

## INSIDE OPPORTUNITY FORMATION: ENTERPRISE FAILURE, COGNITION, AND THE CREATION OF OPPORTUNITIES

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*To better understand opportunity creation, we investigate the extent to which recognition of failure impacts the new transaction commitment mindset of entrepreneurs. In a PLS model, we utilize data gathered from a sample of 220 entrepreneurs, and augment these results with an ANOVA analysis that provides a deeper exploration of the theory. In this article, we: (1) elaborate on the critical dimensions that represent a multi-construct view of the new transaction commitment mindset and describe ways that these dimensions can be measured; (2) examine the extent to which the recognition of new venture failure impacts the new transaction commitment mindset; and (3) explore the implications of the interaction between failure recognition and the new transaction commitment mindset for an entrepreneur's decision to continue or abandon opportunity creation efforts. Our results suggest that recognition of failure does indeed impact the new transaction commitment mindset and, by extension, can enable opportunity creation. Copyright © 2008 Strategic Management Society.*

### INTRODUCTION

Entrepreneurship and new venture failure are often close companions (Mitchell, 1996). Most entrepreneurs experience failure sometime during their careers, and many may experience new venture failure numerous times (e.g., Timmons and Spinelli, 2007). Indeed, the creation of some entrepreneurial opportunities can actually be predicated on a string of such failures (Alvarez and Barney, 2007). In the face of overwhelming evidence that their entrepreneurial efforts have failed, many entrepreneurs quit

their attempts to exploit new opportunities and exit the field (e.g., Dunne, Roberts, and Samuelson, 1988; Knaup, 2005). Others do not; instead viewing failure as a bump along the road to opportunity creation. Why do some entrepreneurs see failure as a signal that they should cease their entrepreneurial efforts, while others see failure as a source of new opportunities: as a signal to continue rather than to abandon their efforts to create and exploit a real entrepreneurial opportunity?

Herein, we propose that the framing of failure as a signal to stop or as a signal to proceed depends on what has been defined as the *new transaction commitment mindset*, which captures the will to engage in new transactions (Smith, Mitchell, and Mitchell, 2009). Entrepreneurs who do not have this mindset are not likely to continue, while those who do are. This *new transaction commitment mindset* has several important dimensions. Building on prior

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research, the first purpose of this article is to elaborate on these critical dimensions and describe ways that these dimensions can be measured.

Secondly in this study, we examine the extent to which the recognition of new venture failure impacts the new transaction commitment mindset: the will of an entrepreneur to continue or abandon entrepreneurial efforts. We apply the logic that whereas most people think *avoiding failure is good*, the notion of an antifailure bias (McGrath, 1999) suggests that, in some cases, *avoiding failure can be bad*. We therefore inquire whether recognizing failure in a new venture may actually aid in opportunity creation. In doing so, we develop the idea of pre-failure bias: where those who have not failed are likely to view failure, and as a result entrepreneurial opportunity, differently than those who have failed (Baron, 1998). This suggests the third purpose of this study—to explore the implications of the interaction between failure recognition and the new transaction commitment mindset for an entrepreneur's decision to continue or abandon opportunity creation efforts. In effect, within this study we investigate *empirically* the extent to which failure recognition interacts with the new transaction commitment mindset, thus mitigating the effects of a pre-failure bias. We do this so we can understand *theoretically* the extent to which an opportunity-focused mindset impacts entrepreneurs' responses to failure, thereby resulting in the creation of opportunities that can generate significant economic value.

In this article, we address the possible composition of the new transaction commitment mindset. Next, we present failure as an important element in opportunity formation and exploitation, and examine the effects of entrepreneurs' *recognition of failure* on their new transaction commitment mindset. We then describe our data gathering, measurement, and analysis approaches, report results, and discuss further implications for research and practice.

## THEORY AND HYPOTHESES

Not all opportunities are *created equal* because not all opportunities are created (e.g., Alvarez and Barney, 2007; Miller, 2007), some being recognized and others discovered (Sarasvathy *et al.*, 2003). When considering opportunity creation, where 'rather than searching for a clear opportunity to be exploited, entrepreneurs who are creating opportunities might engage in an iterative learning process

that ultimately could lead to the formation of an opportunity' (Alvarez and Barney, 2007: 11–12), it is important to understand how iterative, inductive, incremental decision making is effected (2007: 17). Accordingly, in this section, we present the literature that summarizes two key sets of ideas relating to (1) the new transaction commitment mindset, and (2) learning through recognizing failure.

### The new transaction commitment mindset

The new transaction commitment mindset is defined to be *the extent to which an individual is psychologically committed to engaging in new socioeconomic interactions (business transactions)* (Smith *et al.*, 2009). Research that specifies the nature of the new transaction commitment mindset is in its early stages, and the focus is therefore on questions of composition. Previous psychology research on mindsets suggests that a mindset—cognitive structure (Neisser, 1967), psychological gestalt (Fiske and Taylor, 1984, cognitive motivator (Bandura, 1995), mental representation (Posner, 1973; Reed, 2004)—has several critical elements. Three of these elements common to mindsets are representations of external, internal, and experiential factors (Posner, 1973), which lead to motivation.

In the context of the new transaction commitment mindset, these three general elements of a mindset are manifest in particular ways. External representations (i.e., outcome expectancies) can be viewed as the perceived chance of new venture success, which captures the assessment of prospective gains from success in an entrepreneurial initiative under consideration. Internal representations (i.e., expert knowledge structures) can be viewed as an entrepreneur's perceived start-up decision-making expertise, which represents the capability to pursue entrepreneurial opportunities. Experiential factors (i.e., representations of past situations) can be viewed as an entrepreneur's start-up experience, which represents previous instances of undertaking entrepreneurial initiatives. These three elements lead from thought to action because they affect new venture start-up motivation—which captures the enthusiasm and behavioral intention driving the creation of high-value opportunities—in a total situation or configuration of forces that represents a fairly comprehensive approximation of new venture reality in the mind of an individual/ entrepreneur (e.g., Fiske and Taylor, 1984). The theory in the research model, conceptualized as a gestalt in cognitively operationalizable terms, is presented in Figure 1.

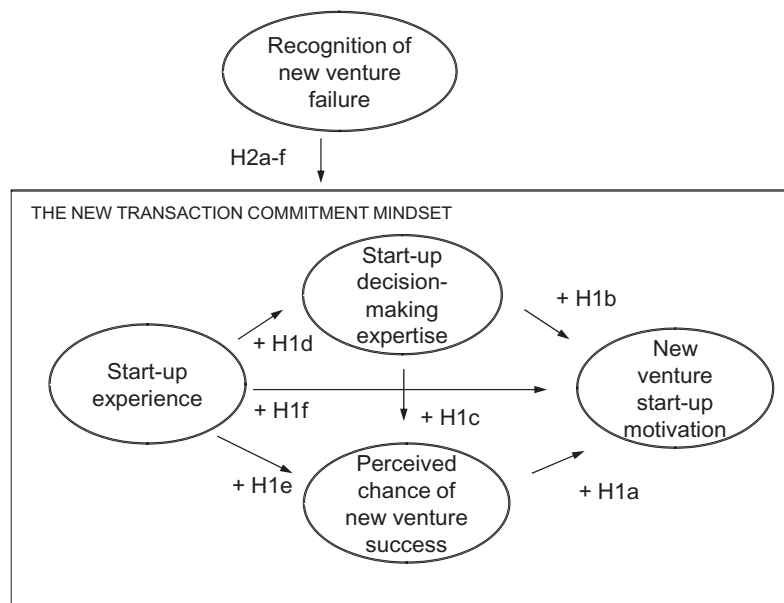


Figure 1. Research model

This figure, however, depicts a reality in empirical research: that while a new transaction commitment mindset may be conceptualized as a gestalt, its examination in an empirical model that concerns opportunity creation requires an approach that explores the extent of structural connections among the conceptualized constructs (Fraenkel and Wallen, 1990). We suggest this approach because it is the tacit learning in path dependent, action-oriented processes that is thought to sustain competitive advantage from the opportunity creation process (Alvarez and Barney, 2007). This idea of a *mindset with a purpose* is consistent with the conceptualization of the new transaction commitment mindset as one that employs *adaptive execution* (McGrath and MacMillan, 2000) and that suggests interrelated contributing constructs (Figure 1: right to left, in turn), to be: new venture start-up motivation, perceived chance of new venture success, start-up decision-making expertise, and start-up experience. This gestalt-based approach to mindset specification therefore results in the following expectations:

*Hypothesis 1a (H1a): Perceived chance of new venture success is positively related to new venture start-up motivation.*

*Hypothesis 1b (H1b): Start-up decision-making expertise is positively related to new venture start-up motivation.*

*Hypothesis 1c (H1c): Start-up decision-making expertise is positively related to perceived chance of new venture success.*

*Hypothesis 1d (H1d): Start-up experience is positively related to start-up decision-making expertise.*

*Hypothesis 1e (H1e): Start-up experience is positively related to perceived chance of new venture success.*

*Hypothesis 1f (H1f): Start-up experience is positively related to new venture start-up motivation.*

### Learning from the recognition of new venture failure

New venture failure itself has been a topic of study for at least two decades. It has been investigated in one form or another at multiple levels of analysis: in the economy (Shane, 1996), in organizational populations (Hannan and Freeman, 1989), in firms (Holmberg and Morgan, 2003), and in individuals (Zacharakis, Meyer, and DeCastro, 1999). Failure has been portrayed both positively (Knott and Posen, 2005) and negatively (e.g., Dickinson, 1981), and has been linked to concepts such as entrepreneurial grief (Shepherd, 2003), learning (Minniti and Bygrave, 2001; Sitkin, 1992), and risk and reward

(McGrath, 1999), as well as numerous other socio-economic phenomena (e.g., Begley and Tan, 2001). Interestingly, we see that where willingness to recognize failure has been found to have cathartic effects (Loewenthal *et al.*, 2002; Mahmud, 2002), these effects might be somewhat similar to the learning necessary to reduce bias in a mindset through better cognitive calibration (e.g., Kruger and Dunning, 1999), enabling a more realistic pursuit of opportunity creation.

We reason that to the extent that a mindset can be conceptualized as a mental representation, a mindset can be subject to bias: where a 'social perceiver systematically distorts' some mental procedure (Fiske and Taylor, 1984: 66). McGrath (1999: 16–18) illustrates the effects of an anti-failure bias on the entrepreneurial process. Anti-failure bias is the perception that risk taking that goes badly is undesirable, and this bias can introduce errors in learning and interpretation processes due to (as outline-numbered for later reference): (A) extrapolation of past successes into the future (e.g., A1: undersampling of failure, A2: routinization, A3: imitation, etc.), or (B) cognitive biases (B1: confirmation bias, B2: misattributions, B3: negative perceptions, B4: negative recollection, etc.) (March and Shapira, 1987; McGrath, 1999). We further reason that fear of failure (e.g., Mitchell, 1996) can invoke *pre-failure* bias for those who do not admit having failed. This is because, drawing upon the above noted errors, pre-failure bias can interrupt the cycle of learning that is commonly expected to result from the trial-and-error-based experiential learning that individuals generally, and entrepreneurs specifically, use to build expertise (e.g., Leddo and Abelson, 1986; Mitchell and Chesteen, 1995).

As also illustrated in Figure 1, we expect that the recognition of new venture failure will impact each relationship within the new transaction commitment mindset. We theorize that individuals who have not yet failed experience a pre-failure bias that is disabling to opportunity creation. This expectation is consistent with assertions suggesting that effective entrepreneurial actions in an opportunity creation context implicate iterative, inductive, and incremental decision making that is impacted by bias and heuristical decision-making processes (Alvarez and Barney, 2007). Opportunity creation strategies must therefore be emergent and changing. Accordingly, we further theorize that those who have not yet failed are likely to be insufficiently flexible of mind, and as a result might tend to have somewhat

unrealistic expectations regarding the sources of opportunity. Instead, they may expect that opportunities exist but go unrecognized due to lack of foresight; or that they exist and must be discovered through search (Miller, 2007). We therefore suggest that without the learning that comes from acknowledging a new venture failure (however perceived), the process of opportunity creation (Alvarez and Barney, 2007) is less likely to be invoked, because the development of an opportunity creation-focused transaction commitment mindset is limited by pre-failure bias.

Thus, in a similar manner that antifailure bias prevents early redirection of efforts and learning, pre-failure bias is likely to compromise or disable the new transaction commitment mindset through invoking an unrealistic picture of opportunity creation. It is because of the learning effects that can come from recognizing failure that we expect recognition of failure to interact with new venture start-up motivation, perceived chance of new venture success, start-up decision-making expertise, and start-up experience. We therefore reason that recognition of failure will tend to reduce pre-failure bias-induced disabilities. We explain this reasoning as it applies to each proposed interaction within the new transaction commitment mindset, beginning with the relationship between perceived chance of new venture success and new venture start-up motivation. (Please note that the references [A1–A3] and [B1–B4] apply to the error types previously identified for further reference.)

Pre-failure bias is expected to compromise the relationship between perceived chance of new venture success and new venture start-up motivation (H1a) through oversampling success and undersampling failure [A1] or confirmation bias [B1]. For example, theory suggests that oversampling success and undersampling failure will result in incorrect inferences when generalizing from observed behavior, thereby leading an individual to see success as more likely than it really is (McGrath, 1999), and that recognition of failure will attenuate these errors. Therefore, we expect that:

*Hypothesis 2a (H2a): Recognition of failure impacts the relationship between perceived chance of new venture success and new venture start-up motivation.*

The relationship between start-up decision-making expertise and new venture start-up motivation (H1b)

is expected to be compromised by pre-failure bias through overly negative perceptions of events associated with prospective failure [B3]. Specifically, pre-failure bias is expected to affect this relationship as ‘ideas and behaviors are rejected, even though they might prove useful under other circumstances or in a different application’ (McGrath, 1999: 18), and recognition of failure is expected to reduce these effects. Thus, within the new transaction commitment mindset:

*Hypothesis 2b (H2b): Recognition of failure impacts the relationship between start-up decision-making expertise and new venture start-up motivation.*

Theory suggests that pre-failure bias can affect the relationship between start-up decision-making expertise and perceived chance of new venture success (H1c) through confirmation bias [B1]. For example, perceptions are influenced and possibilities are limited when new information is interpreted such that preconceptions are confirmed and learning is suppressed. We reason that recognition of failure will tend to diminish these limitations. Accordingly, we expect that:

*Hypothesis 2c (H2c): Recognition of failure impacts the relationship between start-up decision-making expertise and perceived chance of new venture success.*

The relationship between start-up experience and start-up decision-making expertise (H1d) is influenced by pre-failure bias where routinization substitutes for learning [A2], the variety of routines is decreased [A3], or misattributions of success and failure occur due to fear of failure [B2]. For instance, where behavior is selected from a narrow range of path dependently acquired routines as opposed to assessing all possible choices (e.g., Miller, 2007), the level of achievable expertise may be limited as a result of the option-narrowing effects of pre-failure bias. Recognizing a failure episode appears likely to curtail these effects and open learning pathways. Hence:

*Hypothesis 2d (H2d): Recognition of failure impacts the relationship between start-up experience and start-up decision-making expertise.*

Our application of McGrath (1999) suggests that pre-failure type bias is also expected to compromise

the relationship between start-up experience and perceived chance of new venture success (H1e) through oversampling success [A1], or confirmation bias [B1]. Thus, an individual is likely to misperceive chances of success when, due to oversampling, success is seen as more likely than it really is, and failures are seen as less likely than they really are (McGrath, 1999), with the recognition of a failure episode being expected to have a mitigating effect. This logic suggests:

*Hypothesis 2e (H2e): Recognition of failure impacts the relationship between start-up experience and perceived chance of new venture success.*

Finally, theory suggests that pre-failure bias will act upon the relationship between start-up experience and new venture start-up motivation (H1f) through misattribution of success and failure [B2], and negative misperceptions of prospective failure events [B3]. A pre-failure bias effect can be seen in an individual’s overconfidence in her/his own ability—which induces that individual into potentially misguided action—as well as in a reduction of such overconfidence after recognition of a failure episode. Hence, we anticipate:

*Hypothesis 2f (H2f): Recognition of failure impacts the relationship between start-up experience and new venture start-up motivation.*

## METHODS

There has been limited prior empirical research on the new transaction commitment mindset. Thus, in order to examine the hypotheses developed in this article, we adopted an approach that made it possible to develop and test measures of the dimensions of the new transaction commitment mindset. This also made it possible to examine relationships among these dimensions as well as between these dimensions and recognition of failure. In the remainder of this section, we present the data gathering, measurement, and analysis methods we utilized.

### Data gathering

To effectively investigate the new transaction commitment mindset and test hypothesized relationships, we sought a sample that would reflect a relatively

common setting of entrepreneurs and would represent both individuals who had failed in a new venture as well as those who had not. To overcome reticence in discussing new venture failures, and being mindful of the difficulty of accessing sampling frames for probability samples in social science research in general (Pedhazur and Schmelkin, 1991) and in entrepreneurship research in particular (McDougall and Oviatt, 1997), we followed the sampling approach taken by Mitchell *et al.* (2000) and utilized a purposeful sample of 220 entrepreneurs from multiple countries (primarily Canada and the USA).

The respondents were selected by entrepreneurship students between 1997 and 2003 to provide questionnaire and focused interview input to these students in a mentor/student context. We reasoned that entrepreneurs might be more honest about past failures in a mentor-student relationship, especially in cases where these students—as was sometimes the case—turned to family members or close family entrepreneur-friends for mentoring input. The authors provided the students an interview guide consistent with the methods suggested in Mitchell and Chesteen (1995), and each entrepreneur completed a self-report questionnaire along with a consent form permitting their responses to be used for research. All of the respondents considered themselves to be entrepreneurs, 67 percent had started three or more businesses and 42 percent admitted to at least one new venture failure. The respondents ranged widely in self-reported experience and expertise, age (ranging from 20 to 81, with a mean of 45), and industry. Eighty-six percent of the respondents were male.

As with any sample, there are limitations. First, while the sample includes only individuals who had a threshold level of entrepreneurial experience and who either had or had not failed, no distinction was made between those who had failed and started back up and those who had failed and given up. We acknowledge that this imprecision obscures potential survivor bias and leaves open the possibilities of additional unexplained variance, or variance in the new transaction commitment mindset that cannot be parsed between survivors and nonsurvivors, thereby limiting certain types of interpretation.

Second, because our research design required that we capture failure recognition concurrent with mindset responses, the data were gathered from a common source. While no consensus exists about the seriousness of common method biases in marketing, management, psychology, sociology, and

education research (Malholtra, Kim, and Patil, 2006), we have nonetheless examined this limitation closely. Given that self-report data (and the attendant common-rater effects) are necessary to capture the richness required to examine sensitive phenomena—such as entrepreneurs' failure and its impact on their mindsets—we attempted to minimize the remaining sources of common method variance (CMV) as follows (Podsakoff, MacKenzie, and Lee, 2003). Item characteristics effects were minimized by our varying the types of items presented to respondents, item context effects were minimized by presenting a variety of item contexts to respondents, and measurement context effects were minimized by setting the instrument within the overall new venture context to maximize the concreteness versus abstraction of the items (as suggested by Cote and Buckley, 1987). Thus, while we have not fully eliminated the potential threat to internal validity posed by the self-report data in our sample, we have taken reasonable steps to minimize it. We therefore suggest that the sample is appropriate for the exploratory theory-building focus of the study.

## Measurement

**New venture start-up motivation.** New venture start-up motivation was measured with two reflective indicators, as the construct was thought to give rise to the observed items. The first was a self-report item reflecting motivation-as-stance or motivation-as-motor. This item asked respondents to rate their *attitude toward* starting a new business on a nine-point semantic differential scale, with anchors *reserved* and *enthusiastic*. The answers were recoded into a range of 0 to 1 for item variance consistency. The second was a nominal item reflecting motivation as action choice, asking respondents if they thought it was more desirable to invest their free time into (a) a new venture or (b) recreation and travel.

**Perceived chance of new venture success.** This construct was measured with two reflective indicators. One was a self-report item that asked respondents to rate their own chance of success in a new business venture on a nine-point semantic differential scale with anchors of *poor* and *excellent*. The responses were rescaled to a range from 0 to 1 for item consistency. The other item, as a proxy for success, asked respondents to consider how others would assess their performance as an entrepreneur, using a nominal scale of having (a) increased or (b)

stayed the same or decreased in the past three years. Inclusion of an item that is an assessment of others' views (reflected self-perception) is consistent with the Symbolic Interactionist (SI) approach to measuring perception, where reflected self-perceptions have been found to be significantly linked to both self-perceptions and others' perceptions (May, 2001).

**Start-up decision-making expertise.** Start-up decision-making expertise was measured using a single self-report item that asked respondents to rate their level of expertise on a semantic differential scale with anchors of *novice* and *expert*, and responses were coded into a nine-point interval scale measure of expertise. This item was specified as being a formative indicator, as it was intended to fully define the construct for the purpose of examining the model (Pedhazur and Schmelkin, 1991).

**Start-up experience.** The extent of entrepreneurial experience was measured with three reflective indicators. One was a subjective, self-report item that asked respondents to rate their past experience on a semantic differential scale with anchors of *limited* and *experienced* that was coded from 0 to 9, then rescaled to a range from 0 to 1 for item variance consistency. The other two were objective nominally scaled items: 'I have started three or more businesses, at least one of which is a profitable, ongoing entity,' and 'I have significant career experience that makes me highly familiar with new venture formation.' The indicators were specified as being reflective because the construct start-up experience would give rise to the observed items, particularly the self-report item.

**Recognition of new venture failure.** Recognition of new venture failure was measured with a single self-report, nominally scaled item designed to clearly indicate recognition of such failure: 'I have (a) failed in at least one new venture, or (b) never failed in a new venture.' This item was specified as being a formative indicator that fully defined the construct for the purpose of model evaluation.

**Demographic variables.** In addition, age (continuous) and level of formal education (seven interval-spaced categories) were captured in the study and included as covariates in the analysis. Age, in particular, could be an alternative explanation of any relationship between experience and expertise (Reuber and Fischer, 1994), as could level of formal education (Vesper, 1996). Descriptive statistics associated with the measures are presented in Table 1.

## Analysis

The research model was tested using Partial Least Squares (PLS) analysis. PLS is a regression-based approach to structural equation modeling that is more appropriate than maximum likelihood approaches, such as LISREL, when the goal of the research is prediction, not model fit (Fornell and Bookstein, 1982). Because PLS makes minimal measurement demands with respect to scale development, residual distributions, and sample sizes (Fornell and Bookstein, 1982), it is particularly well suited to our exploratory, theory-building research involving new constructs, measures, and relationships. Maximum likelihood approaches—such as LISREL—assume that data are interval and multivariate normal, and that samples are large, making these techniques more appropriate for theory testing using established measures (Bollen, 1989). As a second-generation analytic technique, PLS is favored over regression or ANOVA to test interaction effects because of its ability to model latent constructs without measurement error (Chin, Marcolin, and Newsted, 2003).

The interaction effects for recognition of failure were operationalized in the model using three constructs that captured the interactions between of recognition of failure and (1) start-up experience, (2) start-up decision-making expertise, and (3) perceived chance of new venture success. Following the product indicator approach outlined by Chin *et al.* (2003), the interaction effects were captured with a set of indicators constructed by multiplying the standardized indicator of recognition of failure and the standardized indicators of the predictor constructs.

Before examining the hypothesized relationships in the structural model, the measurement model was assessed for composite reliability (internal consistency), convergent validity, and discriminant validity. Except for perceived chance of new venture success (0.68), the composite reliabilities were above 0.70 for multi-item constructs, which meets Nunnally's (1978) guidelines for reliability. Next, convergent validity was assessed using the average variance extracted (AVE). Only start-up experience had a low AVE (0.47), indicating that less variance was explained in this construct by its measures than not. This low AVE was likely due to a low loading for the item relating to career experience. For the measure of perceived chance of new venture success, the loading for the *other's perspective* item was also low. These low-loading items were not removed,

Table 1. Descriptive statistics

	Measurement model					Latent variable (LV) correlations								
	Mean	S.D.	Loading	AVE	CR	M	PS	SDE	SE	RF	Mod 1	Mod 2	Mod 3	Age
New venture start-up motivation (M)				0.60	0.75									
Stance	0.84	0.22	0.83											
Action choice	0.55	0.50	0.72											
Perceived chance of NV success (PS)				0.55	0.68	0.40**								
P. own estimate	0.84	0.17	0.97											
P. other's estimate	0.84	0.37	0.40											
Start-up expertise (SDE)						0.29**	0.42**							
P. expertise	6.45	2.25	1.00											
Start-up experience (SE)				0.47	0.71	0.17+	0.40**	0.62**						
Belief	0.78	0.24	0.91											
3 or more startups	0.67	0.47	0.64											
Career experience	0.40	0.49	0.42											
Recognition of failure (RF)				1.00	1.00	0.15*	-0.05	0.08	0.14*					
Mod 1: z(RF) * z(SE-Belief)	0.07	1.01	1.00	1.00	1.00	0.03	-0.09	-0.06	-0.09	-0.04				
Mod 2: z(RF) * z(SDE)	0.08	1.02	1.00	1.00	1.00	-0.01	0.01	-0.15*	-0.08	-0.03	0.65**			
Mod 3: z(RF) * z(PS-Own estimate)	-0.03	1.00	1.00	1.00	1.00	0.10+	-0.04	0.02	-0.05	0.01	0.46**	0.43**		
Age	45.00	11.70	1.00	1.00	1.00	-0.06	0.01	0.26**	0.43**	0.14	0.05	0.01	0.06	
Education	4.40	1.80	1.00	1.00	1.00	0.18**	-0.02	0.09	0.09	0.17	0.01	0.06	0.09	0.02

Note: Reported significance of LV correlations is the significance of the Pearson correlation coefficients between the items, for single indicators, or weighted summed scales, for LV's with multiple indicators. \*\*p < 0.01; \*p < 0.05; +p < 0.10.



however, because low PLS loadings simply contribute little to the meaning of the construct and the structural results. Because start-up experience and perceived chance of venture success each had a single dominant high-loading item, only these high-loading items were used in the standardized product measurement of the interaction effects. Finally, the model demonstrated discriminant validity in that the variance shared between two constructs was less than the average variance extracted by the constructs (Fornell and Larcker, 1981). These psychometric properties appear to be sufficient to enable interpretation of the relevant structural parameters.

## RESULTS

The results pertaining to hypothesis H1(a-f) are documented under the heading *Base Model* in Table 2, and the results of all hypothesis examinations are presented visually in Figure 2.<sup>1</sup> Modeled constructs explained 19 percent of the variance in new venture start-up motivation. Providing evidence supporting H1a and H1b, but not H1f, perceived chance of new venture success was found to be a significant antecedent of new venture start-up motivation ( $\beta = 0.36$ ,  $p < 0.000$ ), as was start-up decision-making expertise ( $\beta = 0.19$ ,  $p < 0.05$ ); but start-up experience was not. Modeled constructs also explained 21 percent of the variance in perceived chance of new venture success, providing evidence supporting H1c and H1e, in that both start-up decision-making expertise ( $\beta = 0.28$ ,  $p < 0.05$ ) and start-up experience ( $\beta = 0.23$ ,  $p < 0.05$ ) were significant antecedents of perceived chance of new venture success. Further, the modeled constructs explained 38 percent of the variance in start-up decision-making expertise. Start-up experience was found to be a significant antecedent of start-up decision-making expertise ( $\beta = 0.62$ ,  $p < 0.000$ ), providing support for H1d. Of the covariates age and education, only age was significantly related to start-up experience ( $\beta = 0.42$ ,  $p < 0.000$ ). Collectively these results support the existence of a new transaction commitment mindset consistent with theory. However, the nonsignificant relationship between start-up experience and new venture start-up motivation reveals a differential pattern among the constructs, which (1) helps our

understanding of the nature and strength of relationships, (2) helps researchers identify which constructs figure more prominently; and (3) intimates that the new transaction commitment mindset gestalt may be more akin to a type of ordered cognitive map as has been suggested might occur in the opportunity creation context (Alvarez and Barney, 2007).

The interaction effects of recognition of failure (RF) were assessed in two stages—first assessing the direct (main) effects of recognition of failure, and then adding the interaction terms to the model (to test the hypotheses) (see Table 2, RF Direct Effects and RF Interaction Effects). Recognition of failure was found to have a direct effect on new venture start-up motivation ( $\beta = 0.16$ ,  $p < 0.01$ ). The significance or nonsignificance of path coefficients among base model relationships did not change when the direct effects of recognition of failure were added to the model.

We then examined a third model that included interaction effect constructs (illustrated in Figure 2). Providing support for H2c and H2e, recognition of failure was found to significantly interact within the relationship between start-up decision-making expertise and perceived chance of new venture success ( $\beta = 0.17$ ,  $p < 0.05$ ) and between start-up experience and perceived chance of new venture success ( $\beta = -0.16$ ,  $p < 0.05$ ). While the effect size<sup>2</sup> of 0.02 is low (Cohen, 1988), it is not disconfirming, since a small effect size does not necessarily mean an unimportant effect—particularly because strong, unambiguous results in support of interaction effects tend to be rare (Russell and Bobko, 1992). In this way even small interaction effects can be meaningful (Chin *et al.*, 2003).

The interaction between recognition of failure and the relationship between perceived chance of new venture success and new venture start-up motivation was significant at the 0.10 level (using a two-tailed test), which suggests that we should further assess two points concerning the relationship between perceived chance of new venture success and new venture start-up motivation. First, PLS is known to be conservative because it underestimates path coefficients (Chin *et al.*, 2003). And second, since the detection of interaction effects is highly dependent

<sup>1</sup>Note that the  $\beta$ 's provided in Figure 2 are from the RF Interaction Effects model in Table 2.

<sup>2</sup>The effect size  $f^2 = [R^2 (\text{interaction model}) - R^2 (\text{main effects model})] / (1 - R^2 (\text{main effects model}))$ . Interaction effect sizes are low if 0.02, medium if 0.15, and high if 0.35 (Cohen, 1988).

Table 2. PLS path coefficients and t-statistics

	Base model		RF direct effects		RF interaction effects		$f^2$
	$\beta$	t	$\beta$	t	$\beta$	t	
New venture start-up motivation (RSQ)	0.19		0.21		0.22		0.02
Perceived chance of new venture success	0.36	4.47***	0.38	4.85***	0.39	5.11**	
Start-up decision-making expertise	0.19	2.51*	0.19	2.45*	0.17	2.13*	
Start-up experience	-0.09	-1.02	-0.12	-1.45	-0.11	-1.30	
Recognition of new venture failure			0.16	2.85**	0.16	2.88**	
Mod 1: z(RF)*z(SE-Belief)					0.72	1.25	
Mod 2: z(RF)*z(SDE)					-0.08	-0.98	
Mod 3: z(RF)*z(PS-Own estimate)					0.11	1.67 <sup>+</sup>	
Perceived chance of new venture success (RSQ)	0.21		0.22		0.24		0.02
Start-up decision-making expertise	0.28	2.87*	0.28	2.53*	0.31	2.44*	
Start-up experience	0.23	2.32*	0.24	3.89***	0.22	4.13***	
Recognition of new venture failure			-0.10	-1.76 <sup>+</sup>	-0.10	-1.77 <sup>+</sup>	
Mod 1: z(RF)*z(SE-Belief)					-0.16	-2.23*	
Mod 2: z(RF)*z(SDE)					0.17	2.05*	
Start-up decision-making expertise (RSQ)	0.38		0.38		0.38		0.00
Start-up experience	0.62	8.39***	0.62	8.36***	0.61	8.27***	
Recognition of new venture failure			-0.01	-0.20	0.07	-0.21	
Mod 1: z(RF)*z(SE-Belief)					-0.01	-0.57	
Age	0.00	0.19	0.00	0.21	0.00	0.26	
Education	0.03	0.96	0.03	0.98	0.03	0.98	
Start-up experience (RSQ)	0.19		0.19		0.19		0.00
Recognition of new venture failure			0.07	1.33	0.07	1.33	
Age	0.42	7.76***	0.41	7.41***	0.41	7.41***	
Education	0.08	1.49	0.07	0.55	0.07	0.55	

Note: Following Chatelin, Vinzi, and Tenehaus (2002) the significance of low path coefficients were tested using OLS regression as sign changes in PLS bootstrapping procedures overestimates standard error. \*\*\* $p < 0.001$ , \*\* $p < 0.01$ ; \* $p < 0.05$ ; <sup>+</sup> $p < 0.10$ .

on power (Aiken and West, 1991), we argue (due to an expectation of reverse directionality once a failure is recognized) that the corresponding path coefficient of  $\beta = 0.11$  likely suggests such an interaction.

To elaborate the nature of the potential interaction effects, we then conducted a deeper exploratory analysis as a check on the robustness of our theory. This was necessary because PLS, like regression, is generally capable of detecting only linear interaction effects. This exploratory analysis was conducted using ANOVA to ascertain and plot the extent of nonlinearity. We did so by creating weighted-summed scales from the multiple indicators (using the PLS weights) for the predictor constructs, and then categorical scales representing the predictor constructs of approximately three equal-sized groups. We emphasize that we did not use the ANOVA analysis to confirm the significance of

interaction effects because PLS is a more appropriate analytic tool (Chin *et al.*, 2003). Instead, we used the estimated marginal means to plot the six interaction effects suggested by our research model (Table 3).

What we find to be particularly striking about the results illustrated in these graphs (Table 3) is that two of the three nonsignificant interaction effects from the PLS analysis (graphs A and E in Table 3) are shown to be of the stronger disordinal crossover variety (e.g., Malhotra, 2004), and the other (Graph D in Table 3) has a U-shaped pattern where the effects of recognition of failure are observed at the low and high levels of start-up decision-making expertise. This observation may provide at least one explanation for why some of the hypothesized interaction effects were not observed to be significant in the PLS model. And while the interaction effects of recognition of failure are varied in their impact

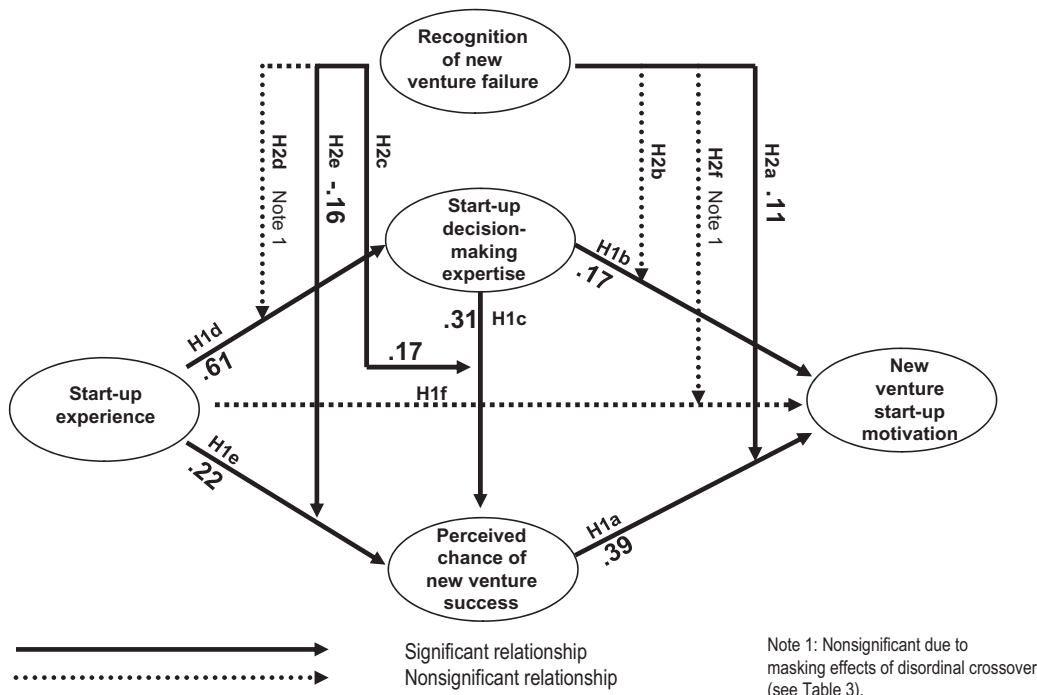


Figure 2. Results model

within the ordered-mindset gestalt, the relationships that they suggest are helpful in accomplishing the theory-building purpose of this study, and as such serve as useful points of focus for subsequent empirical attention. This evaluation of H1 and H2 has thus addressed our first two research questions, which inquire into the cognitive composition of the new transaction-commitment mindset, and the extent to which failure recognition induces a productive strategy within the new transaction commitment mindset.

We now address our third research question, and report the results of our deeper exploration of the hypothesized relationships. Again, our approach represents a robustness check for how recognizing failure in a new venture affects opportunity creation thinking. We use graphs A through F (as presented in Table 3) to organize these results in accordance with the analysis pattern set in H2a-f.

**Perceived chance of new venture success and new venture start-up motivation (H2a)**

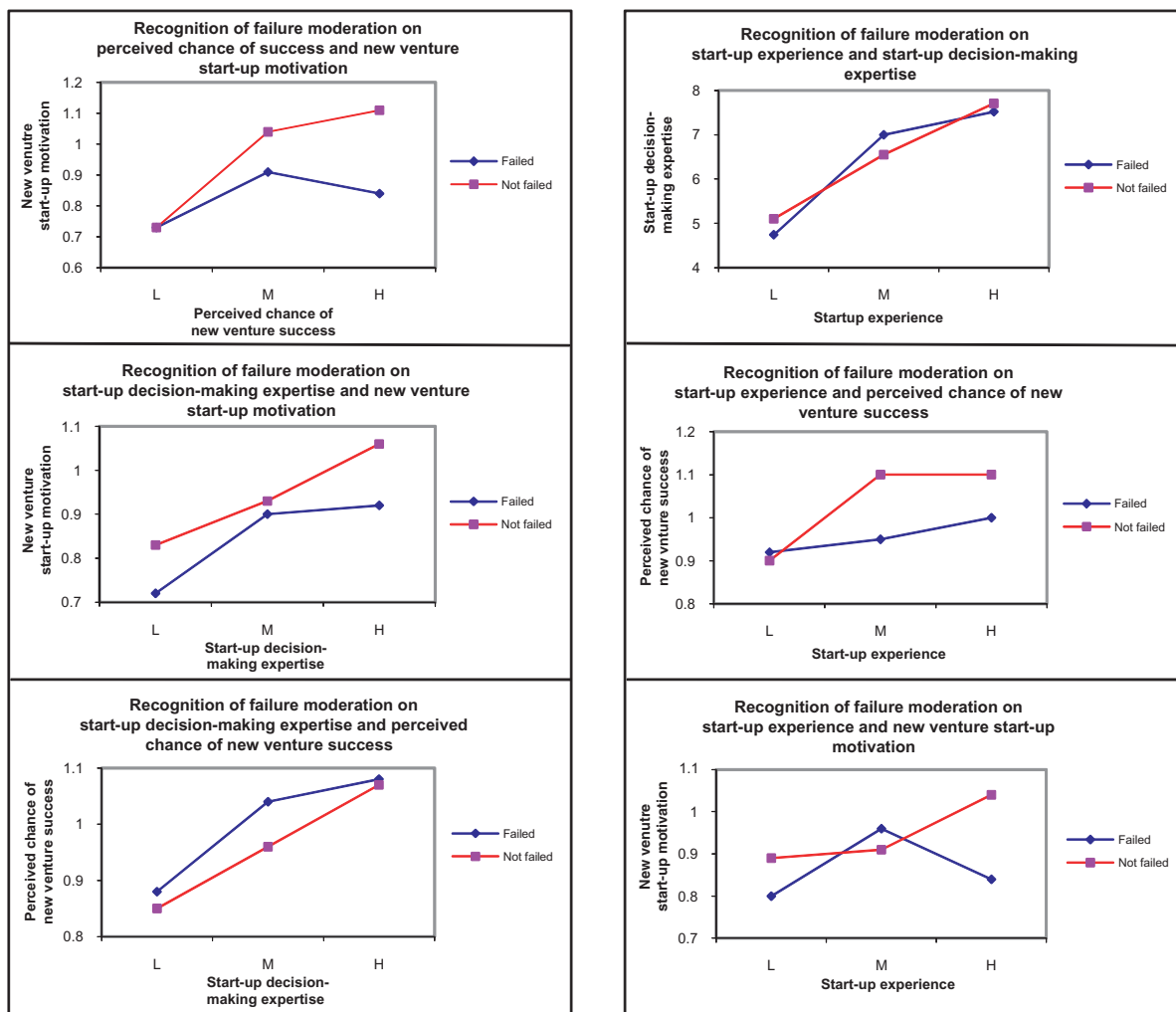
Graph A of Table 3 illustrates the impact of reductions in pre-failure bias in the relationship between perceived chance of new venture success and new

venture start-up motivation: that at medium and high levels of perceived chance of venture success, entrepreneurs who admit having failed are observed to have lower levels of new venture start-up motivation than those who have not recognized a new venture failure (whether they have not, in fact, failed or whether they are just unwilling to admit to a new venture failure). This result is consistent with: (1) theory which suggests that recognition of failure tempers an individual’s extrapolation to the future from past success, which is suggested as the potential unintended consequence of decision errors introduced by oversampling success (McGrath, 1999); and (2) the effectual logic that relates available means to perceived feasible ends (Miller, 2007; Sarasvathy, 2001). In this way, opportunity creation thinking is calibrated by recognition of a new venture failure such that a pre-failure optimism is replaced by a post-failure realism that enables a more sustainable pursuit of opportunity creation.

**Start-up decision-making expertise and new venture start-up motivation (H2b)**

In Graph B of Table 3 we observe how entrepreneurs who admit having failed may have lower levels of

Table 3. Post hoc analysis of interaction effects



new venture start-up motivation than those who do not admit having failed; and this effect is shown to occur at all levels of start-up decision-making expertise. However, as shown in the graph, increases in motivation for individuals who admit to having failed, after reaching medium levels of expertise, are not as great. This might be expected when entrepreneurs who admit having failed have gained more insight into their perceptions of events associated with failure, and have thereby reduced or neutralized their negative perceptions of events associated with failure. We therefore suggest that the motivation to create an opportunity that can generate significant economic value is calibrated by recognition of a new venture failure due to path-dependent learning,

which results in a more measured approach to creation.

**Start-up decision-making expertise and perceived chance of new venture success (H2c)**

Similarly, as illustrated in Graph C of Table 3, entrepreneurs at low and medium levels of start-up decision-making expertise, who admit having failed, rate their chance of new venture success higher. This is consistent with the idea that the act of intelligent failure (risking only an incremental limited commitment) results in opportunity creation from an emergent and changing strategy (Alvarez and Barney, 2007), to create future decision rights (e.g., McGrath,

1999) that might be reflected in start-up decision-making expertise and expressed through perceptions of higher chance of new venture success at a given level of expertise. In this way, opportunity creation thinking is calibrated by recognition of a new venture failure due to incremental commitment-based entrepreneurial action, thereby assisting in opportunity pursuit.

### **Start-up experience and start-up decision-making expertise (H2d)**

Theory suggests that people make sense out of experience (McGrath, 1999) through iterative, inductive, and incremental decision making (Alvarez and Barney, 2007). These effects are evident in Graph D of Table 3, where at least at the low and medium levels of experience, entrepreneurs who admit having failed may transition from reporting less perceived expertise to reporting more perceived expertise than those who do not admit having failed. This result is consistent with the idea that failure is expected to prompt learning versus prompting *selection out* (or leaving) the venturing scene. We therefore suggest that opportunity creation expertise is calibrated by recognition of a new venture failure due to iterative, inductive, and incremental decision making, which—due to its iterative nature—promotes the continued pursuit of creation opportunities.

### **Start-up experience and perceived chance of new venture success (H2e)**

The result illustrated in Graph E of Table 3 is consistent with theory which suggests, for example, that increasing experience without a failure episode should lead to oversampling success and undersampling failure, and/ or develop into a confirmation bias. In both instances, disconfirming evidence is increasingly rejected; which, in turn, tends to make information associated with potential failure less vivid, plausible, visible, or available, and factors associated with success the opposite (McGrath, 1999: Table 1 [A1, B1]). Thus, at low experience levels, there appears to be little capability to make the more refined distinctions suggested by theory to occur where a failure experience would sharpen learning, especially tacit learning in path-dependent processes (Alvarez and Barney, 2007: 17). However, this does not appear to be the case at medium and high levels of experience, where a failure episode seems almost to have *imprinted* itself on respondents

to dampen overoptimism for those who report having failed, and vice versa. Thus, it appears to be likely that opportunity creation thinking is also calibrated—and thereby enabled—by recognition of a new venture failure due to minimizing sampling and confirmation biases.

### **Start-up experience and new venture start-up motivation (H2f)**

The effect depicted in Graph F of Table 3 illustrates how entrepreneurs at low and high levels of experience, who admit having failed, may have lower levels of motivation than entrepreneurs who have not recognized failure, but have higher motivation at a medium level of experience. This result might be explained as a type of incremental limited cost commitment (Alvarez and Barney, 2007; McGrath, 1999), resulting from recognition of failure leading to heightened recognition of the riskiness of opportunities at low levels of experience. Such commitment limits are then removed by additional experience, so that at medium levels of experience, a past failure serves to increase decision rights (perhaps through learning and/ or due to a new confidence at having overcome a past failure episode) thereby motivating new venturing. At high levels of experience, however, two possible explanations suggest themselves to us. First, people who admit having failed may have better knowledge about the potential consequences of failure, and may be more measured in their approach to opportunity pursuit as a result due to their recovery from the misattribution bias that appears to occur at middle levels of experience (where success is misattributed to one's own actions and failure to exogenous unlucky circumstances) (McGrath, 1999). Second, people who admit having failed may now be involved in higher stake ventures increasing their risk awareness. Under conditions of ambiguity and hazard, we are therefore led to expect that opportunity creation thinking is calibrated by recognition of a new venture failure where variations in the opportunity formation process differentially impact flexibility and commitment throughout the process of opportunity creation.

### **Limitations**

The results we report should be interpreted in light of limitations concerning measurement, trade-off choices in model conceptualization, and the manner

in which we attempted to overcome the linearity constraints of PLS.

**Measurement.** While multiple items were used to capture the meaning of key constructs in the model, we acknowledge that as preliminary instrumentation in an exploratory study, these items may not have fully captured the construct domains. While our measures are thus limited, we believe that it is nevertheless well understood that the study of pre-failure bias within entrepreneurship research is still at an early stage of development, where new measures are being created or introduced to test relationships among new constructs. And while we agree that research progress will ultimately rest on the continued development of measures and methods (e.g., as suggested by Nunnally, 1978), in the theoretical specification of a new transaction commitment mindset (Smith *et al.*, 2009) we recognize that without the initial identification of key constructs and relationships in an empirically driven theory-building study, such scale development cannot reasonably be pursued. Thus, while our measurement approach has its limitations, we suggest that these measures are sufficient to capture the intended constructs and support an assertion that the results are sufficiently interesting to suggest further exploration of the interaction effects between failure and the new transaction commitment mindset.

**Model conceptualization.** Social cognition theory suggests that a mindset is a gestalt with recursive, multifaceted relationships among constructs that interact over time. The opportunity creation notion, however, leads us to expect a certain level of path dependency. So to practically examine the effects of the recognition of failure on the new transaction commitment mindset, we needed to hypothesize directional, nonrecursive relationships in a cross-sectional model and call upon concepts from the entrepreneurial cognition research stream to justify the operationalization of a research model. Possible limitations arising from this analytic choice suggest bounding the interpretation of results accordingly.

**Mitigation of linearity.** Our interpretation of results is speculative (by intention and by necessity) given the early stage of empirics in opportunity creation research. Quantitative analysis based in linear regression is, in certain cases, limited in its ability to uncover masked relationships, and is certainly in such cases limited in its capability to enlighten our understanding of observed relationships when identified. Consequently, we turned to ANOVA (as a descriptive technique only), which is

more suited to the kinds of further exploratory analysis we believe has been needed to fully illuminate the potential relationships in the data that yield propositions for later study.

## DISCUSSION

In this article, we use a simple underlying logic that goes as follows: Many entrepreneurial ventures fail. Sometimes entrepreneurs interpret these failures as signals that no opportunities exist in the product-market space they are exploring. Other times entrepreneurs interpret these failures as potential sources of new opportunity. How entrepreneurs frame these failures can have an important effect on whether or not they are willing to continue to invest in entrepreneurial activity, and ultimately upon the extent to which they can create an entrepreneurial opportunity that can generate significant economic value. This type of transaction commitment framing has multiple dimensions that form the new transaction commitment mindset. For opportunity creation to proceed, both the recognition of failure and the right mindset must work together.

In this study, we have therefore put the mindset notion into a broader context: as a type of *moderator* between a failure event and the decision to continue to invest in creating opportunities. We have utilized rich data that—despite inevitable limitations—allow us to capture the cognitive dimensions of the new transaction commitment mindset to investigate *empirically* the extent to which failure recognition interacts with the new transaction commitment mindset, thus mitigating the effects of a pre-failure bias; but also to enable us to understand *theoretically* the extent to which an opportunity-focused mindset impacts entrepreneurs' responses to failure that result in the creation of opportunities that can generate significant economic value. In this section, we discuss two important implications of our results: (1) the extent to which framing of failure impacts opportunity identification, and (2) the more nuanced implications of the *mindset* notion that we have operationalized and tested for better understanding of how entrepreneurs selectively interpret negative signals within the market space.

### Framing failure and opportunity identification

The notion of framing is not new. It has, for instance, been utilized in psychology (Tversky and

Kahneman, 1981), language (Van Dijk, 1977), political science (Schon and Rein, 1994), and social movements (Snow *et al.*, 1986). What all these applications have in common is their focus on a meaning construction process. Helpfully, as opportunity identification has become increasingly important in the entrepreneurship literature (e.g., Venkataraman, 1997), it has been dimensionalized to include three different levels<sup>3</sup>—opportunity recognition, discovery, and creation—each of which can impact meaning construction differentially.

The results we report support the idea that the *meaning* of failure recognition may, in fact, vary by these three opportunity dimensions. Accordingly, we suggest the following possible relationships as the basis for extending this line of research in the future. For example, where both supply and demand are known → an opportunity is *recognized* by an entrepreneur, but → failure ensues, the likely meaning is that there has been a failure in execution. In the case where either supply is known, and demand is not (or vice versa), → an opportunity is being *discovered* by an entrepreneur, but → failure ensues, a likely interpretation of the meaning (framing) of failure would be to consider the failure as a market signal, and that the missing information is now known—i.e., the unknown element has changed from unknown to absent (e.g., no demand), thereby providing sufficient information to say: ‘you’re done!’ However, in the case where neither supply nor demand are known → an entrepreneur is working to *create* a new opportunity, and → a failure occurs, such a signal might be particularly subject to framing considerations (because market signals in a creation context are fairly ambiguous). We reason that this susceptibility to framing occurs because a given failure simply cannot provide the requisite information about both supply *and* demand. Yes, it means that a *bump in the road* has been encountered, but in a creation context, a failure cannot reasonably be interpreted as a *terminal* bump, but only as an information providing one. Of further interest when considering the impacts of failure on the new transaction commitment mindset in this specialized creation context, we encounter a curious nuance in our understanding of traditional biases- and heuristics-based explanations for entrepreneurs’ ignoring negative

information. And we therefore discuss this observation in more depth in the next section.

### More to the story: mindsets and bias

The concept of opportunity creation as it exists in the literature presumes that entrepreneurs will ignore negative market signals and keep going despite them. Extant theory and data relate the reasons for this behavior to such biases as representativeness and overconfidence (e.g., Busenitz and Barney, 1997). The core of the theory that we are developing, which introduces the idea of the new transaction commitment mindset, is not unrelated to these concepts. But it provides an extension of the story. In particular, the extension of the explanation suggested by our results is that while biases are considered to be relatively stable (e.g., Busenitz and Barney, 1997; McGrath, 1999), we find that a mindset such as the new transaction commitment mindset is relatively malleable, being more like a mind *set-point* that may be recalibrated based upon learning (e.g., from a failure episode). Thus, additional focus on the mindset construct, particularly as it relates to previous research on biases, appears to be warranted.

Our literature review found that when the term *mindset* has appeared the literature, it has been primarily used in a descriptive sense (e.g., as a noun modified by various adjectives). Examples include a collective mindset (Hutchins, 1995), a global mindset (Gupta and Govindarajan, 2002), a growth v. fixed mindset (Dweck, 2006), a managerial mindset (Sarasvathy, Simon, and Lave, 1998), and an entrepreneurial mindset (McGrath and MacMillan, 2000). Actual definitions of a mindset *per se* have been sparse, especially where issues of its composition are concerned. With the introduction of the new transaction commitment mindset construct into the literature (Smith *et al.*, 2009) a coalescence around working mindset definitions has been initiated and, more particularly, the role of mindsets in decision making (such as to continue in opportunity creation efforts despite failure) is now more open to investigation.

We suggest that future research might investigate, for example, the differences between the new transaction commitment mindset and other cognitive constructs such as representativeness and overconfidence biases. Future research could also address the extent to which the various characterizations of mindsets are competing versus synonymous, comparing

<sup>3</sup>Recognition: both supply and demand known; Discovery: either supply or demand known, but not both; Creation: neither supply nor demand known (Sarasvathy *et al.*, 2003).

among the constructs suggested by, for example, Bandura (1995), Fiske and Taylor (1984), Posner (1973), and those utilized in our research model (Figure 1). While we have adopted the synonymous view, our results suggest that a deeper analysis is needed to more fully dimensionalize mindsets in general and the new transaction commitment mindset in particular.

## CONCLUSION

Recognizing failure is not easy, for as we have seen in our results, new venture failure affects a person's new transaction commitment mindset. Learning from so called failure is not easy either, because the mindset path-gestalt hybrid is not immune from affective influence. For this reason, we call for additional study that will enable researchers to uncover, operationalize, and evaluate a more complete range of constructs and relationships concerning emotions, failures, and mindsets. However, because mounting evidence suggests that successful behaviors in a variety of fields depend upon improving individuals' calibration in their self estimates (e.g., Kruger and Dunning, 1999), we take seriously confirmation of the counter-intuitive notion suggested by the developing models of mindset-based theory examined herein: that the recognition of having failed in a new venture affects the relationships that make up the comprehensive reality of a new transaction commitment mindset in a *positive, learning* way that explains—at least in part—how the opportunity formation processes can be flexible while commitment emerges. We therefore also encourage further research that investigates this premise.

The results of this study also make sense in the practical domain. For example, we think that there is a reason why most lenders and venture capitalists consider a previous failure to be a virtue for finance-seeking entrepreneurs (Cope, Cave, and Eccles, 2004; Johnson, 2003; O'Connell, 2004). We see three specific practical elements. First, we believe that this research has an important future in developing further explanations for the ways in which entrepreneurial cognitions relate to entrepreneurial action. Second, we confirm that recognizing failure is highly likely to refine reasoning capability within the new transaction commitment mindset of practicing entrepreneurs. And third, we suggest that scholars who use the new transaction commitment mindset as a way to explain the making of decisions under the

ambiguity, hazard, and negative event signaling that characterizes the opportunity creation context, can apply these insights in practice. In particular, we suggest that better thinking is available from focusing the human energy released when a new venture failure is recognized. This, in turn, can greatly assist in the enactment of dramatic improvements in opportunity creation. In this respect (e.g., Dierickx and Cool, 1989), new venture failure might begin to be seen as a catalyst toward redirecting an underappreciated inflow (e.g., higher opportunity creation capability) into a growing stock of entrepreneurial cognition-based opportunity creation resources—enhanced reasoning capabilities within the new transaction commitment mindset.

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