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Information, attention, and decision making: From the Editors

Daan VAN KNIPPENBERG

Linus DAHLANDER

Martine R. HAAS

Gerard GEORGE
Singapore Management University, ggeorge@smu.edu.sg

Citation

FROM THE EDITORS

Information, Attention, and Decision Making

More than five decades after the seminal works on how individuals process information and make decisions within organizations were published (Cyert & March, 1963; Simon, 1957), the thesis that individuals, groups, and organizations are bounded in their rationality and ability to attend to information continues to remain salient. Individuals and organizations display cognitive and motivational biases, both in their attention to information and in their decisions based on that information (De Dreu, Nijstad, & van Knippenberg, 2008; Ocasio, 2011; Tversky & Kahneman, 1974). The nature and volume of information, and managers' behaviors in seeking and using information, have undergone massive transformation over these past 50 years, which have seen the emergence of electronics, computers, and the Internet. Advances in information technology, mobile communications, and big data collection and storage mean that more people and firms have access to more information than ever before (George, Haas, & Pentland, 2014; Hilbert & López, 2011). Yet, our frameworks of attention and decision making have not seen corresponding radical shifts. Perhaps, the underlying processes of decision making remain the same despite the transformative change in context. Alternatively, it is plausible that our theoretical advances have not matched the speed of change in information contexts confronted by businesses and policymakers alike.

The growing ubiquity of information provides unprecedented opportunities—for learning, creativity, and innovation, as well as for performance. Understanding how to leverage these possibilities becomes an important challenge for management research and practice. However, the abundance of information also implies increasing competition for the attention of individuals, groups, and organizations; increasing potential for information overload to fuel biases in decision making; increasing costs of collecting, storing, and sharing information; and an increasing risk that all this information becomes a distraction from more relevant information or indeed from the job itself. Thus, a key challenge in the information age is to manage this wealth of available information and channel it to productive ends.

In this thematic issue,[1] we explore how management in the information age potentially differs and challenges our existing theoretical frameworks and assumptions. We assembled articles that address the rapidly evolving opportunities and challenges of managing in this new information-rich context. These articles are motivated by emergent themes and trends that set the stage for current and future scholarly research on information, attention, and decision making. We follow a brief analysis of these articles with potential directions for future research and highlight broader pastures where systematic research could further improve our understanding of how we live and work in the information age.

MANAGEMENT IN THE INFORMATION AGE

We are living in the information age—a period in history triggered by the digital revolution, and characterized by the shift to a knowledge-based society in an increasingly global economy. With recent extraordinary advances in technological innovation and a dramatic growth of technology-based industries has come an explosion in the world's capacity to store, communicate, and compute information that is fundamentally changing the way that individuals, groups, organizations, and industries work (Hilbert & López, 2011; Pentland, 2014). Along with the shift to more knowledge-intensive work, the ability to effectively and efficiently allocate attention to and process a diversity of information also increasingly comes at a premium. A further development is that groups, organizations, and even nation-states are increasingly becoming truly open systems when it comes to information access—people have growing access to diverse information from varied sources across group, organizational, and national boundaries. This is further compounded by increased

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[1] The articles in this thematic issue were accepted into the journal under normal review processes and were not part of any Special Research Forum call. The articles were assembled to bring out a theme and highlight phenomena and theories of interest across scholars who use micro and macro approaches to address important management and organizational problems.

transparency requirements for regulatory compliance, financial prudence, and consumer disclosure. As a result, information-processing possibilities are greater than ever before—but so are information-processing demands and challenges (Manyika et al., 2011).

Information Scales Faster than Attention

Simon (1957: 167) was early to note that the amount of information is growing rapidly, and that gaining access to information is not the biggest challenge organizations are facing. In his words, information consumes attention, which is a scarce resource. Structures created by organizations for "a world in which the scarce factor is information may be exactly the wrong one[s] for a world in which the scarce factor is attention" (Simon 1957: 167). With vast amounts of information available through emails, the web, consumer data, and social media, among other sources, the problem has never been more salient. The amount of information scales faster than the attention of human decision makers who have to make decisions about which information has priority, and what will be shunted away. At the turn of the 20th century, few people had read more than 100 books, but, today, even small children are exposed to the equivalent amount of information through movies, books, and digital media. Firms are generating treasure troves of big data that lend themselves to the emergence of "analytics"—people analytics, customer analytics, risk analytics, and so on. All of these trends create growing demands on the already limited attention of decision makers in the private, nonprofit, and government sectors.

New Technologies, New Pathologies within Organizations

Inside organizations, the volume of information available for decision making is upending long-standing theories of managerial cognition and action. The challenge is no longer to make decisions under conditions of information scarcity; increasingly, it is to make decisions under conditions of information overload. Organizations are racing to implement increasingly sophisticated information and communication systems that can help them to capture their employees' expertise and experience, facilitate knowledge sharing across their worldwide operations, and tighten their connections to external sources of insight and innovation. With the assistance of digital technologies, ranging from document databases, expertise directories, and social technology platforms to email, videoconferencing, and collaboration software, organizations aim to increase their effectiveness and competitiveness through transferring best practices and lessons learned, enhancing their responsiveness to customers and clients, better integrating their supply chains, and reducing knowledge losses when employees leave for other organizations.

With these new opportunities for creating and capturing value, though, come pathologies for individuals, teams, and the organizations themselves. These include cognitive, social, and motivational challenges at multiple levels; for example, micro-level challenges such as switching attention across tasks (e.g., Altmann & Gray, 2008; Leroy, 2009), meso-level challenges such as handling multiple team assignments simultaneously (e.g., Cummings & Haas, 2012; O'Leary, Mortensen, & Woolley, 2011), and macro-level challenges such as ensuring that electronic repositories become valuable resources rather than expensive investments that are quickly ignored (e.g., Hansen & Haas, 2001). The pathologies that can result from such challenges run the gamut from exhaustion and burnout to impaired judgment, suboptimal decision making, wasted effort, and reduced productivity. These pathologies are also accompanied by the substantial costs associated with collecting, storing, sharing, and analyzing so much information. Organizations cannot assume that all this information comes for free; instead, individuals, groups, and organizations must devote substantial financial resources as well as considerable managerial time to developing and implementing strategies and policies to help them make the best use of the information available to them.

"Old" Problems also Still Loom Large

Technological developments aside, the fundamental problems arising from bounded human rationality still loom large. Even when information opportunities are not driven by technological developments, people are limited in their attention and processing capabilities, as well as in their motivation to acquire and absorb information (Cohen & Levinthal, 1990; Zahra & George, 2002). With or without the advantages—and challenges—of technology, individuals and organizations must search for the information that is most relevant and useful for their tasks, making search processes, cues, and heuristics a subject of continuing and indeed increasing importance in the information age. They must decide how much and what information to share with others

and what information to withhold, whether for reasons of competitiveness, relevance, or privacy concerns. They must be able to transfer that knowledge effectively, requiring robust network ties. And they must also decide how to react and respond to the information they receive, making concerns such as trust and trustworthiness central to the effective utilization of information. A consideration of information-age challenges thus does not negate the importance of addressing the more well-established challenges of information, attention, and decision making.

INFORMATION, ATTENTION, AND DECISION MAKING ACROSS LEVELS

Articles in this issue illustrate how information-processing issues in management research are addressed at different levels of analysis, for different outcomes of interest, and with different conceptualizations of the sources and the nature of the information involved. Indeed, information processing is such a broad-ranging issue that the articles assembled here can only be illustrative as snapshots capturing elements of a much broader issue. The contributions in this thematic issue illustrate how information can originate from different sources, take different forms, and have different effects.

Dioszegi and Carnabuci (this issue), for instance, focus on the creative use of information. They study informational and supportive functions of social networks and show that especially people less disposed to innovative thinking benefit from a social network that stimulates such innovative thinking by exposing them to a diversity of information and perspectives. With the increasingly open structure of organizations, in which individuals do not only have more opportunities to build broad-ranging and diverse networks but are also expected to do so, developing the social network perspective on information access and processing—as in this study—is likely to become increasingly important.

Ross and Sharapov (this issue) study the competitive use of information. They investigate market leaders' imitation of market follower actions, and outline how such imitation is instrumental in maintaining market leadership. They moreover identify environmental uncertainty, initial advantage, and capability similarity as influences moderating the effectiveness of such "follow the follower" strategies. Lam, Huang, and Chan (this issue) examine the performance effects of information. They

show that leader information sharing fuels the influence of participative leadership on employee performance—participative leadership has an increasingly positive (i.e., curvilinear) relationship with performance, but only when information sharing is high.

Highlighting that a diversity of sources of information can also be associated with communication challenges, Firth, Hollenbeck, Miles, Ilgen, and Barnes (this issue) focus on multiteam systems to capture another important issue in increasingly professionalized organizations—that specialized groups may have different understandings of interdependent task performance, and this may introduce a barrier to effective coordination between groups and thus, ultimately, the performance of the multiteam system. Showing that frame-of-reference training to address these different understandings helps address these issues, they point to a broader "meta-issue"—the importance of an understanding of how to deal with different thought worlds in integrating efforts and information across organizational groups.

The issue also highlights some of the forms that information-processing and decision-making biases may take. Piezunka and Dahlander (this issue) show that, when organizations deliberately aim to broaden their information search through crowdsourcing, they may still end up paying attention primarily to information from familiar sources—and more strongly so when the amount of information available increases. Thau, Lee, Pitesa, and Pillutla (this issue) reveal that selection decisions are not only biased by stereotype-based beliefs about job suitability but also by the self-interest of those selecting. Their research is thus important in underscoring that biases in information processing and decision making are not just a matter of the more traditionally studied cognitive biases but also a matter of motivated information processing.

Di Stefano, King, and Verona (this issue) show that sanctioning norm violations is inspired by both a desire for retributive justice and rational calculus in terms of the costs and benefits of sanctioning versus not sanctioning norm violations. They illustrate how individuals try to avoid the consequences of their own biases in decision making, especially avoiding situations that could result in norm violations in anticipation of their tendency to incur costs for retributive reasons.

Some of the contributions to this thematic issue also illustrate how the ever-growing information accessibility and possibilities also create a competition

for people's attention. Haas, Criscuolo, and George (this issue) address the competition for attention that is a consequence of the growing possibilities to share information for people's ability to get online help in solving problems from a knowledge provider–problem match perspective. They show that a problem is more likely to attract the attention of a knowledge provider the more it matches the provider's expertise—and this holds stronger for more challenging problems and with greater competition for attention from other problems.

Smets, Jarzabkowski, Burke, and Spee (this issue) focus on the competition for attention of competing logics. They study how a reinsurance company dynamically balances competing logics through the combination of segmentation of logics to reduce tensions caused by conflicting logics, bridging these segments for integration, and demarcating the logics to prevent a merging that would reduce the potential for future synergy. The model thus also points to the continuous information-processing and decision-making demands to maintain a balance between these integrating and separating forces, and to thus sustain their productive tension.

Stanko and Beckman (this issue) study the competition for attention between work and nonwork information possibilities. They describe how information communication technology (ICT) can divert attention away from work issues by tempting employees to focus their attention on nonwork information available through ICT at work. Their study captures how the U.S. Navy attempts to manage this process by monitoring employees, cultivating their proper use of ICT, and restricting possibilities to use ICT to nonwork ends. This study is important in highlighting that the ever-more open information access in organizations does not just pose challenges in attention to and processing of information in an unbiased way, but also increasingly poses the challenge of countering informational opportunities as distractions.

A final theme is how ICT advances have made it increasingly possible for information from one role to infiltrate into the other role. Becker, Butts, and Boswell (this issue) focus on the widely accepted observation that ICT advances have resulted in work issues increasingly infiltrating nonwork contexts. They show that such work-to-nonwork interferences can cause both positive and negative affect, where the latter can result in work-to-nonwork conflict.

Reyt and Wiesenfeld (this issue) provide a positive counterpoint to this illustration of negative infiltration effects. They study how ICT more or less continuously exposes people to information associated with different roles. They describe how the role integration invited by this exposure stimulates more abstract thinking that is conducive to exploratory learning. In a counterpoint to an information overload, competition for attention, and bias perspective, their work thus shows the potential for positive learning effects of the information richness associated with the information age.

FUTURE RESEARCH DIRECTIONS

The richness and diversity of information, attention, and decision-making research points to the promise of this burgeoning field of inquiry, but also poses a clear challenge to research in management: the need for integration to prevent fragmentation. Common themes such as processing biases and competition for attention beg the question of how these phenomena can be studied across levels of analysis and different outcomes of interest. Following the same logic, studies currently unique to one level of analysis (e.g., motivated information processing) raise intriguing questions about whether and how they might play out at other levels of analysis. Beyond this general call for extending our current understanding of information, attention, and decision-making processes across these levels, there are also a number of emergent thematic areas that future research could usefully address, as discussed below.

Creativity, Innovation, and Talent Management

Arguably, the ever-increasing ubiquity of information may shift key skills away from expertise in the traditional sense of possessing knowledge to expertise as the ability to find and leverage knowledge. Developing this perspective would imply attention not only to such 21st-century skills as the ability to use and navigate information and communication technology tools, but also to such social–behavioral concerns as transactive memory—"knowledge of who knows what"—that may be used to access relevant information in one's social network (Ren & Argote, 2011). Given that innovation stems from knowledge recombination of prior discoveries and applications, the individual capacity to search for knowledge over both familiar and unfamiliar technological domains is also likely shaping fundamental processes in creativity, problem solving, and innovation within organizations. Increasingly the challenge is not simply to access information through social networks

and technology-based tools, but to be able to integrate this information—indeed, to *create* new information from these inputs. These information location, integration, and creation functions thus also are increasingly deserving of research attention.

Content and Nature of Information

Another promising avenue for advancing research on information, attention, and decision making is the analysis of rich text-based datasets using large-scale content analysis techniques. Recent studies have begun to develop new empirical approaches to analyzing the content of information put out by firms, including CEOs' public statements and letters to shareholders (e.g., Kaplan, 2008; Nadkarni & Chen, 2014). These approaches are potentially scalable to the magnitude of millions of observations, in which researchers can scrape, structure, and analyze large datasets to extract meaning and to see how people allocate their attention between competing goals. There are also approaches other than simple word counts (or weighted by the length of the documents) that can construct higher-order topics. These topic models can derive keywords associated with latent variables (topics) and extract more digestible information from very large datasets (Jurafsky & Martin, 2009). Content can allow us to separate between situations that consume more attention. Consider person A and person B working in customer service roles in which they respond to different queries. Person A receives 30 emails that are very similar in nature and content, whereas person B only receives 10 emails that vary markedly in what they deal with. Without considering the content and the topics they cover, one would mistakenly assume that person A had more attention burdens. Whereas management scholars predominantly use structured data—that is, data that can easily be coded and interpreted where relationships between data are known—there is a paucity of research tackling the vast amounts of unstructured data, such as ambient visual cues that also likely affect perception and decision making in workplace environments. Research that addresses how managers visualize, perceive, and filter information to allocate attention on specific cues but not others are likely to help executives in more effective decision-making processes and designing work environments.

Strategic Value and Costs of Information

Another avenue for future research is how organizations can innovate and develop business models to help themselves deal with an increased amount of available information. Research in decision making has discussed individual versus group decisions inside organizations. More recently, organizations are turning to external crowds of people to decrease their attention burden. Consumers and users can vote up and down between competing alternatives that organizations are considering as potential ideas or products. For instance, Starbucks' initiative "My Starbucks Idea," which allows consumers to propose ideas for new flavors and products, has yielded many thousands of ideas. To carefully consider each would consume lots of managerial attention. Even worse, some information that emerges may be a distraction. By using crowds to evaluate the ideas, organizations can filter their attention among a smaller set of alternatives to which they can devote more attention. While this approach has promise, it can also be difficult to evaluate novel ideas that stand out from the status quo. Experimental research on the evaluation of cultural goods has shown how ranking positions positively affect a subject's choice (Salganik & Watts, 2008), and that initial false beliefs can change people's preferences. Apart from product innovation, organizations are adapting their business models to reflect the changing information environment, including pricing for aggregating information and providing select recommendations to potential consumers for fractional revenues. Organizations also respond to being rated by stakeholders (e.g., Chatterji & Toffel, 2010), and likely shift their behaviors in a more dynamic manner. Thus, the powerful use of information, stakeholder, and consumer attention is providing avenues for entrepreneurial ideas, new business models, and more responsive organizations.

The availability of massive amounts of information can create advantage for those organizations that are able to use and analyze information better than their competitors. For instance, many large organizations are keeping massive amounts of information on their customers and clients. Other organizations are also systematically using experimental designs in which people are randomly exposed to different information to see how it alters behaviors, which can then inform managerial decisions. However, information also has significant costs—the costs of data collection, data protection, and security, among others. Some of these data-collection needs are mandated through regulation and the need for compliance. The vastly increased needs for regulatory compliance might also shift managerial attention from value-creating

opportunities to instead focus on meeting evolving standards.

Attention Quality as Well as Quantity

Research in this volume and elsewhere suggests that the quantity of attention we have available to allocate to any given information source is under increasing pressure from the abundance of information available to us, and that too much competition may decrease the likelihood that anyone pays attention (Haas et al., this issue). Recent surveys suggest that employees spend less than 50% of their time on the tasks for which they were hired (U.S. Bureau of Labor Statistics, 2013). The rest of our time is filled attending meetings or on administrative tasks, interruptions, or keeping the inbox clean. Similarly, reports from professors who receive federal grants in the natural sciences suggest that they spend as much as 42% of their time doing administrative work related to their grants (Kean, 2006), rather than interacting with their students, postdocs, or colleagues to advance their science. If people are exposed to many competing claims for attention, an emerging question for management scholars is how employees can be protected sufficiently to enable them to focus their attention on the tasks they were hired to do. Moreover, given the decreasing quantity of attention available to be allocated to any given piece of information, a useful direction for future research would be to explore how and when to structure environments in which the quality of attention allocated to a given task is as high as possible, even if its quantity is not great. In addition, it is becoming increasingly important to consider how can we understand—and capture—the quality of attention, and not only the quantity, that individuals are able to allocate to their tasks under varying conditions.

Workplace Behaviors and Well-Being

As many of the observations above reflect, a central theme of the studies of information, attention, and decision making in this volume is that individuals' time is constrained by the reality that we all live within the same 24 hours a day. Organizations can hire more employees to deal with attention challenges, or create different units responsible for filtering information, but, ultimately, every individual has limited attention. Some of the early work in management traced managers' diaries and allocation of attention between different activities (Mintzberg, 1973). Initial work on information overload suggested that people who are overloaded have higher job satisfaction but perform worse than individuals who are underloaded (O'Reilly, 1980). With new tools and the ability to trace large-scale data within organizations, researchers can revisit and extend some of these insights to shed new light not only on how people allocate their scarce attention between competing activities, and the implications for various kinds of task-related outcomes, but also how these demands affect employees' experiences of their workplaces. There is good reason to expect that information overload contributes to workplace stress and decreasing quality of life, given the pressures on work time and their spillover effects outside work time. There is also reason to expect that these issues have relevance among people lower down the organization, and not only among those at the top, since all employees are exposed to more information than ever before.

The access to more information through smartphones, tablets, and other devices are also making inroads into the private lives of people. For instance, responding to emails from home gives more flexibility to people yet also make the boundaries between professional and private life more blurred (Barley, Meyerson, & Grodal, 2011), increasing flexibility at the potential expense of people feeling stressed. However, our understanding of the psychological and social implications of information-related burnout still has a long way to go. With the ubiquitous use of new technologies that expose people to more information at work and in their private lives, more research could be done to understand how people juggle competing demands.

These information-rich environments also have profound implications for leading and motivating employees in the new workplace, where employees emphasize workplace experience akin to their consumer and information experience (Gruber, Leon, George, & Thompson, 2015). For instance, a generation that is used to immediate feedback through social media "likes" and "shares" might find an annual performance appraisal archaic and ineffective. How do managers rethink their feedback and information sharing with their direct reports to motivate them, and yet not overload them? How do leadership styles and their effectiveness vary with the ability of the individual to use different information media to motivate their employees? Do we have new emergent models of talent development and retention based on how organizations use and share information on individual and team performance on an ongoing basis? How do geographically distributed teams share information, and when are they effective at coordinating

complex tasks? These questions help us question fundamental assumptions of theories formed in the 1970s and 1980s on leadership and motivation that had a different set of underlying conventions and boundary conditions when they were originally conceived.

Information, Institutions, and Social Change

There are many recent examples of how social and political movements use social media to promote themselves, as well as organize their actions. After Mohammed Bouazizi set himself on fire in Tunisia in late 2010 as a protest against his treatment by local government officials, videos and tweets of what he had done spread through social media to other countries. The Tunisian government tried to ban the use of social media, but the diffusion of information was so rapid that the emergent protest movement proved difficult to stop. Civic uproar followed, with hundreds of thousands protestors on streets; governments fell and war broke out in several countries. Social media undoubtedly played a role in allowing people to share stories, and in enabling their core revolutionary message to take root in geographically distant regions (Howard et al., 2011).

Grassroots movements or social entrepreneurs that were once limited by geographical boundaries can now connect to remote others. The idea that new ways of creating and sharing information through social media can be used to organize differently has broader implications for management scholars. One possibility is driven by the availability of data: researchers can now trace the evolution, spread, and success of these initiatives. For instance, while the story of Bouazizi had wider ramifications, there are many other, similar events that get little traction. Why is it that certain events spread, and what can organizations do to shape their fate? By tracing data created through social media, we can overcome some success bias by studying both successful and unsuccessful initiatives, as well as tracing how they change and are re-interpreted by different constituents (Leskovec, Backstrom, & Kleinberg, 2009).

The government of Tunisia sought to stop the uprising, but this was difficult as there was no clear leadership that could be targeted. In many ways, it was a grassroots movement in which people organized their actions in a distributed fashion, and there was no single leader in charge. This resembles many aspects of open-source projects that often lack a traditional hierarchical structure yet manage to coordinate their actions (Dahlander & O'Mahony,

2011), which begs further questions about how social media can be used among ordinary people who were previously not in a position to bring about change in the societies in which they live.

CONCLUSION

This thematic issue encourages us to see how our information-rich context is changing, or has changed, our behavior, our workplaces, our organizations, and our social institutions. Ever since the publication of Simon's (1957) work on bounded rationality, attention, and decision making, our theories have evolved to reflect the changing workplace and the role of the manager. Radical shifts in technology and the regulatory and social environments have increased information flows, awareness, access, and usage. The information age prompts management scholars to rethink and refresh insights and theories on how individuals and organizations operate and thrive in this new context. We encourage scholars to revisit these core assumptions on rationality and information processing, managerial attention, absorption and use of information, and the role of the individual, manager, and the firm in an information-rich, networked world.

Daan van Knippenberg
Erasmus University

Linus Dahlander
ESMT European School of Management and Technology

Martine R. Haas
University of Pennsylvania

Gerard George
Singapore Management University

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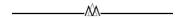
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Daan van Knippenberg is professor of organizational behavior at the Rotterdam School of Management, Erasmus University Rotterdam, The Netherlands. His research interests include leadership, diversity, team performance, creativity, and social identity. Daan is editor-in-chief of *Organizational Psychology Review* and an associate editor of the *Academy of Management Journal* (*AMJ*).

Linus Dahlander is an associate professor of strategy and the KPMG Chair in Innovation at ESMT European School of Management and Technology in Berlin, Germany. He is an associate editor of the *AMJ*, where he covers the topics of innovation, networks, and organization theory.

Martine Haas is an associate professor of management at the Wharton School of the University of Pennsylvania. She is an associate editor of the *AMJ*, covering the topics of knowledge management, multinationals, and organization theory.

Gerry George is dean and professor of innovation and entrepreneurship at the Lee Kong Chian School of Business at Singapore Management University. He also serves as the editor of the *AMJ*.

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