# Experimental Entrepreneurship:
# A Research Prospectus & Workshop

2008 USASBE conference, San Antonio TX

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**Deep Theory Meets Practical Application**

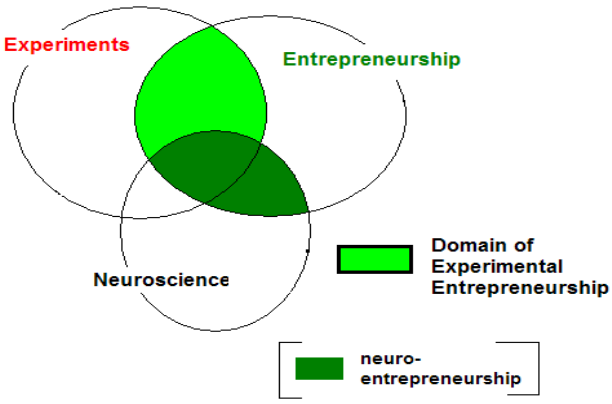
Understanding entrepreneurial behavior requires that we focus at the deepest, most fundamental levels. The early days of entrepreneurship often emphasized personality research. That led us to studying attitudes, rather than traits (Shaver & Scott, 1991). The next step in the field's evolution was to explore individual differences through the lenses provided by cognitive and developmental psychology. This step now allows us to address deep, fundamental issues in entrepreneurial cognition through rigorous experimental research (that need not abandon relevance). It also allows us to take the next logical step and take advantage of the recent breakthroughs in neuroscience.

Experimental research conjures a vision of abstract, ivory tower research far removed from the “real world” that entrepreneurship research has long and proudly embraced. What happened when experimental research entered fields like marketing? Deep theory, yes. Profound practical applications, yes.

This interdisciplinary workshop will focus on the experimental investigation of entrepreneurial behaviour from the perspectives of economics, cognitive, social and developmental psychology, neuroscience, philosophy, evolutionary anthropology, etc. Experimental methods have barely penetrated entrepreneurship research. However, where they have done so, the results have been powerful. In this workshop we will show that **(I)** experiments offer significant methodological opportunity and value to the researcher and **(II)** the range of applicable topics is broad and deep, making it attractive to top scholars. We also have a huge body of proven methods to call upon.

Our main goal is to contribute to the understanding of the factors which determine entrepreneurial processes in different contexts (for-profit, not-for profit, academe, etc.). This project concentrates not only on the psychological, social (and eventually biological/neurological) bases of entrepreneurial behaviour, but also on the social and economic consequences of people displaying entrepreneurial behaviour. Economic experiments are a good method for research questions relating to cognitive processes in entrepreneurship yet are an approach rarely used in the field of entrepreneurship to date (Schade 2005). *Why not take advantage?*

As such, this USASBE workshop will provide a forum to share this prospectus and identify the most fruitful directions for experimental research in entrepreneurship.




## I. VALUE

Using experiments has a number of advantages:

**(1)** Causal Inference: They are the only means by which cause and effect can be plausibly established, affording us the signal opportunity to predict, not just explain.

**(2)** Control: It allows for precise control of variables - control is intended to allow us to conclude that it is the IV, and nothing else, which is influencing the DV (no other approach allows a similarly tight control as do experiments). We can minimize the impact of data issues such as noisy, nonlinear phenomena.

**(3)** Replicability: Experiments can be replicated, something which is rarely (and expensively) achieved with surveys. The more often an experiment is repeated, with the same results obtained, the more confident we can be that the theory being tested is valid.

**(4)** Dynamics: Dynamics are an important aspect of process phenomena such as entrepreneurship. It is easier to capture the dynamics using experimental methods.

**(5)** Behavioural Data: Offers the advantage of behavioural (what people really do) data.

**(6)** Ability to Adopt New Theory & Methods: For example, advancing the role of experimental methods permits us to take advantage of rapid advances in neuroscience.

**a. Value for Theory**

*Key to Advancing Cognition Research*

As entrepreneurship research drills down even deeper into cognitive phenomena, the need to understand deep cognitive structures has become imperative. However, this research is poorly served by the typical paper & pencil instruments, nor even by careful qualitative approaches. Deep cognitive phenomena require studying by careful experimental methods.

*Key to Advancing Social Psychological Research*

Most entrepreneurial phenomena are Person X Situation constructs (intentions, attitudes like self-efficacy, opportunity perception, risk taking propensity) that are sometimes difficult to assess efficiently in typical field samples of entrepreneurs or students. It may simply prove too arduous to balance person and situation effects.

**b. Value for Research**

As you will see in Part II below, the range of possible topics where experimental methods can shed unique new light is staggering. This represents a research agenda of several lifetimes.

*Minimizes Current Methodological Weaknesses*

Because of random assignment to conditions, experimental methods make convenience samples less problematic. Convenience samples may contain biases that are unknown and unknowable. Random assignment to conditions and careful control can minimize even seemingly intractable biases. We thus will find it potentially less necessary to be concerned with the statistical assumptions often ignored in management research.

*Provides Opportunities to Expand Range of Models*

Ability to eliminate confounds that are impossible to remove in the field (e.g., how many "necessity"-motivated gazelles do you find? Growth motivation and 'pull' motivation can be disentangled in a lab setting.) Handle multiplicative models and other nonlinearities more easily. Allows us to identify a sound estimate of effect size (more important than statistical significance)

**c. Value for Teaching & Practice**

*Identifying What Really Matters*

There's a key lesson from clinical psychology that it is effect size that is important. Do we teach students or advise citizens on the basis of statistical significance or would we prefer to focus on meaningful effect sizes? Moreover, a statistically significant result from a field study might well be spurious (or spuriously non-significant). We can lower the risks of both Type I and Type II errors by using experimental methods. We already have too many spurious results (and

spurious non-results) and unreplicable studies because of unknown and unknowable confounds.

**d. Value for Public Policy**

*Identifying Valid Policy Predictors*

By teasing out true predictors of important pre-entrepreneurial phenomena, we can suggest mechanisms that are more optimal for policy makers. For example, it took a considerable amount of large-N surveys to understand that 'churning' is a predictor of future job creation. Experimental studies using a game setting could have quickly and easily shown that games with rapid entry and exit actually encouraged entry by new players and re-entry by prior players.

Even better examples would be in entrepreneurial learning and how public education policies could be better designed. What modalities and content best nurture entrepreneurial thinking? (What limits?) In terms of content, given the rapid mythologization of entrepreneurship and entrepreneurs, simply identifying the myths and misconceptions would offer, at worst, a powerful tool to share with educators, practitioners and policy makers.

**Why not take advantage of methods well-tested in economics to bring entrepreneurship research fully into the 21st century?**

## II. KEY TOPICS

### High Potential Research Topics for Experimental Entrepreneurship

**Behavioral Decision Theory**

Framing Effects & Paradoxes - Consider the extensive experimental evidence that has elucidated our understanding of things like Kahneman & Tversky's classic gain-loss framing effects (prospect theory) including work assessing the role of affect in decision making. What we are seeking to explain are the various consistent deviations from rationality that we observe, typically in pencil-and-paper exercises.

A very early experiment with an entrepreneurship theme showed how perceived self-efficacy would override the Ellsberg Paradox which reflects aversion to high uncertainty [as opposed to Kahneman & Tversky looking at risk aversion (Krueger & Dickson 1994).]

*Research Opportunities:* We can manipulate perceived uncertainty and observe decisional outcomes such as choice of script (Gustafsson & Mitchell 2007) Also, there are other paradoxes (e.g. the Allais paradox) that reflect seeming violations of rationality that have not been well-tested in the lab, let alone in the entrepreneurial context. One final experimental effort should address the observation that Kahneman & Tversky's framing effects need not influence risk

taking, but rather they increase (decrease) *action* taking.

Two specific domains where even laboratory games have been limited (and survey or interview data wholly unsatisfying) might instead be studied through techniques from neuroscience (see below)**:**

Preferences - Preference judgements can now be observed through neuroimaging. Thus, entrepreneurial preferences with regard to resource mobilisation, resource commitments, and decisions on how to exploit a perceived opportunity could be studied.

*Research Opportunities:* Human decisions are inherently multi-criteria; multi-attribute utility theory (MAUT) can be explored more directly with tight experimental controls. We have recently observed lexicographic preferences in entrepreneurial intentions (Krueger, et al, 2007).

Utilities - Activity in the rewarding behaviour is likely to influence entrepreneurial decisions, e.g. how much to invest, general disposition to sell winning investments too early. Investing money and gaining is shown to correlate with activation in the rewarding system.

*Research Opportunities:* Neuroimaging technique allows us to measure the utility derived from a good objectively. There is also a difference between the expected and the experiences utility. Release of dopamine might lead to acceptance of risk more easily. Previous research shows that dysfunction on the OFC-amygdala-Nac reward circuit explains extreme risk-seeking behaviour. All of these aspects could be studied experimentally

Biases & Heuristics - Probably the most popular subtopic in entrepreneurial cognition research, we see considerable interest in biases such as illusion of control and other manifestations of an optimistic bias. However, these are typically observed from survey or interview data. This has constrained our ability to limit and delimit the extent of biases.

*Research Opportunities:* Experimental research in the past has shown simple mechanisms to manipulate illusion of control, even in professional mathematicians. Moreover, many other decision heuristics (e.g., beneficial heuristics like "fast & frugal") have not yet been tested, but could be tested directly in the lab.

Intertemporal Discount Rate - One interesting bias is the human tendency to prefer current payoffs to future ones, often discounting future payments at a rate far above current (and rational) interest rates. Interestingly, humans tend to have lower discount rates for social payoffs (e.g., marriage, children) than financial.

*Research Opportunities:* One might hypothesize that entrepreneurs are less susceptible to this particular bias, at least in comparison to non-entrepreneurial decisions. On the practical side, we might be able to identify decision characteristics that enable lower intertemporal discount rates & thus encourage goal-directed behavior.

Risk Taking - Other untested or under-tested questions fall under risk and risk taking:

*Research Opportunities:* Dickson & Giglierano (1986) proposed that Shapero's notion of "the risk of missing the boat" needed testing, especially with respect to other tradeoffs such as

risk of loss (see Lopes *inter alia*). We also need to assess the tradeoff found in some cultures between the social risk and financial risk (see Finland). Hey (1986) proposed that utility curves can be influenced not just by aversion to uncontrollable risk (a la Arrow-Pratt) but also by "optimism/pessimism," aversion to controllable risk/uncertainty.

**Game Theory**

A specific area of human decision making that lends itself to experimental study has been the use of games whose rules have been cleverly specified so as to elicit interesting phenomena.

*Research Opportunity:* The classic Prisoners Dilemma and the recently popularized Travelers Dilemma (and others) have rarely, if ever, been used with an entrepreneurial setting. For example, could we reverse the Prisoners Dilemma with the “prisoners” replaced by two VCs unable to communicate about investing?

An even more striking opportunity would be to *create* games specifically testing entrepreneurial phenomena. (The practical and pedagogical implications are obviously great.) Consider Kihlstrom & Laffont's general equilibrium model of entrepreneurial entry/exit based on heterogenous utility curves which could easily be tested and enriched as a dynamic game.

**Process Models of Entrepreneurial Activity**

Given that entrepreneurship and entrepreneurial decisions are dynamic processes, it seems more than reasonable that experimental study would clarify some interesting phenomena that have attracted considerable interest among entrepreneurship scholars.

*Research Opportunities:* Intentions models have typically followed the static, ‘snapshot’ approach of Ajzen’s Theory of Planned Behavior (e.g., Krueger, et al. 2000). However, very recent research has surfaced nonlinearities and other complexities, including tipping points (Krueger, et al. 2007; Brannback, et al. 2007) that suggest tracking the process as it unfolds would be quite illuminating. For example, it is generally assumed that entrepreneurs tend to engage in effectuational thinking (Sarasvathy, various) not means-ends strategic behavior. This would become highly testable in the lab. Finally, experiments could assess the impact of barriers, real and perceived, to entrepreneurial decisions.

**Perceptions**

A core topic in any book on cognition is perception; it is also a core topic in any book on experimental psychology. Most of the key phenomena in entrepreneurship research are perceptions-based. What is “opportunity recognition” without opportunity perception? In the lab, we can manipulate perceptions quite readily.

*Research Opportunities:* Kirzner argued that entrepreneurs need a significant degree of alertness to opportunities. Alertness is likely situational (Shapero’s analogy was to ask in what

directions is an entrepreneur's antenna tuned?). Controlled experiments could map that 'tuning."

In general, we have devoted considerable effort to research into how we recognize, discover, identify or enact opportunities and threats. However, very little of that research has explored, for example, the psychophysics of perception.

Returning to process models, the intentions model (and the dominant model of opportunity perception) are predicated upon perceptions: Perceptions of feasibility, desirability, which in turn are predicated upon perceptions of self-efficacy (& collective efficacy) and perceived social (and cultural) norms. Yet again, manipulating these perceptions should shed radical new light onto entrepreneurial thinking and behavior.

Finally, entrepreneurs are renowned for their above-average abilities to "connect the dots" in enacting opportunities. Whether the experiments focus on "dot connecting" or on broader issues of pattern recognition, we can draw upon a long tradition of research into pattern recognition, its antecedents and consequences.

**Emotions & Affect**

Affect - As you might see from Baron's review (2007) that there is no shortage of interesting topics relating to affect and entrepreneurship, especially the role of affect in entrepreneurial decision-making. Neuroeconomics theory suggests that that decision-making as hypothesized in economic theory depends on prior emotional processes. To date only very few studies and economists have studied the role of emotions in entrepreneurial decision-making.

*Research Opportunities:* We could look at the role of emotion in uncertain conditions. The influence of emotions on entrepreneurial decisions should be greater in situation is supposed to be even greater than in certain ones. Thus, entrepreneurship with all its uncertainty and risk makes a prime context for studying the impact of emotions on decisions. We could use cognitive appraisal theory (i.e., primary appraisal, rationality, irrationality, and coping potential) in entrepreneurial situations in order to examine the impact of cognitive and emotional processes on the evaluation and exploitation of entrepreneurial opportunities. Our research will be based on cognitive appraisal theories of emotion because they allow statements about cognitions and emotions and about their connection. Additionally, these theories can be regarded as a central approach in the psychology of emotion (Reisenzein, Meyer, & Schützwohl, 2003). Their basic assumption is that a person appraises an event, and from these appraisals emotions can result. These emotions can in turn influence the behaviour of the person (K. R. Scherer, 1997, 2005). Appraisal theories have been applied in many different contexts, among others in work and organizational settings (e.g. Drach-Zahavy & Somech, 2006; Gowan, Riordan, & Gatewood, 1999; Lepine & van Dyne, 2001; Martin, Jones, & Callan, 2005; Perrewé & Zellars, 1999; Struthers, Weiner, & Allred, 1998), but have not yet been introduced to entrepreneurship research as far as we are aware.

Passion & Fear – We can look specifically at passion and fear, two popular themes relating to entrepreneurial decision-making. Long ago, Keynes argued that initiative-taking was not a function of rational calculation but the presence/absence of a more emotional factor he called “animal spirits” (Krueger 2005). Interestingly, it has proven challenging to actually measure passion (Brannback, et al. 2006)

*Research Opportunity:* As such, this would seem particularly amenable to study using neuroscience techniques; is entrepreneurial passion merely the arousal of the amygdala?

Fear – Amidst the growing interest in emotional displays, one of particular interest for entrepreneurship research is fear (fear of failure? fear of success??)

*Research Opportunity:* Why don't people pursue an incredibly positive opportunity? Slovic noted that "fear" is really two separate phenomena, the more known hazards fuel "fear" but the truly unknown can bring "dread", Dread influences behavior much differently.

Empathy and Trust - Cooperating, trusting others, etc are important aspects in the creation of a venture. We could design imagines or real scenarios in which we manipulate the social and the entrepreneurial aspect and see what influences evaluation and exploitation of these entrepreneurial opportunities. Social neuroscience provides insights into the neural mechanisms underlying our capacity to represent others intentions and feelings, referred to as “empathy” (Singer & Fehr, 2006).

*Research Opportunities:* A topic that is of critical value in the entrepreneurial ecosystem is trust. What is unique, if anything, about trust (between entrepreneurs and suppliers, financiers, et al.)? We could study experimentally, (a) if previous theories of trust and cooperation hold in the entrepreneurial context, (b) neuroimaging technique to reveal causal links behind decisions to trust and cooperate in entrepreneurial situations.

Certainly, in social and sustainable entrepreneurship, the passions (and fears) should differ; perhaps social entrepreneurs may differ from both entrepreneurs and activists.

**Deep Structures**

One area that has already seen growing use of experimental methods has been in the study of deeper cognitive structures, especially scripts (e.g., Gustavsson, Smith & Mitchell 2007; Stamp, et la. 2007). This program should seek to assist these nascent (but already productive) efforts (primarily at Jonkoping, Texas Tech and Victoria). That would likely offer rapid payoffs.

*Research Opportunities:* While scripts have received attention, other phenomena merit equal consideration, such as schemas and cognitive maps (Baron 1998, 2004; Krueger 2005). Mental prototypes have received limited attention (Baron & Ensley 2006). Assessment of deep anchoring beliefs will be challenging, but fruitful (Krueger 2007). Finally, what may be particularly useful will be to study how these cognitive structures (and their content) change. (See below under Creativity and Learning.)

**Creativity**

Creativity is very much a set of cognitive processes whose antecedents are readily manipulable in lab settings. It is obviously of great significance to entrepreneurial cognition and behavior, including considerable practical and pedagogical impact.

*Research Opportunities:* One current theoretical study under development focuses on the processes of ideation that seem to characterize how entrepreneurs enact opportunities (Stamp, et al. 2007). This would be ideal for experimental testing.

We have already seen initial efforts to explore the impact of counterfactual thinking and the impact of teaching counterfactual thinking skills (Gaglio, various).

**Learning**

Learning and the ability to adapt to new and changing environments are key to entrepreneurial sustainability. Damasio has shown that knowledge without emotional signalling leads to the dissociation between what one knows and how one decides to act.

Impact of Training - Interest has grown in assessing the impact of entrepreneurial training and teaching upon the students/trainees. Given the widespread use of action learning and problem based learning modalities, impacts are likely (and generally shown to be positive).

*Research Opportunities:* But, shouldn't we delve more deeply into what is changing? Educational theories would also suggest looking in more fine-grained fashion; e.g., what do specific activities change specifically? (e.g., Do exercises in envisioning entrepreneurial failure inoculate students against fear of failure?)

Memory – *Research Opportunities:* Some individuals can hold more "chunks" in short term memory; Is this an advantage for entrepreneurial decision making? Similarly, some individuals are better at transferring knowledge from short-term to long-term memory (e.g. via active use of mnemonics); again, is this an advantage under entrepreneurial decision making? All of these are also readily manipulable in the lab.

Knowledge – In keeping with the importance of deeper cognitive structures, we do not want to lose sight of knowledge content. What is it that successful entrepreneurs know that others do not? (Or is it more about the knowledge structures?)

*Research Opportunity:* Given the rapid mythologization of entrepreneurship and entrepreneurs, simply identifying the myths and misconceptions would offer, at worst, a powerful tool to share with educators, practitioners and policy makers.

Cognitive Change – Developmental and cognitive developmental psychology argue that where we learn the most about learning - how we learn and how we learn to learn – rests in studying how different influences can induce cognitive changes.

*Research Opportunities:* Good research is underway in the field to study the impact of

teaching/training methods on entrepreneurial cognitions. That would be straightforward to supplement with lab studies. However, we have too little research on the impact of other influences, developmental events that significantly change how we structure knowledge. Past research suggests that we should try to replicate those in experimental settings.

**Field Experiments**

Similarly, most of these experiments lend themselves to replication in different physical domains. Consider the research on various classic dilemmas under very different cultural settings. We are finding that local social norms can skew the results remarkably in direction, magnitude or both. This would offer additional opportunities for the research team and to recruit colleagues.

**Experimental Neuroscience in Entrepreneurship:**
**Towards a neural theory of entrepreneurial decision-making**

Here's where deep theory truly meets practical application. Most of the above also lend themselves to viewing through the neuroscience lens. Given the remarkable progress seen in neuroeconomics and neuromarketing (e.g., Camerer & Loewenstein 2004). The neuronal basis of entrepreneurial behavior could also be examined using a combination of methods from social neuroscience, neuroeconomics, and experimental economics, as for example neuroimaging techniques (i.e., fMRI, PET, TMS). These techniques would allow a better understanding of how entrepreneurial cognitions and emotion (and thus behaviour) forms and is processed in the brain.

Previous studies show that cognition and affective states can influence human behaviour. Studies in the last two decades have changed the image of economic man to psychological and neurobiological man. “Psychological man” (Tversky, 1996) doesn’t have preferences, they have mental processes. Different frames and contexts, and different choice procedures elicit different processes. So we may sometimes exhibit preference reversals because choosing and pricing elicit different mental procedures.)

Thus, the psychologist’s question: What accounts for [economist’s] “reluctance to abandon the [rational] model, despite considerable contrary evidence”?

“Neurobiological man” doesn’t even have a fixed collection of mental processes, in the sense of Tversky's “psychological man.” He has biological and chemical processes, which influence his behavior. Different blood chemistry leads to different mental processes; e.g. depending on the level of lithium (or Valium or Prozac) in our blood, we makes different decisions on both routine matters and matters of great consequence - even life and death. An understanding of how chemistry interacts with mental processes has proved to be very useful, for instance in treating depression.

Thus, the neurobiologist's question: What accounts for the psychologist's "reluctance to abandon purely psychological models, despite considerable contrary evidence"?

Long-term, we intend to create a research program to develop experimental entrepreneurship is to build an interdisciplinary research program in neuro-entrepreneurship. Fpr example, we might begin with combining behaviorally relevant administration of hormones (e.g., oxytocin, vasopressin, testosterone, gluco-corticoids, epinephrine, nor epinephrine) with behavioral and neurobiological testing in order to identify the affective, cognitive, endocrine, & neural mechanisms of different kinds of entrepreneurial actions (e.g., opportunity recognition, evaluation, exploitation).

However, step one is to create a significant program of experimental research in entrepreneurship. Existing initiatives such as the lab at Jonkoping International Business School have begun to show just how far we can advance using rigorous controlled experiments.

We invite our readers and listeners to join the effort.

**In sum**, if one believes there are humans in the entrepreneurial processes, using experimental methodologies offer us perhaps the ultimate opportunity**:** To put the entrepreneur back into entrepreneurship.