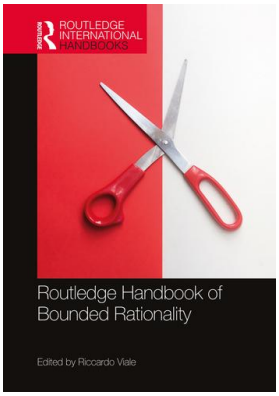

Routledge Handbook of Bounded Rationality

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Attention and organizations

Publication details
https://test.routledgehandbooks.com/doi/10.4324/9781315658353-41
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Published online on: 29 Oct 2020

35

ATTENTION AND ORGANIZATIONS

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Bounded rationality, attention, and organizations: the Carnegie perspective

> [I]n an information-rich world, the wealth of information ... creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.
>
> *Simon, 1971, p. 40*

The allocation of attention is commonly seen as a fundamental problem for organizations (Bouquet and Birkinshaw, 2008; Ocasio, 2011; Joseph and Wilson, 2018). Developing Barnard's (1938) intuition that "narrowing choice" is a central function of executive decisions, Simon (1947) early on identified the process of directing and channeling managers' attention as a key function of organizations, and also provided the almost iconic description of attention management featured in the epigraph. The foundations for such perspectives rely on the central role that limited attention provides in defining bounded rationality (Simon, 1983). The "limits" of decision-making rationality are to a large extent the results of the attentional bottleneck (Simon, 1947).

The notion that attention is a scarce resource and that its allocation is central to intelligent behavior has, of course, a longer history and deep roots in psychology. *Administrative Behavior* resorts to classical sources, such as James (1890) and Tolman (1932), to provide the conceptual background and basic definitions of attention.

> Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others, and is a condition which has a real opposite in the confused, dazed, scatterbrained state which in French is called distraction, and Zerstreutheit in German.
>
> *James, 1890, pp. 403–404*

However, what characterizes organizational views of attention is "a dual emphasis on cognition (limited attention capacity) and structure (how organization shapes individual's attention)" (Festré and Garouste, 2015). Just as the cognitive limitations of individuals help explain how organizations are structured, organizations in turn help understand how individual attention is distributed and coordinated in collective systems.

Early work from the Carnegie School (Simon, 1947; March and Simon, 1958) emphasized some fundamental ways in which organizations provide "attention-directors" as a response to human cognitive limits. To that end, two general, hierarchical systems were proposed to design the architecture of attention in organizations.

1 *Decision hierarchies*. "Prior controlling decisions" create a narrow frame of action for individual decision makers. Organizations provide a stratification of decisions levels that allow decisions on the spot to be guided by broader rationality considerations. Thus, organizational hierarchies can be seen as nested systems of decision premises, ensuring that lower-level decisions are constrained and coordinated by higher-level ones.
2 *Division of labor*. Organizations design and assign tasks to single members, and thus direct their attention to those tasks. By reducing interdependences between different tasks, organizations reduce the number of features that each agent has to pay attention to. Tasks have to be designed in ways that are compatible with individual attention capacity (the "span of attention," March and Simon, 1958). Division of labor determines selective perception by agents specialized in a task. For example, Dearborne, DeWitt, and Simon (1958) have shown how industrial executives see the aspects of a situation that relate to the tasks and goals of their department.

In Simon's original framework, decision premises and division of labor create a close connection between attention and (sub)goals. Both processes define a hierarchy of subgoals attached to tasks that selectively orient individual actions. The conceptual frame here is one of collective problem solving. Cyert and March (1963) introduce a more genuine political perspective on goals and attention. It is a natural implication of the notion of limited attention that individuals cannot simultaneously attend to all dimensions of a decision, and thus attention to different features can only be allocated sequentially (Simon, 1947). If attention to goals is limited, shifts in attention will affect preference orderings. Cyert and March (1963) focus on how the logic of organizational coalition making can affect sequential attentional dynamics. They suggest that stakeholders in organizations generally have conflicting goals that make it impossible to find stable and consistent set of organizational objectives. Instead, organizations can resolve conflicting demands on their decisions by paying attention to different goals in a sequential rather than simultaneous way. For example, when there are conflicting pressures to "smooth production" and "satisfy consumers" the problem could be resolved by first satisfying the former and then the latter. "Quasi-resolution of conflict" becomes an alternative to the standard view of organizational coalition making, opposing shifting attention to side-payments, and dynamic inconsistency of goals to coherent solutions. Phenomena like the present bias (O'Donoghue and Rabin, 1999) and related forms of temporal myopia further facilitate quasi-resolution of conflict and may be complementary to attentional shifts.

Two important further contributions stemmed from the original Carnegie approach, providing new insights and a different perspective on attention in organizations: *the garbage can model* and *the attention-based theory of the firm*.

While Cyert and March emphasize the political implications of the sequential allocation of attention, the garbage can model (Cohen, March, and Olsen, 1972) explores its coordination

implications in non-routine decision making. In a radical departure from traditional models of organizational decision making, the garbage can model explores "organized anarchies" in which preferences are problematic, technologies are unclear, and participation is fluid. Despite its quite radical language, the garbage can model combines important elements of the Carnegie tradition: the "ambiguity of goals" further develops Cyert-March's sequential attention to goals. Attention is a scarce resource, participants to decision processes can pay attention to only one choice at a time, and they have a preference for focusing on choices being close to be made. The main novelty of the model comes from the way these ingredients are combined into a flow of independent streams of decision makers, choice opportunities, and problems. As has been noted (Ocasio, 2012), this introduces an ecological view of how attention is allocated in organizations. Patterns of coordinated organizational decision making arise from the competing demands on the participants' attention and the way they are streaming over time. The result is a subversion of the classical problem-solving structure. Most choices are made by flight (as problems move to other choice opportunities) or by oversight (as most problems still have to be attached to a choice arena), rather than by resolution. Again, some similarity with Cyert and March's quasi-resolution of conflict can be noticed. In organized anarchies, choices are made because the attention of decision makers is focused on issues from which conflicting demands have been temporarily removed. Distraction has an adaptive value.

Building on the dual emphasis on structure and cognition by Simon (1947) and other earlier works (March and Simon, 1958; Cyert and March, 1963; Cohen et al., 1972; Weick, 1979), Ocasio (1997) developed the attention-based view of the firm (ABV). Ocasio describes organizations as systems of structurally distributed attention and defines attention as a cognitive process that encompasses the "noticing, encoding, interpreting, and focusing of time and effort by organizational decision-makers" on issues and answers (Ocasio, 1997, p. 189). Ocasio, whose definition echoes the one provided by James (1890), emphasizes the relevance of attention in decision making, as already underscored by Simon (1947, p. 110). This theory highlights the relationship between individual and organizational information processing: (1) actions of decision makers and subsequent organizational moves depend on the issues and answers the former focus their attention on; (2) in turn, decision makers' focus of attention depends on specific situation and the organizational and environmental context they are in. Later, Ocasio (2011) stresses that attention can be classified into three interacting varieties: (1) *attentional perspective*, which refers to the focus of attention across space and time; (2) *attentional engagement*, that is, the extent by which a firm attends to organizational agendas and sustains vigilance in problem solving over time; and (3) *attentional selection*, and thus the decision as to which stimuli to address at any given time. Subsequent ABV studies focused mostly on topics such as the effect of attention structures on decision-making (e.g., Maula, Keil, and Zahra, 2013; Wilson and Joseph, 2015) and top-down and bottom-up attentional processes (e.g., Shepherd, McMullen, and Jennings, 2007; Zbaracki and Bergen, 2015). Joseph and Wilson (2018) amalgamate these two topics: Whereas previous ABV studies mostly focused on the consequences of the distribution of attention, these authors also stress the role played by organizational tensions and architectural complexity in influencing the distribution of attention.

Attention at work: organizational mechanisms

While the Carnegie classics deal with attention in broad terms, they also provide a way to look at familiar organizational phenomena in a new perspective. Different organizational mechanisms have been analyzed in terms of attentional processes, allowing a reinterpretation of their functions and ways of operating. Here we will focus on some examples.

Control systems (and more generally accounting systems) provide an interesting case, and they were among the first to be analyzed in an attention framework. Control systems are usually described as information feedback systems. Goals and targets are set, current results are regularly compared with the targets, and feedback is used to correct deviations and keep the organization focused on implementing its original strategies (Anthony and Govindarajan, 2007). However, a focus on attention may suggest a different interpretation. In their study of the controller's department in seven organizations, Simon et al. (1954) had already made a distinction between score-card and attention-directing use of information. The score-card question is "Am I doing well or badly?" The attention-directing one is "what problems should I look into?" (Simon et al., 1954, p. 3). It was observed that the attention-directing use of control systems is always paired with the score-card one. Attentional uses of control systems are tightly related to the exertion of the "principle of exception": accounting data direct the attention of managers toward "out of line" situations and trigger direct hierarchical intervention to address them. In a subsequent study encompassing 19 major companies, Simons (1991) found that top managers selectively use control systems to focus attention on strategic uncertainties. As a result, control systems favor the generation of new strategic initiatives in response to emergent uncertainties, rather than just supporting the implementation of current strategies. In a similar vein, Vanderbosch (1999) finds that executive support systems have the fundamental function of concentrating management attention and helping managers to have a focusing influence on the organization.

March and Simon (1958) suggested that the structure of *communication channels* in organizations will affect attention-allocation phenomena by determining which type of stimuli will reach which type of organizational members, and the awareness agents have of the consequences of their actions. In turn, ease of access, saliency, and channel affordances may feed back on organizational flows of communication and the use of different channels (Treem and Leonardi, 2012). Recent research, mostly in the light of Ocasio's ABV theory, has stressed the role of communication channels in the process of attentional engagement. Ocasio and Joseph (2005) extended the ABV theory by explaining the structure and role of communication channels in the distribution of organizational attention, and formulation and implementation of the strategic plan. Distribution and integration of attention occur through the organization's communication channels (Joseph and Ocasio, 2012). Recent studies demonstrate how distribution of attention is affected by specific communication channels. For example, Bouquet and Birkinshaw (2008) explain how subsidiary firms may actively gain or lose the positive attention and efforts of their parent corporate headquarters managers, and how they can have more control over the attention their parent companies dedicate to them. Dutton, Ashford, O'Neill, and Lawrence (2001) explore issue selling and describe how managers' initiatives may shape the attention of top management, and thereby, influence the organizational moves and performance.

Most attention research primarily focuses on structures of communication channels to measure the response to the environmental stimuli (Joseph and Ocasio, 2012). Ocasio, Laamanen, and Vaara (2018) propose communication as a process by which actors can attend to and engage with organizational and environmental issues and initiatives. Comparing the examples of Apple and Motorola companies, Ocasio and Joseph (2018) demonstrate that integrating attention through communication channels with the communications within those channels can be useful in reaching coherence in strategy formulation and implementation. Apple's focus on sustaining organizational attention over the implementation of its strategy, as opposed to the lack of it by Motorola, contribute to the explanation of why Apple succeeded in making smartphones the digital hub, integrating different technologies, while Motorola experienced strategic failure despite moving with similar intents.

Corporate *governance* mechanisms also affect patterns of attention at the top of organizations, sometimes in subtle ways. In particular, the board composition matters, as it affects the diversity of cognitive lenses through which board members look at issues. Tuggle, Simmon, Reutzel, and Bierman (2010) and Tuggle, Schnatterly, and Johnson (2010) argue that heterogeneity on a board of directors influences their patterns of attention by affecting how boards allocate their attention between monitoring functions and discussing new entrepreneurial issues. Tuggle et al. (2010) analyzed a sample of 210 firms by collecting data on board compositions and the text of their board minutes. They suggest that tenure variance, firm/industry background heterogeneity, and the proportion of directors with output-oriented backgrounds are positively associated with the discussion of entrepreneurial issues. Some recent studies examine how governance may affect the attention given to issues and the responses that are formulated. Galbreath's findings (2018) highlight that certain attention structures link boards, inasmuch boards engage in environmental scanning and stakeholder debate. Galbreath also finds interaction between environmental scanning and women on boards, and between stakeholder debate and women on boards. Gender diversity is likely to shift attention through a change in the nature of the attention-directing structures (e.g., environmental scanning, stakeholder debate), rather than through a direct effect.

Surprisingly, little heed has been paid to the role of incentives in directing attention in organizations, despite Simon's (1947) early remark that motivation (together with emotion) is the mechanism responsible for the allocation of attention to competing tasks. It is somehow ironic that inquiry into the role of incentive mechanisms as attention allocation systems has been mostly left to "rational" theories of organizations, in particular to agency models. In their seminal paper on multitasking, Holmstrom and Milgrom (1991) have pointed out that "when there are multiple tasks, incentive pay not only serves to allocate risks and motivate hard work, but also direct the allocation of the agents' attention among their various duties" (p. 25). In their view, attention is a scarce resource that agents have to allocate among tasks that exert competing pressure. Incentives will affect which dimensions of his/her job an agent will pay attention to. As a result, "an increase in an agent's compensation in any specific task will cause some reallocation of attention away from other tasks."

Despite its original rationalistic flavor, the problem of multitasking offers an important window on mechanisms directing attention in organizations and invites closer empirical analysis. There is ample psychological evidence supporting the claim that incentives have an important role in directing human attention among competing stimuli. Stimuli associated with rewards gain prominence in individual attention and are recognized more promptly (O'Brien and Raymond, 2012). If this can generally help to maintain attention focused on relevant items, it can also generate peculiar distortions. For example, stimuli that are associated with rewards but are irrelevant to the current task can capture attention and distract from task-relevant attention (Anderson, Laurent, and Yantis, 2011).

Similar phenomena seem to emerge at the collective level of organized activity. In her excellent review on the provision of incentives on firms, Prendergast (1999) provides ample documentation on the potentially distortive effects of incentives on the allocation of attention (and consequently, selective effort), especially in multitasking situations. For example, when agents are subject to piece-rate incentives, they are less likely to help other workers (Drago and Garvey, 1998). This applies also to temporal allocation: when incentives are provided in rather distant moments of time, a distorted temporal allocation of effort is often observed, with much effort concentrated before the evaluation date, and then falling again after evaluation (Asch, 1990). While these effects can be attributed to rational calculation (e.g., distorted temporal

allocation of effort may result from intertemporal discounting; Prendergast 1999), an interpretation in terms of limited attention seems equally plausible. More research is needed to disentangle these two explanations.

An especially interesting example of how attention relates to incentives is provided by the so-called crowding-out problem (Frey and Oberholzer-Gee, 1997; Fehr and List, 2004; Gneezy, Meier, and Rey-Biel, 2011). It has repeatedly been observed that explicit incentives addressed at inducing behaviors, such as cooperation, trust, or education may actually produce a contrary effect. For example, pro-social behavior may actually be discouraged rather than favored by the introduction of monetary incentives meant to support it. A well-known case is that of blood donation: the introduction of a monetary reward for blood donors actually causes a drop in blood donation, unless an option is left to leave money to a charity (Mellström and Johannesson, 2008). In the employment relationship, the introduction of incentives that rely on monitoring and fining agents who underperform may significantly decrease the agents' effort (Fehr and Gächter, 2002). A basic explanation of the crowding-out effect relies on the fact that incentives direct attention toward certain features of social interaction (Heyman and Ariely, 2004) and thus induce different frames of the decision situation, e.g., from social to monetary (Gneezy et al., 2011). On the contrary, positive affect factors may activate prosocial frames and direct attention toward non-job-specific behaviors and tasks, triggering Organizational Citizenship behavior (Organ, 1988).

The adaptive value of (in)attention

Organizations can be conceived as adaptive responses to the cognitive limits of individuals. "Organizations will have structure … insofar as there are boundaries of rationality … If there were not boundaries to rationality … there could be no stable organizational structure" (March and Simon, 1958, p. 192). A fundamental function of organizations is to manage the gap between the overabundance of information in the world and the limited attention of individual minds. Many features of organizational structures and mechanisms are responses to such limitation (Simon, 1971).

However, attention is not just a problem that organizations have to solve. Attentional processes significantly contribute to how organizations adapt to their environments, and, as such, they have their own, relevant adaptive value. First of all, attentional processes are a fundamental trigger of organizational adaptive responses (Simon, 1947; Nigam and Ocasio, 2010). Sequential shifts in attention are especially relevant to understanding adaptive change, also because they connect cognitive components to the reshaping of organizational coalitions. In his analysis of corporate environmentalism from 1960 to 1993, Hoffman (1999) shows how changes in the chemical industry were triggered by attention shifts related to specific events. These changes were accompanied by transformations in the patterns of interactions among stakeholders.

Attentional processes have adaptive relevance also because they affect which features of the environment organizations pay attention to as they change. Individuals and organizations do not consider all stimuli from their environment but pay attention selectively to only a few of them (Ocasio, 1997). This leads to selective responses that end up determining to which environmental subsystems organizations will adapt to. Weick (1979) has aptly defined such a process as enactment: through focused attention and response, an organization selects (and to some extent "creates") the environment to which it is adapting. This means that the fitness criteria that determine successful adaptation are to some extent endogenous, and that attention actively contributes to generating them.

The adaptive value of attention is enhanced by the shifting nature of organization goals. The very notion of adaptive success depends upon the criteria with which organizational performance emerge, often as a result of quasi-resolution of conflict. As Cyert and March (1963) have suggested, a fundamental way in which organizations adapt is by learning which performance criteria to attend for. This also means that organizational learning defines its own criteria of success. Attentional shifts triggering change and the subsequent organizational adaptation may often result from the dynamics of aspiration levels connected to different goals. By analyzing growth patterns in the insurance industry, Greve (2008) has shown how firm's growth may be the result of a shift of attention to size when profitability goals are satisfied.

Whereas attentional constraints may be seen as a cognitive limitation, they also bring some advantages as far as adaptive processes are concerned. The "less is more" argument (Gigerenzer and Todd, 1999) seems to apply also in the context of attention allocation. In this context, it is worth noticing that scholars of language acquisition have suggested that processing limits of children increase their ability to learn a language (Newport, 1990; Entman, 1993) because processing limits favor focusing on the crucial components of language. In a related essay, Kareev (1995) has shown that processing limitations can produce positive bias in detecting correlations in the environment, which in turn may enhance early detection of potentially informative relationships among variables. A first important implication of attentional limit is that only a few features of experience are indeed considered feed learning. In a dimensionally rich environment, limiting attention to a few features can certainly limit in the long term the accuracy of learning processes. However, it can considerably improve the speed of learning and adaptive performance in the short run. "Speed of learning favors selective attention" (Kruschke and Hullinger, 2010). In turn, selective attention affects the speed of learning (Knudsen and Warglien, 2018). If organizations have limited time to learn, in some environments this advantage may turn out to be important. Knudsen and Warglien (2018) show that in skewed environments where different cues have different informative value, agents with limited attention will learn from a subset of features only and adapt faster than "broad-minded" agents who consider all features presented by experience. Moreover, if short-term learning-speed advantage leads organizations to have access to more information (e.g., because they acquire more customers), the adaptive advantage might become a permanent one, even in the long run. Finally, attention limits may reduce the negative effects of overfitting that may be caused by considering a too-large asset of variables in learning (Goldstein and Gigerenzer, 2009; see also Artinger, Petersen, Gigerenzer, and Weibler, 2015); in fact, they act as a sort of "model selection" constraint that improves the robustness of inferences. Whether these advantages of limited processing apply to organizational learning, especially in non-stationary environments and facing changes, is still an open and under-investigated issue (Bingham and Eisenhardt, 2011) that certainly deserves more attention.

Inattention: from the economist's point of view

Limited attention (often: inattention) has become a hot topic in economics. Many economists have no problem in assuming that attention is a scarce resource, and as such an excellent subject for economic inquiry. Gabaix (2017) offers an excellent introduction to this rapidly growing field of inquiry and suggests that the concept of limited attention has the potential to explain and unify many behavioral anomalies.

The basic paradigm of inattention is that when agents receive a signal with n dimensions, agents "pay attention" only to $m < n$ dimensions, substituting the signal value with a default one in the remaining n-m dimensions. In more graded version, they can pay "partial" attention to each dimension, adjusting the default value in direction of the signal value. Regardless,

inattention generates an "anchoring and adjustment" process in which the set of defaults is partially adjusted toward the signal values. Gabaix (2017) shows how a large set of familiar decision-making biases can be modeled as special cases of the inattention paradigm. For example, quasi-hyperbolic discounting (Laibson, 1997) can be modeled as inattention to the future, providing a simple interpretation of intertemporal-choice anomalies. This interpretation is also normatively manageable, as exponential discounting can be preserved, in this case, the normative reference.

Organizational economics has provided some interesting applications of the inattention paradigm to classical organizational issues. Consider, for example, the tradeoffs between the two most general forms of organizational coordination (March and Simon, 1958): decentralized communication and standardized behavior. Decentralized communication relies on continuous, multilateral feedback among agents. Standardized behavior resorts to predefined rules that established *ex ante* which behavior is appropriate in which context, e.g., through standard operating procedures. It is possible to frame such tradeoffs in attentional terms. Decentralized communication taxes agents' attention, while standard operating procedures save attention resources by making use of a default. Dessein and Santos (2006) build a simple model in which the quality of communication between two organizational agents is a function of the cost of attention. Agents have aligned interests (a team model), must perform multiple tasks, and their payoff depends on (1) how accurately their action matches the current state of the environment and (2) on how well they coordinate their actions. The "standard operating procedure" captures the optimal response to the average state of the environment. There are n tasks to coordinate, and each agent is allocated a task – and only he/she can observe the current state of the environment in such dimension and transmit it to the other agents – but successful transmission is a function of attention. Dessein and Santos show that attentional factors determine the adaptability of an organization: under low-attention conditions, standard operating procedures minimize the cost of miscoordination but make the organization unresponsive, as the agent who observes the true state of the environment will prefer to act according to standard operating procedures rather than respond to the current state, thereby incurring the risk of miscoordination with other agents. Moreover, they show that attention limits the division of labor: as tasks are more fractioned, organizations become more rigid as the cost of miscoordination by feedback will increase with the number of tasks to coordinate.

In a subsequent development of the model, Dessein, Galeotti, and Santos (2016) show that organizations can structure in asymmetric ways the distribution of attention, by focusing all coordination by feedback on a few focal tasks while leaving other tasks to standardized behavior. This example shows the remarkable potential for a dialogue between the economics of inattention and the models of bounded rationality. The role of standard-operating procedures as economizers of attention, the interactions of attention and division of labor, and hybrid models of coordination in which standardization of some tasks frees attention for non-routine coordination, are classical themes of the Carnegie tradition, and these recent models offer new insights and qualifications that enrich our understanding of these issues. An interesting aspect is that such models are typically equilibrium ones, and require that attentional limits are common knowledge, which is a problem leading to the well-known problems of "super-rational" awareness of bounded rationality.

Open questions

The numbers of studies on "attention to attention" have been steadily increasing in recent years, but there are important theoretical areas and empirical issues that still need to be addressed and

offer relevant opportunities for new research (e.g., van Knippenberg, Dahlander, Haas, and George, 2015). Here we suggest a few of them that we find of special priority.

1. *Better integrating organizational attention and organizational learning models*. Models of organizational learning do not usually consider the effect of attentional factors on adaptive performance. Particularly important issues concern the potential benefits of attention limits: Does bounded attention improve learning performance? In which type of environments? What attention mechanisms favor learning? A second major *terra incognita* is how attentional mechanisms help cope with changes in the structure of the environment. Most organizational learning models consider only stationary environments. On the other hand, empirical studies suggest that attention plays a major role in how organizations perceive disruptive events and trigger response to changing environments. The study of adaptation to non-stationary environments opens a set of new questions for students of organizational learning. Some of them are exquisitely attentional. How is non-stationarity recognized? And, if it is recognized, what forces may determine under-reaction (or maybe over-reaction)? How does responding to novelty imply redistributing attentional across organizational members?
2. *Organizational politics and attention*. Organizational cognition and the study of political processes in organization have remained substantially separate domains of inquiry. As originally suggested by Cyert and March (1963), the allocation of attention is a crucial connecting link between these two domains. One area where this is especially evident is organizational communication. Communication affects selective attention (Entman 1993) and helps determine the frames through which organizational actors perceive and interpret decision-making issues and their own interest. This offers opportunities to model "cognitive coalitions" in organizations in which the patterns of alignment of organizational actors in coalitions depend on which dimensions of the coalitional problem are activated by selective attention. Interestingly enough, this seems also an issue that lends itself naturally to experimental treatment. A model of quasi-resolution of conflict might be mature.
3. *Attention failures*. The negative side of the attention limits is the failure of individuals and organizations to detect relevant events and understand changes in their environment (Bansal, Kim, and Wood, 2018), reinforcing the structural (Hannan and Freeman, 1984) and cognitive (Tripsas and Gavetti, 2000) forces leading to organizational inertia. Bounded awareness is the other face of focusing, as it prevents people from considering relevant, available, and perceivable information for informed decision-making (Chugh and Bazerman, 2007). This focusing failure is closely related to well-documented psychology research, such as "inattentional blindness" (Neisser, 1979), "focalism" (Wilson, Wheatley, Meyers, Gilbert, and Axsom, 2000), and "information avoidance" (Golman, Hagmann, and Loewenstein, 2017). This a general problem: for example, Zegart (2006) pointed out that despite the many signals collected about the possibility of a severe terroristic threat, the counter-terrorism agencies did not adjust rapidly enough to prevent the 11 September 2001 attacks. This adaptation failure, which originated in politics, had the consequence that the agencies involved failed to achieve the changes they believed were needed very urgently. Identifying the organizational mechanisms responsible for collective attention failures may require going beyond analogies with individual processes and, instead, articulating how the distribution of attention and the communication channels integrating it work or do not work in detecting threats (e.g., Rerup, 2009; Vuori and Huy, 2016) and opportunities (Shepherd, Mcmullen, and Ocasio, 2017) outside the attentional focus of an organization. This topic may require looking more carefully into the processes through which organizations update

or fail to update their attention rules (Cyert and March, 1963) by responding to weak signals from the environment.

4. *Developing experimental paradigms*. Ocasio (2011) has lamented a lack of cumulativity in research on organizational attention. One natural research strategy to increase cumulativity would be to put both theoretical propositions and inspirations from field observations into hypotheses that can be tested through careful, reproducible laboratory experimentation. Despite the burgeoning development of experimental paradigms to study attention in psychology (e.g., Fawcett, Risko, and Kingstone, 2015), very little has been done in the field of organization research. Experiments on organizational attention should address aspects that are usually absent in psychological research but would be key parameters in the design of an organizational lab setting. Three of them are especially relevant. (a) *The distribution of attention*. A fundamental feature of organizations is that attention is structurally distributed. Experiments should enable to specify the distribution of attention of agents. (b) *Mechanisms of attention integration*. Organizations provide a multiplicity of mechanisms integrating individual attention processes (hierarchies, decision premises, communication, etc.). An organizational experiment should enable evaluation of how these mechanisms interact with attention distribution in affecting organizational performance. (c) *Strategic aspects of attention*. Experiments should enable control of the effect of how different interests affect attention allocation. Examples include the effect of incentives, attention capture, and strategic manipulation of agendas.

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