DIFFUSION OF THE FOCUS OF ATTENTION IN THE BOARDROOM: A
COGNITIVE APPROACH TO THE INFLUENCE OF BOARD CHARACTERISTICS
AND DYNAMICS ON CEO ATTENTIONAL FOCUS

AN ABSTRACT
SUBMITTED ON THE 27th DAY OF APRIL 2018
TO THE DEPARTMENT OF MANAGEMENT
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
OF THE A.B. FREEMAN SCHOOL OF BUSINESS
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FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY BY

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ABSTRACT

This work adopts an attention-based view to study boards of directors’ attention and its effect on CEOs’ attentional patterns from two perspectives: how the aggregate attention of directors relating to other firms may influence the attention of focal firms’ CEOs over time; and how this dynamic may be influenced by social, power and cognitive factors or dynamics. In so doing, it considers the influence of status and power differences between board members and CEOs, the number of reciprocal interlocks present in each boardroom, and boards members’ imported attentional homogeneity. General linear models analysis is carried out to test the hypotheses, measuring board and CEO attention through previously-validated, computer-assisted content analysis of letters to the shareholders of large companies. In broad terms, this study develops a novel construct, board imported attention, to present partial evidence that suggests a process by which CEOs’ attention is affected by the prior attentional focus of board members, resulting from their board or executive roles in other firms, and that this process may be affected by social and/or power relationships between boards and their CEOs. In light of the pervasiveness of boards with an increasing proportion of interlocked directors, these findings have implications for the corporate governance and managerial cognition literatures, allowing for a deeper understanding of the importance of the composition of boards in shaping the attentional patterns of CEOs.
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TABLE OF CONTENTS

ACKNOWLEDGMENT ........................................................................................................ ii

LIST OF TABLES .................................................................................................................. vi

LIST OF FIGURES ............................................................................................................... vii

ABBREVIATIONS .............................................................................................................. viii

CHAPTER I. INTRODUCTION .......................................................................................... 1

   Motivation and research questions .............................................................................. 1

   Contribution ................................................................................................................... 5

   Overview of research methods .................................................................................... 7

CHAPTER II. LITERATURE REVIEW .............................................................................. 10

   Why study CEOs from a cognitive standpoint? .......................................................... 10

   Boards of directors and their influence on CEOs ....................................................... 13

      Board structure .......................................................................................................... 14

      What boards do: Theoretical perspectives .............................................................. 16

      What boards do: Their influence on their CEOs ..................................................... 26

   Managerial cognition and attention ......................................................................... 35

      Managerial cognition and the concept of bounded rationality ............................. 40

      Cognition as a social phenomenon ....................................................................... 43

      Attention as an expression of cognition ................................................................. 45

      Theoretical lenses used to study cognition and attention ..................................... 49

   CEO attention: Environmental scanning ................................................................. 56

      Types of search selection or focus ......................................................................... 58
CHAPTER III. THEORY AND HYPOTHESIS DEVELOPMENT .......................... 62

Boards’ imported attention and CEO attention ............................................ 63

Interaction of board imported attention and CEO–board power relationships on
CEO attention .......................................................................................... 71

Interaction of board imported attention and status on CEO attention .......... 72

Interaction of board imported attention and reciprocal interlocks on CEO attention
.................................................................................................................. 74

Interaction of board imported attention and imported attentional homogeneity on
CEO attention .......................................................................................... 76

Summary .................................................................................................... 78

CHAPTER IV. RESEARCH METHODOLOGY .................................................. 80

Sample selection ......................................................................................... 80

Measurement of variables .......................................................................... 82

Analytical and statistical methods ............................................................... 95

CHAPTER V. RESULTS .................................................................................. 101

Main Analyses ............................................................................................. 105

Hypotheses 1a and 1b: Main relationship between board attention and CEO
attention ....................................................................................................... 105

Hypotheses 2a and 2b: Interaction effect of CEO–board power on main
relationship .................................................................................................. 109

Hypotheses 3a and 3b: Interaction effect of board–CEO relative status on main
relationship .................................................................................................. 111

Hypotheses 4a and 4b: Interaction effect of reciprocal interlocks on main
relationship .................................................................................................... 112

Hypotheses 5a and 5b: Interaction effect of attentional homogeneity on main
relationship .................................................................................................... 113
Robustness Analyses ................................................................. 114
Endogeneity test with instrumental variables ............................ 114
Cut-off sample ........................................................................ 118

CHAPTER VI. DISCUSSION AND CONCLUSIONS ............................. 125
Interpretation and discussion of results ....................................... 125
Board’s imported attention ....................................................... 129
Social/power dynamics ............................................................. 132
External ties ........................................................................... 133
Board’s attentional homogeneity ............................................. 134
Control variables .................................................................. 136
Theoretical, methodological and practical implications ............... 137
Limitations ............................................................................. 140
Directions for future research .................................................. 142

APPENDICES .............................................................................. 145
Appendix A: Summary of literature review on empirical work on antecedents and consequences of managerial cognition and attention ................................................. 145
Appendix B. List of words in the dictionaries used for content analysis (word count) based on Yadav et al. (2007) ................................................................. 150
Appendix C: Summary of variables, operationalization and main data sources ........................................... 151
Appendix D. Collinearity Statistics ............................................... 152

LIST OF REFERENCES .................................................................. 153
LIST OF TABLES

Table 1: Descriptive Statistics ................................................................. 103
Table 2: Correlations .................................................................................. 104
Table 3: Summary of the Results of Hypothesis Testing .............................. 105
Table 4: Board Imported External Attention and CEO External Attention (Model 1) ... 107
Table 5: Board Imported Internal Attention and CEO Internal Attention (Model 2) ..... 108
Table 6: Robustness Check 1 – Alternate Board Imported External Attention (Model 3) ......................................................................................................................................................... 116
Table 7: Robustness Check 1 – Alternate Board Imported Internal Attention (Model 4) ........................................................................................................................................................... 117
Table 8: Robustness Check 2 – Cutt-Off Sample – External Attention (Model 5) .... 120
Table 9: Robustness Check 2 – Cutt-Off Sample – Internal Attention (Model 6) .... 121
Table 10: Robustness Check 3 – Two-Year Time Lag – External Attention (Model 7) 123
Table 11: Robustness Check 3 – Two-Year Time Lag – Internal Attention (Model 8) . 124
LIST OF FIGURES

Figure 1: Conceptual Framework .................................................................................................................. 9

Figure 2: List of Variables Used in the External Attention Tests: Main Analysis vs Robustness Checks. .................................................................................................................................................. 99

Figure 3: List of Variables Used in the Internal Attention Tests: Main Analysis vs Robustness Checks. .................................................................................................................................................. 100

Figure 4. Main Effect of Board Imported External Attention and CEO External Attention .................................................................................................................................................. 109

Figure 5. Moderating Effect of CEO-Board Relative Power on the Relationship between the Board’s Imported External Attention (t-1) and the CEO’s External Attention (t) ........................................................................................................................................ 111

Figure 6. Moderating Effect of Reciprocal Interlocks on the Relationship between the Board’s Imported External Attention (t-1) and the CEO’s External Attention (t) ........................................................................................................................................ 113

Figure 7. Moderating Effect of Lexical Commonality on the Relationship between [Alternate] Board Imported Internal Attention (t-1) and CEO Internal Attention (t) ........................................................................................................................................ 118
### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>2SLS</td>
<td>Two-stage least squares</td>
</tr>
<tr>
<td>ABV</td>
<td>Attention-based view</td>
</tr>
<tr>
<td>AIC</td>
<td>Akaike Information Criterion</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief executive officer</td>
</tr>
<tr>
<td>GLiM</td>
<td>Generalized linear models</td>
</tr>
<tr>
<td>KBV</td>
<td>Knowledge-based view</td>
</tr>
<tr>
<td>LIWC</td>
<td>Linguistic inquiry and word count</td>
</tr>
<tr>
<td>LTS</td>
<td>Letters to shareholders</td>
</tr>
<tr>
<td>M&amp;A</td>
<td>Merger and acquisition</td>
</tr>
<tr>
<td>MBA</td>
<td>Master in business administration</td>
</tr>
<tr>
<td>MNE</td>
<td>Multinational enterprise</td>
</tr>
<tr>
<td>NAICS</td>
<td>North American Industry Classification System</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and development</td>
</tr>
<tr>
<td>RBV</td>
<td>Resource-based view</td>
</tr>
<tr>
<td>ROA</td>
<td>Return on assets</td>
</tr>
<tr>
<td>ROE</td>
<td>Return on equity</td>
</tr>
<tr>
<td>ROI</td>
<td>Return on investment</td>
</tr>
<tr>
<td>SEC</td>
<td>Securities and Exchange Commission</td>
</tr>
<tr>
<td>TMT</td>
<td>Top Management Team</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>UET</td>
<td>Upper echelons theory</td>
</tr>
<tr>
<td>VIF</td>
<td>Variance inflation factor</td>
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CHAPTER I. INTRODUCTION

Motivation and research questions

Top managers are crucial to organizational adaptation and strategic renewal (Adner & Helfat, 2003; Eggers & Kaplan, 2009; Salvato, 2009; Tripsas, 2009). Managers’ role is important, not only in times of uncertainty as they guide their organizations through difficult and dynamic environments (Tushman & Rosenkopf, 1996; Virany, Tushman, & Romanelli, 1992), but at all times, since they help their organizations to adapt and change, and thereby avoid becoming vulnerable to “sudden and deadly obsolescence” (McGrath, 2001: 119). These processes of adaptation and change entail the recognition, selection and execution of strategic innovations, about which very little is currently known (Davila, Foster, & Oyon, 2009). Therefore, in view of the relevance of managers in affecting organizational outcomes, and the current lack of knowledge about how they recognize, select and execute their strategies, this study makes a contribution by investigating the role of directors in determining what CEOs devote their attention to.

Research on attention began in the field of philosophy, which “laid the foundation for the scientific study of attention in ensuing years” (Johnson & Proctor, 2004: 5). During the second half of the nineteenth century, research on attention became more scientific, placing greater emphasis on experimental investigations, and by 1909 it was already considered central to the field of psychology (Capa, 2011). Some of the most relevant early works on attention during the first half of the twentieth century were
Jerslid's work on the task-switching paradigm, Telford’s “psychological refractory period effect” and J. R. Stroop’s “Stroop effect”, which revealed the major impact of irrelevant information on task performance (Johnson & Proctor, 2004). In the 1950s, the research focus shifted as a result of increasing interest in human information processing, leading to the work of D. E. Broadbent, which is said to mark the beginning of modern work on attention (Moray, 2006). Eventually, the ideas and work on attention that had originated predominantly in cognitive psychology (Ward, 2005) permeated into other fields, including strategic management.

In 1989, Charles Stubbart called for a more explicit cognitive emphasis in strategic management, including research on attention (Schneider & Shiffrin, 1977), stating that cognitive science might impart a “powerful theoretical and empirical thrust to advance strategic management research” (Stubbart, 1989: 325). Stubbart’s main argument was that managerial cognition was a vital but neglected element of the strategic management paradigm at the time (e.g. Schendel & Hofer, 1979). This was mainly because research had evolved from initially considering managers as rational utility-maximizing individuals (Coase, 1937), then as individuals with limited capacity to deal with complicated and uncertain information environments (March & Simon, 1958; Simon, 1957), and ultimately as heuristics-based decision makers (Kahneman & Tversky, 1979, 1982, 1996; Tversky & Kahneman, 1974, 1986). Nevertheless, according to Stubbart (1989), viewing managers as heuristic inferencers was not necessarily a real advance over the rational agent view, because managers have been demonstrated to be sometimes wise and intuitive in making their inferences (Kotter, 1982; Mintzberg, 1973; Quinn, 1980), and at other times narrow-minded and error-prone (Hogarth & Makridakis, 1981; Stahl &
Zimmerer, 1984). Thus, managers are neither purely rational nor purely heuristics-based
decision makers. They seem to rely on specific knowledge structures to help represent
and interpret information to facilitate their decision-making processes (Walsh, 1995), and
these knowledge structures play a role in the allocation of their attention (White &
Carlston, 1983).

As a result of this realization, Fiske and Taylor (1991) developed the concept of
attention from a managerial perspective, defining it as those things that occupy the
consciousness of top managers. Ocasio (1997: 189) complemented this definition, stating
that attention encompasses:

...the noticing, encoding, interpreting, and focusing on time and effort by
organizational decision makers on both (a) issues: the available repertoire of
categories for making sense of the environment: problems, opportunities, and
threats; and (b) answers: the available repertoire of action alternatives:
proposals, routines, projects, programs, and procedures.

This definition implies that top managers, including CEOs, must develop mental
procedures to allow them selectively to determine the focus of their attention, while
selectively ignoring other elements of information (Abrahamson & Hambrick, 1997).

Many studies of CEO attention have found it to be influential on a wide variety of
outcomes at various levels. At the organizational level, for example, CEO attention has
been shown to influence firm performance (Garg, Walters, & Priem, 2003; Gary &
Wood, 2011), strategic responses (Kaplan, Murray, & Henderson, 2003), and strategic
change (Gioia & Chittipeddi, 1991). At the industry level, it has been shown to affect the
structure of the industry (Porac & Thomas, 1989). However, few studies have sought to
explain what determines CEO attention (e.g. Chetty, Eriksson, & Lindbergh, 2006; Garg
et al., 2003; Greve, 1998; Nadkarni & Barr, 2008; Short & Palmer, 2003).
Surprisingly, given the central role that boards play in corporate governance, board influence on CEO attention remains largely unexplored, despite empirical data supporting the notion that boards of directors may influence strategic-level decisions (e.g. Haunschild, 1993; Judge & Zeithaml, 1992; Tuggle, 2004). Some relatively recent research led by Christopher Tuggle has started to focus on board attention and some of its implications for organizations. First, Tuggle (2004) focused on understanding how individual board members affect the attention of the entire board, and how the board affects the attention and resource allocation of the firm. Then, in two follow-up studies, Tuggle, Schnatterly, and Johnson (2010a) studied how heterogeneity in a board of directors influences discussion of entrepreneurial issues at board meetings, and Tuggle et al. (2010b) focused on changes in levels of attention toward monitoring in boards. Nevertheless, no previous research appears to have focused on the role played by boards of directors as an antecedent of CEO attention.

Much work has been done to answer Stubbart’s (1989) call, yet many questions remain unanswered regarding what affects CEO attention and how. Therefore, the research questions driving this thesis are:

1. How is CEO attention shaped?
2. What role do boards of directors play in shaping it?
3. Does the attention that board members pay to in other firms affect what they pay attention to in the boardroom of their focal firm, and does this affect what the CEOs of focal firms focus their attention on?
4. What factors/dynamics affect that relationship?
This thesis draws on concepts and notions from several theoretical fields to build arguments to support three preliminary ideas. First, CEO attention is affected by the aggregate imported attention of board members who have connections with other firms as board members or with an executive responsibility in the latter. Second, such relationships vary in magnitude, depending on the relative status of the members. Third, these relationships are also affected by factors associated with social relationships and dynamics between board members and their CEOs, such as reciprocal interlocks, board members’ attentional homogeneity and relative CEO–board power.

**Contribution**

This dissertation builds on Ocasio’s (1997) attention-based view of the firm, which focuses on how firms distribute and regulate the attention of their decision makers. His model is based on three premises: (1) that what decision makers do depends on what issues and answers they focus their attention on, i.e. their focus of attention (Barnett, 2008); (2) that what issues and answers decision makers focus on, and what they do, depends on the particular context or situation in which they find themselves, i.e. their situated attention; and, (3) that the particular context or situation in which decision makers find themselves, and how they attend to it, depends on how the firm’s rules, resources and social relationships regulate and control the distribution and allocation of issues, answers and decision makers to specific activities, communications and procedures, i.e. the structural distribution of attention (Ocasio, 1997: 188). Using Ocasio’s model of situated attention and firm behavior as a framework, this thesis considers the following logic: first, CEOs are decision makers who participate in the “enactment of the environment and the social construction of organizational moves”
second, board members are structurally autonomous social actors “which, through their social influence, power and control, influence and regulate the decision and activities” of CEOs (Ocasio, 1997: 197); third, CEOs can learn vicariously from the cultural and cognitive repertoire of board members’ schemas, which have been formed by their individual past experiences and vicarious learning; and fourth, this is achieved through formal interactions and communications (e.g. board meetings) that prompt CEOs’ actions on specific sets of issues.

This thesis makes the following contributions. First, it contributes to the literature on managerial cognition, and particularly on CEO and top management attention (e.g. Angriawan & Abebe, 2011; Garg et al., 2003; Maula, Keil, & Zahra, 2013), at a time when CEOs and top management teams (TMTs) are required to deal with sometimes over-abundant information from different sources competing for their attention. It focuses on the antecedents of CEO attention, which remain less studied than its consequences or outcomes (Walsh, 1995), and makes a contribution to answering Ocasio’s (2011: 1294) question of what is the relationship between individual- and organizational-level attention, in this case at the executive level, by focusing on the potential influence of boards on CEO attention. This is relevant, given the pervasiveness of boards in corporate America and the significant changes in their composition over the last half-century.

Second, this work builds on the literature around Ocasio’s (1997) theoretical attention-based model, enabling the model to be empirically tested, with the potential to make contributions that may help to develop it further, particularly by focusing on directors’ attention, a construct that is relevant to strategic decision making (Ocasio, 2011). This study may also ultimately contribute to the literature on organizational
isomorphism and inertia (DiMaggio & Powell, 1983; Hannan & Freeman, 1984) resulting from the diffusion of attentional categories through networks of board members.

Third, it highlights the potential importance of attentional processes and factors in boardrooms as antecedents of CEO and TMT attention formation. Traditionally, boardrooms have been considered as “black boxes.” Zald (1969: 110) argues compellingly that boards of directors often “conduct their business in secret, their members are busy people, the processes themselves are sometimes most effectively described by novelists.” This study may help to establish the foundations for a potentially new construct: boards’ imported attention.

Fourth, it enriches a growing body of research around the functioning of boards (e.g. Tuggle, 2004; Tuggle et al., 2010a, 2010b; Westphal & Milton, 2000; Westphal & Zajac, 2001), by supplementing previous work that has used board transcripts (e.g. Tuggle et al., 2010b) with data generated outside the boardroom.

**Overview of research methods**

The theory and hypotheses developed in this study are tested using a sample of approximately 300 large firms. The study focuses on a sample comprising firms complying with the following three conditions: (a) they were included in the Fortune 500 for the years 2008 to 2013; (b) letters to the shareholders are available; and (c) information is available about individual members of their boards of directors for that period.

Data were collected on the external attention of board members and the attention of the focal firms’ CEOs from letters to shareholders (LTS) available from public databases and firms’ websites, and individual-level information about the CEOs and board
members was collected from various sources, including the RiskMetrics database. Attention was measured using computer-assisted text analysis and Yadav’s (2007) dictionaries to describe the level of attention to internal and external environmental elements in the LTS. Relative status was measured using information about awards bestowed by *Institutional Investor* magazine for the years 2008 to 2013, following Graffin et al.’s (2008) process for each measurement and Castellucci and Ertug’s (2010) procedure for relative status. Reciprocal interlocks were identified by comparing information on members of the relevant firms’ boards. Board attentional homogeneity was measured using a mixture of lexical commonality and density in relevant LTS (Abrahamson & Hambrick, 1997). Finally, relative CEO–board power was measured following Westphal and Zajac’s (2001) procedure. Generalized linear models (GLiM) analysis was used to test the hypotheses.

A graphical representation of the model and hypotheses is shown in Figure 1. The remainder of this thesis is structured in four parts. Chapter II reviews the academic background to this research, establishing current ideas and relevant research in this field. Chapter III presents the theoretical background, and the propositions and hypotheses to be tested. Chapter IV describes the methodology and how the sample was built, as well as defining the key variables, and Chapter V presents the results. Finally, Chapter VI interprets the results, draws conclusions, discusses the limitations of this study and identifies potential directions for future research.
Figure 1: Conceptual Framework

Board Imported Attention (t-1)

Represented firm 1 (t-1)

Represented firm 2 (t-1)

. . .

Represented firm n (t-1)

SOCIAL/POWER DYNAMICS WITHIN BOARD

CEO-Board Relative Power (t)

Board-CEO Relative Status (t)

CEO Attention (t)

H1

H2

H3

H4

H5

Reciprocal Interlocks (t)

Attentional Homogeneity (t-1)

Reciprocal Ties

Control variables (t)

- Individual: CEO Age, CEO Functional Background
- Organization: Size
- Environment: Munificence
- Endogeneity Control
CHAPTER II. LITERATURE REVIEW

Why study CEOs from a cognitive standpoint?

Chief executive officers (CEOs) play very specific roles in organizations, and their significance, though challenged by some authors, has consistently attracted the interest of management researchers. Different research traditions have assigned various types of significance to CEOs. One stream sees them as having a decisive role (Carpenter & Westphal, 2001; Westphal & Fredrickson, 2001), and even an obligation (Hambrick & Mason, 1984) to shape firm strategy, and therefore determine firm-level outcomes (e.g. Astley & Van de Ven, 1983; Dutton & Jackson, 1987; Hough & White, 2003; Kesner & Sebora, 1994; Peteraf & Bergen, 2003). This line of thought is supported by strategic decision-making research (Eisenhardt & Bourgeois, 1988; Fredrickson, 1984, 1986), and by the upper echelons perspective (Finkelstein & Hambrick, 1996; Hambrick & Mason, 1984). Another stream considers CEOs to be less relevant to organizational development and firm performance, due to environmental, normative and/or inertial constraints (Crossland & Hambrick, 2011). Support for this line of thought is provided from the perspectives of transaction cost economics (Williamson, 1975), population ecology (Hannan & Freeman, 1977), resource dependence (Pfeffer and Salancik, 1978) and institutional theory (DiMaggio & Powell, 1983).

Evidence to support either of these views is mixed (Bertrand & Schoar, 2003; Crossland & Hambrick, 2007; Halebian & Finkelstein, 1993; Liebenson & O’Connor,
Early studies suggested that CEOs matter very little to corporate performance, supporting the resource dependence and population ecology views. For example, Lieberson and O’Connor (1972) found that CEOs’ role in performance is less relevant than characteristics of their companies or even their industries, while Weiner and Mahoney (1981) found a very small effect of the CEO on firm performance. However, these attempts have been challenged on the grounds of methodological limitations (Kim, 2011). Based on these notions, other studies have confirmed the effects predicted by the upper echelons perspective. For example, Bertrand and Schoar (2003) found that differences in CEOs’ management style explain differences between firms in terms of their growth and financial aggressiveness. Given the mixed results, some studies have sought to identify potential moderators that might explain these differences. Variables have been identified at individual, organizational and environmental levels (e.g. Datta & Rajagopalan, 1998; Finkelstein & Boyd, 1998), of which managerial discretion (Hambrick & Finkelstein, 1987) is one of the most relevant and extensively studied. Research on managerial discretion, defined by Hambrick and Finkelstein (1987) as managers’ latitude to make strategic choices, has yielded empirical evidence that when discretion is high, managers’ impact on various organizational outcomes is strengthened (e.g. Finkelstein & Boyd, 1998; Finkelstein & Hambrick, 1990; Halebian & Finkelstein, 1993; Hambrick, Geletkanycz, & Fredrickson, 1993; Li & Tang, 2010; Lieberson & O’Connor, 1972; Shen & Cho, 2005).

Further evidence favors the idea that executives, and particularly CEOs, play an important role in directing different types of strategic renewal that may be difficult to identify directly in short-term financial performance changes, including new product
launches (Boeker, 1997; Ciborra, 1996; Eisenhardt & Tabrizi, 1995; Song & Montoya-Weiss, 1998), organizational reorientations (Tushman & Rosenkopf, 1996; Virany et al., 1992) and investment strategies (Kor, 2006). More recent lines of research have signaled the potential importance of considering a more comprehensive view of the roles played by CEOs. Some authors propose viewing CEOs as organizational integrators (Calori, Johnson, & Sarnin, 1994), and even as cognitive integrators. In this regard, Calori et al. (1994, citing Bougon, 1992: 385) suggest:

*Given his/her position in the TMT, the CEO can, then, be viewed as a cognitive integrator, the architect of a “congregate map which must match the variety, equivocality and crypticality of the combined strategy and social system phenomena.”*

Thus, research on CEOs’ actions has shifted toward seeing their role from new perspectives, such as managerial cognition theory (Barr, Stimpert, & Huff, 1992; Clapham & Schwenk, 1991; Ginsberg, 1989; Stubbart, 1989) and the attention-based perspective (Ocasio, 1997; Ocasio & Joseph, 2005). Researchers have started to focus on understanding how CEOs influence the flow of information in organizations, as well as how they use this information for strategy formulation (Daft, Sormunen, & Parks, 1988; Lefebvre & Mason, 1997; Simons, 1991), how they handle communications and how these actions reflect their attentional focus (Yadav et al., 2007), and how they focus the attention of their employees (Gifford, 1998).

In conclusion, the underlying logic in the managerial cognition and attention tradition is that strategic action is shaped by how managers, most notably CEOs, notice and interpret the information they receive, and how they translate those perspectives into strategic choice (Daft & Weick, 1984; Reger & Palmer, 1996) and action (Cho & Hambrick, 2006; Kaplan et al., 2003; Ocasio, 1997). Thus, CEOs have gone from being
considered irrelevant to firm success to being considered critical in defining how organizations channel and distribute attention between different levels of decision makers (Ocasio, 1997). Therefore, the question driving this research is not whether CEOs matter, but rather, what is happening in their heads when they do matter?

**Boards of directors and their influence on CEOs**

Boards have been shown to be important for many reasons. They are typically considered to be the formal link between a firm’s shareholders and the TMT in charge of the firm’s operations and functioning (Mintzberg, 1983; Monks & Minow, 1995). Many roles have been attributed to boards, as discussed below, but ultimately they are viewed as the “apex of the firm’s decision control system” (Fama & Jensen, 1983: 311).

Nevertheless, boards’ impact on firm development and performance continues to be debated. Many studies have focused on the explanatory power of board composition and, most importantly, its various effects on firm performance, without reaching conclusive results. The most studied variables include board size, the number of interlocks, the number and proportion of outside directors, and financial and competitor ties (Boyd, 1990). In fact, there is evidence that, although boards are considered to be an important mechanism for limiting managers’ self-serving behaviors when the goals of owners and managers conflict (Eisenhardt, 1989a), they do not always protect shareholders’ interests (Mace, 1971; Patton & Baker, 1987). Davis’s (1991) study of the adoption of “poison pills” is frequently cited as an example of this. This inconsistency between the theoretical roles of boards and their actual influence and roles in organizational development and performance has fueled continued research and monitoring to try to gain a better understanding of board-related phenomena. This is evident in the ever closer monitoring
of boards by institutional investors (Heard, 1987; Judge 1997) and the media (Byrne, 1996, 2000; Orwall & Lublin, 1997), as well as new trends in research on the evolution of board members’ roles and responsibilities (e.g. Tuggle, 2004).

However, a major problem has made it very difficult to study boards: they are “black boxes.” Researchers can only look at what goes into the black box and what comes out of it, excluding the study of actual board processes and interactions (Rindova, 1999). This has led researchers to make “great inferential leaps” (Pettigrew, 1992: 171) to connect input variables, such as board composition, to output variables, such as board or even firm performance. Hence, Forbes and Milliken (1999) have called for further board-related research to complement knowledge of “what boards look like with evidence of what boards do” (Forbes & Milliken, 1999: 489).

What boards do and what they look like has been the subject of several research streams adopting different theoretical perspectives. In terms of what boards look like, the next section briefly reviews the historical evolution of boards, and in terms of what boards do, the remainder of this section looks first at the main theoretical perspectives (agency, resource dependence and stewardship theory) used to describe boards’ roles and relationships with CEOs, and then at the mechanisms and roles through which they may affect the attention of their CEOs.

Board structure

The origins of boards of directors can be traced back to church councils during the Middle Ages (Gevurtz, 2004), then in their influence on the formation of guilds and town councils, and eventually in the development throughout Europe of governance structures that included a board and a chief executive officer. As early as 1313, the Merchants of the
Staple had adopted a system of board governance. Such structures provided a model for the governing boards of trading companies, such as the Russia, Eastland and East India companies. The English experience was paralleled by the development of governance structures in continental Europe, where corporate boards developed as a governance mechanism for merchant societies such as the “hanse” in Germany, merchant cartels such as the Dutch East India Company, and even the administration of the Medicis’ holding company, which eventually evolved into today’s governance mechanism for large business ventures with passive investors (De Roover, 1963). In fact, the model of corporate governance by a representative board working with a chief executive officer (sometimes called “governor”) reflects political practices and ideas widespread in Western Europe in the late Middle Ages. European political ideology and practice at that time, although hardly democratic, often called for the use of collective governance by a body of representatives. (For a very detailed description of the genesis and evolution of boards of directors, see Gevurtz, 2004.)

Boards today, which are elected by shareholders, are legally required in publicly-held firms (Johnson, Daily, & Ellstrand, 1996; Walsh & Seward, 1990), and their structure is regulated by various bodies of legislation. For example, the New York Stock Exchange (NYSE, 2002) requires most listed companies to have boards with a majority of independent directors unless the company has a 50 percent shareholder stake, and audit and compensation committees comprising solely independent directors. Studies covering the period between 1950 and 2005 have consistently shown a decrease in the proportion of inside directors on American boards (e.g. Baysinger & Butler, 1985; Gordon, 2007; Hermalín & Weisbach, 1988; Lehn, Patro, & Zhao, 2009; Smith, 1970), leading to what
some call the “Anglo-Saxon model” of corporate governance now prevalent in the native English-speaking world (Business Week, 1992, 1996). According to this research, the percentage of inside directors in American corporations reduced from 49 percent in 1950 to 15 percent in 2005 (Gordon, 2007), while the percentage of independent outsiders increased from around 25 percent in the 1950s to almost 75 percent by 2005 (Gordon, 2007; Heidrick and Struggles, 1990). This trend has been predicted, interpreted and even criticized in various ways from different theoretical perspectives, the most important of which are briefly described in the next sub-section.

*What boards do: Theoretical perspectives*

The board-centered model of corporate governance that prevails around the world (Buxbaum, Hopt, & Dominick, 1990) has three underlying concepts involving relationships of directors with shareholders, directors with each other, and directors with the corporation’s executives (Gevurtz, 2004): (1) shareholders elect the directors (normally annually); (2) a group composed of peers acting together makes the decisions; and (3) the board has ultimate responsibility for selecting and supervising the corporation’s senior executives (especially its CEO). Different views on these concepts have led to various theories – most notably, agency, resource dependence and stewardship theory – to explain and predict the relationship between boards’ attributes and their effect on firm performance (Lynall, Golden, & Hillman, 2003). A brief review of each is presented below, since a basic understanding of their underlying assumptions and predictions will be useful in the ensuing discussion of different board roles and director types.
Agency theory. Corporations have evolved over time. During the nineteenth century, they initially tended to be small and controlled by a relatively small number of shareholders, but the Industrial Revolution caused many to evolve into larger, more complex corporations. These changes had an effect on management. The professional manager emerged, resulting in a need to separate ownership from control, because the interests of managers, as agents, did not always coincide with the interests of shareholders, as principals (Martin, 2008). The seeds of agency theory can be traced back to Berle and Means (1932), who started a discussion about this separation. Agency theory focuses mainly on understanding potential conflicts of interest arising from this separation (Berle & Means, 1932; Fama & Jensen, 1983) and solving two problems: first, the agency problem, arising when the goals of principal and agent conflict, with implications for monitoring costs (Dalton et al., 1998; Eisenhardt, 1989a; Oswald, Muse, & Rutherford, 2009); and second, the risk-sharing problem, arising from differences in the level of risk tolerance between principal and agent (Eisenhardt, 1989a; Lazarides & Drimpetas, 2008).

Agency theory is based on four basic assumptions consistent with neoclassical economics: (1) agents are self-interested and individualistic, viewing benefits in terms of personal economic gains (Eisenhardt, 1989a), power and job security (Galbraith, 1967; Marris, 1964; Williamson, 1964), which causes divergence between the interests of the two parties involved (Jensen & Meckling, 1976); (2) agents are risk-averse (Eisenhardt, 1989a) because their human capital is invested so heavily in their firm (Boyd, 1995); (3) agents are boundedly rational (Eisenhardt, 1989a); and (4) agents use their information advantage for their personal benefit (Eisenhardt, 1989a). The information advantage
created by asymmetry in the information available to the two parties (principals and agents) creates two specific agency problems: adverse selection and moral hazard (Eisenhardt, 1989a).

Two streams of agency theory literature have developed, adopting positivist and principal–agent views (Eisenhardt, 1989b; Jensen, 1983). According to Eisenhardt (1989a), the former is the most relevant to the study of corporate boards, since it focuses on situations in which the two parties are likely to have conflicting goals and suggests governance mechanisms that may control agents’ behavior (Baysinger & Hoskisson, 1990; Eisenhardt, 1989a; Lorsch & MacIver, 1989; Zahra & Pearce, 1989). At the highest level of organizations, the ultimate focus of agency theory is on power and how it is distributed between boards and CEOs (Finkelstein & Hambrick, 1996). CEOs who wield asymmetrical power may use it to behave in ways that may not be in the best interests of the shareholders, such as increasing their own compensation (Mace, 1971), obtaining more favorable compensation plans (Healy & Kaplan, 1985), enhancing their job or financial security by gaining duality (Finkelstein & Hambrick, 1996; Rechner & Dalton, 1991), or resisting takeovers by adopting “poison pills” (Daily & Dalton, 1993). Agency theory favors the use of various control mechanisms, including executive performance evaluations (Bonn & Pettigrew, 2009), continuous communication of shareholders’ goals and monitoring of agents’ actions (Bonn & Pettigrew, 2009), and maintenance of board independence (Davis, Schoorman, & Donaldson, 1997).

Regarding the governance mechanisms mentioned above, one of which is the board of directors, agency theory researchers have examined two in particular: compensation plans and governance structures (Combs et al., 2007; Davis et al., 1997). With regard to
governance structures, agency theory research has focused on three main characteristics relating to boards: dual role, board size and board composition. Agency theory argues in favor of separating the board chair and CEO positions (Pugliese & Wenstøp, 2007) to increase board effectiveness and firm performance (Shleifer & Vishny, 1997). However, empirical evidence remains mixed. Some studies have found some support for this recommendation (Daily & Dalton, 1994a; Elsayed, 2007; Rechner & Dalton, 1991), others have found support for duality (Coles, McWilliams, & Sen, 2001), and others have found no relationship between duality and firm performance (Dalton et al., 1998; Dulewicz & Herbert, 2004). There is some evidence that this relationship is actually moderated by other variables relating to board characteristics. For example, Daily and Dalton (1994a, 1994b) found that firms with duality that have fewer independent directors are associated with bankruptcy.

Agency theory researchers are divided in terms of the recommendations arising from this view with regard to board size. One stream favors the notion that larger boards are better suited to fulfilling their monitoring responsibilities (e.g. Chaganti, Mahajan, & Sharma, 1985; Muth & Donaldson, 1998; Williams, Fadil, & Armstrong, 2005), while another favors smaller boards. Similarly to research on the effects of duality described above, the empirical evidence is ambiguous. Dalton et al. (1999) found a positive relationship between board size and firm financial performance, whereas other studies have produced evidence supporting the idea that board size is actually inversely related to firm performance (e.g. Conyon & Peck, 1998; Eisenberg, Sundgren, & Wells, 1998; Yermack, 1996). In line with this evidence, some suggest the establishment of an optimal board size to maximize monitoring of the CEO (e.g. Van den Berghe & De Ridder, 2002;
Brown & Caylor, 2009; Firstenberg & Malkiel, 1994; Jensen, 1993; Leblanc & Gillies, 2003; Lipton & Lorsch, 1992; Martin, 2008), while others argue that support for any significant relationship between board size and firm outcomes is weak (e.g. Goodstein, Gautam, & Boeker, 1994).

Beyond size and duality, the actual composition of boards has been the subject of several studies. As previously mentioned, agency theory supports the idea that board independence should lead to better firm performance through better monitoring (Kaplan & Reishus, 1990; Lee & Carlson, 2007; Martin, 2008; Rhoades, Rechner, & Sundaramurthy, 2000). Independence is argued to be critical to a more effective monitoring role by the board, helping it to prevent self-serving attitudes by the CEO (Dalton et al., 1998). This position assumes that inside directors are unlikely to monitor the CEO’s actions effectively since their employment with the firm makes them indebted to the CEO (Patton & Baker, 1987). However, some authors favor having a certain proportion of insiders (Baysinger & Butler, 1985; Fama & Jensen, 1983) to help “overcome problems with information processing and, hence, to improve the effectiveness of decision control” (Baysinger & Hoskisson, 1990: 77). Again, the empirical evidence is mixed: some research has shown a positive relationship between levels of board independence and firm financial performance (Baysinger & Butler, 1985; Lee & Carlson, 2007; Rhoades et al., 2000; Rosenstein & Wyatt, 1990), while other studies have shown exactly the opposite (Agrawal & Knoeber, 1996; Bhagat & Black, 1999; Coles et al., 2001). A third strand has identified poor and even non-existent relationships between board composition and firm financial performance (Dalton et al., 1998). Some authors favoring the idea of a relationship argue that discrepancies in the
contradictory results are explained by the measures used to define board composition (Rhoades et al., 2000), or by consideration of other factors affecting it (Combs et al., 2007). In fact, Wagner et al.’s (1998) meta-analysis suggests a U-shaped relationship, in which homogeneity within the board plays a moderating role.

Almost a century since the introduction of agency theory, hundreds of empirical studies have sought to validate it, but its predictions on the effectiveness of boards as a monitoring mechanism appear insufficient to explain firm performance on its own. This suggests that additional theoretical perspectives are needed to explain other roles of directors besides monitoring and control (Daily, Dalton, & Cannella, 2003; Johnson et al., 1996; Zahra & Pearce, 1989).

**Resource dependence theory.** Resource dependence theory has foundations in sociology (Selznick, 1949), arising from a focus on the role played by the environment in determining organizational effectiveness (Aldrich & Pfeffer, 1976; Pfeffer & Salancik, 1978). Its most basic premise is that a firm’s opportunity to survive depends on its ability to gain control over environmental resources, and that any variable that puts pressure on its ability to gain that control, such as competition, regulation and other social forces, will encourage firms to seek out environmental linkages (Boyd, 1990). Boards are one alternative enabling firms to develop linkages with the external environment. Resource dependence theory has extended previous notions of environmental determinism by building on insights from contingency theory and open systems (Katz & Kahn, 1966; Lawrence & Lorsch, 1967; Thompson, 1967), as well as notions from the political economy of organizations (Zald, 1970). The deterministic view proposed by this theory is
that a firm’s behavior can be explained by looking at its context, allowing the
identification of patterns of environmental dependence (Davis & Powell, 1992).

In contrast to agency theory, which contends that boards serve a mainly monitoring
and control role, resource dependence theory argues that boards are vehicles that enable
firms to scan their environment to extract resources that will allow them to enhance their
performance and increase their legitimacy in society (Pfeffer, 1972, 1973; Price, 1963;
Provan, 1980; Zald, 1967). This signals a different role for boards as providers of critical
resources, such as legitimacy, advice and counsel, links with other organizations, and aid
in obtaining resources or commitments from important elements outside the firm
(Hillman, Cannella, & Paetzold, 2000; Pfeffer & Salancik, 1978). Availability of these
critical resources has many benefits for firms: it helps reduce their dependence on
external contingencies (Pfeffer & Salancik, 1978), decreases uncertainty (Pfeffer, 1972),
lowers transaction costs (Williamson, 1984), and ultimately aids their survival (Singh,
House, & Tucker, 1986).

Research on the validity of resource dependence theory’s predictions regarding
boards of directors has focused on various variables and their relationship with firm
outcomes, most notably directors’ resource-providing role (Galaskiewicz, 1985; Mizruchi
& Galaskiewicz, 1993; Penning, 1980; Scott, 1991; Zahra & Pearce, 1989), board size
and interlocks (Boyd, 1990), and board composition and power distribution.

Considerable empirical evidence supports the notion that resources provided by
board members have a positive impact on firm performance (e.g. Boyd, 1990; Carpenter
& Westphal, 2001; Certo, Daily, & Dalton, 2001; Hillman & Dalziel, 2003; Hillman,
Zardkoohi, & Bierman, 1999; Westphal, 1999). A direct interpretation of this evidence is
that it favors larger and more interlocked boards, because the larger the size of the board (Daily et al., 2002; Dalton et al., 1999; Goodstein et al., 1994; Hillman & Dalziel, 2003; Pfeffer, 1972) and its corresponding ability to be more interlocked (Bazerman & Schoorman, 1983; Burt, Christman, & Kilburn, 1980; Stearns & Mizruchi, 1993), the greater the firm’s ability to attract needed critical resources. However, some authors (Pfeffer & Salancik, 1978) warn against such a simplistic view, arguing that “too many ties to the environment may be as dysfunctional as too few” (Boyd, 1990: 421). This notion is consistent with the evidence of some studies adopting an agency theory perspective (discussed above), such as those by Judge and Zeithaml (1992) and Harrison (1987), which have shown that board involvement and interactions between individual members starts to decrease when boards get too large. In addition, consistent with the notion that boards reflect the firm’s environmental pressures and demands, Boyd (1990) found that in more uncertain environments, boards tend to be smaller but with more interlocked directors, particularly in the case of superior-performing firms. This is also consistent with Filatotchev and Toms (2003) and Hambrick and D’Aveni (1992), who have argued that board diversity and director interlocks may play an important role, particularly in crisis situations, because such board structures may generate more diverse networking opportunities for resource providers (Aguilera et al., 2008).

Regarding board composition, resource dependence research has focused on two main topics: the proportion of outside directors and power distributions within boards. In general terms, resource dependence theory predicts that a board’s composition is determined by a need to maximize the provision of necessary critical resources to the firm (Lynall et al., 2003). This increases the relevance of both independent and affiliated
outside directors (Afuah, 2000; Dalton & Daily, 1999) owing to their links with external resources. Regarding the distribution of power, and particularly the existence of duality, resource dependence theorists take a broader perspective than agency theorists, arguing that the agency problems associated with duality may, under certain circumstances, be mitigated by the advantages of having a CEO with the ability to provide important information to the outside directors about the firm’s performance (Finkelstein & D’Aveni, 1994).

**Stewardship theory.** Stewardship theory was developed as an alternative to agency theory, with roots in psychology and sociology. Its basic premises are that managers are motivated by a range of non-financial motives (Muth & Donaldson, 1998), such as advancement and recognition, intrinsic job satisfaction, respect for authority, and work ethic, and that managers are inherently trustworthy and not prone to misappropriating corporate resources (Donaldson & Barney, 1990; Donaldson & Davis, 1991). Thus, it argues that executives should be seen as stewards who are motivated to act in the best interests of their shareholders (Donaldson & Davis, 1991). In direct contrast to agency theory, the basic premise of stewardship theory is that, from the manager’s perspective, pro-organizational, collectivistic behaviors have higher utility than individualistic, self-serving behaviors (Davis et al., 1997). It does not necessarily assume that conflicts are entirely non-existent; it simply assumes that when minor conflicts of interest arise, managers would rather act as stewards (Davis, 2005; Deutsch, 2005; Donaldson & Barney, 1990) than as pure agents as defined by agency theory.

This brings a different perspective on board characteristics. Stewardship theory would argue that a board should be structured to allow more effective coordination
(Dulewicz & Herbert, 2004), leading to a preference for boards of directors dominated by insiders (Van den Berghe & Levrau, 2004) and, according to some interpretations (Dalton et al., 1998; Davis et al., 1997), for CEO–chair duality, because this eliminates ambiguity about who is responsible for the firm’s performance and facilitates the implementation of strategic decisions without fear of receiving contradicting instructions from the board (Davis et al., 1997).

According to stewardship theory, boards dominated by insiders “are favored for their depth of knowledge, access to current operating information, technical expertise and commitment to the firm” (Muth & Donaldson, 1998: 6), particularly in situations that are not highly threatening to the CEO, because tight control of CEOs may reduce their motivation to act in the best interests of shareholders (Davis et al., 1997). Deutsch’s (2005) meta-analysis provides some evidence to support these arguments, but again, the evidence favoring agency theory’s predictions, discussed above, directly contradicts the predictions of stewardship theory. Nevertheless, a few studies have found interesting results showing positive benefits arising from the presence of insider directors on boards. Ocasio (1994) found that boards with larger proportions of inside board members are linked to higher CEO turnover in organizations with deteriorating firm performance; Baysinger, Kosnik and Turk (1991) found that inside board members are positively related to some long-term-oriented investments, such as R&D; Kesner (1987) found a positive and significant relationship between the proportion of inside directors and returns to investors; and Muth and Donaldson’s (1998) analysis of 145 Australian companies supports stewardship predictions. In contrast, Judge and Zeithaml (1992)
found that high representation of insiders leads to lower board involvement in strategic decision making.

Having explained the origins, basic assumptions and empirical evidence relating to the three main theories on the relationship between boards and CEOs, the next section provides a more detailed review of specific characteristics of boards and board members that have an impact on their relationships with their CEOs, and particularly on what they think and do. It examines the different roles attributed to boards with regard to their relationship with the CEO, the different typologies of directors and how they have been associated with the different roles played by boards, the role of interlocking directorates as mechanisms for the diffusion of information among firms, and the role of status and power in social dynamics among board members and CEOs.

*What boards do: Their influence on their CEOs*

**Board roles.** As indicated in the previous section, the management literature has associated boards with different roles over time. In the early 1980s, the predominant approach was legalistic, associating board roles with their legally mandated responsibilities for service and control (Zahra & Pearce, 1989). The service role was associated with enhancing company reputation, establishing contacts with the external environment, and giving counsel and advice to executives (Carpenter, 1988; Louden, 1982), while the control role was associated with evaluating company and CEO performance to ensure corporate growth and protection of shareholders’ interests (Chapin, 1986; Louden, 1982). Zahra and Pearce (1989) proposed adding a third role of strategy, referring to boards’ role in defining the firm’s strategy. Finkelstein and Hambrick (1996) proposed a different triad: control, service and resource dependence. In
their view, the service role is associated with how boards provide advice to TMTs, including during strategy formulation, while the resource dependence role describes how boards provide access to critical resources (Chatterjee & Harrison, 2005; Finkelstein & Hambrick, 1996). Johnson et al. (1996) argued that service and control are two overlapping roles, and recommended that resource dependence rather than strategy should be considered as the remaining role. Many studies have considered a broad range of activities encompassed by the resource dependence role, including providing legitimacy (Selznick, 1949), providing expertise, including from internal directors (Baysinger & Hoskisson, 1990), providing advice and counsel (Lorsch & MacIver, 1989; Mintzberg, 1983), linking the firm to important stakeholders and other important entities (Burt et al., 1980; Hillman, Keim, & Luce, 2001), facilitating access to critical resources such as capital (Mizruchi & Stearns, 1988), diffusing innovation (Haunschild & Beckman, 1998), and aiding in strategy formulation and participating in other important firm decisions (Judge & Zeithaml, 1992; Lorsch & MacIver, 1989). Muth and Donaldson (1998) argued that the three dominant theories described above – agency, resource dependence and stewardship theory – determine the three primary board roles of managerial control, co-optation and managerial empowerment, respectively. More recently, Van den Berghe and Levrau (2004) identified six roles associated with boards, derived from the different theories previously described: a linking role (resource dependence theory), a coordinating role (stakeholder theory), a control role (agency theory), a strategic role (stewardship theory), a maintenance role (institutional theory) and a support role (managerial hegemony theory). Their evidence suggests that directors
place particular emphasis on the strategic and control roles (Van den Berghe & Levrau, 2004).

For the purposes of this study, it is sufficient to consider Dalton and Daily’s (1999) classifications of expertise and counsel, monitoring and control, and resource dependence, which are similar to the other proposed board role sets described above (Finkelstein & Hambrick, 1996; Johnson et al., 1996; Zahra & Pearce, 1989). Expertise and counsel refers to Johnson et al.’s (1996: 411) definition of “directors advising the CEO and top managers on administrative and other managerial issues as well as more actively initiating and formulating strategy”; the monitoring and control role relates to efforts focusing on protecting shareholder interests, and monitoring managerial and company performance on their behalf (Chapin, 1986; Ewing, 1979; Vance, 1983; Zahra & Pearce, 1989); and the resource dependence role refers to directors serving as environmental links to help deal with uncertainty and resource dependencies, while also bringing critical resources to the organization (Gales & Kesner, 1994; Hillman et al., 2000).

**Director types.** Over time, board members and directors have been categorized using various criteria. An early categorization was in terms of their employment arrangement with the firm, into insiders and outsiders. Insiders refer to directors, or officers, having a full-time job relationship with the firm, while outsiders refer to directors that do not meet this definition (Gevurtz, 2004). Rosenstein and Wyatt (1990) further split the latter group, classifying them as neutral (those with no economic affiliation with the firm), financial (those that contribute capital to the firm) or corporate (those with executive positions in other firms). A second categorization into
“independent” and “non-independent” entered the corporate lexicon in the 1970s (Gordon, 2007), which depends on the capability of each director to fulfill the monitoring role. Independent directors are those capable of solving three problems: enhancing the fidelity of managers to shareholder objectives; enhancing the reliability of the firm’s public disclosure; and providing a mechanism that binds the responsiveness of firms to stock market signals in a bounded way (Gordon, 2007). In the late 1970s, the Corporate Director’s Guidebook proposed a two-level distinction: “management” versus “non-management”, and “affiliated” versus “non-affiliated non-management” (ABA, 1978). Also, in 1978 the SEC proposed categorizing outside directors as “affiliated” or “independent” (Gordon, 2007). Non-management has also been referred to as non-executive directors, or NEDs (OECD, 2003; Roberts, McNulty, & Stiles, 2005). These criteria for classifying directors, particularly for research purposes, have been criticized and questioned (Johnson et al., 1996; Turnbull, 2014) for their lack of consistency, which has probably contributed to the many inconsistencies found in the board composition literature (Tuggle, 2004). Nevertheless, they remain useful for the purposes of this study, which uses Dalton and Daily’s (1999) triple categorization into inside directors, outside-affiliated directors, and outside-independent directors.

**Directorate interlocks.** Research on interlocking directorates, or interlocks, dates back to the early 1900s (Fennema & Schijf, 1979) and is still a topic of great interest in the management field. An interlocking directorship is present where one person is on the board of directors of two or more companies (Davis & Powell, 1992; Pettigrew, 1992; Chua & Petty, 1999). From a resource dependence perspective, interlocks serve four primary functions: they help in managing environmental uncertainty; they help the firm
to gain access to diverse skills and resources; they facilitate exchanges of information across firms (Palmer, 1983); and they provide legitimacy for the focal firm (Pfeffer & Salancik, 1978). These functions have an impact on the size of boards and their composition, including the number of interlocks. Pfeffer (1972) found that firms’ need for linkages to the environment affects their boards’ size and composition.

Various types of interlocks have been identified, most notably unidirectional versus bidirectional, and direct versus indirect. Unidirectional interlocks are those in which “a focal firm manager sits on the tied-to firm’s board, but no tied-to firm managers sit on the focal firm’s board” (Haunschild, 1993: 575); bidirectional interlocks, also called reciprocal or mutual interlocks (Fich, 2000), are those where a focal firm director sits on the tied-to firm’s board and a tied-to firm director sits on the focal firm’s board. For example, if the CEO of a focal firm sits on another firm’s board but no one from that tied-to firm sits on the board of the CEO’s firm, this would be a unidirectional interlock; whereas if someone from the tied-to firm’s board sits on the board of the CEO’s firm, this would be a bidirectional interlock. Direct interlocks are those created by people affiliated with the two interlocked firms, while indirect interlocks are created by people not affiliated with the two firms (Haunschild, 1993). The previous examples refer to direct interlocks, because the common factor between these two examples is the CEO of the focal firm, who is affiliated to one of the interlocked firms by being CEO of the focal firm. If the two firms were interlocked by the dean of a business school, the interlock would be indirect.

Scholarly literature on interlocking directorates, their antecedents and their consequences has been influenced by various theories (Beckman, 2010; Shropshire,
2010), most notably resource dependence theory (e.g. Pfeffer & Salancik, 1978), institutional theory (e.g. Haunschild & Miner, 1997), and embeddedness and social network theory (e.g. Granovetter, 1985). From a resource dependence perspective, interlocks have been seen as mechanisms for cooperation between firms and/or cooptation of an external contingency (Mizruchi & Stearns, 1994), and empirical research has provided evidence of this (e.g. Burt, 1983; Mizruchi & Stearns, 1988, 1994; Stearns & Mizruchi, 1993; Zahra & Pearce, 1989). From an institutional theory perspective, interlocked firms imitate each other following normative, coercive and mimetic pressures (Shropshire, 2008), as interlocks are seen as sources of legitimacy (Davis, 1991; DiMaggio & Powell, 1983). Embeddedness and social network theory build on resource dependence theory, stating that the relational nature of firm linkages helps reduce environmental uncertainty by facilitating access to information (Gulati & Westphal, 1999; Shropshire, 2008). This affects firms’ behavior (Granovetter, 1985), decision making and responsiveness (Davis, 1991; Kraatz, 1998; Mizruchi, 1996; Rao, Davis, & Ward, 2000; Westphal, Seidel, & Stewart, 2001), and thereby affects board formation and composition (Lynall et al., 2003).

The relevance of interlocks evidently relates to their consequences, and research around this topic has been extensive. With regard to the diffusion of information, there is some evidence (e.g. Burt et al., 1980; Useem, 1984) that interlocks play an important role in its dissemination across firms, leading to the adoption of practices such as poison pills (Davis, 1991), mergers and acquisitions (Haunschild, 1993), campaign contributions (Mizruchi, 1992) and organizational structures, including adoption of multidivisional forms (Palmer, Jennings, & Zhou, 1993) and CEO compensation packages (O’Reilly,
Main, & Crystal, 1988). There is also evidence that interlocks help in securing preferential access to critical resources (e.g. Boeker & Goodstein, 1991; Mizruchi & Stearns, 1994). Of particular relevance to this study, and consistent with findings on the role of interlocks in information diffusion, Westphal and Zajac’s (1995, 1997; Zajac & Westphal, 1996) studies of the diffusion of board independence through interlocks reveal that practices actually spread or diffuse through direct interlocks, with a moderating effect of actors, as well as intra- and inter-organizational conditions. Westphal et al. (2001) also found that certain decision methods are diffused through interlocking directorates, so firms will align with their industry’s strategic norms and standards. Also relevant to this study are results suggesting that executives’ external ties influence their future strategy formulation and subsequent firm performance (e.g. Eisenhardt & Schoonhoven, 1996; Geletkanycz & Hambrick, 1997).

**Status and power.** Two variables – status and power – are particularly relevant to processes and social dynamics at the highest level of any firm. Status is an intangible asset, closely related to other constructs such as reputation and celebrity (Perryman, 2008). D’Aveni and Kesner refer to prestige as “the property of having status … due to membership in elite social circles” (1993: 121). Fralich (2012) argues that status is just one aspect of prestige, along with power, while Podolny considers status as “an actor’s position in a hierarchical order” (Podolny, 2005: 13). Other authors (Graffin & Ward, 2010) argue that status is conceptually different from reputation, the former being a “fundamentally relational concept” (Washington & Zajac, 2005: 286), which implies that it depends heavily on the focal actor’s position in a network of affiliations and beliefs (Gould, 2002; Podolny, 1994; Ridgeway & Correll, 2006). Status is determined by
personal characteristics such as age, experience, rank, education, social networks and other socially significant characteristics (Fralich, 2012), and is considered to be highly resistant to change (Washington & Zajac, 2005). Some personal characteristics are associated with managerial abilities, which in the case of CEOs may affect boards of directors’ perceptions (Khurana, 2001). Although various studies in the governance literature have examined the role of status, they have tended to focus on its role in TMTs (Graffin et al., 2008), its impact on organizational behaviors such as fraud (Rijsenbilt & Commandeur, 2013), and the burden of celebrity (Wade et al., 2008). Unfortunately, research on the role of status in board dynamics remains scarce, focusing mainly on the advantages of status to board members (Yermack, 2004).

Regarding power, most of the literature on CEO–board power centers around the distribution of power within boards, and particularly through one of its expressions, duality. Duality refers to the same person holding the positions of CEO and chairman of the board (Baliga, Moyer, & Rao, 1996; Gavin, 2010; Rechner & Dalton, 1989) and is one of the most controversial topics in the corporate governance literature (Lam & Lee, 2008). Although it has witnessed a downward trend in corporate America, it is still somewhat pervasive. In 1987, it was present in close to 80 percent of companies (Kesner & Dalton, 1986), whereas in 2012 the figure was 57.2 percent (Coombes & Wong, 2004). This is significantly different from other industrialized countries, such as Japan (Dalton & Kesner, 1987; Kesner & Dalton, 1986) and the United Kingdom (Daily & Dalton, 1997), drawing strong criticism that performance and shareholder returns are negatively affected (Kesner & Dalton, 1986).
With regard to antecedents of duality, there is evidence that the likelihood of duality increases as the number of outsiders on the board increases (Finkelstein & D’Aveni, 1994). As discussed in the previous section, there are certain theoretical differences of opinion regarding duality. While agency theorists argue for separation of the CEO and board chair positions, thereby avoiding domination of the board and increasing the latter’s ability to monitor managerial opportunism (Dalton et al., 1998; Mallette & Fowler, 1992; Lam & Lee, 2008), proponents of stewardship theory argue in favor of duality, allowing for the concentration of control in the hands of the TMT, particularly in times of crisis (Dalton et al., 1998) when performance is low (Elsayed, 2007). Empirical evidence for the duality–performance relationship is equivocal. Rechner and Dalton (1991) found that firms without duality out-perform firms with duality with regard to ROE, ROI and profit margin; Daily and Dalton (1994a) found a positive relationship between bankrupt firms and duality; Harris and Helfat’s (1998) review of 13 studies found that 10 showed either a positive or null relationship; and Dalton et al. (1998) found no relationship at all in their meta-analysis. With regard to other effects of duality beyond firm performance, it has been shown that duality has a positive effect on CEO compensation (Conyon & Peck, 1998), CEO succession (Cannella & Lubatkin, 1993; Park & Goyal, 2002), earnings management (Davidson et al., 2004), and increases in CEOs’ power relative to the board (Cannella & Lubatkin, 1993; Finkelstein & D’Aveni, 1994).

Other studies of CEO–board power have examined the effect of director tenure/turnover on firm performance. Boards with low turnover have shown a relationship with higher levels of cohesiveness, which is associated with groupthink
(Janis, 1972), lessening the board’s ability to supervise and monitor the CEO’s actions and decisions (Vafeas, 2003), and making the board more lenient in decisions regarding CEO compensation packages (Canavan, Jones, & Potter, 2004), which may be associated with an increase in the relative power of the CEO over the board.

A recent stream in the literature on boards and their effect on CEOs, though very limited so far, refers to cognitive processes affecting their relationship. As this line of research is at the core of this study, the next section provides a more detailed review of the literature on managerial cognition and attention. Subsequent sections will then review the literature on CEO attention (focusing particularly on environmental scanning), and explain how these two literatures are integrated in this study.

**Managerial cognition and attention**

The concepts of managerial cognition and attention are rooted in cognitive psychology, which emerged when American researchers began to overthrow behaviorism in the late 1950s in favor of a model of mind based on the computer (Smith, 2001). The rise of cognitive psychology, which took its name from the title of Ulric Neisser’s (1967) book, resulted from three research approaches external to the field of psychology (Smith, 2001). The first was the “information processing” approach (Shannon, 1948), according to which cognition can be understood as a “flow of information within the organism” (Smith, 2001: 2140). Building on this approach, Broadbent (1958) proposed a model of selective attention, along with a model of the transfer of information from short- to long-term memory, the latter becoming the basis for dual-memory models developed in the 1970s (Smith, 2001).
The second approach was computer modeling, which resulted from the work of those like Alan Newell and Herbert Simon (1972) who, having developed computer programs that displayed human-like general problem-solving skills, argued that computer programs offered detailed models of human problem solving. Their work led to the idea of human information processing as sequences of computational processes operating on mental representations (Miller et al., 1960).

The third approach was Noam Chomsky’s (1957, 1959) development of generative grammar in linguistics. His work further undermined behaviorism as a serious scientific approach to psychology. All these approaches leading to the “cognitive revolution” brought various new strands of research around cognition and attention, such as pattern recognition (e.g. Crowder & Morton, 1969; Neisser, 1967; Sperling, 1960), memory models (e.g. Atkinson & Shiffrin, 1968; Sternberg, 1966, 1969), and psycholinguistics (e.g. Miller, 1962; Collins & Quillian, 1969).

In the early 1970s, an interdisciplinary movement called “cognitive science” evolved from the intersection of the fields of memory, linguistics, information processing, and even artificial intelligence (Smith, 2001). Cognitive science research has since focused on two major computational models, the “connectionist” or “parallel distributed processing” model (e.g. Hinton & Anderson, 1981; McClelland & Rumelhart, 1981), and cognitive neuroscience (e.g. Posner et al., 1988).

Eventually, concepts such as cognition, cognitive frameworks, knowledge structures, attention and many others, gained attention in management research (Walsh, 1995), including areas such as strategic decision making (e.g. Axelrod, 1976; Schwenk, 1988; Stubbart, 1989), performance appraisals (Gioia, Donnellon, & Sims, 1989), power
(Bartunek & Ringuest, 1989) and leadership (Lord & Maher, 1991). Over the last couple of decades, researchers have tried to understand organizations, their flows of information and the processes associated with decision making. Organizations have been described in many ways, relating to cognitive concepts from information processing systems (Galbraith, 1977; Tushman & Nader, 1978), bodies of thought and sets of thinking practices (Weick, 1979), interpretive systems (Daft & Weick, 1984), and even ‘minds’ (Sandelands & Stablein, 1987).

This relationship between cognition and strategy is natural because strategies are said to be manifested in both cognition and action (Gavetti & Rivkin, 2007). Hedberg and Jonsson (1977: 90) argue that strategies reflect “the more or less well integrated sets of ideas and constructs through which problems are spotted and interpreted, and in which actions are invented and selected.” Cognition plays a key role in each stage of the strategic decision process, including goal formulation, environmental analysis, strategy formulation, evaluation and implementation, and strategic control (Stubbart, 1989). This affects organizational outcomes, as evidenced by various empirical work (e.g. Acha, 2002; Holbrook et al., 2000). From a more detailed perspective, some authors have examined the role of top managers’ cognition in explaining differences in strategic action and organizational performance (Donaldson & Lorsch, 1983; Thomas, Clark, & Gioia, 1993), including more specifically the role of top managers’ attention (Cho & Hambrick, 2006; Ocasio, 1997). Various empirical evidence supports this notion (e.g. Barr, 1998; Barr et al., 1992; Garud & Rappa, 1994; Kaplan et al., 2003; Tripsas & Gavetti, 2000; Walsh, 1988). This relationship between cognition and strategy has also been analyzed from the perspectives of capability development (e.g. Adner & Helfat, 2003; Helfat &
Peteraf, 2003) and interpretation of environments (e.g. Daft & Weick, 1984; Sims & Gioia, 1986; Smircich & Stubbart, 1985). Some argue that managerial cognition is particularly relevant in the early stages of developing capabilities such as management’s sensemaking and organizational information processing, which are needed for an organization to react to or cause change (Barr et al., 1992; Cyert & March, 1992; Ocasio, 1997; Walsh, 1995; Weick, 1995). This position extends to the dynamic capabilities view, which sees managerial cognition as one such capability (Eggers & Kaplan, 2009).

Research on managerial cognition and its relationship with strategy has so far focused on two types of cognitive phenomena (Durand, Mounoud, & Ramanantsoa, 1996; Ginsberg, 1990): cognitive or knowledge structures, which represent and contain knowledge; and cognitive processes, which refer to how knowledge is selected, organized, transformed, stored and utilized (Schneider & Angelmar, 1993). Research on cognitive or knowledge structures has focused mainly on concepts such as beliefs, schemas, categories, plans, scripts, frames, and cognitive or mental maps or models (Carpenter et al., 2010; Dirsmith & Covaleski, 1983; Eden, Ackermann, & Cropper, 1992; Huff, 1990; Porac, Thomas, & Baden-Fuller, 1989; Stubbart, 1989; Walsh, 1988), while research on cognitive processes has focused on the effect of judgmental heuristics, inference making and sensemaking on strategic decisions (Bateman & Zeithaml, 1989; Duhaime & Schwenk, 1985). The concept of knowledge structures (Angriawan & Abebe, 2011), which is central to theory-driven information processing (Walsh, 1995) and is synonymous with schemas (Nadkarni & Narayanan, 2007) and cognitive bases (Hambrick & Mason, 1984), is defined by Walsh (1995: 286) as “mental templates consisting of organized knowledge about an information environment that enables
interpretation and action in that environment,” Such templates help managers to process new, though not novel, information (Walsh, 1995), or information considered relevant to goal achievement (Fiske & Taylor, 1991; Sutcliffe & Huber, 1998). Knowledge structures are developed over time through inference, analogy (Gavetti, 2005), vicarious learning (Johnson-Laird, 1983), experience and direct communication from others (Fiske & Taylor, 1991), and are typically considered to be the first step in studying managerial cognition (Walsh, 1995). Knowledge structures have been found to allocate attention (White & Carlton, 1983) and facilitate encoding (Cohen, 1981) and retrieval from memory (Anderson & Pierre, 1978), and thus help to interpret experience (Bower, Black, & Turner, 1979), provide a basis for inference (Langer & Abelson, 1974; Snyder & Uranowitz, 1978) and speed problem solving (Taylor, Crocker, & D’Agostino, 1978).

Several types of knowledge structure have been identified by researchers, including categories and their representative prototypes (Cantor & Mischel, 1977; Rosch, 1978), scripts (Abelson, 1976; Bower et al., 1979; Schank & Abelson, 1977) and frames (Minsky, 1975). Knowledge structures have two distinct features: complexity and focus (Baum & Wally, 2003; Eden et al., 1992; Nadkarni & Narayanan, 2005). Complexity refers to their content in terms of the variety and interconnectedness of concepts (Walsh, 1995), and managers’ complex knowledge structures have been shown to benefit firms (McNamara, Luce, & Tompson, 2002; Nadkarni & Narayanan, 2007). Focus refers to the extent to which a particular knowledge structure is centered around a few core schemas (Nadkarni & Perez, 2007) or dominating factors in the knowledge structure (Angriawan & Abebe, 2011).
Regarding cognitive processes, the concept of sensemaking has been said to encompass the cognition–action processes of environmental scanning, interpretation and associated responses (Gioia & Chittipeddi, 1991; Weick, 1979). Weick has described it as a process by which individuals compare cues extracted from the present with their mental models (Abelson, 1976; Fiske & Taylor, 1991) based on past experiences. When those cues do not match their mental models, cognitive dissonance is produced, triggering sensemaking. The process of environmental scanning is discussed further below.

**Managerial cognition and the concept of bounded rationality**

According to cognitive psychology, cognition refers to “representational structures in the mind and computational algorithms that operate on those structures” (Thagard, 1996: 10). Gavetti and Levinthal (2000: 113) provide a less information theory-based definition: “a forward-looking form of intelligence that is premised on an actor’s beliefs about the linkage between the choice of actions and the subsequent impact of those actions on outcomes.” As an alternative to behaviorism, cognition, and particularly social cognition (Fiske & Taylor, 1991), attracted increasing research interest in the 1970s, resulting from a fascination with information theory (Shannon & Weaver, 1949) to explain how humans acquire, store and retrieve information from their memory (Lord & Maher, 1991).

According to Stubbart (1993), “the cognitive movement was chiefly motivated by the limitations and failures of behaviorism to sufficiently explain the relationship between environment, mind and behavior.”

Simon (1957) introduced the concept of bounded rationality, suggesting that humans have limited attentional and processing capacity, forcing them to construct simplified models of reality using only a limited portion of the information available (Durand et al.,
March and Simon (1958) and Cyert and March (1992) established the tradition of what is referred to as the “Carnegie School”, which emphasizes the cognitive limitations of individual decision makers (Jacobides, 2006). The application of Carnegie School concepts to organizational environments led to the emergence of the concept of managerial cognition, which refers to the set of managerial beliefs and mental models that serve as a basis for decision making (Walsh, 1995). The cognitive base for such decision making relates to knowledge or assumptions about future events, alternatives and the consequences of those alternatives (Adner & Helfat, 2003). Managerial cognitive representations have been shown to be critical in managerial decision making and action (Fiol & Huff, 1992; Huff, 1990; Walsh, 1995).

Managerial cognition research has been based on a set of underlying assumptions: first, a large proportion of what managers contribute to firm performance relates to how they filter, sort, absorb and process ambiguous and complex information (McCall & Kaplan, 1985; Mintzberg, Raisinghani, & Théorêt, 1976; Starbuck & Milliken, 1988); second, managers’ mental models determine what information is relevant and guide action (Nisbett & Ross, 1980); and third, managers have cognitive limitations that hinder their ability to filter the information they receive (March & Simon, 1958; Miller, 1956).

The concept of bounded rationality, introduced initially by the Carnegie School, has two characteristics of relevance to research on this topic: first, it implies a restriction in the amount of information managers can process, creating a bottleneck effect (Daft & Weick, 1984; Feldman & March, 1981; Galbraith, 1973); and second, it places a constraint on the amount of information that can be retained and accessed (Amit & Schoemaker, 1993; Feldman & March, 1981). These characteristics are said to create a
need for managers to perform cognitive simplifications through the use of heuristics to facilitate information processing and strategic decision making (Johnson & Hoopes, 2003). Research on this topic reveals that cognitive simplification may be affected by managers’ value systems and cognitive biases (Hambrick & Mason, 1984; Hambrick & Snow, 1977), otherwise referred to as a dominant logic (Prahalad & Bettis, 1986; Prahalad & Hamel, 1990). It has been shown that cognitive simplifications are performed by employing knowledge structures that may sometimes be quite complex (Duhaime & Schwenk, 1985), allowing managers to represent their informational worlds, and facilitating their processing of information and decision-making processes (Kiesler & Sproull, 1982; Walsh, 1995). Of particular interest to this study is the representativeness heuristic, described initially by Tversky and Kahneman (1974) and later explained by Schwenk (1984: 120) as causing:

...a decision-maker to overestimate the extent to which a situation or sample is representative of the situation or population to which he wishes to generalize. This process may be responsible for the fact that decision-makers tend to view strategic decisions in terms of simple analogies. It also causes them to overestimate the extent to which the past is representative of the present and the extent to which solutions offered for problems in the past will be of value in the present problem.

Empirical evidence for bounded cognition and the resulting cognitive simplification is quite strong: “experimental research from several fields has shown that the bounds of rationality are very narrow indeed” (Stubbart, 1989: 338). Fiske and Taylor (1991) describe human information processors as “cognitive missers.” Yet, the use of heuristics has proven not to be free of negative implications, which have been extensively researched. It may sometimes lead to biases (Barnes, 1984; Durand et al., 1996; Stubbart & Ramaprasad, 1990), such as the illusion of control, the availability bias, hindsight bias, judgments of correlation and causality bias, and even representativeness bias. These are
often based on cause–effect assumptions (Durand et al., 1996) through the use of analogies (Huff, 1982) or metaphors to relate new problems to old ones (Bogner & Barr, 2000). Dozens of heuristic rules have been found to play a major role in managers’ mistakes and biases, even in very simple information-processing tasks (Hogarth, 1980; Kahneman, Slovic, & Tversky, 1982). Even scientists have proven to be vulnerable to cognitive simplification and errors (Kuhn, 1970; Nisbett & Ross, 1980). In fact, heuristic inferences may be a serious threat to managerial decision making (Stubbart, 1989), as shown by various authors (e.g. Argyris, 1985; Barnes, 1984; Duhaime & Schwenk, 1985; Fahey & Narayanan, 1986; Kiesler & Sproull, 1982; Ramaprasad & Mitroff, 1984).

According to Stubbart (1989: 339), “such findings imply that strategists’ reliance on simple, flawed, and biased inferential heuristics in making strategic decisions might be the culprit behind strategic decision errors.”

*Cognition as a social phenomenon*

One stream of the literature on cognition has focused on its characteristic of being the result of social activity (Fleck, 1938). Levine et al. (1993: 599) state that it is “almost always collaborative.” This is acknowledged in Walsh’s (1995) review of the literature on managerial cognition, in which he identified two main topics: knowledge structures and social capital. In this respect, Massingham (2013) later acknowledged that mindsets are influenced by social identity, building on Meyer, Becker, and Van Dick’s (2006: 667) argument that mindsets may include cognitive awareness of “membership in a collective.”

A major stream of research has focused on how cognition and social processes interact (Langfield-Smith, 1992), which is particularly relevant to research on teams’
shared mental models (Cannon-Bowers, Salas, & Converse, 1990, 1993). This is important because teams that have similar or shared mental models are associated with enhanced team performance (Bolstad & Endsley, 1999; Cannon & Edmondson, 2001; Espinosa et al., 2007; Lim & Klein, 2006; Mathieu et al., 2000; McComb, 2007; Reagans, Argote, & Brooks, 2005) and team effectiveness (Carpenter et al., 2010), even if only two team members show similarity of knowledge structures, whereas teams with widely differing mental models are associated with process loss, lack of coordination and ineffectiveness (Mathieu et al., 2000). According to Walsh (1995), groups generate shared cognitive maps resulting from certain social processes. At the individual level, as a result of these social processes, cognitive frameworks are affected by interactions with other members of the group, leading to the emergence of commonly-shared ideas or concepts (Bogner & Barr, 2000), which may eventually take on an existence of their own (Wiley, 1988) in the form of “shared belief systems.” These provide a common framework that influences how new stimuli are noticed and interpreted, and appropriate action taken (Gilbert, 1989; Kelly, 1955). During these interactions among members of a group, social influence has been shown to have an impact on the formation of individual cognition and on decision making (Walsh, 1988), insofar as teams with more diverse cognitive perspectives tend to exhibit greater levels of cognitive complexity (Fiol, 1994; March, 1991).

Furthermore, cognition as a social phenomenon has been extended to the concept of sensemaking, discussed above, which has been described as a social construction process (Berger & Luckmann, 1967). Since sensemaking implies interpretation and enacting, sensemaking research has focused on intersubjective phenomena (Louis, 1983) such as
verbal expressions and written documents (Gephart, 1997) that eventually serve as a basis for interpreting the world.

Attention as an expression of cognition

From a psychological standpoint, attention has been considered to be a special, more deliberate form of cognition (D’Andrade, 1995). For example, studies investigating the processes of problem recognition (Cowan, 1986) and sensing (Kiesler & Sproull, 1982) have considered attention as a collection of “relatively tacit psychological mechanisms that activate, buffer, or guide managers in their strategic thoughts” (Bouquet, Morrison, & Birkinshaw, 2009: 109–110). From an organizational standpoint, early conceptualizations defined attention as a set of elements, such as events, trends, ideas and categories that occupy the consciousness of managers (Dutton, Walton, & Abrahamson, 1989; Fiske & Taylor, 1991). As discussed below, Ocasio (1997; Ocasio & Joseph, 2005) extended this concept, building on Simon’s (1947) ideas around bounded rationality and selective attention, as well as on Kahneman’s (1973) ideas on two underlying concepts: attention selection and attention intensity.

Attention implies awareness as well as cognitive focus (Gerstner et al., 2013), which in turn implies some level of information processing. Some authors have suggested that managers participate in information-processing sequences consisting of three steps: attention, interpretation and action (Abrahamson & Fombrun, 1994; Daft & Weick, 1984; Dutton & Duncan, 1987). The first is the action of attending to certain facets of the environment while ignoring others (Sproull, 1984), the second implies that information that is the focus of attention is interpreted so it becomes structured and has meaning (Daft & Weick, 1984), and the third implies that the resulting interpretation affects managers
Attention, as a cognitive construct, is also considered to be socially embedded (Bouquet et al., 2009). According to Ocasio (1997), it is intrinsically linked with managers’ immediate context, as they receive information through various procedural and communication channels, structural networks of relationships and institutional influences. Nevertheless, “the effects of the social structure on the channeling and distribution of decision-makers’ attention have been greatly deemphasized if not lost” (Ocasio, 1997: 188).

**Attention at the highest level of organizations.** A particular stream of literature on attention examines its role in various organizational dynamics and outcomes. Such research usually works on the premise that most organizational members have very limited spans of attention (Yu, Engleman, & Van de Ven, 2005), and that organizational members have incomplete knowledge of the alternatives available, which ultimately results in bounded rationality (Simon, 1947). Various organizational characteristics have been shown to channel the attention of boundedly rational individuals, including divisions of labor, systems of authority, channels of communication and structural definitions (Yu et al., 2005). Hierarchy has been shown to play a role in this distribution of attention. TMTs may play a key role in providing meaningful interpretations of reality and in influencing organizational outcomes, including CEOs (Barr et al., 1992; Dutton & Duncan, 1987; Dutton, Fahey, & Narayanan, 1983; Dutton & Jackson, 1987; Eggers & Kaplan, 2009; Kaplan, 2008; Nystrom & Starbuck, 1984; Ocasio, 1997). Ocasio (1997: 188) eventually argued that attention and interpretation are so intertwined that there is no meaningful distinction between them.
puts it succinctly: “The most critical players in attention regulation are typically the CEO and the top management group.” Perhaps for this reason, research on the role of different players in shaping organizational attention has focused on the CEO and the TMT (Cho & Hambrick, 2006; Eggers & Kaplan, 2009; Hambrick & Mason, 1984; Kaplan, 2008; Kaplan et al., 2003; Yadav et al., 2007), with a significant lack of research on the role of boards of directors. Appendix A summarizes the empirical work around managerial cognition and attention at the highest levels (TMT, CEO and board level), including their corresponding antecedents and consequences.

At the TMT level, research on TMTs’ atten
tional patterns shows that managers tend to focus their attention on topics or domains that they deem most relevant (Cho & Hambrick, 2006; Nadkarni & Barr, 2008) and that confirm their prior beliefs about the world (Einhorn & Hogarth, 1978; Staw & Ross, 1978). Some evidence supports the notion that TMTs exhibit a more strategic, shared and integrated understanding of the environment than lower-level managers (Hodgkinson & Johnson, 1994; Lyles & Schwenk, 1992; Sackmann, 1992).

At the CEO level, it has been established that CEOs face competing claims on their attention (Hambrick & Abrahamson, 1995; Hambrick & Mason, 1984; Smith & Tushman, 2005), including demands from their shareholders, boards, management teams and other stakeholders, through formal and informal channels such as management information systems and even the media. The amount of information received and processed by CEOs is sometimes significantly higher than that received by their boards and their management teams (Provan, 1991). Nevertheless, CEOs’ focus of attention seems to determine to a high degree their organizations’ focus of attention (Bashinski &
Bacharach, 1980; Bonnel, Possamai, & Schmitt, 1987; Downing, 1988; Tushman & Rosenkopf, 1996). Given the relevance of where CEOs focus their attention, a more detailed review of research on this topic is due, particularly in terms of their antecedents and consequences. As can be seen from Appendix A, empirical studies focusing on CEOs’ cognitive- or attention-related variables can be divided into four major groups: first, studies focusing on environmental scanning (Angriawan & Abebe, 2011; Barr et al., 1992; D’Aveni & MacMillan, 1990; Daft et al., 1988; Garg et al., 2003; Sawyerr, 1993; Thomas et al., 1993; Yadav et al., 2007); second, those focusing on causal reasoning, interpretation, sensemaking and attribution (Bettman & Weitz, 1983; Clapham & Schwenk, 1991; Gioia & Chittipeddi, 1991; Hooghiemstra, 2010; Thomas & McDaniel, 1990); third, those giving specific attention to certain topics, industries or sectors (Collinson & Houlden, 2005; Eggers & Kaplan, 2009; Kaplan, 2008); and fourth, those focusing on characteristics of CEOs’ cognitive capabilities (Calori et al., 1994; Gary & Wood, 2011; Iederan, Curseu, & Vermeulen, 2009; Kaplan et al., 2003; Kern, 2006).

At the board level, it is important to remember that it has been established that boards have many responsibilities and roles competing for their attention (Tuggle et al., 2010b), and they too must choose where they focus their attention. Nevertheless, few studies have examined cognition or attention at the board level, probably because the domain of board cognition is considered to be a “black box” (Haleblian & Rajagopalan, 2006) owing to the difficulty of gaining access to the boardroom. Some authors have found ways to overcome this difficulty. These have focused mainly on how boards allocate their attention (Tuggle, 2004), how involved they are in the strategic decisions of their firms (Judge & Zeithaml, 1992; Pugliese & Wenstøp, 2007), and the degree to
which they generate interactions associated with their roles of advising and counselling the TMT (Westphal, 1999) and monitoring performance (Tuggle et al., 2010a).

Antecedents of board-level cognition and attention can be categorized into four groups: individual properties (demographics) such as functional backgrounds (Tuggle et al., 2010a); board composition variables such as size (Judge & Zeithaml, 1992), diversification (Judge & Zeithaml, 1992; Tuggle et al., 2010a) and the proportion of insiders versus outsiders (Judge & Zeithaml, 1992); the board’s social dynamics such as CEO–board friendship ties (Westphal, 1999), the proportion of directors appointed after the CEO (Westphal, 1999), duality (Tuggle et al., 2010b) and fault line strength (Tuggle et al., 2010a); and performance feedback (Kim, 2011) and the alignment of incentive systems (Westphal, 1999).

Theoretical lenses used to study cognition and attention

Various theories have been invoked by researchers to study attentional structures, processes and outcomes (Ocasio, 2011). Most, if not all, have tended to share two main assumptions about the nature of human information processing (Kiesler & Sproull, 1982): first, individuals have a limited capacity to process the information they receive and perceive (Miller, 1956; Simon, 1947); and second, the cognitive processes of perceiving, encoding, storing, retrieving and inferring require different levels of attention, effort and mental activity (Kahneman, 1973; Norman, 1976). Kiesler and Sproull (1982) suggest thinking about this in terms of a continuum, at one end of which are automatic processes that are relatively unaffected by environmental or organismic conditions, while at the other end are highly sophisticated processes that are affected by such conditions, such as personal intention, learning and social influence. The next sub-sections briefly review the
main theories used to study managerial cognition, including upper echelons theory, the attention-based view and the resource-based view.

**Upper echelons theory.** Hambrick and Mason (1984) established the foundations of upper echelons theory (UET), building on the previously discussed concept of bounded rationality (Cyert & March, 1992; March & Simon, 1958) and based on a premise that managers “make choices through highly personalized lenses, which are an outgrowth of their experiences, values, personalities, and other individual factors” (Gerstner et al., 2013: 261). This means that UET is mainly a theory of information processing, as managers process information available to them through their personal construals (Cho & Hambrick, 2006).

Besides the basic principle on which this theory was built, it has two central tenets: first, managers’ values and cognitive biases will affect their strategic choices, and ultimately their organizational outcomes; and second, since these values and cognitive biases cannot be directly observed and are difficult to measure (Carpenter, Geletkanycz, & Sanders, 2004), they can be revealed by observing personal characteristics such as age, educational level, socioeconomic roots, functional background and financial position (Hambrick, 2007; Hambrick & Mason, 1984). In other words, UET argues that firms and their performance are a reflection of their TMTs, recognizing that managers are ultimately responsible for strategic decision making, interpretation and enacting (Daft & Weick, 1984; Smircich & Stubbart, 1985).

Much UET research has focused particularly on the influence of CEOs on organizational outcomes (Gerstner et al., 2013), not because they are the sole strategic decision makers, interpreters or enacters, but because of their key role in accepting or
rejecting strategic ideas advanced by other members of the organization, and in influencing strategy through the creation or modification of contexts that allow for the generation and promotion of such proposals (Bower, 1970; Burgelman, 2002).

Extending previous ideas, from an attention perspective, this theory would argue that observable and cognitive characteristics of executives, including their limited cognitive capacity, significantly influence their focus of attention (Angriawan & Abebe, 2011), and ultimately the types of decisions they make (Carpenter et al., 2004). To deal with these limitations, executives tend to search for information and pay attention to objects and events that “fit” their characteristics and idiosyncrasies (Dearborn & Simon, 1958; Thomas, Litschert, & Ramaswamy, 1991). This also extends to boards (Tuggle et al., 2010a).

The empirical evidence shows some level of support for UET. From a general managerial perspective, some authors (e.g. Carpenter et al., 2004; Finkelstein & Hambrick, 1996) have shown that managers’ background characteristics influence their attention, information search and decision-making patterns (Angriawan & Abebe, 2011). For example, Cho and Hambrick (2006) found that differences in what managers look at, notice and interpret, and in the weights they give to contradictory stimuli (Ocasio, 1997), triggered by differences in pay plans, lead to different strategies. With regard to CEOs, in particular, age and education may relate to the implementation of certain corporate financial policies (Bertrand & Schoar, 2003), and there is evidence of the impact of CEOs’ personality on TMT dynamics (Peterson et al., 2003).

Nevertheless, in common with the other theories under scrutiny, UET has also been criticized, mainly because demographic characteristics cannot capture context-specific
interpretations of particular situations (Kaplan, 2008), and are considered weak approximations of cognition (Barr et al., 1992; Markoczy, 1997). Criticism also arises from the fact that researchers have sometimes ignored other significant determinants, such as corporate governance and organizational structure (Carpenter et al., 2004), as well as situational context (Ocasio, 1997).

**Attention-based view.** As discussed earlier, Carnegie School theorists have argued that managers are boundedly rational, and are influenced by their personal selective perceptions in making decisions (Cyert & March, 1992; March & Simon, 1958). Building on these notions, UET theorists (Hambrick & Mason, 1984) suggested that managers are influenced by their personal cognitive bases and values when making decisions. Then, almost half a century after the publication of Simon’s (1947) original publication, Ocasio (1997) incorporated into this view the current understanding of social structures, environmental influences, and individual and social cognition (Daft & Weick, 1984), arguing that firm behavior is the result of how firms channel and distribute the attention of decision makers. On this basis, he defined attention as “the noticing, encoding, interpreting, and focusing of time and effort by organizational decision-makers on both (a) issues: the available repertoire of categories for making sense of the environment ... and (b) answers: the available repertoire of action alternatives” (Ocasio, 1997: 189). This gave rise to the attention-based view (ABV).

Ocasio’s (1997) model focuses on six fundamental components that play a role in the allocation of attention: (1) the environment of the decision; (2) the repertoire of issues and answers; (3) procedural and communicational channels; (4) the firm’s attention structures; (5) decision makers; and (6) organizational moves. These six components
form a framework built on three main principles (Tuggle, 2004). The first is focus of attention, also called selective attention (Tuggle et al., 2010b): decision makers’ actions typically focus on the issues to which they pay attention. The second, situated attention, means that the issues and answers on which decision makers focus, and what they do, depend on the situation in which the decision making is embedded. The third principle is the structural distribution of attention: in other words, organizational structures influence the issues that come to decision makers’ attention, their options and the actions they take (Yu et al., 2005).

Focus of attention, also referred to as selective attention, results from the attentional limitations of managers, which restricts them to focusing their attention on only a limited set of issues and answers, with a corresponding effect on what they do (Gebauer, 2009). Ocasio (1997) argued that the focus of attention is affected more by characteristics of the situation than of the decision maker. Going further, Ocasio (2001) and Weick (1979) posited that the focus of attention is driven more by the enactment of the situation in the environment than by its objective characteristics. In any case, the situation is presented as a stronger determinant of focus of attention, influencing the next principle. Situated attention posits that managers’ attention is situated within the firm’s procedural and communication channels through which they interact (Gebauer, 2009). Structurally distributed attention refers to the notion that how managers think and attend to an event is a social and cultural process shaped by the rules, resources, players and social positions of the firm (Ocasio, 1997). All three principles are thought to be based on cognitive processes that reflect managers’ mental models (Cho & Hambrick, 2006; Miller, Burke, & Glick, 1998).
Ocasio’s (1997) ABV suggests that top executives play a critical role in attention regulation within organizations. However, he does not go so far as to hypothesize about the influence of specific executive characteristics on that regulation (Cho & Hambrick, 2006). This explains why empirical research has often focused on factors of specific importance to the decision makers of interest, such as TMTs and CEOs (Bouquet & Birkinshaw, 2008; Cho & Hambrick, 2006; Kaplan, 2008; Yadav et al., 2007; Yu et al., 2005), while empirical research on directors remains scarce. Tuggle et al. (2010b) argue that, from an ABV perspective, firm performance and duality are especially relevant factors when considering directors’ attention to monitoring, the former because information about firm performance is used by directors to evaluate managerial effectiveness (Walsh & Seward, 1990), and the latter because duality is a fundamental structural arrangement that affects board members’ interactions (Finkelstein & D’Aveni, 1994; Finkelstein, Hambrick, & Cannella, 2009).

Empirically, ABV has received some level of support, most notably at the managerial level. Cho and Hambrick (2006) and Nadkarni and Barr (2008) provide evidence supporting the notion that managers’ attentional perspective mediates the effects of internal and external social relations on firms’ ability to adapt to changing environments. At the board level, Tuggle (2004) found that boards’ attention affects firms’ actions, particularly in terms of their entrepreneurial focus.

Resource-based view and dynamic capabilities. The resource-based view (RBV) emerged as an alternative to transaction cost economics and as an extension of Penrose’s (1959) work around organizational capabilities, focusing on the roles played by employee skills in the creation of value in organizations (Wright, Smart, & McMahan, 1995). It is
considered by some authors (e.g. Tikkanen et al., 2005) as part of a group of competence-based theories that include resource dependence theory (Pfeffer & Salancik, 1978), the dynamic capabilities perspective (Nelson, 1991; Teece, Pisano, & Shuen, 1997), the knowledge-based view (KBV) of the firm (Kogut & Zander, 1992) and the core competencies/competence-based competition theory approach (Prahalad, 1990; Sanchez & Heene, 1997).

RBV assumes that differences in organizational performance can be explained by differences in how organizations access and use valuable resources and capabilities (Barney, 1991; Wernerfelt, 1984) and how they capture the resulting rents through protection and deployment of these resources (Mowery, Oxley, & Silverman, 1996). Barney (1991) suggests that resources and capabilities that are valuable, rare, difficult to imitate and imperfectly substitutable are sources of sustained competitive advantage, and that resources that are central to organizational competitiveness should be developed internally.

The dynamic capabilities perspective emerged as a complement to the RBV (Barrales-Molina, Benitez-Amado, & Perez-Arostegui, 2010), focusing on trying to explain why certain adaptive differences are found among firms in the same sector (Teece, 2007). Dynamic capabilities are associated with organizational routines that are learned, stable and repetitive patterns of behavior (Zollo & Winter, 2002). Some authors highlight the key role of managers in the generation of dynamic capabilities through their commitment and skills (Ambrosini & Bowman, 2009; Rosenbloom, 2000), hence the concept of dynamic managerial capabilities (Adner & Helfat, 2003).
Dynamic managerial capabilities are rooted in three underlying factors (Adner & Helfat, 2003; Barrales-Molina et al., 2010): managerial human capital (Castanias & Helfat, 1991, 2001), managerial social capital (Burt, 1997; Geletkanycz, Boyd, & Finkelstein, 2001) and managerial cognition (Hambrick & Mason, 1984). Managerial human capital refers to managers’ skills that are determined by their education, training and expertise. Managerial social capital refers to the social networks maintained by managers, both internal and external. Managerial cognition, as discussed above, refers to the beliefs and mental models used by managers as a basis for decision making (Adner & Helfat, 2003).

From the RBV perspective, a board may become a valuable asset if it is actively involved in decision making and in challenging the CEO’s proposals (Pugliese & Wenstøp, 2007). To do this, boards require a certain set of skills and in-depth knowledge about their firms and their roles (Ruigrok, Peck, & Keller, 2006; Stiles, 2001). RBV theorists would argue that a board with job-related diversity has many advantages: it is more able to identify creative and innovative solutions to problems due to a broader information pool (Williams & O’Reilly, 1998); and it is better prepared to perform its service and control roles (Hillman & Dalziel, 2003).

**CEO attention: Environmental scanning**

As has already been established, various studies have considered managers, including CEOs, as having limited attentional capacity, making it difficult for them to attend to all issues (Cyert & March, 1992; Simon, 1947). This raises a need for them to allocate their attention to some issues while ignoring other potentially important data sources (Hambrick, 1981; Prahalad & Bettis, 1986). To do this, they must perform “scanning
selection,” referring to the issue’s salience and relevance. Effective scanning has been shown to be a prerequisite for successful organizational adaptation (Garg et al., 2003), since managers can only act on those phenomena to which they turn their attention (Hambrick, 1981).

Attention focus, which refers to “the aspects of the environment that are central to top managers’ subjective representations of their environments” (Nadkarni & Barr, 2008: 1396) is considered important for two reasons: first, it determines the degree of attention intensity that a certain event will receive (Weick, 1995); and second, it determines the likelihood of it becoming a part of the firm’s strategic agenda (Cho & Hambrick, 2006; Dutton & Duncan, 1987; Huff, 1990). Attention intensity (Fiske & Taylor, 2008; Kahneman, 1973), and other related concepts such as mindful attention (Weick, 1995), mindfulness (Weick & Sutcliffe, 2006), attentional orientation (Cho & Hambrick, 2006) and engagement (Ocasio, 2011), have been characterized by the level of effort applied in the attention process. This relates to the level of cognitive capacity deployed to notice, interpret and make sense of the information and knowledge available to managers (Kahneman, 1973; Weick, 1995).

As discussed above (see also Appendix A), one of the main topics of empirical studies around CEO cognition and attention has been environmental scanning, which is defined as “the process of monitoring the environment and providing environmental data” (Daft & Weick, 1984: 286). Executives have been shown to use a significant part of their resources to scan their environments, both internal and external (Thomas & McDaniel, 1990). In fact, it has been found that monitoring of the external environment may account for as much as a quarter of top executives’ time (Hambrick, 1981). This is
probably because this is one activity over which executives have greater discretion, since it involves their own individual activities rather than organization-wide activities (Garg et al., 2003). The purpose of this scanning is to “identify the key trends, changes, and events in an organization’s environment that might affect the organization’s functioning” (Milliken, 1990: 43), and eventually to use this information to guide appropriate actions. It has also been found that differences in attentional focus may lead to different firm responses and outcomes (Cho & Hambrick, 2006; Kaplan et al., 2003).

*Types of search selection or focus*

Given the cognitive limitations of managers discussed above, environmental scanning implies search selection. Search selection is concerned with where managers look for new information and knowledge determining their attention (Fiske & Taylor, 2008; Koput, 1997; Sullivan, 2010). The literature has characterized search focus in terms of task or general sector (Bourgeois, 1980; Daft et al., 1988; Garg et al., 2003), local or distant (Helfat, 1994; Martin & Mitchell, 1998; Stuart & Podolny, 1996), narrow or broad (Katila & Ahuja, 2002), and external or internal (Day, 1994; Yadav et al., 2007). Task sector refers to aspects of the environment that have direct transactions with the focal firm, such as competitors, suppliers and customers, while general sector refers to more macro-level dimensions such as social, demographic, economic and political aspects (Nadkarni & Barr, 2008). Differences in attentional focus between these two sectors have been found to have implications for strategic action (Garg et al., 2003).

The distinction between local and distant (exploratory) scanning is typically found in the literature on firms’ innovation and R&D efforts. Local search refers to a general preference by executives and their firms to search for new knowledge and information in
areas that allow them to build on their existing technological base (Stuart & Podolny, 1996). Distant search refers to executives favoring novel knowledge and information further away from what they already know and have mastered (Katila & Ahuja, 2002). This distinction relates to consideration of executives as either myopic or farsighted (Kaplan, 2011). Various studies have shown that managers tend to be notoriously myopic (Levitt, 1975) and biased toward the familiar because they tend to consider habitual information as relevant stimuli (Rindova, 1999). Broad or narrow refers to different levels of search scope, which is associated with how widely a firm explores new knowledge (Katila & Ahuja, 2002). This concept was introduced by Katila and Ahuja (2002), based on the idea that a single dimension of local versus distant search was insufficient. Along with search scope, Katila and Ahuja (2002) recommended considering an additional dimension, search depth, which refers to the degree to which executives and firms revisit existing knowledge.

Of particular interest to this study is the distinction between external and internal focus (Day, 1994; Yadav et al., 2007). This implies that firms’ executives exercise discretion over how much they focus their attention on objects or events whose primary locus is inside or outside the firm (Yadav et al., 2007). This distinction is important from a cognitive standpoint because it affects managerial and organizational cognition and attention, with an eventual impact on the formulation and implementation of strategic actions (Walsh, 1995).

**Internal versus external focus of attention.** Some authors (e.g. Calori et al., 1994; Ocasio, 1997) suggest that executives, and CEOs in particular, may exhibit substantial differences in terms of their attentional predispositions and abilities. Various empirical
studies show that differences in the relative emphasis placed by executives on the internal or external environment have an impact on organizational actions and performance (e.g. Garg et al., 2003; Rust, Moorman, & Dickson, 2002; Smith et al., 1991; Thomas & McDaniel, 1990; Thomas et al., 1993; White, Varadarajan, & Dacin, 2003). Some of this evidence supports the notion that attentional emphasis on efficiency considerations (internal) is associated with less favorable performance (Yadav et al., 2007), while attentional emphasis on external constituents (external), such as customers, leads to superior performance (Rust et al., 2002). Nevertheless, as shown in Appendix A, no single study has focused on the role of boards in defining CEOs’ foci of attention from this internal versus external perspective.

**Summary**

Many theories—most notably agency theory, resource dependence theory and stewardship theory—have been used to explain and predict the relationship between boards’ attributes and their effect on CEOs and TMTs, and ultimately on firm performance. Although they all tend to agree that boards play an important part in firms’ decision control systems, there is little consensus on their specific attributes and the roles and responsibilities that directors should invoke (Tuggle, 2004). Thus, they have failed to attract unequivocal support. Given this lack of consensus, recent research has shifted attention to studying boards’ contributions to firms from a cognitive perspective, particularly with regard to the impact of boardroom dynamics on strategic decision making (e.g. McNulty & Pettigrew, 1999; Pettigrew, 1992; Rindova, 1999).

Some authors have argued that studies of managerial cognition are the most viable vehicle for furthering understanding of the central role of managers (Hambrick & Mason,
1984), and how their cognitive differences explain firm differences, whereas CEO attention, which Simon (1973: 270) considered to be the “chief bottleneck in organizational activity”, has received scant attention. In particular, research on the consequences of board attention on factors other than firm performance remains practically non-existent, with a few exceptions (see Appendix A), leaving the relationship between board and CEO cognition virtually uncharted territory.

Given that there has been a significant increase in the proportion of outside independent directors (Gordon, 2007) and the number of interlocks in public companies in America, along with some interesting advances in content analysis in the cognitive literature relating to strategy, this study posits that there is an opportunity to build on previous research to examine boardroom dynamics from a cognitive and attentional perspective, answering Haleblian and Rajagopalan’s (2006) call for research that will improve understanding of board cognition and its consequences.
CHAPTER III. THEORY AND HYPOTHESIS DEVELOPMENT

Recent research has shown the importance of TMT and CEO cognition and attention for a wide variety of firm outcomes (Acedo & Jones, 2007; Bouquet et al., 2009; Clapham & Schwenk, 1991; Cho & Hambrick, 2006; Eggers & Kaplan, 2009; Garg et al., 2003; Gary & Wood, 2011; Gebauer, 2009; Gioia & Chittipeddi, 1991; Goodhew, Cammock, & Hamilton, 2005; Jenkins & Johnson, 1997; Kaplan, 2008; Kaplan et al., 2003; Kern, 2006; McNamara et al., 2002; Nadkarni & Barr, 2008; Osborne, Stubbart, & Ramaprasad, 2001; Yadav et al., 2007). Of particular interest has been the influence of CEO attention on strategic responses (Gioia & Chittipeddi, 1991; Kaplan et al., 2003) and firm performance (Garg et al., 2003; Gary & Wood, 2011). The results of these studies strongly suggest that cognition at the highest levels of organizations is critical for firms, because what managers think is reflected in what they do (Ocasio, 1997).

Given that CEOs’ attention is limited (Ocasio, 1997; Simon, 1947), they must focus their attention on some events and objects, while ignoring others. The allocation of their attention has been proven to be determined by their perceptions of the external environment (Barr et al., 1992; Clapham & Schwenk, 1991; Daft et al., 1988; Sawyerr, 1993), by information from within their own firms (Bettman & Weitz, 1983; D’Aveni & MacMillan, 1990; Short & Palmer, 2003; Thomas & McDaniel, 1990), and by their own personal characteristics (Angriawan & Abebe, 2011; Iederan et al., 2009). Boards of directors have been found to serve as forums through which information about the
environment is shared and diffused (Haunschild & Beckman, 1998; Chua & Petty, 1999).

Reasons why boards serve as channels through which information is shared and, most importantly, absorbed by focal firms relate to a need to deal with environmental uncertainty through imitation and legitimation (DiMaggio & Powell, 1983).

From the standpoint of interlocking directorates in large public firms, there are two potential sources of information on the external environment: one is information brought to focal firms by external board members, and the other is information brought by internal board members, including the CEO, serving as board members in tied-to firms. The relevance of this rests on a number of factors: (1) the significant level of interlocking among public firms; (2) the significant proportion of outsiders in the composition of public firms’ boards; (3) the fact that many outsiders hold executive positions in other public firms; (4) the fact that many serve as board members in other firms; (5) board dynamics are social in nature; and (6) both CEOs’ and board-members’ attention is bounded.

Together, these conditions suggest that the attention of a focal firm’s board members during board meetings is unlikely to be devoted exclusively to objects and events relating to the focal firm; rather, a mixture of ideas, including topics brought in from outside the firm, will affect the focus of attention of the focal firm’s CEO, and this will, in turn, be affected by social dynamics within the boardroom.

**Boards’ imported attention and CEO attention**

Boards are expected to influence CEOs in ways associated with their roles of service and strategy, control (Zahra & Pearce, 1989) and resource provision (Finkelstein & Hambrick, 1996). While boards and managerial cognition have been widely researched as
distinct topics, few studies have considered the two traditions together to improve understanding of the influence exerted by boards over CEOs from a managerial cognition standpoint. This is surprising, given that cognition, and attention in particular, at the highest organizational levels has been shown to impact on firm outcomes in significant ways (Garg et al., 2003; Gary & Wood, 2011; Judge & Zeithaml, 1992; Kaplan et al., 2003; Tuggle, 2004).

Building on the Carnegie School tradition (March & Simon, 1958; Simon, 1947), which considered decision makers to be boundedly rational, Ocasio (1997: 189) defined attention as:

...the noticing, encoding, interpreting, and focusing of time and effort by organizational decision-makers on both (a) issues: the available repertoire of categories for making sense of the environment: problems, opportunities, and threats; and (b) answers: the available repertoire of action alternatives: proposals, routines, projects, programs, and procedures.

Based on this definition, and given that CEOs and board members fit into the category of decision makers, it could be argued that they all have limited attentional capacity, and have processes by which each individually notice, encode, interpret and focus time and effort on issues and answers associated with the organizations in which they participate.

Attention is socially embedded (Bouquet et al., 2009), and board members and CEOs are socially related to each other by being part of the board of a focal firm, and sometimes of other firms’ boards. It has been established in the literature that relationships affect the behavior of people forming a network (Granovetter, 1985), and that CEOs’ cognition may be affected by other people’s cognition (Barr et al., 1992; Collinson & Houlden, 2005; Thomas & McDaniel, 1990), and particularly the board (Westphal, 1999). Therefore, the cognitive relationship between boards and CEOs is
likely to work in such a way that the attentional focus of the former affects the attentional focus of the latter, at least to a certain degree, and this effect is likely to be affected by characteristics that define social group dynamics, such as the composition of boards and the distribution of power. These ideas suggest that examining the composition of boards and their power relationships with their CEOs may help explain differences in the strategic focus of organizations through the attentional focus of their CEOs.

Boards have been associated with many roles (Finkelstein & Hambrick, 1996; Zahra & Pearce II, 1989) beyond those within their formal mandate (Tuggle, 2004). The strategy-related role extends from ratifying management proposals and supervising ongoing strategies (Johnson et al., 1996) to providing advice and counsel (Carpenter & Westphal, 2001; Carpenter, 1988; Lorsch & MacIver, 1989; Louden, 1982; Mintzberg, 1983) and helping to define the firm’s strategy (Zahra & Pearce, 1989), bringing to the table knowledge and experiences (Hillman & Dalziel, 2003) that enhance the comprehension, creativity and coherence of decisions of the CEO and other board members (Ginsberg, 1994). Rindova (1999) and Andrews (1980) suggest that directors participate in the strategic decision-making process because it allows them to perform their other roles better, such as oversight and provision of critical resources (Finkelstein & Hambrick, 1996). This participation is achieved by refocusing management’s attention. Tuggle (2004) argues that boards’ most general purpose is to perform this refocusing of managerial attention toward the external environment by enriching managers’ views of various topics, such as economy, competition, technology, politics and culture.

Boards are formed of different categories of directors, and a key distinction is between outsiders and insiders (Gevurtz, 2004; Gordon, 2007), each associated with
different roles to different degrees. An important trend over the last 50 years has been an evolution in the composition of the boards of publicly-traded firms in the United States toward a significant majority of outsiders, representing close to 85 percent, with approximately 75 percent independent and 10 percent affiliated (Gordon, 2007). Many have executive positions in other firms, and some of these also publicly traded. Although both outsiders and insiders have been associated with providing advice and counsel to TMTs (Hillman & Dalziel, 2003), the presence of a significant majority of outsiders on the boards of publicly-traded firms warrants special attention to their role in strategic decision-making processes (Judge & Zeithaml, 1992), since “the right set of directors may be a strategic asset to a corporation” (Tuggle, 2004: 5).

Boards’ processes are embedded in a social context. They are formed by individuals with different personal objectives, whose actions are not always motivated by economic incentives and information asymmetries (Granovetter, 1985). Members interact with each other, share information and discuss issues, through processes that are social-psychological in nature (Butler, 1981; Jackson, 1992; Milliken & Vollrath, 1991). Forbes and Milliken (1999: 492) characterize them as “large, elite, and episodic decision-making groups that face complex tasks pertaining to strategic-issue processing.” It has been established that boards’ “output” is entirely cognitive in nature (Forbes & Milliken, 1999), since they are not directly involved in implementation. This cognitive output has been shown to have an effect on firm outcomes through dissemination of information (Westphal et al., 2001) through social networks and the resulting interlocks formed by directors sitting on various boards. Thus, strategic decision making in which boards
participate is affected by the social dynamics and networks created by the very existence of the boards, including scanning of the environment.

From RBV and KBV perspectives, environmental scanning (both internal and external) is critical for effective organizational adaptation (Garg et al., 2003) through the identification of potential opportunities and threats that will eventually affect the firm’s strategic focus. Kiesler and Sproull (1982) argue that individuals gather information about environmental cues through two mechanisms: automatic scanning and directed scanning. In the latter, individuals with fairly clear intentions or objectives “exert effort, [and] follow learned patterns”, while in the former, “individuals continuously receive and encode certain aspects of situations to which their attention is directed” (Kiesler and Sproull, 1982: 555). Resource dependence theory suggests that managers will scan issues they deem to be important more regularly than those they consider to be unimportant (Pfeffer & Salancik, 1978). Thus, scanning focus relates to selective attention (Ocasio, 1997) and the notion that selective attention to events and issues is driven by salience (Fiske & Taylor, 1991). Information resulting from strategic scanning is said to go through one of two processes from a cognitive perspective: cognitive assimilation or cognitive accommodation (El Sawy, 1985). Accommodation information is very general in nature and is associated with enabling managers to identify threats and opportunities, resulting in an increase in managerial wisdom (El Sawy, 1985). However, scanning is carried out at an individual level (Rindova, 1999), raising the problem that managers and directors have limited attentional capacity (Simon, 1955).

At the board level, directors must distribute their attention among their many responsibilities and sources of information directly relevant to the focal firm (Tuggle et
al., 2010b), but they also have responsibilities outside the boardroom competing for their attention (Tuggle, 2004). From an ABV perspective, the board’s situated attention is determined by both internal structures and procedures, and external structures and experiences (Tuggle, 2004). Directors participate in the social dynamics of the board with a personal perspective defined by their experiences and knowledge (Tuggle, 2004) and a focus of attention based on their particular circumstances and characteristics. The same goes for CEOs, who must resort to using heuristics to simplify the processes by which they gather and interpret information (Stubbart, 1989).

In the process of scanning and making sense of the internal and external environment (Thomas & McDaniel, 1990), CEOs will look for cues that they interpret as relevant. One source to which CEOs turn for such cues are boards, from which they learn vicariously (Bandura, 1977). Directors help CEOs manage complexity and uncertainty by sharing advice (Rindova, 1999; Useem, 1984). These interactions with board members enable CEOs to draw analogies that may help them solve complex problems (Duhaime & Schwenk, 1985). This sometimes entails the use of inferences (Gavetti, 2005), which result in a flow of knowledge from board members to CEO, enabling CEOs to understand “things that they never had first-hand knowledge nor experience of” (Durand et al., 1996: 394). This relates to Zahra and George’s (2002) concept of potential absorptive capacity comprising knowledge acquisition and assimilation, and ultimately to learning.

Learning may thus result from CEOs’ exposure to diverse external knowledge brought into the boardroom by board members (Filatotchev & Bishop, 2002). This obviously includes outsiders, who play a critical role in providing a link to the external environment owing to their access to valued resources and information (Tuggle, 2004).
However, as outsiders have attentional limitations (Dutton & Jackson, 1987; Ocasio, 1997), they will bring issues and answers (Ocasio, 1997) from their external experiences to focal firms’ boardroom discussions, including different emphases of attentional focus on external and internal events and issues (Yadav et al., 2007).

Identifying differences in CEOs’ focus of attention on either external or internal issues and events may be facilitated by considering the principles of situated and structurally distributed attention (Ocasio, 1997). First, using the principle of situated attention, board members, with their limited attentional capacity and who have executive positions in tied-to firms, will place greater emphasis on external and/or internal events and issues that are relevant to these tied-to firms. Second, using the principle of structurally distributed attention, CEOs, also with limited attentional capacity, will look for cues to define their allocation of attention to either external or internal events or issues from their board members, who bring their own preferences for allocations of attention to the boardroom. In this study, this is referred to as “imported attentional focus.”

Therefore, the extent to which outsiders comprise an ever more significant proportion of boards’ composition, and the extent to which those with executive and/or board positions at other firms import attentional focus from their external experience to the boardroom, will determine the attentional focus of the CEO. It is important to note that this refers particularly to attentional emphases, so the level of attentional focus on one type does not necessarily determine the level on the other. In other words, in some cases, executives may devote high levels of attention to both internal and external objects.
and events, notwithstanding the attentional implications (Yadav et al., 2007). Therefore, it is hypothesized that:

**Proposition 1:** A board’s imported attentional focus affects the attentional focus of the CEO.

**H1a:** The level of the board’s imported external focus will be positively related to the CEO’s external focus.

**H1b:** The level of the board’s imported internal focus will be positively related to the CEO’s internal focus.

It has also been suggested that boards’ influence over CEOs’ allocation of attention may be affected by other conditions or variables, such as the demographic composition of the board (Golden & Zajac, 2001; Laamanen & Wallin, 2009) and social influence processes (Walsh, Henderson, & Deighton, 1988). Laamanen and Wallin (2009: 972) cite a testimonial as an example of this:

_We addressed our different strategic alternatives in several board meetings discussing whether we should focus on our existing installed base with millions of individual users of our software and develop new software for them or whether we should focus on some of our largest corporate customers and become a dedicated systems supplier for them. The latter alternative was the one that we were most comfortable with. In some respects this was quite natural, since most of our own experiences in the board came from large corporations in the areas of banking, media, and retail._

Upper echelons theory (Hambrick & Mason, 1984) suggests that the attentional orientation of a group results from the collective experiences of members of the group, how information is distributed among them, and the processes they follow to share information and make decisions, leading eventually to some attentional orientations prevailing over others (Cho & Hambrick, 2006). Resource dependence theory (Pfeffer & Salancik, 1978) suggests that board members’ backgrounds and network ties affect the influence of each individual board member over the board’s dynamics (Valenti, Luce, & Mayfield, 2011).
Interaction of board imported attention and CEO–board power relationships on CEO attention

CEO–board power relations may also affect the relationship between imported attention and CEO attention, as they are the result of a social process in which power struggles may limit the CEO’s conscious or unconscious willingness to be influenced by ideas coming from other board members. Shropshire (2010) argues that the likelihood that CEOs will recognize the value of outside experience and information brought to the boardroom by other board members depends first on their motivation for doing so. This motivation has been found to be affected by political dynamics (Bigley & Wiersema, 2002), personal preferences (Gerstner et al., 2013) and power distribution inside the boardroom (Tuggle et al., 2010b).

Power distribution within the boardroom is usually not between equals. Sometimes the CEO dominates the board. CEOs’ power inside the boardroom is determined by its structure, their position, and their relationships or networks (Gavin, 2010). With regard to structure and position, CEOs are usually more powerful when occupying positions of duality, where they also hold the chair of the board position. More powerful CEOs are thought to have greater discretion within their organizations, and more acquiescent boards (Hayward, Rindova, & Pollock, 2004).

Different power relations lead to different behaviors from CEOs and their boards and, by extension, different allocations of attention (e.g. Tuggle et al., 2010b). According to agency theory, domination of a board by the CEO will lead to self-serving behaviors on the part of the CEO (Gavin, 2010) and a reduction in the board’s monitoring capabilities (Pearce & Zahra, 1991). According to stewardship theory, CEOs’ domination of the board allows them to control the flow of information to the boardroom, by
controlling the agenda, the amount of debate during meetings, and appointments of new
directors to the board (Lorsch & MacIver, 1989). Therefore, given that social dynamics
within boardrooms relating to the distribution of power may affect CEOs’ willingness to
be influenced by the board’s imported attention, thus influencing the extent to which they
can control the scanning process, it is hypothesized that:

*Proposition 2: Power dynamics between the board and the CEO moderate the
relationship between the board’s imported attentional focus and the CEO’s attentional
focus.*

*H2a: The positive relationship between the board’s external attentional focus and the
CEO’s external attentional focus will become weaker when the CEO is powerful relative
to the board.*

*H2b: The positive relationship between the board’s internal attentional focus and the
CEO’s internal attentional focus will become weaker when the CEO is powerful relative
to the board.*

**Interaction of board imported attention and status on CEO attention**

According to a common English saying, “imitation is the highest form of flattery,” it has
already been established that boards’ dynamics are social in nature, implying a certain
level of social interaction among board members. This interaction has been proven to
affect how information is diffused and attention focalized. For example, resource
dependence theory (Pfeffer & Salancik, 1978) and institutional theory (DiMaggio &
Powell, 1983) suggest that boards serve as channels through which both tacit knowledge
such as strategic information, beliefs, mental models and behaviors, and explicit
knowledge such as business practices are exchanged among firms (Koenig & Gogel,
1981; Mariolis & Jones, 1982; Mowery et al., 1996; Rao et al., 2000). In reality, different
board members do not have the same level of influence over board dynamics (Manning,
1984). It has been established that board members’ different levels of experience, skills
and expertise (Hillman & Dalziel, 2003), as well as prestige and status, affect how they perform their board duties, including their governance effectiveness (Valenti et al., 2011).

As discussed above, prestige and status are two closely-related constructs that have been shown to have many advantages for firms. According to resource dependence theory (Pfeffer, 1972; Pfeffer & Salancik, 1978), prestigious board members enhance the legitimacy of their focal firms and increase the level of network connections with other organizations and directors (Muth & Donaldson, 1998). Prestigious board members are usually associated with higher levels of external interactions through their social networks, which increase their social influence (Geletkanycz & Hambrick, 1997). This occurs in two ways: status and prestige seem to influence the likelihood that (a) the director will have and transmit relevant strategic information, and (b) the board will receive and apply the information received (Haunschild & Beckman, 1998). This is consistent with the notion that status differences between parties have an impact on how their relationships develop (Castellucci & Ertug, 2010).

The ABV (Ocasio, 1997) suggests that status may shape attention patterns and guide CEOs’ attention to different aspects of the environment (Maula et al., 2013). Fombrun and Shanley (1990) show that employees’ decisions to favor one external supplier of information over other alternatives are affected by the suppliers’ reputation. Davis and Powell (1992) argue that people facing uncertainty will turn to others based on how well they know them, and the degree to which they trust and admire them. White and Carlston (1983) suggest that people participating in a social interaction will focus their attention on information from other individuals from whom they consider the information to be more valuable.
Based on this, and due to the limited attentional capacity of CEOs, as discussed earlier, it is expected that CEOs will tend to look for cues from other board members, since they will be more receptive to information coming from those they admire and consider trustworthy, thereby increasing their legitimacy (institutional theory) and links with the environment (resource dependence theory) and improving their relationship with the board (agency theory). Ultimately, this means that CEOs will tend to allocate more attention to information brought to the board by higher-status board members. Therefore, to the extent that some board members’ experiences and information receive a greater relative weight in the allocation of the CEO’s attention due to their higher social status, it is hypothesized that:

**Proposition 3: The relative difference between board status and CEO status moderates the relationship between the board’s imported attentional focus and the CEO’s attentional focus.**

**H3a:** The positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become stronger when the board–CEO status difference is higher, and will become weaker when the board–CEO status difference is lower.

**H3b:** The positive relationship between the board’s internal attentional focus and the CEO’s internal attentional focus will become stronger when the board–CEO status difference is higher, and will become weaker when the board–CEO status difference is lower.

**Interaction of board imported attention and reciprocal interlocks on CEO attention**

It has already been established that interlocks facilitate the flow of information among firms, and in particular information resulting from scanning the environment. Useem (1982) provides evidence that managers and executives use their board appointments to scan the environment, and Haunschild (1993: 568) suggests that “director ties are important sources of information on firm structures and practices.” Moreover, Westphal...
and Fredrickson (2001: 1119) argue that “learning derived from board ties is particularly valuable in that it reflects the recent experience of a manager’s contemporaries, who face similar macro-economic threats and opportunities.” Lorsch and Maclver (1989: 27) quote one CEO as noting that “serving on the board is a way of seeing how somebody else is doing the same thing you are doing.” This results in boards becoming a primary source of information (Richardson, 1987) and resources (Podolny, 2001) for directors.

Therefore, directors sitting on more than one board are expected to be better suited to scanning the business environment, sharing advice and helping the firms in which they serve as board members to deal with uncertainty associated with strategic decisions (Davis, Yoo, & Baker, 2003; Galaskiewicz & Wasserman, 1989; Kor & Sundaramurthy, 2009; Pfeffer & Salancik, 1978; Richardson, 1987; Rindova, 1999; Useem, 1982) by being able to contribute their “firsthand knowledge of practices elsewhere” (Shropshire, 2010: 248). Focal firms’ board members, including CEOs, invited to join other boards will comply with this condition. For example, it has been shown that focal firms’ CEOs participating as board members in other firms generate value both for their focal firm (Rosenstein & Wyatt, 1990) and for the other firms in which they serve as board members (Fich, 2000).

Based on evidence provided by Rosenstein and Wyatt (1990), it is reasonable to expect a moderating role of reciprocal interlocks on the influence of board attention on CEO attention. Therefore, given that CEOs’ attention is likely to be affected in different ways by different board members, and that these differences may be explained by differences in the level of interpersonal attraction and relatedness, and since these levels are influenced by the existence of reciprocal interlocks, it is hypothesized that:
Proposition 4: The existence of reciprocal interlocks between the focal firm and the firms in which board members have an executive position moderates the relationship between the board’s imported attentional focus and the CEO’s attentional focus.

H4a: The positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become stronger when there are more reciprocal interlocks.

H4b: The positive relationship between the board’s internal attentional focus and the CEO’s internal attentional focus will become stronger when there are more reciprocal interlocks.

Interaction of board imported attention and imported attentional homogeneity on CEO attention

It has been established that people have limited capability to deal with information. They tend to pay attention to information they consider salient and relevant (Kiesler & Sproull, 1982). Salience has been found to be determined by the degree to which the information can be embedded into existing, organized and interconnected knowledge structures (Taylor & Crocker, 1980), while relevance is determined by the degree to which the information is not discrepant (Kiesler & Sproull, 1982). Kiesler and Sproull (1982: 557) argue that the joint effect of salience and relevance “leads to the prediction that decision makers will best incorporate information that is discrepant enough to capture attention but not so discrepant as to seem irrelevant.” Furthermore, it has been found that the frequency of certain opinions or facts has an impact on the likelihood that a person will consider a certain piece of information to be valid and true (Hasher, Goldstein, & Toppino, 1977), which has an impact on the evaluation of salience and relevance (Kiesler & Sproull, 1982).

Since boards are social in nature, they may be thought of as having a collective cognitive structure. This concept has been given various names, including shared knowledge structure (Walsh, 1995), collective knowledge structure (Tyler & Gnyawali,
2009), collective cognitive maps (Axelrod, 1976), team mental models (Klimoski & Mohammed, 1994) and collective cognition (Langfield-Smith, 1992).

Attention is expressed in people’s choice of words. Words are representations of cognitive categories through which people attend to the world (Sapir, 1944; Whorf, 1956). Huff’s (1990) “map of attention” method is based on the notion that a word’s frequency is an indicator of the intensity of attention given to the corresponding cognitive category. By extension, Abrahamson and Hambrick (1997: 519) state that “the degree to which two or more actors use the same words, or do so with the same frequency, provides an indicator of homogeneity across these actors’ attention patterns.”

In a board context, different density distributions of the words and terms used by board members are expected to be related to the board’s cognitive homogeneity or heterogeneity. Homogeneity has been related to poor group dynamics, such as conformity and lack of openness to new information (Wiersema & Bantel, 1992), as well as to the creation of trust among similar individuals, which may sometimes enhance the openness of boardroom discussions (Tuggle et al., 2010a). Furthermore, a more homogeneous cognitive structure may lead to the creation of a dominant logic, increasing the likelihood that a set of people will come to similar conclusions while interpreting a common set of data (von Krogh & Roos, 1996). Lyles and Schwenk (1992: 168) refer to this effect as a “right way of doing things” mentality.

Therefore, based on the premises that (a) words used by people are expressions of their attentional focus, (b) word frequency determines the “density” of certain terms and ideas, and (c) people tend to devote attention to information that is salient, relevant and frequent, it is reasonable to suppose that the density distributions of words and terms used
by board members will relate to the board’s level of cognitive homogeneity or heterogeneity. This is consistent with Abrahamson and Hambrick’s (1997: 514) concept of attentional homogeneity: “the degree of similarity in the foci of attention of top managers across organizations.” The extent to which board members refer to the same terms and use the same language through the same sets of words will strengthen the impact of their aggregated imported attention on the CEO’s allocation of attention.

Therefore, it is hypothesized that:

Proposition 5: Board members’ attentional homogeneity moderates the relationship between the board’s imported attentional focus and the CEO’s attentional focus.

H5a: The positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become stronger when board members’ imported attentional homogeneity is higher.

H5b: The positive relationship between the board’s internal attentional focus and the CEO’s internal attentional focus will become stronger when board members’ imported attentional homogeneity is higher.

Summary

Many theoretical arguments and ample empirical evidence support the notion that attention at the highest levels of organizations, particularly at board and CEO levels, is critical for firms. Surprisingly enough, although the existence of boards has become pervasive in the corporate world, research about the relationship between boards and CEOs from an attentional perspective remains scarce.

The attention-based model (Ocasio, 1997) may serve as a framework to study how boards affect the events and objects on which CEOs focus their attention. According to the third principle of ABV, organizational structures influence the issues that come to decision makers’ attention, their options and the actions they take. This may include the
structural relationship between boards and CEOs, in terms of the role played by boards in regulating the attention of CEOs through their board-related activities (Tuggle, 2004), which is conditional on individual directors’ focus of attention. In turn, their focus of attention depends, to some degree, on the attention paid to events and objects that are salient (Fiske & Taylor, 1991) to other firms with which they are related. Therefore, consistent with ABV, CEOs will look for cues from their board members to define their allocation of attention to either external or internal events and objects, through procedural and communication channels associated with board-related activities. These activities and interactions may be subject to different social and cognitive dynamics that may facilitate or hinder the CEO’s reception or adoption of information (Shropshire, 2010).
CHAPTER IV. RESEARCH METHODOLOGY

This chapter describes the methodology used to test the hypotheses developed in Chapter III. It is organized into three sections: (1) sample selection; (2) measurement of variables; and (3) description of the analytical and statistical methods.

Sample selection

Following in the tradition of using larger samples to examine managerial cognition (e.g. Sutcliffe and Weber, 2000; Houghton et al., 2000), this study focuses on large firms. The reasons for choosing to study large, mainly publicly-traded companies are that (a) they are legally obliged to present and publish annual reports that often include LTS signed by the CEO, thus allowing easy access to archival data; and (b) not focusing on specific industries or particular geographies enables testing for effects that are unlikely to be industry- or geography-specific.

Construction of the sample began with lists of the Fortune 500 for the years 2008 to 2013. This period was chosen because data collection began in 2014, when the most recent annual reports were for 2013. There was no theoretical reason for this decision as it was based entirely on practicality; however, there is no theoretical reason to believe that the expected effects would change if another set of years had been chosen for comparison. A list was prepared of all companies that appeared in the Fortune 500 lists for the years 2008 to 2013 (http://topforeignstocks.com/downloads/), resulting in 611
different firms. Following a search for the annual reports of these companies during that period, it was determined that the best year to consider as the focal year (t) would be 2013, because that was the year for which the highest number of annual reports was available. The ticker of each company was used as the linking variable, and a ticker was made up for those companies that were not public and did not have one. For these 611 firms, 454 annual reports for 2013 were gathered, mainly from The Public Register Online (http://www.publicregisteronline.com/) and the companies’ own websites. Of these 454 annual reports, only 400 included LTS.

The main source of information on the composition of the focal firms’ boards was the RiskMetrics database, while information on companies not included in that database was gathered directly from their annual reports and/or 10K reports. From these sources, information was gathered on individuals participating as board members in each of the 400 companies in 2013, resulting in a list of 4,299 board members associated with these 400 companies (10.7 board members per focal firm, on average).

Having identified the focal firms and the individuals acting as board members in each, a list was compiled of their “represented firms.” Represented firms were defined as those in which the board members of a focal firm held a board membership or an executive position in a firm other than the focal firm. Most of the information was again drawn from the RiskMetrics database and, when this was not available, from annual reports and/or 10K reports or proxy statements.

Once all the represented firms had been identified, a search was conducted for their corresponding annual reports for the year 2012 (t-1). When individuals had more than one represented firm associated with them, a two-step process was followed to associate a
specific letter to the shareholders of a represented firm with those individuals. The first step related to availability: if only one letter to the shareholders was found, this was used, disregarding any other consideration; if more than one letter to the shareholders was found, the individual was associated with the letter from the company in which that individual had longer tenure in an executive position or board membership.

Once all board members of the focal firms had a single represented firm associated with them through a letter to the shareholders (if any), all firms that did not have at least one associated letter to the shareholders from their corresponding represented firms were eliminated from the sample. This reduced the sample to 384 firms, with an average of 4.8 LTS from represented firms per focal firm.

**Measurement of variables**

Based on the Whorf-Sapir hypothesis, which states that the cognitive categories through which individuals attend to the world are embedded in the words they use (Sapir, 1944; Whorf, 1956), attention was measured for both the main independent variables (board imported attention) and dependent variables (CEO attention) using content analysis of LTS, specifically in terms of word counts.

This kind of analysis has been subject to criticism. Abrahamson and Hambrick (1997) point out that one of the main shortcomings of using LTS is that their authors are unknown. Another criticism of indirect methods or proxies of attention, such as LTS, is that they may reflect self-serving and retrospective reporting biases (Barr, 1998; Clapham & Schwenk, 1991; Osborne et al., 2001). Nevertheless, this way of measuring cognition and attention has been shown to have many advantages over other alternatives. According to Abrahamson and Hambrick (1997) and Salancik and Meindl (1984),
anecdotal evidence suggests that LTS are the product of a collaborative effort at the apex of the organization, in which CEOs have a particular interest (Bowman, 1984; Courtis, 1982; Goodman, 1980) and play a major role in their preparation (Kohut & Segars, 1992). Levy (2005: 804) describes LTS as unobtrusive expressions of managerial cognition that reflect “the business, technological, and geographic worlds to which top executives attend.” Duriau et al. (2007) and Walsh (1995) note that content analysis of management texts, such as LTS, is a meaningful way of capturing managerial cognition and is particularly useful in longitudinal studies, and D’Aveni and MacMillan (1990) argue that it serves as a tool to reveal how much attention is paid to some aspects of the environment, relative to others. Several authors (e.g. Barr, 1998; Barr et al., 1992; Osborne et al., 2001) offer substantial evidence that LTS are reasonable sources of data for measuring TMT attention and, in particular, CEO attention. These sources of data are more practical for larger samples over long periods than alternative sources such as interviews or surveys (Kaplan, 2008).

From a validity standpoint, several studies (e.g. Bettman & Weitz, 1983; Bowman, 1984; Clapham & Schwenk, 1991; Fiol, 1995; Huff & Schwenk, 1990) have tested the validity of cognitive measures obtained through content analysis of LTS. Four of these (Bettman & Weitz, 1983; Clapham & Schwenk, 1991; Fiol, 1995; Huff & Schwenk, 1990) reach the conclusion that LTS constitute valid measures of managerial cognition. Bowman (1978), D’Aveni and MacMillan (1990) and Fiol (1989) provide evidence of the construct validity of measures of managerial cognition derived from LTS. For example, Bowman (1978) performed two tests to address concerns regarding the validity of content analysis. In the first test, he obtained, from an independent source, a list of 14 companies
recognized as outstanding in their corporate social responsibility activities in 1973. He then randomly chose another 14 companies from the same industries and of approximately the same size as those in the original list. He proceeded to compute the proportion of line-by-line discussion of corporate social responsibility as a percentage of total lines of prose in each company’s reports, and compared the average of the first group of 14 outstandingly responsible companies with the average of the second group of 14 neutrally chosen matched pair companies, finding a statistically significant difference between them. In the second test, he focused instead on the area of international activities of companies in the food-processing industry. Analyzing line-by-line discussions of the international activities of 40 firms, he computed the proportion of the total discussion devoted to this topic. He then compared each proportion to each company’s corresponding percentage of business generated by international activities, as reported by Standard and Poor’s, finding a significant correlation coefficient.

Fiol (1995) provides further support for the appropriateness of LTS as sources of data on cognition in the context of this study, comparing the proportion of sentences reflecting certain attributions in LTS with those in internal planning documents written during the same 10-year period by the same ten firms. He ultimately recommends that the use of public statements to study cognition (e.g. LTS) should focus on non-evaluative components of communication, such as “internal/external orientation” (Fiol, 1995: 534).

Yadav et al. (2007) also provide their own validity test. They compared the boardroom agendas of two Fortune 500 companies with their LTS for various years. First, they coded the agendas of board meetings to estimate the percentage of time allocated to discussions consistent with their definition of future focus. They then
analyzed the LTS of both companies over the same period and computed a measure of future focus using word counts. They found a very high correlation between their estimation of time allocation to the discussion of topics associated with future focus and the frequency of the word “future” used in the LTS.

Therefore, based on previous studies, and following the guidelines of the computer-aided text analysis literature (Kabanoff, 1996; Weitzman, 2000), attention directed toward certain relevant issues was assessed using counts of specific types of words for external and internal focus. It has been established above that LTS provide certain advantages over other means, including their availability in public records, the major role of the CEO in their preparation given applicable regulations, the fiduciary duty of CEOs toward shareholders, and the fact that these letters are signed by CEOs. Therefore, based on all these ideas, counts of specific sets of words in LTS were used to capture attentional focus at board and CEO levels.

**Dependent variables: CEO attention (external and internal).** Both external and internal focus of CEO attention were measured following Yadav’s (2007) process, using LTS from sample firms for the year 2013 (year t). Yadav’s process includes an already pre-developed dictionary associated with external and internal focus.

Yadav’s (2007: 87) definitions of external and internal focus were used: “external focus refers to attention directed at objects whose primary locus is outside the firm, and internal focus refers to attention directed at objects whose primary locus is within the firm.” LTS were analyzed, aided by computerized examination of word usage using text-analysis software (LIWC 2015) and Yadav’s (2007) dictionaries of words associated with either external or internal focus. Using these dictionaries, external focus of attention was
measured, following Yadav’s (2007: 91) methodology, as “the number of times words denoting attention to customers and competitors” were used, while internal focus of attention was measured as “the number of times words denoting attention to inward, organization-specific issues are mentioned in each set of letters.” Appendix B lists the words that were programmed into the automated software.

The automated software reported the proportion of the corresponding set of words for each focal firm’s letter to shareholders. To validate the results provided by the software, a manual count was carried out using five randomly chosen LTS, and the results were compared with those provided by the software. The resulting data were used to perform a reliability analysis, which revealed high levels of consistency (ICC(3,2) = 1.00, p < 0.001).

Independent variables: Board imported attention (external and internal). The process used for the dependent variable was replicated for all LTS of firms represented in the focal firms through (a) the presence of executives from those companies as board members in the focal firms, and (b) executives of the focal firms serving as board members in other public companies. Values were assigned to each corresponding director, and a value was estimated for the board level for the year 2012 (year t-1) by averaging the values for external and internal focus of the corresponding directors associated with each board and then multiplying the resulting average by a factor that resulted from dividing the number of available LTS, from which averages had been computed, by the size of the board of the corresponding focal firm. The result was a weighted average of board imported attention. This is consistent with the process recommended by Halebian and Rajagopalan (2006), who recognized that while
cognition operates at the individual level, data collected at the individual board-member level must be aggregated to obtain an overall measure of board cognition. A similar logic was followed by McNamara et al. (2002) to examine the effect of TMT cognition on strategic assessment and decision making, where the cognitive complexity of a team resulted from performing a weighted average of the cognitive complexity of each member of the team.

The hypothesized model assumed that inter-organizational relationships in year \(t-1\) would have an impact on CEOs’ attention in year \(t\). This one-year lag also helped to establish causality in the relationship and eliminate the possibility of simultaneity. This logic has been applied in previous studies of managerial cognition (e.g. Kaplan et al., 2003; Levy, 2005; Maula et al., 2013).

**Moderating variable: CEO–board power relationship.** The process described by Westphal and Zajac (2001) was followed to obtain an index of relative CEO–board power. This index comprised four different measures: CEO’s tenure relative to the average tenure of board members; number of directors appointed after the CEO; board leadership structure (expressed as a dummy variable where 1 = duality and 0 = non-duality); and directors’ stock ownership, measured as the percentage of total common stock owned by directors. These four measures were combined into a single index using principal components analysis (Jackson, 1991), for which all measures showed loadings higher than .65.

**Moderating variable: Board–CEO relative status.** For the moderating variable of relative board–CEO status, the process described by Castellucci and Ertug (2010) was followed, subtracting the value of the status associated with each focal firm’s CEO from
the aggregate value of the status of the board members. These values were computed using Graffin et al.’s (2008) procedure, based on the number of awards received by each person between 2007 and 2013 from Institutional Investor magazine.

**Moderating variable: Reciprocal interlocks.** The original model called for the measurement of direct reciprocal interlocks created at the CEO level (CEO of the focal firm participating on the board of a represented firm where the CEO was a member of the board of the focal firm). However, after gathering the information, it became clear that an adjustment was necessary since there was only one case of a focal firm with a relationship as specific as that. The definition was therefore widened to consider all reciprocal interlocks, where a focal firm’s board member appeared in a represented firm, either on its board or occupying an executive position. The variable was computed by reporting the total number of firms related to each focal firm based on this definition.

**Moderating variable: Attentional homogeneity.** Abrahamson and Hambrick’s (1997) process was used to compute attentional homogeneity based on two measures: lexical density and lexical commonality. Lexical commonality was measured by following four steps: (1) measuring the occurrence of a specific set of words in each letter to shareholders in the sample; (2) computing the words’ commonality in the sample of LTS by dividing the number of letters containing a word by the total number of letters in the sample; (3) computing the word commonality for each letter in the sample by summing the product of each word’s commonality (from step 2) and the number of times it was used (from step 1); and (4) computing an average for the letters’ commonality by averaging the values obtained in step 4 for all LTS in the sample.
Lexical density is a measure of the actual number of times a word is shared between two different LTS. Therefore, when a word is shared by two letters, it may be counted twice. To deal with this redundancy, the number of times a word is shared must be divided by two. According to Abrahamson and Hambrick (1997), the maximum number of times a word can be shared with other letters in a sample of size N is $N \times (N-1)/2$, and perfect linguistic homogeneity will occur when all words in a lexicon are shared by all letters in the sample. Lexical density was thus computed following three steps: (1) computing word sharing for each word in the chosen lexicon; (2) computing the total number of times words were shared by summing all the word-sharing values from step 1; (3) computing lexical density by dividing the result of step 2 by the value of the maximum potential number of times words could be shared, obtained by applying the formula $W \times N \times (N-1)/2$, where $W$ refers to the number of words in the chosen lexicon.

This process only considered terms included in Yadav et al.’s (2007) external and internal focus dictionaries (see Appendix B).

This process had an impact on the sample size, because focal firms with only one associated represented firm (19 in total) produced values that were unusable, so they were ultimately dropped from all the analyses.

**Control variables.** The managerial cognition literature offers a variety of individual, organizational and environment-level predictors. Accordingly, several of these factors were controlled for. At the individual level, and consistent with the upper-echelons perspective, some managers’ characteristics seem to influence how they scan and interpret their environment (Hambrick, 2007; Hambrick & Mason, 1984; Michel & Hambrick, 1992), and particularly how they pay attention to their environment (Ocasio,
Levy (2005) considers tenure, age, functional background and education specialty as controls. At the organizational level, firms’ resources, including financial resources and size (financial and workforce), seem to influence their managers’ interpretations of environmental changes and events (Denison et al., 1996; Dutton & Duncan, 1987; Ocasio, 1997). At the environment level, research has shown that managers’ subjective representations of their environments are affected by cognitive challenges embedded in their operating environments (Daft & Weick, 1984; Fiske & Taylor, 1991; Osborne et al., 2001; Reger & Palmer, 1996), which suggests that industry context ultimately has an influence on top managers’ cognition (Nadkarni & Barr, 2008).

**Age of CEO.** In trying to be consistent with previous research based on upper echelons theory, an attempt was made to capture the effect of previously-developed knowledge structures on how environmental information is processed. It has been established that managers tend to enter into a continuous knowledge structure self-reinforcement process (Angriawan & Abebe, 2011). Since knowledge structures evolve as managers’ experiences of the external business environment increase (Daft & Weick, 1984; Fiske & Taylor, 1991; Nadkarni & Barr, 2008), this variable was measured directly in terms of the age of the CEO at the end of 2013 (year t).

**Personal functional background.** This variable seeks to capture the effect of functional experience on how executives interpret their business environment (Hambrick & Mason, 1984). It has been established that executives tend to perceive and interpret company problems depending on their functional area (Dearborn & Simon, 1958), which influences their perceptions and beliefs about the most important strategic issues facing their firms (Westphal & Zajac, 1995). Therefore, based on the personal information
gathered from annual reports and other sources for each CEO, dummy variables were created, using Westphal and Zajac’s (1995) categories: (1) operations, engineering or R&D, (2) marketing and sales, (0) peripheral functions (finance, accounting, management, law, others). Functional background was assessed by examining information about each CEO’s professional trajectory, obtained from multiple sources (mainly Bloomberg and/or annual reports or proxy statements). Coding was done by two different coders, who were MBA students. Consistent with the correlation of .86 obtained by Michel and Hambrick (1992) and the correlation of .88 obtained by Westphal and Zajac (1995), a correlation of .86 was obtained for the entire sample. Disputed cases were discussed with the coders until agreement was reached. Ultimately, two dummy variables were generated, one for operations and engineering and the other for marketing and sales, leaving peripheral functions as a reference.

Size of board. This variable seeks to capture the effect of board size on the board’s ability to generate valuable debate and discussion of strategic issues. It has been established that boards that are too large experience a decrease in their level of involvement (Harrison, 1987) in interactions at individual level (Judge & Zeithaml, 1992; March & Simon, 1958), and in their ability to reach consensus (Muth & Donaldson, 1998). Board size was measured using the number of directors reported in the corresponding annual report and/or 10-K report, which corresponded to board functions in 2013.

Organizational size. This variable seeks to capture the effect of the size of the organization on how managers, and particularly CEOs, interpret their competitive environment. It has been shown that organizational size affects how managers interpret
environmental changes and events (Denison et al., 1996; Dutton & Duncan, 1987; Ocasio, 1997). Organizational size was measured by computing the log value of the revenues of each focal firm in 2013. This information was obtained from RiskMetrics, annual reports and/or proxy statements.

**Munificence.** This variable is intended to capture the impact of environmental munificence on managerial cognition and the perceived choices of senior executives (Kern, 2006). It has been established that more munificent environments encourage managerial discretion (Goll & Rasheed, 1997; Hambrick & Finkelstein, 1987; Li & Tang, 2010) by providing firms with more opportunities and resources, whereas less munificent, and therefore more hostile, environments tend to reinforce more rigid and conservative approaches to strategic change (Finkelstein & Hambrick, 1990). To measure this variable, Boyd’s (1990) procedure was followed, which entailed measuring the growth of sales in specific industries over a five-year period and obtaining a regression slope coefficient divided by the mean value. Thus, the estimation for year $t$ was based on the five preceding years, i.e. the munificence estimate for 2013 was based on data from 2008 to 2012. Industries were defined using NAICS 6-digit codes and data obtained from *US Industrial Outlook* and the US Census Bureau.

**Endogeneity.** There are many reasons for concern about endogeneity in this study, in terms of simultaneity, autoregression, omitted variables and measurement error (Kennedy, 2008). To control for these, the following analysis was performed. Using the same process as followed by Sanders and Hambrick (2007), and based on the notion that using a lagged dependent variable as an explanatory variable “takes path dependence into consideration and addresses serial correlation stemming from persistence” (Pollock, Lee,
& Jin, 2015: 15), imported board attention at t-1 (the main regressor in the original model) was regressed against a measurement of the dependent variable (CEO attention) at t-2, along with some firm characteristics and industry dummy variables to look for significant predictors.

This information could only be obtained for 348 firms, and these were processed using LIWC 2015 in the same way as for the dependent variable. This information was completed with information about the focal firms in 2011, obtained mainly from CompuStat, on board size, number and proportion of independent board members, financial performance in terms of revenue, income, assets, capital expenditure and debt, number of employees, estimated industry size and estimated industry munificence for the period 2007 to 2011. The weighted average board imported attention in 2012 (both external and internal) was regressed against CEO attention values in 2011 and the remaining variables for the focal firms mentioned above, retaining only statistically significant variables in the model (Sanders & Hambrick, 2007). With the resulting regression coefficients, two endogeneity control variables – EndogExt and EndogInt – were computed for use in each of the main analyses (e.g. Chatterjee, 2009; Sanders & Hambrick, 2007) for external and internal attention respectively, according to the following equations (variable names and abbreviations are described in Appendix C).

\[ \text{EndogExt} = -.283 + .36 \text{CAE}_{11} + .247 \text{LogRev}_{11} \quad (F_{2,346}=13.92, p<.001) \]

\[ \text{EndogInt} = -.446 -.155 \text{CAE}_{11} + .561 \text{PropIndep}_{11} + .043 \text{LogRev}_{11} \quad (F_{3,301}=8.323, p<.001) \]

The sample before cleansing procedures comprised 384 firms. Variables had missing data for 19 cases associated with attentional homogeneity (lexical commonality and lexical density), 29 cases for endogeneity control for external attention (EndogExt), and 68 cases for endogeneity control for internal attention (EndogInt). The attentional
homogeneity variables (lexical commonality and lexical density) with missing values are explained by the fact that some of the focal firms in the final sample could only be associated with one LTS from a represented firm, making it impossible to compute lexical commonality and lexical density. These cases were dropped. EndogExt showed missing values for 29 cases because at least one of the variables in the equation used to compute it was missing. Given the final size of the usable sample to test for the effect of external attention (333 cases), the database was left unchanged, with no treatment for missing values. EndogInt showed missing values for 68 cases because at least one of the variables in the equation to compute it was missing. Given the final size of the usable sample to test for the effect of internal attention (294 cases), the database was again left unchanged, with no treatment for missing values.

In terms of the identification of outliers, multivariate outliers were analyzed by computing the Mahalanobis distance test. For variables used to test external attention, nine cases were identified (tickers SEP, MUR, IBM, COP, HES, BLK, BRK.B, GOOG and CPN). From this analysis, and after careful review, a decision was taken to drop one case, CPN, because an NAICS re-categorization between 2007 and 2012 had apparently affected the comparison, producing odd results. Multivariate outliers were then analyzed in the variables used to test internal attention. From this analysis, six cases were identified (tickers IBM, HES, BLK, NU, RRD, GOOG). After careful review, it was decided that there was no reason to think that the data were incorrect, so no additional cases were dropped. After performing a specific analysis on the remaining database to identify univariate outliers, only two cases (tickers CMS and PPL) presented the same
problem as that described for the CPN case. These two cases were also dropped, so the sample before eliminating outliers comprised 381 firms in total.

Finally, the sample was tested for multicollinearity by regressing each independent variable against the remaining independent variables and looking at the resulting variance inflation factor (VIF) statistics. All results, with the exception of the variables generated to control for endogeneity described above, were well below a value of 3.3 (Cenfetelli & Bassellier, 2009). Therefore, it was concluded that there was no reason to be concerned about multicollinearity. A more detailed discussion about the issue of multicollinearity is discussed in Chapter VI.

The final usable sample for testing the effects relating to external attention comprised 333 cases, with 294 cases for internal attention.

**Analytical and statistical methods**

The hypotheses were tested using cross-sectional data with a one-year time lag between the dependent and independent variables. As previously mentioned, this assumes that the things to which board members pay attention in year t-1 will take a year to permeate into the attention of the corresponding focal firm’s CEO in year t. A one-year time lag structure is consistent with previous work on the antecedents of attention at the highest level of organizations (e.g. Tuggle et al., 2010b). To test for moderators, a centered version of the independent variables (main and moderators) was used to compute the interaction variables needed (Cohen et al., 2015). Model 1 and Model 2 test these hypothesized effects in terms of external and internal attention respectively.

In addition to the main analyses, three robustness checks were performed. First, to address potential limitations in the procedure followed to compute the endogeneity
control variables described above, an additional test was conducted to further confirm whether the findings of the first analysis were robust by performing a two-stage least squares (2SLS) instrumental variable regression following the procedure recommended by Semadeni, Withers and Certo (2014). Alternate values for board imported attention, both external and internal (AltBAE and AltBAI respectively) for 2012 were computed, to be used instead of the original variables (Models 3 and 4). Three variables were used as instrumental variables for the model focusing on external attention: proportion of independent directors in 2011, log transformation of revenues for 2011, and CEO external attention in 2011 (F_{3,301}=15.04, p<.001). This first-stage F-statistic for the 2SLS regression is well above the levels proposed by Stock and Yogo (2003: Table 1) for this number of instrumental variables considering only one endogenous variable. With regard to the internal attention model, the instrumental variables considered were: proportion of independent directors, log transformation of number of employees and CEO external attention in 2011 (F_{3,293}=8.28, p<.001).

Second, it was necessary to deal with having too few LTS from represented firms. Since having too few LTS for a given case was not necessarily a problem if cases in which the focal firm had only one board member with ties to other firms (only one represented firm) were considered, in such cases, obtaining a single LTS would imply having all potential LTS. Nevertheless, having too few LTS for a focal firm with many represented firms might present a problem. For this reason, a captured external attention variable was computed by dividing the number of LTS gathered for each focal firm by the total number of board members of that firm associated with a represented firm (potential LTS). To run this robustness check, a cut-off was performed, eliminating all
cases with less than 60 percent of the captured imported attention (approximately 10 percent of the sample), and then the same analysis was run (Models 5 and 6).

Third, to test whether a one-year gap was sufficient, a sub-sample was prepared with 50 firms chosen randomly to perform the main test (with only the main independent variables) using a two-year gap instead. The sub-sample of firms showed no significant differences from the main sample in terms of revenues ($t_{432}=1.15$, $p=.25$) and ROA ($t_{432}=7.3$, $p=.46$). The same procedure as for the main analysis was followed to identify the represented firms associated with each focal firm. This resulted in an average of 5.5 LTS per focal firm, very similar to the full sample used in the main analysis. For this sub-sample, the focus was on performing the analysis with the main independent variables (board imported attention, external and internal) and the same control variables as in the main analyses. The results of these analyses are shown in Models 7 and 8. To facilitate the identification of the differences between the main analysis and the three robustness checks see Figure 2 and Figure 3 for a list of the variables used in each test.

All the models described above entailed analyzing the content of LTS using computer-assisted content analysis, which is a widely accepted technique in quantitative research (Neuendorf, 2002). Since the dependent variables, CEO attention (external and internal), were measured using proportion of word counts, they were treated as continuous variables. Since they did not follow a normal distribution (Shapiro-Wilks tests were used to test for normality, $W=.982$, $p<.001$ and $W=.880$, $p<.001$ for CEO external and internal attention, respectively) it required a specific method of analysis. In this research, words referring to “internal” and “external” focus of attention belonged to a population of words existing in one LTS. According to Nardon (2005), this would be
equivalent to a random sample without replacement, meaning that once a word is identified as “internal” focus, one less word is available to be classified as “external.” It was also important to consider that the data were likely to be correlated, since the measurement was clustered into primary sampling units; that is, the two constructs (CEO external and internal attention) were extracted from the same LTS. Given these two conditions, the use of a Poisson distribution was excluded (Nardon, 2005). To deal with these conditions, a Generalized Linear Models algorithm was used while assuming a gamma distribution for the dependent variable. Since gamma distribution does not include zeros, this resulted in the elimination of one case from the sample used in the external attention models and twelve cases from the sample used in the internal attention models. Finally, the Akaike Information Criterion (AIC; Akaike, 1973) was computed to assess fit of the models. AIC is an index computed from the likelihood of seeing a model given the data rewarded by goodness of fit and penalized for lack of parsimony (Burnham & Anderson, 2004). The model with the smallest AIC values is considered the optimal choice among the alternatives.
Figure 2: List of Variables Used in the External Attention Tests: Main Analysis vs Robustness Checks.

<table>
<thead>
<tr>
<th>Type of Variable</th>
<th>Variable</th>
<th>Main Analysis</th>
<th>Robustness Check 1: alternate IV</th>
<th>Robustness Check 2: cut-off sample</th>
<th>Robustness Check 3: two-year time lag</th>
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<tr>
<td></td>
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<td>(Model 1)</td>
<td>(Model 3)</td>
<td>(Model 5)</td>
<td>(Model 7)</td>
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<td></td>
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<td></td>
<td>Alternate Board Imported External Attention (2SLS)</td>
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<td>• (2012)</td>
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<td>Board-CEO Relative Status</td>
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<td>Reciprocal Interlocks</td>
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<td>Lexical Density – External Attention</td>
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<td>Control Variables</td>
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<td>Functional Background: Marketing and Sales</td>
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<td>Firm Size (log Revenues)</td>
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<td></td>
<td>Industry Munificence</td>
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Figure 3: List of Variables Used in the Internal Attention Tests: Main Analysis vs Robustness Checks.

<table>
<thead>
<tr>
<th>Type of Variable</th>
<th>Variable</th>
<th>Main Analysis (Model 2)</th>
<th>Robustness Check 1: alternate IV (Model 4)</th>
<th>Robustness Check 2: cut-off sample (Model 6)</th>
<th>Robustness Check 3: two-year time lag (Model 8)</th>
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<td>Moderators</td>
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<td>Board-CEO Relative Status</td>
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<td>Reciprocal Interlocks</td>
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<td>Lexical Density – Internal Attention</td>
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<tr>
<td></td>
<td>Functional Background: Operations and Engineering</td>
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<td>Functional Background: Marketing and Sales</td>
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<td>Firm Size (log Revenues)</td>
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<tr>
<td></td>
<td>Industry Munificience</td>
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<tr>
<td></td>
<td>Endogeneity Internal</td>
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</table>
CHAPTER V. RESULTS

This chapter describes the results of analyses performed to test the ten hypotheses proposed in Chapter III. Table 1 presents descriptive statistics and Table 2 shows the bivariate correlations for all variables included in the analyses. As expected, Table 2 shows high and significant bivariate correlations between some independent variables: (1) board imported external attention and board imported internal attention, (2) board imported external attention and the number of reciprocal interlocks, and (3) board imported internal attention and the number of reciprocal interlocks. The first case can be explained by the fact that both variables are affected in the same way by the proportion of directors associated with represented firms (e.g. a focal firm with a high number of represented firms will have higher external and internal imported board attention than a focal firm with a very small number of represented firms). Nevertheless, this was not considered a cause for concern because both variables are considered in different, and entirely independent, analyses. The remaining two cases, which can be explained in the same way, were deemed unproblematic, given the results of the multicollinearity tests described in Chapter IV.

Table 3 presents a summary of the results for each hypothesized relationship. Tables 4 and 5 present the results of multiple regression analyses performed to test the hypothesized effects on CEO attention according to the analytical procedure described
above. Table 6 through 11 present the results of multiple regression analyses performed as robustness checks of the main analyses, as described in the methodology section.
Table 1: Descriptive Statistics

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<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<td>CEO External Attention in 2013 (%)</td>
<td>368</td>
<td>0.190</td>
<td>4.850</td>
<td>1.951</td>
<td>0.771</td>
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<td>CEO Internal Attention in 2013 (%)</td>
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<td>0.060</td>
<td>3.250</td>
<td>0.631</td>
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<td>Board Imported External Attention in 2012 (%)</td>
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<td>0.066</td>
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<td>Board Imported Internal Attention in 2012 (%)</td>
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<td>0.803</td>
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<td>0.160</td>
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<td>CEO-Board Power Index</td>
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<td>3.488</td>
<td>0.000</td>
<td>1.012</td>
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<td>10.000</td>
<td>0.190</td>
<td>1.645</td>
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<tr>
<td>Number of Reciprocal Interlocks</td>
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<td>0.000</td>
<td>17.000</td>
<td>3.717</td>
<td>3.088</td>
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<tr>
<td>Attentional Homogeneity - Lexical Commonality External</td>
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<td>46.257</td>
<td>100.000</td>
<td>80.756</td>
<td>8.654</td>
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<td>Attentional Homogeneity - Lexical Density External</td>
<td>349</td>
<td>7.692</td>
<td>64.103</td>
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<tr>
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<td>100.000</td>
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<td>83.000</td>
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<td>Functional Background Operations and Engineering</td>
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<td>Functional Background Marketing and Sales</td>
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<td>1.000</td>
<td>0.060</td>
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<td>19.000</td>
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<td>Firm Size in Terms of Revenues (log-transformed)</td>
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<td>-0.030</td>
<td>0.241</td>
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Table 2: Correlations

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<td>CEO Internal Attention (%)</td>
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<td>.028</td>
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<tr>
<td>Board Imported External Attention (%)</td>
<td>.109 *</td>
<td>.054</td>
<td>.008 **</td>
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<td>Board Imported Internal Attention (%)</td>
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<td>-.006</td>
<td>.165 **</td>
<td>.123 *</td>
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<td>.037</td>
<td>.033</td>
<td>-.093</td>
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<td>.044</td>
<td>.092</td>
<td>.002</td>
<td>.159 **</td>
<td>.370 **</td>
<td>-.134 *</td>
<td>.068</td>
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<td>.115 *</td>
<td>.075</td>
<td>.127 *</td>
<td>.024</td>
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<td>Firm Size (log-transformed Revenues)</td>
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<td>.232 **</td>
<td>.174 **</td>
<td>.096</td>
<td>.029</td>
<td>.451 **</td>
<td>-.099</td>
<td>.095</td>
<td>-.151 *</td>
<td>.028</td>
<td>.113 *</td>
<td>.006</td>
<td>.019</td>
<td>.315 **</td>
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<td>Industry Munificence</td>
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<td>-.067</td>
<td>-.059</td>
<td>-.084</td>
<td>-.090</td>
<td>-.154 *</td>
<td>-.068</td>
<td>-.114 *</td>
<td>.070</td>
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<td>-.023</td>
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<td>.271 **</td>
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<td>.043</td>
<td>.466 **</td>
<td>-.130 *</td>
<td>.081</td>
<td>-.196 **</td>
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<td>.062</td>
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<td>.076</td>
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<td>.902 **</td>
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<td>Endogeneity Control - Internal</td>
<td>-.210 **</td>
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<td>-.296 **</td>
<td>-.201 **</td>
<td>.070</td>
<td>.049</td>
<td>.403 **</td>
<td>-.077</td>
<td>.079</td>
<td>-.123 *</td>
<td>-.008</td>
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<td>.527 **</td>
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<td>.409 **</td>
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* p < .05  ** p < .01
### Table 3: Summary of the Results of Hypothesis Testing

<table>
<thead>
<tr>
<th><strong>MAIN EFFECT: BOARD IMPORTED ATTENTION → CEO ATTENTION (MODELS 1b AND 2b)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: The level of the board’s imported external focus will be positively related to the CEO’s external focus.</td>
<td>Supported</td>
</tr>
<tr>
<td>H1b: The level of the board’s imported internal focus will be positively related to the CEO’s internal focus.</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MODERATING EFFECT: CEO–BOARD POWER RELATIONSHIP (MODELS 1c, 1h, 2c, 2h)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H2a: The positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become weaker when the CEO is more powerful relative to the board.</td>
<td>Supported</td>
</tr>
<tr>
<td>H2b: The positive relationship between the board’s internal attentional focus and the CEO’s internal attentional focus will become weaker when the CEO is more powerful relative to the board.</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MODERATING EFFECT: RELATIVE BOARD–CEO STATUS DIFFERENCE (MODELS 1d, 1h, 2d, 2h)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H3a: The positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become stronger when the board–CEO status difference is higher, and weaker when the board–CEO status difference is lower.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H3b: The positive relationship between the board’s internal attentional focus and the CEO’s internal attentional focus will become stronger when the board–CEO status difference is higher, and weaker when the board–CEO status difference is lower.</td>
<td>Not supported</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MODERATING EFFECT: RECIPROCAL INTERLOCKS (MODELS 1e, 1h, 2e, 2h)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H4a: The positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become stronger when there are more reciprocal interlocks.</td>
<td>Significant effect opposite to expectations</td>
</tr>
<tr>
<td>H4b: The positive relationship between the board’s internal attentional focus and the CEO’s internal attentional focus will become stronger when there are more reciprocal interlocks.</td>
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</tr>
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</table>

<table>
<thead>
<tr>
<th><strong>MODERATING EFFECT: ATTENTIONAL HOMOGENEITY (IN TERMS OF LEXICAL DENSITY AND COMMONALITY) (MODELS 1f, 1g, 1h, 2f, 2g, 2h)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H5a: The positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become stronger when the imported attentional homogeneity of board members is higher.</td>
<td>Not supported</td>
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<tr>
<td>H5b: The positive relationship between the board’s internal attentional focus and the CEO’s internal attentional focus will become stronger when the imported attentional homogeneity of board members is higher.</td>
<td>Not supported</td>
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</table>

### Main Analyses

Results and tables for individual hypotheses are discussed in the next sections.

**Hypotheses 1a and 1b: Main relationship between board attention and CEO attention**

Model 1 in Table 4 presents the results of a series of GLiM regression equations considering the potential impact of a board’s imported external attention on its CEO’s attention to the external environment. Model 1a considers only the control variables.
Model 1b introduces the main independent variable, board imported external attention. Models 1c through 1g present the results for the hypothetical moderating impact of CEO–board relative power, board–CEO relative status, reciprocal interlocks and boards’ attentional homogeneity in terms of lexical commonality and lexical density on CEO external attention. Model 1h presents the full model considering all variables.

The results shown in Table 4 suggest that the board’s imported external attention at time $t-1$ is positively and significantly related to the CEO’s external attention at time $t$ (Models 1e and 1h at the .01 alpha level and Models 1c and 1g at the .05 alpha level). Therefore, Hypothesis 1a, positing that the level of the board’s imported external focus will be positively related to the CEO’s external focus, is partially supported. This effect is represented graphically in Figure 4.

Similarly, Model 2, shown in in Table 5, presents the results of GLiM regression equations considering the potential impact of a board’s imported internal attention, with its corresponding control variables and moderating variables, on the CEO’s internal attention. However, Hypothesis 1b, positing that the level of the board’s imported internal focus will be positively related to the CEO’s internal focus, is found to be positive (except for Model 2g) but not significant. Hence, Hypothesis 1b is not supported.
Table 4: Board Imported External Attention and CEO External Attention (Model 1)

Results of GLiM Regression Models (Testing Hypotheses 1a, 2a, 3a, 4a and 5a)

<table>
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<tr>
<th>Variable</th>
<th>Model 1a</th>
<th>Model 1b</th>
<th>Model 1c</th>
<th>Model 1d</th>
<th>Model 1e</th>
<th>Model 1f</th>
<th>Model 1g</th>
<th>Model 1h</th>
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<tbody>
<tr>
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<td>7.917****</td>
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<tr>
<td></td>
<td>(.762)</td>
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<td>(.761)</td>
<td>(.777)</td>
<td>(.763)</td>
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<tr>
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<td>.111**</td>
<td>.097*</td>
<td>.150***</td>
<td>.084**</td>
<td>.119**</td>
<td>.196***</td>
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</tr>
<tr>
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<td>(.065)</td>
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<td>(.053)</td>
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<tr>
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<td>.014</td>
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<td>.014</td>
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<td>.014</td>
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<td>-0.008</td>
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<tr>
<td>Reciprocal Interlocks (t)</td>
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<td>.003</td>
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<td>.003</td>
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<td>-0.150***</td>
<td>-0.150***</td>
<td>-0.150***</td>
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<td>(.003)</td>
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<td>Revenues (t) (log transformed)</td>
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<td>-1.070****</td>
<td>-1.048****</td>
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<td>676.642</td>
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<td>101.457***</td>
<td>102.994***</td>
<td>120.352***</td>
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*p < .10; **p < .05; ***p < .01; ****p<.001. Standard errors are shown in parentheses.
### Table 5: Board Imported Internal Attention and CEO Internal Attention (Model 2)

<table>
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<tr>
<th>Variable</th>
<th>Model 2a</th>
<th>Model 2b</th>
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<th>Model 2e</th>
<th>Model 2f</th>
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<th>Model 2h</th>
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<td>Reciprocal Interlocks (t)</td>
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<td>.006</td>
<td>.004</td>
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<td>-.454***</td>
<td>-.454***</td>
<td>-.454***</td>
<td>-.454***</td>
<td>-.454***</td>
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<td>(.023)</td>
<td>(.023)</td>
<td>(.023)</td>
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</tr>
<tr>
<td>Functional Background: Marketing and Sales</td>
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<td>-.202*</td>
<td>-.186*</td>
<td>-.206*</td>
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<td>(.114)</td>
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<td>(.116)</td>
<td>(.116)</td>
<td>(.116)</td>
<td>(.116)</td>
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<tr>
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<td>.327</td>
<td>.327</td>
<td>.327</td>
<td>.327</td>
<td>.327</td>
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<td>(.563)</td>
<td>(.563)</td>
<td>(.564)</td>
<td>(.564)</td>
<td>(.564)</td>
</tr>
<tr>
<td>Revenues (t) (log transformed)</td>
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<td>-.258**</td>
<td>-.263**</td>
<td>-.254**</td>
<td>-.261**</td>
<td>-.257**</td>
<td>-.258**</td>
<td>-.273**</td>
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<td>(.176)</td>
<td>(.181)</td>
<td>(.195)</td>
<td>(.174)</td>
<td>(.176)</td>
<td>(.188)</td>
</tr>
<tr>
<td>Scale (Maximum likelihood estimate)</td>
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<td>.458</td>
<td>.454</td>
<td>.454</td>
<td>.457</td>
<td>.454</td>
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<td>.444</td>
</tr>
<tr>
<td>Akaike's Information Criterion (AIC)</td>
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<td>244.826</td>
<td>246.150</td>
<td>246.471</td>
<td>248.692</td>
<td>246.463</td>
<td>248.119</td>
<td>254.361</td>
</tr>
<tr>
<td>Likelihood Ratio Chi-Square</td>
<td>30.131****</td>
<td>30.223****</td>
<td>32.899****</td>
<td>32.578****</td>
<td>30.357***</td>
<td>32.586****</td>
<td>30.930***</td>
<td>40.688***</td>
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</table>

*p < .10; ** p < .05; *** p < .01; **** p<.001. Standard errors are shown in parentheses.
Hypotheses 2a and 2b: Interaction effect of CEO–board power on main relationship

Models 1c and 1h in Table 4 show the GLiM regression equations that allow for the testing of the expected negative effect of CEO–board relative power on the relationship between the board’s external attentional focus and the CEO’s external attentional focus according to Hypothesis 2a, which posited that the positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become weaker when the CEO is more powerful relative to the board. The results of Models 1c
and 1h are consistent in suggesting that CEO–board relative power has a negative and significant effect on the relationship between the board’s external attention at time $t-1$ and the CEO’s external attention at time $t$ (at the .001 alpha level). Therefore, Hypothesis 2a is supported.

This effect is represented graphically in Figure 5, in which the cases are grouped into three categories: low CEO–board power, with values less than one standard deviation below the mean; medium CEO–board power, with values between one standard deviation below and one standard deviation above the mean; and high CEO–board power, with values more than one standard deviation above the mean (Cohen et al., 2015).

Models 2c and 2h in Table 5, which show the results for the effect of CEO–board relative power on the relationship between the board’s internal attentional focus and the CEO’s internal attentional focus, present positive (opposite to expectations) and non-significant values. Therefore, Hypothesis 2b is not supported.
Figure 5. Moderating Effect of CEO-Board Relative Power on the Relationship between the Board’s Imported External Attention (t-1) and the CEO’s External Attention (t)

Hypotheses 3a and 3b: Interaction effect of board–CEO relative status on main relationship

Models 1d and 1h in Table 4 correspond with regression equations that allowed for testing of board–CEO relative status according to Hypothesis 3a, which posited that the positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become stronger when the board–CEO status difference is higher, and weaker when the board–CEO status difference is lower. Similarly, Models 2d and 2h in Table 5 refer to the effect of relative board–CEO status on the effect of the
board’s imported internal attention on the internal attention of the CEO. All these models show the corresponding coefficients for the interaction variables with positive yet non-significant values. Therefore, Hypotheses 3a and 3b are not supported.

*Hypotheses 4a and 4b: Interaction effect of reciprocal interlocks on main relationship*

Models 1e and 1h in Table 4 show the GLiM regression equations that allowed for testing of the expected positive effect of reciprocal interlocks on the relationship between the board’s external attentional focus and the CEO’s external attentional focus according to Hypothesis 3a. Model 1e shows a significant negative value (at the .01 alpha level), and Model 1h also shows a negative value (at the .05 alpha level), both with signs opposite to expectations. Therefore, Hypothesis 4a is not supported.

This effect is represented graphically in Figure 6, in which the cases are grouped into three categories: low reciprocal interlocks, for cases with one or no reciprocal interlocks; medium reciprocal interlocks, with values between two and six reciprocal interlocks; and high reciprocal interlocks, with cases with more than seven reciprocal interlocks.

Models 2e and 2h in Table 5 show the corresponding GLiM regression equations associated with Hypothesis 4b, which posited that the positive relationship between the board’s internal attentional focus and the CEO’s internal attentional focus will become stronger when there are more reciprocal interlocks. However, in both models, the corresponding coefficients for the interaction variables show negative and non-significant values. Therefore, Hypothesis 4b is not supported.
Hypotheses 5a and 5b: Interaction effect of attentional homogeneity on main relationship

Models 1f, 1g and 1h in Table 4 show the GLiM regression equations that allowed for testing of the expected positive effect of the variables associated with attentional homogeneity (lexical commonality and lexical density) on the relationship between the board’s external attentional focus and the CEO’s external attentional focus according to Hypothesis 5a, which posited that the positive relationship between the board’s external attentional focus and the CEO’s external attentional focus will become stronger when the
imported attentional homogeneity of board members is higher. Model 1f presents the interaction variable for the board’s external lexical commonality, Model 1g shows the interaction variable for the board’s external lexical density, and Model 1h presents the full model. On the one hand, Models 1f and 1h show positive but non-significant values for the interaction effect of lexical commonality. On the other hand, Models 1g and 1h show negative and non-significant values for the interaction effect of lexical density, which is opposite to expectations. Overall, Hypothesis 5a is not supported.

Models 2f, 2g and 2h in Table 5 show the corresponding GLiM regression equations for testing the expected positive effect of the variables associated with attentional homogeneity (lexical commonality and lexical density) on the relationship between the board’s internal attentional focus and the CEO’s internal attentional focus according to Hypothesis 5b. Model 2f presents the interaction variable for the board’s internal lexical commonality, Model 2g shows the interaction variable for the board’s internal lexical density, and Model 2h presents the full model. Again, on the one hand, Models 2f and 2h show positive but non-significant values for the interaction effect of lexical commonality. Moreover, 2g and 2h differ in the directionality of the relationship: Model 2g shows a positive and non-significant value, whereas Model 2h shows a negative and non-significant value for the interaction effect of lexical density. Again, overall, Hypothesis 5b is not supported.

**Robustness Analyses**

*Endogeneity test with instrumental variables.* Table 6 shows the results associated with testing for the relationship between the board’s and the CEO’s external attention, in which the original values for the board’s imported external attention were substituted by
alternate values computed according a 2SLS procedure (Model 3). The results are consistent with the results of the original analysis with regard to the main independent variable for external attention (Models 3b, 3c, 3d, 3f, 3g and 3h at an alpha level of .001, and Model 3e at an alpha level of .01). Although almost all the signs of the interaction effects shown are in line with expectations (except those considering the effect of lexical density, Models 3g and 3h, which show a sign opposite to expectations), none show statistical significance.

Table 7, on the other hand, shows the results associated with testing of the relationship between alternate values for the board’s internal attention (computed using a 2SLS approach) and the CEO’s internal attention. The results are generally consistent with those shown in Table 5 for Model 2, but with one difference: the interaction effect of lexical commonality shows a positive and significant value (Model 4h at the .05 alpha level).
## Table 6: Robustness Check 1 – Alternate Board Imported External Attention (Model 3)

Results of GLM Regression Models (Robustness Check - Testing Hypotheses 1a, 2a, 3a, 4a and 5a with Alternative Board Imported Internal Attention using Instrumental Variables)

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<th>Model 3a</th>
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<th>Model 3d</th>
<th>Model 3e</th>
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*p < .10; ** p < .05; *** p < .01; ****p<.001. Standard errors are shown in parentheses.
Table 7: Robustness Check 1 – Alternate Board Imported Internal Attention (Model 4)

Results of GLM Regression Models

(Robustness Check - Testing Hypotheses 1b, 2b, 3b, 4b and 5b with Alternative Board Imported Internal Attention using Instrumental Variables)

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<th>Model 4a</th>
<th>Model 4b</th>
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<th>Model 4d</th>
<th>Model 4e</th>
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*p < .10; ** p < .05; *** p < .01; ****p<.001. Standard errors are shown in parentheses.
Figure 7 presents these results graphically, with the following three categories: low lexical commonality, with values less than one standard deviation below the mean; medium lexical commonality, with values between one standard deviation below and above the mean); and high lexical commonality, with values more than one standard deviation above the mean (Cohen et al., 2015).

Cut-off sample Table 8 shows the results associated with testing for the relationship between the board’s and the CEO’s external attention, with a reduced sample after
eliminating cases with less than 60 percent of captured imported attention (Model 5). Model 1 (full sample) and Model 5 (cut-off sample) generally show high levels of consistency. Model 5 again shows positive and significant values for the coefficients of board imported external attention (Model 5h at an alpha level of .001, Models 5e and 5g at alpha levels of .05). Table 8 also shows consistent results (negative and significant values) in relation to the interaction effect of CEO–board power (Models 5c and 5h at an alpha level of .05), and the interaction effect of the number of reciprocal interlocks (Model 5e at an alpha level of .05). One minor difference between the two sets of results has to do with which model in each provides a better fit. In Table 4, the model with the smallest AIC corresponds to Model 1e, which tests the moderating effect of reciprocal interlocks, followed very closely by Model 1c, which tests for the moderating effect of CEO–board relative power. In contrast, in Table 8, the model with the smallest AIC is Model 5c, which tests for the moderating effect of CEO–board relative power, this time followed very closely by Model 5e, corresponding with testing for the moderating effect of reciprocal interlocks.

Table 9 shows the corresponding results of testing using a reduced sample, focusing on the relationship between the board’s and the CEO’s internal attention (Model 6). Again, the results of Model 2 (full sample) and Model 6 (reduced sample) are highly consistent. Ultimately, these two analyses show that the effect of cases with very low captured imported attention do not appear to have a major effect on the ability of the models to detect significant relationships or the relative importance of the variables included in them.
Table 8: Robustness Check 2 – Cut-Off Sample – External Attention (Model 5)

Results of GLiM Regression Models
(Robustness Check - Testing Hypotheses 1a, 2a, 3a, 4a and 5a with cut-off sample)

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*p < .10; ** p < .05; *** p < .01; ****p<.001. Standard errors are shown in parentheses.
## Table 9: Robustness Check 2 – Cut-Off Sample – Internal Attention (Model 6)

Results of GLiM Regression Models (Robustness Check - Testing Hypotheses 1b, 2b, 3b, 4b and 5b with cut-off sample)

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<td>(1.20)</td>
<td>(1.23)</td>
<td>(1.23)</td>
<td>(1.23)</td>
<td>(1.23)</td>
<td></td>
</tr>
<tr>
<td>Munificence (t)</td>
<td>.514</td>
<td>.514</td>
<td>.485</td>
<td>.494</td>
<td>.555</td>
<td>.510</td>
<td>.530</td>
<td>.494</td>
</tr>
<tr>
<td>(.588)</td>
<td>(.588)</td>
<td>(.584)</td>
<td>(.584)</td>
<td>(.610)</td>
<td>(.583)</td>
<td>(.586)</td>
<td>(.602)</td>
<td></td>
</tr>
<tr>
<td>Endogeneity Control Internal</td>
<td>-.299</td>
<td>-.299</td>
<td>-.306</td>
<td>-.298</td>
<td>-.303</td>
<td>-.301</td>
<td>-.299</td>
<td>-.317</td>
</tr>
<tr>
<td>(1.235)</td>
<td>(1.241)</td>
<td>(1.214)</td>
<td>(1.247)</td>
<td>(1.257)</td>
<td>(1.239)</td>
<td>(1.240)</td>
<td>(1.253)</td>
<td></td>
</tr>
<tr>
<td>Number of cases</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
</tr>
<tr>
<td>Scale (Maximum likelihood estimate)</td>
<td>.462</td>
<td>.462</td>
<td>.458</td>
<td>.460</td>
<td>.462</td>
<td>.458</td>
<td>.461</td>
<td>.448</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-.110.198</td>
<td>-.110.198</td>
<td>-.108.870</td>
<td>-.109.628</td>
<td>-.110.140</td>
<td>-.108.869</td>
<td>-.109.790</td>
<td>-.105.485</td>
</tr>
<tr>
<td>Akaike’s Information Criterion (AIC)</td>
<td>238.397</td>
<td>240.396</td>
<td>241.739</td>
<td>243.256</td>
<td>244.280</td>
<td>241.738</td>
<td>243.580</td>
<td>250.969</td>
</tr>
<tr>
<td>Likelihood Ratio Chi-Square</td>
<td>26.843 **</td>
<td>26.844 ***</td>
<td>29.500 ***</td>
<td>27.964 ***</td>
<td>26.960 ***</td>
<td>29.502 ***</td>
<td>27.660 ***</td>
<td>36.27 ***</td>
</tr>
</tbody>
</table>

*p < .10; ** p < .05; *** p < .01; ****p<.001. Standard errors are shown in parentheses.
Two-year time lag Tables 9 and 10 present the results of the GLiM regression equations corresponding to Models 7 and 8, in which a two-year time lag between the main independent variables (board imported attention, external and internal) and the dependent variables (CEO attention, external and internal) were tested in comparison with the one-year lag used in the original analyses. The results show that a two-year lag, particularly for the model associated with attention to the external environment (Model 7), where previous models found significant results, performs no better than the one-year lag specification. Moreover, the results associated with testing the effect on internal attention (Model 8) perform more poorly, even in terms of the control variables.
Table 10: Robustness Check 3 – Two-Year Time Lag – External Attention (Model 7)

Results of GLiM Regression Models
(Testing 2-year time lag)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 7a</th>
<th>Model 7b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>7.376****</td>
<td>7.370****</td>
</tr>
<tr>
<td></td>
<td>(1.937)</td>
<td>(1.940)</td>
</tr>
<tr>
<td>Board Imported External Attention (t-2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.006</td>
<td>.006</td>
</tr>
<tr>
<td></td>
<td>(.151)</td>
<td>(.151)</td>
</tr>
<tr>
<td>CEO Age (t)</td>
<td>-.014*</td>
<td>-.014*</td>
</tr>
<tr>
<td></td>
<td>(.008)</td>
<td>(.008)</td>
</tr>
<tr>
<td>Functional Background: Operations and Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-.041</td>
<td>-.041</td>
</tr>
<tr>
<td></td>
<td>(.114)</td>
<td>(.114)</td>
</tr>
<tr>
<td>Functional Background: Marketing and Sales</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.128</td>
<td>.130</td>
</tr>
<tr>
<td></td>
<td>(.164)</td>
<td>(.174)</td>
</tr>
<tr>
<td>Board Size (t)</td>
<td>.041*</td>
<td>.041*</td>
</tr>
<tr>
<td></td>
<td>(.041)</td>
<td>(.024)</td>
</tr>
<tr>
<td>Revenues (t) (log transformed)</td>
<td>-.975****</td>
<td>-.974****</td>
</tr>
<tr>
<td></td>
<td>(-.975)</td>
<td>(.273)</td>
</tr>
<tr>
<td>Munificence (t)</td>
<td>-.507</td>
<td>-.487</td>
</tr>
<tr>
<td></td>
<td>(-.507)</td>
<td>(.801)</td>
</tr>
<tr>
<td>Endogeneity Control External</td>
<td>3.907****</td>
<td>3.903****</td>
</tr>
<tr>
<td></td>
<td>(3.907)</td>
<td>(1.104)</td>
</tr>
<tr>
<td>Number of cases</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Scale (Maximum likelihood estimate)</td>
<td>.117</td>
<td>.117</td>
</tr>
<tr>
<td>Akaike's Information Criterion (AIC)</td>
<td>115.378*</td>
<td>117.377</td>
</tr>
<tr>
<td>Likelihood Ratio Chi-Square</td>
<td>19.576***</td>
<td>19.577**</td>
</tr>
</tbody>
</table>

* p < .10; ** p < .05; *** p < .01; **** p < .001. Standard errors are shown in parentheses.
Table 11: Robustness Check 3 – Two-Year Time Lag – Internal Attention (Model 8)

Results of GLiM Regression Models
(Testing 2-year time lag)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 8a</th>
<th>Model 8b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-1.468</td>
<td>-1.658</td>
</tr>
<tr>
<td></td>
<td>(2.717)</td>
<td>(2.666)</td>
</tr>
<tr>
<td>Board Imported Internal Attention (t-2)</td>
<td>.685</td>
<td>.685</td>
</tr>
<tr>
<td></td>
<td>(.748)</td>
<td>(.748)</td>
</tr>
<tr>
<td>CEO Age (t)</td>
<td>.023</td>
<td>.017</td>
</tr>
<tr>
<td></td>
<td>(.016)</td>
<td>(.017)</td>
</tr>
<tr>
<td>Functional Background: Operations and Engineering</td>
<td>.134</td>
<td>.103</td>
</tr>
<tr>
<td></td>
<td>(.242)</td>
<td>(.243)</td>
</tr>
<tr>
<td>Functional Background: Marketing and Sales</td>
<td>-.341</td>
<td>-.255</td>
</tr>
<tr>
<td></td>
<td>(.322)</td>
<td>(.334)</td>
</tr>
<tr>
<td>Board Size (t)</td>
<td>.031</td>
<td>.042</td>
</tr>
<tr>
<td></td>
<td>(.044)</td>
<td>(.045)</td>
</tr>
<tr>
<td>Revenues (t) (log transformed)</td>
<td>-.018</td>
<td>-.001</td>
</tr>
<tr>
<td></td>
<td>(.264)</td>
<td>(.260)</td>
</tr>
<tr>
<td>Munificence (t)</td>
<td>1.077</td>
<td>1.572</td>
</tr>
<tr>
<td></td>
<td>(1.517)</td>
<td>(1.584)</td>
</tr>
<tr>
<td>Endogeneity Control Internal</td>
<td>-4.577</td>
<td>-4.548</td>
</tr>
<tr>
<td></td>
<td>(3.208)</td>
<td>(3.153)</td>
</tr>
</tbody>
</table>

Number of cases                                            | 48         | 48         |
Scale (Maximum likelihood estimate)                        | .446       | .440       |
Log Likelihood                                            | -6.921     | -6.511     |
Akaike’s Information Criterion (AIC)                      | 31.842     | 33.023     |
Likelihood Ratio Chi-Square                               | 7.977      | 8.796      |

* p < .10; ** p < .05; *** p < .01; ****p<.001. Standard errors are shown in parentheses.
CHAPTER VI. DISCUSSION AND CONCLUSIONS

This chapter discusses the findings of this study, their corresponding theoretical and practical implications, its limitations, and makes suggestions for future research.

Interpretation and discussion of results

Taking advantage of the current dominant configuration of boards in public firms, along with advances in content analysis, this work has tried to provide insights on two critical questions in the managerial cognition literature: (1) what shapes the attention of CEOs, and (2) what is the role played by boards in that process. Previous research on CEO attention has focused on a wide variety of antecedents such as financial health and performance (e.g. Bettman & Weitz, 1983; D’Aveni & MacMillan, 1990; Short & Palmer, 2003), perceived strategic and environmental uncertainty (e.g. Daft et al., 1988; Sawyerr, 1993), and business and geographic scope diversity (e.g. Calori et al., 1994), among others. Still, research on the role played by boards from a cognitive perspective has remained largely overlooked, mostly having focused mainly on how boards allocate their attention (Tuggle, 2004), how involved they are in the strategic decisions of their firms (Judge & Zeithaml, 1992; Pugliese & Wenstøp, 2007), and the degree to which they generate interactions associated with their roles of advising and counselling the TMT (Westphal, 1999) and monitoring performance (Tuggle et al., 2010a), but they have failed at connecting these concepts with the literature on CEO attention. This work has tried to bring forth some ideas to bridge that gap.
To achieve this important goal this work presents a conceptual framework (shown in Figure 1) that introduces a rather novel construct to the managerial cognition literature: board imported attention. The framework is built over two major cognitive premises (bounded attention and the Whorf-Sapir hypothesis), and takes advantage of two relevant conditions (easy access to public archival data from a large number of firms and a significant evolution over the last fifty years in the composition and interlocking of boards), receiving partial support.

Of all the hypotheses presented in this dissertation, only two receive some level of support, along with a third hypothesis test that shows a significant result but in an opposite direction to what was expected. Overall, it might be argued that the number of supported hypotheses is low. Nevertheless, the results produce evidence to support the main tenet of this thesis: that there is a process by which the attention of the CEO is affected by the prior attentional focus of board members, resulting from their board or executive roles in other firms, and that this process can actually be affected by social and/or power relationships between boards and their CEOs.

The specific findings are discussed using the structure used in the conceptual framework shown in Figure 1 and in Chapter 3 regarding the variables affecting CEO attention: board’s imported attention, social/power dynamics within the board, external ties and board’s attentional homogeneity.

However, before discussing the findings of this study, the issue of multicollinearity must be addressed, since it is in an important concern when conducting multiple regression analysis. Multicollinearity occurs when there is substantial correlation among a set of independent variables. Its presence is problematic in multiple regression analysis
because estimation of regression coefficients for correlated predictors tends to lead to large standard errors, making the estimates of little or no value, and decreasing the likelihood of significant findings (Cohen et al., 2015). Thus, any robust multiple linear regression model should avoid multicollinearity in the independent variables.

Multicollinearity is usually identified using two measurements, the variance inflation factor (VIF) and tolerance. The VIF provides an index of “the amount that the variance of each regression coefficient is increased relative to a situation in which all of the predictor variables are uncorrelated” (Cohen et al., 2015: 423). Tolerance is the reciprocal of the VIF. A common rule of thumb is that a VIF of 10 or more, or a tolerance of 0.10 or less are evidence of serious multicollinearity (e.g. Norusis, 2005; Stevens, 1992). Nevertheless, some authors warn that this rule of thumb may be too lenient for most behavioral science applications (Cohen et al., 2015).

The issue of multicollinearity is relevant to this study since some of the independent variables used in the models show somewhat large bivariate correlations (see Table 2), and if multicollinearity were present, this would help explain the relatively small number of significant results found. The relatively high correlation between board imported external attention and board imported internal attention ($r = 0.709$) should not be considered a cause for concern since the two variables are used in entirely different models, each being the dependent variable in the corresponding model. Nevertheless, the high correlations shown by reciprocal interlocks with board imported external attention ($r = 0.660$) and with board imported internal attention ($r = 0.522$) deserve deeper discussion. These high correlations are almost certainly due to the fact that both variables, reciprocal interlocks and board imported attention, are ultimately affected by
the total number of interlocks associated with each board: a higher number of total interlocks increases the likelihood of having more reciprocal interlocks, and the more interlocked a board, the higher the number of LTS of represented firms available, and therefore the greater the value of board imported attention. However, although the literature on moderation establishes the desirability of having moderators that are not correlated with the independent variables (Baron & Kenny, 1986), it certainly does not preclude the existence of a moderation effect when the condition is not met; and while correlation between an independent and moderator variable has no specific interpretation, it may certainly signal a potential collinearity problem.

Nevertheless, there are four reasons why the issue of multicollinearity is not deemed to be a major concern in this study. First, to avoid non-essential multicollinearity between the computed interactions and the independent variables, all independent variables were centered before the interaction terms were created (Cohen et al., 2015). Second, although there were some relatively high correlations among some of the independent variables, they were all smaller than the threshold levels mentioned in the literature as indications of multicollinearity: $r > 0.70$ (Pallant, 2010), $r > 0.80$ (Mertler & Vannatta, 2005), or $r > 0.85$ (Bohrnstedt & Carter, 1971; Schoreder, Lander, & Levine-Silverman, 1990).

Third, the VIF values were lower than the typical threshold of 10 (Cohen et al., 2015), and the VIFs for all centered independent variables were below 2.6 (see Appendix D). In the case of the control variables used in the external attention models, two showed larger VIFs: firm size (5.759) and endogeneity control (5.805). A high correlation between the two was expected since the endogeneity control variable was computed using the size of the firms in 2011 as a regressor. However, this was considered
unproblematic because the stability of their coefficients was not a concern since their performance as controls was not impaired and they showed no evidence of being collinear with the variables of interest (Allison, 2012).

Finally, changes in the sample size did not appear to have major effects on the results. As explained above, when multicollinearity is present, multiple regression models tend to produce unstable estimates of regression coefficients with very high standard errors. Therefore, one remedy for multicollinearity is to collect additional data (Cohen et al., 2015), since the larger the sample, the lower the impact of multicollinearity on standard errors. The regression coefficient estimates in unstable models tend to change significantly, even with a small change in the sample size. In this study, as discussed earlier, the results of analysis performed with a reduced sample (robustness check 2) showed high levels of consistency with those using the full sample.

Therefore, after careful consideration of these arguments, and given that the moderation hypotheses were based on theory, no particular changes to the analyses (e.g. dropping variables, linearly combining predictors or performing a principal components regression) were deemed appropriate or necessary.

**Board’s imported attention**

Previous studies have explored the effects of specific board characteristics on boards’ cognition. Judge & Zeithaml (1992) focused on board size and levels of diversification and insider representation, and how these relate to board involvement in strategic decision making; Tuggle (2004) focused on the effect of the decision-making environment (dynamism, munificence and complexity) on the level of the board’s strategic entrepreneurial attention; Tuggle et al. (2010b) focused on the effect of duality
on the board’s attention to its monitoring role; and Tuggle et al. (2010a) focused on the effect of board diversity (tenure variance, functional background heterogeneity, board/firm industry heterogeneity) on the board’s attention to entrepreneurial issues. Nevertheless, no previous study has tried to view the board as a body that aggregates individual cognition. Adopting an ABV theoretical perspective (Ocasio, 1997), particularly in its fundamental premise that an individual’s attention is limited (Simon, 1957), it was hypothesized that the attentional focus of the board of a focal firm affects the attentional focus of the CEO over time. Since the attentional focus of the board can be considered as an aggregate of the attentional focus of the individuals forming it, it was further hypothesized that, by looking at these individuals’ attentional focus at a specific time, resulting from their role as executives or board members in other firms, the attentional focus of the focal firm’s board might be inferred. This allowed for the use of a new construct called “board imported attention”, examining its effects over time on the attentional focus of the focal firm’s CEO, and ultimately allowing for testing of a process of “diffusion of attention” from represented firms to the focal firm’s CEO via its board members.

The results suggest that the higher the average attentional focus of individual board members on the external environment, determined by the attentional focus given to the external environment in other firms in which they participate as executives or board members, the higher the relative attention of the focal firm’s CEO to the external environment (Hypothesis 1a). With a one-percent increase from the mean in the level of board imported external attention, the CEO’s level of attention to the external environment may increase by between .11 percent (Model 1c) and .196 percent (Model
1h). This may be considered consistent with Tuggle’s (2004: 140) presumption that diversity in the experience of the board, resulting from a higher proportion of outsiders, makes the board “better able to make sense of and react or anticipate the firm’s external environment.”

Lack of evidence in the results for the effect of the board’s imported internal attention on the CEO’s attentional focus to the internal environment (Hypothesis 1b) do not make the study meaningless, in any case it warrants deeper analysis and interpretation. Several potential explanations can be considered. One may relate to the fact that the vast majority of board members related to other firms were independent of their focal firms (Gordon, 2007), meaning that they might not necessarily be experts or sufficiently knowledgeable about what was happening inside their corresponding focal firms. It might thus be harder for them to influence attention in relation to internal issues as a result of the internal attentional focus of other firms in which they held a board or executive position. Another potential explanation, which does not preclude the previous one is the potential existence of moderators that are not identified in this study. For example, it could be the case that represented firms’ focus on topics associated with the internal environment was not necessarily applicable to the focal firms, particularly if the represented firms and the focal firms were participating in rather different competitive environments and industries. Another potential explanation is simple: that the dictionary used to measure internal attention (see Appendix A) was too small or limited to capture the level of attention to internal issues appropriately.
Social/power dynamics

It was hypothesized that social processes relating to power struggles may limit CEOs’ conscious or unconscious willingness to be influenced by ideas coming from other board members, affecting the extent to which they are able and/or willing to control the scanning process. The results of the corresponding tests (Models 1c and 1h) suggest that power imbalances do, in fact, influence the effect of board imported attention on the attentional focus of the CEO. Specifically, the results provide evidence that the higher the relative power of the CEO with regard to the board, the weaker the effect of the board’s imported attentional focus on the external environment on the attentional focus of the CEO on similar topics (Hypothesis 2a). With an increase in the power of the CEO relative to the board from one standard deviation below to one standard deviation above the mean, the CEO’s level of attention to the external environment decreases by almost .4 percent (from 8.23 to 8.19 percent).

Nevertheless, direct interpretation of the coefficients shown for the interaction factor in Models 1c and 1h is impossible because the CEO–board power index is a composite measure. It might be interpreted by considering different scenarios (Graffin, 2006) according to the different values reflected in the index. When the power index is one standard deviation below the mean (low CEO power in relation to the board), the CEO’s tenure relative to the average tenure of board members takes a value of .45, with 0 percent of directors appointed after the CEO, no dual role, and the directors other than the CEO holding 54 percent of the total director stock ownership. When the CEO–board power index is one standard deviation above the mean (high CEO power in relation to the board), the CEO’s tenure relative to the average tenure of board members is 1.25, with 72
percent of directors appointed after the CEO, a dual role, and the directors other than the
CEO holding 72.1 percent of the total director stock ownership. This finding is consistent
with Shropshire’s (2008: 24) proposition that “The likelihood of diffusion increases with
a powerful board vis-à-vis the current CEO.”

The results regarding the effect of relative board–CEO status on the diffusion of
attention are all non-significant (with the exception of Model 4h). The simplest
interpretation would be that status differences are less important than power differences
when it comes to the effect of social dynamics within boardrooms. Nevertheless, it might
also be the case that the operationalization of board–CEO status differences used in this
study failed to capture the construct at a reasonable level. Podolny (2005: 13) states that
status is “directly tied to the pattern of relations and affiliations in which the actor does
and does not choose to engage.” The analysis of this study may have failed to distinguish
between relations and affiliations of different qualities because it was measured only in
terms of awards received by each individual board member and the CEOs. Shropshire
(2010: 254) states that when a “director is affiliated with high-status outside firms, the
ability to facilitate the diffusion of practices increases.”

*External ties*

The results regarding the effect of external ties through reciprocal interlocks are
somewhat surprising in terms of the directionality of the effects. Models 1e and 1h show
a negative effect of the number of reciprocal interlocks on the relationship between
boards’ imported external attention and the attentional level of CEOs to the external
environment. This suggests that the higher the number of reciprocal interlocks, the lower
the influence of imported board attention to the external environment on the CEO’s
attentional level to similar topics. The most reasonable explanation for this may be found in Shropshire’s (2010: 256) statement:

Even if multiple directors have specific and relevant knowledge to contribute, the boardroom may not benefit from having so many interlocking directors, given the challenges of weighing a large amount of information from multiple outside firms.

A higher number of reciprocal interlocks may very well hinder the diffusion of information as a result of information overload. Also, highly interlocked boards tend to have directors holding multiple board seats, making it harder for them to maintain in-depth knowledge of each firm’s practices given their “part-time” status in each firm (Pettigrew, 1992). For example, in the case of 3M, which at the time of the analysis had a board formed of eleven members, there were at least 18 different interlocks, 15 of them reciprocal.

**Board’s attentional homogeneity**

Almost none of the results regarding the board’s attentional homogeneity (lexical commonality and lexical density, either external or internal) shows statistically significant values, except for Model 4h that shows a positive and significant value.

To my knowledge, this was the first time that the concept of attentional homogeneity, and its operationalization, was applied to a context related to boards of directors. It is likely that the lack of statistically significant results provided by this work might be explained by the rather small sample size of texts analyzed per each focal firm: 4.8 LTS on average. When Abrahamson & Hambrick (1997) presented their procedure to compute attentional homogeneity they studied 14 different industries, each with an average of 185 firms. It is now apparent that samples this small are unlikely to show any
kind of statistical significance. Nevertheless, it is worth noting something interesting: lexical commonality consistently shows positive coefficients, while lexical density consistently shows negative coefficients. As explained in the Measurement of Variables section in Chapter IV, lexical commonality measured how commonly words belonging to a specific lexicon were used across different LTS associated with represented firms, while lexical density calculated how much each set of represented firms deviated from a state of perfect linguistic homogeneity (Abrahamson & Hambrick, 1997), in which every represented firm’s LTS would share every word it used with all other represented firms’ letters for the same board. The most simple explanation for the difference in directionality between these two measurements of attentional homogeneity may relate to the fact that the measurement of lexical density did not consider the correction considered by Abrahamson and Hambrick (1997), due to the two drawbacks associated with it: (1) it does not incorporate information about the frequency with which words are used, as lexical density does, and (2) the lexical density measure is highly sensitive to the number of organizations in the sample. The second of these drawbacks may have created some noise in the results, since the number of represented firms in the sample of focal firms showed a rather wide range, with some cases having just one represented firm and others having as many as eleven represented firms.

In fact, Abrahamson and Hambrick (1997: 521) state that “the advantage of the lexical commonality method is that it retains information about both word usage (attentional direction) and frequency of usage (attentional intensity), and makes it possible to calculate attentional homogeneity among a variety of texts of varying lengths.” Therefore, if lexical commonality were to be considered as a better
representation of attentional homogeneity, the results of the analysis, though not significant, would at least be consistent with expectations in terms of the directionality of the relationship: the higher the boards’ attentional homogeneity, the stronger the relationship between the independent and dependent variables. However, since the coefficients are not statistically significant, this interpretation is debatable.

Control variables

As discussed earlier, the analyses performed to test all the hypotheses included six control variables, plus a variable to control for potential endogeneity, focusing on three levels: individual level, organizational level and industry level. The first included CEO age, plus dummy variables reflecting a CEO’s operations and engineering functional background, and a CEO’s marketing and sales functional background. The second included board size and firm size, and the third included industry munificence. All the models included these variables because previous empirical work had proven them to significantly affect CEO attention, or because there were theoretical reasons, even if no empirical evidence as yet, to think that they might have an effect on the topics to which CEOs devote their attention. For this set of control variables, only two cases showed significant correlations: the first related to a functional background in operations and engineering and a functional background in sales and marketing, and the second was board size with firm size. After testing for multicollinearity (see Chapter IV), there appeared to be no reason to consider entering any of these control variables into separate models.

As discussed above, different sets of control variables confirmed the theorized effects: the models associated with external attention consistently showed a significant
effect on CEO external attention by firm size in terms of revenues (negative), whereas the models associated with internal attention consistently showed a significant effect on CEOs’ internal attention by CEOs’ age (positive), as well as their functional background in marketing and sales (negative).

Theoretical, methodological and practical implications

This section presents the theoretical, methodological and practical implications of the empirical findings of this study.

This study has a number of contributions for the corporate governance and the managerial cognition literatures, particularly in terms of the board-CEO relationship. Great efforts have been made over the years to predict and study the effect of boards on firm performance. Researchers have provided very good insights on the characteristics and the composition of boards and their relationship with firm performance. Nevertheless, these connections represent, to some extent, “great inferential leaps” (Pettigrew, 1992: 171). This work goes beyond and tries to complement the current literature by providing a new perspective to the board-CEO relationship from a cognitive standpoint. So far, only a fairly limited number of studies have taken a similar approach (e.g., Tuggle et al., 2010a; Tuggle et al., 2010b), opening an interesting opportunity for researchers to further examine and test more aspects of cognition at the board-CEO-TMT level.

Sense-making is a complex human process, and CEOs are limited in their attentional capabilities, making it necessary for them to selectively notice and interpret objects and events. Their boards help them filter and process vast amounts of data coming both from inside as well as outside the firm, but this filtering is affected by the board members’ own
attentional limitations and the social and cognitive relationships they establish with their CEOs. In applying ABV’s principles of focus of attention and structural distribution of attention (Ocasio, 1997) this dissertation has found evidence to explain different effects of board members on CEOs at a cognitive level, based on their experience in tied-to firms, while testing for the effects of social dynamics within the boardrooms in which they serve. This was achieved by introducing a new construct, board imported attention, as an aggregate of the individual attention levels of board members, and has provided evidence that, after considering an appropriate time lag, some of the phenomena hypothesized here actually occur and can be observed, linking for the first time boards and CEOs from a cognitive standpoint. It is hoped that this work will provide researchers with a new perspective from which to analyze the impact of boards on CEOs, and ultimately on firms’ performance, by increasing understanding of what happens inside the boardroom, adding to the input–output models of boards that have focused primarily on the use of demographic factors as proxies for latent constructs (Tuggle, 2004).

Methodologically, this work makes a contribution by introducing a way to operationalize board imported attention. Board researchers have argued that conducting research on boards is difficult owing to their secretive nature. Although understanding of boardroom dynamics is far from complete, this work provides a way to gain a better understanding by performing content analysis in a way that appears to be unique in the literature. By identifying and relating two otherwise unrelated trends—a major shift in the composition of boards of public firms in the last 50 years and some recent applications of content analysis in the cognitive literature—this study proposes a novel way of measuring the imported attention of boards.
From a practical perspective, the results presented in this dissertation offer some insights to corporate governance literature. They suggest that firms can make decisions regarding structures and processes that may strengthen specific attentional orientations. The results also illustrate the importance of the composition of boards and how they are related to other firms via interlocks in terms of the effect they have on the attentional focus of their CEOs. Based on the theoretical propositions presented in this dissertation and the corresponding results, CEOs are likely to change their focus of attention to a certain degree when the tied-to firms in which the directors participate change their degree of focus of attention. People who have a voice with regard to the composition of boards might consider the attentional focus of their current and potential board members in their tied-to firms, since it is likely to have an effect on the attentional focus of the CEOs in their focal firms. CEO attention has been shown to influence firm performance (Garg et al., 2003; Gary & Wood, 2011), strategic responses (Kaplan et al., 2003) and strategic change (Gioia & Chittipeddi, 1991). Therefore, those concerned about the attentional focus of their CEOs might want to give greater consideration to whether their board members will influence the attention of their CEO appropriately, given their desired strategies and competitive contexts. For example, if shareholders were to consider it desirable to increase their CEO’s level of attention to the external environment, they should elect directors who are associated with other firms in which greater attention is paid to similar external topics.

Also, shareholders may want to be more attentive to power relationships between their CEOs and their boards. This work has presented empirical evidence supporting Shropshire’s argument that, “while power may not solely determine the influence of the
board, it does dictate the opportunities to receive information about practices via interlocking directors that may shape strategic outcomes” (2010: 255). Less powerful boards vis-à-vis the CEO are less likely to influence the attentional focus of the CEO, with corresponding consequences.

The findings can also help companies gain a better understanding of rivals and their actions. More importantly, managers might be able to predict a change in strategic focus based on their knowledge of the compositions of boards at competing firms. Anticipating changes in the attentional focus could be valuable knowledge that could help companies better understand their rivals and potentially plan and time some changes of their own.

**Limitations**

This section discusses the limitations of this work, and concludes by offering directions for future research regarding the relationship between boards’ and CEOs’ attention to different environmental, strategic and organizational issues, as well as the role played by cognitive and team and social dynamics in affecting what happens inside boardrooms.

Enumeration of the limitations of this work must begin by referring to the lack of significant results for a large number of the hypotheses presented. Some potential explanations for these results are discussed above. In addition, the limitations of this work can be grouped into two levels: theoretical and empirical.

From a theoretical perspective, it is evident that the model was under-specified. Only imported board attention was considered, along with a small set of potential moderators and some control variables, as antecedents of CEO attention. Evidently, the model was far from complete. Other potential antecedents of CEO attention were not considered, such as perceived strategic uncertainty (Daft et al., 1988), financial health (D’Aveni &
MacMillan, 1990), mental models (Barr et al., 1992) and single-industry tenure and intrapersonal functional diversity (Angriawan & Abebe, 2011). The absence of these other potential explanatory variables from the model may have affected the results.

From an empirical perspective, a variety of limitations can be identified. Only the five deemed most important are discussed here. The first relates to the sample and the generalizability of the findings. This work analyzed information on almost 300 large organizations, most of them public. Thus, it might be argued that the results are not necessarily generalizable to smaller organizations.

The second limitation relates to measurement of attention using content analysis (word count) of LTS. These measurements probably did not exclusively reflect CEOs’ and board members’ thought processes. Also, the dictionaries used to measure the level of attention paid by CEOs and board members to the external and internal environment might be considered limited in breadth (see Appendix B).

The third limitation relates to the validity of the operationalization of board imported attention. Underlying the proposed measurement are at least two potentially problematic implicit assumptions: first, that the application of the logic for measuring CEO attention using proportions of word counts is equally applicable in the case of board members and their level of attention in their corresponding represented firms; and second, that attention at board level can be estimated by averaging different levels of attention at the individual level. These two over-simplifications may have impacted on the quality of the results and the conclusions.

The fourth limitation relates to how status was measured to compute board–CEO relative status, by measuring the number of awards from a single source applied to
companies headquartered mainly, but not exclusively, in the United States. Graffin et al. (2008) state that the importance given to awards, and therefore their influence on status, may change depending on the efficiency of the financial markets in which firms compete.

The fifth limitation is a weakness in the analysis of results associated with the effect of reciprocal interlocks: interlocks were treated as if the transmission of information, in this case attentional focus, between represented firms and focal firms was uniform. However, recent research has shown that interlocks may act as channels for “both positive and negative outcomes to diffuse between firms” (Shropshire, 2010: 247).

**Directions for future research**

Each limitation mentioned above suggests an avenue for future research. From a theoretical perspective, two interesting topics might be studied in future: perfecting the model, and validating the board imported attention construct and its operationalization. Given that the model was under-specified, consideration might be given to including other potential explanatory variables. In terms of construct validity, researchers might seek alternative ways of measuring imported board attention, or even improve the procedure used in the content analysis. For example, alternative analyses might consider sentences rather than simple word counts. This also opens up the possibility for future research on board cognition through content analysis by complementing existing dictionaries or developing new ones, to measure not only attention to the external or internal environment but also other kinds of attentional foci, such as control orientation, customer orientation, service/product orientation, and past/future orientation (Fiol, 1995). More qualitative techniques, such as ethnographies and in depth interviews, could yield interesting insights about many nuances of the process to complement and perfect the
conceptual framework. Also, recent developments in artificial intelligence and sentiment analysis have produced tools that allow detection of moods, feelings, and thoughts in verbal communications (Hossein, 2014). There are numerous opportunities for the use of technology in the future study of cognition and managerial decision-making.

It was established earlier in this work that the vast majority of the rather limited work on board attention has seen it as an antecedent of firm performance. Given the results provided by this work, future researchers might seek to build a broader model connecting board attention with CEO attention, TMT attention, and eventually firm performance. Empirical studies in this area can deepen our understanding of the effects of cognitive orientations at various levels within the organization.

From an empirical perspective, future researchers might also consider broadening the sample. For example, they might test for differences between large and small firms, or between highly mature firms and companies at early stages, or compare multinational companies with those operating in one market. This wide variety of contexts would be likely to produce different and interesting results.

With regard to the use of different operationalizations of the constructs, future studies might be carried out using other proxies for some of the constructs considered in the model that did not present significant results, to establish whether the limited results presented in this dissertation were due to poor operationalization, or to confirm the lack of significant effects. For example, researchers might consider the status of the represented firms through board members, rather than their individual status simply as “isolated actors” (Graffin et al., 2008: 458).
One topic that may prove to be of particular interest for future research relates to directorate interlocks. Since the role of interlocking directors and board influence over organizational outcomes is expected to expand (Finkelstein et al., 2009), further research on the influence of reciprocal interlocks on CEO attention is warranted. This study has presented some potential explanations where the results obtained were contrary to the hypothesized relationships. Researchers might use this as a basis to perfect the model and the empirical tests used to observe and measure the impact of interlocks on CEOs, TMTs and companies in general from a cognitive perspective.

In summary, this research could certainly be improved in many ways and on many dimensions: the model could be complemented and perfected, and the operationalization of the constructs could be improved. Nevertheless, despite its many limitations, this research makes a contribution to the academic community by offering a new construct to the literature on corporate governance—board imported attention—and a novel and easy way to measure it. This will enable researchers in general, rather than only those lucky few with access to boardrooms, to gain a glimpse into the minds of board members and CEOs, so that boardrooms may stop being “black boxes.”
APPENDICES

Appendix A: Summary of literature review on empirical work on antecedents and consequences of managerial cognition and attention

(Studies at the CEO level focused on environmental scanning are shown in bold).

<table>
<thead>
<tr>
<th>Type</th>
<th>Year</th>
<th>Reference</th>
<th>Cognitive/attentional main variable</th>
<th>Antecedents</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board</td>
<td>1992</td>
<td>Judge &amp; Zeithaml (1992)</td>
<td>•Board involvement</td>
<td>•Board size • Levels of diversification • Insider representation • Organizational age</td>
<td>•Financial performance</td>
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<tr>
<td>Board</td>
<td>1999</td>
<td>Westphal (1999)</td>
<td>•Advice and counsel interactions</td>
<td>•CEO-board friendship ties • Incentive alignment • Portion of board appointed after CEO</td>
<td></td>
</tr>
<tr>
<td>Board</td>
<td>2004</td>
<td>Tuggle (2004)</td>
<td>•Board level attention allocation (board level strategic entrepreneurial attention)</td>
<td>•Environment of decision (dynamism, munificence, complexity) • Attention structure (breadth of knowledge, director knowledge) • Procedural and communication channels (spatial, temporal, procedural) • Issues and answers (monitoring)</td>
<td>•Firm level strategic entrepreneurial action</td>
</tr>
<tr>
<td>Board</td>
<td>2007</td>
<td>Pugliese &amp; Wenstop (2007)</td>
<td>•Board of directors' knowledge • Board strategic involvement</td>
<td></td>
<td>•Board strategic involvement</td>
</tr>
<tr>
<td>Board</td>
<td>2010</td>
<td>Tuggle et al. (2010)</td>
<td>•Board attention to monitoring role</td>
<td>•Duality • Deviation from prior performance</td>
<td></td>
</tr>
<tr>
<td>Board</td>
<td>2010</td>
<td>Tuggle, Schnatterly &amp; Johnson (2010)</td>
<td>•Board attention to entrepreneurial issues</td>
<td>•Board diversity (tenure variance, functional background heterogeneity, board/firm industry heterogeneity) • Functional output-oriented backgrounds • Faultline strength (weak vs strong vs very strong) • Formality of board meetings</td>
<td></td>
</tr>
<tr>
<td>Board</td>
<td>2011</td>
<td>Kim (2011)</td>
<td>•Causal attribution</td>
<td>•Performance feedback • Speed of CEO replacement</td>
<td></td>
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<tr>
<td>CEO</td>
<td>1983</td>
<td>Bettman &amp; Weitz (1983)</td>
<td>•Causal reasoning</td>
<td>•Unfavorable variances</td>
<td></td>
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<tr>
<td>CEO</td>
<td>1990</td>
<td>D'Aveni and MacMillan (1990)</td>
<td>•Allocation of attention (input, output, internal)</td>
<td>•Financial health/perspectives</td>
<td></td>
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<td>Type</td>
<td>Year</td>
<td>Reference</td>
<td>Cognitive/attentional main variable</td>
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<tr>
<td>CEO</td>
<td>1990</td>
<td>Thomas &amp; McDaniel (1990)</td>
<td>Strategic issue interpretation</td>
<td>Strategy</td>
<td>TMT information processing structure</td>
</tr>
<tr>
<td>CEO</td>
<td>1991</td>
<td>Clapham &amp; Schwenk (1991)</td>
<td>Type of attribution</td>
<td>Regulated environment</td>
<td>Future performance</td>
</tr>
<tr>
<td>CEO</td>
<td>1992</td>
<td>Barr, Stimpert, Huff (1992)</td>
<td>Attention to changes in organizational environments</td>
<td>Benign or benevolent environment.</td>
<td>Interpretation of change in organizational environments. Change in top managers’ mental models</td>
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<tr>
<td>CEO</td>
<td>1993</td>
<td>Sawyerr (1993)</td>
<td>Environmental scanning (frequency, level of interest)</td>
<td>Perceived environmental uncertainty</td>
<td></td>
</tr>
<tr>
<td>CEO</td>
<td>1994</td>
<td>Calori et al (1994)</td>
<td>CEOs cognitive complexity</td>
<td>Business and geographic scope diversity</td>
<td>International geographic scope</td>
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<tr>
<td>CEO</td>
<td>2005</td>
<td>Collinson &amp; Houlden (2005)</td>
<td>Decision to internationalize</td>
<td>International experience</td>
<td>Network relationships</td>
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<tr>
<td>CEO</td>
<td>2007</td>
<td>Yadav et al. (2007)</td>
<td>CEO attention with future, external and internal focus</td>
<td>Speed of identification of new technological opportunities. Speed of development of initial products based on those new technological opportunities. Speed of deployment of the new products</td>
<td></td>
</tr>
<tr>
<td>CEO</td>
<td>2008</td>
<td>Kaplan (2008)</td>
<td>Attention to optical technologies</td>
<td>-</td>
<td>Investment in optics</td>
</tr>
<tr>
<td>CEO</td>
<td>2009</td>
<td>Eggers &amp; Kaplan (2009)</td>
<td>CEO attention</td>
<td>-</td>
<td>Time of entry into a new market</td>
</tr>
<tr>
<td>CEO</td>
<td>2010</td>
<td>Hooghiemstra (2010)</td>
<td>Good vs bad news and their attributions</td>
<td>-</td>
<td>Attritions and responsibility</td>
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<td>Type</td>
<td>Year</td>
<td>Reference</td>
<td>Cognitive/attentional main variable</td>
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<td>CEO</td>
<td>2011</td>
<td>Gary &amp; Wood (2011)</td>
<td>• Accuracy of mental models</td>
<td></td>
<td>• Firm performance</td>
</tr>
<tr>
<td>TMT</td>
<td>2013</td>
<td>Gerstner et al. (2013)</td>
<td>• Managerial attention to biotechnology</td>
<td>• CEO narcissism</td>
<td>• Audience engagement</td>
</tr>
<tr>
<td>TMT</td>
<td>1985</td>
<td>Walker (1985)</td>
<td>• Individual cognition of term and boundary dimensions</td>
<td>• Position in the network</td>
<td>• Managerial, technical and marketing functions</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Tenure</td>
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<tr>
<td>TMT</td>
<td>1992</td>
<td>Day &amp; Lord (1992)</td>
<td>• Speed and number of categories</td>
<td>• Expertise level (novice vs expert)</td>
<td></td>
</tr>
<tr>
<td>TMT</td>
<td>1995</td>
<td>Ginsberg &amp; Venkatraman (1995)</td>
<td>• Issue interpretation (urgency, understandability and manageability)</td>
<td></td>
<td>• Commitment to technological competence</td>
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<td></td>
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<td></td>
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<td></td>
<td>• Commitment to administrative competence</td>
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<tr>
<td>TMT</td>
<td>1996</td>
<td>Boyd &amp; Fulk (1996)</td>
<td>• Environmental scanning</td>
<td>• Perceived strategic variability</td>
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<td></td>
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<td>• Perceived strategic importance</td>
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<td></td>
<td>• Perceived complexity</td>
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<tr>
<td>TMT</td>
<td>1997</td>
<td>Jenkins &amp; Johnson (1997)</td>
<td>• Cognitive structure</td>
<td></td>
<td>• Organizational performance</td>
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<tr>
<td>TMT</td>
<td>1997</td>
<td>McNamara &amp; Bromiley (1997)</td>
<td>• Perceived level of standardization</td>
<td></td>
<td>• Risk Assessment</td>
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<td></td>
<td>• Perceived level of industry excitement</td>
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<tr>
<td>TMT</td>
<td>1998</td>
<td>Miller et al (1998)</td>
<td>• Cognitive diversity</td>
<td>• Comprehensiveness of strategic decision-making</td>
<td>• Extensiveness of strategic planning</td>
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<td>TMT</td>
<td>2001</td>
<td>Osborne et al (2001)</td>
<td>• Cognitive strategic group</td>
<td>• Firm performance</td>
<td>• Environments</td>
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<td>TMT</td>
<td>2002</td>
<td>McNamara et al (2002)</td>
<td>• Cognitive complexity of the mental models of TMTs</td>
<td>• Firm performance</td>
<td>• Credit markets</td>
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<td>TMT</td>
<td>2003</td>
<td>White et al (2003)</td>
<td>• Cognitive style</td>
<td>• Perception and appraisal of market situation</td>
<td>• Magnitude of response</td>
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<td>TMT</td>
<td>2005</td>
<td>Goodhew et al. (2005)</td>
<td>• Complexity (features) of cognitive maps</td>
<td>• Financial performance</td>
<td>• Global strategic posture</td>
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<tr>
<td>TMT</td>
<td>2005</td>
<td>Levy (2005)</td>
<td>• Attention patterns of TMT</td>
<td>• Managerial attention</td>
<td>• Time after M&amp;A</td>
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<tr>
<td>TMT</td>
<td>2006</td>
<td>Cho &amp; Hambrick, 2006</td>
<td>• Entrepreneurial attention</td>
<td>• TMT composition (industry tenure, output-</td>
<td>• Strategic change</td>
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<td>function experience, industry-tenure</td>
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<td>heterogeneity, functional heterogeneity)</td>
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<td>• TMT compensation (performance-dependent</td>
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<td>pay)</td>
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<tr>
<td>TMT</td>
<td>2006</td>
<td>Cho (2006)</td>
<td>• Environmental scanning</td>
<td>• Environmental changes</td>
<td>• Strategic change</td>
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<td>• Functional background</td>
<td>• Executive turnover</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• Moderator: TMT heterogeneity</td>
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<td>Type</td>
<td>Year</td>
<td>Reference</td>
<td>Cognitive/attentional main variable</td>
<td>Antecedents</td>
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<tr>
<td>TMT</td>
<td>2006</td>
<td>Fiss &amp; Zajac (2006)</td>
<td>• Framing of strategic change toward shareholder value</td>
<td>• Moderator: Output-oriented background functional experience</td>
<td></td>
</tr>
<tr>
<td>TMT</td>
<td>2007</td>
<td>Acedo &amp; Jones (2007)</td>
<td>• Entrepreneurial cognition</td>
<td>• Framing of strategic change toward shareholder value</td>
<td>• Internalization speed</td>
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<tr>
<td>TMT</td>
<td>2008</td>
<td>Julian et al. (2008)</td>
<td>• Organizational cognition (manageability assessment)</td>
<td>• Resource dependence factors (vulnerability)</td>
<td>• Organization accommodation</td>
</tr>
<tr>
<td>TMT</td>
<td>2008</td>
<td>Nadkarni &amp; Barr (2008)</td>
<td>• Attention focus</td>
<td>• Industry velocity</td>
<td>• Speed of strategic action responses to major environmental changes</td>
</tr>
<tr>
<td>TMT</td>
<td>2008</td>
<td>Bouquet &amp; Birkinshaw (2008)</td>
<td>• Positive headquarters attention</td>
<td>• Structural determinants: subsidiary weight (strategic significance of local environment, strength of a subsidiary within MNE network)</td>
<td></td>
</tr>
<tr>
<td>TMT</td>
<td>2009</td>
<td>Gebauer (2009)</td>
<td>• Focus of attention and Situated attention</td>
<td>• Relational determinants: subsidiary voice (initiative taking, profile building)</td>
<td>• Service orientation of the business strategy</td>
</tr>
<tr>
<td>TMT</td>
<td>2009</td>
<td>Laamanen &amp; Wallin (2009)</td>
<td>• Attention allocation</td>
<td>• Contingencies: factors contributing to subsidiary strategic isolation (geographic distance, downstream competence)</td>
<td>• Capability development</td>
</tr>
<tr>
<td>TMT</td>
<td>2009</td>
<td>Bouquet et al (2009)</td>
<td>• International attention of HQ executives</td>
<td>• Control variables: Subsidiary level; Size, age, performance, functional and market scope, autonomy; MNE characteristics: Formal structure, geographic scope, economic and cultural distance, home region</td>
<td>• Performance</td>
</tr>
<tr>
<td>TMT</td>
<td>2010</td>
<td>Barrales-Molina et al. (2010)</td>
<td>• Knowledge articulation and codification</td>
<td>• Dynamism perceived</td>
<td>• Munificence perceived</td>
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<td>TMT</td>
<td>2011</td>
<td>Hensman &amp; Sadler-Smith (2011)</td>
<td>• Cognitive factors</td>
<td>• Complexity perceived</td>
<td>• Outcomes of intuiting</td>
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<tr>
<td>TMT</td>
<td>2011</td>
<td>Iederan et al. (2011)</td>
<td>• Cognitive structure</td>
<td>• Institutional change</td>
<td>• Competitive retaliation</td>
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<tr>
<td>TMT</td>
<td>2011</td>
<td>Marcel et al. (2011)</td>
<td>• Cognitive frameworks</td>
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<td>Type</td>
<td>Year</td>
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<td>Cognitive/attentional main variable</td>
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<tr>
<td>TMT</td>
<td>2012</td>
<td>Plambeck (2012)</td>
<td>• Managerial interpretation (of precipitating event)</td>
<td>• Organizational factors (firm strategy and firm resources)</td>
<td>• New products degree of innovativeness</td>
</tr>
<tr>
<td>TMT</td>
<td>2013</td>
<td>Li et al (2013)</td>
<td>• Search selection (terrain unfamiliarity, terrain distance, terrain source diversity) • Search intensity (search effort, search persistence)</td>
<td></td>
<td>• New products</td>
</tr>
<tr>
<td>TMT</td>
<td>2013</td>
<td>Maula et al (2013)</td>
<td>• Timing of the formal attention to major discontinuities by an incumbent’s top management</td>
<td>• Level of homophilous interorganizational ties to industry peers • Level of a partner’s status in homophilous interorganizational ties • Level of status of the partners in heterophilous interorganizational ties</td>
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</tr>
</tbody>
</table>
Appendix B. List of words in the dictionaries used for content analysis (word count) based on Yadav et al. (2007)

<table>
<thead>
<tr>
<th>EXTERNAL FOCUS</th>
<th>INTERNAL FOCUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank*</td>
<td>Board*</td>
</tr>
<tr>
<td>Buyer*</td>
<td>CEO*</td>
</tr>
<tr>
<td>Client*</td>
<td>Director*</td>
</tr>
<tr>
<td>Communit*</td>
<td>Diversif*</td>
</tr>
<tr>
<td>Compan*</td>
<td>Diversity*</td>
</tr>
<tr>
<td>Compet*</td>
<td>Employee*</td>
</tr>
<tr>
<td>Consumer*</td>
<td>Management*</td>
</tr>
<tr>
<td>Customer*</td>
<td>Manager*</td>
</tr>
<tr>
<td>Market</td>
<td>Office*</td>
</tr>
<tr>
<td>Marketplace*</td>
<td>Organisation</td>
</tr>
<tr>
<td>Markets*</td>
<td>Organization</td>
</tr>
<tr>
<td>Peer*</td>
<td>Organizational</td>
</tr>
<tr>
<td>Position*</td>
<td>President*</td>
</tr>
<tr>
<td></td>
<td>Reorganization*</td>
</tr>
<tr>
<td></td>
<td>Retire*</td>
</tr>
<tr>
<td></td>
<td>Staff*</td>
</tr>
<tr>
<td></td>
<td>Stakeholder*</td>
</tr>
<tr>
<td></td>
<td>Subsidiar*</td>
</tr>
</tbody>
</table>

Note: Use of an asterisk at the end of a word or word stem signals the software (LIWC2015) to ignore all subsequent letters. Consequently, “Consumer*” counted the words Consumer and Consumers, etc. (Pennebaker et al., 2015).
Appendix C: Summary of variables, operationalization and main data sources

<table>
<thead>
<tr>
<th>Type</th>
<th>Conceptual variable</th>
<th>Name of variable</th>
<th>Operationalization</th>
<th>Main data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variables</td>
<td>CEO External Attention in 2013</td>
<td>CAE$_{13}$</td>
<td>Proportion of word count of LTS based on Yadav’s (2007) dictionary</td>
<td>Letters to shareholders from focal firms in 2013</td>
</tr>
<tr>
<td></td>
<td>CEO Internal Attention in 2013</td>
<td>CAI$_{13}$</td>
<td>Proportion of word count of LTS based on Yadav’s (2007) dictionary</td>
<td>Letters to shareholders from focal firms in 2013</td>
</tr>
<tr>
<td>Independent variables</td>
<td>Board Imported External Attention</td>
<td>BAE$_{12}$</td>
<td>Weighted average of word count of LTS based on Yadav’s (2007) dictionary</td>
<td>Letters to shareholders from represented firms in 2012</td>
</tr>
<tr>
<td></td>
<td>Board Imported Internal Attention</td>
<td>BAI$_{12}$</td>
<td>Weighted average of word count of LTS based on Yadav’s (2007) dictionary</td>
<td>Letters to shareholders from represented firms in 2012</td>
</tr>
<tr>
<td>Moderating variables</td>
<td>Relative status difference between board and CEO</td>
<td>RelStatus</td>
<td>Procedures described by Castellucci and Ertug (2010) and Graffin et al. (2008)</td>
<td>Institutional Investor magazine’s award list</td>
</tr>
<tr>
<td></td>
<td>Reciprocal interlocks</td>
<td>RecIntrick</td>
<td>Number of interlocked firms through focal firms’ directors</td>
<td>Focal firms’ annual reports, 10K, proxy statements</td>
</tr>
<tr>
<td></td>
<td>Board attentional homogeneity : Lexical density - External</td>
<td>LexDenExt</td>
<td>Procedure described by Abrahamson &amp; Hambrick (1997)</td>
<td>Letters to shareholders from represented firms in 2012</td>
</tr>
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<td></td>
<td>Board attentional homogeneity : lexical commonality - External</td>
<td>LexCommExt</td>
<td>Procedure described by Abrahamson &amp; Hambrick (1997)</td>
<td>Letters to shareholders from represented firms in 2012</td>
</tr>
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<td></td>
<td>Board attentional homogeneity : Lexical density - Internal</td>
<td>LexDenInt</td>
<td>Procedure described by Abrahamson &amp; Hambrick (1997)</td>
<td>Letters to shareholders from represented firms in 2012</td>
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<td>Board attentional homogeneity : lexical commonality - Internal</td>
<td>LexCommInt</td>
<td>Procedure described by Abrahamson &amp; Hambrick (1997)</td>
<td>Letters to shareholders from represented firms in 2012</td>
</tr>
<tr>
<td></td>
<td>CEO-board relative power</td>
<td>PwrInd</td>
<td>Procedure described by Westphal &amp; Zajac (2001)</td>
<td>RiskMetrics database</td>
</tr>
<tr>
<td>Control variables</td>
<td>Age: direct report</td>
<td>CEOAge$_{13}$</td>
<td>RiskMetrics database</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Functional background: Operations and Engineering</td>
<td>DummyOpsEng</td>
<td>Procedure described by Westphal and Zajac (1995)</td>
<td>Focal firms’ annual reports, 10K, proxy statements, Bloomberg Executive Profiles</td>
</tr>
<tr>
<td></td>
<td>Functional background: Sales and Marketing</td>
<td>DummyMktSales</td>
<td>Procedure described by Westphal and Zajac (1995)</td>
<td>Focal firms’ annual reports, 10K, proxy statements, Bloomberg Executive Profiles</td>
</tr>
<tr>
<td></td>
<td>Board size</td>
<td>BrdSize$_{13}$</td>
<td>Number of board members</td>
<td>RiskMetrics database</td>
</tr>
<tr>
<td></td>
<td>Firm size</td>
<td>Revi$_{13}$</td>
<td>Log transformation of revenues</td>
<td>Fortune 500 report, focal firms’ annual reports</td>
</tr>
<tr>
<td></td>
<td>Munificence</td>
<td>Munifi$_{0712}$</td>
<td>Procedure described by Boyd (1990)</td>
<td>US Census Bureau</td>
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<tr>
<td></td>
<td>Endogeneity Control External</td>
<td>EndogExt</td>
<td>Procedure described by Sanders &amp; Hambrick (2007)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Endogeneity Control Internal</td>
<td>EndogInt</td>
<td>Procedure described by Sanders &amp; Hambrick (2007)</td>
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</table>
Appendix D. Collinearity Statistics

### Predictors Used in External Attention Models

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Uncentered Tolerance</th>
<th>Uncentered VIF</th>
<th>Centered Tolerance</th>
<th>Centered VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board Imported External Attention (%)</td>
<td>.474</td>
<td>2.111</td>
<td>.462</td>
<td>2.167</td>
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<tr>
<td>CEO-Board Power Index</td>
<td>.767</td>
<td>1.304</td>
<td>.758</td>
<td>1.319</td>
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<tr>
<td>Board-CEO Relative Status</td>
<td>.851</td>
<td>1.175</td>
<td>.876</td>
<td>1.141</td>
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<tr>
<td>Number of Reciprocal Interlocks</td>
<td>.372</td>
<td>2.689</td>
<td>.388</td>
<td>2.575</td>
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<tr>
<td>Att. Hom. - Lexical Commonality External</td>
<td>.524</td>
<td>1.908</td>
<td>.532</td>
<td>1.879</td>
</tr>
<tr>
<td>CEO Age</td>
<td>.835</td>
<td>1.198</td>
<td>.835</td>
<td>1.198</td>
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<tr>
<td>Funct. Background Ops. &amp; Eng.</td>
<td>.913</td>
<td>1.095</td>
<td>.906</td>
<td>1.103</td>
</tr>
<tr>
<td>Funct. Background Mktng. &amp; Sales</td>
<td>.914</td>
<td>1.094</td>
<td>.916</td>
<td>1.092</td>
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<tr>
<td>Board Size</td>
<td>.669</td>
<td>1.495</td>
<td>.688</td>
<td>1.453</td>
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<tr>
<td>Firm Size (log-transformed Revenues)</td>
<td>.165</td>
<td>6.074</td>
<td>.174</td>
<td>5.759</td>
</tr>
<tr>
<td>Industry Munificence</td>
<td>.900</td>
<td>1.111</td>
<td>.932</td>
<td>1.073</td>
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<tr>
<td>Endogeneity Control - External</td>
<td>.166</td>
<td>6.007</td>
<td>.172</td>
<td>5.805</td>
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</table>

### Predictors Used in Internal Attention Models

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Uncentered Tolerance</th>
<th>Uncentered VIF</th>
<th>Centered Tolerance</th>
<th>Centered VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board Imported Internal Attention (%)</td>
<td>.559</td>
<td>1.790</td>
<td>.551</td>
<td>1.816</td>
</tr>
<tr>
<td>CEO-Board Power Index</td>
<td>.782</td>
<td>1.279</td>
<td>.778</td>
<td>1.285</td>
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<tr>
<td>Board-CEO Relative Status</td>
<td>.826</td>
<td>1.210</td>
<td>.845</td>
<td>1.183</td>
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<tr>
<td>Number of Reciprocal Interlocks</td>
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<td>2.247</td>
<td>.452</td>
<td>2.214</td>
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<tr>
<td>Att. Hom. - Lexical Commonality Internal</td>
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<td>2.546</td>
<td>.414</td>
<td>2.417</td>
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<tr>
<td>Att. Hom. - Lexical Density Internal</td>
<td>.391</td>
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<td>2.459</td>
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<td>CEO Age</td>
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<tr>
<td>Board Size</td>
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<td>1.310</td>
<td>.783</td>
<td>1.276</td>
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<tr>
<td>Firm Size (log-transformed Revenues)</td>
<td>.581</td>
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<td>1.657</td>
</tr>
<tr>
<td>Industry Munificence</td>
<td>.891</td>
<td>1.122</td>
<td>.893</td>
<td>1.120</td>
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<tr>
<td>Endogeneity Control - Internal</td>
<td>.680</td>
<td>1.470</td>
<td>.686</td>
<td>1.457</td>
</tr>
</tbody>
</table>
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BIOGRAPHY

Juan Vicente Romero McCarthy was born in Guadalajara, Mexico on June 17, 1972. He received his Bachelor degree in Chemical Engineering from Instituto Tecnológico y de Estudios Superiores de Occidente (ITESO) in Guadalajara, Mexico, in June 1994, his Master in Business Administration from IPADE Business School in Mexico City in 2001, and his Master of Management from Tulane University in 2015. Mr. Romero worked as Project Engineer for IBM and Celanese, as Trader for Cargill, and as Country Manager for a division of Grupo Disagro before becoming a graduate level business professor. Since 2007, Mr. Romero has been a full time professor of Accounting and Management Control at IPADE Business School, teaching at graduate and executive programs. In 2011, he entered the Latin American Faculty Development Ph.D. program at Tulane University’s Freeman School of Business.