Three Essays on the Micro-Foundations of Entrepreneurial Human Capital

By

Andy El-Zayaty

A dissertation submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

(Business)

at the
UNIVERSITY OF WISCONSIN-MADISON 2021

Date of final oral examination: 05/17/2021
The dissertation has been approved by the following members of the Final Oral Committee:

Martin Ganco, Associate Professor, Management and Human Resources (Co-Chair)
Russell Coff, Professor, Management and Human Resources (Co-Chair)
Hart Posen, Professor, Management and Human Resources
Markus Brauer, Professor, Psychology

ACKNOWLEDGMENTS

It is difficult to highlight every person who has helped me along the way to completing my PhD. The obvious starting point is my dissertation committee. First and foremost, I would like to thank Martin Ganco, the co-chair of my committee and the true definition of a mentor. He has imparted knowledge, time, and effort with a generosity that goes far above and beyond what any student could expect. My success would not have been possible without him. Similarly, Russ Coff, Hart Posen, and Markus Brauer enriched my mind, guided my thinking, and pushed me to improve.

I also want to thank the colleagues who I bonded with along the way for their support: my cohort-mates, Rakoon Piyanontalee & Thomas Ngo, my academic "big sister" Bukky Akinsanmi, as well as my friends and collaborators, Yea Hee Ko and Zhi Cao. I also owe thanks to the UW-Madison faculty in the MHR department and elsewhere.

My family and friends kept me afloat over these six years, and I owe them a debt of gratitude. Seth Swanner and Hosanna Krienke, who listened to my complaints across three states and over a whole lot of Discord – thank you. The podcast crew, for firmly rooting me in the 90's in order to stay sane – thank you. My little "search assistant", Eleanor – thank you. But most importantly, and above all others – thank you to my wife, Nora Eltahawy. It is not sufficient to say that I wouldn't have reached the finish line without you. There would have been no race to begin with. You made it possible for me to be the person I needed to be to do this – thank you.

TABLE OF CONTENTS

Contents

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

In this dissertation, I examine the micro-foundations of entrepreneurial human capital in three inter-related essays. In the first essay, I examine the impacts of the use of vague language by entrepreneurs on venture funding outcomes and identify how human capital associated with the use of rhetoric moderates that relationship. In essay 2, I further explore the theme of entrepreneurial language use. Using both archival and experimental data, I test the impact of complex language on the success of crowdfunding ventures, and examine how this effect interacts with the presence of external signals of quality. Finally, in essay 3, I build a theoretical framework exploring how the search processes which underly the aggregation of firm level human capital resources sometimes lead to negative outcomes. By incorporating search and complexity theory into the extant theory on human capital aggregation, I generate new insights into the unintended impacts of the aggregation process over the lifecycle of the firm.

INTRODUCTION

The strategy and entrepreneurship literatures have, over the past several years, begun to critically consider the level of analysis at which firm-level phenomenon should be studied. In their earliest forms, discussions of firm strategy and entrepreneurial performance were concerned primarily with "macro" level constructs which resided solely at the level of the organization, in contrast to "micro" fields such as organizational behavior, which considered individuals and their impacts on those around them. The starkness of this divide eventually gave way to the micro-foundational approach, in which different levels of analysis, especially that of the individual, were employed to study firm level phenomenon (Foss, 2003; Lippman & Rumelt, 2003).

The micro-foundations literature is broad both in topics and in terms of its own definition. A seminal work in the field describes it as an effort to address the fact that "there are no conceivable causal mechanisms in the social world that operate solely on the macro-level" (Abell, Felin, & Foss, 2008). Most importantly, the mechanisms that are of most concern in the micro-foundations literature are the individuals who comprise the firm (Felin & Foss, 2005).

It is because of this point that this literature has consistently overlapped with the strategic human capital literature. The human capital literature's focus on individuals as a source of competitive advantage (Becker, 1964; Coff, 2002; Ganco, Coff, El-Zayaty, & Mawdsley, 2020) pre-dated explicit discussions of micro-foundations as a new direction for macro research. It ultimately joined those discussions by exploring new elements of the link between human capital and firm performance, such as the transaction costs of the individuals involved (Coff, 1999; Raffiee & Coff, 2016) and the social and psychological interactions between people which lead

to firm-level human capital "emergence" (Ployhart & Moliterno, 2011; Ployhart, Weekley, & Baughman, 2006).

It is this concept of emergence, or aggregation, which is the underlying concern of each of the essays in this dissertation. Specifically, the three studies herein how the human capital micro-underpinnings of *entrepreneurial* performance at the individual level influence firm level outcomes. The first two studies are empirical explorations of the role of human capital in entrepreneurial resource acquisition, with a specific focus on individuals' ability to use and understand different types of language. The third study builds a theoretical framework based in the existing literature on the emergent creation of firm level human capital from the individual level. It explores how the process of problem-solving via the aggregation of human capital has path-dependent impacts which stretch from the entrepreneurial stage of the firm lifecycle through to maturity.

Language and human capital have been growing in importance as topics of interest for scholars researching the micro-foundations of entrepreneurial performance. The language used by managers and entrepreneurs in particular is an important source of information in situations where information – especially about performance or potential performance – is lacking (Clingingsmith & Shane, 2017; Vaara, Sonenshein, & Boje, 2016). Firms' written and verbal communications with third parties can be used to form narratives that influence the way they are perceived (Barry & Elmes, 1997; Harmon, Green, & Goodnight, 2015). Similarly, firms can strategically focus on various parts of speech or linguistic tools in order to reinforce certain ideas in the minds of their audience that might help them to achieve goals such as receiving funding or being considered to be a member of an extant, legitimate group (Glynn & Navis, 2013; Martens, Jennings, & Jennings, 2007). The exchange of information between managers, entrepreneurs,

and third parties such as venture capitalists is a prime example of what Abell, Felin, and Foss's deemed to be "how intentional human action and interaction…produce strategic phenomena" (2008).

Entrepreneurs' human capital serves a similar role to language, providing meaningful information to outsiders about the capabilities and quality of a firm when their ability to show traditional signs of performance may be limited (Hoenig & Henkel, 2015; Shane & Stuart, 2002; Stuart, Hoang, & Hybels, 1999). The human capital of new venture founding team members is known to have significant impacts on a firm's ability to acquire resources (e.g., funding from investors). Various streams of literature have noted that things such as previous founding experience, previous managerial experience, cognitive endowments, and education (especially in technical fields) are associated with more positive assessments of a firm by potential investors (Haeussler, Harhoff, & Mueller, 2014; Stuart & Abetti, 1990). Investors in particular observe the experience and education background of founding team members as a proxy for their human capital, which is in turn a proxy for the quality of the venture they have founded (Colombo & Grilli, 2010; De Clercq & Sapienza, 2005). Studies consistently show that the founding team's experience is amongst the top criteria that venture capitalists use in choosing to invest in a venture (Franke, Gruber, Harhoff, & Henkel, 2006; Zacharakis & Meyer, 2000).

The first chapter of this dissertation builds on both the literature on entrepreneurial language use and entrepreneurial human capital to explore the how individual level human capital and communication aggregate to impact firm funding outcomes. I analyze entrepreneurial firms' use of vague language in their investor facing communications in order to understand the role such language might play in their funding success. Prior work in management and other literatures has highlighted the fact that firms have a tendency to use vague language in order to

obfuscate underlying facts which are either negative, unclear, or controversial (Channell, 1994; Guo, Yu, & Gimeno, 2017). As a result, audiences generally associate the use of such language with being low quality or untrustworthy (Colwell, Hiscock, & Memon, 2002; Neu, 1991). At the same time, however, speakers who are able to understand and build a rapport with their audiences may instead be able to tap into other, positive elements of vague language, such as indicating membership in an in-group, or drawing on shared informal knowledge and norms (Leech, 2000; McGee, 2018). I hypothesize in this study that in general, the use of vague language will be associated with inferior funding outcomes for entrepreneurial firms. However, drawing on the entrepreneurial human capital literature, I also propose that firms whose founding members are particularly skilled in the use of language will be able to extract value from the use of vague language by understanding their audience and tailoring messages to their needs.

Another area in which discussions of language and human capital have become focal points of research is the literature on crowdfunding. Crowdfunding is a setting in which language is especially important due to the fact that on most crowdfunding platforms, the written "pitch" is the primary source of information for potential investors. Due to this, a growing literature has examined the way that crowdfunding entrepreneurs use language in their pitches. A variety of traits of language have been shown to have an impact on crowdfunding outcomes, such as positivity (Anglin, Short, Drover, Stevenson, McKenny, & Allison, 2018), exciting or inclusive language (Kaminski & Hopp, 2019), and appeals to rationality (Patel, Wolfe, & Manikas, 2020). In addition, the nature of the project itself – for example, whether it has social impacts or is purely a for-profit enterprise - has been shown to interact with which approaches to narrative work best (Parhankangas & Renko, 2017).

Whilst the human capital of crowdfunding entrepreneurs has many of the same signaling impacts as that of entrepreneurs in other contexts, perhaps what is more important in the crowdfunding literature is the human capital of potential investors. An early and enduring concern in the crowdfunding space has been how "naïve" investors, who are not professionals in investing nor subject matter experts, might not be able to discern low from high quality projects, or even fraud from legitimate business (James, 2013; Morsy, 2013). This led to many studies of the outcomes of crowdfunding and general crowdsourcing of ideas, with a core finding that, surprisingly, crowds on the whole perform nearly as well as professionals at identifying and choosing winners (Da & Huang, 2019; Palley & Soll, 2019; Schijven & Hitt, 2012).

The second chapter of this dissertation expands on these themes by exploring language complexity. Language complexity, or general ease of reading, has received some attention in the management literature as a determinant of certain firm outcomes (Guo, Sengul, & Yu, 2020). It has received relatively less attention in the context of crowdfunding, despite the fact that it is a naturally relevant aspect of language when the defining characteristic of the audience is their lack of technical knowledge and experience. In addition to the likelihood that unsophisticated investors may prefer simpler communications, an existing literature in linguistics highlights the fact that most audiences in fact have negative associations with complex language, and prefer simple, straightforward language instead (Burke & Greenberg, 2010; Geppert & Lawrence, 2008). As a result, in this study I explore the impact of language complexity on crowdfunders' willingness to invest in a project, and how that language might interact with other signals of quality that are available to them. In this case, individual level interactions between the entrepreneur and each funder, facilitated by language, aggregate into the overall crowdfunding success (or failure) of the project.

This dissertation also explores the actual mechanisms by which human capital aggregates. A key question for the micro-foundational literature, especially in terms of human capital, is understanding how and why individual skills become usable at the firm level (Crocker & Eckardt, 2014; Ployhart & Moliterno, 2011; Ployhart, Nyberg, Reilly, & Maltarich, 2013; Ployhart, Weekley, & Ramsey, 2009). Broadly, this work makes use of Kozlowski and Klein's (2012) concept of "emergence", a term which describes a phenomenon (in this case, firm-level human capital) which has its origins in individual knowledge and behavior but is somehow "amplified" into a higher level construct. An exemplar of this stream of research can be found in Ployhart and Moliterno (2011) which describes a multilevel model of "emergent" human capital resources which originate in the knowledge, skills, and abilities (KSAOs) of individuals. Via social and affective processes, individuals' KSAOs become available for use by the firm in an amplified (but only partially isomorphic) form.

Building on this literature, the final chapter of this dissertation is a theoretical exploration of the path dependent impacts of the search and problem-solving processes which individuals engage in in order to build firm level human capital resources. Responding to the generally positive view of human capital aggregation in the emergence literature, this study highlights the circumstances under which the impacts of this process can be negative. The process of aggregating human capital at the individual level to build firm-level resources is an exercise in search and problem-solving. By considering the complexity and dynamism of the problem spaces underlying these search processes, this study builds a framework in which building firm-level human capital resources may result in both the creation and destruction of value. Importantly, this paper considers the nature of firm problems at the entrepreneurial stage and

onward, and how decisions taken early in a firm's life impact their ability to make other decisions later.

In its entirety, this dissertation makes a number of contributions to our collective understanding of the micro-foundations of entrepreneurial success via human capital. The first two chapters expand on how human capital at the individual level impacts the firm-level outcome of entrepreneurial funding, as well as the role that language plays in the relationship between human capital and funding outcomes. The final chapter, meanwhile, returns to the fundamental question of the micro-foundational literature and proposes new and counter-intuitive theoretical perspectives that are derived from the time-dependent nature of firm problems and the path-dependent impacts of decisions made at the entrepreneurial stage of a firm's life. Together, these studies aim to broaden the purview of the micro-foundational literature on human capital with a focus on entrepreneurial firms.

REFERENCES

Abell, P., Felin, T., & Foss, N. 2008. Building micro-foundations for the routines, capabilities, and performance links. ***Managerial and Decision Economics***, 29(6): 489.

Anglin, A. H., Short, J. C., Drover, W., Stevenson, R. M., McKenny, A. F., & Allison, T. H. 2018. The power of positivity? The influence of positive psychological capital language on crowdfunding performance. ***Journal of Business Venturing***, 33(4): 470-492.

Barry, D. & Elmes, M. 1997. Strategy Retold: Toward a Narrative View of Strategic Discourse. ***The Academy of Management Review***, 22(2): 429-452.

Becker, G. S. 1964. ***Human Capital: A theoretical and empirical analysis, with special reference to education***. Chicago: University of Chicago Press.

Burke, V. & Greenberg, D. 2010. Determining Readability: How to Select and Apply Easy-to-Use Readability Formulas to Assess the Difficulty of Adult Literacy Materials. ***Adult Basic Education and Literacy Journal***, 4(1): 34-42.

Channell, J. 1994. ***Vague Language***: Oxford University Press.

Clingingsmith, D. & Shane, S. 2017. Training Aspiring Entrepreneurs to Pitch Experienced Investors: Evidence from a Field Experiment in the United States. ***Management Science***, 64(11): 5164-5179.

Coff, R. W. 1999. When competitive advantage doesn't lead to performance: The resource-based view and stakeholder bargaining power. ***Organization Science***, 10(2): 119-133.

Coff, R. W. 2002. Human capital, shared expertise, and the likelihood of impasse in corporate acquisitions. ***Journal of Management***, 28(1): 107-128.

Colombo, M. G. & Grilli, L. 2010. On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital. ***Journal of Business Venturing***, 25(6): 610-626.

Colwell, K., Hiscock, C. K., & Memon, A. 2002. Interviewing techniques and the assessment of statement credibility. ***Applied Cognitive Psychology***, 16(3): 287-300.

Crocker, A. & Eckardt, R. 2014. A Multi-level Investigation of Individual and Unit-level Human Capital Complementarities. ***Journal of Management***, 40(2).

Da, Z. & Huang, X. 2019. Harnessing the Wisdom of Crowds. ***Management Science***, 66(5): 1847-1867.

De Clercq, D. & Sapienza, H. J. 2005. When Do Venture Capital Firms Learn from Their Portfolio Companies? ***Entrepreneurship Theory and Practice***, 29(4): 517-535.

Felin, T. & Foss, N. J. 2005. Strategic organization: a field in search of micro-foundations. ***Strategic Organization***, 3(4): 441-455.

Foss, N. J. 2003. Selective intervention and internal hybrids: Interpreting and learning from the rise and decline of the Oticon spaghetti organization. ***Organization Science***, 14(3): 331-349.

Franke, N., Gruber, M., Harhoff, D., & Henkel, J. 2006. What you are is what you like—similarity biases in venture capitalists' evaluations of start-up teams. ***Journal of Business Venturing***, 21(6): 802-826.

Ganco, M., Coff, R., El-Zayaty, A., & Mawdsley, J. K. 2020. Firm-specific Human Capital at the Crossroads: A Conversation on Current Issues and Future Directions *. In B. Cirillo & D. Tzabbar (Eds.), ***Employee Inter- and Intra-Firm Mobility***, vol. 41: 55-73: Emerald Publishing Limited.

Geppert, J. & Lawrence, J. 2008. Predicting Firm Reputation Through Content Analysis of Shareholders' Letter. ***Corporate Reputation Review***, 11: 285-307.

Glynn, M. A. & Navis, C. 2013. Categories, Identities, and Cultural Classification: Moving Beyond a Model of Categorical Constraint. ***Journal of Management Studies***, 50(6): 1124-1137.

Guo, W., Yu, T., & Gimeno, J. 2017. Language and Competition: Communication Vagueness, Interpretation Difficulties, and Market Entry. ***Academy of Management Journal***, 60(6): 2073-2098.

Guo, W., Sengul, M., & Yu, T. 2020. The Impact of Executive Verbal Communication on the Convergence of Investors' Opinions. ***Academy of Management Journal***.

Haeussler, C., Harhoff, D., & Mueller, E. 2014. How patenting informs VC investors – The case of biotechnology. ***Research Policy***, 43(8): 1286-1298.

Harmon, D. J., Green, J. S. E., & Goodnight, G. T. 2015. A Model Of Rhetorical Legitimation: The Structure Of Communication And Cognition Underlying Institutional Maintenance And Change. ***Academy of Management Review***, 40(1): 76-95.

Hoenig, D. & Henkel, J. 2015. Quality signals? The role of patents, alliances, and team experience in venture capital financing. ***Research Policy***, 44(5): 1049-1064.

James, T. G. 2013. Far from the maddening crowd: Does the jobs act provide meaningful redress to small investors for securities fraud in connection with crowdfunding offerings. ***BCL Rev.***, 54: 1767.

Kaminski, J. C. & Hopp, C. 2019. Predicting outcomes in crowdfunding campaigns with textual, visual, and linguistic signals. ***Small Business Economics***: 1-23.

Kozlowski, S. & Klein, K. 2012. ***A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes***.

Leech, G. 2000. Grammars of Spoken English: New Outcomes of Corpus-Oriented Research. ***Language Learning***, 50(4): 675-724.

Lippman, S. A. & Rumelt, R. P. 2003. The payments perspective: micro-foundations of resource analysis. ***Strategic Management Journal***, 24(10): 903-927.

Martens, M. L., Jennings, J. E., & Jennings, P. D. 2007. Do the Stories They Tell Get Them the Money They Need? The Role of Entrepreneurial Narratives in Resource Acquisition. ***The Academy of Management Journal***, 50(5): 1107-1132.

McGee, P. 2018. Vague language as a means of avoiding controversy. ***Training Language and Culture***, 2: 40-54.

Morsy, S. 2013. The JOBS Act and crowdfunding: How narrowing the secondary market handicaps fraud plaintiffs. ***Brook. L. Rev.***, 79: 1373.

Neu, D. 1991. Trust, impression management and the public accounting profession. ***Critical Perspectives on Accounting***, 2(3): 295-313.

Palley, A. B. & Soll, J. B. 2019. Extracting the Wisdom of Crowds When Information Is Shared. ***Management Science***, 65(5): 2291-2309.

Parhankangas, A. & Renko, M. 2017. Linguistic style and crowdfunding success among social and commercial entrepreneurs. ***Journal of Business Venturing***, 32(2): 215-236.

Patel, P. C., Wolfe, M. T., & Manikas, A. S. 2020. Logic is (Somewhat) Overrated: Image-Based Versus Concept-Based Rhetoric in Crowdfunding Narratives. ***Entrepreneurship Theory and Practice***, 45(3): 600-625.

Ployhart, R. E., Weekley, J. A., & Baughman, K. 2006. The Structure and Function of Human Capital Emergence: A Multilevel Examination of the Attraction-Selection-Attrition Model. ***The Academy of Management Journal***, 49(4): 661-677.

Ployhart, R. E., Weekley, J. A., & Ramsey, J. 2009. The Consequences Of Human Resource Stocks And Flows: A Longitudinal Examination Of Unit Service Orientation And Unit Effectiveness. ***Academy of Management Journal***, 52(5): 996-1015.

Ployhart, R. E. & Moliterno, T. P. 2011. Emergence of the Human Capital Resource: A Multilevel Model. ***Academy of Management Review***, 36(1): 127-150.

Ployhart, R. E., Nyberg, A. J., Reilly, G., & Maltarich, M. A. 2013. Human Capital Is Dead; Long Live Human Capital Resources! ***Journal of Management***.

Raffiee, J. & Coff, R. W. 2016. Micro-Foundations of Firm-Specific Human Capital: When Do Employees Perceive Their Skills to be Firm-Specific? ***Academy of Management Journal***.

Schijven, M. & Hitt, M. A. 2012. The vicarious wisdom of crowds: toward a behavioral perspective on investor reactions to acquisition announcements. ***Strategic Management Journal***, 33(11): 1247-1268.

Shane, S. & Stuart, T. 2002. Organizational Endowments and the Performance of University Start-ups. ***Management Science***, 48(1): 154-170.

Stuart, R. W. & Abetti, P. A. 1990. Impact of entrepreneurial and management experience on early performance. ***Journal of Business Venturing***, 5(3): 151-162.

Stuart, T. E., Hoang, H., & Hybels, R. C. 1999. Interorganizational Endorsements and the Performance of Entrepreneurial Ventures. ***Administrative Science Quarterly***, 44(2): 315-349.

Vaara, E., Sonenshein, S., & Boje, D. 2016. Narratives as Sources of Stability and Change in Organizations: Approaches and Directions for Future Research. ***The Academy of Management Annals***, 10(1): 495-560.

Zacharakis, A. L. & Meyer, G. D. 2000. The potential of actuarial decision models: Can they improve the venture capital investment decision? ***Journal of Business Venturing***, 15(4): 323-346.

ESSAY 1: LOUD AND (NOT SO) CLEAR: VAGUE LANGUAGE, FOUNDING TEAM HUMAN CAPITAL, AND RESOURCE ACQUISITION

Abstract:

Investors look to the language a firm uses for information that may not be available otherwise, especially in entrepreneurial settings. One aspect of language that is garnering greater attention in the management and other business literatures is vagueness. Vague language is often viewed negatively by audiences due to its association with obfuscation and avoidance of detail. However, some work in linguistics implies that the use of vague language can have positive impacts if the speaker understands the needs of the audience. This study explores the use of vague language and its relationship with entrepreneurial funding outcomes, as well as how it interacts with the skills of the entrepreneurial founding team. I hypothesize and find that in general investors are less interested in firms which use vague language. However, the positive impacts of vague language use become apparent when firm founders have human capital endowments associated with the effective use of language and the ability to understand audience needs.

INTRODUCTION

"The pitch is pretty paramount to our investment decision… we're not the experts, we don't know the people that deeply…how do you differentiate between pitches where they're essentially saying the same things? It comes down to the nuances." – Excerpt of interview with anonymous Bay Area venture capitalist

Investors generally cannot observe the underlying quality of a firm before they invest in it. As a result, they rely on observable signals that may provide information about quality. A large literature has developed exploring the ways that the language used by entrepreneurs and their firms serves as an informative signal to potential investors (Clough, Fang, Bissa, & Wu, 2019; Guo Sengul, & Yu, 2019). Entrepreneurs are aware of this and use language in a strategic manner as a result. They communicate information using specific types of language and are selective about the information they share (Bermiss & Murmann, 2013; Martens, Jennings, & Jennings, 2007; Steigenberger & Wilhelm, 2018).

Given the high levels of uncertainty experienced by entrepreneurs, this strategic communication process will necessarily involve the communication of unclear or uncertain information. Despite this, there is minimal work exploring whether and how entrepreneurs communicate such information verbally to potential investors. While some work in accounting has highlighted the likelihood of established firms to use complex language to obfuscate negative outcomes in annual reports (Neu, 1991), this work does not address ambiguous, unclear information, nor does it address the uniquely uncertain circumstances faced by entrepreneurs seeking funding.

Literature in linguistics has illustrated that when individuals are uncertain about the value or veracity of what of they are saying, they tend to hedge more and use vague language to avoid addressing underlying issues (Drave, 2002; Lakoff, 1973; Milanovic & Milanovic, 2010). In general, readers and listeners of vague language associate it with dishonesty, lack of precision,

and low performance/low reputation (Carpenter, 1990; Dulaney Jr, 1982; Short & Palmer, 2007). However, in some circumstances, vague language has been shown to "carry relevant contextual implications" (Jucker, Smith, & Lüdge, 2003). This can include focusing attention in particular directions and using language that takes into account the beliefs, viewpoint, or knowledge of the intended audience (McGee, 2018).

Given these two potential reactions, in this study I explore the varying impacts of entrepreneurs' use of vague language on their funding success, and under which circumstances these outcomes may be positive or negative. I argue that in general, vague language will result in worse funding outcomes in terms of both number of investments and the breadth of investors willing to invest in a firm, due to the negative connotations audiences have regarding such language. However, relying on insights from the strategic human capital literature, I also propose that firms with founders who are particularly skilled at the use of language – especially in terms of tailoring messages for specific audiences – will actually benefit from the use of vague language due to their ability to use framing and contextual clues to overcome the general negative connotations of the language style.

Specifically, I propose that, while the main effect of vague language on funding outcomes will be negative, rhetorical skills embodied in founders[1] with prior experience or education centered primarily on the use of rhetoric will positively moderate this relationship. Literature on human capital and founding teams has broadly ignored the implications of rhetoric-oriented human capital, either alone or alongside the traditional business and technical human capital constructs. This study aims to address this gap in an entrepreneurial setting.

[1] Above and beyond any basic rhetorical ability of founders with more traditional business and technical backgrounds.

In order to unpack the impacts of vague language and founders' rhetorical skills on firm funding, I observe approximately 30 years of venture capital investments in U.S.-based entrepreneurial ventures, as well as the educational and professional backgrounds of the founders of the target firms. Using a measure primarily situated in computational linguistics, the type-token ratio (TTR), I obtain an objective measure of the vagueness of investor-facing language used by firms on the Crunchbase database. In addition, by categorizing founders' human capital as oriented toward rhetoric, business, or technical aspects (or any combination of the three), I am able to observe relationships between different founding team formulations and different types of funding outcomes for firms across multiple industries.

My findings are consistent with the theory and indicate that in general, the use of vague language by firms is associated with a reduced number of investments and fewer overall unique investors. At the same time, the presence of a founder with rhetoric-oriented prior experience or education on a firm's founding team is associated with greater success on these measures when vague language is used. I also consider the quality of firms, not only by controlling for observable quality traits, but by explicitly hypothesizing that firms that use vague language have worse long-term outcomes in terms of firm exit, in line with the supposition that the use of vague language is triggered by uncertain or negative underlying facts.

This study contributes to both the entrepreneurship and strategic human capital literatures in two primary ways. First, it adds to the nascent literature using text analysis techniques to understand how entrepreneurs' rhetoric may impact their investment outcomes by highlighting the importance of vague language and noting that not all founders will have the same efficacy in wielding it. Second, it bridges the gap between the literature on entrepreneurial storytelling/communication and the broader human capital literature, especially with regards to

founding teams, by introducing novel theory surrounding the importance of rhetoric-oriented human capital as a conduit through which entrepreneurs successfully acquire resources from third parties.

THEORETICAL MOTIVATION

The Role of Rhetoric in Entrepreneurial Ventures

"You need a cohesive story…a 'why us' and a 'why now'. You need to have a good story and you need to know how to present your idea, your experiences, the opportunity, in a way that makes sense to someone who's not necessarily an expert. We are not experts in, I would say, any of the areas we invest in." – Bay Area venture capitalist

Written and verbal language are key elements of the entrepreneurial funding process. Entrepreneurs engage in the strategic use of language when preparing business plans, giving pitches to investors, writing founder biographies, and preparing any outward facing rhetoric that expresses vital information about the firm and the founding team to external parties. Founders must clearly express who the founding team is, what the firm does, and convince others of its value proposition (Arthurs & Busenitz, 2003; Cooper, Woo, & Dunkelberg, 1988). Entrepreneurs must embed the information they wish to reach third parties in the language they use, and investors and other stakeholders attempt to assess the potential quality of a firm in the language directed at them (Amit, Glosten, & Muller, 1990; Zott & Huy, 2007).

A growing literature has attempted to highlight the different impacts different facets of language have had on firms. The use of particular types of idioms and wording has been shown to help firms navigate uncertainty (Cornelissen, Mantere, & Vaara, 2014; Weick, 1995). Specific to the investment context, angel investors have been illustrated to focus on clarity and understandability of an entrepreneur's pitch when determining whether they will provide them with funds or not (Clark, 2008). Martens, Jennings, & Jennings (2007) show through qualitative

and quantitative analysis of initial public offering prospectuses that firms which employ certain types of entrepreneurial narratives receive more resources than others.

Vague Language: Its Intentions and Interpretations

A trait of language that has received significant attention in linguistics and other fields, but remains less explored in business, is vagueness. Vagueness in language is defined as an effect caused by a speaker[2] in which "the information [received] lacks the expected precision" (Austin, Urmson, & Sbisà, 1975), or "that which modifies a linguistic item…to make its meaning less precise" (Drave, 2002). Vague language is associated with the concept of hedging, in which a speaker "attenuates…the full semantic value" of the language they are using by adjusting their choice of words (Fraser, 2010).

The concept of intentionality in speech is an important one in terms of vague language use. Linguists consider the use of vague language to be a strategic decision on the part of a speaker (Channell, 1994; Ruzaitė, 2007; Zhang, 2013). In this view, the intentional use of vague language is generally the product of a desire on the part of the speaker to obfuscate the true meaning of their utterance. A speaker may lack information, desire to avoid sharing unflattering information, or simply wish to avoid too full a commitment to a particular view or opinion (Fraser, 2010; Milanovic & Milanovic, 2010).

Alternatively, the use of vague language may be tied to information problems on the part of the speaker. A speaker with a poor understanding of the issues being described to the audience may lack strategic clarity due to their fundamental uncertainty (Parnell, 2013). Without a precise understanding of the information being conveyed to the audience, the speaker is less likely to use

[2] In this study, I use the term "speaker" to refer to the individual using language. The language itself may be written or spoken. Similarly, an "utterance" can be interpreted as a "unit of language" which is not necessarily spoken aloud.

precise language even if their intention is to disclose all information available to them. For the purposes of this study, I take the position that the use of vague language is an intentional decision, as this is consistent with the prevailing theories in linguistics as well as extant work in management and other business disciplines regarding impression management.

Unsurprisingly, there is a significant literature highlighting the negative connotations of vague speech due to its tendency to be used to mitigate the negative connotations of more precise language (Leech, 2000). Especially in the accounting literature, a variety of studies on language-based impression management have highlighted self-serving uses of vague language and general hedging (Brennan, Guillamón-Saorín, & Pierce, 2009; Neu, 1991). The core of this literature is that managers wish to obfuscate negative information, and as a result communicate with third parties using language that allows them to avoid sharing this information without explicit dishonesty (Adelberg, 1979; Courtis, 1995). The same is surely true of entrepreneurs; an entrepreneur in search of funding is likely to act in a self-interested manner and, as a part of their many utterances to potential investors, is likely to engage in vague language.

These efforts do not go unnoticed by their audience, however. The use of vague language has been linked to perceptions of apprehensiveness or deceptiveness on the part of the speaker (Colwell, Hiscock, & Memon, 2002; Dulaney Jr, 1982; Geppert & Lawrence, 2008; Zhou & Hripcsak, 2007). This contrasts with more concrete language, which is viewed as straightforward and assertive (Carpenter, 1990). In the case of entrepreneurial investment, potential investors closely observe the language used by entrepreneurs in order to obtain information that is not otherwise available. A close examination of vague, hedging language is likely to lead audiences, especially knowledgeable ones such as venture capitalists, to question whether negative information is being obfuscated by the speaker. It is therefore unlikely that audiences are

unconcerned with vague language, and that they will not only take note of it, but are likely to allow it to affect their impression of the focal firm and, as a result, their investment decision.

In line with this, I hypothesize that the use of vague language by entrepreneurs will generally be associated with less success in acquiring external funding.

> *Hypothesis 1: Firms which use vague language in investor-facing communications will be less successful at acquiring investments over time than those that use more concrete language.*

It is worth noting, however, that despite the generally negative connotations of vague language, there are circumstances in which it is viewed as positive. Vague language can be used by the speaker to engage in "implicit communication" that indicates to the listener that there is a shared understanding, experience, or common ground between the speaker and the audience (McGee, 2018; Overstreet & Yule, 1997). It is therefore possible for the speaker to use "strategic imprecision" (Leech, 2000) to create a feeling of rapport with the audience, thus mitigating negative elements of both the language and the uncertain facts underlying it (Cheng & Warren, 2001; Gassner, 2012; Zhang, 2013). This does not mean that this sense of closeness or rapport necessarily exists between the speaker and the audience; simply that the language implies its existence, thus engendering positive interpretations on the part of the audience when parsing "gaps" in the details that would be present in more concrete language (McGee, 2018).

But when will entrepreneurs be able to achieve this outcome rather than the negative outcome generally associated with vague language and underlying uncertainty?

In order to assess this, one must return to the entrepreneurship and strategy literature to determine which other factors play a role in the reactions of the firm's audience – i.e., investors. Understanding what drives investors' decision-making when assessing an entrepreneurial

venture can inform our understanding of when vague language will be negative in its impacts and when it will be positive.

Like the language used by a firm, the human capital of the founders of a firm has been shown to be associated with changes in the degree of success the firm has in terms of investment. Founding team human capital is associated with more positive assessments of a firm by potential investors and increased investment from them (Colombo & Grilli, 2010). Founders who have previously founded or managed firms, as well as founders who have specific skills that investors associate with superior performance are assessed positively by investors (Haeussler, Harhoff, & Mueller, 2014; Stuart & Abetti, 1990). Since external parties like investors are not able to directly observe quality, they rely on the traits of founders to provide information that is otherwise unavailable.

Traditionally, the literature on founders' human capital has focused on founders with business-oriented skills and technically-oriented skills, due to the link between these skillsets and basic firm functions. However, I propose that another skillset is relevant in the funding stage – the skill of using language effectively. If the traits of a firm's language are informative for (and potentially persuasive to) external parties like funders, it is clear that individuals with a greater degree of skill in using language will have an impact on the firm's success in using specific types of language.

In the case of vague language, this is especially true. As set out above, one of the primary differentiators between vague language which is perceived negatively and vague language that is perceived positively is the tailoring of that language to a nuanced understanding of the audience's preferences and knowledge. Individuals trained in the art of rhetoric and strategic communication are especially focused on the understanding of one's audience and how to tailor

messages specifically to their preferences (Christopher, 2013; Fleming, 1998; Paretti, 2006). As a result, efforts to educate professionals across fields in the art of audience awareness in rhetoric have proliferated (Carvalho, 2002; Druschke & McGreavy, 2016; Overington, 1977). Further, individuals with education or professional experience relevant to the effective use of rhetoric have been trained to understand appropriate word choice and sentence structure (Beck, McKeown, & Kucan, 2008; Faigley, Daly, & Witte, 1981; Glisan, Uribe, & Adair-Hauck, 2007).

Given this, it is likely that when the founding team of a firm has individuals with these specific skills, they will be more capable of leveraging the positive elements of vague language. The "strategic imprecision" mentioned previously relies on understanding the needs and expectations of an audience, a task that these individuals are well-suited for. Firms which have access to this set of skills should be able to therefore bypass the negative impacts of vague language use and access its benefits.

In the case of entrepreneurs appealing to investors, the use of strategic imprecision may take the form of using descriptions of the underlying business or industry that are vague enough to appeal to a broad audience of investors without appearing to obfuscate or reveal uncertainty on the part of the entrepreneur. For example, instead of using technical terms that are directed at only the most likely audience for a firm, entrepreneurs may describe the underlying business in a number of disparate ways, each likely to appeal to a different audience. They can then generate the sense of a shared understanding/rapport with many types of investors without actual being committed to the specifics of that audience.

In line with the above logic, I hypothesize the following:

> *H2: Firms whose founding teams have a greater endowment of human capital associated with rhetoric and communication will have superior funding outcomes when using vague language than those teams that have lesser endowments of that type of human capital.*

It is worth noting of course, that as explored earlier in this study, that vague language is generally employed due to uncertainty or discomfort with underlying information – it is a form hedging, primarily deployed to soften negative perceptions or avoid sharing information that may be received poorly. As a result, I further hypothesize that even those firms that are successful in using vague language to attract funding will not have superior performance in contrast to those that do not – rather, they will have lower performance, as this language is being used to hedge with regards to uncertain (or negative) underlying facts.

> *H3: Firms that use vague language and achieve superior funding outcomes will have lower performance outcomes relative to those that do not use such language.*

METHODS

Data and Context

In order to test these hypotheses, I have hand collected a dataset beginning with all of the venture capital investment events that occurred in the United States from 1990-2019 on the subscription investment database Crunchbase Pro[3]. Crunchbase has been illustrated to be an exhaustive repository of investment events which rivals other commonly used databases (Block & Sandner, 2009; Tarasconi & Menon, 2017). A thirty-year window allows me to capture a wide variety of industries and market circumstances in my data, as well as to allow for sufficient time to observe the entire lifecycle of a large portion of the firms in the sample (i.e., from inception to exit, either via acquisition or failure). The final combined dataset is comprised of approximately 44,000 unique investment events, 10,000 target companies (spanning 119 industries), as many biography texts for each target company (as examples of investor-facing rhetoric), 1,600

[3] For support on why venture capital is an ideal setting for this study, see Clough et al, 2019 and Huang et al, 2020.

investing companies, and 22,000 individual firm founders. This comes to a total of 52,796 observations.

Measures

Dependent Variables

The level of analysis for this study is the target firm, and accordingly, all variables are either initially measured at the firm level (target or investor firm, respectively, depending on the variable) or aggregated from the individual level to the firm level (in the case of individual measures like founders' human capital).[4]

Ideally, I would be able to observe all companies that sought funding during the period under observation, and thus operationalize "acquiring funding" in terms of firms that do and do not receive funding. Unfortunately, as with nearly all investment data, Crunchbase data is limited to those firms that receive funding. Accordingly, I must operationalize "acquiring funding" in a way that is conditional on the receipt of initial funding.

If the operationalization of the construct of acquiring funding must be conditional on initial funding, there remain two primary axes on which to observe greater success. First would be the number of times a firm receives funding over the time it is observed in the data. This is fundamentally a reflection of the firm's success at engaging in the act of seeking funding and succeeding in doing so repeatedly. This includes both receiving investments from multiple sources and receiving investments from the same source repeatedly. In line with this, one of the dependent variables I use in this study is a count of the total number of investments received by the focal firm over the course of the time period covered by the data.

[4] It should be noted that the models used in the analyses set out in this paper generally include both variables that vary over time as well as variables that are stable over time.

Alternatively, one may consider the number of unique investors that invest in the focal firm as a measure of its success in acquiring funding. This eliminates the consideration of receiving multiple investments from one investor, and instead measures the firm's success at the task of acquiring funding across a broad audience. This is an especially relevant measure for the purposes of this study, as the use of vague language is a potential avenue to appealing to broad audiences without committing to the specifics required for a single audience. Accordingly, the second dependent variable in this study is a count of the total number of unique investors who invest in the focal firm over the course of the time period covered by the data.

These measures are in line with extant work on venture capital financing (Gompers & Lerner, 2001; Gompers & Lerner, 2004; Gompers, Lerner, Blair, & Hellman, 1998). Entrepreneurs have a demand for venture capital funding and each instance of funding, as well as each individual investor that chooses to invest in the firm, represents a success on the part of the entrepreneur in terms of acquiring desired resources, especially given that the size (in dollars) of each investment is controlled for in the analyses. As mentioned above, each of these operationalizations carry different implications in terms of the underlying mechanism of the relationship between the independent and dependent variables. Number of investments may reflect an element of escalation of commitment on the part of the investor, while total number of unique investors may reflect a greater degree of success in making the underlying venture appealing to broad audiences. Neither interpretation takes away from the fact that each are reasonable proxies for "acquiring funding", and the implications of both will be explored in the discussion section.

Finally, for H3, I also consider one of the most important measures of performance in terms of investment, which is firm exits. For each investment target in the data, I am able to

observe whether they have ever engaged in an initial public offering of shares (IPO) or been otherwise acquired. I thus construct a binary variable which is equal to one if the focal target firm is ever acquired or engages in an IPO, and zero if it never does either during the years observed.

Independent Variables

The first primary independent variable is vague language. Language vagueness is captured in this study using the type-token ratio (*TTR)* of the Crunchbase biography texts for each firm. The TTR is a measure of lexical diversity which finds its roots in computational linguistics (Cunningham Kevin & Haley Katarina, 2020; Hess, Ritchie, & Landry, 1984). The TTR is measured as the ratio of unique words to total words in a piece of text. While there are multiple types of TTR measures with slight differences between them, I use the Ure Lexical density measure, which uses the total number of words in the text, as opposed to the total number of clauses, as per the Halliday Lexical density measure (Biber, Connor, & Upton, 2007; Castello, 2008).

The TTR is an appropriate measure of language vagueness as per the linguistics literature, where it has been associated with lack of clarity and precision (Short & Palmer, 2008). More specifically, studies have noted that a greater TTR indicates apprehension, caution, and potentially deception on the part of the speaker (Carpenter, 1986; Colwell et al 2002; Dulaney, 1982; Geppert & Lawrence, 2008). This contrasts with low TTR statements, which have been deemed to be more precise, assertive, and concrete (Carpenter, 1990). As a result, in this study, a higher TTR for a communication indicates more vague language.

In addition to vague language, I also must measure the human capital of the firm founders, both in terms of rhetoric-oriented human capital and other primary types. In order to

both consider the novel elements of human capital introduced in this study as well as taking into account the historic work on it, I categorize human capital as either rhetoric-oriented, business-oriented, or technically-oriented. In order to assess the human capital composition of a founding team, I first must determine which, if any, of these types of human capital each individual founder in the dataset has. I do this based on the education and work experience of each individual.

Previous work has proxied business-related human capital with past experience in managerial positions, as well as educational attainment in business-related fields, while proxying technically-oriented human capital with experience in R&D, design, engineering, and so on (Colombo & Grilli, 2005). Alongside practical experience, academic education creates not only domain-specific knowledge but conceptual skills and abilities that can shape individuals' approaches to strategizing (Brinckmann & Kim, 2015; Honig, 2004).

In line with the above, in order to determine if an individual has business-oriented human capital, I first flag whether any of their educational experiences involve degrees in fields that are traditionally associated with primary business functions[5]. I then do the same for each individual's work experience, performing keyword searches for position titles that indicate the individual would have familiarity with primary business functions. I perform the same procedure for technically-oriented capital[6].

For rhetorically-oriented human capital, I capture educational keywords such as "literature", "rhetoric", "journalism", and so on. From the professional side, I capture job titles that are generally associated with the aforementioned educational backgrounds, as well as jobs

[5] Accounting, finance, marketing, operations, etc. A full list of these fields is available in Appendix B.
[6] I capture keywords associated with STEM (science, technology, engineering, and mathematics) fields. This list is also in Appendix B.

such as “editor”, “writer”, etc. In addition, since these skills are less clearly associated with major professional fields than either business or technical skills, I use the U.S. Department of Labor’s O*Net website to identify fields that are considered to be associated with strong verbal and/or written language skills. O*Net is a free federal public database meant to provide the U.S. labor force with information on jobs and the skills that are most associated with them. One category of abilities by which jobs are sorted is “Cognitive Abilities”, with the relevant sub-categories “oral expression”, “oral comprehension”, “written comprehension” and “written expression”. I supplement the other rhetoric-related jobs with some of the top scoring jobs on these lists that are not clearly already associated with either business or technical human capital. This nets only a small number of notable additions, such as law, history, and political science. For a full list of keywords used to capture job titles and degrees, see Appendix B.[7] [8]

If an individual has a business background in either their education or job experience, they are tagged as a “business founder”. I then aggregate the individual tags at the firm level and mark each firm with at least one “business founder” as having business-oriented human capital on their founding team. Similarly, if a founding team for a firm has one “technical founder”, they are flagged as a team having technically-oriented human capital, and the same is done for “rhetorical founders”.

I use these tags as the basis of two primary measures of human capital composition on a funding team. The first, founding team human capital ratio, is a ratio of founders on the team who fall into each of the three categories. In this measure, rhetoric, technical, or business human capital is a binary variable at the individual level, and a ratio at the firm level – so, for example, a

[7] Any individual in the dataset may be flagged as having one, two, or all three of these types of human capital.
[8] It is worth noting that, perhaps contrary to expectations, over 18% of founders have some form of rhetoric-oriented human capital. Presuming this sample is representative, this skillset is present in a notable portion of the population of entrepreneurial founders.

firm with three founders, one of whom has had any education or experience tagged as rhetoric-oriented, will have a rhetoric-oriented human capital ratio of 0.33.

The second measure, founding team human capital tenure, takes into account the length of time the individual spent in the position where they derived the relevant experience. At the individual level, this is the number of days an individual spent in any professional position that has been tagged as being relevant to one of the three focal types of human capital. At the firm level, this is the aggregate of days relevant to each type of human capital across all founders. It should be noted that this measure ignores education, as the data do not allow consistent observation of the time spent acquiring relevant degrees, and even when such data is available, there is not a great deal of meaningful variance due to the relatively standard lengths of various degree programs.

Finally, I interact both measures with the focal firm's TTR to test whether changes in language vagueness have a differential effect with different human capital backgrounds.

Control Variables

In these analyses I control for a number of firm and investment level factors. From the firm side, I control for number of firm founders, number of employees, whether or not the firm had a patent at the time of investment, and the age of the firm at the time of investment. I also attempt to control for major indicators of firm quality. I include a binary variable showing whether any of the firm founders has a master's or Ph.D. degree, and I control for the logarithm of the size of the focal investment in dollars.

I also control for two major factors of the structure of the investment: whether the focal investor was the "lead" investor on the focal investment, and how many investors were involved in the focal investment. Syndicating an investment – i.e., leading an investment round with

multiple other investors taking part – is one way that VCs attempt to diversify their risk while also ensuring that they pick a high-quality venture to invest in (De Clercq & Dimov, 2008; Lerner, 1994; Sapienza & Gupta, 1994). In fact, the vast majority of investments are syndicated (Makarevich, 2018). The lead VC, who sets the price of the investment round and generally manages interactions with the target, selects syndicate members based on its needs and therefore has significant impact on the nature of the overall investment and the syndicate's approach to it (Gompers & Lerner, 2004; Hopp, 2009; Stuart & Sorenson, 2007). Accordingly, the lead investor may behave differently than other investors in a systematic way. The variable *lead investor* is a binary variable that controls for this.

The primary impact of syndication is on quality. The sharing of information amongst investors of differing experience may lead to a better understanding of the underlying quality of a given investment opportunity (Bygrave, 1987; Dai, Jo, & Kassicieh, 2012). Because of this, syndicated investments may be systematically different than non-syndicated investments. The variable *number of lead investors* is a discrete variable which is a count of the number of lead investors involved in a syndicate on the focal investment round.

I also include a number of fixed effects. Year fixed effects are included to control for confounding factors related to any particular year in the data. Since geographic distance influences investment decisions, I include state fixed effects which capture the location of the target venture. I include investor fixed effects to further control for idiosyncratic traits and behaviors of investors that I cannot observe using other variables. Industry fixed effects are included to partial out systematic differences between the different industries of the focal target investments. Finally, I include funding round fixed effects to control for the stage of the focal investment. The focal data is comprised of investments that range from seed funding rounds to

venture capital rounds A through F, and each round represents differing needs and different levels of development and sophistication at the level of the target firm. Controlling for this helps to eliminate the confounding factors associated with these differences.

In order to control for individual investment firms' experience in a focal industry, which may impact their investment patterns, I include two measures. First, I include a dummy variable, *repeat*, which controls for whether the focal investor has ever previously invested in the focal industry. Second, I include a continuous variable, *diversifying percentile*, which is a measure of how related the industry of the focal investment is to the average of the industries that are already in the investor's portfolio. This is calculated as an adjusted measure of co-occurrence of any two industries in the totality of the data, where -1 indicates completely unrelated industries (i.e., they never co-occur in one portfolio in the data) and where 1 indicates perfectly related industries (i.e., they always occur together in the data).

The final set of controls is included in order to support the validity of the language vagueness measure. It is possible that lexical diversity (TTR) is proxying for the underlying complexity or innovativeness of the focal firm's business. Accordingly, I include variables at the industry level that control for the complexity and innovativeness of the space in which the focal firm functions. First, I include a count of the granted patents in the focal industry (*granted)*. Then, using the National Science Foundation's Business R&D and Innovation Survey for the year 2016, I include the total percent of process & product innovations reported in the focal industry (*innovation percentile)*.

Analysis

I use both Poisson models and ordinary least squares models to complete the analyses for this study. They produce quantitatively and qualitatively similar results, so I present the OLS results here for ease of interpretation.

[Insert Table 1.1 about here]

Results

Table 1 provides summary statistics and correlations between all variables included in these analyses.

To test H1 and H2, I run a series of regressions using number of investments and total number of investors as the dependent variables, including vague language as the primary variable, with and without human capital interaction terms. The findings are as follows:

[Insert Tables 1.2 and 1.3 about here]

As illustrated in the table, a one-point increase in the TTR is associated with approximately 2.3 fewer investments over time for the focal firm ($p<0.001$), and is marginally associated with 0.5 fewer unique investors ($p<0.1$). This supports H1 – the use of vague language is associated with less funding success.

Turning to the founding team human capital results, the main effects of rhetoric-oriented human capital on funding outcomes are negative. Specifically, an increase in the ratio of founding team members with rhetoric-oriented human capital is associated with a decrease of approximately 1.3 ($p<0.001$) in number of investments and 0.8 ($p<0.001$) unique investors, respectively. The same is true for rhetoric-oriented human capital tenure, with a decrease of 1.6 in terms of number of investments ($p<0.001$) and 0.5 unique investors ($p<0.001$). While I did not hypothesize about this relationship, it is worth nothing how these findings inform the relationship between human capital, vague language, and funding.

These findings contrast with the interaction terms between rhetoric-oriented human capital and vague language. A greater ratio of rhetoric-oriented human capital when paired with vague language is associated with an increase of 13.3 total investments ($p<0.001$) and 8.3 unique investors ($p<0.001$). In terms of tenure, investments increase by 7.6 ($p<0.001$) and unique investors increase by 1.9 ($p<0.05$). These findings support H2 – founding teams with greater endowments of rhetoric-oriented human capital appear to have superior funding outcomes when using vague language.

Finally, I consider firm performance as the dependent variable in Table 4. As hypothesized in H3, firms that use vague language are associated with lower rates of acquisition and IPO, regardless of the presence of rhetoric-oriented human capital. This supports the supposition that vague language is being used by these firms to draw attention away from or obfuscate negative underlying quality issues.

[Insert Table 1.4 about here]

Robustness Tests

In order to determine the robustness of these findings, I run a series of alternative specifications of these analyses. I consider a number of possibilities in terms of what may drive the associations found in the main analyses in order to determine what changes to make to test their robustness.

One potential issue is certain types of education or experience that could be considered to exist at the intersection of business and rhetoric-oriented human capital. Chief amongst these are public relations and marketing. Degrees and/or professional experience in these fields involve both a large amount of verbal communication as well as understanding of primary business

functions. In the original specifications, public relations is treated as a rhetoric-oriented field and marketing is treated as a business field.

[Insert Tables 1.5, 1.6, and 1.7 about here]

I run a series of specifications here that imagine different classifications based on the above. Table 5 shows the results of the analyses excluding PR from the rhetoric-oriented category and including it in business, while Table 6 shows the results of the analyses when also shifting marketing from the business category to the rhetoric category. As per the results in Tables 5 and 6, the results remain primarily qualitatively similar under all of the robust specifications.

Another potential concern is the inclusion of legal backgrounds as a rhetoric-oriented field. While this makes sense both intuitively and in line with the skill categorizations available on O-Net, one could argue that knowledge of the law might have significant, non-communication-based impacts on a firm's ability to succeed and to attract the interest of investors. As a result, I run separate analyses excluding legal skills from the human capital categories entirely. The results in Table 7 show that this also has no impact on the results in qualitative terms.

Endogeneity

Another potential issue is endogeneity. While these results indicate that firms vague language use is generally negative, and firms with greater endowments of rhetoric-oriented human capital use vague language to positive effect, team composition and language use are endogenous to the firms themselves. It may be that some other, unobserved, omitted variable impacts team and language issues as well as funding outcomes.

Addressing this issue in a study such as this one is complex, since the traditional identification approach of using a plausibly exogenous instrumental variable would require a variable which is correlated with the vagueness of firms' language whilst also being uncorrelated with their funding success. It is conceptually extremely difficult to find such a variable, as the known antecedents of vague language use (uncertainty about underlying information, desire to obfuscate information) are clearly correlated with firm performance, which impacts investment behaviors.

One way to address this is to use the Impact Threshold of a Confounding Variable (ITCV) method (Busenbark, Yoon, Gamache, & Withers, 2021; Frank, 2000). The ITCV method calculates the magnitude of the impact necessary for an omitted variable to overturn the associations in a focal regression. Using the *konfound* package in Stata, I run the primary OLS regressions models above in order to determine the degree to which omitted variable bias might affect the relationship between language vagueness and funding outcomes. With regards to number of investments, 46.92% of observations would have to equal zero in order to invalidate the inference that an increased TTR significantly decreases the number of investments. In addition, the impact threshold for such an omitted variable would have to be greater than any of the current control variables, which is considered a reasonable benchmark for this measure (Busenbark, et al, 2021). This method cannot be applied to the main effect of vagueness on total unique investors given that it is only marginally significant.

In terms of the interaction term, the inference of a relationship between the interaction of rhetoric-oriented human capital and vague language and the total number of investments is similarly unlikely to be overturned by omitted variable bias. 54.27% of observations would have to equal zero to invalidate the inference, and again the impact of the omitted variable would have

to be greater in magnitude than any other control variable. With unique investors as the dependent variable, the results are even less likely to be overturned by omitted variable bias, with the percentage threshold equivalent to 63.18% of the observations, and again the magnitude of the omitted variables impact needing to be larger than all included control variables.

DISCUSSION

The findings set out above are consistent with the broad hypothesis that, in fact, the use of vague language is generally associated with fewer overall investments and fewer unique investors. However, firm founders with relevant human capital can use this language to achieve superior funding outcomes. Specifically, prior experience and education that is relevant to the use of rhetoric appears to be associated with better outcomes in acquiring resources from third parties when using vague language.

The implications of this are far-reaching. For one, this expands our understanding of the role of founding teams in firm funding and success. Rather than being focused solely on the traditional constructions of business and technical skills on founding teams, scholars (as well entrepreneurs and investors) may need to consider the role of rhetoric-oriented human capital in attracting a diverse investor base. Secondly, by highlighting some of the benefits of using vague language (while also highlighting the boundary conditions of who uses this language best), I provide potential insight to both scholars and practitioners on how entrepreneurial pitches should be delivered.

Limitations and Future Research

Of course, this analysis is not without limitations. These three types of human capital, while theoretically significant, are not the only types. It is possible that the effects reported in these analyses could be impacted by the inclusion of a broader set of definitions of human

capital. However, given the depth of the literature on each of these categories, it seems that this is a useful way of conceptualizing different entrepreneurs' specialized knowledge.

In addition, the nature of the data does limit the ability to generalize these results somewhat. Due to the fact that one cannot observe all startups that fail to receive any funding in most datasets, it is not possible to reach conclusions about what types of human capital attract investment in the first place. The dependent variables in this study are an imperfect proxy for the question of overall investment acquisition.

There are a number of potentially promising new directions for research building off of this study. For instance, the use of vague language in other settings with potentially different implications, such as crowdfunding, may be worth investigating. In addition, while this study provides insights into human capital complementarity in a founding team, it does not consider the differences between complementary skill sets within a single founder versus complementary skill sets across multiple founders. So, for example, a team with one founder who has a both a rhetoric-oriented background and a business-oriented background is treated the same as a team of two with one rhetoric-oriented individual and one business-oriented individual. Considering the possible impacts of conflict, agency issues, and many other dynamics that differ when knowledge resides in multiple individuals as opposed to only one, this likely warrants further study.

The addition of the novel concept of "rhetoric-oriented human capital" is one clear contribution of this study, but it also opens a number of doors for further study. There are many novel types of unique human capital that may need to be explored further. Things like legal experience may be sufficiently unique from other skillsets (and relevant to entrepreneurship) to warrant specific study, though the risk of infinite regress should also be considered when

pursuing such topics. Similarly, skills or traits that are related to communication and may serve as substitutes or complements to it – such as interpersonal skills, charisma, etc. – should also be studied alongside rhetoric-oriented human capital.

A natural extension of this study is to expand the analysis into other measures of effective rhetoric in entrepreneurial settings. Some work has begun to address this (see Vaara, Sonenshein, & Boje, (2016) for a review), but there is still significant work to be done to understand the many facets of strategic rhetoric use in entrepreneurial firms.

Finally, it is feasible to believe that there are industry-related effects to be considered in the relationship between vague language, rhetoric-oriented human capital, and funding outcomes. Future studies might consider whether the impact of and need for vague language and/or rhetoric-oriented human capital differs between and within industries. For example, one might imagine that highly innovative firms may have a greater need for vague language and rhetoric-oriented human capital as their value proposition may be less clear or require more creative communication strategies than firms that are selling commodities or well-known products.

CONCLUSION

In this paper, I have explored the importance of vague language and rhetoric-oriented human capital to the resource acquisition process of new ventures. By considering traditional human capital constructs alongside the novel construct of rhetoric-oriented human capital, I aim to provide a fuller understanding of the role founders' human capital plays in resource acquisition. Based on data on investments over a nearly 30-year period, I note that in general, the use of vague language is associated with worse funding outcomes. However, I also observe that a

greater endowment of rhetoric-oriented human capital on a founding team results in improved funding outcomes.

REFERENCES

Adelberg, A. H. 1979. Narrative Disclosures Contained in Financial Reports: Means of Communication or Manipulation? ***Accounting and Business Research***, 9(35): 179-190.

Amit, R., Glosten, L., & Muller, E. 1990. Entrepreneurial Ability, Venture Investments, and Risk Sharing. ***Management Science***, 36(10): 1232-1245.

Arthurs, J. D. & Busenitz, L. W. 2003. The Boundaries and Limitations of Agency Theory and Stewardship Theory in the Venture Capitalist/Entrepreneur Relationship*. ***Entrepreneurship Theory and Practice***, 28(2): 145-162.

Austin, J. L., Urmson, J. O., & Sbisà, M. 1975. ***How to Do Things with Words: Second Edition***: Harvard University Press.

Beck, I. L., McKeown, M., & Kucan, L. 2008. Creating Robust Vocabulary: Frequently Asked Questions and Extended Examples.

Biber, D., Connor, U., & Upton, T. A. 2007. ***Discourse on the Move: Using Corpus Analysis to Describe Discourse Structure***: John Benjamins Publishing Company.

Brennan, N., Guillamón-Saorín, E., & Pierce, A. 2009. Impression Management: Developing and Illustrating a Scheme of Analysis for Narrative Disclosures - A Methodological Note. ***Accounting, Auditing & Accountability Journal***, 22: 789-832.

Brinckmann, J. & Kim, S. M. 2015. Why We Plan: The Impact of Nascent Entrepreneurs' Cognitive Characteristics and Human Capital on Business Planning. ***Strategic Entrepreneurship Journal***, 9(2): 153-166.

Busenbark, J. R., Yoon, H., Gamache, D. L., & Withers, M. C. 2021. Omitted Variable Bias: Examining Management Research With the Impact Threshold of a Confounding Variable (ITCV). ***Journal of Management***: 01492063211006458.

Bygrave, W. D. 1987. Syndicated investments by venture capital firms: A networking perspective. ***Journal of Business Venturing***, 2(2): 139-154.

Carpenter, R. H. 1990. The statistical profile of language behavior with Machiavellian intent or while experiencing caution and avoiding self-incrimination. ***Annals of the New York Academy of Sciences***, 606: 5-17.

Carvalho, J. B. 2002. Developing audience awareness in writing. ***Journal of Research in Reading***, 25(3): 271-282.

Castello, E. 2008. ***Text Complexity and Reading Comprehension Tests***: Peter Lang.

Channell, J. 1994. ***Vague Language***: Oxford University Press.

Cheng, W. & Warren, M. 2001. The use of vague language in intercultural conversations in Hong Kong. ***English World-Wide***, 22: 81-104.

Christopher, W. T. 2013. Toward an Understanding of Audience - Issues in Argumentation Rhetorical Argumentation and the Nature of Audience. ***Philosophy & Rhetoric***, 46(4): 508-532.

Clark, C. 2008. The impact of entrepreneurs' oral 'pitch' presentation skills on business angels' initial screening investment decisions. ***Venture Capital***, 10(3): 257-279.

Colwell, K., Hiscock, C. K., & Memon, A. 2002. Interviewing techniques and the assessment of statement credibility. ***Applied Cognitive Psychology***, 16(3): 287-300.

Cooper, A. C., Woo, C. Y., & Dunkelberg, W. C. 1988. Entrepreneurs' perceived chances for success. ***Journal of Business Venturing***, 3(2): 97-108.

Cornelissen, J. P., Mantere, S., & Vaara, E. 2014. The Contraction of Meaning: The Combined Effect of Communication, Emotions, and Materiality on Sensemaking in the Stockwell Shooting. ***Journal of Management Studies***, 51(5): 699-736.

Courtis, J. K. 1995. Readability of annual reports: Western versus Asian evidence. ***Accounting, Auditing & Accountability Journal***, 8(2): 4-17.

Cunningham Kevin, T. & Haley Katarina, L. 2020. Measuring Lexical Diversity for Discourse Analysis in Aphasia: Moving-Average Type–Token Ratio and Word Information Measure. ***Journal of Speech, Language, and Hearing Research***, 63(3): 710-721.

Dai, N., Jo, H., & Kassicieh, S. 2012. Cross-border venture capital investments in Asia: Selection and exit performance. ***Journal of Business Venturing***, 27(6): 666-684.

De Clercq, D. & Dimov, D. 2008. Internal Knowledge Development and External Knowledge Access in Venture Capital Investment Performance. ***Journal of Management Studies***, 45(3): 585-612.

Drave, N. 2002. Vaguely speaking: a corpus approach to vague language in intercultural conversations: 25-40. Leiden, The Netherlands: Brill | Rodopi.

Druschke, C. G. & McGreavy, B. 2016. Why rhetoric matters for ecology. ***Frontiers in Ecology and the Environment***, 14(1): 46-52.

Dulaney Jr, E. F. 1982. Changes In Language Behavior As A Function Of Veracity. ***Human Communication Research***, 9(1): 75-82.

Faigley, L., Daly, J. A., & Witte, S. P. 1981. The Role of Writing Apprehension in Writing Performance and Competence. ***The Journal of Educational Research***, 75(1): 16-21.

Fleming, D. 1998. Rhetoric as a Course of Study. ***College English***, 61(2): 169-191.

Frank, K. A. 2000. Impact of a Confounding Variable on a Regression Coefficient. ***Sociological Methods & Research***, 29(2): 147-194.

Fraser, B. 2010. Pragmatic Competence: The Case of Hedging. ***New Approaches to Hedging***, 9: 15-34.

Gassner, D. 2012. Vague Language That Is Rarely VagueP: A Case Study of ?Thing? in L1 and L2 Discourse. ***International Review of Pragmatics***, 4(1): 3-28.

Geppert, J. & Lawrence, J. 2008. Predicting Firm Reputation Through Content Analysis of Shareholders' Letter. ***Corporate Reputation Review***, 11: 285-307.

Glisan, E., Uribe, D., & Adair-Hauck, B. 2007. Research on Integrated Performance Assessment at the Post-Secondary Level: Student Performance Across the Modes of Communication. ***Canadian Modern Language Review-revue Canadienne Des Langues Vivantes - CAN MOD LANG REV***, 64: 39-67.

Gompers, P. & Lerner, J. 2001. The Venture Capital Revolution. ***Journal of Economic Perspectives***, 15(2): 145-168.

Gompers, P. & Lerner, J. 2004. The Venture Capital Cycle.

Gompers, P. A., Lerner, J., Blair, M. M., & Hellmann, T. 1998. What Drives Venture Capital Fundraising? ***Brookings Papers on Economic Activity. Microeconomics***, 1998: 149-204.

Haeussler, C., Harhoff, D., & Mueller, E. 2014. How patenting informs VC investors – The case of biotechnology. ***Research Policy***, 43(8): 1286-1298.

Hess, C. W., Ritchie, K. P., & Landry, R. G. 1984. The Type-Token Ratio and Vocabulary Performance. ***Psychological Reports***, 55(1): 51-57.

Honig, B. 2004. Entrepreneurship Education: Toward a Model of Contingency-Based Business Planning. ***Academy of Management Learning & Education***, 3(3): 258-273.

Hopp, C. 2009. When Do Venture Capitalists Collaborate? Evidence on the Driving Forces of Venture Capital Syndication. ***Small Business Economics***, 35: 417-431.

Jucker, A. H., Smith, S. W., & Lüdge, T. 2003. Interactive aspects of vagueness in conversation. ***Journal of Pragmatics***, 35(12): 1737-1769.

Lakoff, G. 1973. Hedges: A Study in Meaning Criteria and the Logic of Fuzzy Concepts. ***Journal of Philosophical Logic***, 2(4): 458-508.

Leech, G. 2000. Grammars of Spoken English: New Outcomes of Corpus-Oriented Research. ***Language Learning***, 50(4): 675-724.

Lerner, J. 1994. Venture Capitalists and the Decision to Go Public. ***Journal of Financial Economics***, 35: 293-316.

Makarevich, A. 2018. Performance feedback as a cooperation "switch": A behavioral perspective on the success of venture capital syndicates among competitors. ***Strategic Management Journal***, 39(12): 3247-3272.

McGee, P. 2018. Vague language as a means of avoiding controversy. ***Training Language and Culture***, 2: 40-54.

Milanovic, M. & Milanovic, A. 2010. Softening the Words of Crises: Hedging in Economics-Related Articles Published on the Internet. ***Ekonomski Horizonti***, 12: 121-129.

Neu, D. 1991. Trust, impression management and the public accounting profession. ***Critical Perspectives on Accounting***, 2(3): 295-313.

Overington, M. A. 1977. The Scientific Community as Audience: Toward a Rhetorical Analysis of Science. ***Philosophy & Rhetoric***, 10(3): 143-164.

Overstreet, M. & Yule, G. 1997. On Being Inexplicit and Stuff in Contemporary American English. ***Journal of English Linguistics***, 25(3): 250-258.

Paretti, M. 2006. Audience Awareness: Leveraging Problem-Based Learning to Teach Workplace Communication Practices. ***Professional Communication, IEEE Transactions on***, 49: 189-198.

Parnell, J. A. 2013. Uncertainty, Generic Strategy, Strategic Clarity, and Performance of Retail SMEs in Peru, Argentina, and the United States. ***Journal of Small Business Management***, 51(2): 215-234.

Ruzaitė, J. 2007. ***Vague Language in Educational Settings: Quantifiers and Approximators in British and American English***: Lang.

Sapienza, H. & Gupta, A. 1994. Impact of Agency Risks and Task Uncertainty on Venture Capitalist-CEO Interaction. ***Academy of Management Journal***, 37(6): 1618-1632.

Short, J. C. & Palmer, T. B. 2007. The Application of DICTION to Content Analysis Research in Strategic Management. ***Organizational Research Methods***, 11(4): 727-752.

Stuart, R. W. & Abetti, P. A. 1990. Impact of entrepreneurial and management experience on early performance. ***Journal of Business Venturing***, 5(3): 151-162.

Stuart, T. E. & Sorenson, O. 2007. Strategic networks and entrepreneurial ventures. ***Strategic Entrepreneurship Journal***, 1(3-4): 211-227.

Weick, K. E. 1995. ***Sensemaking in Organizations***. Thousand Oaks: Sage Publications.

Zhang, G. 2013. The impact of touchy topics on vague language use. ***Journal of Asian Pacific Communication***, 23(1): 87-118.

Zhou, L. & Hripcsak, G. 2007. Temporal reasoning with medical data—A review with emphasis on medical natural language processing. ***Journal of Biomedical Informatics***, 40(2): 183-202.

Zott, C. & Huy, Q. N. 2007. How Entrepreneurs Use Symbolic Management to Acquire Resources. ***Administrative Science Quarterly***, 52(1): 70-105.

ESSAY 2: WISE CROWDS? CROWDFUNDING SUCCESS, TEXT COMPLEXITY, AND EXTERNAL QUALITY SIGNALS

Abstract:

Language use in crowdfunding contexts is a growing area of research interest due to the primacy of the written word in crowdfunding pitches on platforms such as Kickstarter. While many facets of language have been explored in this literature, language complexity has largely been overlooked. Given the naivete of crowdfunding investors in terms of both subject matter expertise and investment experience, this is a significant oversight. This study draws on prior studies that imply a general bias against complex language amongst non-technical audiences alongside the "wisdom of crowds" literature in management to build theory about crowdfunding investors' language preferences and how these preferences may shift in the presence of external signals of venture quality. I hypothesize and find that crowdfunders show less interest in pitches which use complex language. I also disentangle the interaction between language complexity and external quality signals using both archival and experimental methods.

INTRODUCTION

The language used by firms provides information about their underlying quality/potential performance to external parties. This is especially true for startups and in settings such as crowdfunding where limited information is available other than what is written by entrepreneurs (Baum & Silverman, 2004; Huang & Pearce, 2015). Aspects of language such as positivity (Anglin, Short, Drover, Stevenson, McKenny, & Allison, 2018), narrative structure (Cappa, Pinelli, Maiolini, & Leone, 2020), context relevance (Allison, Davis, Webb, & Short, 2017), and literal versus figurative language (Clarke, Cornelissen, & Healey, 2018) have been illustrated to have significant impacts on the success of crowdfunding pitches.

The information investors can extract from language is especially useful when those investors are less experienced. Crowdfunding investors, for example, can derive information about the nature and quality of a venture from pitch language to supplement a knowledge base that is lacking in comparison to more traditional investors such as venture capitalists (Nicolosi, Peng, & Zhu, 2009). The "wisdom of crowds" literature has gone into some depth unpacking the ways that naïve investors seek information to supplement their lack of formal knowledge, ranging from the behaviors of other investors (Vismara, 2018), external signals of quality (Agrawal, Catalini, & Goldfarb, 2014), and their own assessments of the information available in a pitch.

Accordingly, a vital aspect of crowdfunding language is how understandable pitches are to untrained audiences. When language is complex, it is more difficult to understand for the reader, especially if that reader is not a subject-matter expert (Burke & Greenberg, 2010; Jones & Shoemaker, 1994). Complex language is generally considered to be related to more complex or technical content (Albers & Mazur, 2014; Yasseri, Kornai, & Kertész, 2012). Further, it is a

way to signal legitimacy to technically-minded audiences (Kavaler, Sirovica, Hellendoorn, Aranovich, & Filkov, 2017).

It has also been noted in the linguistics literature that audiences associate more complex language with low quality/low reputation firms and institutions (Geppert & Lawrence, 2008; Short & Palmer, 2007). Complex language makes ideas appear abstract and obscures important implications (Flesch, 1951; Hart, 2000; Jackson, 1992). This tendency is explored in the accounting literature on impression management, in which it has been illustrated that managers use complex language to obfuscate negative information in public documents (Adelberg, 1979; Brennan, Guillamón-Saorín, & Pierce, 2009; Neu, 1991). By making documents difficult to read, managers attempt to hide negative quality signals from external parties.

Given the above, in this study I explore the joint impact of complex language and other, more often studied indicators of underlying quality on third parties' perception of firm quality. Specifically, I examine the role of complex language on funding success in Kickstarter campaigns that both were and were not indicated to be high quality by a third-party (in this context, recipients of the "Staff Pick" identifier). I hypothesize that, due to the combined effect of investor subject matter naivete and the negative connotations of complex language explored in the linguistics literature, in general the use of complex language in crowdfunding pitches will result in reduced investor interest.

However, drawing from studies of investor reactions to external signals of quality, I also note that in contexts in which investors are naïve and are seeking information, they tend to react strongly to signals of legitimacy conferred by highly visible third parties (Budescu & Chen, 2014; Kim & Viswanathan, 2019). Accordingly, I hypothesize that when complex language is paired with an indication of underlying project quality (in this case, a "Staff Pick" indicator on

Kickstarter), the latter effect will prevail, and funding outcomes will be superior to pitches without such a signal, whether language is complex or simple.

For the first part of the study, I undertake an archival analysis of the association between the complexity of the language used in a crowdfunding pitch and its likelihood of being fully funded. To establish the causality of these relationships, I have also designed a randomly-controlled trial, which I run on the Amazon MTurk platform. In this experiment, I select representative campaigns from Kickstarter and ask study participants to rate their interest in the project. There are two treatments. The first is a manual "simplification" of the language used in the pitch, which follows a semi-standardized procedure set out more fully in the Data and Methods section. The second is the application of a "Kickstarter Staff Pick" banner at the top of the text. Participants are randomly assigned to one of four conditions: original text with no banner, simplified text with no banner, original text with banner, or simplified text with banner. Basic demographic and expertise information is collected as well for the purposes of control variables.

I identify that, on average, in both the archival and experimental data, language complexity leads to less interest from crowdfunders. However, in the archival data, complex language combined with being a "Staff Pick" leads to better outcomes, while in the experiment, it is the simplified language combined with the "Staff Pick" banner that leads to the most investment interest. This leads to a significant insight from this study; the positive relationship seen between this interaction and funding outcomes in the archival data may be confounded by unobserved variables, such as actual project quality. Since the experimental design allows me to hold actual quality constant, we see a different relationship. Naïve investors do react positively to the external indicator of quality, but it does not eliminate their preference for simple language.

This study contributes to a number of research streams. Firstly, it expands upon the growing literature which explores different facets of entrepreneurs' language use and their impacts on firm outcomes. Language complexity has not been examined at length in the context of crowdfunding, where it is theoretically of great importance. Secondly, this study provides greater insight into the mechanisms at play in the "wisdom of crowds" literature. By disentangling the roles of external quality signals and actual venture quality, I am able to provide clarity about when "the crowds" make decisions in line with their own information versus when they defer to "group" information.

While these findings are obviously relevant for the focal streams of academic research, they are also actionable for practitioners as well. The results of this study indicate that entrepreneurs who expect to be catering to non-traditional investors such as crowdfunders may want to make additional efforts to simplify the language that they use in order to appeal to that specific crowd. Similarly, while practitioners cannot simply make use of titles like the Kickstarter Staff Pick without earning them, this study highlights the importance of centering such external signals of quality, as well as the potential to amplify their effect with simple language.

The Importance of Language to Entrepreneurial Funding

The language used by firms has been analyzed at length in the strategy and entrepreneurship literature. The way that firms, especially entrepreneurial founders, use language impacts third parties' perceptions of the quality and nature of the firm (Arthurs & Busenitz, 2003; Hisrich & Jankowicz, 1990; Huang, Joshi, Wakslak, & Wu, 2020). Whether verbal or written, the language that firms use informs many decisions by stakeholders, including whether or not to invest in the focal firm (Baron & Shane, 2005; Kirsch, Goldfarb, & Gera, 2009). A

number of studies have now illustrated that even when the content of messages does not vary significantly, the nature of the language can have profound impacts on how they are interpreted (Guo, Sengul, & Yu, 2019; Pennebaker, Mehl, & Niederhoffer, 2003).

There are a number of different aspects of language use that impact firm level outcomes. The formation of narratives about the identity, abilities, and mission of a firm is one way in which entrepreneurs manage the perceptions of external parties (Boje, 1995; Harmon, Green, & Goodnight, 2015). Similarly, firms can derive legitimacy from the way they use language to draw comparisons between their firms and others, or even existing market categories (Glynn & Navis, 2013). More specific decisions, like the nature of the terminology a firm uses, the tone of their communications, and the use of specific idioms all impact the perceptions (and ultimately, the decisions) of third parties vis a vis the firm (Aggarwal, Kryscynski, & Singh, 2015; Anglin et al., 2018; Cornelissen, Mantere, & Vaara, 2014).

Complexity is another trait of language that has received significant attention in the management literature and elsewhere. Broadly speaking, complexity refers to how easily understood a linguistic message is. This tends to be based on the use of shorter, simpler words, phrases, and sentences (Kimble, 2012; Pallotti, 2014). This is relevant because the greater the sophistication of a message, the more information it may be able to deliver (Bapna, 2017; Kamatham, Pahwa, Jiang, & Kumar, 2021). More complex communications are more information-dense (Connelly, Certo, Ireland, & Reutzel, 2010; Lester, Certo, Dalton, Dalton, & Cannella Jr, 2006).

Recent studies have highlighted some of the ways that the complexity of a message impacts investors' behavior, from increasing their convergence on an opinion (Guo, Sengul, & Yu, 2019) or changing their reactions to negative news (Guo, Sengul, & Yu, 2020). These

studies generally converge on the same concept – most audiences are more satisfied when they can more easily understand the language they are presented with (Jackson, 1992; Parhankangas & Renko, 2017). Some exceptions do exist – some studies have indicated that highly specialized audiences may view more complex language as more legitimate (Armstrong, 1980; Lehavy, Li, & Merkley, 2009), but on the whole, the body of evidence indicates that audiences prefer simple language to complex.

The logic for this preference has two probable mechanisms: audiences' perceptions of why complex language is used, and their own cognitive limitations. Audiences tend to associate complex language with low quality and low reputation firms (Geppert & Lawrence, 2008; Short & Palmer, 2007). Simple messages are viewed as more credible and less likely to be deceptive (Rennekamp, 2012). In line with this, it is not surprising that a significant literature has arisen around the fact that complex language used in annual reports and other formal documentation has been associated with negative perceptions of firms due to the potential obfuscation of important (negative) information (Ajina, Laouiti, & Msolli, 2016; Brennan et al., 2009).

Further, complex language is mentally taxing for an audience to process and is especially challenging for those who lack subject matter expertise (Chaiken & Eagly, 1976; DuBay, 2004). As information load increases, individuals tend to process signals differently (Dane & Pratt, 2007; Steigenberger & Wilhelm, 2018). There are limitations on the ability of signal recipients to process the information being provided to them. Research on cognition has separated information processing into two systems: an intuitive, simple "system 1" process and a deliberate, rational "system 2" process (Evans, 2006, 2007; Kahneman, 2003). As the amount of information and the number of signals being processed by an individual increases, they are increasingly unable to devote the cognitive resources necessary to engage in system 2

processing, relying on more subconscious and conservative system 1 processing (Kurzban, Duckworth, Kable, & Myers, 2013; Steigenberger & Wilhelm, 2018). Research has shown that as information that is relevant to a decision increases, decision-makers become more likely to rely on their intuition rather than actively processing new information (Akinci & Sadler-Smith, 2012; Evans, 2010). When an individual defaults to intuitive decision-making processes, they are more likely to rely on heuristics based in their past experience (Dane & Pratt, 2007). As a result, the use of complex, information-dense rhetoric may make investors more conservative and less willing to make an investment.

These issues are especially important to consider in a crowdfunding context. The importance of crowdfunding as a form of resource acquisition for new venture has increased drastically over the past several years (Agrawal et al., 2014). This has led to a proliferation of studies attempting to understand what the most important parts of a crowdfunding campaign are (Mollick, 2014) and how crowdfunding investors differ from traditional, professional investors like venture capitalists (Mollick & Nanda, 2015). Two important conclusions in this literature are that crowdfunding websites such as Kickstarter allow entrepreneurs to gain access to funding from investors who are a) inexperienced in investing and b) unlikely to be subject matter experts. Further, the language used in crowdfunding pitches is likely even more important than in other entrepreneurial settings, as investors are unlikely to have any source of information other than what is presented in the pitch (Kraus, Richter, Brem, Cheng, & Chang, 2016).

This difference in investor attributes is key to theorizing about crowdfunding. Venture capitalists and angel investors are highly sophisticated investors who commonly have both expertise in investing and the industries in which they invest (Franke, Gruber, Harhoff, & Henkel, 2008; Shepherd, 1999). In contrast, crowdfunders are generally neither experts in the

underlying field nor professional investors. The experience and skillset held by professional investors means that they are more likely to be accustomed to, and able to parse, complex explanations and descriptions of ventures. As a result, they are less likely to experience the uncertainty that drives them to conservative investing decisions, as described above (Steigenberger & Wilhelm, 2018). Naïve investors, as non-experts, are more likely to be overwhelmed by complex language in addition to the difficulties of navigating the novel (relative to professional investors) decision to invest.

Given these points, I hypothesize the following:

H1: Crowdfunding pitches which use more complex language will, on average, be less successful in terms of funding outcomes than those that use simpler language.

Other Quality Signals and the Wisdom of Crowds

While the content of the pitch itself is the primary source of information for crowdfunders, it is not the only source. External signals of quality may also be present and play a role in crowdfunder decision-making. These external signals take two primary forms. The first is the presence of other funders. It has been illustrated in prior studies that most crowdfunding successes become successes very late in the funding process, when new investors can look to early investors as a signal of legitimacy (Crosetto & Regner, 2018). The other is external signals of quality. Kickstarter, for example, has long used the "Staff Pick" badge as a way to signal to users that the focal project is high quality. These external signals are often considered to be the drivers of the "wisdom of crowds" by which crowdfunders approximate the performance of professional investors (Mollick & Nanda, 2015). Examples of this include crowds looking to the few experts in their midst as examples for the "correct" investment behavior (Budescu & Chen, 2014). Similarly, early investors with experience in a relevant field are a signal of quality to other later investors (Kim & Viswanathan, 2019). Ultimately, the argument in much of this

literature is that "the crowd" is not necessarily skilled at identifying quality on their own, but rather tend to be successful at identifying external signals of quality.

When crowdfunders are exposed to two primary sources of information – in this case, the language of the pitch and external signals of quality – they are consistently more likely to react to the external, legitimizing source rather than their own assessment of the information in front of them (Mahani & Poteshman, 2008; Mannes, 2009). The more public information crowdfunders are exposed to – such as indicators of quality from other sources – the less likely they are to rely on their own private information about the project, and lose useful information to follow the crowd (Da & Huang, 2019). Studies have shown that individuals in a crowd decision-making setting select options that are presented to them as better, even when they are told beforehand that the value of these external assessments is low (Simmons, Nelson, Galak, & Frederick, 2011).

In the case of crowdfunding, this means that individuals in a crowdfunding context are likely to have two sets of information from which to make decisions. The first is what they are able to parse from their own understanding and interpretation of the crowdfunding pitch – i.e., their internal information. The second is the external information provided to them – in the crowdfunding context, a signal of quality from the platform or other legitimate external sources. Insofar as their internal information conflicts with the external information provided to them, a naïve investor should weigh the external information more heavily.

Given these points, I hypothesize the following:

> *H2: When a crowdfunding pitch is both linguistically complex and has an external signal of quality, individual crowdfunders will more heavily weight the external signal of quality in their assessment of it, and it will be more successful in terms of funding outcomes than other pitches.*

STUDY 1

METHODS

There are two separate elements to this study – an archival and experimental portion. The archival study explores associations in actual crowdfunding data, while the experimental study establishes the causality of the relationships observed in the archival data. I describe the first effort below.

Data and Context

Scraped Kickstarter data is publicly available which includes the details of all of the currently active campaigns halfway through each month for the past several years. I randomly select 3 days from the past three years, and then randomly select a sample from each. I then use the archived URLs from these campaigns to additionally scrape all of the text of these campaigns and gather additional information, such as number of images and project category, which I combine with the campaign level information from the original scraped data. The final dataset is approximately 40,000 campaigns across 197 categories. It is worth noting that the motives of funders on Kickstarter do vary in comparison to traditional investment settings (e.g. venture capital) or even other crowdfunding setting such as equity crowdfunding. Venture capitalists, angel investors, and equity crowdfunders invest with the intention of becoming partial owners in the underlying project. In contrast, crowdfunders on Kickstarter invest with multiple outcomes in mind. First, they are taking part in ensuring that the product/service becomes available for purchase more broadly – not unlike traditional equity investors. However, they also "invest" as a form of purchase. Kickstarter funders generally receive the product or service being funded, often prior to it becoming available on the market, as a reward for their investment. Accordingly, their intentions and incentives do not exactly match those of equity crowdfunders or traditional

investors. However, insofar as they are still engaging in an assessment of both the appeal of the underlying project and its likelihood of success (if the product/service fails to be funded or is unfeasible to provide, they generally are not guaranteed any reward), their investment decision is similar enough to traditional ones that the underlying logic of most investment-oriented literature should apply.

Measures

Dependent Variables

The dependent variable in this study is funding success. In order to capture granular differences in degrees of support from crowdfunders, I use the natural logarithm of the number of backers as well as the natural logarithm of the amount of money pledged to the project as my measures of funding success, rather than the binary "fully funded" or "not fully funded" approach. This is more appropriate for a number of reasons. Firstly, the binary "funded" or "not funded" outcome lacks granularity in terms of differentiating between outcomes. Secondly, funding status is partially driven by the aspirations of the entrepreneur and the scale of the project. Entrepreneurs who estimate higher costs or who have more cost-intensive projects will have a higher bar to clear in order to be fully funded.

Independent Variables

To capture language complexity, I use the Flesch Kincaid Index of the text of each campaign. The Flesch Kincaid Index (FK) is a measure of the complexity of a piece of text. Originating as a simple readability test in linguistics (Farr, Jenkins, & Paterson, 1951; Gunning, 1952), the FK index assigns a number assessing the reading level necessary to understand a piece of text. This is determined based on the ratio of words to sentences and "complex words" (i.e., those with 3 or more syllables) to total words. The FK index and similar measures (Gunning-Fog

index, etc.) have been used in a number of management studies on language (Guo et al., 2019; Guo, Yu, & Gimeno, 2017).

I measure the presence of an external signal of validity based on whether the focal project is a Kickstarter Staff Pick or not. I use a binary variable which is equal to 1 if the project was designated a Kickstarter Staff Pick and equal to 0 if it was not. Staff Picks are selected by Kickstarter, and they have only provided broad guidelines on how the selection process works. The official Kickstarter blog states only that the badge is awarded to "exceptional projects", and encourages entrepreneurs to focus on issues like compelling images and sufficiently clear information about the project and its rewards (Kickstarter.com, 2015).

Control Variables

I control for a number of campaign level factors. Due to the fact that the use of images is associated with better crowdfunding outcomes, I control for the number of images in the campaign. I also control for the length of time that the campaign was available for funding. Finally, I include fixed effects controlling for the category of the project. Based on the categories assigned to the projects by their founders, there are 197 unique categories present in the data.

RESULTS

Table 2.1 shows the results of an ordinary least squares regression analysis using the log number of backers as the dependent variable and complex text as the independent variable, as well as the same analyses using the log amount of money raised as the dependent variable. Model 1 shows a decrease of 0.01 log backers per one-point increase in Flesch Kincaid index, while Model 2 shows a decrease of approximately 0.02 log dollars pledged given the same increase in language complexity ($p<0.001$ in both cases). These results provide support for H1.

[Insert Table 2.1 about here]

Table 2.2 shows the tests of Hypothesis 2 regarding external signals of quality. Pitches that are Staff Picks on average receive 1.55 additional log backers ($p<0.001$) as well as approximately 2 more log dollars ($p<0.001$) than those that were not Staff Picks. This shows support for H2.

[Insert Table 2.2 about here]

Table 3 shows the test of Hypothesis 3, the interaction between external signal quality and complex language. The results show an increase of 0.013 log backers for each one-point increase in Flesch Kincaid index for Staff Pick pitches. In addition, there is an increase of 0.044 log dollars for each increase in Flesch Kincaid index for Staff Pick Pitches. These results provide support for H3.

[Insert Table 2.3 about here]

STUDY 2

The second portion of the study is a randomly controlled trial which is aimed at determining the causality of the relationships underlying the associations highlighted in Study 1. This is necessary for a number of reasons. Firstly, complex language is not merely language, but also reflects the content of the pitch. Observing correlational relationships between performance and language is informative, but these relationships may be confounded by the underlying quality or nature of the project. It is possible, for example, that lower quality ideas require more complex language to explain them, and thus individuals are reacting to the quality rather than the language. Similarly, being deemed a Staff Pick by Kickstarter is not a random trait. While Kickstarter does not make public the system by which it selects Staff Picks, it is likely that it promotes projects that it expects will be successful due to their quality, or conversely, desires to be successful despite their quality. Accordingly, the associations between Staff Pick designation

and funding success cannot be deemed to be causal. As a result of these considerations, an experimental design is the best way to disentangle the potential variables at play and isolate the impacts of language and signals of external quality alone (and in tandem).

METHODS

Data and Context

To establish the causality of these relationships, I have designed an experiment in which representative campaigns are selected from the archival Kickstarter data. Representativeness is determined based on being within one standard deviation from the mean on each of the primary variables of interest and main controls. In addition, I ensure that the sample is within one standard deviation of funding away from the funding goal, to eliminate performance outliers. To control for differences in the way different categories of projects are perceived and their linguistic norms, I limit the sample to only hardware projects. Finally, I keep only those projects that were actual Staff Picks and that were fully funded, to control for major quality differences. I eventually selected 2 representative campaigns at random from this final sample.

Using a semi-standardized set of procedures, I then produce a linguistically "simplified" version of each of these campaigns. The "simplification" procedure works as follows. First, I determine the mean Flesch-Kincaid index by category (i.e. industry) of all campaigns in the full dataset, as well as the standard deviation by category. I then calculate a band of acceptable Flesch-Kincaid scores that will count as "simplified" – between 1 and 2 standard deviations less complex than the original score.

After this, on a word-by-word basis, I assess the baseline complexity of the word by determining its number of syllables. I cross-reference each word using a thesaurus to determine which synonyms exist for the word that are a) the same or fewer syllables and b) the same or

more common in terms of usage. If a common synonym exists with fewer syllables, I replace that word. Similarly, I assess each sentence to determine whether it could be separated into two or more sentences without causing any of those sentences to be grammatically incorrect, and make those changes wherever possible. I also eliminate extraneous words that do not alter the meaning of the sentence or serve a necessary grammatical function.

I do not introduce contractions or abbreviations into the text in order to avoid changing the tone of the text. Similarly, I do not change or remove words that are fundamental to the understanding of the campaign, such as part of the name or a technical term that cannot be easily replaced with a word that carries all of the same implications Finally, I do not correct any spelling or grammar errors present in the original text. Once the text is within the acceptable Flesch-Kincaid "simplified score" range, I cease to make changes.

The success of the manual manipulation was validated by hiring a pool of independent contractors on Amazon's Mechanical Turk (MTurk) platform. Using the Qualtrics survey platform, I placed the original and unedited version of each campaign's text side by side. Each MTurk contractor is presented with one of these matching pairs of text. They are then asked to answer a series of questions - if the original text is more complex than the edited text, if the original text has a more professional tone than the edited text, and if the edited text is easier to understand than the original text. The responders then answered these questions using a 1-7 Likert Scale. I also provide a true or false statement of "I couldn't tell the difference between the two texts", and a simple arithmetic problem as an attention check. Respondents were finally asked to fill in a text box with their opinions of the differences between the two texts.

This procedure revealed interesting patterns. The vast majority of respondents identified a difference in readability, smoothness, and understandability between the two texts. Similarly, a

majority deemed the simplified version to be “easier to read”. Perhaps surprisingly, a strong majority deemed the simplified version to be “more professional”. While this is not one of the aspects of language I explore in this study, it is perhaps worthy of further exploration in other studies.

After confirming that the language manipulation affected the readability of the text, I returned to MTurk to run the complete study. As a first step, I employed MTurk’s “premium” filters to ensure that all individuals who participated in the study have provided proof to Amazon that they have earned a U.S. based bachelor’s degree. This serves a number of purposes. Firstly, it reflects the reality of actual users of the Kickstarter platform, the majority of whom are Americans with at least a bachelor’s degree. Secondly, it provides some certainty that the participants are either native English speakers or are proficient enough in English to have successfully navigated a U.S. undergraduate program, which is important for the validity of the language manipulation.

Participants were told that they were taking part in a study assessing willingness to invest in crowdfunding opportunities. To begin, they were asked basic questions such as gender, their level of experience with crowdfunding platforms, and whether or not they had experience (in terms of education or professional work) in technical spaces or engineering. They were then instructed to read a crowdfunding pitch. Participants were randomly assigned to one of four conditions: original (complex) text and no Staff Pick banner, simplified text and no Staff Pick Banner, original text with a Staff Pick banner, and simplified text with a Staff Pick banner. Within these categories, they were also randomly assigned to either the first or second pitch, to address any idiosyncrasies involved in testing only one pitch. They were then asked to answer a question about how interested they would be to learn more, on a 1-7 Likert scale. An attention

check in the form of a graphic slider that had to be moved from 0-10 was included, and participants were also instructed to explain their reasoning for their responses to the questions in a text box. A sample of individuals was taken across the four conditions, and after eliminating participants that either failed the attention check or whose text box indicated the use of an automated algorithm responding to tasks on MTurk, the final sample was 248 participants.

Measures

Dependent Variables

The dependent variables for this study was a discrete variable ranging from 1-7, representing participants response to the questions "how interested would you be in receiving more information about this product or opportunity?". Extant studies on crowdfunding have used similar approaches to assess investor interest (Bapna, 2017). One benefit of this approach is that participants may view seeking information or judging quality to be less of a commitment than being asked to actually invest, whereas asking participants to invest without the ability to investigate further would not reflect the actual process of crowdfunding.

Independent Variables

The independent variables in this study are the two treatments and their interaction. The first treatment is the use of simplified language and the second is the inclusion of the Staff Pick banner. The interaction between these two is represented by the fourth condition in the experiment where both are included. Accordingly, there are four "condition" variables: condition 1 (control), condition 2 (simplified text), condition 3 (inclusion of a staff pick banner), and condition 4 (simplified text and the inclusion of a staff pick banner).

Control Variables

Based on participants responses, I control for their gender, level of experience with crowdfunding, and technical experience. Gender has been shown to have a significant relationship with crowdfunding and other investing behaviors (Greenberg & Mollick, 2015; Mohammadi & Shafi, 2018). Participants were presented with the options of male, female, non-binary, prefer not to say, or "my gender identity is not listed". Due to the fact that all participants chose either male or female, this variable is coded as a binary variable, where 0 is equal to female and 1 is equal to male.

In addition, more experienced crowdfunders (and investors in general) behave differently than those with less experience (Cappa et al., 2020; Kim & Viswanathan, 2019). As a result, I ask participants to rate, on a 1-4 scale, how experienced they are with crowdfunding. The available responses rang from "I am unfamiliar with them/have never used them" to "I am familiar with them and have invested many times previously".

Finally, controlling for subject matter expertise is important when assessing outcomes in a situation where investor naivete is the norm (Petit & Wirtz, 2021). Given that the pitches presented are from the hardware category on Kickstarter, I ask participants to report whether or not they have a background in engineering or technology, whether it be a college degree or professional experience. This variable takes the value of 0 if the participant has no such background and 1 if they do.

RESULTS

I first run an ordinary least squares regression including conditions 2, 3, and 4 as variables of interest, with condition 1 (original text with no Staff Pick banner) excluded as the control group. The results of this analysis can be seen in Table 2. Surprisingly, the main effect of

simplified language is not significant, contrary to the findings in the archival study and H1. Condition 3 (Staff Pick banner) receives significantly more investor interest than the control condition ($b=0.666$. $p<0.05$), supporting H2. Finally, condition 4 (simplified language and Staff Pick banner) also receives significantly greater investor interest than the control condition ($b=0.882$, $p<0.01$). This provides support for H3. It is worth noting that a Wald test indicates that the effect size for condition 4 is significantly larger than the effect size for condition 3.

[Insert Table 2.4 about here]

More insights can be gleaned from examining each condition in comparison to all others. Accordingly, I run four primary analyses using ordinary least squares regression to compare each of the four experimental conditions to all others (that is, the excluded group is all other conditions). These results can be seen in Table 3. As per model 1, we see that the control group, in which text is complex and there is no Staff Pick banner, receives significantly less interest ($b=-0.623$, $p<0.01$). This provides support for H1 and H2. Models 2 and 3 indicate that, when compared to all other types, condition 2 (only simplified text) and condition 3 (only Staff Pick banner) are not significantly different in terms of investor interest. However, model 4 shows that condition 4, which is the interaction of both treatments results in a significant increase ($b=0.561$, $p<0.05$) in interest from investors. This runs counter to H3 – in the archival study, Kickstarter pitches that had complex language and were Staff Picks had the best outcomes. Here, we see that the greatest amount of investor interest is instead focused on those that have a Staff Pick banner but use simple language.

[Insert Table 2.5 about here]

This highlights the benefits of using an experimental design to supplement the archival study. In the archival data, the impact of the Staff Pick banner cannot be separated from actual

quality, since only those (presumably high quality) projects that are actual Staff Picks are presented to investors with the banner. In the experiment, the signal of quality is separated from actual underlying quality, so the impact of the banner can be observed directly. Accordingly, these results highlight the fact that what appears to be a preference for the combination of complex text and a Staff Pick designation may in fact be confounded by the actual quality of the underlying project. Investors' general preference for simplified language appears to be amplified by their preference for external signals of quality, rather than the external signal of quality overriding their preference for simplified language.

DISCUSSION

The findings of the archival and experimental studies are largely consistent with one another, with the notable exception of the H3 results regarding the interaction of external signals of quality and language complexity. Overall, this study provides support for the hypothesis that crowdfunders prefer simplified language and react positively to external signals of quality even when quality is held constant. These findings have significant implications for research and practice.

Firstly, this adds to the growing body of literature that highlights the importance of different aspects of language in crowdfunding pitches. The importance of language in entrepreneurial endeavors in general has been studied at length, but this study further highlights the fact that the unique traits of crowdfunders require a unique approach by entrepreneurs seeking funds. The fact that crowdfunders are generally not investment experts or subject matter experts means that simplified language may play a significant role in attracting their attention.

Secondly, this study adds clarity to the "wisdom of crowds" literature. By parsing the differing impacts of different signals of quality, this study helps to clarify when naïve investors

will defer to "group" information about quality and when they will rely on their own preferences/information. Whilst my archival results support previous findings in the literature that funders might set aside their preferences when faced with external signals of quality, the experiment highlights that this may in fact not be the case, and that external signals of quality only amplify existing preferences rather than overriding them.

Limitations and Future Research

There are of course limitations to this study. Firstly, while the experimental design provides causal clarity about the relationships highlighted in the archival study, certain issues still remain. Firstly, in order to avoid confounding impacts of differences across industries, only items from the hardware category are used in the experiment, while the archival study contains the full suite of categories available on Kickstarter. Accordingly, the experimental findings may not be generalizable to other industries.

Furthermore, I use more than one pitch in the experiment. This helps to avoid any bias associated with the idiosyncrasies of a single pitch being used for the entire experiment. However, due to the time intensiveness of the language editing process, as well as concerns about introducing noise associated with too large a set of pitches, I used only two pitches. It may be that a greater number of pitches would be ideal to highlight the "true" effects at play.

In terms of future research, there are a number of directions in which one could build from this study. A clear first step is to test other traits of language that may be relevant to naïve investors beyond complexity. With the growth of stand-alone text analysis tools and their incorporation into popular statistical packages, there are many opportunities to measure, manipulate, and study the role of language in crowdfunding. While work already exists on many

language traits such as sentiment, use of certain idioms and metaphors, other potentially relevant traits remain unexplored, such as the use of jargon, vague language, and many others.

Another potential research direction revolves around questions of true underlying quality. The current experiment uses only campaigns that were fully funded and actually received Staff Pick status. Introducing pitches that did not receive Staff Pick status and/or failed to be fully funded would provide further insights into the mechanisms at play. It may be that investors would have different language preferences or would react differently to Staff Pick banners if the underlying project were of low quality.

Conclusion

The language used in crowdfunding efforts is a growing focus of research. This study considers the importance of language complexity in crowdfunding settings, and proposes that, given literature that indicates that audiences generally dislike complex language and interpret it as a signal of poor quality, complex language use in a pitch should be associated with less interest from crowdfunders. Further, given the "wisdom of crowds" literature's assessment of how naïve investors react to external signals of quality, this study also proposes that investors will show greater interest in pitches with an external signal of quality, and that when combined with complex language, they will default to the "group" judgement embodied in that signal rather than make use of their own information in the form of their language preferences.

By using archival and experimental methods, I discover that the truth is somewhat more complicated than this. Investors show greater interest in projects with simplified language and Staff Pick banners. The value of external indicators of quality are clear, but in the experimental study, amplify rather than override investors' preference for simple language. Both researchers

and entrepreneurs would do well to carefully consider both their use of language, and their efforts to highlight external signals of quality.

REFERENCES

Adelberg, A. H. 1979. Narrative Disclosures Contained in Financial Reports: Means of Communication or Manipulation? ***Accounting and Business Research***, 9(35): 179-190.

Aggarwal, R., Kryscynski, D., & Singh, H. 2015. ***Management Science***, 61(11): 2685-2706.

Agrawal, A., Catalini, C., & Goldfarb, A. 2014. Some Simple Economics of Crowdfunding. ***Innovation Policy and the Economy***, 14(1): 63-97.

Ajina, A., Laouiti, M., & Msolli, B. 2016. Guiding through the Fog: Does annual report readability reveal earnings management? ***Research in International Business and Finance***, 38: 509-516.

Akinci, C. & Sadler-Smith, E. 2012. Intuition in Management Research: A Historical Review. ***International Journal of Management Reviews***, 14(1): 104-122.

Albers, M. J. & Mazur, M. B. 2014. ***Content and Complexity: information Design in Technical Communication***: Taylor & Francis.

Allison, T., Davis, B., Webb, J., & Short, J. 2017. Persuasion in crowdfunding: An elaboration likelihood model of crowdfunding performance. ***Journal of Business Venturing***, 32: 707-725.

Anglin, A. H., Short, J. C., Drover, W., Stevenson, R. M., McKenny, A. F., & Allison, T. H. 2018. The power of positivity? The influence of positive psychological capital language on crowdfunding performance. ***Journal of Business Venturing***, 33(4): 470-492.

Armstrong, J. S. 1980. Unintelligible Management Research and Academic Prestige. ***INFORMS Journal on Applied Analytics***, 10(2): 80-86.

Arthurs, J. D. & Busenitz, L. W. 2003. The Boundaries and Limitations of Agency Theory and Stewardship Theory in the Venture Capitalist/Entrepreneur Relationship*. ***Entrepreneurship Theory and Practice***, 28(2): 145-162.

Bapna, S. 2017. Complementarity of Signals in Early-Stage Equity Investment Decisions: Evidence from a Randomized Field Experiment. ***Management Science***.

Baron, R. A. & Shane, S. A. 2005. ***Entrepreneurship: A Process Perspective***: Thomson/South-Western.

Baum, J. & Silverman, B. 2004. Picking Winners or Building Them? Alliance, intellectual, and human capital as selection criteria in venture financing and performance of biotechnology startups. ***Journal of Business Venturing***, 19(3): 411.

Boje, D. M. 1995. Stories of the Storytelling Organization: A Postmodern Analysis of Disney as "Tamara-Land". ***The Academy of Management Journal***, 38(4): 997-1035.

Brennan, N., Guillamón-Saorín, E., & Pierce, A. 2009. Impression Management: Developing and Illustrating a Scheme of Analysis for Narrative Disclosures - A Methodological Note. ***Accounting, Auditing & Accountability Journal***, 22: 789-832.

Budescu, D. V. & Chen, E. 2014. Identifying Expertise to Extract the Wisdom of Crowds. ***Management Science***, 61(2): 267-280.

Burke, V. & Greenberg, D. 2010. Determining Readability: How to Select and Apply Easy-to-Use Readability Formulas to Assess the Difficulty of Adult Literacy Materials. ***Adult Basic Education and Literacy Journal***, 4(1): 34-42.

Cappa, F., Pinelli, M., Maiolini, R., & Leone, M. I. 2020. “Pledge” me your ears! The role of narratives and narrator experience in explaining crowdfunding success. ***Small Business Economics***.

Chaiken, S. & Eagly, A. H. 1976. Communication modality as a determinant of message persuasiveness and message comprehensibility. ***Journal of Personality and Social Psychology***, 34(4): 605-614.

Clarke, J. S., Cornelissen, J. P., & Healey, M. P. 2018. Actions Speak Louder than Words: How Figurative Language and Gesturing in Entrepreneurial Pitches Influences Investment Judgments. ***Academy of Management Journal***, 62(2): 335-360.

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. 2010. Signaling Theory: A Review and Assessment. ***Journal of Management***, 37(1): 39-67.

Cornelissen, J. P., Mantere, S., & Vaara, E. 2014. The Contraction of Meaning: The Combined Effect of Communication, Emotions, and Materiality on Sensemaking in the Stockwell Shooting. ***Journal of Management Studies***, 51(5): 699-736.

Crosetto, P. & Regner, T. 2018. It's never too late: Funding dynamics and self pledges in reward-based crowdfunding. ***Research Policy***, 47(8): 1463-1477.

Da, Z. & Huang, X. 2019. Harnessing the Wisdom of Crowds. ***Management Science***, 66(5): 1847-1867.

Dane, E. & Pratt, M. G. 2007. Exploring Intuition and its Role in Managerial Decision Making. ***Academy of Management Review***, 32(1): 33-54.

DuBay, W. H. 2004. ***The Principles of Readability***: ERIC Clearinghouse.

Evans, J. B. T. 2010. Intuition and Reasoning: A Dual-Process Perspective. ***Psychological Inquiry***, 21(4): 313-326.

Evans, J. S. B. T. 2006. The heuristic-analytic theory of reasoning: Extension and evaluation. ***Psychonomic Bulletin & Review***, 13(3): 378-395.

Evans, J. S. B. T. 2007. Dual-Processing Accounts of Reasoning, Judgment, and Social Cognition. ***Annual Review of Psychology***, 59(1): 255-278.

Farr, J. N., Jenkins, J. J., & Paterson, D. G. 1951. Simplification of Flesch Reading Ease Formula. ***Journal of Applied Psychology***, 35(5): 333-337.

Flesch, R. 1951. ***The Art of Clear Thinking***: Harper.

Franke, N., Gruber, M., Harhoff, D., & Henkel, J. 2008. Venture Capitalists' Evaluations of Start–Up Teams: Trade–Offs, Knock–Out Criteria, and the Impact of VC Experience. ***Entrepreneurship Theory and Practice***, 32(3): 459-483.

Geppert, J. & Lawrence, J. 2008. Predicting Firm Reputation Through Content Analysis of Shareholders' Letter. ***Corporate Reputation Review***, 11: 285-307.

Glynn, M. A. & Navis, C. 2013. Categories, Identities, and Cultural Classification: Moving Beyond a Model of Categorical Constraint. ***Journal of Management Studies***, 50(6): 1124-1137.

Greenberg, J. & Mollick, E. 2015. "Leaning In or Leaning On? Gender, Homophily, and Activism in Crowdfunding". ***Academy of Management Proceedings***, 2015(1): 18365.

Gunning, R. 1952. ***The technique of clear writing***. Toronto: McGraw-Hill.

Guo, W., Yu, T., & Gimeno, J. 2017. Language and Competition: Communication Vagueness, Interpretation Difficulties, and Market Entry. ***Academy of Management Journal***, 60(6): 2073-2098.

Guo, W., Sengul, M., & Yu, T. 2019. Rivals' Negative Earnings Surprises, Language Signals, and Firms' Competitive Actions. ***Academy of Management Journal***, 63(3): 637-659.

Guo, W., Sengul, M., & Yu, T. 2020. The Impact of Executive Verbal Communication on the Convergence of Investors' Opinions. ***Academy of Management Journal***.

Harmon, D. J., Green, J. S. E., & Goodnight, G. T. 2015. A Model Of Rhetorical Legitimation: The Structure Of Communication And Cognition Underlying Institutional Maintenance And Change. ***Academy of Management Review***, 40(1): 76-95.

Hart, B. 2000. A Natural History of Early Language Experience. ***Topics in Early Childhood Special Education***, 20(1): 28-32.

Hisrich, R. D. & Jankowicz, A. D. 1990. Intuition in venture capital decisions: An exploratory study using a new technique. ***Journal of Business Venturing***, 5(1): 49-62.

Huang, L. & Pearce, J. L. 2015. Managing the Unknowable: The Effectiveness of Early-stage Investor Gut Feel in Entrepreneurial Investment Decisions. ***Administrative Science Quarterly***, 60(4): 634-670.

Huang, L., Joshi, P., Wakslak, C., & Wu, A. 2020. Sizing Up Entrepreneurial Potential: Gender Differences in Communication and Investor Perceptions of Long-Term Growth and Scalability. ***Academy of Management Journal***.

Jackson, L. D. 1992. Information Complexity and Medical Communication: The Effects of Technical Language and Amount of Information in a Medical Message. ***Health Communication***, 4(3): 197-210.

Jones, M. J. & Shoemaker, P. A. 1994. Accounting narratives: A review of empirical studies of content and readability. ***Journal of Accounting Literature***, 13: 142.

Kahneman, D. 2003. A perspective on judgment and choice: Mapping bounded rationality. ***American Psychologist***, 58(9): 697-720.

Kamatham, S. H., Pahwa, P., Jiang, J., & Kumar, N. 2021. Effect of appeal content on fundraising success and donor behavior. ***Journal of Business Research***, 125: 827-839.

Kavaler, D., Sirovica, S., Hellendoorn, V., Aranovich, R., & Filkov, V. 2017. ***Perceived language complexity in GitHub issue discussions and their effect on issue resolution***.

Kim, K. & Viswanathan, S. 2019. The experts in the crowd: the role of experienced investors in a crowdfunding market. ***MIS Q.***, 43(2): 347–372.

Kimble, J. 2012. ***Writing for Dollars, Writing to Please: The Case for Plain Language in Business, Government, and Law***: Carolina Academic Press.

Kirsch, D., Goldfarb, B., & Gera, A. 2009. Form or substance: the role of business plans in venture capital decision making. ***Strategic Management Journal***, 30(5): 487-515.

Kraus, S., Richter, C., Brem, A., Cheng, C.-F., & Chang, M.-L. 2016. Strategies for reward-based crowdfunding campaigns. ***Journal of Innovation & Knowledge***, 1(1): 13-23.

Kurzban, R., Duckworth, A., Kable, J. W., & Myers, J. 2013. An opportunity cost model of subjective effort and task performance. ***Behavioral and Brain Sciences***, 36(6): 661-679.

Lehavy, R., Li, F., & Merkley, K. 2009. The Effect of Annual Report Readability on Analyst Following and the Properties of Their Earnings Forecasts. ***The Accounting Review***, 86.

Lester, R. H., Certo, S. T., Dalton, C. M., Dalton, D. R., & Cannella Jr, A. A. 2006. Initial Public Offering Investor Valuations: An Examination of Top Management Team Prestige and Environmental Uncertainty. ***Journal of Small Business Management***, 44(1): 1-26.

Mahani, R. S. & Poteshman, A. M. 2008. Overreaction to stock market news and misevaluation of stock prices by unsophisticated investors: Evidence from the option market. ***Journal of Empirical Finance***, 15(4): 635-655.

Mannes, A. E. 2009. Are We Wise About the Wisdom of Crowds? The Use of Group Judgments in Belief Revision. ***Management Science***, 55(8): 1267-1279.

Mohammadi, A. & Shafi, K. 2018. Gender differences in the contribution patterns of equity-crowdfunding investors. ***Small Business Economics***, 50(2): 275-287.

Mollick, E. 2014. The dynamics of crowdfunding: An exploratory study. ***Journal of Business Venturing***, 29(1): 1-16.

Mollick, E. & Nanda, R. 2015. ***Management Science***, 62(6): 1533-1553.

Neu, D. 1991. Trust, impression management and the public accounting profession. ***Critical Perspectives on Accounting***, 2(3): 295-313.

Nicolosi, G., Peng, L., & Zhu, N. 2009. Do individual investors learn from their trading experience? ***Journal of Financial Markets***, 12(2): 317-336.

Pallotti, G. 2014. A simple view of linguistic complexity. ***Second Language Research***, 31(1): 117-134.

Parhankangas, A. & Renko, M. 2017. Linguistic style and crowdfunding success among social and commercial entrepreneurs. ***Journal of Business Venturing***, 32(2): 215-236.

Pennebaker, J. W., Mehl, M. R., & Niederhoffer, K. G. 2003. Psychological Aspects of Natural Language Use: Our Words, Our Selves. ***Annual Review of Psychology***, 54(1): 547-577.

Petit, A. & Wirtz, P. 2021. Experts in the crowd and their influence on herding in reward-based crowdfunding of cultural projects. ***Small Business Economics***.

Rennekamp, K. 2012. Processing Fluency and Investors' Reactions to Disclosure Readability. ***Journal of Accounting Research***, 50(5): 1319-1354.

Shepherd, D. A. 1999. Venture Capitalists' Assessment of New Venture Survival. ***Management Science***, 45(5): 621-632.

Short, J. C. & Palmer, T. B. 2007. The Application of DICTION to Content Analysis Research in Strategic Management. ***Organizational Research Methods***, 11(4): 727-752.

Simmons, J. P., Nelson, L. D., Galak, J., & Frederick, S. 2011. Intuitive Biases in Choice versus Estimation: Implications for the Wisdom of Crowds. ***Journal of Consumer Research***, 38(1): 1-15.

Steigenberger, N. & Wilhelm, H. 2018. Extending Signaling Theory to Rhetorical Signals: Evidence from Crowdfunding. ***Organization Science***, 29(3): 529-546.

Vismara, S. 2018. Information Cascades among Investors in Equity Crowdfunding. ***Entrepreneurship Theory and Practice***, 42(3): 467-497.

Yasseri, T., Kornai, A., & Kertész, J. 2012. A Practical Approach to Language Complexity: A Wikipedia Case Study. ***PLOS ONE***, 7(11): e48386.

ESSAY 3: UNPACKING THE IMPACTS OF HUMAN CAPITAL AGGREGATION

Abstract:

Human capital is a firm-level resource that is comprised of knowledge, skills, and abilities that fundamentally reside in individuals, implying the existence of a process of "aggregation" which turns individual-level human capital into a resource usable by the firm. This aggregation process has generally been viewed positively; additional human capital produces additional value for the firm. However, this view overlooks the potential complexity inherent in the micro-processes underlying how and why firms engage in human capital aggregation. Beginning with the presumption that most human capital aggregation processes begin with a firm recognizing a firm-level problem which can potentially be resolved by acquiring or developing new firm level human capital, we build a theoretical framework which highlights when positive and negative human capital aggregation outcomes will occur. Specifically, we develop the concept of sequential aggregation of human capital and discuss how its effects on firm level outcomes depend on the context. We rely on the firm lifecycle framework to provide such context and propose when aggregation results in the creation or destruction of value.

INTRODUCTION

A unique trait of human capital as a resource is that it fundamentally resides in employees but is conceptualized as an aggregate, firm-level construct (Nyberg, Moliterno, Hale, & Lepak, 2014). This firm level human capital resource arises through the aggregation and combination of individual-level knowledge, skills, and abilities. The process entails complex social interactions between employees, as well as between employees and the organizational context (Crocker & Eckardt, 2014; Ployhart & Moliterno, 2011; Morris & Snell, 2019). As individuals are recruited, work together, receive training, and learn, their human capital combines into a unique aggregate resource that can be deployed to address the firm's critical strategic problems (Mayer, Somaya, & Williamson, 2012; Nyberg & Ployhart, 2013).

While many aspects and mechanisms of the aggregation process have been explored, the element of search has been largely overlooked. Search is the primary underlying force of the human capital aggregation process. Human capital resources are built or acquired by firms to solve problems. Firms must engage in search both to identify human capital solutions to problems, as well as to identify the individual level human capital needed to enact a given solution. The introduction of search to this process implies considerations of bounded rationality, individual biases, path dependency, and questions of complexity and dynamism on problem spaces, none of which are explicitly addressed in the aggregation literature.

In this paper we propose that each of these issues – bounded rationality and biases at the individual level, as well as complexity, dynamism, and path dependency at the firm level – will have significant impacts on the outcomes of the aggregation process. Importantly, these outcomes may be harmful to the firm's problem-solving performance. This contrasts both against the literature that dismisses these considerations as playing a part in aggregation, as well as the

extant work that primarily treats aggregation as a value-producing process (Ployhart, Nyberg, Reilly, & Maltarich, 2013; Schmidt & Hunter, 1998).

We identify mechanisms integral to the search processes underlying human capital aggregation that can cause and amplify both positive and negative outcomes. Specifically, by integrating the concepts of search and bounded rationality with human capital aggregation, we develop the concept of *sequential aggregation*. Organizations evolve sequentially when boundedly rational individuals decide on the acquisition or development of human capital embodied in other individuals who, in turn, bring their own cognitive limitations to bear when making later decisions about human capital. We explore conditions that either alleviate or amplify the negative impacts associated with this sequential process.

Human capital aggregation is linked to individuals who make decisions about a) how to deploy their own skills and knowledge and b) how to develop or acquire skills and knowledge of other individuals, to enhance the firm's stock of human capital. Importantly, these decisions are impacted by individuals' cognitive limits and biases (Gavetti & Levinthal, 2000; Levinthal & Posen, 2007). The goal of human capital aggregation is the development of valuable, problem-solving resources. However, if this process is sequential – i.e., if it occurs repeatedly, with the starting point of one occurrence being influenced by the ending point of the previous occurrences, it may lead to significant problems at the aggregate level, resulting in a loss of ability to coordinate, lack of complementarities and declining organizational performance.

When will sequential aggregation lead to positive outcomes and when will it tip in the other direction? We identify several contingencies within the search processes that drive human capital aggregation as a problem-solving tool. When a firm faces tradeoffs associated with problem complexity (Levinthal, 1997; Nickerson & Zenger, 2004), thus necessitating a high

degree of coordination and sharing of knowledge among employees, sequential aggregation may introduce a lack of coordination that complicates the firm's search. Similarly, when problems exist in a dynamic context (as is often the case in nascent technological industries) sequential aggregation may impact the firm's ability to adapt and discover better solutions. Sequential aggregation may also be associated with groupthink and reinforcement of initial human capital configurations. Thus, as we argue, sequential aggregation is a process that may lead to a diversity of perspectives and human capital facilitating exploration and discovery of a broader range of solutions to firm's problems, or conversely could lead to homogenization of human capital and a smaller range of solutions. The role of sequential aggregation – as well as whether a greater or lesser number of solutions is preferable - will crucially depend on the type of problems being solved by the firm.

Since firms face unique problems at different points in their lifecycles (Nickerson & Zenger, 2004; Quinn & Cameron, 1983), they must periodically add and deploy expertise to address needs that are specific to their current developmental and competitive circumstances (Tzabbar & Margolis, 2017). Accordingly, to further unpack the key elements of how our theoretical mechanism of sequential aggregation affects human capital aggregation, we expand upon the baseline theoretical mechanisms by framing our discussion using a firm lifecycle framework. This allows us to explore the effects of aggregation using canonical problems associated with each lifecycle stage. In addition, this allows us to make corollary propositions specific to firm performance at different stages of the lifecycle. These expand on the insights from our primary propositions.

In addition to building a comprehensive framework of the impacts of search on the outcomes of human capital aggregation that has been lacking in prior work, our discussion yields

further insights. For instance, we highlight that sequential aggregation may facilitate both pivots and adaptation of entrepreneurial firms when the founding teams are homogenous and suffer from lack of diversity of perspectives or may reinforce this homogeneity, depending on the type of problem faced by the firm (Beckman, 2006; Beckman & Burton, 2008; Davis & Eisenhardt, 2011). When startups grow rapidly and the problems they face require focus and stability, the effects of sequential aggregation may be negative.

It is worth noting that in this paper we focus on problem complexity and the dynamism of the problem space due to the fact that they are the primary "moderators" of the search process which underlies human capital aggregation as a problem-solving tool. This is not to say that other idiosyncrasies of firms will not impact the nature and outcomes of the aggregation process. The idiosyncrasies of founding team expertise, hiring routines, horizontal differentiation within the firm (e.g., functional and divisional expertise), and other factors may affect the homogeneity or heterogeneity of views and abilities with the firm. This would, in turn, affect the outcome of the aggregation process. To explore each of these is beyond the scope of this paper – our intention is to focus on the search process that underlies the use of sequential aggregation as a problem-solving tool, and to build theory surrounding the primary moderators of that search process.

We contribute to several literatures. First, we offer nuance in the human capital aggregation literature by exploring a mechanism that drives both negative and positive outcomes. Prior work has almost exclusively seen human capital aggregation as an additive process. Second, we flesh out the link between human capital aggregation and search theory by contextualizing aggregation within a dynamic, lifecycle-based, framework. Finally, our analysis has practical implications that are salient in the current environment. The COVID19 pandemic

has forced many organizations to decentralize and adopt remote work. In such settings, the problems associated with sequential aggregation are likely to be more pronounced and may even grow over time as fewer employees are hired and developed in close coordination with others within the firm.

HUMAN CAPITAL AGGREGATION AS SEARCH FOR SOLUTIONS

When firms are faced with a strategic or operational challenge, they engage in search for solutions (Cyert & March, 1963 [1992]; Nickerson, Yen, & Mahoney, 2012). This process generally involves the recognition and formulation of the problem's boundaries, followed by search for and selection of a solution (Nickerson & Zenger, 2004).[9]

The acquisition and development of strategic human capital is a common solution to problems faced by the firm (Wright & McMahan, 2011). Human capital is considered a potential source of competitive advantage because it is often valuable, rare, and hard to imitate (Barney, 1991; Coff, 1997; Hall, 1993). Given the costliness of acquiring or creating firm-level human capital resources, the decision to engage in such decisions is a significant one (Barney, 1986; Wright, Dunford, & Snell, 2001).

The Impact of Sequential Aggregation on Organizational Performance

The central mechanism in our theory is the concept of *sequential aggregation*. Sequential aggregation refers to the continuous process of identifying, selecting, and developing human capital as the "building block" of a firm-level human capital resource. This process is carried out by (co)founders/managers, who themselves were often selected and/or developed by other founders or managers. Mechanisms such as recruitment and training are used to explicitly

[9] While an alternate view on problem solving exists – one in which solutions serendipitously bring attention to unformulated problems – we take the traditional, intentional search-based view of problem solving in this paper. In the context of the strategy literature, the focus is on substantial problems that the firm is likely to be aware of even in the absence of a formal formulation (von Hippel & Krogh, 2015).

generate knowledge that can be used to address problems faced by the firm (Bartel & Saavedra, 2000; Loewenstein & Spletzer, 1997; Nickerson & Zenger, 2004). This process is ongoing over the life of the firm, and is performed sequentially – i.e., individuals who are hired/trained by one set of decision-makers may become decision-makers, and carry on the aggregation process by searching for, identifying and developing human capital needed to resolve firm-level problems. Decisions about human capital are often carried out throughout the organization, so this sequential process may have many layers.

Importantly, the process of sequential aggregation is reliant on the boundedly rational understanding of the individuals involved in making decisions. We adopt the imagery of Gavetti and Levinthal (2000) and others (Csaszar & Levinthal, 2016; Csaszar & Ostler, 2020), who discuss the notion of cognitive representations that provide a constrained vision of the search space. Per this prior work, individuals hold a simplified version of the problem search space. Based on this representation, individuals form their own understanding about the complex environment, and predictions about the likely solutions to the focal problem. Based on this understanding, the individuals subsequently formulate a strategy to solve the problem. We add that, when a focal individual selects or develops the human capital of other individuals as a solution to the problem they perceive, they will more likely focus on individuals who have cognitive representations which are *consistent with their own*. This means representations that have an overlap in how the individuals perceive the search space (Gavetti and Levinthal, 2000). In other words, individuals who have certain beliefs about how to address the firm's challenges are more likely to gravitate toward individuals with similar beliefs.[10] In the context of search theory, this allows both individuals to coordinate the search process, take advantage of search

[10] It is useful to note that many diverse perspectives may be consistent with the same cognitive representation.

complementarities and accelerate their problem-solving performance.[11] This coordination improves solution speed and efficiency but may cause the organization to miss superior solutions that are outside of the overlapping cognitive representations of the individuals.

Despite the general desire of decision-makers to identify and deploy individuals with viewpoints like theirs, the broader work on bounded rationality and imperfect cognition indicates that it is extremely unlikely that others will have *exactly* the same view of the problem space as them. As a result, some variation between layers of human capital in the aggregation process is unavoidable. When the aggregation is sequential, imperfections in the overlaps of boundedly rational cognitive representations may cause more distant individuals in the sequence (for example, a founder who engaged in sequential aggregation by hiring/developing managers beneath them and an employee who is hired/developed by a manager multiple degrees removed from that initial hiring/development process) to have significantly non-overlapping cognitive representations. This is due to the cumulative "drift" effect – the cumulative difference in perceptions of the same problem space across multiple layers of individuals hired or trained to address a problem within a firm.

This will have two effects. On the positive side, it may help the firm to diversify its information about the problem space, as everyone's search process provides novel information from a different portion of the landscape. This may allow the organization to dislodge itself from a poorer local solution associated with the prior cognitive representation and discover a better

[11] At the firm level, this is related to organizational exploitation (March, 1991). From the perspective of the exploration-exploitation literature, one could think about sequential aggregation as a human capital process that contributes to organizational search. Importantly, the process identified by March (1991) focuses on how fast the agents within an organization converge to the same solution. March does not focus on the underlying mechanisms related to human capital. Further, as we describe below, there are some important differences relative to March's model. E.g., when the search process is locked in a suboptimal peak, sequential aggregation may reinforce this lock-in (i.e., exploitation) while it may encourage broad search (i.e., exploration) when away from the peak. Consequently, there is no one-to-one mapping between sequential aggregation and either exploration or exploitation and these are conceptually different constructs.

one. On the negative side, search of a focal agent is not informative for search of an agent that holds non-overlapping cognitive representation of the problem, as they are exploring independent portions of the solution space. This will result in a lack of search complementarities and coordination. Agents with non-overlapping cognitive representations search the space as if they are independent. Even worse, if the agents have a biased understanding of the cognitive representation of the other agent, and perceive their searches to be mutually informative, while they are not, this may lead to outcomes that are even inferior to independent search. The mechanism of sequential aggregation of human capital constitutes the core theoretical "engine" of our theory.

In summary, we formulate the following propositions:

Proposition 1a: When individuals involved in a firm's human capital aggregation process have overlapping conceptions of the problem space, their search efforts encourage exploitation over exploration.

Proposition 1b: When individuals involved in a firm's human capital aggregation process do not have overlapping concepts of the problem space, their efforts encourage exploration over exploitation.

As we describe in the sections that follow, whether the human aggregation process will result in non-overlapping cognitive representations of the firm's problem held by different individuals within the organization or will result in homogenization of views and human capital depends on the characteristics of the problem faced by the firm.

Impact of Problem Complexity on the Aggregation Process

The key variable in organizational search theory (Levinthal, 1997; Nickerson & Zenger, 2004; Rivkin, 2001) is problem complexity. Problems become complex (i.e., NP-hard; Rivkin, 2001) when tradeoffs exist between the parts of the problem. This means that if solving a problem requires making decisions on N parts (i.e., elements), changing one element that

improves the contribution of that element to the organization may negatively affect the contribution of another element elsewhere in the organization. As shown in the organizational search literature, this has several effects on the characteristics of the problem. First, it makes the problem harder to solve (i.e., complex) for boundedly-rational agents. This is because changing elements incrementally, i.e., locally (e.g., by making one of only a few decisions in each period) may lead the organization to be locked in a position that does not maximize its performance on the landscape (Kauffman & Kauffman, 1993).[12] Second, it creates differentiation opportunities for organizations that are better at discovering superior solutions by resolving the tradeoffs (i.e., making long-jumps and traversing the values of the problem space). While most organizations are stuck at a suboptimal position, some organizations can find a solution (by luck or due to differential ability) that is not obvious to others.

The effect of sequential aggregation of human capital on organizational performance depends on problem complexity. Since the human capital aggregation process is essentially a series of path dependent problem-solving search processes being carried out by an organization, the nature of these problems will determine the nature (and outcomes) of the search. Further, prior literature has often argued that business environments and industries vary significantly in terms of problem complexity (e.g., (Lenox, Rockart, & Lewin, 2007). Problem complexity is thus an important driver of heterogeneity across business environments, and ultimately, a firm's ability to engage in search to build and leverage human capital resources.

When the problem complexity is low (i.e., the problem space is smooth and consists of few tradeoffs), elements of the problem are mostly complementary and the problem space has few optima (i.e., peaks). In such a context, it is possible to consider decisions about each of the

[12] Gavetti and Levinthal (2000) show that the search process is accelerated within the cognitive representation of the agent.

elements in isolation. The non-overlapping cognitive representations that we identify in Proposition 1b may not interfere with the ability of the organization to coordinate the search. The complementarities will guide the individuals toward the peak, and sequential aggregation will homogenize the human capital of the firm. Even if the process of sequential aggregation will tend to diversify the cognitive representations of the agents, searching too far away from where the firm is currently will lower performance. The process will push the firm toward coherence and coordination.

We illustrate this mechanism in Figure 1, which depicts a traditional "rugged landscape" model, in which both the x and y axes represent different values of various configurations of attributes that might impact firm "fitness". Dark colors represent low fitness points (minima) while light colors represent high fitness points (peaks or maxima). The ovals represent cognitive representations. The agents can find the best solution within the oval. This is analogous to being able to maximize the performance along some dimensions of the search space (Gavetti and Levinthal, 2000). The best solution to the firm's problem is point A. Due to the constraints of its cognitive representation, agent 1 may perceive point X as the best solution to the problem and acquires/develops the human capital of agent 2 with point X as the starting point. Agent 2 then decides that point Y is the best position within its cognitive representation and, in turn, acquires/develops the human capital of agent 3. Importantly, because the problem space has only a single peak and no tradeoffs, agent 3 will select a position that is very close to point A. The three agents thus jointly coordinate to search for A. Subsequent aggregation is then unlikely to deviate significantly from A and the human capital will start homogenizing around A. Based on this logic, we formulate the second proposition:

> *Proposition 2: When the organization faces few tradeoffs and its decisions are mostly complementary (i.e., problem complexity is low), sequential aggregation will*

encourage exploitation over exploration in the development of human capital resources for problem-solving.

The outcome is different when the firm's problem includes many tradeoffs. This creates a rugged search space with multiple peaks – that is, multiple potentially optimal solutions to the focal firm level problem. Improving the performance of one element may lower the performance of another element of the problem. Sequential aggregation of human capital resulting in non-overlapping cognitive representations may then lead to two outcomes: 1) the loss of coordinated search effort, 2) allowing the organization to fully explore the search space. Agent 1 believes that the best solution within its cognitive representation is point X (which is close to one of the solutions – peak C). Agent 1 then acquires/develops the human capital of agent 2. However, to agent 2, point Y appears to be a better solution than point X. If agent 2 moves its position to point Y, it will move away from solution C toward solution B. In turn, when agent 2 acquires/develops the human capital of agent 3, while hoping to coordinate the search efforts, the search may diverge even further. For agent 3, point Z (close to peak A) may appear better than point Y. In this example, all three agents search toward different solutions of the firm's problem. Sequential aggregation creates a divergence in search efforts in which the positions of one agent may not be informative for the search effort of other agents. In the context of a complex search space, the sequential aggregation of human capital thus may be detrimental to coordinated search efforts. Whether such search is performance-enhancing will depend on the height of the peaks. If for instance, peak C is the best solution to the firm's problem, sequential aggregation may push the firm away from this peak and it may end up on suboptimal peaks A or B.

It is also useful to note that once the search process finds a peak, the sequential aggregation of human capital may be an insufficient mechanism to break away from it (while it encouraged exploration when the agents were away from the peak). This is because agents that

discovered the peak, will consider it to be the best solution to the firm's problem and will acquire/develop human capital with that position as the starting point. The sequential process that we describe in Figure 2 may cease to create sufficient diversity of perspectives once the firm discovers the peak and the homogenization process described in Proposition 2 will take hold. This is because sequential human capital aggregation as a search process tends to lead to some form of convergence around a peak. As soon as a peak is identified by an agent, the sequential aggregation process builds around that peak via the acquisition and development of human capital designed to exploit that peak. Each new agent brought into the decision-making process will be selected for their consistent views of that peak, generating a "core rigidity" around that peak, thus making it difficult to move on via the discovery of a new, more distant peak (Leonard-Barton, 1992). Consequently, when solving complex problems sequential aggregation will increase opportunities as well as risks. However, once the firm settles on a peak, the sequential aggregation may be insufficient to restart exploration.[13]

We summarize this logic in the following proposition:

> *Proposition 3: When the organization faces many tradeoffs and its decisions are mostly interdependent (i.e., high problem complexity), sequential aggregation will encourage exploration, creating both opportunities for improved performance and an increased risk of fixating on a suboptimal solution once a peak is found.*

The Impact of Environmental Dynamism on the Aggregation Process

Another central construct in organizational theory relates to environmental dynamism (Brown & Eisenhardt, 1997; Davis, Eisenhardt, & Bingham, 2009). Importantly, problem complexity (i.e., the presence of tradeoffs) and environmental dynamism (i.e., how the search space changes over time) are orthogonal constructs. In the human capital aggregation process,

[13] This is an important distinction between how sequential aggregation drives exploration and the traditional exploration with a fixed parameter (e.g., March, 1991).

this is analogous to an industry or competitive environment in which the skills and knowledge necessary to succeed are in a constant state of flux – an example could be a cutting-edge technological industry. In the context of our example, we represent dynamism by changing the height of different positions in the search space. For instance, in Figure 2, let us first assume that point C is the highest point in the search space and that agent 1 has discovered it and is aware that point C is one of the solutions (i.e., it is a local peak). Then, if the changing environment sufficiently lowers the relative performance of the point C relative to its surroundings, the exploration facilitated by sequential aggregation can restart and serve the useful role of discovering better solutions. Individuals brought into the sequential aggregation process by agent 1 will eventually not recognize point C as a peak any longer, due to its lower performance, and will search the environment for an alternate peak. In other words, an external shock changing the environment is needed to break the homogenizing tendency of sequential aggregation. This is because, as proposed above, the process of sequential aggregation encourages homogenization of human capital around local peaks due to the payoffs involved, even if a complex problem space initially encourages problem-solvers to engage in uncoordinated search. However, if those payoffs dissipate, the force encouraging homogenization weakens. Ensuing waves of human capital acquisition and creation will then be more likely to allow non-overlapping cognitive representations of the problem space result in exploratory search. In other words, the exploratory role of sequential aggregation of human capital is potentially more beneficial in complex and dynamic environments. Consequently, we maintain the following:

> *Proposition 4: When the organization faces dynamic problems with many tradeoffs, sequential aggregation will encourage exploration over exploitation.*

[Insert Figure 2 about here]

Sequential Aggregation Across the Lifecycle of the Firm

Having established the primary propositions stemming from our view of sequential aggregation, we next expand upon those general mechanisms with a discussion of sequential aggregation across the lifecycle of a firm. This is a highly complementary and useful element of our analysis for several reasons. Firstly, given that sequential aggregation is a linear, path-dependent process – that is, it occurs over the course of multiple consequent decisions – it is best to explore the time-dependent elements of how it and its impacts manifest in firms. Secondly, as per our propositions, whether sequential aggregation will have positive or negative impacts on a focal firm is dependent on the nature of the problem that the firm is attempting to solve via human capital aggregation. Since firms face unique types of problems at different points in their lifecycle, it also provides valuable insight into the workings of sequential aggregation to explore some canonical problems and their common solutions at different stages in the firm's existence.

In line with this logic, to structure our analysis, we will take the following approach. First, we will identify the primary problems which a firm faces at different stages in its lifecycle. We conceptualize the firm lifecycle using Quinn and Cameron's (1983) four stage model: entrepreneurial phase, collectivity phase, formalization and control phase, and elaboration of structure phase. Second, we:

1) explore the firm can solve canonical problems at these stages by engaging in human capital aggregation,
2) highlight the ways in which the aggregation process affects the solutions explored by the firm, and the positive and negative impacts of aggregation outcomes, and
3) discuss how the outcomes of sequential aggregation process are impacted at each stage by problem complexity and dynamism.

A FOUR STAGE PATH DEPENDENT MODEL OF SEQUENTIAL AGGREGATION

Entrepreneurial Stage: Finding an opportunity vs. failing to pivot

In the entrepreneurial stage, firms are small and founder/founding team driven (Lippitt & Schmidt, 1967; Quinn & Cameron, 1983). The ideas, skills, and goals of the founders have an outsized impact in this phase as there are few other individuals involved in decision making. The human capital of the founding team is "acquired" via the founding of the firm, and the initial human capital combinations are achieved as the entrepreneurial team begins to work together (Kamm, Shuman, Seeger, & Nurick, 1990).

Primary problems: identify and select opportunities. The primary strategic challenges at this stage are identifying a promising opportunity, judging its quality, and crafting a strategy to pursue it (David, Michael, Ireland, & Brett Anitra, 2010; Smith, Mitchell, & Summer, 1985). Search for a strategic direction is intense and exploratory, as the process often includes false starts and pivots as new information about various opportunities comes to light.

To select a strategic direction, firm decision makers must form a mental image of the landscape on which opportunities exist. A potential problem space for the focal firm is the series of entrepreneurial opportunities which may be exploited by the nascent firm. Firms use heuristics to understand their environment and what is possible within it, relying on a variety of methods to parse the vast amount of information available to them (Haynie, Shepherd, & Patzelt, 2012; Nicholls-Nixon, Cooper, & Woo, 2000). Thus, the initial opportunity, as well as the strategy deployed to realize it, will be shaped by the mental landscape imagined via the founders' collective knowledge and biases (Beckman & Burton, 2008; Gavetti & Levinthal, 2000).

Human capital aggregation-based solution: form an effective founding team. One path to solving the opportunity/strategy problem at this stage is to generate a human capital

resource that will enhance the firm's ability to recognize and judge opportunities, as well as to understand them sufficiently to craft and implement strategies. Because individual level human capital is in short supply at this stage, bringing new human capital into the firm is the primary mechanism by which the firm may aim to solve the relevant problems.

A founder may "recruit" additional team members to leverage their human capital for opportunity recognition and strategy formulation. In doing so, they bring knowledge into the firm and create a situation in which the founding team will interact, work together, and exchange information (Beckman, 2006; Colombo & Grilli, 2010). This combination of founders initiates the human capital aggregation process in a bid to resolve their fundamental problem of identifying and acting on opportunities.

Expanding the pool of founder human capital has been shown to be a potential solution to problems that the firm will face at this stage. New knowledge and opportunity-awareness can be achieved through changes or additions in the top management team (Cho & Shen, 2007; Krishnan, Miller, & Judge, 1999).[14] A breadth of knowledge from a combined group of individuals may aid early-stage firms in their ability to "pivot" to different products, markets, or strategies as circumstances require (Boeker, 1989). Since entrepreneurial behaviors are fundamentally experimental – in that, it cannot be known ex ante which ideas will succeed – the ability to quickly switch between ideas (and a larger selection of ideas to switch between) may help young firms navigate the high odds of failure in these nascent stages (Kerr, Nanda, & Rhodes-Kropf, 2014; Scherer & Harhoff, 2000). Indeed, this ability is the fundamental trait of the much celebrated "lean startup," in which quick deliverables, fast learning, and limited waste

[14] Complementarities between the founding team's different knowledge sets may increase their awareness of opportunities beyond what a single entrepreneur might be able to achieve (Shepherd & Krueger, 2003; West, 2007). Founders may have differing innate abilities to perceive opportunities (Kirzner, 1997) or simply better judgment in choosing among opportunities (Klein, 2008).

are expected to create efficient entrepreneurial firms (Tanev, Rasmussen, Zijdemans, Lemminger, & Svendsen, 2015).

Founding team cognition guides the aggregation process. The addition of individuals to the founding team is the primary path to building a human capital resource to resolve the problem of establishing an initial opportunity and strategy in an entrepreneurial firm. Before individuals can be added to the team, however, the human capital of the original founder(s) must be leveraged to identify and select those people who will be brought on board. Bounded rationality causes decision-makers to favor ideas which are familiar or like the status quo. Accordingly, original founders will tend to approach founding team formation in a way which leverages existing ideas, routines, and resources, as opposed to deviating from their existing ideas and mental frameworks (Katila & Thatchenkerry, 2014).

The role of sequential aggregation in the entrepreneurial stage. The structuring of the founding team and the initial layer of hires at the entrepreneurial stage begins the process of sequential aggregation. Initial founders who expand the founding team as discussed above will do so based on their perception of the problem landscape (i.e., the available entrepreneurial opportunities and strategies to exploit them). Those individuals who join the founding team (and any additional hires involved in these fundamental entrepreneurial decisions) will be identified based on the perceived fit of their human capital with the initial founders' mental representation of the problem space. Due to the bounded rationality of both the founders choosing to expand the team and the founders who are added to the team, they will both have mental representations of the available opportunities and strategies that are a) imperfect and b) not entirely aligned with the other party's (that is, the "drift" inherent in sequential aggregation may apply to early founding teams as well).

The impact of this initial degree of drift will be determined by problem complexity and environmental dynamism. The complexity of the problem of identifying entrepreneurial opportunities and their attendant strategies at this point is dependent on the nature of the industry and environment in which the nascent firm operates.[15] When the problem space is complex – in this setting, when there are multiple potential optima (i.e., peaks) on the landscape that present possible valuable opportunities and strategies – the impact of sequential aggregation will be amplified. This is because there is a greater likelihood that the individuals who join the founding team, and who have slightly different perceptions of the solutions available in the problem space, will identify a peak that differs from the one(s) identified by earlier members and engage in uncoordinated search as a result. The opposite is true when the problem space is non-complex – i.e., when it has few or only one peak. The variance between the mental models of the layers of founding team members will not result in disparate search, because even if a founding team member who has been added at this stage has a non-overlapping view of the space, they are unlikely to find a peak in the that non-overlapping space, and thus search that differs from the search of the original founder(s) will not be reinforced by improved performance.

> *Corollary to Proposition 2: Sequential formation of entrepreneurial teams will tend to promote homogeneity of views and human capital in less complex environments.*
>
> *Corollary to Proposition 3 Sequential formation of entrepreneurial teams will tend to promote pivoting and exploratory search in complex environments.*

Environmental dynamism will play a role as well. The problem space of opportunities and strategies may be unstable if the industry/environment in which the firm is acting is subject to a great deal of change. Entrepreneurial opportunities that are peaks at one point in time may

[15] Identifying potentially valuable opportunities may be easier in growing industries, for example, as well as in industries that are less technologically sophisticated. Conversely, identifying valuable opportunities may be significantly more challenging in more mature industries with lower growth, as well is in industries that have a high degree of technological advancement or require highly specialized knowledge (Jones, 2009).

cease to be peaks after a shift in technology, regulation, demographics, and so on. As a result, sequential aggregation which is carried out with the intention of building resources toward discovering opportunities will be less likely to result in convergence on a single peak in a dynamic environment. Accordingly, in dynamic spaces, the drift associated with sequential aggregation will allow a firm to be aware of a greater variety of potential peaks and be more equipped to pivot if the opportunity space changes during their search.

> *Corollary to Proposition 4: Sequential aggregation will be more likely to result in exploratory search and successful pivoting when entrepreneurial firms function in a dynamic environment.*

An example of the dynamics of this stage can be found in the case of e-commerce startup Printfection, which began life as a B2C apparel company and quickly pivoted to what would prove to be a more successful B2B model. E-commerce is undoubtedly a high complexity, high dynamism environment, and Printfection faced a fundamental entrepreneurial problem – their selected B2C model was a low quality "peak" to pursue. The founding team expanded their view of the problem space by bringing additional human capital into the search process, and successfully identified a higher peak. Founder and CEO Casey Schorr, reflecting on the pivot in an interview, advised other founders to "find a trusted business partner, preferably someone who's very different and brings a completely different skillset to the table. That way, when you engage in a conversation you're going to get a completely different viewpoint. It really helps flesh out the tough questions and make better decisions." (Startups.com, 2017).

Collectivity Stage: Meeting Market Demand in the Present and Future

In the second of four firm life cycle stages, the collectivity stage, the firm, having established its initial opportunity and strategy, becomes internally oriented and engages in fewer exploratory activities (Chrisman & McMullan, 2000; Rice, 2002). Rather than being primarily *ad*

hoc in its actions as it is during the entrepreneurial stage, the firm in the collectivity stage attempts to establish more coherent (but not entirely formalized) routines to take advantage of its human capital resources and become more efficient (Quinn & Cameron, 1983). The founding team have either developed, through experience, or acquired, through hiring, human capital oriented toward the pursuit of the strategy established in the previous phase (Gilbert, McDougall, & Audretsch, 2006; Lumpkin & Dess, 2001). The environment in which the firm functions is now bounded by the strategic decisions of the entrepreneurial stage; rather than the full universe of possibilities, the firm functions locally within the areas in which they have identified opportunities.

Primary problem: meet growing demand. The primary difficulty faced by the firm in the collectivity stage is to achieve the appropriate level of scale to meet demand for the product or service selected in the first stage (Shepherd, Douglas, & Shanley, 2000). In this stage the firm must move beyond the start-up level of productivity to grow. If the opportunity and strategy established in the entrepreneurial stage were sufficiently high quality, the firm will face a level of demand in this stage that is beyond what the founder(s) and early team members are capable of meeting. This problem presents two independent challenges: acquiring the talent to produce the quantity and quality of output needed and building the beginnings of formal work structures which are commonly lacking in the entrepreneurial stage (Mosakowski, 2017; Teece, 2012).

Aggregation-based solution: aggregating production-related human capital. The firm at this stage may attempt to address the problem of growing demand by acquiring human capital oriented toward improving production.[16] Establishing an increased scale of production requires that individuals within the firm understand the scope of demand, are able to establish

[16] While the demand problem can require non-human capital investments such as factory capacity and inventory storage space, human capital resources will be fundamental to the successful deployment of these assets.

models for demand projections, and can establish production routines that maintain quality while significantly increasing quantity. It has been illustrated repeatedly across multiple literatures that human capital is associated with increased productivity (Black & Lynch, 1996; Dietz & Bozeman, 2005).

The role of sequential aggregation in the collectivity stage. This stage of the lifecycle is notable for being a time when the firm is especially reliant on sequential aggregation, especially in the form of hiring. The process of identifying and selecting individuals to join the firm at this stage is carried out by founders/managers who themselves were identified and selected in the entrepreneurial stage. In other words, the hiring process is reliant on the boundedly rational understanding of the individuals brought into the firm in the entrepreneurial phase, who in turn were brought into the firm based on a boundedly rational view of the type of human capital that was needed at that time. The firm thus endures a "layered" effect of bounded rationality, which begins to exacerbate the "drift" associated with sequential aggregation.

The path dependent element of sequential aggregation also becomes relevant at this stage. If the firm was operating in a problem space that was complex, unstable, or both in the entrepreneurial stage, it is likely that search carried out by the individuals on the founding team was uncoordinated. Uncoordinated search in past stages will lead to a greater likelihood of different starting views of the problem space at this stage.

The complexity and stability of the problem space at the collectivity stage will also have consequences. The problem of moving from entrepreneurial levels of productivity to the type of productivity necessary to meet demand as an established firm is inherently difficult and there are multiple ways of achieving this transition (Coff, Coff, & Eastvold, 2006). The degree of complexity will be determined, as in the entrepreneurial stage, by contextual considerations.

Increasing the scale of production on a product or service with relatively simple and limited inputs is complex, but doing so for a product or service that requires rare or costly inputs – such as rare materials or specialized labor for delivery of the service – will be significantly more so.[17] The same considerations will apply in terms of environmental dynamism; if elements of the supply chain, whether material or human capital oriented, are subject to potential shocks, the space of potential scaling solutions becomes less stable.

In a moderate complexity, stable problem space, the process of aggregating new human capital for scaling up demand should converge on a single peak relatively quickly. The agents who hire or train individuals to work toward a solution they have identified will have a particular view of the problem landscape and the focal peak. A relative lack of other optimal solutions (i.e., peaks) on the space, as well as a lack of dynamic change in what is a peak on the landscape, will prevent new agents from engaging in distant search despite differences in their view of the problem space. The view of the problem will homogenize, and the firm will converge on a single peak with some degree of efficiency. This is ideal for the focal problem: the firm's goal is to find a sufficient solution to build capacity and to do so quickly, and a variety of solutions is not preferable here as it was in the entrepreneurial stage.

Alternately, if the problem space for the firm is either highly complex or dynamic in nature, agents will be less likely to meaningfully coordinate their search processes. Based on different views of the problem space, different layers of individuals will work toward different peaks in the problem space, and their search will be reinforced by improved performance since they will be working toward actual optima. As a result, the firm will struggle to converge on a single way to scale up their ability to meet demand, and their performance will suffer as a result.

[17] This will also be determined by elements such as the complexity of the supply chain, the degree of regulation surrounding inputs and distribution, and other factors.

Corollary to Propositions 2 & 3: Firms whose growing teams are formed sequentially will suffer from inefficient and uncoordinated search in the collectivity stage if they function in a complex environment.

Corollary to Proposition 4: Firms whose growing teams are formed sequentially will suffer from inefficient and uncoordinated search in the collectivity stage if they function in a dynamic environment.

An example of this dynamic can be seen in the case of the crowdsourcing invention platform, Quirky. Quirky created a platform on which individuals could submit ideas of varying types and complexity, and those that received sufficient support would be taken to market by Quirky in partnership with the inventor. The human capital aggregation at Quirky was inherently sequential as both community inventors and diverse internal employees commented on products and helped to attract new inventors into the ecosystem. As Quirky grew and took part in the development and sale of increasingly successful products, it faced a challenge. It needed to expand its ability to manage new projects and its capacity to meet demand for successful products, but due to the extremely complex and dynamic nature of its business this proved very difficult. The coordination challenges associated with managing an increasingly complex and diverse set of contributors (inside and outside of the organization, often in different industries) grew much faster than the firm's profitability. Ultimately, Quirky was unable to maintain its growth. Founder and former CEO Ben Kaufman stated in an interview after leaving the company, "Are these great ideas? Yes. Can Quirky do them justice, sell them, and scale them profitably? No." (Hoyt & Marks, 2013; Lagorio-Chafkin, 2015).

Aggregation Solidifies Path Dependent Routines in the Formalization and Control Stage

The formalization and control stage is characterized by stability and efficiency due to the firm's continued movement toward formalized procedures, hierarchy, and standardized routines (Adizes, 1979; Katz & Kahn, 1978; Lyden, 1975; Quinn & Cameron, 1983). In this stage, the

firm is more subject to inertia, as its operations become increasingly dominated by formalized routines geared towards the efficient execution of strategic goals that were decided upon previously (Dougherty, 1992; Henderson & Clark, 1990; Rosenbloom, 2000). Rather than engage with exploratory options for growth, the firm focuses primarily on gathering resources to execute its strategy and overcoming weaknesses from earlier incarnations of the firm (David et al., 2010; Downs & Mohr, 1976). The firm focuses on "producing results" rather than "acting entrepreneurially" (Adizes, 1979).

Primary problem: professionalization of decision-making processes. At the formalization and control stage, a firm is faced with the challenge of "professionalization" – that is, establishing the routines, procedures, scale, and resources of a larger, more mature firm. As the firm continues to mature, the formalization of structures and routines is necessary to maintain competitive advantage (Dai, Roundy, Chok, Ding, & Byun, 2016; Wales, Gupta, & Mousa, 2011). Introducing formal structures and routines is an attempt to limit variance in performance which becomes more problematic with size and age (Dai et al., 2016; Sciascia, Mazzola, & Chirico, 2013). This is necessary as the competitive stakes are higher as the firm faces larger, more mature rivals, and inefficient, informal processes that may have been acceptable at an earlier stage of the firm's development become too potentially costly to tolerate.

Aggregation-based solution: alter firm structure to achieve the benefits of professionalization and develop greater efficiency. The aggregation and arrangement of human capital resources can help to address the firm's need to professionalize at this stage. Building routines and structures that maximize the strategic benefit of existing human capital while allowing for the development of new human capital resources is crucial to moving the firm's decision-making process from an ad-hoc set of processes to a professional, mature firm's

set of processes. Firm structure is a determining factor in the way that knowledge-related problems are solved (Macher, 2006).

Routines for managing the stock and flow of individual level human capital into and out of the firm are determined by the overall structure of the firm (Dierickx & Cool, 1989; Ployhart, Weekley, & Baughman, 2006; Sung-Choon et al., 2007). The routines for the development and deployment of human capital (Huckman & Pisano, 2006; Huselid, 1995; Youndt, Snell, Dean, & Lepak, 1996) will interact with operational routines for day-to-day tasks, allowing the firm to generate and deploy human capital resources strategically (Benner & Tushman, 2003; Cohen & Bacdayan, 1994; Grant, 1996).

Sequential aggregation influences structural decisions. The role of sequential aggregation changes somewhat at this stage in comparison to previous stages because its *path dependent* element takes primacy. The human capital aggregation actions that take place in this stage are focused on re-arranging and re-structuring human capital resources that have already been formed. As a result, the impacts of human capital aggregation at this stage will be primarily driven by the outcomes of prior stages.

When determining how to structure the firm to formalize routines and "professionalize" the firm, decision-makers have two primary options. First, they can focus on hierarchical structures which prioritize maintaining existing ideas and routines. This involves keeping top management members as centralized decision-makers and often retaining founder-CEOs. Alternatively, the firm can redistribute hierarchical decision-making authority across multiple units or a flattened structure, as well as considering the replacement of founder-CEOs with "professional" CEOs, a common request of stakeholders such as venture capitalists (Hellmann & Puri, 2002).

Agency theory would imply that founders would be hesitant to move toward any structure which would dilute their decision-making power and value appropriation opportunities (Coff, 2010; Jensen & Meckling, 1976).[18] Hierarchical firms focus on building efficient routines around existing human capital and solving problems centrally and sequentially. In the context of this stage of the firm's lifecycle, this means two basic actions: maintaining the primacy of the founder-executives and structuring the firm in such a way as to center them in firm level problem solving. Making use of the hierarchies built into the firm from its earlier entrepreneurial stage – such as decision-making mechanisms that center executives who are also founders – can help a firm to efficiently and quickly solve problems based on previous experience and then move on to making plans for future contingencies (Mihm, Loch, Wilkinson, & Huberman, 2010).

Environmental dynamism is the ultimate determinant of the nature of the outcome of sequential aggregation at this stage. The problem of professionalization is dynamic because external shocks to the solution space are common and are primarily caused by forces outside of the control of current decision makers. Specifically, shareholders and investors (such as VCs) are extremely active in determining the structure and leadership of the firm at this stage. They may make decisions about leadership and structure that can bypass the sequential aggregation process entirely.

The replacement of founder executives at a certain point in new venture maturation has been studied at great length. As a firm grows, non-founder executives become valuable for their knowledge of the needs of external stakeholders such as venture capitalists – in fact, VC investors may insist on a change of CEO at this stage (Vanaelst, Clarysse, Wright, Lockett, Moray, & S'Jegers, 2006). Executives can be brought in from other firms to provide expertise

[18] This resistance could contribute to the fact that at least half of start-ups never replace their founder-CEOs (Jain & Tabak, 2005).

and experience that founders, despite their instrumental role in the early stages of the firm, may lack (Clarysse & Moray, 2004). These "professional" executives have relevant operational knowledge as well as networks and experience that can help the firm continue to grow (Clarysse & Moray, 2004; Eesley, Hsu, & Roberts, 2013; Miller & Shamsie, 2001).

Even if founder-executives remain in charge, their impact on firm problem-solving can be diluted via the use of a modular firm structure. Modular structures allow a firm to take complex problems and disassemble them, with discrete problem-solving groups addressing each of the parts before ultimately recombining them into a firm-level solution (Langlois, 2002). In this way, the firm structure resembles the problem structure – disparate but feeding into one overarching whole (Afuah & Tucci, 2012; Sanchez & Mahoney, 1996). A modular firm structure allows for different individuals in different discrete portions of the firm to be responsible for a different portion of a solution to a problem, de-centering founder-executives and reducing the central role their human capital plays in the firm level aggregated human capital resource.

If these external shocks occur to the problem space, the sequential aggregation process will take a very different direction. Either hierarchical structures will no longer be tied to the initial vision of the founding team, due to their replacement, or the hierarchical structure that centers the cognition of the early founders itself will change. In either event, the sequential aggregation process can be disrupted significantly at this stage if an exogenous shock like the interference of investors or shareholders occurs.

> *Corollary to Propositions 1a and 1b: The path dependent forces of sequential aggregation will cause firms at the formalization and control stage to structure their human capital in a way that reinforces existing human capital endowments and focuses on efficiency and search coordination (i.e., the mechanism identified in Proposition 1a will dominate).*
>
> *Corollary to Proposition 4: Firms at the formalization and control stage which have the sequential aggregation process interrupted by dynamic changes may be able to re-orient*

themselves toward less coordinated, more exploratory search (i.e., the mechanism identified in Proposition 1b will dominate).

This logic can be tied to the extant literature exploring the relationship between founder-CEO's and firm performance. There are generally mixed results in that literature as to whether founder-CEOs have a positive or negative impact on performance and prior work has identified several mechanisms driving this relationship (Adams, Almeida, & Ferreira, 2009; Chen & Thompson, 2015). If we consider the fact that founder-CEO replacement is an important step in the process of sequential hiring, the effect of the replacement may critically depend on the context. The mechanism of sequential aggregation of human capital may have been overlooked in prior studies. For instance, CEOs may help to professionalize the organization around its existing successful strategies. However, when founders are replaced by CEOs in response to shocks from the external environment resulting in low performance of the firm, it triggers new search that may have unpredictable impacts, as well as interrupting the path-dependent sequential aggregation process up to this point. Mixed outcomes from this process then are likely.

Human Capital Guides Renewal Options in the Elaboration of Structure Stage

In the elaboration of structure stage, the firm attempts to balance strategic flexibility and the cohesion and efficiency established in the previous stage (Quinn & Cameron, 1983). The firm has substantial resources and has established its demand base, meaning that it faces a decision to either continue as it is or engage in some form of expansion or diversification. Flexibility, resource acquisition and growth become newly emphasized. The firm "develops at the boundaries", attempting to change and address new environmental opportunities and challenges (Katz & Kahn, 1978).

Primary problem: previously exploited opportunities may no longer be viable. At this stage in the firm's life cycle, demand for the firm's initial products or services would be expected to be reaching a mature level. In addition, incumbent competitors will also be growing, and nimble new entrants could pose competitive threats (Hockerts & Wüstenhagen, 2010). As a result, the firm must engage in some sort of significant renewal of its strategy to maintain competitive advantage.

Research has been explicit about the importance of adaptability at the firm level to survive as competitive environments shift (Gavetti, Levinthal, & Rivkin, 2005; Joseph & Ocasio, 2012; Laureiro-Martínez & Brusoni, 2018). Mature firms need to engage in radical innovation at times to avoid having their rents competed away (Agarwal & Gort, 2002; David et al., 2010). This can be due directly to the pressures of new competitors eroding existing competitive advantage (Porter, 1979), or other environmental threats, such as a preferred strategy being blocked by circumstances or changes in regulation (Marx & Hsu, 2015).

Aggregation-based solution: acquisitions provide strategic renewal opportunities. The firm can seek a strategic renewal via a large infusion of new human capital. This mirrors the team-building solution to the firm's initial opportunity problem in the entrepreneurial stage, which is fitting given the need to behave entrepreneurially in this stage. The mass acquisition of individual and firm level human capital will not only give the firm new capabilities but new awareness of opportunities for competitive advantage to replace those which have been eroded over time.

The primary way that a firm can achieve the scale of new human capital and knowledge resources necessary at this stage is through an acquisition. Human capital can be the most important deciding factor in whether an acquisition is made (Masten, Meehan, & Snyder, 1989;

Monteverde & Teece, 1982). The competencies of the target firm may be at least partially obtained and integrated into the acquiring firm via "acqui-hiring", where an acquisition is executed primarily to gain access to most or all of the target's human capital (Chatterji & Patro, 2014; Huber, 1991; Song, Almeida, & Wu, 2003).

The nature of the acqui-hire will play a role in its human capital aggregation impact (Selby & Mayer, 2013). Vertical acquisitions are known to provide greater efficiency and control to the acquiring firm due to limited differences in the firms' knowledge bases (Li, Ramaswamy, & Pécherot Petitt, 2006; Williamson, 1971). Conversely, conceptually distant, horizontal acqui-hires allow firms to innovate by bridging the gap between the existing knowledge within a firm and the knowledge base of a target firm (Pennings, Barkema, & Douma, 1994; Pennings & Harianto, 1992). This presents challenges in combining dissimilar firms and bases of human capital, but this mismatch may lead to performance benefits as well (Chatterjee, Lubatkin, Schweiger, & Weber, 1992; Marks & Mirvis, 2011).

Sequential aggregation determines mature firms' ability to search for distant solutions. The problem space on which the firm searches for solutions to the strategic renewal problem at this stage is inherently complex – many related and unrelated acqui-hiring targets are available. The degree of this complexity will be determined by the nature of the firm. Firms with long and complex supply chains will have a greater number of "local" peaks associated with vertical/related acqui-hiring, and firms with a greater number of potential complementarities with firms in other industries will have a greater number of "distant" peaks associated with horizontal/unrelated acqui-hiring. The number of peaks on the problem space will have the same impacts on coordinated search across layers of human capital that have been explored in earlier stages in this paper.

Like the formalization and control stage, the path dependent impact of the firm's history of sequential aggregation will play a very significant role in how the firm engages in human capital aggregation to solve its strategic problems at the elaboration of structure stage. Attempting to identify and select targets for acqui-hiring mirrors the decisions taken during the entrepreneurial stage. However, in the elaboration of structure stage, the firm has developed multiple layers of human capital through the process of sequential aggregation and depending on how the aggregation process played out in previous stages, may find itself in drastically different circumstances.

The firm's ability to successfully search for and identify valuable targets for an acqui-hiring based strategic renewal will be largely dependent on how much the sequential aggregation process has reinforced the homogenizing element of the human capital aggregation process versus how much problem complexity and dynamism has exacerbated human capital "drift" over time. Firms that have continuously converged around local peaks due to their engaging with relatively low complexity, stable problems will not have developed the broad ranging human capital (and its attendant broad-ranging awareness of the problem space they now occupy) to successfully identify distant peaks on the problem landscape in the elaboration of structure stage. By the same logic, some firms have suffered a great deal of human capital "drift" over the course of their lifecycle due to the uncoordinated search caused by the sequential aggregation of boundedly rational actors and their engagement with complex, dynamic problem landscapes. They will have a breadth of human capital and variety of mental representations of the problem landscape that will make them more likely to be aware of (and capable of working toward) distant solutions at this stage.

Firms that have homogenized their human capital resources over the course of the sequential aggregation process will struggle to identify and engage with innovative solutions at this stage of their lifecycle (Hill & Levenhagen, 1995; Huff, Huff, & Thomas, 1992; Porac & Thomas, 1990; Senker, 1995). Over time, the firm has limited its ability to effectively navigate the innovation-based challenges of an acqui-hire (Hsu & Lim, 2013; Stinchcombe, 1965). Ultimately, a homogenous, efficiency-oriented legacy of human capital resources hampers the firm's ability to identify and pursue new opportunities (Hodgkinson, 2003; Hodgkinson & Wright, 2002; Laureiro-Martínez & Brusoni, 2018).

> *Corollary to Proposition 2: For firms in the elaboration of structure stage which have developed in less complex and more stable contexts, the sequential hiring process may be an insufficient mechanism for renewal due to the path dependent effects of homogenization over prior stages.*
>
> *Corollary to Proposition 3: For firms in the elaboration of structure stage which developed in complex environments, sequential aggregation can drive renewal of mature organizations by restarting search and allowing firms to discover superior opportunities.*
>
> *Corollary to Proposition 4: For firms in the elaboration of structure stage which developed in dynamic environments, sequential aggregation can drive renewal of mature organizations by restarting search and allowing firms to discover superior opportunities.*

Potential examples of this dynamic can be seen in high profile acqui-hires in recent years. Tech giants such as Facebook and Yahoo have engaged in multiple acqui-hires, but with vastly differing results. Facebook, whose CEO Mark Zuckerberg famously is quoted as saying the company "has not once bought a company for the company itself" but rather "to get excellent people", has successfully engaged in acqui-hires of companies such as Drop.io, Friendfeed, and Hot Potato (Aggarwal & Rizvi, 2020; Hindman & Bradford, 2011). In contrast, Yahoo, a firm at a similar stage in its lifecycle, has instead had a series of failed acqui-hires, famously failing to achieve meaningful talent benefits from acquisitions of companies such as MessageMe, Vizify, and EvntLive. While one cannot directly observe the sequential aggregation mechanisms

discussed in this paper throughout the history of these specific firms, it is telling that talent management analyst John Sullivan attributes the difference in Facebook and Yahoo's acqui-hiring performance to a difference in their innate ability to discover, develop, and nurture new ideas (Weissman, 2016).

DISCUSSION

We have set out to design a framework for understanding how the human capital aggregation process can, under circumstances, lead to unexpected negative outcomes, even when the firm engaging in the aggregation process seemingly engages in "optimal" behavior. What this ultimately means is that, due to the path dependent nature of sequential hiring and training that occurs in the human capital aggregation process, the perception that a firm acquiring or developing "good people" is, in and of itself, good for the firm, is not necessarily true. More broadly, it means that the acquisition or creation of human capital resources via the aggregation process – one of the most relied upon problem-solving tools available to firms – may not be as reliable as believed.

The implications of this are far reaching, if only because the human capital aggregation process underlies so many crucial firm phenomena. While the most obvious processes affected by the implications of the newly developed theory here are the primary starting points of the human capital aggregation process – hiring and training – other firm-level activities are also impacted. Mergers and acquisitions, whether they are performed with the intention of acquiring the human capital resources of the target or not, must be viewed with greater caution considering the potentially far-reaching negative consequences that can arise from the aggregation process that takes place as the two firms are combined. Similarly, firm restructurings are also tied to

potentially significant changes in the ways that human capital combines and ultimately aggregates into a firm-level resource – potentially to the detriment of the firm.

There is a great deal of research that can build on our theory. The most obvious starting point is the search for data that is sufficiently granular to allow scholars to observe the microprocesses theoretically examined in this paper. This is admittedly a high bar; to observe the processes at play, one would have to have individual level data on the expectations and intentions of founders/decision-makers, as well as a significant amount of quite granular hiring data, to be able to identify hiring biases as well as the degree to which hires match those biases. A potentially feasible starting point could involve an in-depth longitudinal study of a single firm or small set of firms, as a traditional "large *n*" dataset may become unwieldy with the number of constructs involved in the human capital aggregation process.

Another potential way to move forward from the framework set out here is the creation of detailed mathematical models to allow a more nuanced understanding of the complex, interactive relationships at play in the aggregation process. A benefit of a modeling approach would be the ability to make simplifying assumptions to focus on a few core variables in the process. This may allow for more specific insights than the verbal theory-building process can.

Aside from ways to quantitatively explore the theoretical framework we have built in this paper, one of the most important avenues for future research is to consider the differences between knowledge-intensive industries and other industries in the applicability of the propositions set forth here. A great deal of the theoretical analysis in this paper presumes that the human capital acquired or developed by the firm at various stages is valuable and idiosyncratic in some manner. It may be that, in industries with low knowledge-intensity, the fungibility of

various individuals' human capital means that the outcomes of the aggregation process are qualitatively different in terms of their strategic impact on the firm.

Finally, as set out in the introduction, exploring other, non-search-oriented moderators of the directions and outcomes of the aggregation process is likely to be fruitful. The diversity of the human capital on the founding team, for example, may determine how subsequent "waves" of sequential aggregation play out. The number of waves of aggregation may also be an important moderator. The specifics of HR routines that play a part in the process could also be examined. For instance, outsourcing, external HR services, and the utilization of internal labor markets might alter the path of some of the mechanisms explored here.

Ultimately, this paper is the foundation from which a more nuanced understanding of the human capital aggregation process and its outcomes can be built. By calling into question the overly positive assumptions about the aggregation process present in the current literature, we can present propositions which highlight its potential to destroy value which will in turn hopefully stimulate rich avenues for future research.

REFERENCES

Adams, R., Almeida, H., & Ferreira, D. 2009. Understanding the relationship between founder–CEOs and firm performance. ***Journal of Empirical Finance***, 16(1): 136-150.

Adizes, I. 1979. ***How to Solve the Mismanagement Crisis: Diagnosis and Treatment of Management Problems***: Adizes Institute.

Afuah, A. & Tucci, C. L. 2012. Crowdsourcing as a solution to distant search. ***The Academy of Management Review***, 37(3): 355-375.

Agarwal, R. & Gort, M. 2002. Firm and Product Life Cycles and Firm Survival. ***American Economic Review***, 92(2): 184-190.

Barney, J. B. 1986. Strategic Factor Markets: Expectations, Luck, and Business Strategy. ***Management Science***, 32(10): 1231-1241.

Barney, J. B. 1991. Firm Resources and Sustained Competitive Advantage. ***Journal of Management***, 17(1): 99-120.

Bartel, C. A. & Saavedra, R. 2000. The Collective Construction of Work Group Moods. ***Administrative Science Quarterly***, 45(2): 197-231.

Beckman, C. M. 2006. The influence of founding team company affiliations on firm behavior. ***Academy of Management Journal***, 49(4): 741-758.

Beckman, C. M. & Burton, M. D. 2008. Founding the Future: Path Dependence in the Evolution of Top Management Teams from Founding to IPO. ***Organization Science***, 19(1): 3-24.

Benner, M. J. & Tushman, M. L. 2003. Exploitation, exploration, and process management: the productivity dilemma revisited. ***Academy of Management Review***, 28(2): 238-256.

Black, S. E. & Lynch, L. M. 1996. Human-Capital Investments and Productivity. ***The American Economic Review***, 86(2): 263-267.

Boeker, W. 1989. The Development and Institutionalization of Subunit Power in Organizations. ***Administrative Science Quarterly***, 34(3): 388-410.

Brown, S. L. & Eisenhardt, K. M. 1997. The Art of Continuous Change: Linking Complexity Theory and Time-Paced Evolution in Relentlessly Shifting Organizations. ***Administrative Science Quarterly***, 42(1): 1-34.

Chatterjee, S., Lubatkin, M. H., Schweiger, D. M., & Weber, Y. 1992. Cultural differences and shareholder value in related mergers: Linking equity and human capital. ***Strategic Management Journal***, 13(5): 319-334.

Chatterji, A. & Patro, A. 2014. Dynamic capabilities and managing human capital. ***Academy of Management Perspectives***, 28(4): 395-408.

Chen, J. & Thompson, P. 2015. New Firm Performance and the Replacement of Founder-CEOs. ***Strategic Entrepreneurship Journal***, 9(3): 243-262.

Cho, T. S. & Shen, W. 2007. Changes in executive compensation following an environmental shift: the role of top management team turnover. ***Strategic Management Journal***, 28(7): 747-754.

Chrisman, J. J. & McMullan, W. E. 2000. A Preliminary Assessment of Outsider Assistance as a Knowledge Resource: The Longer-Term Impact of New Venture Counseling. ***Entrepreneurship Theory and Practice***, 24(3): 37-53.

Clarysse, B. & Moray, N. 2004. A process study of entrepreneurial team formation: the case of a research-based spin-off. ***Journal of Business Venturing***, 19(1): 55-79.

Coff, R. 2010. The coevolution of rent appropriation and capability development. ***Strategic Management Journal***, 31(7): 711.

Coff, R. W. 1997. Human assets and management dilemmas: Coping with hazards on the road to resource-based theory. ***The Academy of Management Review***, 22(2): 374-402.

Coff, R. W., Coff, D. C., & Eastvold, R. 2006. The Knowledge-Leveraging Paradox: How to achieve scale without making knowledge imitable. ***The Academy of Management Review***, 31(2): 452-465.

Cohen, M. D. & Bacdayan, P. 1994. Organizational Routines Are Stored as Procedural Memory: Evidence from a Laboratory Study. ***Organization Science***, 5(4): 554-568.

Colombo, M. G. & Grilli, L. 2010. On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital. ***Journal of Business Venturing***, 25(6): 610-626.

Crocker, A. & Eckardt, R. 2014. A Multi-level Investigation of Individual and Unit-level Human Capital Complementarities. ***Journal of Management***, 40(2).

Csaszar, F. A. & Levinthal, D. A. 2016. Mental representation and the discovery of new strategies. ***Strategic Management Journal***, 37(10): 2031-2049.

Csaszar, F. A. & Ostler, J. 2020. A Contingency Theory of Representational Complexity in Organizations. ***Organization Science***, 31(5): 1198-1219.

Cyert, R. M. & March, J. G. 1963 [1992]. ***A Behavioral Theory of the Firm*** (2 ed.). Cambridge, MA.: Blackwell.

Dai, Y., Roundy, P. T., Chok, J. I., Ding, F., & Byun, G. 2016. 'Who Knows What?' in New Venture Teams: Transactive Memory Systems as a Micro-Foundation of Entrepreneurial Orientation. ***Journal of Management Studies***, 53(8): 1320-1347.

David, G. S., Michael, A. H., Ireland, R. D., & Brett Anitra, G. 2010. Resource Orchestration to Create Competitive Advantage: Breadth, Depth, and Life Cycle Effects. ***Journal of Management***, 37(5): 1390-1412.

Davis, J. P., Eisenhardt, K. M., & Bingham, C. B. 2009. Optimal Structure, Market Dynamism, and the Strategy of Simple Rules. ***Administrative Science Quarterly***, 54(3): 413-452.

Davis, J. P. & Eisenhardt, K. M. 2011. Rotating Leadership and Collaborative Innovation: Recombination Processes in Symbiotic Relationships. ***Administrative Science Quarterly***, 56(2): 159-201.

Dierickx, I. & Cool, K. 1989. Asset Stock Accumulation and Sustainability of Competitive Advantage. ***Management Science***, 35(12): 1504-1511.

Dietz, J. S. & Bozeman, B. 2005. Academic careers, patents, and productivity: industry experience as scientific and technical human capital. ***Research Policy***, 34(3): 349-367.

Dougherty, D. 1992. Interpretive Barriers to Successful Product Innovation in Large Firms. ***Organization Science***, 3(2): 179-202.

Downs, G. W. & Mohr, L. B. 1976. Conceptual Issues in the Study of Innovation. ***Administrative Science Quarterly***.

Eesley, C. E., Hsu, D. H., & Roberts, E. B. 2013. The contingent effects of top management teams on venture performance: Aligning founding team composition with innovation strategy and commercialization environment. ***Strategic Management Journal***: n/a-n/a.

Gavetti, G. & Levinthal, D. 2000. Looking Forward and Looking Backward: Cognitive and Experiential Search. ***Administrative Science Quarterly***, 45(1): 113-137.

Gavetti, G., Levinthal, D. A., & Rivkin, J. W. 2005. Strategy making in novel and complex worlds: the power of analogy. ***Strategic Management Journal***, 26(8): 691-712.

Gilbert, B. A., McDougall, P. P., & Audretsch, D. B. 2006. New Venture Growth: A Review and Extension. ***Journal of Management***, 32(6): 926-950.

Grant, R. M. 1996. Toward a knowledge-based theory of the firm. ***Strategic Management Journal***, 17: 109-122.

Hall, R. 1993. A Framework Linking Intangible Resources and Capabilities to Sustainable Competitive Advantage. ***Strategic Management Journal***, 14(8): 607-618.

Haynie, J. M., Shepherd, D. A., & Patzelt, H. 2012. Cognitive Adaptability and an Entrepreneurial Task: The Role of Metacognitive Ability and Feedback. ***Entrepreneurship Theory and Practice***, 36(2): 237-265.

Hellmann, T. & Puri, M. 2002. Venture Capital and the Professionalization of Start-Up Firms: Empirical Evidence. ***Journal of Finance***, 57: 169-197.

Henderson, R. M. & Clark, K. B. 1990. Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. ***Administrative Science Quarterly***, 35(1): 9-30.

Hill, R. C. & Levenhagen, M. 1995. Metaphors and Mental Models: Sensemaking and Sensegiving in Innovative and Entrepreneurial Activities. ***Journal of Management***, 21(6): 1057-1074.

Hockerts, K. & Wüstenhagen, R. 2010. Greening Goliaths Versus Emerging Davids—Theorizing about the Role of Incumbents and New Entrants in Sustainable Entrepreneurship. ***Journal of Business Venturing***, 25: 481-492.

Hodgkinson, G. P. & Wright, G. 2002. Confronting Strategic Inertia in a Top Management Team: Learning from Failure. ***Organization Studies***, 23(6): 949-977.

Hodgkinson, G. P. 2003. Cognitive Inertia in a Turbulent Market: the Case of UK Residential Estate Agents. ***Journal of Management Studies***, 34(6): 921-945.

Hsu, D. H. & Lim, K. 2013. Knowledge Brokering and Organizational Innovation: Founder Imprinting Effects. ***Organization Science***: 131105054352004.

Huber, G. P. 1991. Organizational learning: The contributing processes and the literatures. ***Organization Science***, 2(1): 88-115.

Huckman, R. S. & Pisano, G. P. 2006. The Firm Specificity of Individual Performance: Evidence from Cardiac Surgery. ***Management Science***, 52(4): 473-488.

Huff, J. O., Huff, A. S., & Thomas, H. 1992. Strategic renewal and the interaction of cumulative stress and inertia. ***Strategic Management Journal***, 13(S1): 55-75.

Huselid, M. A. 1995. The impact of human resource management practices on turnover, productivity, and corporate financial performance. ***Academy of Management Journal***, 38(3): 635-672.

Jensen, M. C. & Meckling, W. H. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. ***Journal of Financial Economics***, 3: 305-360.

Joseph, J. & Ocasio, W. 2012. Architecture, attention, and adaptation in the multibusiness firm: General electric from 1951 to 2001. ***Strategic Management Journal***, 33(6): 633-660.

Kamm, J. B., Shuman, J. C., Seeger, J. A., & Nurick, A. J. 1990. Entrepreneurial Teams in New Venture Creation: A Research Agenda. ***Entrepreneurship Theory and Practice***, 14(4): 7-17.

Katz, D. & Kahn, R. L. 1978. ***The Social Psychology of Organizations***: Wiley.

Kauffman, S. A. & Kauffman, M. S. F. I. P. B. S. A. 1993. ***The Origins of Order: Self-organization and Selection in Evolution***: Oxford University Press.

Kerr, W. R., Nanda, R., & Rhodes-Kropf, M. 2014. Entrepreneurship as Experimentation. ***Journal of Economic Perspectives***, 28(3): 25-48.

Krishnan, H. A., Miller, A., & Judge, W. Q. 1999. Diversification and top management team complementarity: is performance improved by merging similar or dissimilar teams? ***Strategic Management Journal***, 18(5): 361-374.

Langlois, R. 2002. Modularity in Technology and Organization. ***Journal of Economic Behavior & Organization***, 49: 19-37.

Laureiro-Martínez, D. & Brusoni, S. 2018. Cognitive flexibility and adaptive decision-making: Evidence from a laboratory study of expert decision makers. ***Strategic Management Journal***, 39(4): 1031-1058.

Lenox, M. J., Rockart, S. F., & Lewin, A. Y. 2007. Interdependency, Competition, and Industry Dynamics. ***Management Science***, 53(4): 599-615.

Leonard-Barton, D. 1992. Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development. ***Strategic Management Journal***, 13(5): 111-125.

Levinthal, D. & Posen, H. 2007. Myopia of Selection: Does Organizational Adaptation Limit the Efficacy of Population Selection? ***Administrative Science Quarterly***, 52(4): 586.

Levinthal, D. A. 1997. Adaptation on rugged landscapes. ***Management Science***, 43(7): 934-950.

Li, M., Ramaswamy, K., & Pécherot Petitt, B. S. 2006. Business groups and market failures: A focus on vertical and horizontal strategies. ***Asia Pacific Journal of Management***, 23(4): 439-452.

Lippitt, G. L. & Schmidt, W. H. 1967. Crises in a developing organization. ***Harvard Business Review***, 45(6): 102-112.

Loewenstein, M. A. & Spletzer, J. R. 1997. Delayed Formal on-the-job Training. ***ILR Review***, 51(1): 82-99.

Lumpkin, G. T. & Dess, G. G. 2001. Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment and industry life cycle. ***Journal of Business Venturing***, 16(5): 429-451.

Lyden, F. J. 1975. Using Parsons' Functional Analysis in the Study of Public Organizations. ***Administrative Science Quarterly***.

Macher, J. T. 2006. Technological Development and the Boundaries of the Firm: A Knowledge-Based Examination in Semiconductor Manufacturing. ***Management Science***, 52(6): 826-843.

Marks, M. L. & Mirvis, P. H. 2011. A framework for the human resources role in managing culture in mergers and acquisitions. ***Human Resource Management***, 50(6): 859-877.

Marx, M. & Hsu, D. H. 2015. Strategic switchbacks: Dynamic commercialization strategies for technology entrepreneurs. ***Research Policy***, 44(10): 1815-1826.

Masten, S. E., Meehan, J. W., & Snyder, E. A. 1989. Vertical Integration in the U.S. Auto Industry: A note on the influence of transaction specific assets. ***Journal of Economic Behavior and Organization***, 13: 265-273.

Mayer, K. J., Somaya, D., & Williamson, I. O. 2012. Firm-specific, industry-specific, and occupational human capital and the sourcing of knowledge work. ***Organization Science***, 23(5): 1311-1329.

Mihm, J., Loch, C. H., Wilkinson, D., & Huberman, B. A. 2010. Hierarchical Structure and Search in Complex Organizations. ***Management Science***, 56(5): 831.

Miller, D. & Shamsie, J. 2001. Learning across the life cycle: Experimentation and performance among the hollywood studio heads. ***Strategic Management Journal***, 22(8): 725-745.

Monteverde, K. & Teece, D. J. 1982. Supplier Switching Costs and Vertical Integration in the Automobile. ***Bell Journal of Economics***, 13(1): 206-213.

Morris, S. & Snell, S. 2019. How employees can better solve customer problems: a use value approach to human and social capital. Handbook of Research on Strategic Human Capital Resources. Cheltenham, UK: Edward Elgar Publishing.

Mosakowski, E. 2017. Overcoming Resource Disadvantages in Entrepreneurial Firms: When Less Is More. ***Strategic Entrepreneurship***: 106-126.

Nicholls-Nixon, C. L., Cooper, A. C., & Woo, C. Y. 2000. Strategic experimentation: Understanding change and performance in new ventures. ***Journal of Business Venturing***, 15(5): 493-521.

Nickerson, J., Yen, C. J., & Mahoney, J. T. 2012. Exploring the Problem-Finding and Problem-Solving Approach for Designing Organizations. ***Academy of Management Perspectives***, 26(1): 52-72.

Nickerson, J. A. & Zenger, T. R. 2004. A Knowledge-Based Theory of the Firm--The Problem-Solving Perspective. ***Organization Science***, 15(6): 617-632.

Nyberg, A. J. & Ployhart, R. E. 2013. Context-emergent turnover (cet) theory: a theory of collective turnover. ***Academy of Management Review***, 38(1): 109-131.

Nyberg, A. J., Moliterno, T. P., Hale, D., & Lepak, D. 2014. Resource-based Perspectives on Unit-level Human Capital: A review and integration. ***Journal of Management***, 40.

Pennings, J. M. & Harianto, F. 1992. The diffusion of technological innovation in the commercial banking industry. ***Strategic Management Journal***, 13(1): 29-46.

Pennings, J. M., Barkema, H., & Douma, S. 1994. Organizational Learning and Diversification. ***The Academy of Management Journal***, 37(3): 608-640.

Ployhart, R. E., Weekley, J. A., & Baughman, K. 2006. The Structure and Function of Human Capital Emergence: A Multilevel Examination of the Attraction-Selection-Attrition Model. ***The Academy of Management Journal***, 49(4): 661-677.

Ployhart, R. E. & Moliterno, T. P. 2011. Emergence of the Human Capital Resource: A Multilevel Model. ***Academy of Management Review***, 36(1): 127-150.

Ployhart, R. E., Nyberg, A. J., Reilly, G., & Maltarich, M. A. 2013. Human Capital Is Dead; Long Live Human Capital Resources! ***Journal of Management***.

Porac, J. F. & Thomas, H. 1990. Taxonomic Mental Models in Competitor Definition. ***Academy of Management Review***, 15(2): 224-240.

Porter, M. E. 1979. How Competitive Forces Shape Strategy. ***Harvard Business Review***, 57(2): 137-145.

Quinn, R. E. & Cameron, K. 1983. Organizational life cycles and shifting criteria of effectiveness: some preliminary evidence. ***Management Science***, 29(1): 33.

Rice, M. P. 2002. Co-production of business assistance in business incubators: an exploratory study. ***Journal of Business Venturing***, 17(2): 163-187.

Rivkin, J. W. 2001. Reproducing knowledge: Replication without imitation at moderate complexity. ***Organization Science***, 12(3): 274-293.

Rosenbloom, R. S. 2000. Leadership, Capabilities, and Technological Change: The Transformation of NCR in the Electronic Era. ***Strategic Management Journal***, 21(10-11): 1083-1103.

Sanchez, R. & Mahoney, J. T. 1996. Modularity, flexibility, and knowledge management in product and organization design. ***Strategic Management Journal***, 17: 63.

Scherer, F. M. & Harhoff, D. 2000. ***Technology Policy for a World of Skew-Distributed Outcomes***.

Schmidt, F. L. & Hunter, J. E. 1998. The validity and utility of selection methods in personnel psychology: practical and theoretical implications of 85 years of research findings. ***Psychological bulletin***, 124(2): 262-274.

Sciascia, S., Mazzola, P., & Chirico, F. 2013. Generational Involvement in the Top Management Team of Family Firms: Exploring Nonlinear Effects on Entrepreneurial Orientation. ***Entrepreneurship Theory and Practice***, 37(1): 69-85.

Selby, J. & Mayer, K. J. 2013. Startup Firm Acquisitions as a Human Resource Strategy for Innovation: The Acqhire Phenomenon. ***Academy of Management Proceedings***, 2013(1): 17109.

Senker, J. 1995. Tacit Knowledge and Models of Innovation. ***Industrial and Corporate Change***, 4(2): 425-447.

Shepherd, D. A., Douglas, E. J., & Shanley, M. 2000. New venture survival: Ignorance, external shocks, and risk reduction strategies. ***Journal of Business Venturing***, 15(5): 393-410.

Smith, K. G., Mitchell, T. R., & Summer, C. E. 1985. Top Level Management Priorities in Different Stages of the Organizational Life Cycle. ***Academy of Management Journal***, 28(4): 799-820.

Song, J., Almeida, P., & Wu, G. 2003. Learning-by-hiring: When is mobility more likely to facilitate interfirm knowledge transfer? ***Management Science***, 49(4): 351-366.

Stinchcombe, A. L. 1965. Social Structure and Organizations. In J. G. March (Ed.), ***Handbook of Organizations***: 142-193. Chicago: Rand McNally.

Sung-Choon, K., Morris, S. S., & Snell, S. A. 2007. Relational archetypes, organizational learning, and value creation: extending the human resource architecture. ***Academy of Management Review***, 32(1): 236-256.

Tanev, S., Rasmussen, E. S., Zijdemans, E., Lemminger, R. O. Y., & Svendsen, L. L. 2015. Lean and global technology start-ups: linking the two research streams. ***International Journal of Innovation Management***, 19(03): 1540008.

Teece, D. J. 2012. Dynamic Capabilities: Routines versus Entrepreneurial Action. ***Journal of Management Studies***, 49(8): 1395-1401.

Tzabbar, D. & Margolis, J. 2017. Beyond the Startup Stage: The Founding Team's Human Capital, New Venture's Stage of Life, Founder–CEO Duality, and Breakthrough Innovation. ***Organization Science***, 28(5): 857-872.

Vanaelst, I., Clarysse, B., Wright, M., Lockett, A., Moray, N., & S'Jegers, R. 2006. Entrepreneurial Team Development in Academic Spinouts: An Examination of Team Heterogeneity. ***Entrepreneurship Theory and Practice***, 30(2): 249-271.

Wales, W. J., Gupta, V. K., & Mousa, F.-T. 2011. Empirical research on entrepreneurial orientation: An assessment and suggestions for future research. ***International Small Business Journal***, 31(4): 357-383.

Williamson, O. E. 1971. The Vertical Integration of Production: Market Failure Considerations. ***The American Economic Review***, 61(2): 112-123.

Wright, P. & McMahan, G. 2011. Exploring Human Capital: Putting human back into strategic human resource management. ***Human Resource Management Journal***, 21(2): 93-104.

Wright, P. M., Dunford, B. B., & Snell, S. A. 2001. Human resources and the resource based view of the firm. ***Journal of Management***, 27(6): 701-721.

Youndt, M. A., Snell, S. A., Dean, J. W., Jr., & Lepak, D. P. 1996. Human resource management, manufacturing strategy, and firm performance. ***Academy of Management Journal***, 39(4): 836.

Appendix 1: Figures

Figure 1: Four lifecycle stages.

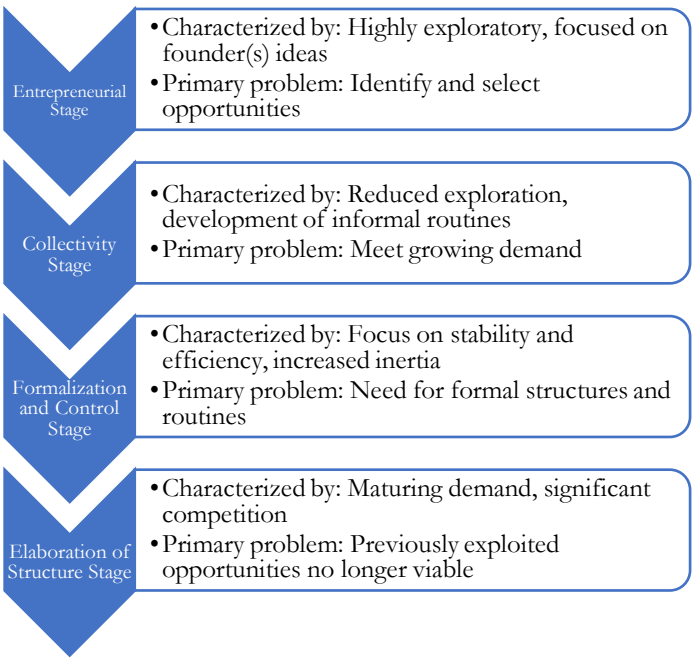
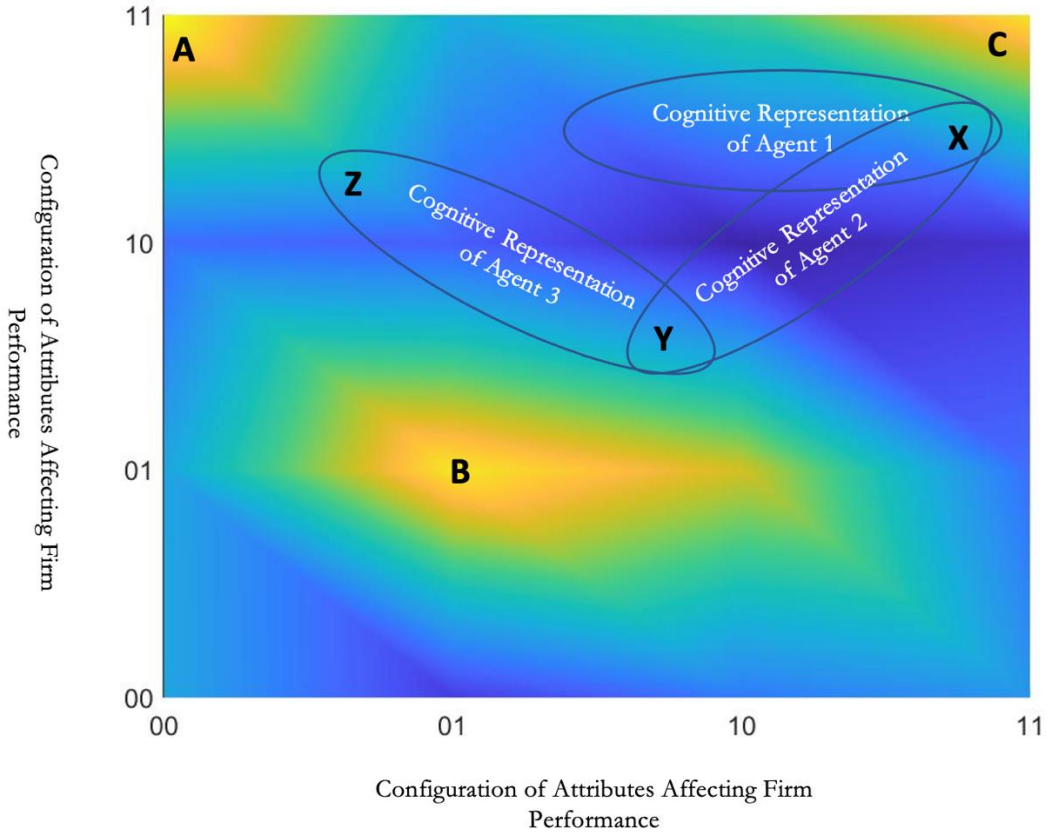
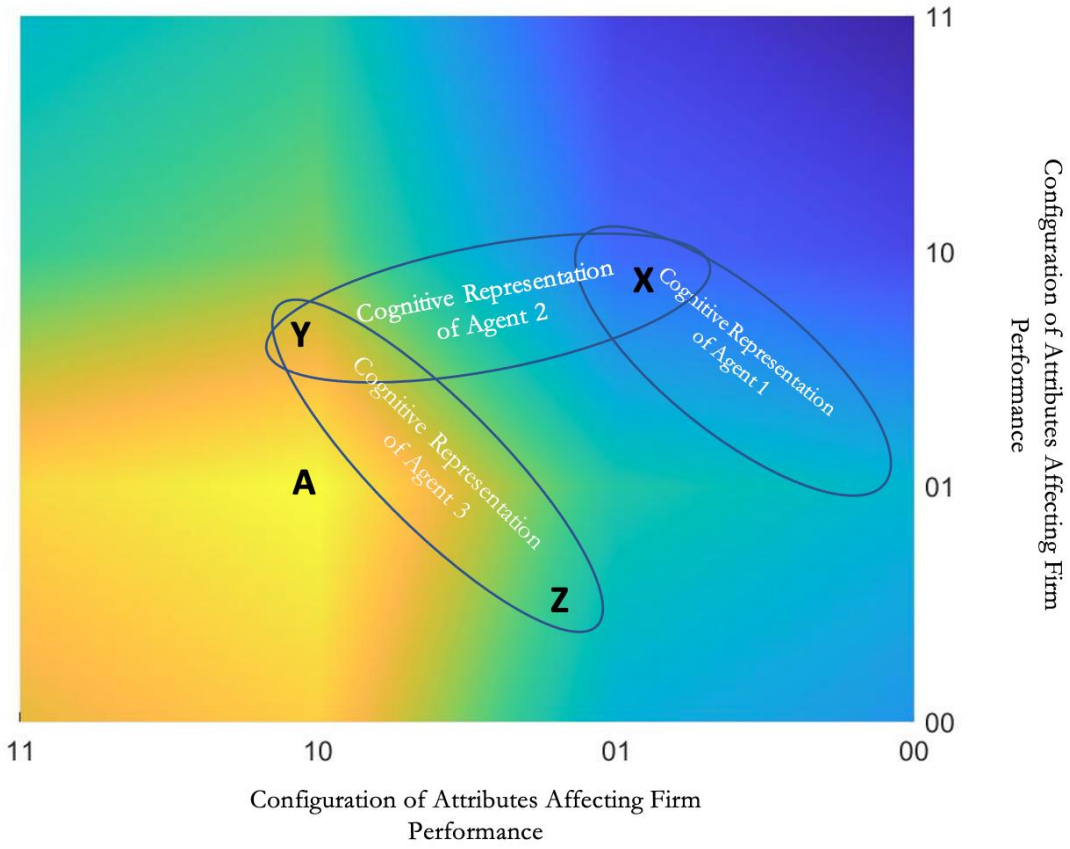


Figure 2 Sequential Aggregation of Human Capital with Low Problem Complexity



Note: Different shades represent the height of the peaks. Peaks are at points A, B, and C.

Figure 3 Sequential Aggregation of Human Capital with High Problem Complexity



Note: Different shades represent the height of the peaks. Peaks are at points A, B, and C.

Appendix 2: Tables

TABLE 1.1

Descriptive Statistics and Pearson Correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Number of Investments	8.00	6.60	1.00																											
Total Investors	4.04	2.81	0.85	1.00																										
Firm Exit	0.29	0.45	0.16	0.03	1.00																									
Number of Employees	2.88	1.72	0.41	0.30	0.37	1.00																								
Number of Founders	2.36	1.15	0.04	0.04	0.03	0.09	1.00																							
Higher Education	0.57	0.49	0.16	0.15	0.07	0.06	-0.01	1.00																						
Firm Age	1442.55	1283.60	0.10	-0.02	0.12	0.23	0.02	-0.02	1.00																					
Patent at Invest	0.08	0.27	0.16	0.03	0.38	0.21	-0.01	0.01	0.24	1.00																				
Log Investment Size	17.78	2.37	0.31	0.25	0.12	0.38	0.00	0.11	0.25	0.09	1.00																			
Repeat Investment	0.73	0.45	0.12	0.09	0.06	0.12	-0.01	-0.01	0.01	0.03	0.05	1.00																		
Relatedness to Existing Portfi	0.71	0.12	0.01	0.03	0.05	0.01	0.02	0.01	-0.09	0.06	-0.03	0.00	1.00																	
Lead Investor	0.24	0.43	-0.15	-0.16	0.02	-0.01	0.00	-0.04	-0.02	-0.02	-0.04	0.05	-0.01	1.00																
Syndicated Investors	2.78	1.83	0.59	0.47	0.12	0.54	0.04	0.03	0.15	0.08	0.33	0.09	0.01	-0.02	1.00															
Innovation Percentage	42.01	19.34	0.01	0.04	-0.01	0.04	0.01	-0.06	-0.05	-0.05	-0.03	0.34	-0.06	0.05	-0.03	1.00														
Patents Granted in Industry	4907.43	5365.84	-0.11	-0.08	-0.06	0.04	0.03	-0.02	-0.04	-0.05	-0.03	0.13	-0.05	0.04	-0.08	0.49	1.00													
TTR	0.87	0.08	-0.12	-0.01	-0.22	-0.16	-0.03	0.02	-0.08	-0.26	-0.09	-0.08	0.01	-0.04	-0.10	-0.06	-0.04	1.00												
Rhetoric-Oriented HC Ratio	0.06	0.20	-0.17	-0.19	-0.15	-0.11	-0.04	-0.20	0.00	-0.10	-0.08	-0.05	-0.03	0.03	-0.05	-0.03	0.03	0.04	1.00											
Business-Oriented HC Ratio	0.72	0.37	-0.02	-0.02	0.01	0.04	-0.09	-0.05	0.04	0.09	-0.02	-0.02	0.01	0.01	0.00	-0.08	-0.05	-0.14	0.10	1.00										
Tech-Oriented HC Ratio	0.37	0.40	0.00	-0.03	0.04	0.06	0.01	0.01	-0.02	0.04	0.05	0.01	-0.04	0.04	0.05	0.04	0.02	0.02	-0.09	-0.19	1.00									
Log Rhetoric HC Tenure	7.35	1.04	-0.05	0.03	-0.03	0.06	-0.01	0.07	-0.04	-0.04	0.06	0.00	0.00	-0.02	0.07	0.02	0.07	-0.04	0.18	0.02	-0.09	1.00								
Log Business HC Tenure	9.15	0.70	0.41	0.42	0.24	0.49	0.20	0.29	0.08	0.16	0.22	0.07	0.02	-0.05	0.35	0.03	0.02	-0.17	-0.20	0.21	-0.05	0.33	1.00							
Log Tech HC Tenure	8.34	0.98	0.36	0.30	0.27	0.43	0.11	0.29	0.06	0.12	0.24	0.09	-0.03	-0.04	0.34	0.06	0.04	-0.11	-0.23	-0.28	0.37	0.16	0.56	1.00						
Rhetoric Ratio x TTR	0.05	0.18	-0.17	-0.18	-0.15	-0.11	-0.04	-0.20	0.00	-0.11	-0.09	-0.05	-0.03	0.03	-0.05	-0.03	0.03	0.09	1.00	0.10	-0.09	0.17	-0.20	-0.24	1.00					
Business Ratio x TTR	0.62	0.33	-0.06	-0.02	-0.05	0.00	-0.09	-0.04	0.01	0.01	-0.04	-0.04	0.02	0.00	-0.02	-0.10	-0.06	0.16	0.12	0.95	-0.19	0.02	0.17	-0.31	0.13	1.00				
Tech Ratio x TTR	0.32	0.39	-0.01	-0.02	0.01	0.04	0.01	0.02	-0.03	0.00	0.04	0.00	-0.04	0.03	0.04	0.03	0.01	0.14	-0.09	-0.21	0.99	-0.09	-0.07	0.36	-0.09	-0.17	1.00			
Rhetoric Tenure x TTR	6.37	1.04	-0.11	0.03	-0.14	-0.03	-0.03	0.07	-0.07	-0.17	0.01	-0.04	0.01	-0.04	0.01	-0.01	0.03	0.50	0.17	-0.05	-0.07	0.84	0.19	0.08	0.20	0.10	-0.01	1.00		
Business Tenure x TTR	7.89	0.87	0.22	0.32	0.02	0.26	0.13	0.24	0.00	-0.08	0.11	-0.01	0.02	-0.07	0.20	-0.02	-0.02	0.64	-0.12	0.07	-0.03	0.22	0.65	0.35	-0.08	0.26	0.05	0.53	1.00	
Tech Tenure x TTR	7.17	1.04	0.24	0.26	0.10	0.27	0.07	0.26	0.00	-0.06	0.15	0.03	-0.02	-0.06	0.23	0.02	0.01	0.50	-0.18	-0.33	0.33	0.12	0.38	0.80	-0.15	-0.18	0.40	0.37	0.68	1.00

TABLE 1.2

Regression Results of Investment Outcomes (Total Investments) on Vague Language and Founding Team Human Capital[19]

DV: Total Number of Investments	Model 1	Model 2	Model 3
Number of Employees	0.569***	0.574***	0.010
	(0.040)	(0.040)	(0.109)
Number of Founders	0.120*	0.121**	-0.402***
	(0.047)	(0.047)	(0.117)
Higher Education	0.402***	0.384***	1.181***
	(0.100)	(0.101)	(0.327)
Firm Age	-0.000***	-0.000***	0.000
	0.000	(0.000)	(0.000)
Patent at Investment	1.281***	1.203***	1.358+
	(0.246)	(0.246)	(0.770)
Size of Investment (Log)	0.240***	0.245***	0.312**
	(0.040)	(0.040)	(0.111)
Repeat Investment in Focal Industry	0.506***	0.503***	0.239
	(0.127)	(0.127)	(0.328)
Relatedness to Existing Portfolio	0.123	0.107	-0.165
	(0.723)	(0.720)	(1.582)
Lead Investor	-1.818***	-1.823***	-0.730**
	(0.110)	(0.110)	(0.264)
Syndicated Investors	1.493***	1.494***	1.495***
	(0.039)	(0.039)	(0.084)
Innovation Percentage	0.019***	0.019***	0.023**
	(0.003)	(0.003)	(0.007)
Patents Granted in Industry	-0.000***	-0.000***	-0.000***
	0.000	(0.000)	(0.000)
TTR	-2.349***	4.700**	2.641
	(0.636)	(1.525)	(25.526)
Rhetoric-Oriented Human Capital Ratio		-12.905***	
		(2.742)	
Business-Oriented Human Capital Ratio		7.082***	
		(1.400)	

[19] Note: For all models, standard errors are clustered at the level of the investing firm. Results are qualitatively similar when using Huber-White Robust Standard Errors. * p<.05 **p<.01 **p<.001

Technically-Oriented Human Capital Ratio		3.542**	
		(1.344)	
Rhetoric Ratio x TTR		13.361***	
		(3.117)	
Business Ratio x TTR		-7.931***	
		(1.609)	
Technical Ratio x TTR		-4.477**	
		(1.539)	
Rhetoric-Oriented Human Capital Tenure			-8.142***
			(1.942)
Business-Oriented Human Capital Tenure			16.435***
			(2.480)
Technically-Oriented Human Capital Tenure			-8.949***
			(1.902)
Rhetoric Tenure x TTR			7.564***
			(2.239)
Business Tenure x TTR			-16.133***
			(2.818)
Technical Tenure x TTR			10.433***
			(2.168)
Constant	0.441	-5.713***	-15.090
	(1.083)	(1.610)	(22.536)
Year Fixed Effects	Y	Y	Y
Industry Fixed Effects	Y	Y	Y
Investor Fixed Effects	Y	Y	Y
State Fixed Effects	Y	Y	Y
Funding Round Fixed Effects	Y	Y	Y
n	13717	13717	2626
R-squared	.4927	0.495	0.663
Adj. R-squared	.4541	0.457	0.589
Change in R-Squared (Within)	.2456	0.250	0.391

TABLE 1.3

Regression Results of Investment Outcomes (Unique Investors) on Vague Language and Founding Team Human Capital

DV: Unique Investors	Model 1	Model 2	Model 3
Number of Employees	0.263***	0.267***	0.075
	(0.017)	(0.017)	(0.054)
Number of Founders	0.043+	0.043*	-0.265***
	(0.022)	(0.022)	(0.060)
Higher Education	0.395***	0.395***	0.017
	(0.045)	(0.045)	(0.180)
Firm Age	-0.000***	-0.000***	0.000
	0.000	0.000	0.000
Patent at Investment	0.520***	0.495***	0.551+
	(0.084)	(0.084)	(0.324)
Size of Investment (Log)	0.247***	0.248***	0.317***
	(0.023)	(0.023)	(0.079)
Repeat Investment in Focal Industry	0.075	0.073	0.181
	(0.059)	(0.059)	(0.159)
Relatedness to Existing Portfolio	(0.110)	(0.103)	(0.102)
	(0.315)	(0.313)	(0.870)
Lead Investor	-0.688***	-0.692***	-0.387**
	(0.051)	(0.051)	(0.136)
Syndicated Investors	0.533***	0.535***	0.630***
	(0.018)	(0.018)	(0.045)
Innovation Percentage	0.007***	0.007***	0.017***
	(0.002)	(0.002)	(0.004)
Patents Granted in Industry	-0.000***	-0.000***	-0.000***
	0.000	0.000	0.000
TTR	-0.556+	1.004	-25.544**
	(0.286)	(0.694)	(9.651)
Rhetoric-Oriented Human Capital Ratio		-8.138***	
		(1.366)	

Business-Oriented Human Capital Ratio		2.596***	
		(0.625)	
Technically-Oriented Human Capital Ratio		(0.777)	
		(0.593)	
Rhetoric Ratio x TTR		8.375***	
		(1.573)	
Business Ratio x TTR		-2.923***	
		(0.723)	
Technical Ratio x TTR		0.551	
		(0.687)	
Rhetoric-Oriented Human Capital Tenure			-2.197**
			(0.818)
Business-Oriented Human Capital Tenure			6.876***
			(1.230)
Technically-Oriented Human Capital Tenure			-6.930***
			(0.927)
Rhetoric Tenure x TTR			1.949*
			(0.951)
Business Tenure x TTR			-6.005***
			(1.396)
Technical Tenure x TTR			7.956***
			(1.059)
Constant	-1.774**	-3.049***	7.472
	(0.558)	(0.789)	(8.250)
Year Fixed Effects	Y	Y	Y
Industry Fixed Effects	Y	Y	Y
Investor Fixed Effects	Y	Y	Y
State Fixed Effects	Y	Y	Y
Funding Round Fixed Effects	Y	Y	Y
n	13717	13717	2626
R-squared	.4216	0.4266	0.6295
Adj. R-squared	.3776	0.3827	0.5479
Change in R-Squared (Within)	.1986	0.2055	0.3725

TABLE 1.4

Regression Results of Investment Outcomes (Firm Exit) on Vague Language and Founding Team Human Capital

DV: Firm Exit	Model 1	Model 2	Model 3
Number of Employees	0.012***	0.012***	0.009
	(0.003)	(0.003)	(0.007)
Number of Founders	0.000	0.000	0.015+
	(0.003)	(0.003)	(0.009)
Higher Education	-0.033***	-0.037***	0.016
	(0.007)	(0.007)	(0.025)
Firm Age	0.000	0.000	0.000
	0.000	0.000	0.000
Patent at Investment	0.110***	0.104***	0.081+
	(0.017)	(0.017)	(0.044)
Size of Investment (Log)	0.019***	0.019***	(0.006)
	(0.004)	(0.004)	(0.010)
Repeat Investment in Focal Industry	0.003	0.003	(0.005)
	(0.009)	(0.009)	(0.022)
Relatedness to Existing Portfolio	0.175**	0.171**	(0.091)
	(0.055)	(0.055)	(0.112)
Lead Investor	0.003	0.002	0.018
	(0.008)	(0.008)	(0.018)
Syndicated Investors	-0.024***	-0.024***	-0.021***
	(0.003)	(0.002)	(0.005)
Innovation Percentage	0.000*	0.000*	0.000
	0.000	0.000	(0.001)
Patents Granted in Industry	-0.000***	-0.000***	-0.000**
	0.000	0.000	0.000
TTR	-0.217***	0.221+	-3.824**
	(0.051)	(0.131)	(1.164)
Rhetoric-Oriented Human Capital Ratio		(0.359)	
		(0.248)	
Business-Oriented Human Capital Ratio		0.677***	
		(0.120)	
Technically-Oriented Human Capital Ratio		-0.194+	
		(0.113)	
Rhetoric Ratio x TTR		0.290	

		(0.281)	
Business Ratio x TTR		-0.705***	
		(0.137)	
Technical Ratio x TTR		0.212	
		(0.129)	
Rhetoric-Oriented Human Capital Tenure			0.489***
			(0.099)
Business-Oriented Human Capital Tenure			-0.466**
			(0.155)
Technically-Oriented Human Capital Tenure			-0.216+
			(0.116)
Rhetoric Tenure x TTR			-0.571***
			(0.116)
Business Tenure x TTR			0.529**
			(0.176)
Technical Tenure x TTR			0.295*
			(0.132)
Constant	0.043	-0.375**	3.566***
	(0.091)	(0.139)	(1.015)
Year Fixed Effects	Y	Y	Y
Industry Fixed Effects	Y	Y	Y
Investor Fixed Effects	Y	Y	Y
State Fixed Effects	Y	Y	Y
Funding Round Fixed Effects	Y	Y	Y
n	13717	13717	2626
R-squared	0.403	0.4087	0.6441
Adj. R-squared	0.357	0.3634	0.5657
Change in R-Squared (Within)	0.023	0.0321	0.0537

TABLE 1.5

Regression Results using Alternate Human Capital Definition 1 – PR Treated as Business Human Capital

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	DV: Number of Investments		DV: Total Investors		DV: Firm Exit	
Number of Employees	0.585***	0.028	0.273***	0.091+	0.012***	0.010
	(0.040)	(0.108)	(0.017)	(0.053)	(0.003)	(0.007)
Number of Founders	0.122**	-0.342**	0.042+	-0.211***	0.000	0.015+
	(0.047)	(0.115)	(0.022)	(0.059)	(0.003)	(0.008)
Higher Education	0.389***	1.250***	0.395***	0.075	-0.037***	0.019
	(0.101)	(0.325)	(0.046)	(0.179)	(0.007)	(0.024)
Firm Age	-0.000***	0.000	-0.000***	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	0.000	0.000
Patent at Investment	1.115***	1.307+	0.517***	0.672*	0.106***	0.130**
	(0.250)	(0.736)	(0.086)	(0.309)	(0.017)	(0.043)
Size of Investment (Log)	0.246***	0.405***	0.249***	0.414***	0.020***	0.008
	(0.040)	(0.114)	(0.023)	(0.068)	(0.004)	(0.009)
Repeat Investment in Focal Industry	0.495***	0.316	0.071	0.223	0.003	(0.006)
	(0.128)	(0.324)	(0.059)	(0.156)	(0.009)	(0.022)
Relatedness to Existing Portfolio	-0.059	0.453	-0.130	0.264	0.154**	(0.046)
	(0.722)	(1.559)	(0.317)	(0.842)	(0.055)	(0.108)
Lead Investor	-1.803***	-0.617*	-0.689***	-0.322*	0.004	0.026
	(0.111)	(0.262)	(0.051)	(0.135)	(0.008)	(0.018)
Syndicated Investors	1.511***	1.486***	0.535***	0.620***	-0.023***	-0.024***
	(0.039)	(0.084)	(0.019)	(0.045)	(0.003)	(0.005)
Innovation Percentage	0.019***	0.025***	0.007***	0.019***	0.000*	0.000
	(0.003)	(0.007)	(0.002)	(0.004)	0.000	(0.001)
Patents Granted in Industry	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	0.000	0.000
TTR	4.259**	-0.722	0.461	-27.001**	0.368**	-4.368***
	(1.510)	(25.588)	(0.694)	(9.654)	(0.131)	(1.161)
Rhetoric-Oriented Human Capital Ratio	-12.363***		-7.554***		(0.312)	
	(2.739)		(1.357)		(0.248)	
Business-Oriented Human Capital Ratio	6.626***		1.988**		0.805***	
	(1.386)		(0.625)		(0.120)	
Technically-Oriented Human Capital Ratio	3.335*		-0.928		(0.157)	
	(1.336)		(0.592)		(0.113)	
Rhetoric Ratio x TTR	12.701***		7.668***		0.236	
	(3.113)		(1.563)		(0.281)	
Business Ratio x TTR	-7.504***		-2.252**		-0.869***	
	(1.590)		(0.722)		(0.137)	
Technical Ratio x TTR	-4.259**		0.712		0.164	
	(1.529)		(0.686)		(0.129)	
Rhetoric-Oriented Human Capital Tenure		-7.631***		-1.962*		0.448***
		(1.924)		(0.801)		(0.097)
Business-Oriented Human Capital Tenure		15.537***		6.391***		-0.476**
		(2.438)		(1.204)		(0.155)
Technically-Oriented Human Capital Tenure		-8.777***		-6.811***		-0.213+
		(1.909)		(0.928)		(0.116)
Rhetoric Tenure x TTR		7.163**		1.787+		-0.520***
		(2.223)		(0.932)		(0.114)
Business Tenure x TTR		-15.502***		-5.686***		0.539**
		(2.776)		(1.370)		(0.176)
Technical Tenure x TTR		10.483***		7.939***		0.296*
		(2.173)		(1.058)		(0.133)
Constant	-5.180**	-14.640	-2.525**	6.731	-0.490***	3.695***
	(1.599)	(22.531)	(0.794)	(8.290)	(0.139)	(1.014)
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y	Y
Investor Fixed Effects	Y	Y	Y	Y	Y	Y
State Fixed Effects	Y	Y	Y	Y	Y	Y
Funding Round Fixed Effects	Y	Y	Y	Y	Y	Y
n	13612	2630	13612	2630	13612	2630
R-squared	.4968	.6530	0.4257	0.617	0.408	0.6435
Adj. R-squared	.4583	.5779	0.3817	0.5341	0.3625	0.5655
Change in R-Squared(Within)	.2499	.3697	0.2036	0.3485	0.0315	0.0621

TABLE 1.6

Regression Results using Alternate Human Capital Definition 2 – PR Treated as Business, Marketing Treated as Rhetoric

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	DV: Number of Investments		DV: Total Investors		DV: Firm Exit	
Number of Employees	0.597***	0.320***	0.279***	0.139***	0.013***	0.010+
	(0.040)	(0.079)	(0.017)	(0.038)	(0.003)	(0.006)
Number of Founders	0.124**	0.042	0.043*	-0.024	0.000	0.020**
	(0.047)	(0.097)	(0.022)	(0.048)	(0.003)	(0.006)
Higher Education	0.400***	0.486*	0.402***	0.018	-0.036***	(0.005)
	(0.101)	(0.229)	(0.046)	(0.119)	(0.007)	(0.018)
Firm Age	-0.000***	-0.000	-0.000***	-0.000*	0.000	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	0.000	0.000
Patent at Investment	1.106***	1.355*	0.518***	0.728**	0.106***	0.074*
	(0.249)	(0.590)	(0.086)	(0.233)	(0.017)	(0.037)
Size of Investment (Log)	0.233***	0.200**	0.241***	0.218***	0.019***	0.003
	(0.040)	(0.072)	(0.023)	(0.044)	(0.004)	(0.007)
Repeat Investment in Focal Industry	0.477***	0.090	0.061	0.040	0.002	(0.003)
	(0.127)	(0.257)	(0.059)	(0.124)	(0.009)	(0.018)
Relatedness to Existing Portfolio	-0.081	1.492	-0.142	0.565	0.154**	(0.028)
	(0.721)	(1.351)	(0.317)	(0.637)	(0.055)	(0.087)
Lead Investor	-1.790***	-1.262***	-0.681***	-0.518***	0.005	0.019
	(0.111)	(0.212)	(0.051)	(0.101)	(0.008)	(0.014)
Syndicated Investors	1.510***	1.362***	0.535***	0.581***	-0.023***	-0.018***
	(0.039)	(0.070)	(0.019)	(0.037)	(0.003)	(0.004)
Innovation Percentage	0.018***	0.032***	0.007***	0.020***	0.000+	(0.001)
	(0.003)	(0.006)	(0.002)	(0.003)	0.000	0.000
Patents Granted in Industry	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	0.000	0.000
TTR	4.339**	11.160	0.410	-27.484***	0.367**	-2.485*
	(1.497)	(24.459)	(0.688)	(8.321)	(0.130)	(0.983)
Rhetoric-Oriented Human Capital Ratio	-8.713***		-6.297***		(0.112)	
	(2.250)		(1.055)		(0.188)	
Business-Oriented Human Capital Ratio	7.130***		2.311***		0.813***	
	(1.380)		(0.623)		(0.119)	
Technically-Oriented Human Capital Ratio	3.015*		-1.158+		(0.174)	
	(1.333)		(0.591)		(0.113)	
Rhetoric Ratio x TTR	8.013**		6.107***		0.003	
	(2.608)		(1.231)		(0.215)	
Business Ratio x TTR	-7.963***		-2.563***		-0.874***	
	(1.585)		(0.719)		(0.136)	
Technical Ratio x TTR	-3.961**		0.942		0.180	
	(1.527)		(0.685)		(0.129)	
Rhetoric-Oriented Human Capital Tenure		-5.677***		-2.042***		0.417***
		(1.481)		(0.596)		(0.083)
Business-Oriented Human Capital Tenure		5.786**		1.649+		-0.326*
		(2.192)		(0.947)		(0.138)
Technically-Oriented Human Capital Tenure		1.420		-1.614*		-0.194*
		(1.469)		(0.664)		(0.093)
Rhetoric Tenure x TTR		6.161***		2.397***		-0.466***
		(1.699)		(0.699)		(0.097)
Business Tenure x TTR		-5.155*		-0.592		0.360*
		(2.510)		(1.098)		(0.159)
Technical Tenure x TTR		-1.192		1.956*		0.249*
		(1.708)		(0.778)		(0.107)
Constant	-4.983**	-23.872	-2.330**	10.075	-0.475***	2.254**
	(1.583)	(21.502)	(0.787)	(7.100)	(0.138)	(0.858)
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y	Y
Investor Fixed Effects	Y	Y	Y	Y	Y	Y
State Fixed Effects	Y	Y	Y	Y	Y	Y
Funding Round Fixed Effects	Y	Y	Y	Y	Y	Y
n	13612	3995	13612	3995	13612	3995
R-squared	.5002	.5812	.4295	.5641	0.4088	0.5903
Adj. R-squared	.4618	.5112	.3857	.4912	0.3633	0.5219
Change in R-Squared(Within)	.2549	.3087	.2089	.3203	0.0328	0.0466

TABLE 1.7

Regression Results using Alternate Human Capital Definition 3 – Law Excluded from Rhetoric

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	DV: Number of Investments		DV: Total Investors		DV: Firm Exit	
Number of Employees	0.587***	-0.043	0.273***	0.031	0.012***	0.004
	(0.040)	(0.117)	(0.017)	(0.057)	(0.003)	(0.008)
Number of Founders	0.124**	-0.424***	0.043*	-0.286***	0.000	0.015
	(0.047)	(0.122)	(0.022)	(0.062)	(0.003)	(0.009)
Higher Education	0.364***	1.207***	0.384***	-0.077	-0.038***	0.018
	(0.101)	(0.341)	(0.046)	(0.188)	(0.007)	(0.026)
Firm Age	-0.000***	0.000	-0.000***	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	0.000	0.000
Patent at Investment	1.090***	1.414+	0.517***	0.448	0.106***	0.074+
	(0.250)	(0.800)	(0.086)	(0.333)	(0.017)	(0.045)
Size of Investment (Log)	0.247***	0.319**	0.250***	0.319***	0.020***	(0.006)
	(0.040)	(0.117)	(0.023)	(0.081)	(0.004)	(0.010)
Repeat Investment in Focal Industry	0.485***	0.319	0.069	0.178	0.003	0.001
	(0.128)	(0.341)	(0.059)	(0.164)	(0.009)	(0.023)
Relatedness to Existing Portfolio	-0.002	0.640	-0.108	0.175	0.157**	(0.001)
	(0.722)	(1.625)	(0.317)	(0.899)	(0.055)	(0.113)
Lead Investor	-1.800***	-0.772**	-0.688***	-0.417**	0.004	0.016
	(0.111)	(0.277)	(0.051)	(0.140)	(0.008)	(0.018)
Syndicated Investors	1.514***	1.526***	0.536***	0.646***	-0.023***	-0.020***
	(0.039)	(0.089)	(0.019)	(0.048)	(0.003)	(0.005)
Innovation Percentage	0.019***	0.025**	0.007***	0.015***	0.000*	0.000
	(0.003)	(0.008)	(0.002)	(0.004)	0.000	(0.001)
Patents Granted in Industry	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	0.000	0.000
TTR	4.956**	-7.524	1.206+	-26.186**	0.297*	-3.686**
	(1.525)	(25.678)	(0.696)	(9.748)	(0.132)	(1.229)
Rhetoric-Oriented Human Capital Ratio	-14.116***		-5.205***		(0.345)	
	(2.761)		(1.361)		(0.276)	
Business-Oriented Human Capital Ratio	7.145***		2.537***		0.731***	
	(1.403)		(0.630)		(0.121)	
Technically-Oriented Human Capital Ratio	3.775**		-0.637		(0.154)	
	(1.343)		(0.592)		(0.113)	
Rhetoric Ratio x TTR	13.382***		4.705**		0.309	
	(3.121)		(1.546)		(0.313)	
Business Ratio x TTR	-8.029***		-2.844***		-0.776***	
	(1.613)		(0.728)		(0.138)	
Technical Ratio x TTR	-4.751**		0.398		0.167	
	(1.536)		(0.685)		(0.130)	
Rhetoric-Oriented Human Capital Tenure		-8.291***		-2.648**		0.537***
		(2.030)		(0.851)		(0.101)
Business-Oriented Human Capital Tenure		15.660***		7.214***		-0.532***
		(2.438)		(1.247)		(0.156)
Technically-Oriented Human Capital Tenure		-9.212***		-7.021***		(0.165)
		(1.954)		(0.949)		(0.122)
Rhetoric Tenure x TTR		7.581**		2.389*		-0.633***
		(2.333)		(0.987)		(0.118)
Business Tenure x TTR		-15.416***		-6.353***		0.605***
		(2.779)		(1.416)		(0.177)
Technical Tenure x TTR		10.850***		8.063***		0.241+
		(2.239)		(1.088)		(0.139)
Constant	-5.850***	-5.300	-3.231***	8.339	-0.439**	3.389**
	(1.612)	(22.660)	(0.792)	(8.292)	(0.140)	(1.067)
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y	Y
Investor Fixed Effects	Y	Y	Y	Y	Y	Y
State Fixed Effects	Y	Y	Y	Y	Y	Y
Funding Round Fixed Effects	Y	Y	Y	Y	Y	Y
n	13612	2499	13612	2499	13612	2499
R-squared	.5003	.6617	.4273	.6318	0.4069	0.6445
Adj. R-squared	.4618	.5859	.3833	.5494	0.3613	0.5649
Change in R-Squared(Within)	.2550	.3808	.2058	.3696	0.0297	0.0584

TABLE 2.1
Descriptive Statistics and Pearson Correlations

Experimental Data:

	Variable	Mean	SD	1	2	3	4	5	6	7	8
1	**Investor interest**	5.12	1.83	1.00							
2	**Condition 1**	0.30	0.46	-0.14	1.00						
3	**Condition 2**	0.80	0.45	-0.02	-0.41	1.00					
4	**Condition 3**	0.21	0.41	0.06	-0.34	-0.32	1.00				
5	**Condition 4**	0.21	0.41	0.12	-0.34	-0.32	-0.27	1.00			
6	**Gender**	0.62	0.49	-0.08	0.04	-0.03	0.06	-0.07	1.00		
7	**Tech Experience**	0.55	0.50	0.31	0.06	-0.03	0.01	-0.03	0.08	1.00	
8	**Crowdfunding Experience**	1.79	0.79	0.16	-0.01	-0.02	-0.03	0.06	-0.09	0.28	1.00

Archival Data:

	Variable	Mean	SD	1	2	3	4	5	6	7
1	**Log Number of Backers**	3.32	2.07	1.00						
2	**Log Money Pledged**	6.69	3.39	0.89	1.00					
3	**Text Complexity x Staff Pick**	1.63	4.24	0.39	0.34	1.00				
4	**Text Complexity**	11.03	4.97	-0.06	-0.05	0.12	1.00			
5	**Staff Pick**	0.15	0.36	0.43	0.37	0.92	0.00	1.00		
6	**Image Count**	7.95	12.78	0.53	0.47	0.21	-0.03	0.23	1.00	
7	**Log Campaign Length**	22.30	0.73	0.21	0.22	0.09	0.01	0.10	0.22	1.00

TABLE 2.2
Archival Results: Text Complexity and Staff Pick Main Effects

	Model 1	**Model 2**	**Model 3**	**Model 4**
	DV: Log Backers	DV: Log Pledged	DV: Log Backers	DV: Log Pledged
Text Complexity	-0.013***	-0.020***		
	(0.002)	(0.003)		
Staff Pick			1.556***	2.004***
			(0.024)	(0.042)
Image Count	0.058***	0.089***	0.049***	0.078***
	(0.001)	(0.001)	(0.001)	(0.001)
Log Campaign Length	0.231***	0.473***	0.194***	0.425***
	(0.012)	(0.021)	(0.012)	(0.020)
Constant	-2.141***	-4.339***	-1.632***	-3.708***
	(0.274)	(0.470)	(0.256)	(0.452)
Category Fixed Effects	Y	Y	Y	Y
n	29324	29324	29324	29324
R-squared	.4998	0.455	0.562	0.493
Adj. R-squared	.4964	0.451	0.559	0.490
Change in R-Squared (Within)	.1744	0.155	0.277	0.214

TABLE 2.3
Archival Results: Text Complexity and Staff Pick Interaction Effect

	Model 1	**Model 2**	**Model 3**	**Model 4**
	DV: Log Backers	DV: Log Pledged	DV: Log Backers	DV: Log Pledged
Text Complexity x Staff Pick			0.014**	0.045***
			(0.005)	(0.009)
Text Complexity	-0.013***	-0.019***	-0.014***	-0.024***
	(0.002)	(0.003)	(0.002)	(0.003)
Staff Pick	1.556***	2.002***	1.404***	1.509***
	(0.024)	(0.042)	(0.062)	(0.110)
Image Count	0.049***	0.078***	0.049***	0.078***
	(0.001)	(0.001)	(0.001)	(0.001)
Log Campaign Length	0.195***	0.426***	0.195***	0.426***
	(0.012)	(0.020)	(0.012)	(0.020)
Constant	-1.510***	-3.527***	-1.493***	-3.474***
	(0.257)	(0.453)	(0.257)	(0.453)
Category Fixed Effects	Y	Y	Y	Y
n	29324	29324	29324	29324
R-squared	0.563	0.494	0.563	0.494
Adj. R-squared	0.560	0.491	0.560	0.491
Change in R-Squared (Within)	0.278	0.216	0.278	0.216

TABLE 2.4

Experimental Results - Text Simplification and Staff Pick Banner Impacts on Investor Interest
(Only Control Condition Excluded)

DV: Investor Interest	
Condition 2 - Simplified Text	0.401
	(0.286)
Condition 3 - Staff Pick Banner	0.666*
	(0.310)
Condition 4 - Simplified Text + Staff Pick Banner	0.882**
	(0.312)
Gender	(0.338)
	(0.227)
Tech Experience	1.136***
	(0.230)
Crowdfunding Experience	0.146
	(0.146)
Constant	3.999***
	(0.362)
n	248
R-squared	0.1444
Adj. R-squared	0.1231

TABLE 2.5
Experimental Results - Text Simplification and Staff Pick Banner Impacts on Investor Interest
(All Other Conditions Excluded)

	Model 1	Model 2	Model 3	Model 4
DV: Investor Interest				
Condition 1 - Control	-0.623**			
	(0.239)			
Condition 2 - Simplified Text		-0.052		
		(0.246)		
Condition 3 - Staff Pick Banner			0.292	
			(0.271)	
Condition 4 - Simplified Text + Staff Pick Banner				0.561*
				(0.270)
Gender	(0.343)	-0.362	-0.373	-0.334
	(0.227)	(0.230)	(0.230)	(0.228)
Tech Experience	1.131***	1.096***	1.095***	1.120***
	(0.230)	(0.233)	(0.232)	(0.231)
Crowdfunding Experience	0.157	0.164	0.169	0.145
	(0.146)	(0.148)	(0.147)	(0.147)
Constant	4.610***	4.456***	4.379***	4.328***
	(0.325)	(0.333)	(0.327)	(0.325)
n	248	248	248	248
R-squared	.1360	0.112	0.116	0.1272
Adj. R-squared	.1218	0.097	0.101	0.1129

Table 3.1:
Forces Impacting the Aggregation Process at Each Lifecycle Stage.

Lifecycle Stage	Environmental Dynamism	Problem Complexity	Reliance on sequential aggregation	Outcome
Entrepreneurial	High	Low or High (depends on the sector)	Low	SA may drive HC homogenization. SA may help organization to pivot.
Collectivity	Medium	Medium	Medium	SA aggregation may drive the lack of coordination which is critical at this stage.
Formalization & Control	Low	High or Medium (depends on the context and modularization)	High	If complexity is high, SA may be a negative process interfering with search efficiency. If it is low, it can drive search efficiency.
Elaboration of Structure	Medium	High	High	SA may be a key mechanism driving organizational renewal.

Notes: SA = Sequential Aggregation of Human Capital, HC = Human Capital