identify more meaningful patterns of relations between new issues and the schematically organized clusters of issue characteristics stored in memory (Grégoire, Barr, & Shepherd, 2010). This process invites comparisons between the presenting issue and existing schemas (Weick & Sutcliffe, 2006), increasing the salience of some aspects of held schemas while weakening the influence of other aspects (Marcel, Barr, & Duhaime, 2011). Hence, specialized attention makes it possible to move away from default framing or established patterns of thinking and to see issues in a new light. Indeed, prior research shows that attention influences the development of strategic knowledge structures and also influences later strategic interpretations (Kabanoff & Brown, 2008; Surroca, Prior, & Tribó Giné, 2014). This process may be especially important for processing new issues, which—because they often do not conform to clear-cut categories—are typically subject to interpretation.

For example, because specialization allows the firm to encode issues at the structural level (Grégoire et al., 2010), it may reduce the tendency of managers to automatically categorize ambiguous issues as threats (i.e., reduce threat bias). When their attention is specialized, managers are more likely to discover and utilize information contradictory to a default framing (Fiol & O'Connor, 2003; Weick & Quinn, 1999), to diagnose issues in a positive light, and to identify a course of action that resolves problems effectively (Thomas & McDaniel, 1990). Ceteris paribus, managers engaged in specialized attention are more likely to interpret issues as opportunities (Jackson & Dutton, 1988).

At COMM, Systems managers held a positive view of cellular because it was interpreted it as the natural evolution of IMTS, and thus, as a worldwide opportunity since (unlike AT&T) they had sold IMTS equipment outside the United States. As one division VP stated, "So we picked Washington-Baltimore, which was a more strategically international market location for us. I think it really reflected the difference between our two companies. AT&T viewed it at the time to be pretty much a top 35 market opportunity. We viewed it as a world market opportunity" (Motorola Oral History). The group first recognized the real potential for successfully launching cellular with the development of its prototype handset, the Dyna-TAC. This prototype directed attention within Motorola to the commercial potential of portable cellular communication. The Dyna-TAC embodied cellular as a portable opportunity, and in particular, made the idea of "portability"—as a workable solution—more available for attentional processing by managers inside the firm. Jim Caile, a Systems manager and one of the architects of the cellular plan, remarked: "What convinced me of the value of cellular was that I was walking across from the COMM sector building to the [corporate] tower with a demonstration unit in hand. The phone rang as I'm walking across and they said, 'Come on back; the meeting's been cancelled.' And that's when the light bulb went on about the utility of this. That you could hold it in your hand—it wasn't tied to the car" (Motorola Oral History).

Specialization affects subsequent interpretation because, once an issue has been categorized, incoming information is viewed in a manner that conforms with categorical interpretation (Nisbett & Ross, 1980), which reinforces the initial categorization (Dutton & Jackson, 1987).

Managers are more likely to initiate actions and channel resources that are considered risky when they view circumstances as presenting opportunities (Thomas, Clark, & Gioia, 1993). When new information is perceived as an opportunity, and not as a threat, the firm is more likely to instigate a relatively open pursuit of new technologies and markets (Nutt, 1984; Sharma, 2000); thus, such perceptions are conducive to firm growth.

3.4 | Attentional integration and bottom-up processing

Tight and loose coupling between the corporate office and divisional managers creates distinctions based on how central (or peripheral) each issue is to the firm's attentional field. Tight *vertical* coupling may reinforce the unit's preoccupation with new issues (Salvato, 2009) and amplify attention patterns because such coupling reflects interactions, shared dialogue, and information exchange with company executives concerning environmental stimuli (Ocasio, Laamanen, & Vaara, 2017; Tuggle, Schnatterly, & Johnson, 2010).[3] Hence, interactions that reflect tight coupling stabilize the attention paid to environmental stimuli within the unit and help new issues retain their prominence on both corporate and divisional agendas (Ocasio & Joseph, 2005).

Tight *horizontal* coupling, or a common attention focus among divisions, may similarly stabilize and amplify attention to new issues and also aid in the securing of resources. Martin and Eisenhardt (2010) found that, when business unit executives see that they are focused on the same issues (e.g., technologies) as other units, they initiate collaboration with those units in order to develop the technology. Even if a common focus of attention does not lead to collaboration, it may lead a unit manager to seek out the information and resources that other units can provide by way of assistance. Since large corporations are dynamic social communities (Galunic & Eisenhardt, 2001), peer units are at least nominally obliged to assist.

At Motorola, attentional integration between the corporate office and divisional managers was critical for amplifying the specialized attention patterns of Systems managers. Frequent interactions between the CEO, COO, and Systems engineers kept planning efforts for the cellular system focused on a solution that used many small cells, each with limited coverage. Small cells meant low power, which meant the cellular system's technical specifications would amount to more than a mere extension of IMTS. However, these direct interventions in the cellular design also ensured that COMM's radio technology would ultimately be more powerful, have more coverage, and be much cheaper than cellular. In this way, the problems that two-way versus cellular could address (e.g., fleet communications vs. private calls, short vs. long conversations) remained distinct. Thus, joint attention to the problem served to protect the core business, and kept the cellular solution on the agenda, but only in a form that would not compete directly with two-way radio systems, at least initially.

Interactions between executives and managers (or between managers) are also occasions to gain access to knowledge and excess resources that would otherwise be difficult to obtain (Ambos & Birkinshaw, 2010). Management research portrays corporate attention as "a gateway to the best practices, technologies, people, and career opportunities available in the corporate world, many of which are in limited supply" (Bouquet & Birkinshaw, 2008, p. 579). Such access is critical because pursuing new issues often requires particular corporate capabilities or managerial resources (Bartlett & Ghoshal, 1990; Doz, Santos, & Williamson, 2001). For example, headquarters often transfers

[3]Tight vertical coupling may reflect either corporate or divisional interests, and it may arise owing either to the unit's strategic importance or to deviations in performance (Bouquet & Birkinshaw, 2008; Gaba & Joseph, 2013). Such coupling is generally an indication of support for the business unit.

experienced managers—the "excess resources" of, say, a new unit head or subject matter expert—to units facing new environmental stimuli. Executive movement from one unit to another supports entry into new segments by amplifying and extending attentional focus and knowledge sharing between units that have different customers, make different products, and employ different processes and technologies (Williams & Mitchell, 2004).

For example, the Motorola corporate office indirectly amplified the attention given to the switching problem by providing experienced managers to the cellular group. Of particular note was the transfer of Ed Staiano from Motorola's Wireless Data Communications group to Systems division with an explicit mandate to fix the problems with Motorola's switches and to develop software that would allow the firm to build out its switching operation. Under Staiano, the division recruited heavily to draw engineering resources from COMM and software expertise from Bell Labs. The movement of software experts into Systems amplified the attention being given to the cellular issue and allowed that division to address the switching problems much more rapidly than it could have via strictly internal development.

3.5 | Attentional integration and top-down processing

Among divisions, similar attention patterns may not only yield the exchange of information and resources, but also induce political behavior. The reason is that common attention patterns are not enough to guarantee that an issue's initial framing will be similar among different individuals. In other words, managers may focus on similar problems and solutions, yet interpret them differently. In one study, Leonardelli, Pickett, Joseph, & Hess (2011) offered a detailed account of attention to a common problem that is variously interpreted and of the conflict that naturally follows. Although conflicting frames are sometimes resolved, more often they are maintained in the presence of different interests. When managers interpret a given technology in different ways, they engage in "framing contests" or other rhetorical strategies to make their respective views resonate within the firm and to mobilize action in their favor (Kaplan, 2008; Ocasio et al., 2017).

For example, Motorola's Systems division viewed cellular as a major portable opportunity even as its COMM sector—whose core business was private two-way (dispatch) radio equipment—viewed cellular as a threat. This is why COMM had objected to AT&T's initial proposal, whose cellular approach could limit the two-way radio market and give AT&T a monopoly on future growth. At the same time, COMM increasingly viewed efforts by its Systems division to carve out a segment of the cellular market as problematic as it became apparent they could compete. As one engineer noted, "Nobody in COMM Sector liked cellular because it was viewed as a competitive threat to the land mobile [COMM] business" (Motorola Oral History).

Given tight vertical coupling between headquarters and each of the firm's constituent divisions, the former is much more likely than the latter to recognize and hold dual or even conflicting perspectives of new issues (Gilbert, 2005); hence, the corporate office is well suited to adjudicate interpretive differences between divisional managers. Paradoxical frames may be held by top managers, who are tasked with recognizing distinctions between divisional frames and remaining focused on possible synergies between them at the organizational level (Smith & Tushman, 2005). In this case, those at Motorola headquarters shared the Systems division's view of cellular as an opportunity *and* the COMM sector's view of cellular as a threat. Yet, they also recognized that cellular could benefit the firm and so were willing to invest $150 million in its development. As one Systems engineer stated, "They [senior management] were following their business instincts and business sense that said this could be very big. They all sensed it was important for the company. And important for us to be an important part of a growing industry" (Motorola Oral History).

3.6 | Organizational tensions and the contingent benefits of attention structure

Specialization and integration together facilitate taking action on issues, but this combination may be beneficial only under certain conditions. Missing from prior accounts that examine the impact of attention structure on decision maker's attention to new issues (e.g., Joseph & Ocasio, 2012) is the conditioning role of interdependencies in routines and resources (Thompson, 1967). Routine interdependencies arise when unit activities are linked to other units, and there are resource interdependencies when the resources allocated to one unit depend on those allocated to another.[4] We suggest that integrating attention in the context of routine and resource interdependencies may result in two types of organizational tensions, or forms of "attentional incoherence" (Rerup, 2009): *coordinative tensions*, which reflect intra-firm conflict over units' routines and activities meant to support growth initiatives; and *cooperative tensions*, which amount to intra-firm conflicts over resources and control.

In the case of Motorola, *coordinative* tensions grew from disagreements concerning how the cellular group should be organized and whether or not cellular systems should be sold through COMM's existing sales force (C&E). Division manager Staiano felt his initiatives were constrained by COMM's functional structure and its demand that cellular be sold and distributed through C&E; he did not believe C&E had the requisite knowledge, and therefore, proposed that distribution be handled by third-party dealers. Staiano also felt COMM's functional organization would be a drag on the cost structures, product timelines, and fast decision making that he believed the new business would need, and he sought to create new profit and loss responsibilities for both subscriber products and systems infrastructure.

At the same time, *cooperative* tensions arose because the two-way radio business and Systems found themselves in competition for the COMM sector's resources. Systems sought to reinvest resources in its focal cellular product, but many in COMM wanted to recoup the millions of dollars already invested in developing that technology. Two-way radio products, having delayed investment in some of its own technologies, now sought to channel cellular profits back into those development efforts. The units also found themselves in competition for customers. Managers estimated that about 20% of System's customers overlapped with COMM's customers, a percentage that was expected to rise as the cost of cellular declined.

In the presence of interdependencies, attention to similar problems *or* attention to solutions may create constructive organizational tensions. For example, when interdependent divisions address similar problems (e.g., fleet communications) but focus on different solutions (two-way radio vs. cellular), cooperative and coordinative tensions may arise as the divisions debate how resources should be allocated, who should be authorized to make particular decisions, or how to approach various activities along the value chain. And when interdependent divisions focus on similar solutions (cellular technology) while addressing different problems (cost savings for fleet managers vs. revenue generation for telecom operators), they are likely to experience constructive organizational tensions. Under these conditions, intra-organizational conflict may lead to distinctive interpretations and internal competition, which in turn, may result in creative tension, and thus, be a source of new knowledge and productivity advantages (Birkinshaw & Lingblad, 2005).

[4]Our notions of routine and resource interdependencies are similar to (respectively) the reciprocal and pooled interdependence of Thompson (1967). However, routine interdependencies include instances where the outputs of one unit become inputs of another and where activities (e.g., finance, marketing, other support activities) are shared. Resource interdependencies do not involve contributions to the whole so much as control over resource allocation—for instance, when one unit is subordinate to another or when a superordinate unit controls the resources of two subunits. We thank Dan Levinthal for pointing out this connection.

However, when divisional focus reflects similar problems *and* similar solutions, and divisional interdependencies exist, organizational tensions may cause antagonistic and destructive conflict. Complete overlap reduces the degrees of freedom in decision making and often puts incentives at risk. In an extension of previous work on architectural innovation in dynamic environments (Birkinshaw, 2001; Galunic & Eisenhardt, 2001; Siggelkow, 2002), Birkinshaw and Lingblad (2005) argued that high levels of internal conflict may be detrimental to organizational performance, especially when the environment is highly uncertain. Such conflict is destructive when it disrupts learning or the efficiency of information processing in the short term, in which case clashing managers will not be keen to share knowledge or human resources. For example, tensions between COMM and Systems factions grew to the point where COMM shut down its job board to prevent its engineers from moving to the cellular group—despite the latter's desperate need for them.

These organizational tensions may also end up increasing growth by pressuring the corporate office to delineate a new unit, and thereby, establish intra-organizational competitive dynamics. This architectural elaboration may involve separating a current unit into multiple units, consolidating units, or (less often) creating an entirely new unit. In Motorola's case, headquarters agreed to split Systems from COMM; thus, a new General Systems Sector was formed in 1985. The resulting architectural elaboration of the firm also involved splitting General Systems Sector into a Cellular Subscriber division (handsets) and a Cellular Infrastructure division (responsible for bases, switches, and system installation)—each with its own sales, manufacturing, and engineering groups. The organizational structures of the technological units contained in COMM and GSS (before and after the split) are illustrated in Figure 4.

Such intra-organizational competition may spur a broad range of activities that encourages growth. Subunits may engage in social comparisons that play up their own strengths (and discount

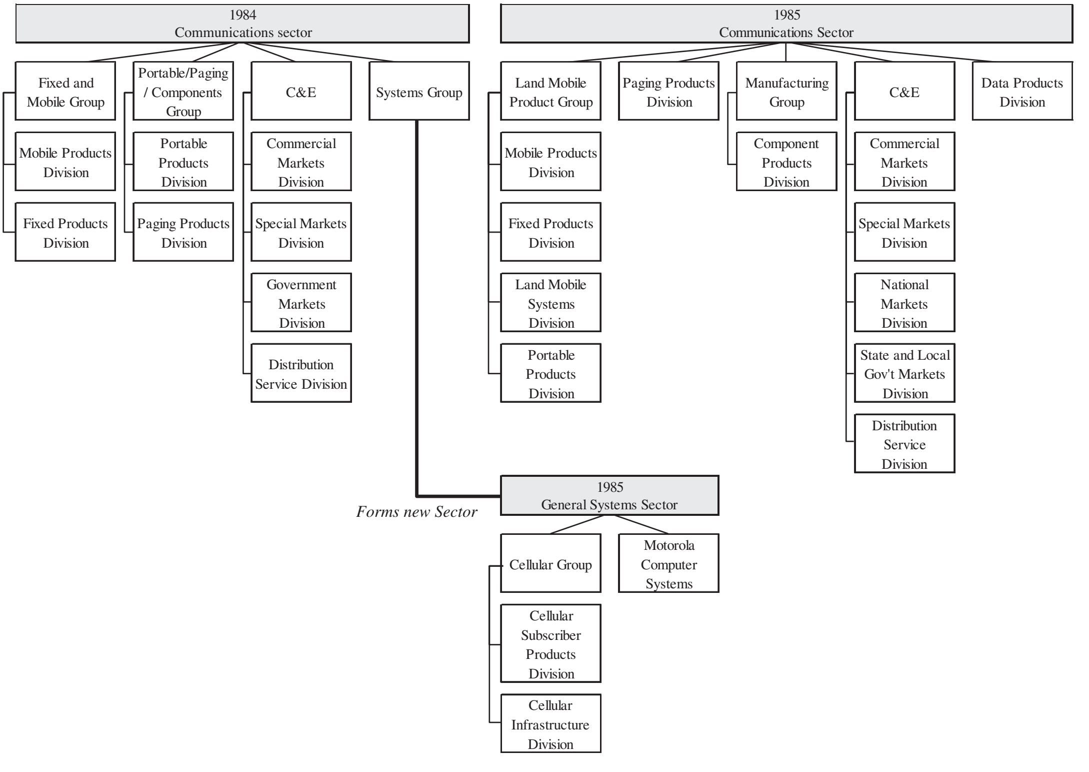

FIGURE 4 Simplified organizational structure before and after COMM-GSS split. Source: Motorola Archives

their weaknesses) vis-à-vis other subunits (Hu, He, Blettner, & Bettis, 2017; Jordan & Audia, 2012; Kacperczyk, Beckman, & Moliterno, 2015). Intra-organizational competition may also encourage subunits to develop new resources further, to reduce the "time to market" for new products, and to increase their coverage overall (Birkinshaw & Lingblad, 2005). In this way, the structural differentiation of attention (with respect to technologies or customers) may prepare the ground for constructive tensions and independent pursuit of own problems and solutions.

Accordingly, the overall effect of separating Systems from COMM was to transform *destructive intra-organizational conflict* into *constructive intra-organizational competition*, which fueled the pursuit of new issues and the subsequent creation of additional resources. For example, Systems was forced to develop its own sales and distribution network, which sometimes competed with COMM for the same customers. The COMM sector could now devote more attention to previously underemphasized technologies, a shift that led them to compete more directly with the Systems cellular product. Thus, it was not until the advent of cellular that COMM began emphasizing the ability of its two-way radio systems to connect with the public phone system. In addition, COMM wanted to focus on development of its own two-way trunking technology, which made more efficient use of the additional spectrum granted in 1974. The resulting structural distribution of attention also allowed each unit to focus on its own stream of subsequent new issues.

3.7 | Issues not pursued

Attention to new issues helps direct firms to new avenues of growth, but this does not prevent firms from foreclosing on alternative (and perhaps, more profitable) growth opportunities. In some cases, "missed opportunities" reflected the organization's attentional engagement with the focal issue (i.e., an inability to shift attention to alternatives), rather than an explicit effort to discount alternatives. In other words, the specialized attention given to a particular issue necessarily limits the level of intensive and sustained attention available for other issues—even when there are no explicit trade-offs between them. As a COMM vice-president said of the sector's computer efforts: "Cellular strategy came at expense of Data products. Although, I wouldn't say we've sat there and very consciously made one trade-off versus another" (Motorola Oral History). We remark that Data products was established as a distinct unit within COMM after cellular was split off.

In other cases, alternatives were not pursued because they were viewed as threats to the core business (i.e., a problem of interpretation). For instance, Motorola deliberately decided against becoming a wireless operator. Motorola had no experience as a telecom operator, and there were no situational factors sustaining attention to the issue as an opportunity. The cellular group viewed the service side of the business as a threat because it would have put them in direct competition with AT&T and compromised its status as an independent supplier of equipment; at the same time, there was no countervailing attentional focus (from, say, another unit).

4 | DISCUSSION

Despite the importance of growth to the field of strategic management, theoretical advances regarding the *process* of growth have been surprisingly slow in coming (McKelvie & Wiklund, 2010). The attention-based view of firm growth developed in this article is intended to augment theoretical development and empirical work on the subject. In particular, our approach answers the call for a greater role to be played by behavioral mechanisms in growth theories (Pitelis, 2007)—and for an agenda whose goal is to understand better the cognitive foundations of heterogeneity in growth patterns (Kaplan, 2011). Toward those ends, we link theories of attention and theories of firm growth in explaining the delineation of new organizational units in support of new problem and solutions. Most studies investigating drivers of growth have placed attentional processes in the background of their treatment. We bring managerial attention to the forefront: Our theoretical lens is focused on the mechanisms that link attention structure to attentional processes in support of growth. In linking attention structure, processes, and formal structure (interdependencies), our framework augments theories of both attention and growth by introducing the possibility of intra-organizational conflict. Thus, we achieve our goal of an expanded and improved understanding of growth and of attention allocation within multi-divisional firms.

An important aspect of this study is how it extends the theory of firm growth by building on the foundational work of Penrose (1959/1995). Her approach presumes that the direction of firm growth is affected by how managers' beliefs affects their noticing of opportunities (Makadok, 2003; Sirmon, Hitt, & Ireland, 2007). Building on this foundation, subjectivist perspectives of opportunity identification (Foss et al., 2008) suggest that firms' decisions about utilizing excess managerial capacity may depend on how central are the different growth opportunities in their cognitive representations (i.e., the extent to which a firm's focus is schema driven). However, we broaden the extant literature to consider the impact of both schema-driven and stimulus-driven managerial attention while considering also the effect of attention structure. Our account recognizes that, within a multi-divisional firm, (a) managers often differ in their perceptions of opportunities,and (b) managers' respective orientations to environmental stimuli are regulated by their allocation of attention to both bottom-up and top-down signals. These are important considerations for better understanding how new issues that support growth, but deviate from existing beliefs, reach the firm's agenda. For example, in our model, the role of the corporate office is less about the provision of overarching decision premises, and more about specific interventions that amplify and stabilize attention focus on emergent technology-related issues, while adjudicating (rather than altering) often divergent perceptions of issues that arise. These interventions, which may be either direct or indirect, then become the basis for attentional engagement capable of moving the firm in new directions and away from its default categorization of issues.

We also use our ABV logic in taking up Pitelis's (2007) charge to incorporate conflict into growth theories. Penrose largely ignored the potential for divergent interests within the firm, despite the obvious role they play in allocating managerial resources to support the application of collective knowledge to new opportunities. In particular, we emphasize the different types of attention patterns (problems, solutions, or both), formal structure (interdependent vs. independent units) and the nature of intra-organizational conflict (constructive or destructive). We explain how attentional specialization and integration can yield organizational tension stemming from overlap in problems, overlap in solutions, and interdependencies. It is noteworthy that our theory does not prescribe an optimal degree of specialization or integration or an optimal amount of either form of organizational tension. Future research could explore the limits of these conjectures to find the optimal number of issues and to assess—in the context of structural interdependencies—the extent to which growth is engendered by attentional integration.

Our study also contributes to the literature on attention-based views of strategy (Bouquet & Birkinshaw, 2008; Eggers & Kaplan, 2009; Maula et al., 2013; Ocasio & Joseph, 2005) by linking attention structures to attentional processes in support of new issue focus. Research on the implications of attention structure (e.g., Joseph & Ocasio, 2012; Wilson & Joseph, 2015) and on the nature of attentional processes (e.g., Nigam & Ocasio, 2010; Shepherd et al., 2017; Tuggle et al., 2010) has proceeded along separate lines. In this article, we integrate the features of decision-maker location within a multi-divisional organization and corresponding attention patterns, with their respective attentional processes (schema- or stimulus-driven) to explain the firm's attentional engagement with new issues. Hence, this study integrates attentional hierarchy and induced and emergent explanations of attention while illustrating the relationship between them. As we have illustrated, this relationship is consequential for directing attention to new issues and away from routine patterns of attention. We highlight specific mechanisms (prototypes/trials, direct intervention, appointment of managerial resources, architectural elaboration) that shape cognition in the firm's constituent business units—via both bottom-up and top-down processing—and so underscore the need for future empirical work to examine their intersection. We treat them as parallel phenomenon, but if they do represent two extreme modes of attentional processing (as argued, e.g., by Weick & Sutcliffe, 2006) then organizations are likely to operate somewhere in the middle. In that case, structure may play a key role in balancing the costs and benefits of more mindful and conceptual attentional processing.

Our other contribution to the attention-based view is an enhanced understanding of organizational tensions and architectural elaboration and of their role in the structural distribution of attention. Prior ABV work (e.g., Joseph & Ocasio, 2012) presupposes a structural distribution of attention, focusing on its consequences while largely ignoring its origins. Moreover, ABV research has largely overlooked the role of divisional interdependencies and how formal and attention structure may interact. In early work, "differentiated structures" was proposed as a solution to the problem of divergent interests and goals (Cyert & March, 1963). Against that view, we argue that goal conflict does not completely explain the decision-making benefits of a new organizational unit and its accompanying bundle of resources. The structural distribution of attention is a consequence of the interaction between focusing on both problems and solutions, on the one hand, and on the other hand, interpreting those issues in an environment characterized by interdependencies. In our formulation, the value of attentional specialization and integration for innovation is contingent on within-firm interdependencies; in this respect, we depart from prior ABV studies. It remains an open question whether similar responses should be expected from industry-, market-, or geographic-based units—or how such factors as more centralized decision making would affect the outcomes.

By linking attention structure to formal structure, we contribute to widening the perspectives of organizational design. The resurgence of work in organizational design has been remarkable, and this area of study is once again considered an important field of strategy and organizational studies (Puranam, 2012). Our article complements recent emphases—on structure and screening properties (see, e.g., Christensen & Knudsen, 2010; Csaszar, 2012), on centralization and search (Siggelkow & Levinthal, 2005), and on formal and informal structures (Gulati & Puranam, 2009)—by highlighting the importance of a firm's "cognitive structure" in conjunction with more traditional levers (e.g., formal structure) for promoting the development of new technologies and markets (Karim, 2006).

We observe that the organizational design literature has largely overlooked the attention-directing features of structure, despite their role in foundational studies (Simon, 1947). A failure to incorporate these features may well account for the contradictory findings reported on the relationship between formal structure and the generation and application of knowledge (i.e., growth). Thus, one stream of research suggests that interdependencies among units facilitate knowledge sharing (Argyres & Silverman, 2004) and recombination (Fleming & Sorenson, 2004), while a second stream claims that benefits are derived from unit independence, or "structural decomposability," because of the resulting greater variety of issues (Burns & Stalker, 1961) and less conservative screening of new ideas (Csaszar, 2013). Our study helps reconcile these divergent ideas by considering how divisional interdependencies condition the relationship between attention structure and the development of new issues in support of growth. We offer a contingency perspective by incorporating routine and resource interdependencies that, through organizational tensions, condition the value of attentional specialization and integration on growth. In particular, our theory indicates that extant studies of formal structure do not properly account for embedded attentional processes, from which it follows that we have much to learn from revisiting the firm's attention structure as a design problem.

By extension, we also offer some insights into the literature on intra-organizational competition on architectural innovation. Prior work has recognized that the intra-organizational conflict stemming from charter overlap may be both beneficial and detrimental to an organization (Birkinshaw & Lingblad, 2005; Galunic & Eisenhardt, 2001). According to this literature, a charter reflects the technologies, products, and/or customer groups assigned to a unit as well as a shared understanding of the organizational domain that the unit has staked out (Galunic & Eisenhardt, 2001). Birkinshaw and Lingblad (2005) defined *charter overlap* as the extent to which adjacent units in the organization occupy the same charter space as the focal unit; according to these authors, intra-organizational conflict stemming from charter overlap has the potential to affect the organization both positively and negatively.

Through our research lens, charters serve as a mechanism for specializing attention and reflect both a problem focus (e.g., goals, customer needs) and a solution focus (e.g., technologies, products). Because charters have both a problem component and a solution component, organizational tensions may be present without explicit and antagonistic organizational conflict. For example, solution overlap reflects the extent to which one division focuses on technology similar to that of another division; thus, tensions can be productive because their outcomes can be applied to different opportunities and customer problems. In contrast, *problem* overlap reflects the extent to which different divisions sell to the same (or similar) customers. Again, tensions may exist but are productive to the degree the divisions offer different solutions (technologies). Yet, complete overlap is problematic when there are interdependencies between divisions. Our argument implies that firms must balance the attentional implications of their charters with the resource and routine interdependencies embedded in their formal structure—because it is through the balance, that antagonistic intra-organizational conflict can be channeled into constructive intra-organizational competition.

4.1 | Future directions

Attention processes and the micro-foundations of growth are areas that merit additional research. Steps in that direction have been taken by several other studies, including those concerned with opportunity identification (Bakker & Shepherd, 2017; Kor et al., 2007), resource orchestration (Sirmon et al., 2007), problem solving (Nickerson & Zenger, 2004), and strategic organization (Felin & Foss, 2005). Our study adds to this list, but more research is needed if we are to understand fully the link between micro-organizational behavior and the firm-level sources of a resource-based advantage. For example, our theory articulates in only a general way the relationship between attention and the management of knowledge or other resources. We propose that attentional integration informs the unit's interpretation of a given issue and broadens the knowledge base that is brought to bear on developing solutions. However, our theory does not address what types of knowledge are sought or eventually used. We are agnostic as to whether units, when focusing on similar problems, will draw on different sources of knowledge—or use the same body of knowledge to resolve issues that differ greatly (Grant, 1996). The interaction between knowledge and attention might also vary in response to environmental uncertainty or change. All of these questions suggest fruitful avenues for future research.

Similarly, we know that attentional focus helps to create bundles of resources (Sirmon et al., 2007), but have little understanding of precisely how and which resources are selected or of the factors that condition this bundling activity. In particular, our article does not explore what, specifically, constitutes the delineation of a new unit; instead, we suggest that more research is required before we fully understand these factors. We have focused on divisionalization of units, but more work is needed to explore the variety of possible elaborations (e.g., formations, deletions, mergers, split-ups)—as other researchers (e.g., Karim & Mitchell, 2004) have done.

For researchers interested in pursuing an empirical agenda, there are various methods and approaches that can be used to measure attention and growth patterns. Case studies are one way to examine the complexities of attention. Rerup (2009), Joseph and Ocasio (2012), Zbaracki and Bergen (2015), and Vuori and Huy (2015), for example, have taken this approach to examining attention patterns in large organizations across units, groups, and individuals. Another viable method is text analysis, which offers two key advantages: It provides a valid measure of attention; and it facilitates large-scale quantitative analysis based on increasingly available and large volumes of emails, patents, websites, and other company documents across units and time (e.g., Wilson & Joseph, 2015).

This article features a type of growth—namely, architectural elaboration—that differs from more conventional measures such as sales, assets, and employment. Of course, our approach requires detailed information on the bundle of resources, routines, channels, and charters actually created when new units are formed (or when existing units are subdivided). It is fortunate that changes to the internal structure of an organization can be understood without relying on idiosyncratic corporate access, and several scholars have devised methods to measure that structure. For example, internal structure has been studied using lists of executives from SEC 10K filings (Williams & Mitchell, 2004), product registries (Karim, 2006), product classifications from the Pharmaceutical Industry Database (Bottazzi & Secchi, 2006), patents (Arora, Belenzon, & Rios, 2014), and business activities from the Directory of Corporate Affiliations published by LexisNexis (Zhou, 2013). That being said, developing more granular knowledge of organizational structure, and of architectural elaboration in all its forms, remains a worthwhile endeavor.

5 | CONCLUSION

In writing this article we were able to establish links among attention structure, attentional processes, formal structure, and growth. In so doing, we have expanded the conversation from the firm's formal structure to include its cognitive structure while arguing that the notion of *attentional design* could be a powerful managerial tool and building block in the field of organization design. Our focal premise argues for a return to foundational research, which suggested that structure plays a key attention-directing role (Simon, 1947), and that the features of interdependence or decomposition cannot in themselves account for the contribution of structure to heterogeneity in firm performance.

Our other major goal was to show that the elaboration of organizational architecture is a suitable and worthwhile unit of analysis for future research. The use of structure as a dependent variable has greatly receded with the decline of contingency theory (Donaldson, 2001), although structure remains a subject of analysis for scholars interested in organizational design. As an expression of growth and a function of managerial cognition, architectural elaboration fulfills the requirements not only of those who prefer process-type growth theories that view each firm as a "bundle of productive resources" (Barney & Arikan, 2001, p. 129), but also of those calling for a more behaviorally plausible and decision-centered perspective on organizational growth (Gavetti, Levinthal, & Ocasio, 2007).

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