

## **Head and Heart: The Influence of Emotions on Cognitive Engagement in a Micro-Business Start Up**

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*Students attending entrepreneurship classes at a mid-size university in the Midwest participated in a class project. Each student started a micro-business of his/her own design. Requirements were that each business be legal and pose no material danger to the student or other people. The initial investment was limited to \$100. An initial online survey measured demographic variables and individual difference variables such as emotional competence. Each week, participants filled out additional surveys online designed to measure affect and levels of cognition related to the business. Results from hierarchical linear modeling show that a model with negative affect as a fixed effect fits the data significantly better than the null model. A model with positive affect added as a fixed effect did not fit the data significantly better than the null model. A model including both negative affect and emotional competence fit the data best of all.*

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### **1. Introduction**

Though entrepreneurship is a multi-faceted phenomenon, one thing is always certain: At the center of a new business there is at least one individual making choices (Shaver & Scott 1991). In this paper, we examine the links between affect and cognition as subjects run an entrepreneurial micro-business over the course of several weeks. Our objective was to explore how feeling and thinking mutually influence performance, an approach that to our knowledge has not been used in previous work.

Entrepreneurship research focusing on the individual is a fairly recent development. Seminal treatments of entrepreneurship focused on the individual as an actor, but not as a unique actor. For example, the first use of the word "entrepreneur" appears to have been in Jean Baptiste Say's *A Treatise on Political Economy, or the Production, Distribution, and Consumption of Wealth* (Say 1834). Say extended Adam Smith's work in *Wealth of Nations* (Smith 2003) to include the role of the entrepreneur.

A short time later, John Stuart Mill (1848) referred to the entrepreneur as the person who undertook risk in his effort to introduce new products. Both Say and Mill recognized the centrality of the entrepreneur to economic activity, but like Schumpeter (1934) and members of the Austrian School a century later, their interest was in the "generic" entrepreneur, not in his/her distinguishing characteristics as an individual.

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With the later establishment of psychology as a science and its subsequent application to business, the question of how, if at all, entrepreneurs differ from non-entrepreneurs naturally emerged. Early attempts to integrate psychology into an understanding of the entrepreneur focused either on cultural values that lent themselves to supporting the entrepreneur (McClelland 1961) or to personal characteristics in themselves (Hornady & Aboud 1971; Timmons 1978).

Early work on the psychology of entrepreneurship focused on trait characteristics such as personality. The search for an entrepreneurial "personality" was largely unfruitful. Nonetheless, this work continued largely unabated until Gartner's (1988) challenge to the field to reconsider its devotion to finding a unique personality in favor of focusing on entrepreneurial behaviors. "Who?" Gartner said, "is the wrong question."

Though Gartner chided the field to focus on entrepreneurial behaviors, it was clear that behaviors were strongly linked to psychological characteristics, even if enduring characteristics such as personality had been weak predictors. As a result, research focus shifted toward "state" characteristics such as cognition (Baron 1998; Frese Krauss, Keith, Escher, Grabarkiewicz, Luneng, Heers, Unger, & Friedrich 2007), emotion (Taylor 2007; Cardon, Wincent, Singh, & Drnovsek 2009) and the interaction between the two (Baron 2008) as opposed to traits such as personality.

In the end, entrepreneurship scholars gravitated toward a more sensible view of the role of "entrepreneur as person," aided by Shaver and Scott's (1991) seminal article on person, process, and choice. In short, an entrepreneurial event is characterized by the interaction between the person and his/her environment, just as it is for any other event (Mischel 1968). Neither states, traits, nor environment factors alone account for entrepreneurial behavior. All three influence behavior in important ways and thus must be a part of person-centered entrepreneurial research.

For some time, cognition research has dominated studies of the entrepreneur as an individual, coming from such diverse perspectives as goal-setting (Noel & Latham 2006), intentions (Zhao, Seibert, & Hills 2005; Audet 2004; Krueger, Reilly, & Carsrud 2000), and risk perception (Busenitz 1999). Recently, though, there has been a surge of interest in emotions as an integral part of the entrepreneurial experience (Cardon, Wincent, Singh, & Drnovsek 2009).

For example, passion has emerged as the focal point of interest for studies of affect in entrepreneurship. Cardon and others (2009) outlined a theoretical framework for the integration of passion into the entrepreneurship literature based on findings that passion leads indirectly to higher firm performance (mediated by communicated vision, goals, and self-efficacy; Baum & Locke 2004), drives persistence and tenacity (Bird 1989), and communicates confidence to investors (Huy & Zott 2007).

Passion looks at affect from a long-term perspective--its enduring qualities over time (Cardon, et al. 2009) and resulting connection with the entrepreneur's identity. It should not be confused with specific primary emotions such as anger, sadness, fear, happiness, and disgust or secondary emotions such as disappointment, jealousy, shame, guilt, and love, some of which may be associated with passion at one time or another, but are not identical

with it.

Though passion is sometimes described as long-term intense positive affect, it should also not be confused with positive affect itself or its counterpart, negative affect. These terms refer to categories of shorter-lived emotions. We believe that while the study of passion is a desirable development, its focus on the positive may prove limiting. Negative affect may also influence important entrepreneurial outcomes.

This paper first summarizes the relevant literature on affect and cognition. Hypotheses are developed on the basis of existing theory. Our experimental methodology is explained along with the data collection process. Findings from hierarchical linear modeling (HLM) are discussed, followed by a discussion of the study's strengths and limitations.

## 2. Literature Review

An emotion is an internal arousal caused by a specific external stimulus. Emotions are distinguished from moods by their longevity. Moods are longer-lasting and are not as specific as emotions. They are distinguished from trait characteristics such as personality in that they change readily and are not considered "embedded" in the person. While emotions may be related to physiological, cognitive, and behavioral states, they are not the same phenomenon (Andersen & Guerrero 1998).

Theories of emotion fall into three broad categories. One perspective, developed independently by William James and Carl Lange, views emotions as the feelings that accompany bodily sensations produced by excitement (Palencik 2007). In other words, physical sensations precede emotions. This runs counter to our intuitive view of affect, which sees physiological reactions as the result rather than the cause of emotions. An example would be seeing an oncoming car, experiencing a pounding heart, and concluding that we are scared based on the bodily feelings we have.

A second perspective is the Cannon-Bard view of emotion (Lang 1994) which contends that the physiological and emotional reactions to a stimulus occur simultaneously. Thus, when we see a threat such as an oncoming car, we experience a pounding heart and the emotion of fear at the same time and due to the same cause. This view is more compatible with how most of us think about emotion, but falls short of explaining how and to what degree cognition affects our interpretation of the stimulus.

Third, Schachter and Singer (1962) propose a two-factor theory of emotions that explain feelings as composed of both a physiological and a cognitive component. Physiological arousal for which there is no ready cognitive explanation can be manipulated with environmental cues. Similarly, a ready cognitive explanation is robust to such manipulated cues. This theory holds that emotional states are a dynamic combination of our perceptions of physiological states, cognitions about those states, and the environment within which they occur (Schachter & Singer 1962).

The disparities between these viewpoints can be summed up as tension between the view that cognitions are bypassed during emotional reactions (Zajonc 1980) and the view that there is always a cognitive component, though it may be fleeting or even below the level of

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conscious awareness (Lazarus 2000). As Leventhal (1987) notes, neither view wholly prevails, but it is clear that cognition and emotion are not entirely independent of one another.

In achievement-related contexts, it has been shown that the experience of and attributions for emotions is a complex array of signal-processing. Somatic, cognitive, and environmental cues are combined in ways that make it difficult to say which will dominate in a given situation (Weiner, Russell, & Lerman 1979). The complex nature of the interaction among these cues makes modeling their relationship with cognition and performance difficult at best.

We have chosen to focus our attention on two broad categories of emotion--positive and negative affect. Our reasons are twofold. First, this approach offers a more complete perspective than passion, which as we have noted includes only positive elements. Second, positive and negative affect are well-established constructs in the psychology literature.

Positive and negative affect describe two rough categories of emotions. Positive affect can be described in terms of such adjectives as "inspired," "attentive," and "proud." Negative affect is associated with adjectives such as "distressed," "irritable," and "jittery." The PANAS developed by Watson (1988) contains two ten-item scales that demonstrate relative independence of the two scales and good reliability and validity.

Work-related behavior has been shown to be positively associated with positive self-concept, which is generally linked to positive affect (Judge, Erez, & Bono 1998). Baron (2008) suggests that entrepreneurial behavior can also be affected by emotion, including such activities as resource acquisition and opportunity recognition.

While positivity has been shown to be associated with higher performance, it also has a dark side, sometimes making entrepreneurs subject to reduced task performance, biased recall of information, and increased impulsivity (Baron, Hmieleski, & Henry 2011). Positive affect is clearly desirable--to a point--but it can get out of hand, leading to dysfunctional thinking. Conversely, negative affect is generally undesirable, but may not be a detriment as long as positive affect buffers it (Nico 2003).

Given these findings, we believe that high levels of either positive or negative affect are likely to be associated with a high level of involvement in an activity, including cognitive involvement. There is already some support for this line of thinking. People with positive affect have been found to be more engaged with an entrepreneurial business. Negative affect also prompts action, albeit on shorter-term concerns than positive affect (Foo 2009). Positive affect may prompt one to think about what can go right in the future. Negative affect may indicate that one carries an appropriate level of concern for what can go wrong in the now. Both may translate into constructive problem-solving through appropriate cognition.

Lack of emotional involvement (both low negative and low positive affect) may indicate apathy about the business and a lack of desire to make it succeed. Persons who do not feel strongly one way or the other about a business are unlikely to think about it much.

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H1: Negative affect is associated with time spent thinking about a new business.

H2: Positive affect is associated with time spent thinking about a new business.

While emotions may be associated with more thinking, we have seen that they can also lead to sub-optimal thinking patterns if they become extreme in direction and intensity (Baron, Hmieleski, & Henry 2011). Buffering mechanisms include emotional competence. Emotional competence is the ability to experience one's emotions fully but not to get "carried away" by them. The emotionally competent person is likely to temper his/her strong feelings about the business with a healthy dose of cognition.

H3: Emotional competence is associated with time spent thinking about a new business after controlling for negative affect.

H4: Emotional competence is associated with time spent thinking about a new business after controlling for positive affect.

### 3. Methodology

Participants were recruited from an entrepreneurship class at a large university in the Midwest. Each participant was asked to start a micro-business of his/her own design as part of class requirements. Extra credit equivalent to 2% of the course grade was offered to participants completing all surveys. Extra credit equivalent to 1% of the course grade was offered to participants failing to complete up to two surveys. No credit was extended to those missing more than two.

Requirements were that each business be legal and pose no material danger to the student or other people. Other than that, there were no restrictions except for the amount of the initial investment, which was limited to \$100. An initial online survey measured several individual difference variables such as emotional competence at the beginning of the exercise. Each week, participants filled out additional surveys online designed to measure affect and levels of cognition related to the business. A final survey was also administered to measure variables reflective of their performance. The exercise occurred over a period of nine weeks. The sample was composed of 43% females and 57% males.

Participants placed their initial investment in cash in an envelope. They were instructed that at no time was their total investment to exceed \$100, though they were allowed to use cash generated by the business to purchase inventory or other items pertaining to the business such as advertising.

Time spent thinking about the business was measured with the following question, answered on a five-point Likert scale: 1 = Have not thought about it at all to 5 = Have thought about it constantly.

Week and subject were random variables in the hierarchical linear model. Week ranged from 1 to 9 and represented each weekly survey. Subject represented each individual who participated.

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Negative and positive affect were measured with 19 of the original 20 items of the PANAS (Watson 1988). One item was removed because an entry error created confusing wording. Each item asked respondents to assess to what extent he/she had felt each emotion listed since the last survey. Items included such adjectives as distressed, irritable, etc. (negative) and inspired, interested, etc. (positive). Items were measured on a five-point Likert scale ranging from 1 = not very much or not at all to 5 = extremely.

Emotional competence was measured with a 31-item scale based on emotional awareness and emotion management. The former involves the ability to identify one's emotion and understanding how those emotions relate to one's goals, thoughts, behaviors, and accomplishments (Goleman 1998; Weisinger 1998). The latter involves an intention to: (a) elicit and sustain pleasant and/or unpleasant emotions when considered appropriate, (b) effectively channel negative affect, and (c) restrain negative emotional outbursts and impulses (Boyatzis 1982).

This approach allowed us to treat emotion and cognition simultaneously. It enhances our understanding of "head" and "heart" issues by treating them as tightly-related facets of human behavior rather than separate dimensions.

### 4. Findings

Data was collected online and the nine surveys were aggregated to form one data set. Cases with missing data were removed, leaving 142 observations for 19 unique participants over nine observation periods. Independent variables were centered on the grand mean. Hierarchical linear modeling was conducted using R, an open-source statistical package (R Development Core Team, 2011).

HLM in R is conducted by comparing hypothetical models to the null model, which allows both the slope and the intercept of random variables to vary by group. In this case, both week (1-9) and individual (subject number) were treated as random variables. The results contribute to our understanding of cognition and emotions over time. To our knowledge, this is a new and unique approach. The null model is shown in Table 1.

The null model was compared to Model 1 in which negative affect was added as a fixed effect. R uses ANOVA to test for significant differences between multilevel models. Model 1 fit the data significantly better than the null model (Chi-square = 32.94;  $p < .000$ ). Results are shown in Table 2. H1 was supported. Negative affect was associated with time spent thinking about the business.

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Table 1: Null Model

AIC	BIC	Log Likelihood	Deviance	RML Deviance
366.9	378.7	-179.4	356.9	358.9

Dependent variable: Time spent thinking

Random variables: Week, Subject

### Random Effects:

Group	Variance	Standard Deviation
subject	.27	.52
week	.03	.19
Residual	.57	.75

### Fixed Effects:

	Estimate	Standard Error	t value
(Intercept)	3.12	.15	20.71

Number of observations: 142, groups: subject, 19; week, 9

Next, the null model was compared to Model 2 in which positive affect was added as a fixed effect. The results were non-significant, thus Model 2 is not shown (Chi-square = 1.5;  $p = .22$ ). H2 was not supported. Positive affect was not associated with time spent thinking about the business.

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**Table 2: Model 1**

AIC	BIC	Log Likelihood	Deviance	RML Deviance
338.9	353.6	-164.4	324	328.9

Dependent variable: Time spent thinking

Random variables: Week, Subject

### Random Effects:

Group	Variance	Standard Deviation
subject	.27	.52
week	.03	.19
Residual	.57	.75

### Fixed Effects:

	Estimate	Standard Error	t value
(Intercept)	3.12	.15	20.71

Number of observations: 142, groups: subject, 19; week, 9

### Correlation of Fixed Effects:

	(Intercept)
Negative affect	.02

### ANOVA Model Comparison:

AIC	BIC	Log likelihood	p-value
349.5	362.8	-170.2	p < .000

### (Model 2 not shown, results n.s.)

Last, Model 1 was compared to Model 3 in which negative affect and emotional competence were added as fixed effects. Model 3 fit the data significantly better than Model 1 (Chi-square = 7.37;  $p < .01$ ). Results are shown in Table 3. H3 was supported. Emotional competence was associated with time spent thinking about a new business after controlling for negative affect. H4 was not tested due to lack of significant findings for Model 2.

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Table 3: Model 3

AIC	BIC	Log Likelihood	Deviance	RML Deviance
334.7	352.5	-161.4	316.6	322.7

Dependent variable: Time spent thinking

Random variables: Week, Subject

### Random Effects:

Group	Variance	Standard Deviation
subject	.08	.28
week	.05	.22
Residual	.47	.69

### Fixed Effects:

	Estimate	Standard Error	t value
(Intercept)	3.16	.11	27.9
Negative affect	.7	.1	6.7
Emotional competence	.73	.26	2.8

Number of observations: 142, groups: subject, 19; week, 9

### Correlation of Fixed Effects:

	(Intercept)	Negative affect
Negative affect	.02	
Emotional competence	.03	.02

### ANOVA Model Comparison:

AIC	BIC	Log likelihood	p-value
331.3	347.6	-10.2	p < .01

## 5. Conclusion

Hierarchical linear modeling indicates that the best model fit for the data is one in which the dependent variable (time spent thinking) is regressed on negative affect and emotional competence with week and subject entered as random effects. Subjects experiencing stronger negative affect thought more about their businesses. Emotional competence added to that effect.

Emotions are sometimes conceptualized as distinct from and at odds with cognition--one is either feeling or thinking, but not both. Common language reflects this alleged trade-off in phrases such as "Listen to your heart, not your head" or "Don't let your feelings get in the way." Our work suggests that in the case of negative affect, the two may be complementary forms of personal involvement and may vary together rather than being at

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odds with one another. Feeling bad leads to thinking more.

Negative affect is sometimes considered a detriment to cognition, including creative tasks (Isen, Nowicki, & Daubman 1987) and entrepreneurial activity such as opportunity recognition (Baron 2008). We found instead that negative affect is associated with increased thought. Contrary to our predictions, positive affect was not found to have the same influence. Feeling good was not a spur to cogitation. Perhaps feeling bad begs for relief while feeling good is a good way to be.

Common language also reflects assumptions about the connection between emotional intensity and entrepreneurship. Successful entrepreneurs are often said to be emotionally volatile (think of the late Steve Jobs). We found that emotional competence, which may be thought of as tempering affect, is associated with more cognition. It is possible that great achievers like Jobs are openly emotional but simultaneously able to think clearly and decisively. In other words, they can harness the energy of their emotions rather than being overwhelmed by them.

This raises the question of how affect links to performance. The current study focused solely on the effects of affect and emotional competence on cognition and thus did not include performance as a dependent variable. It is entirely possible that thinking more about a business leads to worse performance, though the research on learning goals would indicate otherwise (Seijts & Latham 2006). Setting a learning goal (a goal for generating a certain number of strategies) as opposed to a performance goal is superior for complex tasks, which surely characterizes a business start up. However, spending more time cranking out bad ideas is unlikely to prove helpful.

Another issue concerning the influence of cognition on entrepreneurial performance lies in the "paralysis by analysis" syndrome. While cognition clearly has a role in performance, excessive cognition may lead to getting stuck. For an entrepreneur to succeed, he/she must act, often before all the facts are in and all possible strategies analyzed.

Last, we would like to offer a caution concerning research on passion and the entrepreneur. Passion has been conceptualized as predominantly long-term positive affect. We believe that there may be value in extending it to include negative affect, both long and short-term. An appropriate level of ongoing pessimism and anxiety may be a part of the successful entrepreneur's passion and may prompt more thought when it is warranted.

The ebb and flow of emotions are significant in themselves. The present study did not examine specifically how affect changes over time. Future studies should look at both the trends of affect over time and the reciprocal effects of cognition and affect. It has been suggested, for example, that an "efficacy spiral" may cause self-efficacy to lead to higher performance, which in turn leads to higher self-efficacy (Lindsley, Brass, & Thomas 1995). The reverse may also be true. Affect and cognition may affect each other similarly.

Lab studies are often criticized for lack of generalizability, even though there is ample evidence that they actually generalize quite well (Anderson, Lindsay, & Bushman 1999; Latham & Lee 1986). We stipulate that some elements of this class project differ from a

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real business. For example, one-hundred dollars is a significant but not life-changing loss for most students, whereas an entrepreneur may have his/her house and savings on the line. It could likewise be argued that these participants considered the \$100 business inconsequential in the grand scope of their lives. Even so, we believe that the present findings should prompt similar research in field settings with real entrepreneurs.

Last, our sample size is small. To a degree, the repeated-measure design alleviates that problem, but we recognize that our results should be interpreted with due caution. Future works with larger samples in a field setting are clearly warranted.

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