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Applying experimental methods to advance entrepreneurship research: On the need for and publication of experiments

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1. Executive summary

Welcome to the special issue on Applying Experimental Methods to Advance Entrepreneurship Research! With this opening article, we first articulate the importance of experimental methods to advance entrepreneurship research. We note the comparative paucity of experimental methods in entrepreneurship, and the *Journal of Business Venturing* (*JBV*), in particular. We encourage researchers – those with and without experience in experimental methods – to consider experiments as part of their methodological toolkit, and we explain the benefits to the field for expanding our use of experimental methods. Doing so, we provide a reminder of the importance of causality and explain why causality matters for the field of entrepreneurship.

We further posit that one reason for the comparative paucity of experimental methods in entrepreneurship research may be that entrepreneurship research employing experimental methods is not surviving the publication process. We address this possibility by offering practical advice for those seeking to publish experimental methods in entrepreneurship journals. Using exemplars from the special issue, we outline five areas (joining a conversation, theoretical contribution, ecological validity, samples and representativeness, and securing and enriching causal analysis) that may improve researchers' efforts to publish experimental research in premier entrepreneurship journals such as *JBV*.

We conclude this opening article by introducing and summarizing the nine articles that comprise this special issue. Despite their common focus on experimental methods, the articles represent a diverse set of theoretical and topical approaches and employ a wide range of empirical approaches. Ultimately, we hope they encourage researchers in entrepreneurship to use experimental methods in their research designs and to submit their best work to *JBV*.

2. Introduction to the special issue

Entrepreneurship requires thinking, acting, feedback, and adjustment. This action-driven approach creates knowledge that is not otherwise accessible to the entrepreneur—such as by observing and analyzing markets (Brush, 2014; Kerr et al., 2014). The challenge for the enterprising individual, however, is that cause and effect relationships between actions and outcomes are often opaque, and thus the necessary adjustments needed to improve outcomes moving forward can be difficult to identify. In an ideal world, practitioners could turn to entrepreneurship research as a guide for untangling commonly experienced cause and effect relationships related to entrepreneurial actions and their outcomes. However, entrepreneurship research is generally limited in this regard because

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scholarship to date boasts a strong focus on observational methods (Aguinis and Lawal, 2012; Hsu et al., 2017) that are not well suited for establishing causal relationships. Indeed, "inferring causality is one of the most difficult aspects of scientific research" (Colquitt, 2008: 616) because it requires documenting variation between cause and effect variables, establishing temporal precedence of the causal variable, and disqualification of alternative explanations as the cause (Cook and Campbell, 1979). Given the complexity of the phenomena studied in entrepreneurship research, satisfying the entirety of these criteria requires experimental research methods.

Despite this and other advantages, however, entrepreneurship research has not yet fully taken advantage of experimental methods. Indeed, there is still a lack of awareness that the knowledge derived from observational methods, as the predominant tool of choice, might be insufficient to establish linkages needed to effectively guide entrepreneurs and their stakeholders, who want to know, for example, if a particular action is likely to cause them to be more successful. As suggested by Rynes et al. (2018) and discussed in more detail below, by emphasizing experiments more intensively, entrepreneurship research creates rigorous scientific and theoretical insights. Experimental research also can improve practical relevance by providing more reliable knowledge about what causes changes in entrepreneurs' affect, cognitions, behaviors, and performance, about what may lead to the emergence and disappearance of entrepreneurship, and about the relationship between entrepreneurship and economic and social development.

To further develop and promote experimental methods in entrepreneurship research, we are pleased to present this special issue on Applying Experimental Methods to Advance Entrepreneurship Research to readers of *JBV*. This special issue originated with a Professional Development Workshop (PDW) at the 2016 Academy of Management Annual Meeting in Anaheim on publishing entrepreneurship research using experimental methods. The PDW arose from the organizers' experiences and the belief that it was time to build a community of scholars around the notion of using experimental methodologies to advance various facets of entrepreneurship research. PDW attendance was quite strong, with nearly every seat filled, and the insightful questions and lively discussion from the audience left all involved longing for a platform by which the conversation could continue. In our view, the PDW experience demonstrated a strong latent demand for experimental work in entrepreneurship and led us to the idea of a special issue as a forum to further advance the development and use of experimental methods in entrepreneurship research.

But some readers might question, as we did, whether strong interest in experimental research by entrepreneurship scholars warrants a special issue, especially since experiments are not the exclusive domain of any one field of research, even one as multidisciplinary as entrepreneurship. Indeed, experiments have long been a go-to method in other fields, and recent years have witnessed a slow but steady increase in the use of experimental methods in entrepreneurship research, as outlined by recent reviews (Hsu et al., 2017; Kraus et al., 2016). On the surface, then, it appears that experimental research is moving forward on its own, with little need for special issue intervention. However, there is more to the story.

Obstacles exist that lead experiments to be a *comparatively* rare method in entrepreneurship. Aguinis and Lawal (2012) found only 11 articles (6.3% of empirical articles) using experimental and quasi-experimental methods in *JBV* between 2005 and 2010. Updating their results, we find that from 2011 to 2018, the results are similar: 7% of empirical articles in *JBV* were experimental or quasi-experimental. However, recent years look more promising—12% in 2016, 18% in 2017—but with a concerning drop to 8% in 2018. Indeed, this special issue (nine articles) equates to the total number of experimental articles published in *JBV* in 2017 (6) and 2018 (3) combined. Looking at a broader set of seven entrepreneurship journals (including *JBV*), Grégoire, Binder, and Rauch (this issue) find that the number of articles utilizing experiments in all of these journals rose from 6 per year in 2010–2014 to 10.7 per year in 2015–2017. Yet, even this encouraging data suggest that only a couple of experimental studies are published, on average, in each entrepreneurship journal each year.

As a result, despite some progress, entrepreneurship is a complex phenomenon that evokes unique challenges for use of experimental methods. These challenges manifest in at least two ways: (1) entrepreneurship researchers deciding not to use experimental methods, and (2) entrepreneurship experimental studies not surviving the review process to publication (see also Stevenson and Josefy, this issue). To address the first challenge, we provided significant latitude regarding topics and experimental approaches in our call for papers, and we advertised the call throughout adjacent fields to reach those who are conducting experimental research on entrepreneurship topics but may not consider entrepreneurship journals as their primary publication outlets. Moreover, with this special issue, we hope to encourage researchers to add experimental methods to their toolkit (cf. Kuckertz and Prochotta, 2018).

To address the second challenge, we sought to provide a research outlet in the special issue that highlights research at the intersection of entrepreneurship and experimental methods, and that offers insights on contemporary techniques in experimental methods. We encouraged submissions where experimental designs help us to uncover important conceptual insights, disentangle complex relationships, and tackle difficult research questions that cannot be addressed via other methods. In that spirit, we explicitly asked authors to take a very reflective stance towards the employed methods' strengths and weaknesses, either as part of their method or discussion sections. Beyond the strengths or weaknesses of experimental methods vis-à-vis non-experimental methods, we wanted to see a discussion of the advantages and disadvantages of the experimental choices made vis-à-vis other experimental options. Doing so sheds light on the advantages and challenges researchers face as they attempt to advance experimental research through the review process. We believe this can inspire researchers to consider experimental methods in their own investigations, as well as illuminate viable paths to publication.

We are pleased to be a part of a rising tide in the promotion of experimental methods in the field of entrepreneurship and believe that the articles in the special issue serve as examples of the inherent challenges and immense payoff of applying experimental methods to future questions that emerge as scholars confront the complexities of entrepreneurship as a phenomenon. We are indebted to the many authors that submitted to the special issue, the tireless work of the reviewers, the support of PDW organizers, attendees, and participants, to former *JBV* editor-in-chief Dean Shepherd for greenlighting the special issue, and current editor-in-chief Jeff McMullen for his unwavering support. We believe the articles in the special issue, and the insights in this opening article that

emerged from the process of moving them forward, provide valuable lessons that have the potential to elevate experimental research within – and outside of – the field of entrepreneurship. In the following sections, we elaborate on these insights to help readers in their own efforts to apply experimental methods to advance entrepreneurship research.

3. Entrepreneurship research needs more experiments

The reliable identification of causal effects is why experimental methods, in general, and randomized control trials, in particular, are often considered to be the gold standard as a means to create reliable and action-oriented knowledge. To appreciate experimental methods, it is important to understand the value of the identification of causal relationships.

As an example, the importance of causality can be seen in the difference between stating *that successful entrepreneurs have a higher likelihood of displaying a particular characteristic* (e.g., successful entrepreneurs are better educated), and stating *changing a particular characteristic makes (prospective) entrepreneurs more successful* (e.g., educating individuals leads to success in entrepreneurship). The former is a correlational relationship, while the latter is a causal relationship. Continuing the example, if the better educated have better job prospects and only start businesses if they have found sufficiently good opportunities, then we may observe that, on average, the better educated are more successful. In this case, however, educating entrepreneurs, which would be highly relevant for policymakers and entrepreneurship educators, will not necessarily make them more successful; there is no causal relationship.

In addition to disentangling correlational versus causal relationships, experimental methods offer a means to overcome issues of reverse causality common in entrepreneurship research. For example, Bönte et al. (2016) highlight that entrepreneurs' risk-taking may not be simply a function of self-selection into entrepreneurship (Hsieh et al., 2017) but that becoming an entrepreneur may lead to changes in risk-taking (Brachert and Hyll, 2014). Similarly, although social networks should enhance new venture performance (Batjargal et al., 2013), the reverse may also be true (Stuart and Sorenson, 2007). When the potential for reverse causality is present, experimental methods provide an ideal means to develop a better understanding of the nature and direction of causal relationships and increase the fidelity of the results, especially when compared to post-hoc methods to test for the direction of causality.

Another key advantage of experimental methods is they are well suited for replication: “the performance of another study statistically confirming the same hypothesis” (Moonesinghe et al. 2007: 218). While the emphasis on novelty as a prerequisite for publication has rendered replication studies out of fashion in social science research (Neuliep and Crandall, 1993), it does not change the fact that replication studies are a necessary component of causal effect confirmation. Indeed, prior scholarship has noted that replication is the cornerstone of causal inference (Moonesinghe et al., 2007), and therein a scientific field “that replicates its work is rigorous and scientifically sound” (Makel et al., 2012). We agree and note that observational studies are plagued by idiosyncrasies that make replication studies difficult. By contrast, while experiments are not a panacea for replication, the approach creates a highly controlled environment that can be replicated for use with a new sample. Given the emergence of journals such as *Academy of Management Discoveries* that actively encourage replication studies, we see the replicability of experiments as a distinct and valuable feature.

Taken together, the above arguments illustrate that experimental methods provide valuable insight into both the theory and practice of entrepreneurship. However, experiments do not have to be employed alone. Using experiments in conjunction with other methods can be an especially fruitful endeavor. Experiments can be the primary method used to generate new theoretical and empirical insights and then be supplemented by other methods. For example, Shepherd et al. (2013) conducted an experiment to uncover when and why entrepreneurs select opportunities that violate their personal values. To this experiment, they added data from the post-experiment survey and data on entrepreneurs' actual entry into energy-inefficient industries to demonstrate the impact of such decisions. Several articles in the special issue follow this approach by following up experiments with other methodologies (Hsu et al., this issue; Stevenson et al., this issue; Younkin and Kuppuswamy, this issue). Experiments can also supplement and clarify a study's findings. For example, Kistruck et al. (2013) used a quasi-experimental field study to show that identity mechanisms can mitigate agency problems in base of the pyramid markets. However, because of the noise and potential competing explanations in the field study, the authors used a laboratory study to confirm identity theory's role as the causal mechanism. In this special issue, Rigtering, Weitzel, and Muehlfeld, this issue used a similar approach.

4. Experiments and pathways for contribution

Making a scientific contribution to one's field of study is an ideal that is universal in science. In organization studies, claims of novelty and usefulness represent one way to demarcate what is, and what is not, considered a contribution (Astley, 1985). Hence, it is no surprise that one of the top questions journal reviewers ask is: “what is new here” (Mone and McKinley, 1993)? But the validity of responses by authors to this question is difficult to evaluate in fields where knowledge is socially constructed. In these socially-constructed fields, “the determination of what ideas count as knowledge is a meaning-making activity” (Locke and Golden-Biddle 1997: 1025). Entrepreneurship represents such a socially-constructed field, and experimental methods have a role to play in the meaning-making of the community of entrepreneurship researchers.

Specifically, the use of experimental methods can enhance the argument that one's research is novel. If authors wish for experimental methods to be a core part of a manuscript's contribution, this requires approaching experimental methods as needing both novelty *and* continuity. In terms of novelty, the experimental method must grab the attention of other researchers (especially reviewers), and to do so usually requires a new twist on the methods. For the experimental method to be part of the contribution, it must push the boundaries of the traditional approach to experiments. Rather than the methods being contributions in and of themselves, a contribution becomes possible when the method is extended in ways that increase its applicability and utility across

disciplines.

However, a key challenge with innovating methods is that one must maintain continuity with convention. Methods cannot stray too far from the intellectual schemas that researchers have around the method because if they do, the lack of understanding that follows leaves readers with the sense that the study lacks rigor. For example, Lahti, Halko, Karagozoglu, and Wincent (this issue) conduct a neuroscience experiment of entrepreneurial bonding, and one of the central challenges we faced when inviting reviewers was that neuroscience studies in the field of entrepreneurship are rare. But in adopting this approach in entrepreneurship, this study was able to demonstrate a novel approach that represents a methodological contribution (in addition to its contribution to theory).

Another possibility for creating a pathway for contribution with experimental methods is to use experimental methods to address new topics or answer questions that might not be able to be answered in the same way using other methodologies. This opens the door for significant contributions to theory or the practice of entrepreneurship. As we have noted, this entails the use of experiments to address questions that require a causal understanding, that have many alternative explanations, that may involve reverse causality, or that are not easily captured (for various reasons) using other methodologies. For example, Rigtering et al. (this issue), use a field experiment in the area of corporate entrepreneurship to offer novel insights regarding how framing influences a corporate entrepreneurship initiative. Doing so, they shed light on a phenomenon in an established literature that would remain under-explained. Similarly, experimental methods help us shed new light on long-standing questions. Younkin and Kuppuswamy (this issue) apply a series of experiments to understand the nature of founder race and bias. Again, the experimental method allows them to investigate causality and explain these important relationships in ways other methods could not. In both of these studies, experimental methods enable a theory contribution that would not be possible without the use of experiments.

Ultimately, the path to making a contribution requires one to understand paradigmatic convergence around what it means to conduct rigorous experiments that produce high-quality data as a guide. But, if our arguments thus far hold, it is not enough to simply conduct a rigorous experiment. The road to publication is a labyrinth of complexities with method and data representing only part of the equation. Other challenges remain, and it is imperative for the future of entrepreneurship research that those seeking to conduct experimental work consider the obstacles involved and do so within a framework of potential pathways to publication.

5. Pathways to publication

Even if experimental methods are being commonly used, the question remains if many of these studies are not surviving the review process at premier journals (see also Stevenson and Josefy, this issue). If experimental research is not surviving the review process, what insights might be offered, not just for future authors, but also for reviewers evaluating experimental methods in the papers they are reviewing? We thus turn to the prickly question of how to increase the chances of publishing experimental research in entrepreneurship journals such as *JBV*.

Drawing from our experiences as authors, reviewers, and editors, and most notably from our work on this special issue, we identify core elements that inform authors' publishing of experimental methods in premier entrepreneurship journals. In doing so, we acknowledge and hope that authors using any methodology, not just experimental methods, will find these insights useful. These are not exhaustive; nor does following this advice provide guaranteed success. Indeed, we caution that these are not steadfast rules for publication. Moreover, there is other excellent advice on this topic provided in reviews both in this special issue (Grégoire et al., this issue; Stevenson and Josefy, this issue) and elsewhere (Hsu et al., 2017; Kraus et al., 2016). In providing such advice, we also acknowledge that no study is perfect. All methods require trade-offs. Each of the experiments in this special issue had to navigate these trade-offs. Throughout the process, we asked the authors to be highly self-reflective of the various considerations they balanced for their studies. Indeed, we believe careful reflection on these issues can serve as core elements of high-quality experimental methods in entrepreneurship and hence might prove fruitful for increasing the relative number of experimental research studies in entrepreneurship.

5.1. Joining a conversation

An important attribute of experimental research that survive the review process at premier journals, including those selected for this *JBV* special issue, is they offer a tight and well-argued link to entrepreneurial phenomena that are of keen interest to scholars in the discipline. As editors and authors, we typically think of this as “joining a conversation” that is occurring in the field, ideally with part of that conversation unfolding in the targeted journal. Experimental research must focus on phenomena in which entrepreneurship scholars are interested and must be positioned in a way that relevance to an entrepreneurship-focused journal such as *JBV* is crystal clear. Importantly, the use of experimental methods is typically not part of the positioning relative to joining the conversation. Instead, the conversation is phenomenon-driven and therefore generally methods neutral. Therefore, scholars should realize that unless the target is a methods journal (or a special issue particularly dedicated to a method focus), the conversation one is joining is not about experimental methods, but instead about a phenomenon and, thus, experimental methods serve as a mechanism to empirically tap into the phenomenon to enable new discoveries and insights (Henshel, 1980).

Notably, the papers in this special issue join conversations that are the kind that could be overheard among a group of entrepreneurship scholars gathered at a conference. For example, Lahti et al. (this issue) explore entrepreneurial bonding (bonding between founders and their ventures), and this links to well-cited studies on explaining entrepreneurship through the use of parenting metaphor and related work on the role of founder passion (Cardon et al., 2005; Breugst et al., 2012). Likewise, Stevenson, Ciuchta, Letwin, Dinger, and Vancouver (this issue) join conversations on both entrepreneurial self-efficacy and crowdfunding, using these literatures as a launching off point to demonstrate that self-efficacy may actually harm funders' decision making. For their part,

Frederiks, Englis, Ehrenhard, and Groen (this issue) link with discussions around future-oriented cognitive processes that are gaining traction in top journals (e.g., Kier and McMullen, 2018) and advance the conversation by documenting the role of perspective taking and prospective thinking on the quality of new venture ideas. Finally, by evaluating a mandatory tax training program for entrepreneurs, Nagel, Huber, Van Praag, and Goslinga (this issue) tie to both economic studies on entrepreneurship policy and illustrate the journal's interdisciplinary focus by linking to the tax literature.

5.2. Theoretical contribution

A necessary condition for publication in premier journals, including *JBV*, is that the article makes an impactful contribution to theory, practice, and/or policy.[1] We focus here on contributions to theory. This signals that manuscripts employing experimental methods cannot generally rely on the empirics and findings as their contribution. Instead, authors must contribute to our understanding of entrepreneurial phenomena by offering core arguments that push theory forward and support this effort with sound logic and persuasive argumentation, while also making proper ties to past research and synthesizing all of this into a coherent theoretical framework. The net effect is that articles that make a theory contribution ought to, among other things, have a set of theoretically-derived hypotheses where the experimental method is used to test, extend, and/or is otherwise motivated by theory. The importance of this for advancing experimental methods in entrepreneurship research cannot be overstated. The absence of strong theoretically-derived hypotheses leaves researchers unclear about which variables should be included in the experiment. This undermines the validity of the experiment, and therein the ability to use experiments to infer causality and thus the gold standard of the research technique fades away.[2]

5.3. Ecological validity

Validity in general, as Grégoire et al. (this issue) note, represents an important challenge for entrepreneurship research using experiments. Here we draw special attention to the fact that ecological validity specifically is a core element of applying experimental methods to entrepreneurship research that is often overlooked. Ecological validity is the "relation between real-world phenomena and the investigation of these phenomena in experimental contexts" (Schmuckler 2001: 420). Hence, ecological validity reflects the degree to which elements of the experiment tie to real-world phenomena (Schmuckler, 2001). Notably, ecological validity is distinct from external validity in that external validity is about generalizability to other situations, contexts, or populations (Aronson and Carlsmith, 1968) whereas ecological validity is about ensuring representation of real-world phenomena (Schmuckler, 2001). Ecological validity is one of the strengths of the Rigtering et al. (this issue) paper, which uses a field experiment in the area of corporate entrepreneurship that enables the authors to develop a causal understanding of a phenomenon as it is happening in the organization.

While ecological validity is something that researchers from all disciplines should consider, it is an especially critical factor in entrepreneurship research. Entrepreneurship is an applied discipline and often entrepreneurship practice serves as the stimulus for entrepreneurship research. The risk for experimental research in entrepreneurship, then, is that scholars must ensure the elements of experiments tie to the real world in a meaningful way. Conducting extensive literature reviews, expert surveys, or grounded theory inquiries are ways in which to inform ecological validity of experimental designs (Zikmund, 2003). Conducting multiple experiments is another way to address this with variation between experiments moving from less to more ecologically-valid contexts. For example, Frederiks et al.'s (this issue) study of new venture ideas included an initial experiment that prompted participants to generate new venture ideas. Because such prompting is rare in real life, they conduct a second study where individuals spontaneously generated new venture ideas. The spontaneous generation of new venture ideas tracks with entrepreneurs' real-life experiences, and thus, the second study improved ecological validity.

5.4. Samples and representativeness

Next, we turn to the validity and adequacy of the sample. The question of adequacy of the sample received ample treatment in the special issue (e.g., Grégoire et al., this issue; Hsu et al., this issue; Stevenson and Josefy, this issue). Recent reviews have also addressed the question of student samples (Hsu et al., 2017; Kraus et al., 2016). We build on these ideas to discuss samples more holistically, and specifically the idea of representativeness in terms of alignment with the phenomenon (conversation joined), in a real-world manner (ecological validity), and with theory (theoretical logic and hypotheses). Beginning with the phenomenon, alignment reflects the extent to which the sample is representative of the entrepreneurial phenomenon of interest. For example, one can ask: if a study is seeking to join the conversation about crowdfunding, is the sample representative of this context (e.g., is the sample made up of individuals, firms, platforms, etc. that reflect crowdfunding)? Younkin and Kuppuswamy (this issue) demonstrate this in their study on reward-based crowdfunding by using a sampling approach that explicitly targets crowdfunders on Amazon Mechanical Turk. Doing so, they match their samples' characteristics to those of crowdfunders on major crowdfunding sites. They also test whether their results hold for those individuals that have actually used a rewards-based crowdfunding site.

[1] Specifically, in the guide for authors (https://www.elsevier.com/journals/journal-of-business-venturing/0883-9026/guide-for-authors), it states "articles can be either rigorous theoretical contributions or theory-driven empirical contribution" as long as the contribution increases "understanding of entrepreneurial phenomena."

[2] Although we focus on a deductive approach here, experiments can be plausibly used with inductive or abductive approaches.

Second, the experimental task should align with the nature of the sample. Expanding on Section 5.3 above, this is a question of ecological validity. With respect to sampling and ecological validity, we ask about the extent to which the experimental task is realistic and relevant for the proposed sample. For example, Hsu, Burmeister-Lamp, Simmons, Foo, Hong, and Pipes (this issue) utilize student samples in their experiments but do so deliberately because of their focus on intention. Although the use of student samples is potentially contentious, these authors neatly justify their use of a student sample and combine this with post hoc analyses using data collected from working employees recruited on Amazon Mechanical Turk. Finally, Rigtering et al. (this issue) use employees of a firm that is engaging in corporate entrepreneurship as their sample, as these are the exact individuals for whom the experimental task is relevant. A sample that is asked to do an experimental task or experience a manipulation that is not relevant nor realistic ultimately results in confusion regarding to whom and to which situations the experimental findings apply, thus undermining the potential contribution of the experiment.

Finally, we emphasize the important link between theory and sample. One consideration is the extent to which the theory is 'universalistic,' meaning that it holds across samples with varying levels of experience, intelligence, and other factors. In entrepreneurship, we posit that such universalistic situations are rare; thus, it is important for the sample to match the specifics of the theory or constructs of interest. Often this means, as articulated above, that the sampling units directly match the phenomena of interest and for whom the task is relevant and realistic. However, this decision is not always so straightforward. For example, while a study on equity crowdfunding would, according to the criteria above, require a sample of actual equity crowdfunders, theory may suggest otherwise. Stevenson and Josefy's (this issue) theoretical (amateur funders) and empirical (effectiveness of self-efficacy) manipulations called for a sample of inexperienced individuals that are characteristic of, but not experienced with, the amateur crowdfunders of interest to this research. In short, their theory required inexperience, as the theoretical roles of prior experience (and the knowledge gained from experience) and self-efficacy differ. As the authors note, sampling experienced crowdfunders would have violated both the theoretical argument and undermined the manipulations. These issues parallel arguments made recently about the potential for reverse causality and sample selection biases (Bönte et al., 2016). Thus, it is important to take into account the 'needs' of your theory when determining whom to invite to participate in your studies.

5.5. Securing and enriching the analysis of causal effects

Employing experimental methods to investigate an effect does not automatically guarantee the identification of the causal effect of interest. There are multiple pitfalls which may threaten the ability to derive insights on the causality of an observed effect, or the internal validity of an experiment (Angrist and Pischke, 2009). We would like to draw attention to some of them. Manipulation checks in form of measuring the manipulated variables are an important tool to demonstrate that the desired manipulation has indeed been effective, yet problems may arise when these checks reveal that the manipulation has been less effective or even ineffective for some participants (e.g., because participants did not comply with or did not understand the procedures of the experiment or simply are more or less sensitive to the manipulations). Although researchers might be tempted to focus on only those who have seemingly been correctly manipulated, this may cause endogenous selection problems that compromise the identification of the causal effect (Gerber and Green, 2012).

Furthermore, by assuming that such manipulation checks better reflect the variation one wants to study, it might be tempting for researchers to analyze how the manipulation check rather than the original manipulation is related the outcome of interest. Nevertheless, since both the manipulation check and the outcome could be affected by the same unobserved variable, this would turn an experiment into a purely correlational study, threatening the identification of a causal effect (Gerber and Green, 2012). Researchers may also simultaneously measure potential mediating or moderating variables in addition to outcomes. In these cases, the relationships between the moderators, the mediators, and outcomes and, hence, the analysis of a potentially moderated or mediated effect, should not be claimed to demonstrate a causal relationship.

While the above-mentioned issues may compromise the identification of causal effects, we would like to emphasize that providing these kinds of analyses as supplements to sound analyses of the causal effects offer important additional information. Rather than calling to replace correlational analyses with causal analyses, we call for the most informative use of available information, which may include both types of analyses. For example, researchers usually introduce particular mechanisms that underlie the hypothesized and tested causal effect. By simultaneously measuring potential mediators, for instance, researchers may rule out potential alternative explanations and, thereby, increase confidence that the causal effect indeed rests on a particular mechanism (see Nagel et al., this issue, for an example). Furthermore, also excluding individuals with ineffective manipulations or taking manipulation checks as explanatory variables (e.g., Hsu et al., this issue) may provide additional insights on top of the test of causal effects. For such combinations, however, we urge researchers to report and unambiguously test the causal effects, to separate related correlational analyses, and to be transparent and explicit about what analyses are less informative only under particular conditions.

6. Articles appearing in the special issue

JBV is a multi-disciplinary, multi-functional, and multi-contextual journal which publishes work from a broad group of disciplines and scholars. In line with the journal's mission, as noted above, we encouraged submissions from a wide range of scholars and promoted the call for papers across disciplines. We received 56 submissions, and we are pleased to present the following 9 articles (discussed in alphabetical order) for this special issue on Applying Experimental Methods to Advance Entrepreneurship Research.

Frederiks, Englis, Ehrenhard, and Groen (this issue) explore the influence of future-oriented cognitive processes such as perspective taking and prospective thinking, and the role of backward-looking counterfactual thinking on the quality of new venture

ideas (NVIs). Conceptually, they advance that different cognitive processes will impact the generation of NVIs differently. They test their predictions via two priming experiments where participants are exposed to cognitive primes designed to evoke future-focused and counterfactual thinking. Importantly, the priming experiments included control groups that established the effectiveness of the prime and provided insights on causality. One interesting twist is that the experiments allowed for the generation of both prompted and spontaneous generation of NVI, and the researchers found important differences between these two modes of NVI generation. These insights are valuable because they provide an improved understanding of the role of cognitive processes in NVI generation and do so across situations where idea generation is prompted and when it is spontaneous.

Grégoire, Binder, and Rauch (this issue) address the validity challenges faced by entrepreneurship researchers conducting experiments. Specifically, they note that there are certain characteristics of entrepreneurship that can threaten the validity of experimental research in entrepreneurship—such as the radical uncertainty, temporal dynamics, and high personal stakes involved in entrepreneurship research. They suggest that these different characteristics are hard to integrate into experiments in a way that leads to valid results that enable theoretical and practical contributions. In their paper, they look across 144 different studies from entrepreneurship and management journals to provide a set of strategies to address the challenges to validity that can be used by researchers doing experimental research in entrepreneurship. In this way, they build on and complement prior research that broadly addresses experiments in entrepreneurship (Kraus et al., 2016; Hsu et al., 2017) to offer clear and practical guidance for increasing the validity of experiments in entrepreneurship in a way that is realistic, theoretically meaningful, and can establish the causal effects of the constructs of interest. Their paper represents a helpful guide for both established and novice experimentalists.

Hsu, Burmeister-Lamp, Simmons, Foo, Hong, and Pipes (this issue) seek to provide additional insight into the relationship between entrepreneurial self-efficacy and entrepreneurial intention. While prior research has posited a relationship between entrepreneurial self-efficacy and entrepreneurial intention (Boyd and Vozikis, 1994; Chen et al., 1998; McGee et al., 2009), recent evidence has demonstrated that there are boundary conditions to such a relationship that needs to be understood (e.g., Fitzsimmons and Douglas, 2011). In their paper, Hsu and colleagues accordingly conceptualize perceived person-entrepreneurship fit as a moderator of the entrepreneurial self-efficacy and entrepreneurial intention relationship. In two randomized experiments and one correlational survey, they demonstrate that entrepreneurial intention is strongly predicted by entrepreneurial self-efficacy when there is a high perceived person-entrepreneurship fit, but that this relationship does not hold when there is a low perceived person-entrepreneurship fit. As we have noted, Hsu and colleagues demonstrate when student samples can be appropriate within entrepreneurship research.

Lahti, Halko, Karagozoglu, and Wincent (this issue) argue that while entrepreneurs in the field often speak about the businesses they launch as their "baby," and approaching entrepreneurship research from a parenting perspective has proved valuable (Cardon et al., 2005), there is little empirical evidence that this manifests in impactful ways beyond simply a metaphor for understanding entrepreneurship. They employ neuroscience methods to compare the brain activity of entrepreneurs (firm founders) and parents (fathers) via functional magnetic resonance imaging (fMRI). Their findings indicate that entrepreneurs exhibit similar patterns of affective bonding as do parents when exposed to child stimuli. This provides evidence that the relation between founder and venture is biological and takes hold at the neurological level. Despite calls for the use of neuroscience methods in entrepreneurship (Nicolaou and Shane, 2014) and their potential to transform entrepreneurial cognition research (McMullen et al., 2014), there has been little tangible movement in this direction. Lahti and colleagues answered the call and overcame the challenge of conducting multidisciplinary research (de Holan, 2014).

Nagel, Huber, Van Praag, and Goslinga (this issue) study the impact of a publicly financed training program for first-time entrepreneurs. They go beyond the narrow focus on training in business model/business plan development and draw attention to training related to handling taxes and filing information to tax authorities and how these authorities can support entrepreneurs in such processes. Although traditional entrepreneurship training has mostly built on a cooperative and supportive style, tax authorities often employ a "cops and robbers" perspective, treating entrepreneurs as potential robbers. Contrasting such activities, Nagel and colleagues build on a cooperative perspective based on mutual trust and respect and without deterrence. Using a field experiment, run in cooperation with tax authorities, they demonstrate that such training improved tax compliance, and higher profits were reported, possibly resulting in higher tax payments, which implies a substantial benefit to public authorities.

Rigtering, Weitzel, and Muehlfeld (this issue) use a field experiment in the area of corporate entrepreneurship (Burgelman, 1983; Covin and Slevin, 1991; Covin and Miles, 1999) to address the question of how framing regarding an "intrapreneurial" initiative in an organization can affect the success of that initiative. These authors use self-determination theory and research on creativity to argue that the way in which managers invite employees to engage in the initiative (i.e., framing the initiative as opt-out versus opt-in and providing examples of prior successes) can influence both the number of ideas that get submitted and the quality of these ideas. Specifically, they find that: (1) use of an opt-out approach can increase participation in the initiative, but not in a way that decreases the quality of the ideas; and (2) that providing examples of successful ideas can increase the usefulness of ideas, but does so at the expense of the number of ideas. Their approach enables them to understand causal relationships that exist between managerial action and organizational outcomes in a research area that primarily has used secondary data or surveys.

Stevenson, Ciuchta, Letwin, Dinger, and Vancouver (this issue) draw from control theory to challenge a key tenet of entrepreneurship research – the beneficial effect of self-efficacy. Using two experimental studies and a quasi-experimental field study, they show that self-efficacy can hinder decision-making performance, specifically as a result of reduced searching effort. In addition to the contribution to entrepreneurship research on self-efficacy, this article offers contributions to the crowdfunding literature, especially what influences amateur equity crowdfunder decisions, and the importance of unqualified crowd cues for exacerbating individuals' potential decision errors. Empirically, they present an example of testing complex theory by using mediation and moderated mediation analyses in conjunction with experiments.

Stevenson and Josefy (this issue) draw on gatekeeping theory (Shoemaker and Vos, 2009) to address why experiments are not more prevalent in entrepreneurship research. They seek to address the "chicken and the egg" challenge of increasing the prevalence of experiments in entrepreneurship research: (a) experiments in entrepreneurship research are not common; (b) as a result they face more resistance; (c) which results in entrepreneurship experiments remaining rare; (d) which in turn entrenches the resistance to experiments and difficulties in getting them published. To provide a solution, Stevenson and Josefy conduct three different studies. The first study surveys authors to understand: (1) the kinds of manuscripts being submitted to (and rejected from) journals, (2) the authors' characteristics, and (3) the perceived reasons for the rejection. The second study examines the decision letters authors receive for manuscripts that use experiments in entrepreneurship research (rejection and revise and resubmit). The third study surveys journal editors who have experience with entrepreneurship research using experiments. As a result, Stevenson and Josefy develop a better understanding of the nature of the individual- and routine-level gatekeeping that occurs with experimental research in entrepreneurship. They provide concrete and practical advice to authors and reviewers to ensure that experiments in entrepreneurship can be realized without undermining the quality of the research.

Younkin and Kuppuswamy (this issue) tackle a thorny practical issue – the persistent underperformance of minority entrepreneurs – that is accompanied by a difficult empirical setting – where potential explanations may be hidden by social desirability or may not be consciously accessible. They draw from theory on consumer discrimination to examine a specific mechanism underpinning underperformance: consumer bias. This article advances theory and research in minority entrepreneurship and reward-based crowdfunding by identifying a consumer-level bias that penalizes minority founders as well as mechanisms founders and crowdfunders can use to alleviate the bias. They provide an example of using multiple experiments to rule out alternate explanations as well as the important difference between ruling out an explanation and failing to rule it in. Pairing their experiments with crowdfunding campaign data, they reinforce the criticality of experiments to provide a causal understanding of why specific behaviors occur.

7. Conclusion

While there is a slow but steady increase in the use of experimental methods in entrepreneurship, challenges exist that continue to play a role in experimental methods remaining comparatively rare. Given the importance of experiments as uniquely qualified to speak to causality, with this special issue, we sought to provide a forum for highlighting exemplars at the intersection of entrepreneurship and experimental research and for offering insights on leading-edge practices in experimental research. Moreover, we hoped to see entrepreneurship scholars utilize experimental designs in future research to uncover important insights, disentangle complex relationships, and tackle difficult research questions that might not lend themselves to other methods. Our hopes were realized, and the papers in this issue deliver upon this promise. We close by encouraging other researchers to use experimental methods in their future research and to submit different kinds of experiments, including types and designs not present in this special issue, as a way of making an important contribution to the field of entrepreneurship research.

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