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Beyond Affective Valence: Untangling Valence and Activation Influences on Opportunity Identification

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Research surrounding how entrepreneurs identify opportunities focuses on the impact of affective valence on entrepreneurs' cognitive processes. Extending this body of research, we theorize how affective valence and affective activation work together to impact opportunity identification. We emphasize that to understand affective influences, both valence and activation should be included because they each influence active search effort and knowledge integration. We discuss the theoretical and practical implications of our study and suggest that future research should include more dynamic relationships among affect and entrepreneurial outcomes.

Opportunity identification is a core element in entrepreneurship (Dimov, 2007a; Shane & Venkataraman, 2000). Opportunities embody the genesis of a process whereby insightful entrepreneurs with novel ideas bring new products and services into existence (Baron, 2004; Dimov, 2007b; Eckhardt & Shane, 2003). Across numerous studies, scholars have diagrammed the important roles many different cognitive processes play in identifying opportunities (e.g., Foo, 2011; McMullen & Shepherd, 2006; Mitchell et al., 2007). These cognitive processes shape how information relevant to opportunities is perceived and evaluated. More recently, there has been a growth in the interest of affect (i.e., moods and emotions) and its role in the cognitive evaluation of opportunities especially since researchers argue that the study of the entrepreneurial mind is incomplete without considering affect (Cardon, Foo, Shepherd, & Wiklund, 2012; Welpe, Spörrle, Grichnik, Michl, & Audretsch, 2012). A literature search for articles in the Business Source Premier database focusing on affect in the entrepreneurial domain yields 34

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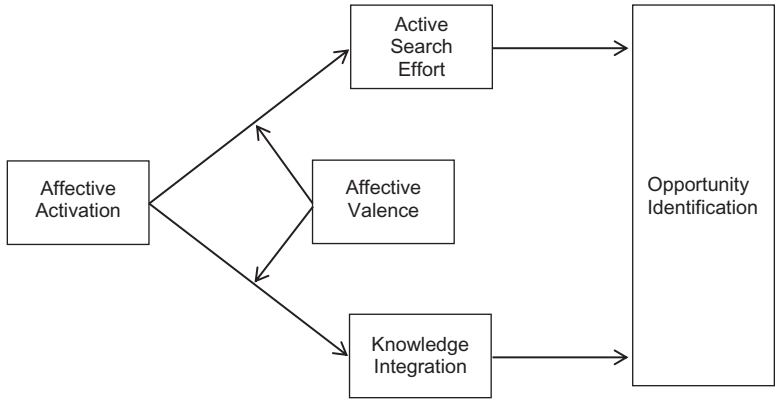
papers, with the large majority (76%) published in the last 4 years. This burgeoning area of research has generated so much interest that *Entrepreneurship Theory and Practice* dedicated a special issue to the topic of emotions and entrepreneurship in January 2012.

Researchers across numerous fields agree that affect is a complex construct consisting of at least two underlying dimensions: valence (the hedonic tone) and activation (the level of energy). Mirroring trends in the organizational and psychological literatures, most extant affect research in entrepreneurship has focused on the valence dimension. As an indicator of this orientation, none of the 34 articles mentioned earlier detail the effects of activation separate from those attributable to valence. That said, this does not mean the dimensionality of affect has been completely ignored by entrepreneurship scholars either. Some scholars, such as Hayton and Cholakova (2012), as well as Baron, Hmieleski, and Henry (2012), are careful to acknowledge this dimensionality exists but still go on to say that their main focus is on valence or on affect in a narrow range of activation (in effect, holding activation constant so that the effects of valence can be analyzed). These scholars should be lauded for their attempts to consider both valence and activation, and acknowledged for bringing affect into the discussion surrounding entrepreneurial cognition and opportunity identification. Given the progress made in the psychological sciences detailing the effects of activation distinct from valence (e.g., Baas, De Dreu, & Nijstad, 2011; De Dreu, Baas, & Nijstad, 2008), we extend current entrepreneurship theory concerning the interaction between cognition and affect, namely to disentangle the effects of valence separate from those of activation.

Clarifying the affective–cognitive relationships attributable to valence separate from those of activation is important in entrepreneurship because the latter is a process likely to be infused by all types of affect, including both positive and negative valence as well as high and low activation. Numerous scholars agree that the entrepreneurial context is populated by emotional decision making because the constructive processing required provides openings for emotions and moods to influence cognition (e.g., Baron, 2008; Baron & Tang, 2011; Baron, Tang, & Hmieleski, 2011; Cardon, Zietsma, Saparito, Matherne, & Davis, 2005; Hayton & Cholakova, 2012). Moreover, the entrepreneurial context is novel, dynamic, and uncertain (Baron, 2007). As such, the environment changes constantly, which opens and closes doors of opportunity depending on the insight and execution abilities of the focal entrepreneur. This means that *both* positive and negative affect should be expected. It is unlikely that an entrepreneur experiences all wins or all losses as they undertake this journey (Minniti & Bygrave, 2001; Shepherd, 2004). Rather, they are likely to experience both valences as some adaptations of their business model prove successful while other ones do not. Given the prevalence of both valences in the entrepreneurial process, even within the same entrepreneur, it behooves us to theorize how both positive and negative valence could impact decisions. Lastly, the entrepreneurial process and the identification of opportunities do not occur in a single moment. Although entrepreneurial insights may be realized in a flash, Dimov (2007b) and Hayton and Cholakova point out that the refinement of these insights into opportunities where profit can be earned may involve repeated iterations that occur over lengthy periods of time. Thus, cognition is likely to be infused by affect that varies in activation. Various scholars (e.g., Baron et al.; Boyd & Gumpert, 1983; Rahim, 1996) have painted the entrepreneurial landscape as one populated by peaks and valleys, where periods of high pressure and stress are interspersed with periods of relative calm and stability (Schindehutte, Morris, & Allen, 2006). As such, most entrepreneurs likely experience a range of affect that varies from high to low activation. More work is needed to theorize about this range and its effects on cognition.

Figure 1

Theoretical Model



Previous research shows that affective valence influences entrepreneurial cognition (e.g., Baron, 2008; Foo, Uy, & Baron, 2009; Podoynitsyna, Van der Bij, & Song, 2012). The goal of this paper is to open the discussion and study of affect in entrepreneurship to include *both* affective valence and affective activation in opportunity identification. We develop a theoretical model that seeks to integrate findings across both activation and valence, and their interaction with cognitive processes associated with opportunity identification. We propose how *activation* interacts with valence to influence active search effort and knowledge integration (see Figure 1), two processes that are known to be important in opportunity identification. While this theoretical model does not include all possible ways that valence and activation matter, it provides a launching pad to study these issues in entrepreneurship research.

In the next section, we clarify the key concepts employed in this paper, namely, the affective dimensions of valence and activation, and opportunity identification. Then, we build and explain our propositions on how affect is linked to opportunity identification through active search effort and knowledge integration. Finally, we discuss the implications of our theoretical propositions to entrepreneurship research.

Theoretical Overview

Affect: Valence and Activation

Affect is a multidimensional construct that involves more than simple positive or negative feelings (Cropanzano, Weiss, Hale, & Reb, 2003). Affect is composed of two primary dimensions: valence and activation (Barrett & Russell, 1998). Valence refers to the degree of positive feelings associated with affect, whereas activation "refers to a sense of mobilization or energy and summarizes one's physiological state" where "terms used to describe it include energy, tension, or behavioral readiness" (Seo, Barrett, & Bartunek, 2004, p. 426; also see Duffy, 1972). Highly activated feelings such as excitement and anger differ in their cognitive and behavioral effects when compared with more deactivated feelings such as serenity and boredom (Fredrickson, 2001; Frijda, 1994). Researchers have long known that affect exists both as a general individual tendency to experience

particular levels of either positive or negative feelings (i.e., dispositional affect) and as an experience at a particular point in time (i.e., state affect) (Watson, 2000). In entrepreneurship research, effects of both state and dispositional affect have been theorized and found (Baron et al., 2011, 2012; Foo et al., 2009; Hayton & Cholakova, 2012). Although they are distinct and separate phenomena, state and dispositional affect typically exert parallel and similar effects (Lyubomirsky, King, & Diener, 2005). That said, a number of researchers prefer studying state affect, noting that affect at a point in time, rather than general affective levels, has a greater impact on cognition at that same point in time (Hayton & Cholakova). While a person's state affect fluctuates around dispositional levels, at any point in time, it is state affect that is a more proximal predictor of how a person thinks or reacts. Given that affective activation varies temporally by nature and is a state factor, we focus on state affective influences in our theorizing. Examples of positively valenced deactivating affect include states of feeling calm and relaxed, while positively valenced activating affect includes states of feeling elated and happy. States of feeling sad and depressed are examples of negatively valenced deactivating affect, while angry and fearful states are negatively valenced activating affect.

Developing Propositions: Affect, Creativity, and Opportunity Identification

Entrepreneurial opportunities are situations where new goods or services can be introduced and sold at a price greater than their cost (Gaglio & Katz, 2001; Shane & Venkataraman, 2000). Opportunity identification[1] involves two cognitive processes: active search (Baron, 2006; Fiet, Clouse, & Norton, 2004) and knowledge integration (Baron, 2004; Tang, Kacmar, & Busenitz, 2012). As the foundation for our theory, we begin with a conceptual model (shown in Figure 1) where the cognitive processes of active search and knowledge integration act as critical influences on opportunity identification. Using this model as the foundation for our theorizing, we then build and extend new theory concerning the roles affective valence and activation play in influencing opportunity identification. In this model, affective activation is a key driver behind the energizing of both active search and knowledge integration, but that affective valence shapes how these two cognitive processes interact with opportunity identification.

Affect and Active Search Effort

Although some opportunities are identified by chance or serendipity, many entrepreneurs engage in active search for opportunities (Fiet et al., 2004; Hills & Shrader, 1998). Active search involves conscious effort on the part of entrepreneurs to accumulate information relating to new business opportunities (Baron, 2006; Kaish & Gilad, 1991). The entrepreneur's active search for information is critical in opportunity identification (Cooper, Folta, & Woo, 1995; Hills & Shrader; Kaish & Gilad). Active search requires

1. In this paper we use the term "opportunity identification." There is a debate whether opportunities are discovered (Shane & Venkataraman, 2000) or created/enacted (Alvarez & Barney, 2010; Sarasvathy, 2001). Despite these ontological differences, entrepreneurs have to use means that satisfy the ends of customers. From Popper's (1963) perspective, one cannot determine whether such ends exist and simply wait to be discovered (discovery perspective) or the ends can be created in some way (creation or enactment perspective). Since entrepreneurs, regardless of ontological differences, have to search for and find ways to integrate existing resources, to create products or services of value to customers (Dimov, 2011), we use the term "opportunity identification."

entrepreneurs to be sensitive to the environment (Gaglio & Katz, 2001) and helps them develop a knowledge base that facilitates the integration and accumulation of new knowledge, which provides the foundation for opportunity identification (Tang et al., 2012). The search effort does not always follow a systematic strategy, as entrepreneurs look for answers to their questions in myriad ways (Kirzner, 1973). Active search effort can help construct cognitive frameworks or schemas that organize and interpret external information, and are also crucial in processing and utilizing stored information (Tang et al.).

To conduct active search, the entrepreneur has to be motivated to search for information (Amabile, 1997; Gaglio & Katz, 2001; Sarter, Gehring, & Kozak, 2006) and be willing to exert the requisite mental effort to gather it. Motivation to engage in search activities can be stimulated by affective activation, irrespective of valence, since activation generates a sense of energy or urgency for action that prompts individuals to allocate greater effort toward an activity. At low activation levels, "individuals experience inactivity, neglect information, and show low cognitive performance" (De Dreu et al., 2008). In contrast, increasing activation levels stimulate greater cognitive effort (Lang, Schwarz, Lee, & Angelini, 2007). For example, in an empirical study involving 118 subjects participating in a stock investment simulation, Seo, Bartunek, and Barrett (2010) demonstrated that higher activation levels were significantly associated with greater cognitive effort devoted to the mental task. A similar finding was uncovered by De Dreu et al. (study 3) who showed that increasing levels of activation were linked to greater effort aimed at attempting to decipher familiar pictures from fragmented images.

Extremely high activation levels, positive or negative in valence, tend to debilitate cognitive processes by causing sensory overload (Clore et al., 2001). Past studies indicated the detrimental effects of extremely high levels of arousal on a myriad of cognitive processes (Clore et al.; Easterbrook, 1959; Eysenck & Calvo, 1992; Janis, 1982; Kroeber-Riel, 1979; Mandler, 1975). For example, severe feelings of distress and anxiety, examples of intensely activated affect, can interfere with cognitive functioning (Ohman & Mineka, 2001). These levels of affective arousal can impede one's cognitive processes such as working memory and attention due to increased cognitive load (Kroeber-Riel). As a consequence, this leaves less capacity for information processing because "feedback from the heightened autonomic nervous system activity is highly salient and, thus, competes with other cues for the limited attentional capacity" (Sanbonmatsu & Kardes, 1988; see also, Mandler).

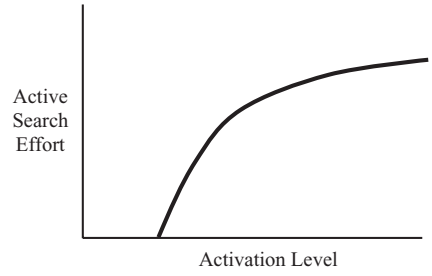
Moreover, Kahneman (1973) theorizes that the attentional effort one exerts will increase as a function of demand up to a certain asymptote, after which the individual no longer has the ability to exert greater effort (see Figure 2). An analogous relationship could exist between affective activation and active search effort. Among entrepreneurs, a convex parabolic relationship could exist where at a certain asymptote, further increases in affective activation do not result in elevated active search effort because the individual has reached his or her available limit. The entrepreneur may continue to experience greater activation, but at the limit indicated by the asymptote, the entrepreneur is not capable of exerting more effort toward the search for opportunities.

> **Proposition 1:** The relationship between affective activation and active search effort is convex parabolic in shape. Initially, activation increases search effort, but beyond a certain point, an asymptote is reached where active search effort levels off with respect to increasing affective activation.

Extending the relationship portrayed in Figure 2, we propose joint effects of affective activation and affective valence on active search effort. Beginning at moderate activation

Figure 2

Relationship Between the Entrepreneur's Affective Activation Level and Active Search Effort



levels, negative valence should increase active search effort and depth while simultaneously constraining those efforts to a narrower range than positive valence. Our theorizing begins at moderate activation levels because at very low activation levels (e.g., extreme tiredness), the whole system is de-energized (Thayer, 1978). Indeed, scholars that have considered activation levels in their studies found that interaction effects with particular variables are observable beginning at moderate levels of activation (e.g., De Dreu et al., 2008; Gendolla & Krusken, 2002; Labouvie-Vief & Marquez, 2004).

We ground our reasoning for the first portion of this moderation effect, increased effort resulting from negative valence, in Carver and Scheier's (2009, 2011) theory of self-regulation and affect. According to this theory, affective valence serves as a signal indicating one's perceived rate of progress toward a goal and, as a result, effort appraisals. Whereas positive valence signals progress exceeding one's standards, negative valence signals unsatisfactory progress (Seo et al., 2010; Warr, 2007). Even though positive valence signals adequate progress, entrepreneurs experiencing positive valence may be encouraged to coast (Carver & Scheier, 2009, 2011) or exert just enough effort to maintain perceived progress rates at levels they set for themselves. Such satisficing behaviors are adaptive because people usually have several goals; with freed resources, other goals can be addressed (Carver & Scheier, 2009). In comparison, the information conveyed by negatively valenced affect is that one's progress rate is slower than expected. This prompts greater effort on the task at hand because the individual wants to correct the situation and increase progress to match one's standard (Gendolla & Brinkmann, 2005).

Several studies provide evidence supporting Carver and Scheier's (2009, 2011) theory of self-regulation and affect. For example, across investigations of affect on cognitive processing (Bless, Bohner, Schwarz, & Strack, 1990), effort mobilization (Gendolla, Abele, & Krusken, 2001), and creativity (De Dreu et al., 2008), empirical findings show that negatively valenced affect can lead to greater effort expenditures than positively valenced affect. These findings are consistent whether effort is measured behaviorally (time spent on a task in De Dreu et al., study 3; or the number of thoughts elaborated upon in response to persuasive arguments in Bless et al.) or physiologically (systolic blood pressure in Gendolla et al. as well as Gendolla & Krusken, 2002). When rewards are contingent upon performance, a condition mirroring the context of entrepreneurship, individuals in negative moods exert more effort on cognitive tasks than do those in positive moods (Gendolla & Krusken). In an experiment involving over a hundred participants where positive rewards were available to those who successfully completed a memory

task, Gendolla and Krusken (study 2) demonstrated that individuals in whom negative moods had been induced exerted greater effort, assessed by systolic blood pressure, than those in positive moods. This moderation effect does not appear at low levels of activation but only manifests itself as activation levels rise (Gendolla & Krusken). Meaning, at low levels of activation, there is no difference in effort expenditures resulting from different affective valences. Thus, some threshold of activation must be reached for the moderation effect to occur.

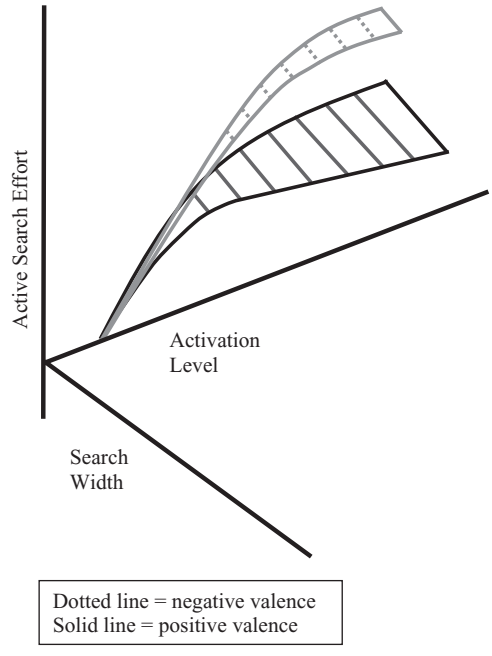
Apart from differences in the amount of active search effort, the depth as well as the range of active search inspired by positive versus negative valence should differ. Depth refers to the number of ideas explored within a certain cognitive category (Rietzschel, De Dreu & Nijstad, 2007), whereas range refers to the relative width of the array or the degree of association by which ideas are related (Fredrickson & Branigan, 2005). According to Fredrickson (2001), positively valenced affect widens an individual's thought and action repertoires. Thus, positively valenced affect should prompt a wider scope of search among ideas for opportunities than negatively valenced affect. Fredrickson and Branigan confirmed these effects through a series of experiments where they found that compared with both neutral and negative affective states, positive affect broadened the scope of attention as assessed through a global versus local bias visual task. Because positively valenced affect signals that one's current environment is safe, the mind is prompted to pursue a wider range of thoughts and utilize more global visual processing. In contrast, individuals experiencing negatively valenced affect tended to employ local, narrower, visual processing. Negatively valenced affect signals that something is wrong, and the issue needs to be resolved immediately (Schwarz & Clore, 1983), resulting in a focus on the problem to the exclusion of other matters (Carver, 2003). Such results are consistent with experiments showing that positive affect generates more global biases, while negative affect generates a narrowed attention focus (e.g., Bolte, Goschke, & Kuhl, 2003; Derryberry & Tucker, 1994), as well as investigations proving that individuals experiencing negative affect tend to exhibit the anchoring bias more strongly (Bodenhausen, Gabriel, & Lineberger, 2000).

Bolte et al. (2003) offer one reason for this effect, theorizing that positive affect tends to inspire activation of remote associates within memory, whereas negative affect restricts activation to close associates. In essence, they argue that positive valence sparks intuition of linkages between ideas and concepts from a more remote range than does negative valence. In addition to communicating the current situation is safe, positive valence could provide confidence and optimism that cause individuals to make associations between categories that they would not otherwise make. In contrast, negative valence may result in pessimism and concern about being correct in one's analysis, thus reducing the likelihood of an individual to make associations between disparate categories (Bolte et al.). In sum, these tendencies should encourage entrepreneurs experiencing positively valenced affect to look more widely in their opportunity searches because they see linkages between disparate ideas more readily. In contrast, entrepreneurs experiencing negatively valenced affect could search in knowledge corridors more closely tied to their areas of expertise because they are not as likely to make associations between concepts from disparate realms. Figure 3 depicts this relationship, where positively valenced affect encourages a wider range of search than does negatively valenced affect. Figure 3 also shows the moderation of valence on activation theorized earlier. Beginning at moderate levels of activation, negatively valenced affect inspires greater active search effort than positively valenced affect.

In contrast with positively valenced affect, negatively valenced affect suggests that there is a problem here and now that needs to be addressed, thereby preventing the person's thoughts from wandering around and exploring other areas. Similar effects are

Figure 3

Moderating Effect of Affective Valence on the Affective Activation to Active Search Effort and Search Width Relationship



proposed with respect to the depth of one's search efforts. Namely, negative valence should promote deeper search within these narrow corridors than positive valence. When analyzing the relationship between affect and creativity, De Dreu et al. (2008, study 4) found that negative valence was significantly linked to deeper cognitive processing within certain categories as assessed by dividing the total number of new ideas by the number of categories for those ideas generated in a creativity task. We depict this relationship in Figure 4. In addition to promoting greater active search effort beginning at moderate levels of activation, negatively valenced affect also encourages deeper search within given knowledge corridors than does positively valenced affect.

Integrating our logic concerning affective influences on active search effort, width, and depth, we propose the joint impact of activation and valence on active search as follows:

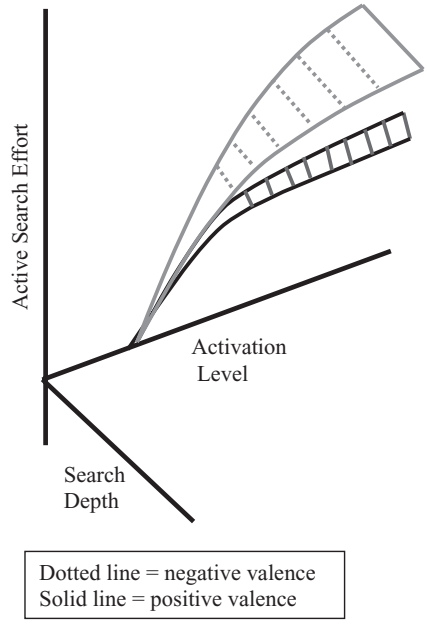
Proposition 2: The effect of affective activation on active search effort is moderated by affective valence such that at moderate levels of activation, negative valence stimulates greater effort and a deeper but narrower range of search than does positive valence.

Affect and Knowledge Integration

Opportunity identification requires the entrepreneur to associate or integrate various pieces of market information in a unique or novel manner (Baron, 2004; Tang et al., 2012)

Figure 4

Moderating Effect of Affective Valence on the Affective Activation to Active Search Effort and Search Depth Relationship



that allows new profit opportunities to be realized. In their discussion about the links between pattern recognition and entrepreneurship, Baron and Ensley (2006) describe opportunity identification as a process that involves creatively forming connections, or "connecting the dots," among complex and seemingly independent events, such as technological advancements and political upheavals. Furthermore, Gaglio and Katz (2001) contend that the ability to alter one's cognitive schemas to integrate new information is critical to opportunity identification. In the creativity literature, the linking or association of disparate particles of information is cited as one path toward original and novel ideation (e.g., Baughman & Mumford, 1995; Boden, 1990; Ward, Smith, & Finke, 1999). Examining the work of these various scholars, it becomes apparent that an entrepreneur's capacity to integrate information from different sources is foundational to the ability to identify new opportunities. Entrepreneurs make connections among these available pieces of information to identify new means–ends relationships (Shane & Venkataraman, 2000). In other words, entrepreneurs not only integrate disparate information into their schemas (Gaglio & Katz), but they do so creatively (Amabile, 1997) in a way that enables accumulation of profit from new goods or services. We examine how affective activation may influence this process of knowledge integration.

For knowledge to be integrated, entrepreneurs could use either a top-down processing and draw from existing categories based on their knowledge (memory) about how the world is organized, or a bottom-up processing where the stimulus information arrives from the sensory receptors (Bobrow & Norman, 1975). Both types of information processing contribute to the knowledge integration process (Ruthruff, Remington, & Johnston, 2001). As an example, the entrepreneurial opportunity represented by

smartphones is qualitatively different from that represented by "spinning luggage" (wheeled luggage that can spin 360 degrees on its vertical axis). The invention of the smartphone required integration of cellular phone technology schemas, computer schemas, digital music player schemas, touchscreen technology schemas, and Internet schemas. The invention of spinning luggage was an innovation over and above wheeled luggage but required a refinement of the schema associated with simply putting wheels on luggage. Smartphones required integration of a wide array of schemas, whereas spinning luggage required refinement of an existing schema. Neither entrepreneurial opportunity was superior to the other, but their identification required different types of knowledge to be integrated.

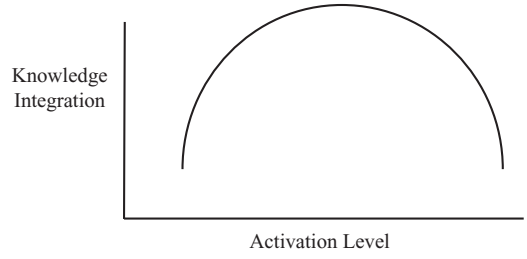
Baron (2004) argues that possessing richer schemas filled with greater amounts of interconnected knowledge enables individuals to identify opportunities more readily. Following the theorizing of Baron (2004, 2006), we argue that the process of knowledge integration is critical to the development of richer schemas and that one key component of this process is the ability to discern whether two separate pieces of information are related in a salient manner. The degree to which an individual draws ties between disparate pieces or categories of information is called cognitive flexibility (Hirt, Devers, & McCrea, 2008). Greater cognitive flexibility is indicated by the likelihood of an individual to indicate that two seemingly diverse pieces of information are indeed related to one another. This affirmation regarding the linkage between pieces of information is a step in knowledge integration because without it, the individual disregards novel data as unrelated to current search processes and ignores them.

With respect to the intersection between affective activation and cognition, Baas et al. (2011) argue that affective activation (versus valence) is a key driver of cognitive flexibility as well as the ability to combine and restructure information. Empirically, De Dreu et al. (2008) demonstrated in an experiment involving 179 participants that activation levels, irrespective of valence, are positively and significantly linked to the probability that an individual will evaluate weak exemplars as prototypical of a given semantic category. This result provides support for our contention that activation levels drive inclusion of greater amounts of information into schemas and are thus linked to knowledge integration.

Since knowledge integration through mental schemas is a cognitively based activity, we refer to the body of literature reviewing the general effects of activation on cognitive performance as well as those that investigate the more specific effects on processes related to cognitive flexibility. A series of classical works (e.g., Broadbent, 1971; Yerkes & Dodson, 1908) shows an inverted U-shaped relationship between activation and cognitive performance; cognitive performance increases with rising activation up to a certain inflection point, after which increasing activation results in decreased cognitive performance. Although moderate levels of activation motivate increased attention, high levels of activation can disrupt information processing (Sanbonmatsu & Kardes, 1988) and cause individuals to restrict the range of cues to which they pay attention in their environment. Cue restriction refers to a reduction in the quantity of information to which an individual can pay attention in the surrounding environment (Hanoch & Vitouch, 2004). This cue restriction is a result of increased salience of proprioceptive sensory feedback from an individual's nervous system (Mandler, 1975; Sanbonmatsu & Kardes). As activation rises, the feedback from the autonomic nervous system is given priority and thus absorbs attentional capacity that would otherwise be directed toward external cues. Easterbrook (1959) argues that this resulting cue restriction causes less information to be transferred to the individual. Although the individual may pay attention to the same number of cues compared with a lower activation state, the restriction in range increases the probability of

Figure 5

Relationship Between the Entrepreneur's Affective Activation Level and Knowledge Integration



redundancy among the cues assimilated. Given that this redundancy means cues that add no new information occupy cognitive space that would otherwise be filled by novel cues, there is a general reduction in the overall amount of information being integrated into one's cognitive schemas as peripheral, but possibly new and helpful cues are ignored. Staw, Sandelands, and Dutton (1981) point out that increased arousal and activation can restrict cognitive information processing because individuals rely more heavily on internally generated hypotheses and prior expectations. Again, this occurs because of the increased salience of proprioceptive feedback that reduces cognitive processing availability (Mandler) that drives attention toward more easily accessible cues (Eysenck, 1976). As a whole, this effect reduces the incorporation of new knowledge into cognitive schemas because individuals fail to update hypotheses and expectations with new information.

In sum, this body of evidence indicates that affective activation should have an inverted U-shaped relationship with entrepreneurs' ability to find connections among disparate pieces of information. As such, we offer the following proposition and graph it in Figure 5.

> **Proposition 3:** The relationship between affective activation and knowledge integration will be an inverted-U such that up to an inflection point, activation increases knowledge integration, but beyond that point, increasing activation debilitates knowledge integration.

As proposed earlier, opportunity identification is influenced by the impact of affective activation on knowledge integration. We extend our theorizing and propose that affective valence moderates this relationship because extensive research shows that valence impacts schema activation and knowledge combination. In general, positive valence, more so than negative valance, promotes consideration of a wider range of schemas. This means that positively valenced affect will encourage knowledge integration from more disparate pieces of information than would negative valence.

Studies indicate that individuals experiencing positive affect tend to rely on general knowledge structures and pre-existing schemas, whereas those experiencing negative affect tend to rely on more specific, data-driven knowledge structures focused on a given environment (Bless et al., 1996). Bless et al. explained that this difference originates from the fact that positive affect implies that the environment is safe, and reliance on general knowledge structures is satisfactory. Bless et al. further explained that reliance on existing general knowledge structures requires fewer cognitive resources, and these spared

resources can be deployed elsewhere to incorporate more information stored in memory or to integrate current schemas or situational information with schemas traditionally applied in other domains.

Conversely, negative affect informs the individual that the current situation is problematic, and existing general knowledge structures or schemas require refinement, promoting more constrained, detail-oriented examination into one's current environment (Ambady & Gray, 2002) to determine the cause of the problem (Bless et al., 1996). This explanation is supported by empirical studies that show that the experience of positively valenced affect, compared with negatively valenced affect, facilitates retrieval of pleasant materials from memory, which have broader and more extensive links to other diverse content in memory (Isen, Johnson, Mertz, & Robinson, 1985; Teasdale & Russell, 1983). Compared with neutral and unpleasant materials, positively valenced material in memory possesses richer and more complex compositions (Isen, Shalker, Clark, & Karp, 1978) that augment creative ideation. Positively valenced affect has also been tied to usage of broader and more inclusive categories (Amabile, 1983; Isen & Daubman, 1984; Isen, Niedenthal, & Cantor, 1992), more flexible deployment of attention (Baumann & Kuhl, 2005), and more global visual configuration (Gasper, 2003). With respect to opportunity identification, positively valenced affect should induce integration of knowledge from more disparate arrays or domains, whereas negative valence prompts a narrower focus and the identification of opportunities within a more restricted domain of knowledge. Such differences result in qualitatively different opportunities to be identified.

> **Proposition 4a:** Positively valenced affect, as compared with negatively valenced affect, encourages identification of opportunities that incorporate a wider range of information and knowledge.

Affective valence could also impact the location of the inflection point in the inverted-U relationship between affective activation and knowledge integration. Specifically, positively valenced affect prompts the inflection point to be experienced at lower levels of activation than does negatively valenced affect. We build our argument for this moderating effect on the work concerning cue restriction associated with higher levels of activation (e.g., Easterbrook, 1959) as well as on the extensive research surrounding regulatory orientation and its effects on appraisal efficiency and performance (e.g., Higgins, 1997, 1998).

As activation levels increase from moderate to higher levels, individuals become more prone to cue restriction (Easterbrook, 1959; Kahneman, 1973). The cue restriction associated with increased activation levels causes an individual's attention span to become more narrowly focused on their central task, which then reduces attention to information related to peripheral opportunities. This general tendency to focus narrowly as activation levels rise conflicts with the tendency we outlined in the paragraph earlier to integrate wider arrays of information. In contrast with positive valence, negatively valenced affect prompts a narrower focus on one's central task and thus supports an individual's desire to refine existing schemas or knowledge frameworks. Cue restriction, which increases as activation levels rise, hinders an individual's ability to look broadly and integrate information from a wide range of disparate realms (Warr, 2007). Meanwhile, cue restriction supports an individual's ability to analyze an existing problem deeply and augments the individual's ability to focus within a narrow domain (Warr).

We use regulatory focus theory to explain the assertions in the previous paragraph. A host of theoretical and empirical research surrounding regulatory focus theory suggests that cognitive performance is enhanced when the strategic nature of the means for

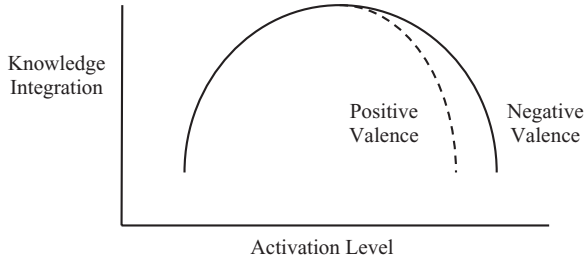
attaining a goal is compatible with the performer's regulatory focus while working on a task (Higgins, 1997, p. 1285; Tang, 2009). Regulatory focus theory (Higgins, 1987, 1998) proposes that individuals are driven by two distinct self-regulation systems: (1) a promotion focus oriented toward achieving alignment with ideal self-guides (representing hopes, wishes, and aspirations), and, (2) a prevention focus oriented toward avoiding misalignment with ought self-guides (representing duties, obligations, and responsibilities). Although people possess both ideal and ought self-guides, and the corresponding promotion or prevention focus, one or the other typically dominates an individual's mindset at a given point in time. Cognitive processing is faster and more efficient, and overall performance is higher when alignment exists between an individual's regulatory focus and the task environment (Shah & Higgins, 2001; Shah, Higgins, & Friedman, 1998; Tang). We use a similar logic here. Entrepreneurs experiencing negatively valenced affect possess a goal of figuring out why they feel unpleasant and want to determine what is wrong (Schwarz & Clore, 1983). Increasing activation that narrows their attention span supports this goal of looking deeply into restricted domains of information to analyze their current situation (Easterbrook, 1959). Conversely, positively valenced affect encourages individuals to look more broadly and consider wide domains of information (Fredrickson & Branigan, 2005). The narrowed attention span brought on by increasing activation works in opposition to this goal of searching broadly. Thus, where there is congruence between the goal prompted by negative valence and the strategic focus of increased activation, there is misalignment between positive valence and increased activation.

Since rising affective activation levels work in opposition to the broad information integration processes induced by positively valenced affect but complement the narrow information integration refinements encouraged by negatively valenced affect, *the inflection point* for activation on opportunity identification should occur at lower levels of activation for positive affect than for negative affect. The entrepreneur will struggle more to reconcile the divergent goals of rising activation and positive valence compared with the convergent goals associated with negative valence. As a result, knowledge integration suffers more in the former condition than the latter. We offer the following proposition and graph it in Figure 6.

Proposition 4b: The inverted-U relationship between affective activation and integration of knowledge is moderated by affective valence such that positively valenced affect results in integration impairment at lower levels of activation than does negatively valenced affect.

Figure 6

Moderating Effect of Affective Valence on the Affective Activation to Knowledge Integration Relationship



Discussion

The basic premise of this paper is that affect influences opportunity identification by impacting the extent to which entrepreneurs actively search for information and the extent to which information is integrated into their cognitive schemas. Most research on affect in entrepreneurship has concentrated on the dimension of valence and the role it plays in driving opportunity identification (e.g., Baron, 2008; Hayton & Cholakova, 2012). Extant research should be commended for incorporating the influence of affect on cognition into the discussion of the entrepreneurial process. We extend this line of inquiry by developing theory concerning the roles of *both* activation and valence in opportunity identification.

Theoretical Implications

We extend theory by offering propositions that theorize about the range of effects likely to emanate when different valences interact with various levels of activation. Given the uncertain and dynamic nature of the entrepreneurial context, entrepreneurs are likely to experience a variety of valences and levels of activation. We contribute to the general literature on affective influences in entrepreneurship by building theory concerning the synergy, or lack thereof, between effects of valence and activation. Specifically, we investigate how valence interacts differently with activation levels to support or hinder cognitive efforts to integrate broad and narrow domains of knowledge.

While our propositions treat active search and knowledge integration separately, we recognize that both contribute to opportunity identification. An individual who engages information search more actively would have more data available for constructing pieces of knowledge, and such processes could subsequently contribute to the identification of business opportunities (Dimov, 2007a). Knowledge integration could be compromised or prematurely truncated if available information is insufficient. In the creativity literature, researchers emphasize that creativity is limited when a broad information base is lacking (Perttula & Sipila, 2007). Moreover, Ward (2007) argues that conceptual combination is critical in the process of generating new and original ideas. Conceptual combination involves integrating and reorganizing different pieces of information (Sternberg, 2005), a process akin to knowledge integration. Thus, one who conducts more active information search would likely have more information available that could render more "raw materials" for knowledge integration.

By proposing curvilinear effects emerging from joint interactions between affective valence and activation, our paper answers the call for research on affect in entrepreneurship to begin moving beyond linear effects toward more complex relationships (e.g., Foo et al., 2009). While research that considers curvilinear relationships in entrepreneurship is growing (e.g., Baron et al., 2011, 2012; Cardon, Wincent, Singh, & Drnovsek, 2009; Shepherd, 2003; Shepherd, Wiklund, & Haynie, 2009), we are still searching for more complex, nonlinear relationships that more accurately depict how these affective mechanisms actually unfold. Although some of our figures are symmetrical, an entire family of curves may be possible, especially with respect to individual differences among entrepreneurs. These individual differences such as prior entrepreneurial experience and role identity salience (cf. Cardon et al.) could further enrich our understanding about the nonlinear relationship between affective activation and valence impacting opportunity identification. Future empirical work should consider these complex relationships.

Underlying the complex relationships we proposed are the processes that activation and valence impact. Specifically, activation impacts opportunity identification by providing energy to elevate search motivation. Valence impacts opportunity identification with

positive valence priming wider information search and cognitive flexibility, and negative valence priming more effortful but narrower search and areas of knowledge integration. Future research could continue this exploration and examine how affective activation and valence jointly impact and shape other processes relevant to opportunity identification and evaluation. For example, a host of research indicates that affect influences risk evaluations (e.g., Mano, 1994; Mittal & Ross, 1998; Nygren, Isen, Taylor, & Dulin, 1996). Future studies could examine how much risk is perceived in possible opportunities given the activation and valence profiles of the focal entrepreneur. Interestingly, work by Isen and her colleagues (e.g., Isen & Geva, 1987; Isen & Patrick, 1983) shows that the influence of affect and risk on decision making varies depending on the amount of reward at stake and the nature of the risk. These findings can be expanded to include considerations of activation and valence, and how their joint influence impacts risk perception and the subsequent desire to engage or refrain from calculated gambles associated with opportunity identification and evaluation.

In proposing affect's influence on opportunity identification and evaluation, we have been guided by the cognitive perspective that is prevalent in entrepreneurship research. Beyond this cognitive perspective, an avenue for future research that could enrich our theoretical understanding of the proposed relationships involves different action tendencies and actual behaviors or actions in response to experienced emotions. Affect of similar activation can have different action tendencies. For instance, Foo (2011) found that for positively activated affect, happiness leads to approach, while hope leads to retreat. For negatively activated affect, anger leads to approach, while fear leads to retreat. In all cases, emotions can lead to heightened action tendencies, but these tendencies can be toward very different behaviors (such as approach or retreat). Importantly, action tendencies do not guarantee actions since a person who is afraid may not automatically hide because of fear of looking foolish or cowardly. This brings us to another area of future extension: the realm of emotion regulation. Emotion regulation refers to "the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (Gross, 1998, p. 275). Researchers could investigate differences in emotion regulation strategies and behavioral outcomes in response to experiencing specific emotions associated with differing valence and activation profiles.

As noted in the previous paragraph, our study has been guided by affect's influence on cognitive processes. This cognitive perspective is particularly important during the opportunity identification phase given the information entrepreneurs need to search for and integrate to identify products and services desired by consumers. Beyond the opportunity identification phase, Baron (2008), and Baron and Tang (2011) argue that affect has the potential to influence a number of other entrepreneurial processes, including the acquisition of valuable resources, social network development, and innovation. Recently, a number of entrepreneurship studies (e.g., Cardon et al., 2005, 2012) have theorized about passion as an influential form of affect. Highly activated affect like passion has been shown to influence opportunity evaluation among angel investors (Mitteness, Sudek, & Cardon, 2012), teamwork among entrepreneurs (Drnovsek, Cardon, & Murnieks, 2009), and commitment among the individuals working in entrepreneurial ventures (Cardon, 2008). As such, this unique form of activated positive affect may contribute to the experience of flow (Csikszentmihalyi, 1975) as well as enhanced cognitive processing (Cardon et al., 2009).

Two boundary conditions of our propositions should be noted. First, an important boundary condition concerns the capacity of the entrepreneur to conduct active search. Brehm and Self (1989) argue that arousal is linked to increased effort only in cases where

the individual believes that s/he is capable of successfully executing the behavior necessary to produce an outcome. This resembles work on expectancy theories of motivation (e.g., Pinder, 1998; Vroom, 1964). In cases where such capability does not exist, there is unlikely to be a link between arousal and effort. Such belief in one's capability is captured by the entrepreneur's self-efficacy (Chen, Greene, & Crick, 1998), or more specifically, opportunity-identification self-efficacy, or "the individual's perceived self-efficacy concerning his/her capacities to identify and develop new product and market opportunities" (Barbosa, Gerhardt, & Kickul, 2007, p. 88). Such self-efficacy can be impacted by the entrepreneurs' degree of success or failure in identifying opportunities over time. A similar boundary condition should exist between affective activation and active search effort. Unless the entrepreneur believes that s/he is capable of conducting a fruitful search for opportunities or that such efforts will be duly rewarded, higher activation would not lead to increased search effort.

Empirical Suggestions

Having explained the theoretical importance of studying affective activation and valence in entrepreneurship, we now turn to several empirical suggestions. Fortunately, many of the concepts proposed in this study can be measured with existing scales. For example, Warr's (1990) scale can be used to measure activated affect. In his scale, activated positive affect is measured with items including excitement and enthusiasm, while calm and ease items, among others, are used to measure low activation positive affect. Another possibility is the scale developed by Huelsman, Nemanick, and Munz (1998) that measures four affective dimensions of positive energy, tiredness, negative activation, and relaxation.

We suggest using scales from either Ucbasaran, Westhead, and Wright (2009) or DeTienne and Chandler (2007) to measure opportunity identification. In Ucbasaran et al.'s measure, respondents are asked directly to report the number of opportunities for creating or purchasing a business that they have identified within the last 5 years. The wording of DeTienne and Chandler's (2004) instrument allows for distinguishing the extent of innovativeness of the opportunities. While Ucbasaran et al.'s measure focuses on breadth of opportunities, DeTienne and Chandler's measure is suitable for examining the depth or quality of opportunities identified. Active search effort can be assessed by capturing the time spent as well as intensity in search effort, much like how search efforts are measured in other contexts such as job search (e.g., Wanberg, Glomb, Song, & Sorenson, 2005) and consumer information search (e.g., Brucks, 1985). Following Gielnik, Kramer, Kappel, and Frese's (2012) empirical study on information acquisition and processing among South African business owners, we can also capture active search using the "scanning and search" dimension of Tang et al.'s (2012) alertness scale. Moreover, verbal protocols that require participants to "think out loud" as they carry out a particular task (e.g., Mason & Stark, 2004) can also be used to capture active search effort. Specific coding schemes for active search effort breadth and depth can be generated and used to content-analyze the verbalizations of participants (Sarasvathy, Simon, & Lave, 1998). Knowledge integration can be measured using patent data, including the number of and types of patents cited in the patent application. While there can be other ways to measure these constructs, the main point is that the key concepts in this paper can be assessed with existing measures, allowing researchers to test our propositions.

Linked to our call for the importance of studying affective activation and valence, we encourage researchers studying affective influences to consider moving beyond Positive Affect and Negative Affect Schedule (PANAS) scales to scales including both activation

and valence components. Notably, Watson, Wiese, Vaidya, and Tellegen (1999) have reconceptualized their focal dimensions of positive affect and negative affect as being more accurately defined as positive activation and negative activation, as reflected from the loadings of the PANAS items on high levels of activation. We need to consider other scales that incorporate and capture the full range of activation and valence, such as the affect measure based on the circumplex model developed by Feldman (1995) and the Scale of Positive and Negative Experience (Diener et al., 2010). In short, beyond PANAS, other techniques incorporating affective activation and valence have become available to analyze the effects of affect empirically.

How long the impact of affective activation and valence on cognition lasts (i.e., minutes, hours, days, or years) as well as whether the dynamics of the relationships proposed change when different affective states follow each other are critical empirical questions. Studies on emotions indicate that their duration varies, as some emotions can last from seconds to several days or weeks (Fitness & Fletcher, 1993; Frijda, Mesquita, Sonnemans, & van Goozen, 1991). In making the role of time explicit, it would be important to look at the pattern of the relationships proposed over time, i.e., whether they strengthen or weaken as experienced by the entrepreneur in the opportunity identification process and perhaps even beyond.

Given that the studies we have referred to are mostly laboratory-based, they typically involve immediate effects of primed affect on cognition. In contrast, the nature of the entrepreneurial process could take long periods of time. Scholars may consider using experience sampling methods (ESMs) to investigate the proposed relationships as entrepreneurs go about functioning in their natural environment (Beal & Weiss, 2003; Uy, Foo, & Aguinis, 2010) across these extended periods of time. An example is the ESM study by Foo et al. (2009) that looked at affective influences on venture effort as mediated by temporal focus. It is possible that while the impact of affective valence and activation may be similar for both identification and implementation, the duration of the relationship (i.e., how long the impact of affect on decisions and behavior) may vary significantly when comparing different phases. Future empirical research can model explicitly the role of time in opportunity identification and beyond to develop a more nuanced understanding of the nature and duration of the relationships proposed (Mitchell & James, 2001).

Entrepreneurship is often described in affective terms in the popular literature, and the study of affect in entrepreneurship research has burgeoned over the last few years. This work should be noted for breaking new ground at the intersection of affect and cognition in the entrepreneurial context. Despite this progress, there is much room to expand the discussion concerning the specific role of affective activation. Our paper starts this area of discussion and opens the door to encourage deeper study of affective influences in entrepreneurship that include both affective valence and activation. As scholars have already established that affect matters in entrepreneurial endeavors, it is about time to explore more complex relationships among affect, cognition, and following that, their influences beyond opportunity identification.

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