Attending to the External Environment to Identify Potential Opportunities

Abstract Building on a recent study (Shepherd et al. in *Strategic Management Journal* 38:626–644, 2017), this chapter highlights the importance of noticing opportunities as an initial step toward new venture creation. Unsurprisingly, there has been considerable interest in the processes of allocating attention to notice potential opportunities arising from changes in the external environment. We know a great deal about the role of top-down (i.e., based on knowledge and experience) processes of allocating attention to the environment in forming opportunity beliefs worthy of entrepreneurial action. However, in this chapter, we illustrate how bottom-up processes, whereby environmental changes capture entrepreneurs' attention, shape opportunity identification. Building on the notion of guided attention, we detail an attention model of forming opportunity beliefs for entrepreneurial action that includes both top-down and bottom-up processes for allocating attention. This chapter explains how entrepreneurs can allocate their transient attention to identify potential opportunities from environmental changes. This chapter also describes how allocating sustained entrepreneurial attention influences belief formation about radical and incremental opportunities requiring entrepreneurial action.

This chapter is based on Shepherd et al. (2017). The assertions that we make in this chapter are justified, cited, and referenced in Shepherd et al. (2017).

Cognition is critical to entrepreneurial action. Entrepreneurs' subjective representations of the environment help them identify potential opportunities, but entrepreneurs cannot form a complete understanding of the environment because of their cognitive limitations. As a result, entrepreneurs' attention determines which aspects of the environment they notice for interpretation and action. Because identifying and exploiting opportunities make up the essence of entrepreneurship, scholars have been interested in how entrepreneurs identify and interpret environmental signals as potential opportunities requiring entrepreneurial action. Opportunities can arise from changes in the environment and represent "courses of action that seek to derive benefits from these changes" (Grégoire et al., 2010, p. 415). Environmental changes that serve as a basis for identifying new opportunities include, for example, new technologies, emerging markets, societal trends (e.g., pro-environmental), and changes in legal regulations.

Existing entrepreneurial cognition studies have primarily focused on top-down processes for allocating attention to notice and interpret environmental-change signals of potential opportunities. Top-down processes rely on existing knowledge structures to direct entrepreneurial attention. Entrepreneurs use their knowledge structures to deductively interact with the environment to notice, interpret, and respond to changes in the environment that signal a potential opportunity. For example, entrepreneurs with knowledge about the pharmaceutical industry are likely to attend to environmental changes in this industry but less so to changes in other industries, such as the semiconductor or software industries. Therefore, a knowledge structure focuses attention on aspects of the environment that are expected to inform entrepreneurial action.

We know less about bottom-up processes of attention allocation. Bottom-up processes allow prominent aspects of environmental changes to draw attention. For example, a gist—a big-picture representation of the environment—can draw decision makers' attention to striking environmental changes (Shepherd et al., 2007). As another example, in disruptive-change contexts, individuals rely on Gestalt properties within the situation to perceive patterns and make sense of unfolding events. In contrast, relying on knowledge structures (i.e., top-down processing) directs attention to aspects that are expected to be important—these studies of bottom-up processes for allocating entrepreneurial attention act as a counterweight to studies on top-down processes. However, questions remain about how top-down and bottom-up processes work together to

allocate entrepreneurial attention to form opportunity beliefs. Therefore, it is crucial to understand how the allocation of entrepreneurial attention impacts entrepreneurs' ability to notice and discern different environmental changes to form beliefs about incremental and radical opportunities. Building on cognitive psychology theories, in this chapter, we describe an attentional model of opportunity beliefs for entrepreneurial action (see Shepherd et al., 2017) that offers three primary insights.

First, bottom-up processes for allocating attention are distinct from top-down processes, and to date, studies have primarily explored one or the other but not both concomitantly (Ocasio, 1997, 2011). This chapter describes the combination of top-down and bottom-up processes for allocating entrepreneurial attention and how the level of control that top-down processes exert on bottom-up processing influences opportunity-belief formation. By opportunity belief, we mean an entrepreneur's anticipation that exploiting a particular opportunity is both desirable and feasible.

Second, current knowledge of opportunity-belief formation is focused primarily on opportunities arising from incremental environmental changes (e.g., Benner & Tushman, 2003). Unfortunately, it is disruptive changes (rather than incremental changes) that people have substantial difficulty noticing (Tushman & O'Reilly, 1996). This difficulty in noticing disruptive changes is likely due to top-down processes for allocating attention to aspects of the environment that are expected to be important (Tripsas & Gavetti, 2000). Therefore, the difficulty in noticing disruptive changes to identify potential opportunities is at least partly related to processes for allocating entrepreneurial attention. In this chapter, we thus offer a deeper understanding of how entrepreneurs can notice disruptive environmental changes and identify and evaluate the radical opportunities that arise from such disruptions. Specifically, we explain how a greater reliance on the bottom-up allocation of transient attention helps entrepreneurs notice disruptive changes to identify potential opportunities and how sustained attention explains the formation of opportunity beliefs for entrepreneurial action.

Finally, the process underlying opportunity-belief formation involves two phases: the focal entrepreneur identifying what could be an opportunity for someone and then evaluating if the identified opportunity is personally worth acting on or not (McMullen & Shepherd, 2006). Entrepreneurship studies have generated considerable knowledge on the identification phase of opportunity-belief formation (e.g., Grégoire &

Shepherd, 2012) and the evaluation phase of opportunity-belief formation (Haynie et al., 2009) but not the link between the two. In this chapter, we explain how entrepreneurial cognition and the nature of environmental changes combine to influence opportunity-belief formation—that is, the identification and evaluation of potential opportunities desirable and feasible for entrepreneurial action.

ATTENDING TO THE ENVIRONMENT TO FORM OPPORTUNITY BELIEFS FOR ENTREPRENEURIAL ACTION

To explain the attention model of opportunity beliefs (Shepherd et al., 2017), we rely on research on the cognitive psychology of attention (e.g., Kahneman, 2003; Most et al., 2011). As illustrated in Fig. 1.1, attending to environmental changes for opportunity-belief formation comprises first allocating transient attention and then allocating sustained attention. For allocating transient attention, an entrepreneur's search strategy and job demands impact how they use top-down guidance of bottom-up processes for allocating entrepreneurial attention, which then impacts the entrepreneur's ability to notice incremental or disruptive environmental changes signaling potential opportunities. Allocating sustained attention begins with the identified potential opportunity (from the transient-attention phase). Depending on the entrepreneur's cognitive mode and immersion level, he or she believes that there is an incremental or radical opportunity worthy of entrepreneurial action.

ALLOCATING TRANSIENT ATTENTION TO IDENTIFY A POTENTIAL OPPORTUNITY (FOR SOMEONE)

Guided attention explains how top-down processes for allocating attention can work with bottom-up processes. Top-down processes can allocate attention to specific aspects of the environment that entrepreneurs expect to be important (based on the entrepreneurs' knowledge structures) but then allow bottom-up processes in which the prominence of environmental changes draws attention. Therefore, with guided attention, entrepreneurial attention is allocated to striking environmental changes *and* exhibits important properties as determined by entrepreneurs' knowledge structures. However, striking environmental changes that do not meet the importance threshold do not draw attention. Therefore,

Fig. 1.1 An attention model of opportunity beliefs for entrepreneurial action (Adapted from Shepherd et al., 2017)

entrepreneurs can ready themselves to notice specific types of opportunities by setting the level of control that top-down processes have over bottom-up attention allocation.

Knowledge structures direct how top entrepreneurs deductively interact with the environment to notice, interpret, and respond to new stimuli. Although entrepreneurs tend to focus on just one environment-related knowledge structure at any given moment, entrepreneurs use numerous non-focal knowledge structures for cognitive processing, which they do not typically apply to the current environment. To the extent that these non-focal knowledge structures are “accessible” for bottom-up activation (i.e., have not been “tuned out” by top-down control), they enable entrepreneurs to be surprised and have their attention drawn to features of the environment that are not reflected in the focal knowledge structure.

As illustrated in Fig. 1.2, when entrepreneurs scan the environment, greater top-down guidance of entrepreneurial attention relies on a more

Fig. 1.2 Entrepreneurial attention and focal and non-focal knowledge structures

limited number of knowledge structures to direct attention to. For example, an entrepreneur may have his or her expert knowledge of an existing technology primarily direct his or her attention to how scientists and other researchers are improving this specific technology's performance in a given market. Less top-down guidance (i.e., more bottom-up processing) of attention relies less on a particular knowledge structure, which makes a larger set of alternate (non-focal) knowledge structures accessible to stimulation from environmental changes (although the focal knowledge structure leads the entrepreneur to consider such stimuli to be irrelevant). For example, the entrepreneur with knowledge of a particular technology may not allocate as much attention to the development of this technology for the given market but may instead allocate part of his or her attention to other potentially unrelated technologies or markets.

High Top-Down Guidance (Low Bottom-Up Processing) for Attending to the External Environment to Identify Potential Opportunities

Entrepreneurs' beliefs about the external environment drive top-down guidance of entrepreneurial attention. These beliefs about the external environment are based on learning from experience and are stored as knowledge structures. Top-down processes of allocating attention are highly effective for performing tasks efficiently, predictably, and reliably. For example, top-down decision making allocates attention to aspects of the external environment that entrepreneurs' knowledge and experience lead them to believe are likely to reveal potential opportunities. Given that attention is a limited resource, top-down processes also direct attention away from environmental aspects that entrepreneurs expect to be unimportant. Incremental changes to the environment—changes consistent with the current trajectories of technologies, consumers, competitors, and institutions—typically occur when and where entrepreneurs expect them to occur. Thus, entrepreneurs' allocation of attention to these aspects of the external environment is more transient when there is high top-down guidance in the allocation of entrepreneurial attention than low top-down guidance.

While high top-down guidance of entrepreneurial attention helps entrepreneurs notice incremental environmental changes to identify incremental potential opportunities, it also obstructs entrepreneurs from noticing unexpected changes in the external environment. Thus,

entrepreneurs are unlikely to identify potential opportunities from *disruptive changes* (i.e., changes involving new configurations of technologies, consumers, and competitors that generate new market categories and industries). Indeed, when people rely heavily on their focal knowledge structures, they are unlikely to attend to unexpected environmental changes, even striking environmental changes. For example, various experiments have revealed that when people are highly focused on performing a specific task, they are blind to unrelated information even when that information is highly prominent. Interestingly, when a task is considered less important, individuals are more likely to notice a prominent change in the environment (Neisser, 1976). It appears that when a *focal* task is less important, observers can “relax” top-down processes for allocating attention. This relaxation allows for the individual to engage more bottom-up processes to allocate transient attention to non-focal knowledge structures to notice and interpret unexpected environmental changes. In contrast, observers for whom a focal task is very important concentrate their attention on the focal knowledge structure relevant to the task, which starves non-focal knowledge structures of the transient attention needed to notice unexpected changes.

There is broad evidence in the business context indicating that the effects of high top-down guidance contribute to individuals’ failure to notice disruptive changes. For example, Polaroid’s managers used their past experience to focus attention on technology consumables rather than on hardware. As a result, they were blind to prominent changes in the imaging industry (Tripsas & Gavetti, 2000). Polaroid’s managers attended to environmental aspects that they expected to be important (based on a continuation of current practices) but did not notice environmental changes that were inconsistent with their beliefs about the nature of the business. They relied too little on bottom-up processes that would allow their transient attention to be drawn to striking environmental changes through non-focal knowledge structures. Therefore, while high top-down guidance of attention helps entrepreneurs identify potential opportunities from *incremental* environmental changes, it obstructs entrepreneurs from identifying potential opportunities from *disruptive* environmental changes.

Low Top-Down Guidance (More Bottom-Up Processing) for Attending to the External Environment to Identify Potential Opportunities

In reducing the level of control of top-down processes for allocating attention, entrepreneurs rely more on bottom-up processes for making transient attention more accessible for non-focal knowledge structures. This availability of transient attention to be drawn to non-focal knowledge structures enables entrepreneurs to be surprised by prominent environmental changes and allocate attention to them. The most prominent environmental changes are the environmental aspects most likely to capture attention when there is lower top-down guidance of (or control over) bottom-up processes for allocating entrepreneurial attention. Therefore, greater reliance on bottom-up processes (less top-down guidance) enables entrepreneurial attention to be drawn to prominent unexpected environmental changes to identify potential opportunities. This greater reliance on bottom-up processes of allocating attention helps entrepreneurs identify potential opportunities for disruptive environmental changes.

However, because low top-down guidance means that entrepreneurs must approach the external environment with few preconceived expectations, we note that attention might be drawn to environmental changes that have little relevance to possible markets or technologies. Indeed, having their attention drawn to prominent environmental changes may lead individuals in the wrong direction and interfere with their cognition and decision-making processes. Furthermore, greater reliance on bottom-up processes for allocating attention reduces reliance on past experience, so entrepreneurs may “reinvent the wheel,” or make the same mistakes again and inefficiently apply action repertoires to potential opportunities.

Therefore, the extent of top-down guidance of attention impacts entrepreneurs’ identification of potential opportunities from different environmental changes. Specifically, greater top-down guidance of attention helps entrepreneurs identify potential opportunities from incremental environmental changes but potentially obstructs them from identifying potential opportunities from disruptive environmental changes. In contrast, greater reliance on bottom-up processes for allocating attention helps entrepreneurs identify potential opportunities from disruptive environmental changes but obstructs them from identifying potential opportunities from incremental environmental changes.

SEARCH, GUIDED ATTENTION, AND THE IDENTIFICATION OF POTENTIAL OPPORTUNITIES

Entrepreneurs' *search strategies* determine where they focus their attention to gain new information and knowledge. Search strategies differ based on the scope of the terrain covered to reveal potential information. *Narrow-scope search* involves covering local terrain for new information—that is, searching markets and technologies that are related, familiar, or similar to entrepreneurs' previous markets and technologies. In contrast, *broad-scope search* involves covering distant terrain for information—that is, searching markets and technologies that are unrelated, unfamiliar, or dissimilar to entrepreneurs' previous markets and technologies.

A narrow-scope search strategy likely triggers high top-down guidance of allocating entrepreneurial attention. That is, searching the neighborhood of operations in which they have prior experience, entrepreneurs will use this familiarity to engage their experience in this terrain—namely, to engage their knowledge structures for allocating attention. With top-down processes strongly allocating attention, entrepreneurs are more likely to identify potential opportunities from *incremental* environmental changes and are less likely to identify potential opportunities from *disruptive* environmental changes.

In contrast, *broad-scope search* refers to investing effort to seek information and knowledge that is unrelated to one's current knowledge base. This conscious effort to move away from one's most recent experiences relaxes top-down guidance and thereby increases the use of bottom-up processes for allocating entrepreneurial attention. Thus, distant search provides greater exposure to new information, such as disruptive environmental changes. This greater reliance on more bottom-up processes enables entrepreneurs' attention to be drawn to these changes to identify radical opportunities from them.

Therefore, the level of top-down guidance for allocating entrepreneurial attention mediates the relationship between an entrepreneur's search strategy and his or her ability to identify potential opportunities. Specifically, the more local the search strategy, the greater the top-down guidance for allocating entrepreneurial attention. Local search strategies help entrepreneurs identify potential opportunities from incremental environmental changes but obstruct them from identifying potential opportunities from disruptive changes. In contrast, more distant search strategies increase the bottom-up allocation of attention, which

helps entrepreneurs identify potential opportunities from disruptive changes but obstructs them from identifying potential opportunities from incremental changes.

ENTREPRENEURS' JOB DEMANDS, GUIDED ATTENTION, AND THE IDENTIFICATION OF POTENTIAL OPPORTUNITIES

Entrepreneurs face numerous challenges in performing entrepreneurial tasks. Indeed, entrepreneurs often need to be jacks-of-all-trades because they need to perform many varied tasks, particularly in the early stage of venture development. For example, these tasks include seeking finance, acquiring new talent, identifying and building relationships with new customers and suppliers, developing new technologies and products, setting up an organizational structure, coordinating with the rest of the entrepreneurial team, etc.

These tasks can be even more demanding in some external environments. For example, hostile environments create many challenges that require entrepreneurial attention. Facing a hostile external environment, entrepreneurs may have to develop creative ways to conserve current resources, allocate attention externally to acquire information to appraise the nature of the focal threats, and form new strategies to address those threats (see Miller & Friesen, 1983). Similarly, more complex environments pose considerable challenges for entrepreneurs because they need to consider many factors and possible contingencies between those factors to gain an understanding of the environment. Furthermore, entrepreneurs of new ventures face the liabilities of newness and must therefore try to convince potential stakeholders to support their ventures despite these (potential) new ventures lacking legitimacy. Finally, the more dynamic the external environment, the more often entrepreneurs must change and adapt their tasks and the attention they allocate to different (aspects of) tasks. These challenging external environmental conditions place greater information-processing demands on entrepreneurs.

Facing more task-related demands produces greater strain on entrepreneurs' cognitive and attentional limitations. Therefore, they may turn to the efficiency provided by relying heavily on top-down processes for allocating attention. In contrast, entrepreneurs who face fewer job demands are likely to rely less heavily on top-down processes to allocate entrepreneurial attention. In other words, although entrepreneurs with

few job demands still depend on a focal knowledge structure, more transient attention is accessible for non-focal knowledge structures for the entrepreneur to notice and interpret unexpected environmental changes.

Therefore, Shepherd et al. (2017) suggested that the level of top-down guidance for allocating attention mediates the relationship between entrepreneurs' job demands and their ability to identify potential opportunities. Specifically, job demands increase top-down guidance of entrepreneurial attention, which helps entrepreneurs identify potential opportunities from incremental environmental changes but obstructs them from identifying potential opportunities from disruptive environmental changes. In contrast, lower job demands increase bottom-up processes for allocating entrepreneurial attention, which helps entrepreneurs identify potential opportunities from disruptive environmental changes but obstructs them from identifying potential opportunities from incremental changes.

Although attending to environmental changes (via transient attention) may help entrepreneurs identify potential opportunities, this identification is necessary but not sufficient for entrepreneurial action. Entrepreneurial action requires sustained attention to evaluate whether an opportunity for someone (third-person opportunity) represents an opportunity for the focal entrepreneur (i.e., an opportunity belief) that is worthy of entrepreneurial action (first-person opportunity). We now explain the allocation of sustained attention necessary for entrepreneurial action.

SUSTAINED ENTREPRENEURIAL ATTENTION FOR ACTING ON AN OPPORTUNITY BELIEF

We can classify opportunities in terms of their proximity to current technological and market trajectories. On the one hand, *incremental opportunities* often arise from small changes in the technological trajectory and/or existing customer needs. The exploitation of such incremental opportunities typically builds on existing knowledge. For example, over the last decades, large automotive manufacturers have improved cars' combustion engines to consume less and less fuel. On the other hand, *radical opportunities* often arise from substantial changes to the technological trajectory or the creation of new markets. The exploitation of radical opportunities typically requires a departure from existing knowledge. For example, introducing electrical engines in cars requires

automotive manufacturers to build up their knowledge of battery production and new software development so they can connect all the electronic components of electric cars. Disruptive environmental changes (e.g., legal restrictions on carbon dioxide emissions for new cars) often provide the basis for the departures required for identifying radical opportunities. After identifying a potential opportunity (from an incremental or disruptive environmental change), an entrepreneur must evaluate the desirability and feasibility of this opportunity for him- or herself before forming an opportunity belief that requires entrepreneurial action.

As shown in Fig. 1.3, Shepherd et al. (2017) combined immersion and cognitive processes to explain how entrepreneurial attention forms opportunity beliefs for entrepreneurial action. *Immersion* is mindful engagement with the situation or task at hand. Being immersed in a task requires a significant amount of an individual's emotional, cognitive, and physical resources. There are two generic *cognitive processes*—intuition and deliberate reasoning. *Intuition* involves thoughts and feelings that are generated quickly and with little (if any) conscious reflection. Intuition allows an individual to make relatively automatic, rapid judgments. In contrast, *deliberate reasoning* is more likely to be consciously enacted and controlled and is thus typically more effortful and slower than intuition. This form of cognitive processing is relatively flexible and may be

		Entrepreneur's Cognitive Mode	
		Intuition	Deliberate Reasoning
Entrepreneur's Immersion	High	Absorptive Likelihood of forming beliefs on: Incremental Opportunities: High Radical Opportunities: High <i>when stimulates shift to Abductive; low otherwise.</i>	Abductive Likelihood of forming beliefs on: Incremental Opportunities: Low Radical Opportunities: High
	Low	Categorical Likelihood of forming beliefs on: Incremental Opportunities: Low Radical Opportunities: Low	Analytical Likelihood of forming beliefs on: Incremental Opportunities: High Radical Opportunities: Low

Fig. 1.3 Entrepreneurs' cognitive modes, immersion, and opportunity beliefs for entrepreneurial action (Adapted from Shepherd et al., 2017)

governed by rules. Combining immersion and cognitive processes leads to four different modes of discernment: (1) abductive, which involves high immersion and deliberate reasoning; (2) absorptive, which involves high immersion and intuition; (3) analytical, which involves low immersion and deliberate reasoning; and (4) heuristic, which involves low immersion and intuition (Shepherd et al., 2017). Each mode of *entrepreneurial discernment* is a means of allocating sustained attention to grasp and comprehend aspects of an *identified* potential opportunity to evaluate it to form an opportunity belief that informs entrepreneurial action.

Sustained Attention for Abductive Discernment and Opportunity-Belief Formation

Abduction refers to the creative construction of meaning (i.e., hypotheses) to explain surprising anomalies while experiencing a situation. Specifically, inquiry begins by engaging the world, and immersion facilitates this engagement with the world. Indeed, when immersed in tasks, entrepreneurs engage with the world, and the world has a way of speaking back. As entrepreneurs immerse themselves in entrepreneurial tasks, they find their way by applying their knowledge structures to understand their experiences. While using knowledge structures can help entrepreneurs make sense of their experiences while immersed in the environment, these knowledge structures can also force new experiences to conform to what is familiar, so entrepreneurs thus run the risk of failing to notice novel differences between the environment and their knowledge structures based on their interpretations of those new experiences. However, some anomalies are too difficult to “force fit” into existing knowledge structures. These anomalies that poke out of the nets of individuals’ knowledge structures are breakdowns. Breakdowns involve anomalies that are made conspicuous (i.e., broken, absent, or obstructive) when individuals are immersed and engaged in activities with the current situation. Therefore, taking action while immersed in an activity or a situation can be a source of new information and understanding for entrepreneurs.

An entrepreneur may experience the identification of a potential opportunity as a surprising finding that requires further exploration to determine whether he or she should commit to creating a new venture to exploit the opportunity or not. Indeed, experiencing something as surprising triggers a reconsideration and revision of one’s knowledge structures to understand the current situation. Experiencing such

a surprise also generates a sense of uneasiness and unsettledness felt in the body (Peirce, 1958). This irritation triggers the allocation of entrepreneurial attention to test a hypothesis about the fit between the potential opportunity and the focal entrepreneur's knowledge (e.g., skills, experience, abilities, and so on) and motivations (e.g., aspirations, goals, and so on). Compared to the other modes, abduction may constitute a relatively slow march from a guess to a fully developed opportunity (see Chapter 2). However, *any guess will do* for abduction to start the inquiry process; it frees entrepreneurs from their current expectations as they formulate opportunity conjectures and allocate attention based on those conjectures. This allocation of attention based on the freedom to explore unconventional potential opportunities enables entrepreneurs to allocate sufficient sustained attention to evaluate (and refine) potential radical opportunities.

However, forming a belief that one should act on a radical opportunity achieved through abduction does not provide the sort of focused attention necessary for evaluating an incremental opportunity. Indeed, abduction can be a highly inefficient process of exploration. This inefficiency is particularly problematic when an entrepreneur evaluates information that is not highly novel, such as with incremental opportunities. This inefficiency translates into slowness to grasp incremental potential opportunities, which more efficient entrepreneurs are able to grasp. In such cases, the window of opportunity is closed to entrepreneurs before they are willing and able to act.

Therefore, entrepreneurs using abductive discernment are likely to form the belief that an identified radical opportunity should be acted upon. In contrast, entrepreneurs using abductive discernment are unlikely to form the belief that an identified incremental opportunity should be acted upon.

Sustained Attention for Analytical Discernment and Opportunity-Belief Formation

Analytical discernment involves propositional statements (i.e., “if, then” statements) about the relationship between an input and an output for an individual's situation. These propositional statements help sustain entrepreneurial attention on potential incremental opportunities that fit entrepreneurs' knowledge and motivations. To make these propositional statements, entrepreneurs need to categorize potential opportunities.

Categorizing a potential opportunity imposes meaning on it based on the class of known opportunities to which it is now a member. By assigning meaning to potential opportunities, entrepreneurs' categorization of potential opportunities enables them to prioritize potential opportunities (and problems and other issues) to determine which potential opportunities require further attention and which do not.

Therefore, sustained attention for deliberate reasoning about an identified potential incremental opportunity can lead an entrepreneur to form the belief that it represents an opportunity for him or her to create a venture with a competitive advantage. Indeed, entrepreneurs sometimes use explicit rules that guide entrepreneurial attention toward specific identified potential opportunities and ignore others. For example, entrepreneurs may only focus on opportunities that are within their geographic home regions because they do not want to move or spend much time travelling, or they may set boundary conditions to accommodate their family situation (e.g., particular working hours, time of absence, minimal financial income). Alternatively, some entrepreneurs determine the maximum amount of effort and money they are willing to put at risk to pursue an opportunity. For example, when starting Virgin Airlines, entrepreneur Richard Branson set himself a limit of one year to determine whether he could transform his imagined concept of running an airline into a profitable business.

Entrepreneurs' knowledge structures inform their deliberate reasoning. Sustained entrepreneurial attention is focused on potential opportunities consistent with entrepreneurs' knowledge and motivations (i.e., incremental opportunities). This focus provides little scope to sustain entrepreneurial attention on non-local aspects of potential opportunities, thereby obstructing beliefs for radical opportunities. When deliberate reasoning is combined with low immersion in the task and environment, entrepreneurs find it difficult to label and interpret potential radical opportunities and are thus unlikely to exploit such opportunities.

Therefore, entrepreneurs using analytical discernment are likely to form the belief that an identified incremental opportunity should be acted upon. In contrast, entrepreneurs using analytical discernment are unlikely to form the belief that an identified potential radical opportunity should be acted upon.

*Sustained Attention for Categorical Discernment
and Opportunity-Belief Formation*

Evaluating potential opportunities from the categorical-discernment mode is typically performed at an unconscious level. *Categorical discernment* refers to the grouping of objects, people, and situations and all the information that the focal individual associates with each of the categories (Macrae & Bodenhausen, 2000). Entrepreneurs use categories to evaluate the environment. Entrepreneurs' categories may include, for example, different (types of) industries, technologies, markets, and so on. Using categorical discernment, entrepreneurs' cognitive processing proceeds effortlessly to match problems with solutions. Although this assessment is quick, it can effectively match the current context with domain-specific knowledge.

By definition, incremental opportunities are those opportunities that represent changes (albeit small changes) in current technological or market trajectories. Still, entrepreneurs may categorize these changes as similar to a context stored in their knowledge structures despite differences. Therefore, when using categorical discernment, an entrepreneur is likely to distort novel, ambiguous signals such that they are consistent with the prototypical attributes of his or her environment category (i.e., force fit his or her perception to fit with the categorization), ignore information about the current situation that is inconsistent with the categorization, or discount inconsistent information by attributing it to unusual situational conditions. Indeed, people tend to engage a range of cognitive mechanisms to maintain the categorizations stored in their knowledge structures and are generally reluctant to update their categories. Indeed, categories become crystalized, making reclassifications of the external environment less likely. For example, one study found that individuals relied on an industry's old categories to attempt to navigate a new environment (Reger & Palmer, 1996). The study also found that even though the new environment was highly turbulent, the individuals' categorizations were highly resistant to updating. Overall, environmental changes appear to have a minimal immediate impact on entrepreneurs' current decisions and actions when they allocate sustained attention using categorical discernment.

With categorical discernment, potential radical opportunities are also unlikely to be allocated the sustained attention necessary for opportunity-belief formation. A radical opportunity is outside the parameters of the

environment's normal trajectory. Therefore, it is difficult to connect a radical potential opportunity to existing categories, so such opportunities are not easily connected to the repertoire of responses. Even experts have difficulty at this task. Experts can become cognitively entrenched, limiting their ability to process radical ideas. Therefore, when using categorical discernment for radical opportunities, an entrepreneur likely either applies a triggered category even though it does not match the focal potential opportunity or "explains away" the potential opportunity.

Therefore, entrepreneurs using categorical discernment are unlikely to form the belief that an identified potential opportunity (incremental or radical) should be acted upon. To illustrate this proposition, consider the classical industry categories of "automotive" and "software." Adhering to this categorization, managers of classical car manufacturers decided against building cars with software at the core of their technologies. Tesla, on the other hand, has realized the opportunity to develop the next generation of electric vehicles by moving beyond this categorization.

Sustained Attention for Absorptive Discernment and Opportunity-Belief Formation

Rapid unconscious responses to potential opportunities can also occur while individuals are deeply immersed in the environment. Heidegger (1962) referred to this immersion as "being in the world" in that individuals are absorbed in their current activities. Absorption in the environment facilitates adjustments to incremental changes in that environment. While absorbed in activities, entrepreneurs engage the environment, and the environment has a way of talking back. This backtalk does not involve deliberate reasoning. Rather, when entrepreneurs are absorbed in activities and receive backtalk, the environment is gradually disclosed to them. Entrepreneurs can learn and master this skill of thinking on their feet.

Absorption refers to an immediate response to one's environment that does not involve deliberate cognitive processing, enabling an individual to move forward by flexibly responding to changes in the situation he or she faces. These incremental adjustments occur in the moment while the individual is highly immersed in the focal activity. By incremental adjustments, we mean adjustments made in response to unsurprising changes congruent with past actions and experiences. Although some sufficiently minor changes may momentarily startle entrepreneurs, entrepreneurs tend to quickly shift to new forms of action to cope with

such changes. Entrepreneurs are likely to respond swiftly to potential incremental opportunities arising from their current activities. Therefore, through *absorptive discernment*, entrepreneurs can immediately (and unconsciously) respond to backtalk from their interactions with the environment and use their readily available tools to exploit the potential incremental opportunities they come across.

In contrast, for more surprising changes encountered while immersed in an activity—that is, breakdowns that interrupt the flow of an ongoing activity—entrepreneurs are surprised out of absorption into a more deliberate-reasoning mode of discernment (abductive or analytical, as described above). For example, an entrepreneur may develop a software solution for clients in the travel industry. As long as he or she is deeply immersed in this task, the entrepreneur is unlikely to notice that the software would also be useful for solving logistics problems in manufacturing. Once an external shock (e.g., COVID-19) hits the travel industry, the entrepreneur may allocate attention to alternative opportunities for developing and using the software, including in the manufacturing sector. Therefore, when relying on absorptive discernment, entrepreneurs are unlikely to allocate sustained attention to potential opportunities that do not interrupt their ongoing entrepreneurial activities—namely, those potential opportunities that interrupt entrepreneurial activities shift discernment to a deliberate mode (i.e., abductive or analytical). If the shift in sustained attention is to abductive discernment, then an entrepreneur is likely to form a belief that there is a radical opportunity worthy of entrepreneurial action.

Therefore, entrepreneurs using absorptive discernment are likely to form the belief that an identified incremental opportunity should be acted upon. In contrast, entrepreneurs using absorptive discernment are unlikely to form the belief that an identified potential radical opportunity should be acted upon unless there is a shift to the analytical-discernment mode.

AN ATTENTION MODEL OF OPPORTUNITY-BELIEF FORMATION FOR ENTREPRENEURIAL ACTION

This chapter explained how the allocation of entrepreneurial attention influences the identification and evaluation of potential opportunities and how attentional processes differ for incremental as opposed to radical

opportunities. To address these questions, we employed an information-processing perspective to build a model about whether entrepreneurs form beliefs to act on radical opportunities or incremental opportunities. Building on the literatures on cognition and the psychology of attention, we described an attentional model of opportunity beliefs for entrepreneurial action (see Shepherd et al., 2017).

In describing this model, we distinguished between a transient phase and a sustained phase of attention allocation. In the transient-attention phase, entrepreneurs' knowledge structures impact the extent to which they notice incremental or disruptive environmental changes. Noticing an environmental change (or being blind to it) depends on the nature of the environmental change (incremental or disruptive) and the extent to which the focal entrepreneur relies on top-down guidance of bottom-up processes to allocate transient attention. The top-down guidance comes from entrepreneurs' knowledge structures. The extent of top-down guidance depends on entrepreneurs' job demands and search strategies (local or distant). This phase of allocating transient attention helps explain why (1) some entrepreneurs notice potential opportunities from incremental environmental changes but are blind to potential opportunities from disruptive environmental changes and (2) why some entrepreneurs notice potential opportunities from disruptive environmental changes but are blind to potential opportunities from incremental environmental changes.

Once an entrepreneur notices a potential opportunity from an incremental or disruptive environmental change, the entrepreneur enters the sustained-attention phase to discern whether he or she believes this identified potential opportunity for someone is worthy of personal entrepreneurial action. This evaluation of a potential opportunity depends on which discernment mode the entrepreneur uses for the evaluation process. The discernment mode ultimately used to evaluate an identified potential opportunity depends on both the extent to which the entrepreneur is immersed in his or her environment and his or her reliance on intuition or deliberate reasoning for information processing. Combining these dimensions produces four discernment modes that impact the likelihood that entrepreneurs will form a belief that there is an incremental or radical opportunity worthy of their entrepreneurial action. We believe that this model (Shepherd et al., 2017) provides at least three important insights.

First, the attentional model distinguishes between different types of opportunity beliefs, noting that the process for forming incremental

opportunity beliefs differs from that for forming radical opportunity beliefs. Although previous studies have explained how individuals notice incremental changes and subsequently recognize incremental opportunities from those changes, we focused on recognizing disruptive changes that are difficult to notice (Tushman & O'Reilly, 1996). Indeed, entrepreneurs are often blind to disruptive environmental changes, so they miss the chance to act on the corresponding radical opportunities. By describing entrepreneurial attention allocation and the conditions under which entrepreneurs notice disruptive as well as incremental changes, the attentional model is capable of explaining how entrepreneurs form *both* incremental and radical opportunity beliefs for entrepreneurial action based on their use of different modes of discernment.

Second, in this chapter, we highlighted four discernment modes that entrepreneurs can employ in forming opportunity beliefs for entrepreneurial action. The cognition literature has typically focused on either the cognitive-processing mode (e.g., Dutton, 1993) or the extent of immersion (Tsoukas & Chia, 2002). Furthermore, previous entrepreneurship studies have focused on the identification of opportunities in general or on one type of opportunity belief or the other (e.g., Bingham & Eisenhardt, 2011). In this chapter, we compared these discernment modes in terms of the likelihood of forming an opportunity belief about a potential incremental opportunity and the likelihood of forming an opportunity belief about a potential radical opportunity.

Further, this chapter highlighted the notion of transient attention from the psychology of attention and how it complements entrepreneurial cognition research on the effects of sustained attention (e.g., Bogner & Barr, 2000). Without transient attention enabling entrepreneurs to notice environmental changes to identify potential opportunities, the entrepreneur's sustained attention of discernment modes has little to focus on. We explained how the level of top-down guidance of bottom-up processes for allocating entrepreneurs' transient attention influences entrepreneurs' ability to notice environmental changes. We described several antecedents likely to influence the level of top-down guidance of bottom-up processes for allocating entrepreneurial attention. By explaining how top-down and bottom-up processes are combined, this chapter described how entrepreneurs can identify different types of potential opportunities from environmental changes. Failing to consider the combination of top-down and bottom-up processes for allocating entrepreneurial attention limits understanding of how entrepreneurs can

overcome constraints (cognitive and environmental) to identifying potential opportunities and form opportunity beliefs for their entrepreneurial action.

Finally, the attention model of opportunity-belief formation for entrepreneurial action (Shepherd et al., 2017) explicitly acknowledges two phases of attention allocation: (1) the transient-attention phase, which involves identifying a potential opportunity for someone, and (2) the sustained-attention phase, which involves evaluating whether the identified potential opportunity is worthy of one's personal entrepreneurial action. Indeed, identifying an environmental change that signals a potential opportunity will not yield an actual opportunity to believe in if the focal entrepreneur does not sustain enough attention to evaluate it.

CONCLUSION

Noticing a potential opportunity from an incremental or disruptive environmental change to form an incremental or radical opportunity belief is necessary for entrepreneurial action and challenging because entrepreneurs, as all people, have limited attentional and cognitive resources. All entrepreneurs experience a world of perpetually fluctuating data, some of which is relevant to them. However, entrepreneurs' challenges go well beyond the process of interpreting what these data mean. Limits on entrepreneurial attention can almost ensure that certain types of data will go completely unnoticed, preventing entrepreneurs from evaluating them as potential opportunities for entrepreneurial action. This chapter explained a model (Shepherd et al., 2017) that attempts to allocate some scholarly attention away from the almost exclusive focus on entrepreneurs' top-down attention-allocation processes and sustained attention toward entrepreneurs' bottom-up processes and transient attention. In a nutshell, this model suggests the following:

- Entrepreneurs with high top-down guidance of attention are more likely to notice incremental environmental changes to identify potential opportunities, while entrepreneurs with low top-down guidance of attention (high bottom-up processing) are more likely to notice disruptive environmental changes to identify potential opportunities.
- High job demands increase the top-down guidance of entrepreneurial attention.

- Entrepreneurs using abductive discernment are more likely to form the belief that an identified potential radical opportunity should be acted upon but are less likely to form the belief that an identified potential incremental opportunity should be acted upon.
- Entrepreneurs using analytical discernment are more likely to form the belief that an identified incremental opportunity should be acted upon but are less likely to form the belief that an identified potential radical opportunity should be acted upon.
- Entrepreneurs using categorical discernment are less likely to form the belief that an identified potential opportunity (incremental or radical) should be acted upon.
- Entrepreneurs using absorptive discernment are more likely to form the belief that an identified incremental opportunity should be acted upon but are less likely to form the belief that an identified potential radical opportunity should be acted upon unless there is a shift to the analytical-discernment mode.

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