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# The influence of founder age in early-stage new venture funding: A configuration perspective

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The influence of founder age in early-stage new venture funding: A configuration perspective

by

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*"If you want to walk fast, walk alone, but if you want to walk far, walk together"*

My lifelong journey indeed seems quite far in time and distance from growing up with humble beginnings outside of Chicago. The path forward has entailed numerous nurturers, guides, and partners whom I will forever be indebted. Unconditional love and support from my parents were foundational advantages that were easily taken for granted and only appreciated after gaining insight through a lifetime of experience. My older brother and sister provided much needed shelter for me to germinate in an otherwise harsh and distracting environment. The love of my life, my wife, not only showed me the importance of devotion and purpose, but also that the gratification of success earned from hard work is multiplied exponentially through sharing with those you care about. She is an irreplaceable partner in navigating life and my best friend! My three incredible children who are achieving things I only dreamed of and continue to teach me lessons of life as well as fill me with incredible pride. The Doctorate is a capstone academic achievement made possible by dedicated advisors who both challenged me to excel and provided encouragement for me to persevere. The DBA program has been transformational to a level I never expected nor thought possible. I am eternally grateful to all of those who have contributed to an incredible journey. I look forward to extending my hand to help others make their dream a reality. Thank You!

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# ABSTRACT

The influence of founder age in early-stage new venture funding: A configuration perspective

by

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Founder age is a significant signal influencing investors' funding decisions for early-stage new ventures. More first-time founders are starting new ventures than ever before due to the aging of the workforce coupled with employment instability for long tenured employees. However, research findings regarding how founder age drives funding decisions are mixed. Ambiguity exists as some scholars emphasize the importance of youthfulness in driving entrepreneurship and innovation, while others advocate for the value of seniority in leading the new venture to success. A multiple case study of six angel investors was conducted using a uniquely constructed dataset of thirty-eight new ventures seeking funding. This study argues that prior research has been hindered by the lack of a comprehensive theory that accommodates the various signals delivered at the founder-level and the founder-investor level. Hence, the study extends signaling theory and entrepreneurial literature with empirical findings which demonstrate the interdependence between founder age, informational, and interpersonal signaling in determining an investor's funding decision. Utilizing fuzzy set qualitative comparative analysis (fsQCA), this paper identifies combinations of signaling conditions linked to an investor's funding offer. These findings are elaborated upon to develop a typology of successful signal configurations, advancing the understanding of the complex role of founder age in investor new venture funding offer decision-making. The study also introduces a new

signaling configuration framework which integrates signaling theory and configurational concepts to capture the causal complexity of signaling phenomena, emphasizing the features of conjunction, equifinality, and asymmetry. The new theoretical framework captures the causal complexity inherent in signaling relationships and enhances our understanding of how and why combinations of different factors lead to a particular funding offer outcome. In practice, the study provides new venture founders insights which may be used to best position their fundraising activities as well as enables investors to identify areas susceptible to age bias which may obscure otherwise profitable funding opportunities.

INDEX WORDS: entrepreneur age, new-venture finance, signaling, signal configuration, fsQCA

# I    INTRODUCTION

Founder age holds significant importance for new ventures seeking funding, with younger individuals often perceived as more adept at generating ideas and implementing new technologies (Azoulay, Jones, Kim, & Miranda, 2020). In contrast, older founders may be viewed as inflexible in adapting to new information, making them less appealing to investors (Gielnik, Zacher, & Wang, 2018). This body of research indicates that investors may prefer younger founders rooted in the prevailing belief that they are more effective at initiating new ventures (Kibler, Wainwright, Kautonen, & Blackburn, 2015). However, some studies suggest that older founders possess valuable business and life experiences, potentially making them more adept at navigating the challenges of a nascent company (Ko & McKelvie, 2018). Despite these insights, the conditions under which founders age influences a new venture's access to funding remain unclear.

The literature gap on influence of founder age in new venture funding arises from two primary reasons. First, studies relying on econometric methods have indicated a positive linear relationship between founder human capital and successful investor funding outcomes. These studies often associate the benefits of founder experience, education, and social capital with older founders due to their correlation with founder age (Zhao, O'Connor, Wu, & Lumpkin, 2021). However, it is essential to recognize that founder age does not necessarily equate to relevant experience as younger founders may possess superior knowledge of new technologies. Furthermore, the relationship between founder age and social capital has shifted with the rise of non-traditional networking channels which may favor younger founders (Zhao et al., 2021).

Second, the exploration of the interdependence of founder age and other signaling attributes that facilitate an interpersonal connection with an investor remains underexplored. Most current

studies have focused on individual founder characteristics in isolation overlooking the holistic

perspective investors adopt when making new venture funding decisions (Colombo, 2021;

Svetek, 2022). Further, despite several studies which have identified that investors prefer

founders with similar characteristics (Ebbers & Wijnberg, 2012; Franke, Gruber, Harhoff, &

Henkel, 2006), researchers have largely ignored the homophily signaling influence inherent in

the dyadic relationship between new venture founders and investors (Svetek, 2022). This study

aims to advance our understanding of how founder age interacts with other signaling phenomena

to influence investor funding offers addressing an existing gap in new venture funding research.

Advancing our understanding of the influence of founder age in the context of new venture

funding is increasing important phenomena for both founders and investors alike. As the

population ages and employment stability within traditional companies declines, more older

founders are starting new companies than ever before[1]. Although older founders may possess

valuable business experience and extensive relationship networks, they are often vying for scarce

funding with younger competitors who may be perceived as having more potential. As a result,

older founders should consider the implications their age may have on fundraising efforts and

develop mitigation strategies accordingly. Investors also benefit from understanding the

influence of founder age on funding decisions enabling refinement of diligence processes to

better identify profitable funding opportunities. Despite empirical data indicating that the mean

age of entrepreneurs for the fastest growing new ventures is in their mid-forties (Zhao et al.,

2021), older founders do not fit into the dominant youthful prototype entrepreneur which may

lead to discrimination (Kibler et al., 2015). As older founders of new ventures become more

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[1] Fairlie, Robert (2022) State Report on Early-Stage Entrepreneurship in the United States: 2021, Kauffman Indicators of Entrepreneurship, Ewing Marion Kauffman Foundation: Kansas City.

commonplace, understanding the influence founder age may have on funding efforts is an important area to address for both entrepreneurial research and practice.

The study investigates how founder age influences early-stage new venture funding offers through causal interdependencies with signaling phenomena and similarity with an investor. Researchers have extensively studied how signaling as well as the homophily influences of similarities between a founder and investor impact new venture funding. However, the role that founder age plays in new venture funding is largely unknown. The primary goal of the study is to close the gap in knowledge surrounding founder age in the context of new venture funding by using a configuration lens to identify interdependencies of founder age with other signaling phenomena. A configurational approach captures the causal interaction between signaling relationships which is a major point of departure from previous studies. Highlighting these interdependencies, the study builds upon signaling theory and brings clarity to how founder age influences new venture funding outcomes.

## I.1    Literature synthesis overview

Securing funding from investors during the early stages of establishing a business is a critical factor in determining the ultimate success for a start-up company (Cooper, Gimeno-Gascon, & Woo, 1994; Wright Robbie, 1998). Given the importance of funding for a new venture, the criterium used by investors to evaluate early-stage start-up companies has been extensively studied (Hall & Hofer, 1993; MacMillan, Zemann, & Subbanarasimha, 2022; Tyebjee & Bruno, 1984). Of these criterium, quality of the founder has been identified as one of the most important decision factors to distinguish successful from unsuccessful new ventures (MacMillan et al., 2022). This is not surprising as investors have very little tangible information available during

the early-stage of a new venture since product viability and market demand is often untested (Busenitz, Fiet, & Moesel, 2005; Hall & Hofer, 1993).

In the absence of factual performance data, investor deal evaluation is heavily reliant on subjective assessment about the quality of the founder (Busenitz et al., 2005; Maxwell, Jeffrey, & Lévesque, 2011; Zacharakis & Meyer, 1998). Founder characteristics are often used as a proxy to assess a the quality of a new venture and play a significant role in funding decisions (Croce, Tenca, & Ughetto, 2017; Mitteness, Sudek, & Cardon, 2012). Investor assessment of a founder's quality is heavily reliant on subjective judgements which are fraught with both positive and negative bias (Ferrary & Granovetter, 2009; Huang & Knight, 2017). For instance, gender bias against women founders has been demonstrated in a number of studies which adversely impacted their funding results (Gry Agnete Alsos & Elisabet Ljunggren, 2017; Brush, Greene, Balachandra, & Davis, 2018; Kanze, Huang, Conley, & Higgins, 2018).

However, research findings of how founder age impacts new venture funding is ambiguous. On one hand, researchers have identified in qualitative studies that older founders are stereotyped as less capable of starting a new venture (Ainsworth & Hardy, 2008; Azoulay et al., 2020; Gielnik, Zacher, & Frese, 2012; Kibler et al., 2015). Researchers also found that Silicon Valley investors emphasized a founder's youth during their new venture evaluation process (Azoulay et al., 2020). Conversely, founder age is often associated with attributes identified as important drivers of new venture funding success such as industry experience, education, or social capital (Zhao et al., 2021). As a result, the role that founder age plays in new venture funding remains largely unknown.

**I.2    Signaling Theory framing overview**

One approach used to mitigate the inherent information asymmetries between founders and investors for early-stage companies is the use of signaling to convey the quality of a new venture (Ahlers, Cumming, Günther, & Schweizer, 2015; Connelly, Certo, Ireland, & Reutzel, 2011). As a result, researchers have utilized signaling theory broadly to explain how founder attributes impact new venture funding (Clough, Fang, Vissa, & Wu, 2019). Signaling theory describes how information conveyed by a founder can influence an investor's perception of their capabilities (Connelly et al., 2011; Spence, 1973). Founder indices such as age or gender are unalterable characteristics that may influence the investor's expectations resulting in different outcomes for otherwise equivalent signalers (Spence, 1973). Signals can be categorized as informational, which provide insight into the quality of the founder, or interpersonal, which indicate how the founder might interact with an investor (Huang & Knight, 2017).

For interpersonal signals, an area of focus for research has been the signaling impact of human capital characteristics which persuade investor funding assessments (Bernstein, Korteweg, & Laws, 2017; Ko & McKelvie, 2018; Mitteness et al., 2012). Homophily is a reoccurring theme for signaling theory studies as researchers have identified that investors prefer founders with similar characteristics (Ebbers & Wijnberg, 2012; Franke et al., 2006; Murnieks, Haynie, Wiltbank, & Harting, 2011). Similarity in educational background, professional experience, and academic field of study were identified as interpersonal signals which influence investor decision-making (Ebbers & Wijnberg, 2012; Franke et al., 2006; Murnieks et al., 2011). Recently, focus has been on the signaling impact of gender indices noting that investors assign different values to human capital signals for women founders (Gry Agnete Alsos & Elisabet

Ljunggren, 2017). Other founder indices such as age, race, or physical appearance have not been as extensively researched as gender.

Researchers have primarily investigated the signaling impact of founder indices, informational, and interpersonal signal phenomena on new venture funding in isolation using econometric models (Colombo, 2021; Svetek, 2022). However, new venture funding is a dynamic process in which prospective investors attempt to evaluate hidden attributes which indicate both the quality of a new venture's economic positioning as well as the founder's capability to successfully execute business objectives (Courtney, Dutta, & Li, 2017). Investors do not simply make decisions based on a single factor, but rather assess a multitude of criterion simultaneously (Huang & Knight, 2017).

The study focuses on the early stages of a new venture funding where tangible performance information is limited resulting in an investor funding selection process which is highly subjective and susceptible to systemic bias (Ferrary & Granovetter, 2009; Maxwell et al., 2011). Given that an investor's perception of founder age is closely intertwined with human capital attributes, funding decision variability may not necessarily rely on the relative superiority of certain signaling factors. Instead, the signaling influence of founder age should be considered in conjunction with other relevant signals that collectively shape investor funding decisions. Applying signaling theory in isolation to individual items may yield incomplete and potentially misleading conclusions. Refer to **Figure 1** for signaling theory in the context of new venture funding offers.

-----Insert Figure 1 about here -----

## I.3    Configuration overview

Using the set theoretic configuration method of fuzzy set qualitative comparative analysis (fsQCA) (Ragin, 2000; Rihoux & Ragin, 2008), the complexity of signaling causal interactions is captured enriching our understanding of age bias in the context of new venture funding. The fsQCA method is well suited for this study because it allows for both a systematic and rich qualitative assessment of using a relative small sample of cases in comparison to conventional techniques (Furnari et al., 2021; Greckhamer, Misangyi, & Fiss, 2013). The ability to capture the relative importance of age, as well as the other attributes configured in the analysis, affords a significant benefit of using fsQCA. The study will follow the configuration theorizing process of scoping, linking, and naming developed by Furnari (Furnari et al., 2021) to identify key explanatory conditions and develop configurations. See **Figure 2** for the configurational theorizing process utilized for this study.

-----Insert Figure 2 about here -----

For scoping and linking, the study draws upon previous research to identify explanatory conditions and associated signaling attributes which have plausible coherence to explain the outcome of interest. During the scoping phase, an offer of new venture funding from an investor was selected as the outcome variable of interest given its importance for new venture success. The criticality of new venture funding not only makes it relevant for practitioners but also has findings from a plethora of research studies to draw upon while investigating the theoretical relationships of explanatory conditions to utilize for the comparative analysis.

The first category of explanatory conditions considered were founder age and gender indices. Indices are unalterable characteristics that may influence the investor's expectations resulting in different outcomes (Spence, 1973). Older founders do not fit into the dominant youthful

stereotype of entrepreneurs which hinders their chance for success (Kibler et al., 2015). Several studies have also indicated that investors demonstrate gender bias against women founders resulting in lower fundraising than their male counterparts (Gry Agnete Alsos & Elisabet Ljunggren, 2017; Brush et al., 2018; Guzman & Kacperczyk, 2019; Kanze et al., 2018). The study considers signals from founder age and gender when constructing the set theoretical configurations to capture the influence on investor funding offers from these indices.

Founder informational signals were the second category of explanatory conditions considered. Multiple studies have demonstrated that level of education and previous new venture experience are strong indicators of a founder's human capital quality (Bernstein et al., 2017; Ko & McKelvie, 2018; Mitteness et al., 2012). As a result, the study utilized both the founder's education and previous new venture experience as measures which provide informational signals reflecting the founder's capability. Financial relationships with prominent investors has also been demonstrated to signal credibility for new venture founders (Hsu, 2004; Ko & McKelvie, 2018). As such, endorsement signaling resulting from multiple competing investor offers is included within the scope of explanatory conditions.

Founder interpersonal signaling was the third category of explanatory conditions utilized for the study. Similarity of founder and investor characteristics is scoped into the comparative analysis to capture homophily tendencies which have been observed in other studies. Not surprisingly, investors prefer to work with founders who have similar characteristics such as professional experience, educational background, and professional fields of interest (Ebbers & Wijnberg, 2012; Franke et al., 2006). To capture the interpersonal signaling influence for professional experience, the study utilized the similarity between the investor's industry experience and both the founder(s) primary professional industry experience as well as the new

venture's industry. For field of interest interpersonal signaling, the study utilized the similarity of academic major between the investor and founder(s). Additionally, the alignment of interest in technology focused new ventures between the investor and founder was also incorporated in the comparative analysis.

This study reframes investor early-stage new venture funding decision-making as a complex system of signaling relationships between a new venture founder and potential investors by exploring the dynamic interaction of founder age with informational and interpersonal signaling. Delving into the "causal recipes" driving investor funding decisions in relation to founder age, this study explores interdependencies between founder signaling and investor signal interpretation. Grounded in signaling theory (Spence, 1973), the study adopts a configurational lens using fuzzy-set qualitative comparative analysis (fsQCA) to assess these causal interdependencies (Furnari et al., 2021). This approach enables a nuanced exploration of how specific combinations of conditions dynamically interact in causally complex ways, emphasizing configurational features of conjunction, equifinality, and asymmetry (Misangyi et al., 2017).

To provide a more comprehensive understanding of how indices, informational, and interpersonal signaling dynamically interact to influence an outcome, a new signaling configuration framework was developed and used for this study (see **Figure 3**). The framework integrates the impact of informational and interpersonal signaling along with signaler indices in order to capture the dynamic interaction of these conditions within a configurational construct. The framework posits that in order to capture the causal complexity inherent within signaling relationships, conjunction and equifinality should be considered to provide a more holistic view of the conditions leading to an outcome of interest.

-----Insert Figure 3 about here -----

Prior researchers have identified the signaling impact on investor decision-making for the explanatory conditions included within this study, when viewed in isolation. However, researchers have recognized that many signals are enigmatic lending themselves to multiple interpretations and combinations which influence investor perceptions (Ciuchta et al., 2018). Additionally, the signaling impact of founder age in the context of new venture funding is ambiguous due to inconsistent research findings. Hence, there is a solid theoretical foundation to expect combinatory and potentially equifinal effects among these explanatory conditions, but an insufficient basis to hypothesize specific configurations a priori. Therefore, this study employed a configurational technique to empirically identify patterns of the identified explanatory conditions and develop a comprehensive theory of investor funding offers for early-stage new ventures.

## I.4    Method overview

Following the configurational theorizing process (Furnari et al., 2021), an exploratory case study method was used to investigate signaling phenomena in the context of early-stage new venture funding. An exploratory case study is appropriate to explore phenomena where there is no clear or single set of outcomes (Yin, 2003). Using a uniquely constructed dataset, the study links six investors with their funding decisions for 38 new ventures. A multiple case study approach was used to assess the commonality and differences in new venture funding offer configurations between these six investors using the same set of explanatory conditions (Yin, 2003).

Given the focus on investigating both informational and interpersonal signaling influences on early-stage new venture funding, it is important to have a dataset which includes a collection of founders representing a wide range of attributes, variability of new venture industries, and

investor diversity. In consideration of these priority requirements, a unique dataset of founders seeking funding on the U.S. television show *Shark Tank* was constructed using information sourced from Kaggle, Crunchbase, and LinkedIn. Researchers have used data from television shows such as *Shark Tank* (Ciuchta, Letwin, Stevenson, McMahon, & Huvaj, 2018) and its Canadian Broadcasting sister show *Dragon's Den* (Maxwell et al., 2011) noting that investment decision making mimics "real-world" situations. The uniquely constructed dataset addresses the key criteria needed for the configurational analysis as both founder contestants and shark investors encompass a broad spectrum of attributes representing different industries. Another advantage is that the show's new venture screening closely mirrors the process used by angel investment groups (Maxwell et al., 2011).

The study used fsQCA which is derived from configuration theory for the comparative analysis (Ragin, 2000). Using the direct method of calibration as prescribed by Ragin (Rihoux & Ragin, 2008), raw data was transformed into fuzzy-sets to perform the qualitative comparative analysis. The direct calibration method is most commonly used by researchers and is well suited to accommodate the combination of continuous, ordinal, and categorical data which resides within the constructed dataset (Pappas & Woodside, 2021). This method addresses conjunctural causation enabling simultaneous examination of causal conditions as combinations. Moreover, it allows for multiple combinations of conditions to be associated with an outcome, a configurational concept known as equifinality. The method is well suited for this study because it allows for both a systematic and rich qualitative assessment using a relative small sample of cases in comparison to conventional econometric techniques (Furnari et al., 2021; Greckhamer et al., 2013).

### I.5    Results overview

Supporting the concept of equifinality, several combinations of signaling condition configurations which lead to investor funding offers were identified by this study. The findings demonstrate interdependencies between signaling phenomena anchored around founder age. In particular, the influence of founder age on funding offers was complimented by informational and interpersonal signaling while endorsement signaling served as a contingent condition. For configurations where there was an explicit absence of age as a necessary condition, founder youth served as a substitutive condition for informational and interpersonal signaling.

Leveraging these findings, the study extracts novel insights and develop a typology of successful explanatory condition combinations. The study identifies that in configurations where a founder has strong individual and interpersonal signaling with the investor, founder age is not a necessary condition for funding offer success. In the absence of strong signaling, older founders are less successful than younger counterparts to receive a funding offer suggesting that founder age may affect investor funding assessment thresholds. One possible explanation is that investors may require robust human capital attributes which demonstrate capability for older founders as opposed to younger counterparts who are expected have less verifiable accomplishments simply due to a shorter experience duration. While signaling configurational themes are consistent across the six case studies, there are notable differences in the signaling importance of various founder characteristics between investors. These findings are consistent with previous researchers who note that investors may interpret signals differently due to personal preferences or congruence with investor views (Ciuchta et al., 2018; Yang, Kher, & Newbert, 2020).

**I.6    Contribution overview**

This study contributes to signaling theory and entrepreneurship literature by demonstrating a configuration perspective of the influence that founder age has on early-stage new venture funding. Using the set-theoretical configuration method of fsQCA (Rihoux & Ragin, 2008), the study was able to capture the dynamic complexity of signaling relationships. The findings provide clarity of the role that founder age, in combination with other signaling conditions, may have on new venture funding offers. The paper elaborates on the findings to develop a typology of successful signaling configurations, advancing the understanding of the complex role of founder age in new ventures' success in receiving a funding offer from investors. The configurational typology highlights the dynamic interaction of signaling phenomena demonstrating complimentary, contingent, and substitutive interdependencies between signaling conditions.

Differing from previous studies which have investigated the significance of individual signals in isolation, this study identifies multiple combinations of signaling explanatory conditions that result in an investor funding offer supporting the concept of equifinality. Building upon signaling theory (Spence, 1973), this study advances our understanding of how and why signals interact in concert beyond a narrow siloed view. The findings support the concept of conjunction since multiple signaling conditions rather than a single item drive investor funding offers outcomes. Advancing our understanding of how founder indices, informational, and interpersonal signals interact in a real-world environment is an important extension of signaling theory. In practice, the study provides insights that older new venture founders can utilize to best position themselves for funding success. Correspondingly, new venture investors may gain

awareness of a potential age bias blind spot embedded with their diligence process which could impact profitability.

This study is not without limitations. The dataset is based on a targeted population of new ventures seeking funding on the *Shark Tank* television show that coupled with a small sample size may limit the generalizability of findings. Given that fsQCA is designed for small sample sizes (Greckhamer et al., 2013) and that the *Shark Tank* diligence process mirrors those commonly used by angel investor groups (Maxwell et al., 2011), it is suggested that the results are representative of early-stage new venture funding decision-making. Since fsQCA is not prone to omitted variable bias (Fainshmidt, Witt, Aguilera, & Verbeke, 2020), exclusion of other relevant will not impact fit measurements. However, unobservable contextual factors as well as temporal differences between various stages of the funding diligence process could be impactful presenting opportunities for future research.

The study also introduces a new signaling configuration framework which integrates signaling theory and configurational concepts to capture the causal complexity of signaling phenomena, emphasizing the features of conjunction, equifinality, and asymmetry. The new theoretical framework captures the inherent causal complexity in signaling relationships and enhances our understanding of how and why combinations of different conditions lead to a particular funding offer outcome. The framework posits that signaling analysis which do not consider interdependency between indices, informational, and interpersonal signals may lead to incomplete or misleading conclusions. The new framework is not only applicable in advancing our understanding of founder age in the context of new venture funding, but can be applied when investigating other types of indices driven signaling phenomena such as gender, race, or physical

disabilities which may also affect an outcome of interest. See **Figure 3** for the new Signaling

Configuration Framework.

## II   LITERATURE SYNTHESIS

To position and frame the study, the guidelines identified by Webster and Watson (Webster & Watson, 2002) were used to conduct a rigourous literature review. Webster and Watson (Webster & Watson, 2002) suggest to initially identify relevant articles from leading journals then to go backwards by reviewing citations from these articles to identify additional research to consider. In accordance with this guidance, a broad Web of Science artcle search was performed on 2/9/2023 using the key words: "Signal*" OR "Bias" OR "Funding*" combined with AND "Entrepreneur*" OR "Founder" OR "Start$up for UT Dallas Top 24 business journals plus leading entrepreneurship journals; Entrepreneurship Theory and Practice, Journal of Business Venturing, Strategic Entrepreneurship Journal, and Venture Capital. The abstracts from the broad search were reviewed with less relevant articles not pertaining to new ventue funding such as trading or loan financing excluded from the literature synthesis. In addition, relevant literature was identified using highly cited references from recent review artcles in leading journals encompassing new venture funding (MacMillan et al., 2022), the use of signaling in new venture funding (Colombo, 2021; Svetek, 2022), age and entrepreneurship (Zhao et al., 2021), signaling theory (Connelly et al., 2011) and configurational theorization (Furnari et al., 2021; Rihoux & Ragin, 2008).

The literature review search resulted in 129 articles of which 71% were cited over 100 times and 63% published within the last ten years (since 2012). See **Table 1** for the summary of the literature review coverage. Emerging from a synthesis of these articles were four themes; 1) early-stage funding is critical for new venture success, 2) signaling theory explains how indices, informational, and interpersonal signaling influence new venture funding, 3) signaling relationships have complex causal influences, 4) founder age influence on new venture funding

is ambiguous. A detailed discussion of these themes are included in sections 3.1 through 3.7 with a summary of literature synthesis themes contained in **Table 2**.

-----Insert Tables 1 and 2 about here -----

## II.1    Funding is critical for new ventures

Securing financing from investors during the early-stages of establishing a business is a critical factor in determining the ultimate success for a new venture company (Cooper et al., 1994). Many new ventures seek funding from friends and family as they explore a new business concept which allows time for founders to build a performance track record and validate market demand before seeking investment from outside sources (Wright Robbie, 1998). However, during this early-stage of a new venture, founders rely heavily on financing from third party investors to provide capital for research and development activities as well as achieve growth objectives (Cooper et al., 1994). As a result, the ability to secure external funding is one of the largest challenges for founders to overcome during the early-stages of a new venture (Ko & McKelvie, 2018).

Given the critical nature of financing, there has been extensive research conducted how investors evaluate early-stage new ventures (Busenitz et al., 2005; Ferrary & Granovetter, 2009; Hall & Hofer, 1993; MacMillan et al., 2022; Maxwell et al., 2011; Plummer, Allison, & Connelly, 2016; Tyebjee & Bruno, 1984). Through this research, evaluation criteria used by investors to rank and screen new ventures has been categorized into five primary steps: deal origination, deal screening, deal evaluation, deal structuring, and post investment activities (Sharma, 2015; Tyebjee & Bruno, 1984). Deal evaluation is defined as the assessment of perceived risk and expected return based upon the new venture's characteristics (Tyebjee & Bruno, 1984). Early research focusing on the criteria used for deal evaluation identified quality

of management as the most heavily weighted decision criteria for investors during their evaluation phase (Tyebjee & Bruno, 1984). Management's "quality" was defined as the investor's assessment of management, financial and marketing skills of the leadership team combined with references of the founder (Tyebjee & Bruno, 1984). MacMillian et al. (MacMillan et al., 2022) aggregated a more expansive list of investor assessment criteria under the management quality category gathered from the prevailing literature to assess differences between successful and unsuccessful new ventures. Of these criteria, founder and management team characteristics were identified as the most important criteria to distinguish successful from unsuccessful new ventures (MacMillan et al., 2022).

With limited tangible performance information available during the early phase of a new venture, the assessment of management's quality is highly subjective and varies between investors (Busenitz et al., 2005; Ferrary & Granovetter, 2009; Maxwell et al., 2011; Zacharakis & Meyer, 1998). Deal evaluation is difficult during the early-stage of a new venture as new product offerings are underdeveloped and market demand is untested (Busenitz et al., 2005; Hall & Hofer, 1993). In the absence of factual performance data, investor deal evaluation is heavily reliant on subjective assessment about the quality of the founder (Busenitz et al., 2005; Maxwell et al., 2011; Zacharakis & Meyer, 1998). Founder characteristics function as a proxy of a new venture's financial prospects (Kaplan, Sensoy, & Strömberg, 2009). For these same reasons, founder characteristics play a large role in the assessment and funding decision-making processes (Croce et al., 2017; Mitteness et al., 2012). The critical importance of founder "quality" for new venture funding cannot be ignored as new venture proposals are rejected more often for reasons related to founder and management team characteristics than for lack of business innovativeness (Croce et al., 2017).

Investors are not consistent with how they evaluate new ventures as some weigh the founder's characteristics heavily while others are more focused with financial and marketing capabilities (Sharma, 2015; Tyebjee & Bruno, 1984). Investors also do not understand their intuitive decision process because of noise caused by information overload which may lead to systemic bias in their decision-making process (Zacharakis & Meyer, 1998). As a result, the investor assessment process is more of an art than science due to the effect of human decision making factors (Sharma, 2015). However, with the absence of robust performance information during the deal evaluation stage, investor assessment of a founder's quality is heavily reliant on interpersonal interactions which are fraught with both positive and negative bias (Ferrary & Granovetter, 2009).

Founder fundraising efforts frequently fail due to the difficulty in convincing prospective investors of their capabilities given the inherent lack of quantifiable information (Cooper et al., 1994; Maxwell et al., 2011). The investor selection process is also highly personal in nature, with signals communicated during face-to-face meetings influencing perceptions of management's capabilities (Ferrary & Granovetter, 2009). Unless founders can find a way to overcome the inherent uncertainty associated with a new venture, they face a high probability of failure (MacMillan et al., 2022).

Because of the importance placed on founder characteristics during deal evaluation, the study focuses on investor funding offers during the early-stage of a new venture. Researchers may distinguish between angel investors and venture capital firms as they differ in terms of their funding sources and organizational structures. However, both provide financial and non-financial investments and work closely with founders during the early-stages to maximize the venture's growth prospects (Drover, Wood, & Zacharakis, 2017). As such, angel investors and venture

capital firms will collectively be viewed as "investors" in conjunction with the literature synthesis.

## II.2   Signaling Theory in context of new venture funding

One approach used to mitigate the inherent information asymmetries between founders and investors for early-stage companies is the use of signals to convey the quality of a new venture (Connelly et al., 2011). As such, signaling theory has been widely used to explain the impact of different "signals" on new venture funding (Colombo, 2021; Svetek, 2022). In entrepreneurial literature, signalers are considered to be the founder who has access to non-public information (Connelly et al., 2011; Taj, 2016). Researchers have utilized signaling theory broadly to explain how founder characteristics influence outcomes (Clough et al., 2019). Signals are categorized as informational or interpersonal (Huang & Knight, 2017). Informational signals provide insight into the founder's capability to lead a new venture while interpersonal signals indicate how the founder might interact with the investor (Huang & Knight, 2017). For signaling attributes which cannot be altered, such as age and gender, the term indices is applied (Spence, 1978). Indices are unalterable characteristics of a signaler that may influence the receiver's expectations resulting in different outcomes for otherwise equivalent signalers (Spence, 1978). See **Figure 1** for the key elements of signaling theory. A detailed discussion of indices, informational, and interpersonal signaling research findings are included in sections 3.3-3.5 below.

## II.3   Founder indices

The signaling impact from gender indices has been an area of research focus demonstrating bias against female new venture founders seeking funding (Gry Agnete Alsos & Elisabet Ljunggren, 2017). Empirical studies have quantified a significant funding gap for women founders indicating an underlying investor gender bias (Brush et al., 2018; Guzman &

Kacperczyk, 2019). Outside of the recent research surrounding gender signaling, founder indices have largely been unexplored. Given that gender indices have an impact on the new venture funding assessment process, it is reasonable to consider the signaling impact that founder age may have on investor funding offers.

## II.4  Informational signals

Informational signaling from human capital attributes such as education and prior new venture founding experience help persuade investors (Matusik, George, & Heeley, 2008). Multiple studies have demonstrated that a founder's level of education is a strong signal for investors (Colombo, 2021; Ko & McKelvie, 2018). One reason investors value highly educated founders is that there is strong empirical evidence supporting a positive relationship between the founder's level of education and new venture success (Cooper et al., 1994; Ko & McKelvie, 2018). Prior new venture experience is also a strong signal of the founder's human capital quality as it projects an ability to navigate through organizational uncertainty and emerging threats (Ko & McKelvie, 2018). Experienced new venture founders are considered more effective at evaluating opportunities compared to novice entrepreneurs, which increases investor expected returns (Fisher, Kuratko, Bloodgood, & Hornsby, 2017).

Endorsement of a new venture by prominent investors through a financial commitment has also been demonstrated as a strong informational signal to investors indicating credibility of the new venture. Studies have shown that financial commitments from prominent investors have a stronger signaling effect than other types of affiliated relationships (Hsu, 2004). Even simply an expressed interest from other prominent investors serves as a certification which increases the founder's credibility increasing the likelihood of investor funding (Gry Agnete Alsos & Elisabet Ljunggren, 2017). Viewed in isolation, founder education, prior new venture experience, and

endorsement signaling have been extensively researched and consistently rank as significant factors for new venture funding success. Missing from the literature is a comprehensive view of if and how these individuals signaling phenomena interact in conjunction with founder age to influence investor decision-making.

## II.5  Interpersonal signals

Interpersonal signaling from similarity of investors and founders, or homophily, is a reoccurring theme throughout the new venture funding research conducted using signaling theory. Homophily is the principle that similar people tend to connect at a higher rate than dissimilar people (McPherson, Smith-Lovin, & Cook, 2001). Much of the work investigating interpersonal signaling involves how founders with similar attributes as their corresponding investors were viewed more favorably during funding diligence activities. For example, investors were determined to prefer founders with similar leadership styles (Murnieks et al., 2011). Studies also noted that investors favor founders with similar educational backgrounds (Ebbers & Wijnberg, 2012) as well as similar professional experience (Franke et al., 2006).

Homophily concepts also suggests that the level of compatibility between the founder and investor influences how signals are interpreted. For instance, investors with coaching experience place a greater emphasis on a founder's coachability when assessing a new venture (Ciuchta et al., 2018) while investors who are more willing to mentor placed greater emphasis on founder passion than other investors (Mitteness et al., 2012). Signals which are congruent with investor views of the founder's gender were also found to be more effective (Yang et al., 2020). When seeking new venture funding, signaling of prior equity investment was more effective for male founders whereas signaling prior philanthropic investment worked better for female founders (Yang et al., 2020). Considering the impact of interpersonal signaling on new venture funding,

the similarity of investor and founder professional experience and fields of interest were

considered in the qualitative comparative analysis.

## II.6   Signaling causal relationships

New venture funding is a dynamic process in which prospective investors attempt to evaluate

hidden attributes which indicate both the quality of a new venture's economic positioning as well

as the founder's capability to successfully execute business objectives (Courtney et al., 2017).

With limited capital available in the market, competition is intense for both founders seeking the

financing needed to grow their business as well as investors trying to maximize their profitability

(Wright Robbie, 1998). Fear of missing out (FOMO) can be a powerful motivator for investors

who do not want to be excluded from potentially lucrative deals. For early-stage new venture

founders, overcoming the high information gap to successfully persuade investors is particularly

difficult given the lack of a proven track record and untested market demand (Maxwell &

Lévesque, 2014). Although the impact of founder signaling on new venture funding have been

studied extensively, this research has mainly focused on the incremental impact of an attribute

and not the effect when viewed holistically (Colombo, 2021; Svetek, 2022).

Investors do not simply make decisions based on a single factor, but rather assess a multitude

of criterion simultaneously (Huang & Knight, 2017). Signals are rarely perfectly aligned with a

particular quality and may have both informational and interpersonal implications (Connelly et

al., 2011). Researchers have recognized that many signals are ambiguous lending themselves to

multiple interpretations and combinations which influence investor perceptions (Ciuchta et al.,

2018). As an example, rhetorical signals were found to complement substantive signals by

drawing the attention of prospective investors which improved crowdfunding results

(Steigenberger & Wilhelm, 2018). Expanding on traditional signaling theory which assumes that

signals are processed individually by investors, researchers identified that certain new venture attribute signals remained unnoticed by investors unless they were complimented with a third-party validation (Courtney et al., 2017; Plummer et al., 2016). Additionally, researchers have identified that new venture funding is influenced by gender stereotypes which negatively impact female founders (Gry Agnete Alsos & Elisabet Ljunggren, 2017; Brush et al., 2018; Guzman & Kacperczyk, 2019; Kanze et al., 2018). To capture the dynamic complexity of signaling relationships, this study employs a set-theoretical configuration method to analyze "causal recipes" of signaling phenomena not reflected in studies using econometric models.

## II.7   Ambiguity of founder age influence

Several studies have documented prevailing views that older founders are less capable of starting a new venture than younger counterparts. Kibbler (Kibler et al., 2015) noted in a case study that older founders experienced age bias because they did not fit into the dominant cultural view favoring youth. Another researcher noted that older founders were viewed as incapable of understanding how to build a new business (Ainsworth & Hardy, 2008). Negative perceptions of older founders were also identified when studying Silicon Valley investors which emphasized a founder's youth during their evaluation process (Azoulay et al., 2020). Conversely, Zhao (Zhao et al., 2021) conducted a meta-analysis noting that founder age has a weak, positive linear relationship with overall new venture success. One explanation is that the benefits of business experience, education, and social capital are associated with older founders due to their correlation with age (Zhao et al., 2021). The mixed findings from these studies create ambiguity around the role, if any, that founder age plays in investor decision-making. This study brings clarity around the conditions in which founder age influences new venture funding offer outcomes.

## III  THEORETICAL FRAMING

Signaling theory (Spence, 1973) is applied to investigate the influence of founder age on early-stage new venture funding offers. Signaling theory describes how information conveyed by a founder can influence an investor's perception of the sender's capabilities (Connelly et al., 2011). The key elements of signaling theory apply in situations where there is an informational gap between new venture founders and investors whereas the founder has a knowledge advantage (Spence, 1973). Although originally developed as an economic theory to explain phenomena in the labor market, Signaling Theory has been utilized in a wide range of business contexts where information asymmetry exists in dyadic relationships (Connelly et al., 2011). In the context of new venture funding, the founder engages in signaling to convey an otherwise unobservable but important piece of information to the investor. The investor must then interpret the signals to factor into their funding decision-making process. The function of signaling is to reduce the information asymmetry of unobservable but relevant items to improve investor decision-making (Svetek, 2022). The use of signals to convey a new ventures qualities is one approach used to mitigate the inherent information asymmetries between founders and investors for early-stage new ventures (Connelly et al., 2011).

An important consideration for signaling theory is that the investor believes in a relationship between the signal and a significant unobservable quality, thus influencing their decision (Bergh, Connelly, Ketchen Jr, & Shannon, 2014; Connelly et al., 2011; Spence, 1978). Founders only benefit from signals which the investor notices and perceives as relevant (Drover, Wood, & Corbett, 2018). Since most signals can be modified by founders, investors place more value on signals that are not only informative but also difficult to manipulate (Connelly et al., 2011). Researchers have also determined that signals which reflect a founder's underlying personality

characteristics are also important in the context of new venture funding (Clough et al., 2019). Investors signaling beliefs are also updated based on experience of which signals proved effective and those which were misleading (Spence, 1973).

Founder signaling is intended to communicate information to favorably influence an investor's funding decision (Connelly et al., 2011). Signals differ and can be classified as either indices, informational, or interpersonal. Founder indices are unalterable characteristics that may influence the investor's expectations resulting in different outcomes for otherwise equivalent new ventures (Spence, 1973). Informational signals provide insight into the capability of the founder while interpersonal signals indicate how the founder might interact with an investor (Huang & Knight, 2017). A detailed discussion of indices, informational, and interpersonal signaling phenomena are discussed in greater detail in sections 4.1-4.3.

### III.1  Indices signaling

Signaler indices are relevant to the signaling process as they influence investor decision outcomes (Vasudeva, Nachum, & Say, 2018). Indices encompass founder characteristics such as age, gender, or race. Unlike information or interpersonal signals, indices are not pliable and thus cannot be modified or selectively altered by a founder (Spence, 1973). However, indices may influence investor expectations resulting in different funding outcomes for founders with otherwise equivalent signaling (Spence, 1978). Recent studies have focused on the indices signaling effect for female founders. One study noted that female founders are less likely to signal growth potential resulting in lower levels of investor funding relative to male counterparts (Guzman & Kacperczyk, 2019). Researchers have also noted that signals which are congruent with the founder's gender are more effective resulting in different signal strength between male and female founders (Yang et al., 2020). Given the underlying research supporting gender

indices signaling for new venture founders, it is reasonable to consider the impact that a

founder's age as well as gender may have on investor funding offers.

## III.2  Informational signaling

Informational signaling provides insight into the quality of a founder which is a critical factor

used by investors for new venture funding decisions (Ko & McKelvie, 2018). Human capital

attributes such as education and new venture experience as well as endorsements from external

investors signal the founder's qualifications (Hsu, 2004; Ko & McKelvie, 2018). With limited

tangible performance information during the early-stage of a new venture, founder quality is one

of the most important criteria used by investors to make funding decisions (MacMillan et al.,

2022). Additionally, the assessment of management's quality is highly subjective and varies

between investors (Busenitz et al., 2005; Ferrary & Granovetter, 2009; Maxwell et al., 2011;

Zacharakis & Meyer, 1998). As a result, informational signaling conveys important information

about the founder's capabilities which impact new venture funding outcomes, particularly during

the early-stage (Ko & McKelvie, 2018).

Viewed in isolation, multiple studies have demonstrated as positive linear relationship of

informational signals to successful new venture funding outcomes (Bernstein et al., 2017; Ko &

McKelvie, 2018; MacMillan et al., 2022). This study leverages informational signals previously

identified by researchers as having a significant individual effect on new venture funding to

determine their impact when viewed holistically in conjunction with multiple signals.

## III.3  Interpersonal signaling

Interpersonal signaling provides insight into the founder's behavior style and how well the

founder may work with the investor (Huang & Knight, 2017). Investors not only seek to add

value to a new venture by injecting funding but also through providing non-financial guidance

and support (Sudek, 2006). As a result, it is not surprising that investors prefer working with founders with similar views (Ebbers & Wijnberg, 2012; Franke et al., 2006; Murnieks et al., 2011). Positive interpersonal signals include mirroring an investor's views and expressing overlapping interests (Huang & Knight, 2017). In fact, researchers have identified that investors may reject competent founders if they are unable to form a personal connection (Huang, 2018). Therefore, it is reasonable that investors would consider compatibility with potential founders when considering new venture funding decisions.

To date, researchers have mainly explored information signaling with a few exceptions investigating the effects of interspersal signals on new venture funding (Ciuchta et al., 2018; Warnick, Murnieks, McMullen, & Brooks, 2018). To capture the interpersonal signaling impact in a configuration context, this study incorporates similarity characteristics previously identified by researchers to positively influence investor funding decisions.

## III.4  Signaling causal complexity

Previous studies have primarily focused on the impact of individual signaling phenomena on new venture funding outcomes (Colombo, 2021; Svetek, 2022). However, founder signaling during early-stage funding diligence is often unclear and inconsistent making investor assessment of a new venture very difficult (Plummer et al., 2016). Moreover, researchers recognize that investors are exposed to numerous founder signals, and thus tend to make holistic assessments rather than considering each signal individually (Huang, 2018). As a result, in real-world environments investors do not simply make decisions based on a single factor, but rather assess a multitude of criteria simultaneously (Edelman, Manolova, Brush, & Chow, 2021; MacMillan et al., 2022). Complimentary signaling interactions have also been identified in studies noting that signals can be influenced by the presence or absence of other signaling

conditions (Courtney et al., 2017; Plummer et al., 2016). Although these studies have identified specific instances of signal complexity, a holistic perspective of signaling phenomena interdependencies remains largely unexplored.

**III.5  Signaling configurations**

Configurational concepts are well suited to study causal complexity of multiple explanatory conditions (Furnari et al., 2021). Configurations are complex bundles of interdependent characteristics that orchestrate in combination to drive an outcome of interest (Fiss, 2011). Configurational researchers focus on how and why multiple attributes combine into distinct configurations to explain a phenomena, or conjunction, while also recognizing that complex causal explanations may involve more than one configuration leading to the outcome of interest, or equifinality (Furnari et al., 2021). As a result, a configurational theorizing approach is appropriate to study the complexity of signaling phenomena in contrast to traditional econometric methods which are limited to assessing mainly linear associations.

Given the causal complexity of signals, there is a solid theoretical foundation to expect combinatory and potentially equifinal effects among signaling phenomena. However, there is an insufficient basis to hypothesize specific signal configurations a priori as the interdependencies amongst signaling phenomena has not been fully explored. Expanding existing signaling theory research, this study employed a configurational technique to empirically identify patterns of the identified explanatory conditions and develop a comprehensive theory of investor funding offers for early-stage new ventures.

# IV  METHODOLOGY

To capture the causal complexity of signaling interactions, the study utilized fsQCA 4.0 Windows (Ragin and Davey, 2022) to perform the comparative analysis in the context of early-stage new venture funding offers. Grounded in set theory and Boolean algebra, fsQCA identifies whether the presence or absence of causal conditions and their combinations are consistent with the presence or absence of a particular outcome (Ragin, 2000). Much of the previous research on the signaling impact of founder attributes on new venture funding has focused on specific items in isolation (Colombo, 2021; Svetek, 2022). As a result, the effect that complimentary or contradictory signals may have on new venture funding outcomes were largely not addressed.

In contrast to regression analysis, fsQCA identifies whether the presence or absence of causal conditions and their combinations are consistent with the presence or absence of a particular outcome (Fainshmidt et al., 2020). A grouping of associated conditions which have a combined causal effect on new venture funding are termed configurations (Fiss, 2011). Using fsQCA, each observation is assessed as a combination of attributes, and identifies the attribute configurations that are consistently linked to the outcome of interest (Furnari et al., 2021). An important aspect of fsQCA is that cases can be partially contributing to the outcome, as opposed to simply present or absent (Rihoux & Ragin, 2008). Two elements of comparative analysis essential to understanding how the causal complexity of a combination influence an outcome are conjunction and equifinality (Rohlfing, 2008). Conjunction prescribes that configurations of multiple explanatory conditions rather than just a single factor drive outcomes while equifinality posits that different configurations can lead to the same outcome (Rohlfing, 2008).

This paper explores the relationship between the degree of membership of signaling conditions for early-stage new venture cases and the outcome of interest, an investor funding

offer. This method addresses conjunctural causation enabling simultaneous examination of causal conditions as combinations. Moreover, it allows for multiple combinations of conditions to be associated with an outcome, a configurational concept known as equifinality.

The method is well suited for this study because it allows for both a systematic and rich qualitative assessment using a relative small sample of cases in comparison to conventional econometric techniques (Furnari et al., 2021; Greckhamer et al., 2013). The ability to capture the relative importance of founder age in conjunction with other explanatory conditions affords a significant benefit of using fsQCA as complex signaling relationships are not easily captured using traditional variance-based methods (Pappas & Woodside, 2021). Second, fsQCA allows for a richer qualitative case study analysis by explaining combinational condition antecedents on outcomes while variable-based methods focus on the similarities of variables between different cases (Ragin, 2000). A final practical consideration is that given the limited number of new ventures studied, this method is appropriate for small sample sizes which may be unsuitable for many econometric methods (Greckhamer et al., 2013).

Following the configurational theorizing process (Furnari et al., 2021), an exploratory case study is used to investigate the signaling phenomena since there is no clear or single set of expected outcomes (Yin, 2003). Oriented with the investor as the unit of analysis, the study explores the necessary signaling conditions which lead to a funding offer for the new venture founder(s). The six investors included within the scope include Barbara Cocoran (investor #1), Mark Cuban (investor #2), Lori Greiner (investor #3), Robert Herjavec (investor #4), Daymond John (investor #5), and Kevin O'Leary (investor #6). A multiple case study approach is used to assess the commonality and differences in new venture funding offer configurations between the six investors using the same set of explanatory conditions (Yin, 2003). Drawing on the

comparative analysis conceptual foundation, Furnari organized the configuration theorizing process into three stages; scoping, linking, and naming (Furnari et al., 2021). The study followed this framework to identify key attributes and develop configurations to be analyzed using fsQCA (see **Figure 2**).

Scoping is the first stage where relevant attributes are identified that may plausibly form configurations to describe the phenomena influence on an outcome variable. These configurations should have "plausible coherence" as the theory not only implies that multiple attributes combine to explain an outcome, but also have inherent logic among the attributes (Furnari et al., 2021). Linking is stage two, where one must specify how the attributes connect with each other in various configurations (Furnari et al., 2021). Furnari (Furnari et al., 2021) emphasized to consider interdependent links amongst attributes which may be contingent or complimentary. Contingency means that the effects of one or more attributes is a function of the presence or absence of some other relevant attribute(s), while complementarity means that two or more attributes mutually enhance one another's contribution to become synergistic (Furnari et al., 2021). Equifinality must also be considered to identify the multiple configurations that may be equally effective in explaining the phenomena (Furnari et al., 2021). Naming is the last stage which will involve framing the results in a meaningful manner to describe the complex interaction of the explanatory conditions which lead to various new venture funding outcomes.

The following sections 5.1 through 5.4 discuss in detail the scoping and theoretical linking rationale for the outcome variable (new venture funding offers) and each of the selected explanatory conditions (indices, informational, and interpersonal signaling). See **Table 3** for linking of explanatory conditions to new venture funding literature. Naming is included in the discussion of results where a typology of successful signaling configurations was developed

advancing the understanding of the complex role of founder age in investor new venture funding

offer decision-making.

-----Insert Table 3 about here -----

## IV.1  Outcome variable

Investment offers from investors solicited by early-stage new ventures seeking funding was

selected as the outcome variable for the comparative analysis for three primary reasons. First,

obtaining funding during the early-stage is a critical success factor for new ventures (Cooper et

al., 1994) making findings from the study relevant for researchers and practitioners alike. Due to

the criticality of new venture funding, the depth of research surrounding the signaling effects

from founder attributes is robust (Ko & McKelvie, 2018; MacMillan et al., 2022; Tyebjee &

Bruno, 1984). As a result, the theoretical relationships of explanatory conditions used for the

comparative analysis are well established. Lastly, since information is limited during the early-

stage of a new venture, investor assessment is highly subjective and varies between investors

leading to biases (Busenitz et al., 2005; Ferrary & Granovetter, 2009; Maxwell et al., 2011;

Zacharakis & Meyer, 1998). With the outcome variable of interest established, plausible

explanatory conditions which may collectively influence new venture funding offers are scoped

in for the comparative analysis.

## IV.2  Indices signaling conditions

Spence defines indices as unalterable characteristics that may influence the investor's

expectations resulting in different funding outcomes for founders (Spence, 1973). Indices, such

as age and gender, differ from signal attributes in that they cannot be altered or manipulated by

the founder to influence a desired outcome (Spence, 1973). However, observable indices are to

be regarded as parameters to consider within the conditional probability distributions of an

investor's subjective assessment (Spence, 1973). In addition to founder age, this study utilizes signals from founder gender indices when constructing the set-theoretical configurations.

Founder age is the focus of the comparative analysis in order to capture the conditions in which it may have an impact on investor new venture funding offers. Older founders do not fit into the dominant youthful image of entrepreneurs which hinders their chance for success (Kibler et al., 2015). It is expected that the impact of founder age on new venture funding offers will vary depending on the combination of informational and interpersonal signaling. For each of the selected explanatory signaling conditions, the theoretical linkage of founder age is discussed in greater detail.

Founder gender is also included as an explanatory indices condition in the comparative analysis scope. Although several studies have indicated that investors demonstrate gender bias against female founders, the combined impact of gender with age remains unknown (Zhao et al., 2021). It is possible that the adverse impact of founder age may be amplified when combined together with female founders. Conversely, older female founders may be viewed more favorably by investors as some of the impact driven by gender stereotypes may dissipate with age (Zhao et al., 2021).

## IV.3  Informational signaling conditions

The study utilized both the founder's education and prior new venture experience as measures to reflect the quality of their human capital as investors rely heavily on these informational signals when making early-stage investment disccisions (Bernstein et al., 2017; Ko & McKelvie, 2018; Mitteness et al., 2012). Quality of a new venture's founder has been identified as one of the most important decision criteria used by investors to assess new ventures (MacMillan et al., 2022; Tyebjee & Bruno, 1984). Human capital information signals such as

education and prior new venture founding experience help persuade investors (Matusik et al., 2008). Investors especially rely heavily on the founder's education and experience when making early-stage investment discissions (Bernstein et al., 2017; Ko & McKelvie, 2018; Mitteness et al., 2012). Multiple studies have demonstrated that a founder's level of education is a strong signal for investors (Colombo, 2021; Ko & McKelvie, 2018; Svetek, 2022). One reason investors value highly educated founders is that there is strong empirical evidence supporting a positive relationship between the founder's level of education and new venture success (Cooper et al., 1994; Ko & McKelvie, 2018). Another explanation presented by researchers is the high opportunity costs foregone by highly educated founders to start a new venture implies a more attractive expected return opportunity (Ko & McKelvie, 2018).

Prior new venture experience is also a strong informational signal of the founder's human capital quality as it projects an ability to navigate through organizational uncertainty and emerging threats (Ko & McKelvie, 2018). Experienced new venture founders are considered more effective at evaluating opportunities compared to novice entrepreneurs, which increases investor expected returns (Fisher et al., 2017). New venture experience also indicates knowledge of how to manage a nascent business's important operational functions such as customer contracting or recruiting employees (Shepherd, 1999). Even if a founder's previous new ventures were unsuccessful, these experiences are transferable to future endeavors increasing the likelihood of an improved outcomes (Ko & McKelvie, 2018). The study utilizes both the founder's education and prior new venture experience as informational signals which reflect the quality of their human capital.

The comparative analysis also investigates how endorsement signals from multiple funding offers interact with the other explanatory conditions. Existing research indicates that the presence

of funding offers from other investors amplify the effectiveness of other human capital informational signaling or function as a substitute for a perceived deficiency. Conversely, the absence of interest from other investors could dampen the effectiveness of otherwise strong founder signaling. Endorsement of a new venture by prominent investors through a financial commitment has been demonstrated as a strong signal to investors indicating credibility of the new venture. Studies have shown that financial commitments from prominent investors have a stronger signaling effect than other types of affiliated relationships (Hsu, 2004). Financial commitments from other prominent investors are an influential factor serving as a certification which increases the new venture's credibility (Ko & McKelvie, 2018). Even a mere assertion by founders of expressed interest from other investors provides a credibility for the new venture founders which increased the likelihood of investor funding (Gry Agnete Alsos & Elisabet Ljunggren, 2017).

This study investigates how endorsement signals from multiple funding offers interact with the other explanatory signaling conditions. Existing research would indicate that the presence of offers from other investors would amplify the signaling effectiveness of the other human capital informational signaling. Endorsements signaling could also be substantiative for interpersonal signaling explanatory conditions. Conversely, the absence of interest from other investors could dampen the effectiveness of otherwise strong founder signaling.

In general, older founders have a greater amount of human capital accumulated over time (Cooper et al., 1994). Viewed in isolation, founder education, prior new venture experience, and endorsement signals have been extensively researched and consistently rank as significant factors for new venture funding success. However, depending on the context, the perceived value of experience may diminish or be complimented by the presence or absence of other explanatory

conditions. For instance, a founder's age may signal rigidity to explore future opportunities rather than harvest existing businesses (Gielnik et al., 2012). These tradeoffs are explored further using a configurational approach.

## IV.4  Interpersonal signal conditions

Interpersonal signals provide investors insight into how the founder may interact with others (Huang & Knight, 2017). Consistent with other studies investigating homophily influences on decision-making, entrepreneurial researchers have noted that investors prefer to work with founders having similar characteristics. Similarity in educational background, professional experience, and field of study have been identified as important factors utilized by investors to select amongst competing new venture founders (Ebbers & Wijnberg, 2012; Franke et al., 2006; Murnieks et al., 2011). These results are not surprising since investors, particularly angel investors, view their value-added contribution to the new venture not only in financial terms but also by the non-financial resources they can provide to compliment the founder's skillset (Huang & Knight, 2017). Positive interpersonal signals include "mirroring" an investor's views and demonstrating similar professional interests (Vissa, 2011). Interpersonal signaling behavior may also establish expectations, both favorable and adverse, of how the investor and founder will work together (Elsbach & Kramer, 2003).

The study expands on this research by providing a configurational perspective of founder indices in combination with informational and interpersonal signaling. Building upon the findings that investors favor founders with similar training or experience (Franke et al., 2006; Murnieks et al., 2011), the configuration analysis will incorporate similarity of professional experience and field of study interest. Professional experience similarity leverages two interpersonal signaling characteristics of professional work experience and new venture industry

interest alignment. Field of interest similarity also leverages two interpersonal signaling characteristics of academic major concentration and technological interest alignment.

The dyadic relationship between an angel investor and founder is inherently more personal which amplifies the influence of interpersonal signaling in the context of new venture funding (Huang & Knight, 2017). All factors considered equal; one may expect that the causal interaction of interpersonal signaling would not differ significantly based upon the founder's age. However, Kibler (Kibler et al., 2015) identified that prevailing views for older founders extended beyond independent third parties to include personal friends and family. The potential impact that founder age may have on interpersonal signaling are examined in greater detail during the discussion of findings.

## IV.5  Signaling Configuration Framework

To provide a more comprehensive understanding of how individual and interpersonal signaling dynamically interact to influence new venture funding offers, a new signaling configuration framework was developed and used for this study (see **Figure 3**). The framework bundles the signaling impact of founder informational signals and indices as explained by signaling theory with founder interpersonal signaling driven by similarity with the investor. Signaling theory has been extensively used to study how founders utilize signaling to distinguish themselves to gain investor funding (Colombo, 2021; Svetek, 2022). Researchers have also identified that transmitted signals may not convey the founder's intended message as the interpretation may vary depending on investor specific characteristics (Connelly et al., 2011). For example, older investors have been noted to place more emphasis on a founder's passion when evaluating funding decisions (Mitteness et al., 2012). In another instance, founder coachability was noted as an important signal in entrepreneurial pitch competition settings, but this impact

was conditional on the investor's prior coaching experience (Ciuchta et al., 2018). The framework captures these phenomena by incorporating the influence of both founder and investor attributes within the context of new venture funding offers.

Another consideration incorporated within the framework is signaling congruence as signal effectiveness is impacted by the alignment or misalignment of signals with the investor's underlying expectations (Connelly et al., 2011). Investors have certain expectations about a founder's capability which are associated with their underlying indices. The concept of "signal fit", as described within signaling theory, is that if certain signals do not match with the investor's underlying assumptions, a signal is more likely to be ignored or rejected (Connelly et al., 2011). For instance, signals which are congruent with investor views of the founder's gender were found to be more effective (Yang et al., 2020). In an empirical study, it was noted that informational signals about a new venture's quality presented by male founders led to greater amounts of funding than similar signaling conveyed from female founders (Eddleston, Ladge, Mitteness, & Balachandra, 2016). Unexplored in the research is the signaling fit impact of founder age in the context of new venture funding.

A third aspect of the framework is to capture the causal complexity inherent in signaling relationships. Investor do not simply make new venture funding decisions based on a single factor, but rather assess a multitude of criterion. Signals may be complimentary, contradictory, or may be influenced by the presence or absence of other factors (Edelman et al., 2021). For instance, research on signaling interactions in new venture funding (Plummer et al., 2016) demonstrated how informational signaling may remain relatively unnoticed unless combined with an endorsement from a third party affiliation. Researchers have developed various frameworks to address signaling complexity. Drover et. al. (Drover et al., 2018) theorized about

the cognitive processes associated with a receiver's interpretation of multiple, often incongruent signals and Huang and Knight (Huang & Knight, 2017) developed a theoretical model grounded in exchange theory which describes the process of how founder informational and interpersonal signaling interaction impacts their relationship with the investor. However, these frameworks do not address the configurational aspects of signaling phenomena.

Lastly, the new framework integrates signaling theory and configurational concepts to capture the causal complexity of signaling phenomena emphasizing the features of conjunction, equifinality, and asymmetry. Configuration theory is also predicated on the principle of causal symmetry which explains that a condition or combination of conditions which explain a certain outcome can be different than the conditions that lead to the absence of the same outcome (Rihoux & Ragin, 2008). The framework captures the causal complexity inherent in signaling relationships and enhances our understanding of how and why combinations of different factors lead to a particular funding outcome.

The framework incorporates configurational concepts within a signaling theory construct to capture the causal complexity phenomena embedded within these signaling relationships. Configurational theories are effective at explaining causally complex phenomena with a focus on studying how and why multiple conditions combine into distinct configurations to explain an outcome of interest (Furnari et al., 2021). Configurational methods recognize that complex causal explanations may involve more than one configuration of attributes, conjunction, and that more than one configuration can lead to the same outcome, equifinality (Rihoux & Ragin, 2008). Given the plethora of studies identifying the causal complexity of signaling relationships, configurational methods are well suited to explain the combined effect of indices, informational, and interpersonal signaling on new venture funding offers. The new framework is not only

applicable in advancing our understanding of founder age in the context of new venture funding, but also may be useful when investigation other types of indices associated with gender, race, or physical disabilities. **Figure 4** displays the theoretical foundational elements of the new framework combining signaling theory and configurational concepts in the context of new venture funding.

-----Insert Figure 4 about here -----

### IV.6  Data collection

Given the focus on investigating both individual and interpersonal signaling influences on early-stage new venture funding, it is important to have a dataset which includes a collection of founders representing a wide range of attributes and investor diversity. In consideration of these priority requirements, a unique dataset of founders seeking funding on the U.S. television show *Shark Tank* was constructed using information sourced from Kaggle, Crunchbase, and LinkedIn.

Researchers have used data from television shows such as *Shark Tank* (Ciuchta et al., 2018) and its Canadian Broadcasting sister show Dragon's Den (Maxwell et al., 2011) noting that investment decision making mimics "real-world" situations. The uniquely constructed dataset addresses the key criteria needed for the configurational analysis as both founder contestants and shark investors encompass a broad spectrum of characteristics and professional experience. Another advantage is that the show's new venture screening closely mirrors the process used by angel investment groups (Maxwell et al., 2011).

Founders seeking funding on the U.S. television show *Shark Tank* were used as a basis for this study. On the television show, founders pitch their new ventures to potential "shark" investors to obtain funding for their new ventures. The show's new venture screening process closely mirrors the process used by angel investment groups (Maxwell et al., 2011). Founders

must first complete a seventeen-page online screening application and attend an optional regional "open call" event. The application includes information about management team credentials such as education and experience as well as the new venture's business proposal, competitive positioning, and financial projections. After a phone screening, remaining applicants must submit a ten-minute pitch video. If selected for the show, the founder contestants perform a forty-five-minute pitch to the sharks which is edited for television before airing. Sharks may propose an offer which can be accepted or rejected by the founder. Finally, all shark investments are subject to a final round of due diligence before the funding is completed[2].

The use of a reality television shows for academic research raises questions of data validity. Researchers have used data from television shows such as *Shark Tank* (Ciuchta et al., 2018) and its Canadian Broadcasting sister show Dragon's Den (Maxwell et al., 2011). These studies have codified the applicability of these television shows to "real-world" investment decision making as the founder faces situations with real consequences, as do the shark investors who risk their own funds to pursue real opportunities. Maxwell (Maxwell et al., 2011) further noted that behavioral economic studies found that during intense TV show environments, participant decisions are similar to real-life behaviors when contestants have had time to think about what they might do in various situations prior to the show. This is the case with *Shark Tank* as both founder contestants and shark investors have considerable time to reflect on how they would make a decision prior to actually being confronted with a choice.

*Shark Tank* data addresses many of the key criteria needed for the configurational analysis of early-stage new venture funding. The show has been aired for fourteen years with over 1,250

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[2] Further details of the *Shark Tank* application process are available online at https://allsharktankproducts.com/author/lois-crouse/.

pitches from founders seeking funding. These founders represent a wide range of demographics, personal and profession qualifications, and new venture industries. The shark investors also vary in terms of demographics, credentials, and experience allowing for the analysis of multiple attribute matching configurations. For this study, the variability of both founder and investor attributes from *Shark Tank* data is appealing in contrast to traditional angel investment groups which may be more narrowly focused on a particular industry or have limited diversity amongst their investor population.

Given the robust nature of *Shark Tank* data for research, a number of databases have been created which are available in the public domain. New venture founders and associated funding outcomes from *Shark Tank* shows were sourced from Kaggle. Kaggle is a data science platform where users can find and publish data sets to build models and collaborate with other data scientists. It is a subsidiary of Google LLC launched in 2010 and has more than ten million registered users from 194 countries[3]. The *Shark Tank* dataset includes 50 fields for each of the 1263 contestant investment pitches performed over fourteen seasons[4]. **Table 4** contains the description for each of the 50 available Kaggle dataset fields. The investment pitches from the shows which aired in 2018 were selected for the study. The most current season prior to Covid 19 were chosen to eliminate any potential effects of the pandemic on new venture funding assessments.

Additional data elements regarding founder and investor personal and professional attributes including founder age, founder academic background, and founder professional experience were sourced through LinkedIn and Crunchbase information records. LinkedIn is a widely used

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[3] Kaggle descriptive data was sourced from Kaggle - Wikipedia.
[4] The Kaggle *Shark Tank* contestant investment pitch information was sourced from https://www.kaggle.com/datasets/thirumani/shark-tank-us-dataset.

professional social network with over 900 million registered users which provides extensive professional profiles about an individuals' work experiences, educational backgrounds, and skills[5]. The amount and quality of data available on LinkedIn can vary as not all users provide comprehensive profiles. As a result, only new ventures with publicly available founder educational and experience data were included within the scope of the study. Crunchbase is a premier source of start-up company information which is gathered from over 4000 investment firms providing information on their own investments as well as a community of executives, entrepreneurs, and investors who voluntarily contribute to company profiles[6]. Crunchbase information has been widely used by researchers as listed new ventures have strong incentives to disclose information to distinguish themselves for potential investors (Ko & McKelvie, 2018). See **Table 4** for data field descriptions, **Table 5** for sources of the newly constructed dataset, and **Table 6** for key dataset elements.

-----Insert Tables 4, 5, and 6 about here -----

## IV.7  Data measurement and coding

The study utilized explanatory conditions which have previously been identified by researchers as producing a signaling impact on investor new venture funding decisions. Refer to **Table 3** for selected research literature supporting each explanatory condition. Each of the explanatory conditions also adhere to the core signaling tenants of being readily observable, reliable, and costly to imitate (Connelly et al., 2011). The measurement and coding for the outcome variable and each explanatory condition are discussed in detail below. An additional factor for consideration was measurement for new ventures with multiple founders. Researchers

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[5] LinkedIn information was sourced from LinkedIn - Wikipedia.
[6] Crunchbase information was sourced from Crunchbase - Wikipedia.

have noted that when evaluating new ventures, investors consider characteristics of the combined team as opposed to focusing on only one of the founders (MacMillan et al., 2022). In studying biases arising from similarities between investors and new venture management teams, Franke et al., (Franke et al., 2006) considered team characteristics when performing a conjoint analysis study. The study leverages a similar approach for new ventures with multiple founders by measuring the signaling condition utilizing the most favorable attribute within the collective new venture founder team. See **Table 7** for a data calibration and coding statistics.

-----Insert Table 7 about here -----

## IV.8  Outcome variable data coding

Founders seeking funding from shark tank investors must pass through a series of five screening tollgates in a fashion consistent with the process followed by angel investors investment groups (Maxwell et al., 2011). Founders must first submit an extensive application which, if accepted, is followed-up with a telephone screen interview. In the third tollgate, founders must submit a 10-minute pitch video which is used to determine the contestants who will appear on the show. The first direct interaction between the shark investors and founders occurs at the fourth tollgate during the pitch presentation. Only five of the six shark investors participate on each show so the number of new ventures assessed in each case study will vary depending on their attendance. After the pitch presentation, investors may either decline to propose a funding offer or enter into a negotiation with the founder over terms and conditions. Often several investors may propose competing funding offers which are discussed

simultaneously with the founder who eventually selects the most desirable arrangement. Finally, investment offers are subject to due diligence before the funding is finalized[7].

Given the focus on the influence of founder signaling on investor decision-making, the outcome variable selected for the study was funding offers proposed by the investor after the in-person new venture pitch presentation. The pitch presentation is the first direct interaction between the investor and founder and thus the decision point along the funding process selected for this analysis. Whether or not an offer is accepted by the founder entails additional factors for consideration which were outside of the scope of this study. To identify all investor offers proposed to a founder, *Shark Tank* television episode recaps[8] were reviewed to identify each shark investor that made a new venture funding offer during that particular episode.

For each of the investors, an investment offer proposal to the founder was coded as "1", with a decline to submit a founding offer coded as "0". On average across all six investor case studies, offer frequency was 27%. However, offer frequency varied significantly between investors with investor #5 at a 6% offer rate and investor #6 at an offer rate of 38%. Refer to **Table 9** for case study results overview.

## IV.9  Indices condition data coding

Given the confidentiality restrictions in obtaining specific founder personal information, the founder's age was estimated based on their college graduation date or beginning year of work experience. For founders with a college undergraduate degree, their age was estimated using the date of their undergraduate college graduation plus 22 years. For founders that did not attend

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[7] Detailed *Shark Tank* new venture investment diligence procedures were sourced from https://allsharktankproducts.com/author/lois-crouse/).

[8] Shark tank television show result recaps were sourced from Shark Tank Recap - Products and Updates.

college or have a clear graduation date, their age was estimated using the start date of their first full-time work experience plus 18 years. It is acknowledged that this method may result in underestimating founder ages as many college graduates are older than 22 years and many people begin working later than age 18. However, calibration of the estimated founder age results in a comparative measure reflective of their relative differences. For new ventures with multiple founders, the estimated age of the oldest founder was used as the explanatory condition. Female founder gender was measured based upon the relative genders of the new venture founders. New ventures with only female founders were coded as "4" while those with only male founders coded as "1". For mixed gender new venture teams, those with a female CEO were coded as "3" and those with a male CEO coded as "2". Given age stereotypes, older founders were expected to adversely influence new venture funding offer configurations. In a similar fashion, female gender was also expected to adversely influence new venture funding as researchers have identified bias against women new venture founders seeking funding.

## IV.10 Informational signal condition data coding

For informational signaling, founder human capital quality and credibility were measured using the founder's education level, previous new venture experience, and endorsement as demonstrated by multiple funding offers. For education level signaling, founders with a doctorate degree were coded as a "4", those with a master's degree were coded as a "3", those with an undergraduate college degree coded as a "2", and those without a college degree coded as a "1". The highest degree earned by any of the founders was coded for the new venture. New ventures with any founder having previous new venture experience as a founder or C-suite executive was coded as a "1" with all others coded as a "0". Endorsement signaling was measured as the number of funding offers proposed to the new venture in addition to any offer from the

applicable case study investor. Human capital and endorsement signaling have been found to positively influence new venture funding so higher levels of founder education, competing investors, or the presence of founder previous new venture experience are expected to promote funding offers.

### IV.11 Interpersonal signal condition data coding

For interpersonal signaling, similarity of founder and investor professional experience and field of interest were investigated. Professional experience similarity was measured using two explanatory conditions of investor alignment with both the founder's previous professional work experience as well as the industry focus of their new venture. Professional work experience similarity was coded as a "1" if the investor's primary professional experience NAICS industry code matched the primary professional experience for any of the founders, and coded as "0" otherwise. Industry focus similarity was coded as a "1" if the investor's primary professional experience NAICS industry code matches the founder's new venture industry, and coded as a "0" otherwise. Field of interest similarity was also measured using two explanatory conditions of academic interest and technological interest. Academic field of study similarity was coded as "1" if any of the investor's academic majors match the academic major of any of the founders, and coded as a "0" otherwise. Technology field of interest similarity was coded as "1" if the investor had a technology business background and the new venture product or services are developed through proprietary scientific methods or information technology hardware or software development, and coded as "0" otherwise. Homophily suggests similarity between founders and investors will positively influence new venture funding offers. See **Table 8** for qualitative analysis measurement and coding.

-----Insert Table 8 about here -----

**IV.12 Calibration**

In order to employ fsQCA, outcome variables and explanatory conditions must be calibrated to form fuzzy-sets (Pappas & Woodside, 2021; Ragin, 2009). A fuzzy-set is a grouping of attributes with varying levels of membership ranging from non-membership (0) to full membership (1) (Ragin, 2000). Between non-membership and full membership are varying degrees of membership in the fuzzy-set with 0.5 reflecting the cross-over point between "more in" versus "more out." (Ragin, 2000). The assignment of set membership scores follows directly from the definition and labeling of the set (Ragin, 2009). Using the direct method of calibration as prescribed by Ragin (Rihoux & Ragin, 2008), the raw data values from the labeling interval scale are transformed to fuzzy-set interval scores using fully in (1), neither fully in nor fully out (.5), and fully out (0). These three benchmarks are then used to transform the raw interval scale data into fsQCA membership scores ranging between 0 and 1. The direct method for fsQCA is recommended and most commonly used by researchers when calibrating continuous data or for qualitative ordinal variables using Likert scale measurements (Pappas & Woodside, 2021). Also, categorical variables such as gender may be combined with other data values in the 0,1 range to form fuzzy-sets (Pappas & Woodside, 2021). Since the raw data used for the study will be a combination of continuous, ordinal, and categorical measurements, the direct method is used for calibration. Given the absence of predefined values for the three reference points, the 90th, 50th, and 10th percentiles are utilized for calibration. The data coding and calibration descriptive statistics are displayed in **Table 7**.

# V   RESULTS

The study utilizes fsQCA 4.0 Windows (Ragin and Davey, 2022) to perform the comparative analysis in the context of new venture funding. Grounded in configuration theory, fsQCA transforms raw data from ordinal, categorical, or interval scales into degrees of membership in the target set (Pappas & Woodside, 2021). The associated fuzzy-set membership score attaches a truth value rather than a probability for a particular configuration (Rihoux & Ragin, 2008). In order to reduce the combinations of configurations to the most important conditions which cannot be omitted from any solution, frequency, consistency, and coverage thresholds were established to simplify the results. Frequency describes how many cases in the sample are explained by a configuration (Rihoux & Ragin, 2008). Consistency, which ranges between 0 and 1, represents the extent in which a combination of causal attributes leads to an outcome (Rihoux & Ragin, 2008). Coverage describes the extent that the outcome variable is explained by the configurations (Pappas & Woodside, 2021). For fuzzy-sets, the proportional reduction in inconsistency (PRI) shall also be measured to avoid negation of configurations in both the outcome and absence of the outcome (Greckhamer et al., 2013). Since each of the six investor case studies include less than 50 new ventures, small-n criterium is followed when establishing thresholds for the QCA analysis  (Fiss, 2011; Greckhamer et al., 2013; Rihoux & Ragin, 2008). Following the process prescribed by Ragin (Fiss, 2011; Rihoux & Ragin, 2008), truth tables were constructed for each of the six investors to identify configurations of founder indices, informational signals, and interpersonal signals associated with new venture funding offers. See **Table 9** fsQCA model output.

<div align="center">-----Insert Table 9 about here -----</div>

Configurational results from the fsQCA model were used to construct configuration tables for each investor case study reflecting the combinations of explanatory conditions leading to the outcome variable of a new venture funding offer. Sufficiency analysis was performed using a consistency score that captures the degree to which a configuration is a subset of the outcome (Rihoux & Ragin, 2008). The intermediate solution was leveraged to specify "easy" counterfactuals while also utilizing the parsimonious solution to distinguish core from peripheral conditions (Ragin & Sonnett, 2005).[9] A core condition suggests a relatively strong connection with the outcome variable and is included in both the parsimonious and intermediate solutions, whereas periphery conditions are only within the intermediate solutions (Fiss, 2011). The distinction between core and peripheral conditions is made by using large and small circles, respectively. In the sufficiency analysis table, a large filled circle ("●") indicates the presence of a core condition and a small filled circle ("•") the presence of a peripheral condition. A large crossed-out circle ("⊗") denotes the absence of a core condition, and a small crossed-out circle ("⊗") denotes the absence of a peripheral condition. A blank indicates a "do not care" condition which is neither present or absent in the configuration leading to the outcome variable. For interpretation of sufficiency analysis results, the filled circles represent cases associated with high values ($> 0.50$) in a condition, whereas crossed-out circles represent cases associated with low values ($< 0.50$) in a condition. See **Table 10** for case study sufficiency analysis overview and **Table 11** for the case study configuration table sufficiency analysis.

-----Insert Tables 10 and 11 about here -----

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[9] Using the intermediate and parsimonious solutions helps distinguish "easy" and "difficult" counterfactuals, where "easy" counterfactuals refer to situations in which a redundant condition is added to a set of conditions that already led to the outcome and "difficult" counterfactuals where a condition is removed from a set of conditions on the assumption that this condition is redundant. The intermediate solution only simplifies assumptions based on "easy" counterfactuals (i.e., unobserved combinations with a solid theoretical basis), while parsimonious solutions include all simplifying assumptions (i.e., unobserved combinations) regardless of whether they are based on "easy" or "difficult."

Consistency and coverage measures are also displayed in the sufficiency analysis for both individual solutions as well as an overall measure for all of the configurations. Consistency measures the extent that the combination of explanatory conditions leads to new venture funding offer outcomes, both for each solution as well as overall for all solution configurations (Pappas & Woodside, 2021). Consistency gauges the degree of dependability of the relationship between the explanatory conditions within a configuration and the outcome variable of interest. The overall coverage describes the extent to which new venture funding offer outcomes may be explained by the configurations, and is comparable with the R-square reported on regression-based methods (Pappas & Woodside, 2021). Raw coverage represents how much of new venture funding offers are explained by the individual configuration and unique coverage reflects how much of that explanation is attributed solely by that particular configuration.

All of the case study fsQCA results met or exceeded the recommended overall minimum consistency levels of 0.75 (Rihoux & Ragin, 2008) and overall coverage exceeded 0.60 (Greckhamer, Furnari, Fiss, & Aguilera, 2018). An overview of the comparative analysis results is displayed in Table 10. These fsQCA fit measurements indicate that the configurations lead to investor offers over 75% of the time they are in place and account for at least 60% of the cases containing the combination of conditions which also exhibit a funding offer (the outcome variable). High levels of consistency and coverage provide evidence of predictive validity and empirical relevance of the associated explanatory condition configurations with receiving a funding offer. The discussion provides a more detailed assessment of these results.

## V.1   Interpretation of configurations

Analysis of the fsQCA results were used to developed several themes which may explain how signaling from a founder's age in conjunction with their informational and interpersonal

signaling may lead to a funding offer. The absence of founder age (younger founder) was a dominant explanatory condition which was noted as a factor in 65% (28 of 43) of the funding offer configurations. In contrast, founder age (older founder) was a core condition in 30% (13 of 43) of the configurations with the remaining 5% (2 of 43) having founder age as a non-factor. This overall result was not surprising given the literature surrounding the prevailing adverse investor views associated with older new venture founders. In contrast, gender indices related to female founders did not appear to be a distinguishing explanatory condition which was unexpected given previous research findings of significant disparity in new venture funding outcomes for women entrepreneurs. The female gender explanatory condition was present in 21% (9 of 43) of the successful funding offer configurations which was consistent with the overall case study population of 18% (7 of 38) women founders. A possible explanation may be that female founders were disproportionately screened-out during earlier diligence tollgates. These phenomena are outside the scope of this study and would require further research to gain greater clarity regarding participation levels of female founders.

In relation to founder age, female founder gender indices do not appear to have an influence on funding offers. Of the 9 female founder explanatory conditions present in successful funding offers, 33% (3) were bundled with older founders compared to 29% (10 of 34) for male founders. However, one unexpected finding was the prevalence of female founders bundled with education human capital as a necessary condition for receiving a funding offer. For female founders, the education explanatory condition was present in 44% (4 of 9) successful configurations compared to 26% (9 of 34) for male counterparts. One potential explanation is that female founders may have a higher hurdle to gain credibility from investors. Education, as well as other informational human capital signals may serve this purpose disproportionately aiding female founders relative

to males. Outside of the scope of this study, future research of this dynamic interaction between human capital and founder gender is needed to advance an understanding of this phenomena.

Drilling further into the successful funding outcome configurations, there were some signaling condition interdependencies which spanned across many case studies and notable differences uniquely associated with a particular investor. The first item of note was that regardless of age, founders that exhibited both informational and interpersonal signaling represented the majority (60%) of successful configurations which resulted in a funding offer. However, for the remaining combinations of successful signaling conditions, there is a greater proportion of configurations with younger founders (70%, or 7 of 10) that did not need informational signaling as a necessary condition relative to older founders (50%, or 3 of 6). In fact, for two configurations founder youth was the only necessary signaling condition with both informational and interpersonal conditions absent. This finding supports previous studies that indicate investors prefer younger new venture founders as they are easier to coach and mentor (Azoulay et al., 2020).

Another observation of these remaining signaling bundles is that half (3 of 6) of older founder configurations include endorsement signaling from having multiple funding offers. In contrast, just 30% (3 of 10) of similar configurations for younger founders included endorsement signaling. One explanation of this phenomena is that the endorsement signaling from competing investors may provide credibility to older founders and serve as a contingent condition offsetting the adverse influence of founder age. Although not incorporated within the configurational analysis as an explanatory condition, it is noted that in 75% (12 of 16) of these remaining configurations the founder and investor genders matched. In comparison, genders matched for 50% of the configurations which included both informational and interpersonal signaling.

Gender homophily configurational effects is another area in which further investigation may be conducted in a future study.

In aggregate, the findings suggests that older founders may have a higher investor offer threshold to overcome relative to younger founders. Although there were similarities of signaling interaction across different investors, there were also some notable differences to consider. For investors #3 and #5, homophily conditions from interpersonal signaling were prominently observable in their successful offer configurations. Conversely, investors #1 and #6 were more focused on informational signaling conditions. Lastly, investors #2 and #4 appeared to have a more balanced approach largely incorporating both informational and interpersonal signaling conditions in their decision-making process. It is acknowledged that other signaling attributes not incorporated within the scope the study could impact these findings. However, differences amongst the six case studies suggest that each investor has a unique perspective when evaluating funding opportunities. Therefore, signaling effectiveness will vary not only due to founder attribute signaling but also from investor characteristics which affect how these signals are interpreted.

Investors tend to use heuristics to make holistic decisions of which new ventures to support by considering numerous signals simultaneously (Huang, 2018). Researchers have used cognitive theories to explain how investors interpret various combinations of different signals (Drover et al., 2018). Consistent with this body of research, the findings indicate an inherent limitation in utilizing individual signals in isolation without consideration of the bundled signaling effect of multiple conditions. Additionally, the corresponding investor characteristics which may impact the investor's interpretation must also be considered. The proposed Signaling

Configurational Framework integrates signaling theory and configurational conjunction and equifinality concepts to capture the dynamic complexity of signaling relationship phenomena.

Configuration typologies were developed to evoke the essence of the signaling themes resulting from this study in accordance with the Configurational Theorizing Process in **Figure 2** (Furnari et al., 2021). Configuration typology characteristics are included in **Table 12** with the distribution of configuration typologies displayed in **Table 13**.

-----Insert Tables 12 and 13 about here -----

## V.2  Signaling configuration typologies

"Phenom" configurations comprise 28% of successful funding offers. The highest frequency typology consists of 12 configurations where younger founders exhibit both informational and interpersonal signaling to investors. Younger founders are perceived as more adept at starting a new venture (Kibler et al., 2015) as well as open to coaching and mentoring (Azoulay et al., 2020). Perceived coachability has been associated with a willingness for investors to fund a new venture (Ciuchta et al., 2018). Investors also tend to favor founders with similar training or experience (Franke et al., 2006). As a result, the phenom configuration of founder youth bundled with both informational and interpersonal signaling was unsurprisingly the most prevalent combination of conditions for successful funding outcomes. Phenoms entertain multiple offers and benefit from the credibility signaling generated by investor competition.

Case 2 is representative of a typical phenom configuration with a 21-year-old male recent graduate who was seeking funding to grow the new venture he started in college. His company marketed a unique liquid cleaning spray product which utilized nanotechnology to keep items protected for up to a year. At the young age of 21, the founder for case 2 already started two new ventures and was well on his way to becoming a career entrepreneur. Another example is case

17, a food and beverage new venture founded by a 31-year-old male with a master degree and previous new venture experience starting up another health brand company. Like most of the phenoms, cases 2 and 17 received multiple offers from investors. Case 18, includes one of the few female founders. At age 31 with a doctorate degree, she started a company producing solar cooking grills. Although not in the scope of this study, it is worth noting that all 5 of the phenom male founders received multiple offers from investors whilst the 2 female phenoms only received one funding offer.

   "Sure bet" configurations followed phenoms with 21% of successful funding offers. Similar to phenoms, sure bets exhibit both informational and interpersonal signaling but include older new venture founders. A sure bet differs from the other configurations which are influenced by the presence or absence effect of founder age. This result is reasonable given that the sharks are all successful investors that have learned through experience which founders afford the highest chance of success. This feedback loop as described in signaling theory (Spence, 1973), reinforces the investor's view of the signaling relationship which is modified by experience. The feedback mechanism allows investors to recalibrate the relevance of signals based on performance of their previous investments (Spence, 1973). The strong informational and interpersonal signaling from founder human capital or similarity with investors serve to offset founder age influences on funding offers. As a result, phenoms and sure bets comprise about half (49%) of the successful funding offers.

   Case 4 is a hair products consumer brand new venture founded by a 36-year-old man with previous new venture experience. The previous new venture experience combined with similar educational and business background matching resulted in offers from investor #2 and #6. Case 31 involved the oldest founder in the study, a 66-year-old male who founded a men's self-

grooming supplies new venture with his 30-year-old son. The pair of founders had combined similarity with investor fields of interest which augmented their educational background as well as endorsement signaling from receiving multiple funding offers from investors #2, #3, and #4. Although not in the scope of this study, it is noted that all of the sure bet configuration involved male founders and no females. Further investigation is needed to fully understand this observation the context of new venture funding.

"Apprentice" configurations also represented the second highest frequency comprising 21% of total funding offers. This configuration type encompasses young inexperienced founders that share professional experience or fields of interest with the investor. Founder youth signaling functions in combination with interpersonal signaling to serve as a substitute for their limited experience. The apprentice configuration was observed in all of the six investor case studies indicating a preferred typology across varying investors. In addition to contributing funding, early-stage investors also provide business expertise and networking connections which can accelerate new venture growth and increase their return on capital (Cooper et al., 1994). In this context, it is not surprising that investors would take a calculated risk on founders with aligned interests despite their inexperience. While a founder's youth serves as a substitute for informational signaling, similar older founders need additional contingent conditions before receiving a funding offer. Contingency conditions for older founders are described in greater detail within the "certified professional" typology.

Case 12 epitomizes the apprentice category as a fitness consumer brand product new venture started by a 23-year-old male founder who just graduated from college. Despite limited industry experience and no previous new venture experience, the founder and investor shared similar educational backgrounds majoring in business at universities in the Midwest as well as sharing

work experience in the technology sector. In another example, case 35 involved a 35-year-old female founder of a fermented tea new venture who shared having an undergraduate degree in education with the investor (#1) who submitted a funding offer.

"Certified professional" configurations comprise 12% of the funding offers. Certified professionals encompass both younger and older founders that exhibit informational signaling but lack similarity with an investor through interpersonal signaling. One item of note is a contingency relationship between endorsement and human signaling for older founders which was not observed with younger counterparts. Specifically, certified professional configurations for older founder include a necessary endorsement signaling condition. In contrast, configurations for younger founders only encompass human capital signaling from education or experience attributes. Endorsements signaling founder legitimacy have been substantiated to increase the prospects of receiving funding (Plummer et al., 2016). However, the importance of endorsements for older founders relative to younger competitors has not been explored.

An example of a certified professional new venture is case 38 founded by two male entrepreneurs ages 38 and 36. Case 38 founders developed a stainless-steel insulator product for consumers to use to keep liquor drinks properly chilled. The founders have solid educational backgrounds with one having an engineering bachelor's degree and the other with an MBA. Their new venture was also operational for five years and ready for expansion which was also an appealing factor for the investors. However, like the other older founders for certified professional new ventures, interest from multiple investors is a necessary condition for a funding offer. In contrast, Case 13 involves a specialty soda new venture founded by a male team of 29-year-old with a master's degree and a 27-year-old partner with no degree but previous new

venture experience. Unlike the certified professionals with older founders, only one offer from investor #4 was needed to secure funding.

"Long Shot" configurations, which are distinguished as having no informational or interpersonal signaling, comprise 9% of total funding offers. Long shots demonstrate the most extreme examples of founder age influence with 75% (3 of 4) of the configurations having a core absence of age (younger founder) condition. Long shots are concentrated with investors #4 and #6 which may have greater risk appetite than the other sharks. For instance, case 5 entails a 30-year-old male founder of an undergarment new venture which did not have any observable interpersonal similarity signaling or with investor #6. In a similar fashion, case 27 involves a 30-year-old male founder of a pet product new venture that received an offer from investor #4 despite having no informational or interpersonal signaling conditions. These investors may have considered other investment decision conditions not included within the scope of this study. However, the frequency of long shots indicates that founder youth may, in some cases, have a dominating effect on the combined signaling impact on new venture funding.

"Sponsor" configurations comprise the remaining 7% of total funding offers representing older founders having strong interpersonal similarity with the investor. Similar to apprentices, sponsors lack informational signaling but are much less frequent. Sponsors are concentrated within two case studies for investor #3 and #4 suggesting that this configuration type may be more appealing to investors with a broader interest in mentorship. This finding is consistent with studies which determined that angel investors assign different values to founder signals depending on their interest in mentoring (Mitteness et al., 2012). For instance, case 22 entails a 39-year-old female founder of a fashion beauty new venture. The founder has no college degree or previous new venture experience but aligned with investor #3's field of interest and fashion

industry professional experience. Refer to **Table 14** for case descriptions of configuration typology.

-----Insert Table 14 about here -----

### V.3   Signaling configuration propositions

Based on the findings, several propositions are proposed to explain the equifinality of funding offer outcomes demonstrated by the signaling configuration typology.

*Proposition 1*: *The influence of founder age on early-stage new venture funding is interdependent on both informational and interpersonal signaling.*

Consistent with other studies which have identified causal complexity of signaling relationships (Edelman et al., 2021), the findings support interdependence of founder age with other signaling phenomena. For phenom and sure bet configurations, which comprise 49% of the successful funding offers, the presence of both informational and interpersonal signaling negated the influence of founder age. In these instances, investors were attracted to founders that signaled strong capabilities through informational signaling as well as the likelihood of personal compatibility with the investor through interpersonal signaling, regardless of age. However, in the absence of having both informational and interpersonal signaling, other patterns emerge which generally favor younger founders leading to propositions 3 and 4. The interdependence of signals may help explain the ambiguous results from previous founder age research in the context of new venture funding. Without considering a holistic approach which captures the causal complexity of signaling phenomena, misleading or incomplete research conclusions may arise. This study adds clarity that founder age does not simply have a linear impact on new venture funding but rather works in conjunction with other conditions to form a "causal recipe" which influences an outcome.

*Proposition 2*: *Founder youth serves as a substitute for informational and interpersonal signaling.*

*Proposition 3: Endorsement signaling serves as a contingent condition for older founders which lack interpersonal signaling.*

Configurations characterized by young founders lacking strong new venture capabilities as indicated by informational signaling encompass 30% of the successful funding offers. These configurations, apprentices and long shots, highlight a substitutive quality that youth may have to augment otherwise inexperienced founders. In the context of new venture funding, investors seek to add value through active involvement by providing guidance and sharing access to their business network (Ciuchta et al., 2018; Huang & Knight, 2017). The results indicate that investors favor mentoring young unproven founders (apprentices and long shots) more readily than older counterparts (sponsors).

In contrast to apprentice and sure bet configurations, older founders which lacked interpersonal signaling were contingent on the presence of endorsement signaling in order to receive a funding offer. This contingency relationship is not observed with younger founders. Receiving a financing offer from a prominent third party investor signals credibility for the founder which improves the likelihood of receiving funding from other investors (Plummer et al., 2016). This study furthers previous findings of endorsement signaling noting a contingency relationship with founder age.

Qualitative studies echo propositions 2 and 3 to the extent that investors have articulated that they prefer younger new venture founders (Ainsworth & Hardy, 2008; Kibler et al., 2015). However, as noted in proposition 1, it is important to migrate away from a siloed view of the

influence of founder age on new venture funding to a more holistic approach which encompasses the interdependencies of relevant conditions.

*Proposition 4*: *Signaling influence effectiveness varies between investors.*

Proposition 4 supports previous research findings that investors may interpret signals differently resulting in varying levels of signal effectiveness (Drover et al., 2018; Huang, 2018). Although there were similarities noted across all 6 investor studies, there was also notable differences of signaling configuration type preferences amongst investors. Some investors gravitated toward informational signaling while others were more focused on interpersonal signaling. As noted in the limitations section, investor variability could be due to other factors not considered for this study. Notwithstanding limitations, this finding reinforces that signaling effectiveness is a two-way street depending on both the founder signaling as well as investor interpretation.

These propositions are elaborated upon in the discussion section in relation to contributions for entrepreneurship literature and signaling theory.

# VI  DISCUSSION

This study explores the role of a founder's age in obtaining funding offers based upon an investor's interpretation of individual and interpersonal signaling. A configurational method is used to identify the combinations of signals anchored around a founder's age that result in an investor funding offer. The literature is limited in both theoretical constructs and empirical studies investigating the influence of founder age on new venture funding activities. Unlike previous studies which investigated the significance of individual signals in isolation, this study finds that there are different combinations of conditions that influence investor funding offers for early-stage new ventures supporting the concept of equifinality. It is asserted that the influence of founder age on new venture funding is interdependent on informational and interpersonal signaling conditions. Using fuzzy-set qualitative comparative analysis and a unique dataset of early-stage new ventures seeking funding, the paper identifies a typology of six equifinal configurations associated with successful funding offers. Based on signaling patterns identified from the configurational analysis within the context of existing research, several implications for signaling theory and entrepreneurial literature are submitted as contributions.

## VI.1  Extension of Signaling Theory

Existing research regarding how founder age drives new venture funding remains ambiguous as the research is limited with mixed conclusions. Although scholars in a handful of studies have identified founder age as a factor detrimental for older new venture founders (Azoulay et al., 2020; Kibler et al., 2015), the conditions and impact founder age has on new venture funding is largely unexplored. Leveraging signaling theory with a configurational perspective, the study provides an in-depth understanding of the conditions in which a founder's age influences new venture funding offer outcomes. The study finds a causal interdependence of signaling

phenomena which include signaling configurations where founder age is not an important condition (phenoms and sure bets) as well as when founder youth is substitutive (apprentices and long shots) or founder age is contingent on other signaling conditions (certified professionals).

The study expands upon signaling theory and entrepreneurial literature by incorporating a configurational perspective in the context of early-stage new venture funding. Signaling theory provides a useful framework for understanding why certain founders are more successful than others in obtaining early-stage new venture funding. However, researchers have mainly focused on identifying the empirical magnitude of signaling effects largely ignoring the causal influences which occur when signals are bundled together (Svetek, 2022). Investors are always exposed to multiple signals when evaluating a new venture and tend to make holistic evaluations rather than considering signals one by one (Huang, 2018). More recently, signaling configurations were explored to examine how new ventures communicate firm quality as they progress through various stages of investor diligence tollgates (Edelman et al., 2021). This study expands upon this work by providing an in-depth understanding of how signaling configurations consisting of founder indices combined with informational and interpersonal signaling influence investor funding decision-making. The departure from traditional methods was critical as it reinforces the causal interdependencies of founder age with key signaling phenomena otherwise not readily apparent. The paper sheds light on how founder age influences new venture funding and takes an important step forward in determining mitigation strategies to help key stakeholders (founders, investors, policymakers) equalize the entrepreneurial finance playing field.

## VI.2  Typology of signaling conditions

The paper elaborates on the findings to develop a typology of successful signaling configurations which advance the understanding of the complex role of founder age in new

venture funding offer outcomes. In particular, the combined presence of both informational and interpersonal signaling conditions result in successful funding offer outcomes regardless of founder age. In these instances (phenoms and sure bets), the influence of founder age was effectively negated by the overall strength of signals indicating an attractive funding opportunity for the investor. Further, founder youth complimented interpersonal signaling serving as a substitute for the lack of human capital attributes. Investors favor mentoring young unproven founders (apprentices and long shots) more readily than older counterparts (sponsors). The findings also indicate a contingent dependency of endorsement signaling for older new venture founders (certified professionals).

In aggregate, the findings suggests that older founders may have a higher threshold to overcome in order to receive a funding offer relative to younger counterparts. One explanation is that investor expectations are elevated for older founders as they have had more time to develop capabilities. If so, older founders transitioning from traditional careers may need to enhance signaling effectiveness by demonstrating how their professional experience translates to new venture capabilities. Further, obtaining funding from an initial independent investor before embarking on a broad fundraising effort may be a higher priority for older founders. Investors should also consider enhancing their diligence process to minimize inherently age biased criteria which may inadvertently reject otherwise profitable funding opportunities.

## VI.3  New Signaling Configuration Framework

A final contribution is the new signaling configuration framework. The framework integrates signaling theory and configurational concepts to capture the causal complexity of signaling phenomena emphasizing the features of conjunction, equifinality, and asymmetry. Researchers have determined that signals transmitted during new venture funding diligence can be

complimentary, contradicting, or moderated by the presence or absence of other signals (Brush et al., 2018; Edelman et al., 2021). To capture the causal complexity inherent in signaling relationships, a new framework was developed for researchers to leverage when investigating new venture funding phenomena. Empirical findings from the study demonstrated the utility of the new framework. The framework enhances our understanding with a holistic perspective of the signaling impact on new venture funding by combining the causal interaction of indices, informational, and interpersonal signaling.

The paper posits that there is an interdependence between founder indices, informational, and interpersonal signaling which, if not consider, may lead to incomplete or misleading conclusions. In addition to advancing our understanding of the signaling influence of founder age, the framework may also be utilized to investigate other types of investor biases associated with gender or race. This study provides a more comprehensive theoretical framework to accommodate the various signals delivered at the founder-level and the founder-investor level as it is imperative that researchers place a stronger emphasis on exploring the dynamic complexities inherent in signaling relationships in future studies.

## VII LIMITATIONS AND CONCLUSION

The study is not without limitations. First, the dataset population derived from *Shark Tank* contestants was skewed toward consumer-oriented new ventures which coupled with a small sample size may limit the generalizability of our findings. However, fsQCA is designed for small samples and although each case study analyzes a single investor view, it is suggested that the variability of signaling attributes for the six investors provides a broad representation of the new venture funding competitive environment. Given the prevailing view that older founders are less capable of grasping and implementing new technologies (Azoulay et al., 2020), it is expected

that the relative overabundance of non-technology companies in the sample may have a tempering effect on age bias findings. Future research is encouraged to investigate how signaling from new venture attributes such as product technical complexity interact with individual and interpersonal signals to influence new venture funding.

Second, although careful consideration was taken in selection of the signaling factors used in the comparative analysis, there may be other relevant conditions which were not captured. FsQCA is not prone to omitted variable bias (Fainshmidt et al., 2020), but the absence of such conditions in the model might limit the solution coverage. For instance, other signaling attributes such as founder race or new venture industry may also have a causal relationship with founder age. Additionally, unobserved factors can also affect investor funding offer decision-making, such as their risk appetite, current funding capacity, and existing investments in overlapping or conflicting businesses. Future studies can expand upon this theory by including additional founder and new venture level conditions, as well as complement the analysis with investor contextual considerations to build upon evidence of signaling causal relationships.

Finally, it is acknowledged that the study does not incorporate the temporal dynamics of signaling effectiveness as the study was conducted at a specific point-in-time of the new venture funding process. Effective signaling configurations change during the investment decision-making process (Edelman et al., 2021) as investors use different cognitive processing depending on the stage of the investment process (Drover et al., 2018). Although the findings provide insight into a critical phase of new venture funding when a funding offer is proposed, future studies should investigate ex ante investment screening processes which are often performed by junior analysts prior to investor engagement to identify potential systematic bias patterns. Studies

focused on ex post diligence would also expand our understanding of if founder age influence wanes as investors accumulate factual data.

Despite these limitations, the study expands the body of literature encompassing founder age in the context of new venture funding and advances signaling theory using a configurational lens. It also contributes a new framework for future researchers to leverage when unpacking the complexity of signaling relationships. The hope is that others will utilize a configurational approach to investigate other aspects of signaling influences on new venture investor decision-making.

**APPENDICES**

**Appendix A: Figures**

**Figure 1: Signaling Theory in the Context of New Venture Funding Offers**
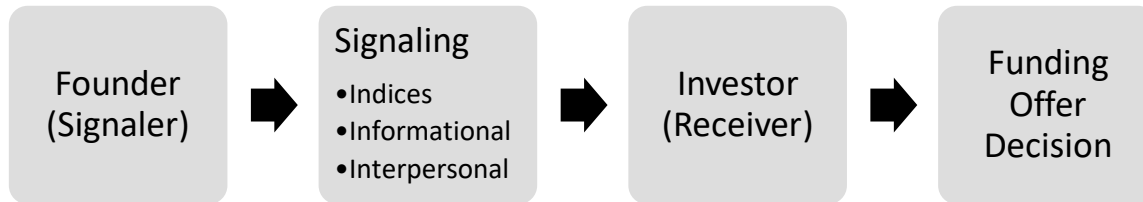


- **Indices Signals:** Unalterable characteristics that may influence investor expectations resulting in different outcomes for founders (Spence, 1973)
- **Informational Signals:** Provide insight into a founder's new venture capabilities (Huang & Knight, 2017)
- **Interpersonal Signals:** Provide insight into how founder and investor may interact (Huang & Knight, 2017)

**Figure 2: Configuration Theorizing Process**
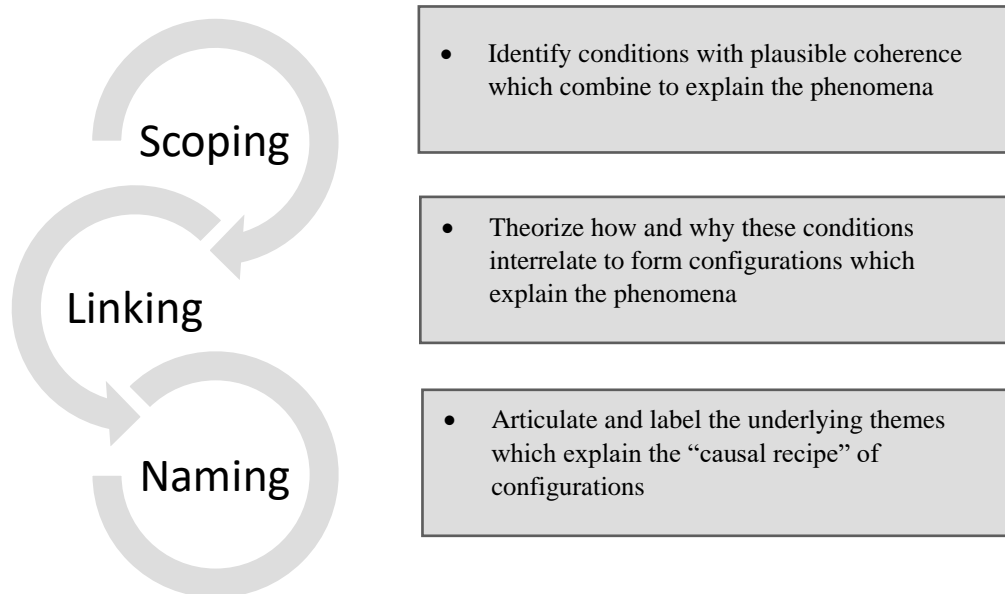
**Figure 3: Signaling Configuration Framework**
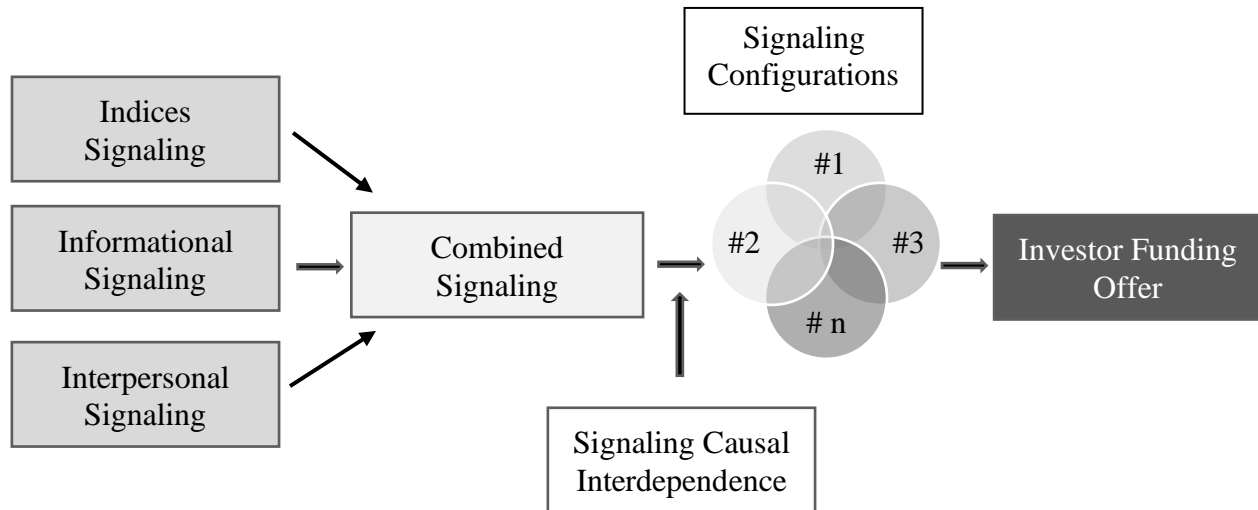


**Figure 4: Signaling Configuration Framework: Theoretical Foundation**
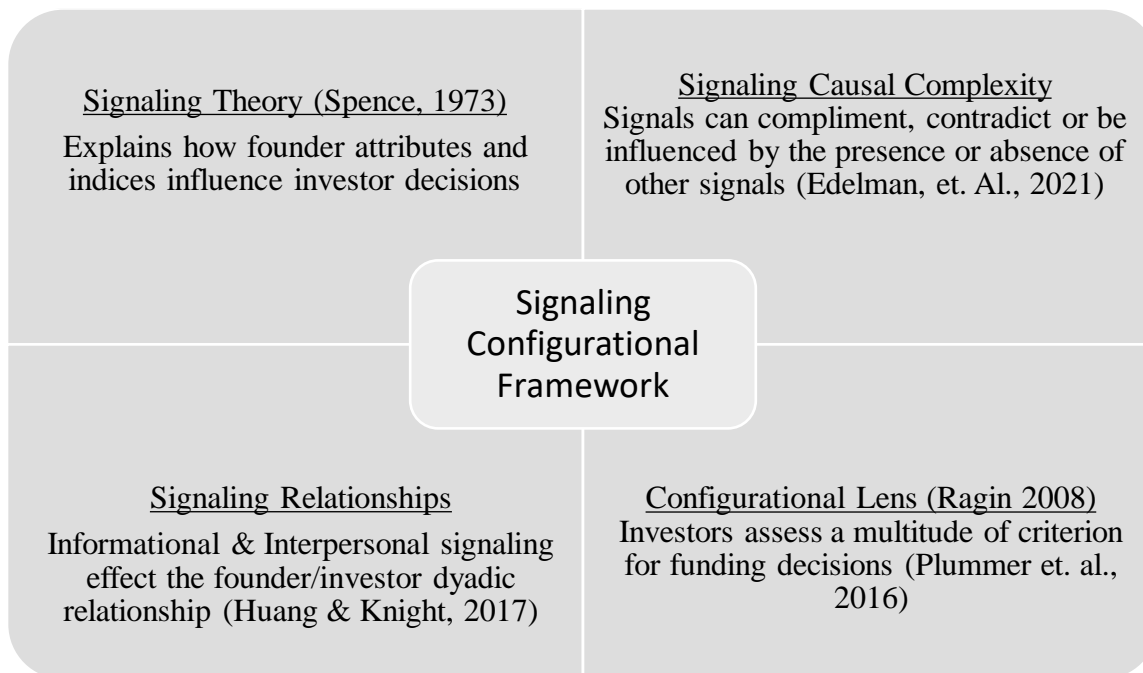
**Appendix B: Tables**

**Table 1: Literature Review Coverage**

| Journal Quality | 100+ Citings | < 10 Years (since 2012) | Total Articles |
|---|---|---|---|
| **UT 24 Journals** | 65% (22) | 68% (23) | 34 |
| **Leading Entreprenerial Journals** | 68% (44) | 71% (46) | 65 |
| **FT Top 50 Journals** | 100% (10) | 40% (4) | 10 |
| **Other Journals** | 80% (16) | 40% (8) | 20 |
| **Total Literature Review Coverage** | **71% (92)** | **63% (81)** | **129** |

**Table 2: Literature Synthesis Themes**

| Theme | Findings | Key Literature |
|---|---|---|
| **Early-stage funding is critical for new venture success:** **New venture funding has been studied extensively** | Securing funding to support R&D and business growth is an important determinant for new venture success | (Cooper et al., 1994; Ko & McKelvie, 2018; Shepherd, 1999; Wright Robbie, 1998) |
| | With limited performance data during the early-stage, founder "quality" is used as a proxy to assess a new venture | (Hall & Hofer, 1993; Kaplan et al., 2009; MacMillan et al., 2022; Plummer et al., 2016; Tyebjee & Bruno, 1984) |
| | Investors rely on subjective attributes to evaluate founder quality leading to inconsistent and biased assessments | (Busenitz et al., 2005; Ferrary & Granovetter, 2009; MacMillan et al., 2022; Maxwell et al., 2011) |
| **Signaling Theory: Explains how information conveyed by a founder can influence an investor's perception of the new venture's quality** | Signaling Theory (Spence, 1973) has been used by researchers to explain how founder indices, informational, and interpersonal signaling influence new venture funding | (Colombo, 2021; Connelly et al., 2011; Spence, 1978; Svetek, 2022; Taj, 2016) |

| | During the early-stage, investors rely more heavily on observable founder quality signals | (Ciuchta et al., 2018; Ko & McKelvie, 2018; Mitteness et al., 2012) |
|---|---|---|
| **Indices:** **Unalterable founder characteristics that influence investor expectations resulting in different outcomes for otherwise equivalent new ventures (Spence, 1973)** | Female founder signaling may be interpreted differently than male counterparts | (Gry Agnete Alsos & Elisabet Ljunggren, 2017; Brush et al., 2018; Guzman & Kacperczyk, 2019; Kanze et al., 2018) |
| **Informational Signaling:** **Signals that provide insight into the quality of the founder or new venture (Huang & Knight, 2017)** | Informational Signals (including founder human capital) is an important signal which impacts new venture funding | (Bernstein et al., 2017; Croce et al., 2017; Huang & Knight, 2017; Kaplan et al., 2009; Ko & McKelvie, 2018; MacMillan et al., 2022; Mitteness et al., 2012) |
| | Funding from prominent investors signals credibility of the founder and new venture | (Gry Agnete Alsos & Elisabet Ljunggren, 2017; Hsu, 2004; Ko & McKelvie, 2018) |
| **Interpersonal Signaling:** **Signals that provide insight into how the founder may interact with the investor (Huang & Knight, 2017)** | Investors prefer entrepreneurs with similar characteristics | (Ebbers & Wijnberg, 2012; Franke et al., 2006; Murnieks et al., 2011) |
| | Signals that are congruent with investor (receiver) views are more effective | (Ciuchta et al., 2018; Warnick et al., 2018; Yang et al., 2020) |
| **Signaling relationships have complex causal influences:** **Configurational comparative methods (Ragin, 1987; Rihoux & Ragin, 2008) are well suited to capture the** | Investors do not simply make decisions based on a single factor, but rather assess a multitude of criterion simultaneously | (Edelman et al., 2021; Huang & Knight, 2017; MacMillan et al., 2022) |

| inherent dynamic complexity associated with new venture funding signaling | | |
|---|---|---|
| | Signals can be complimentary, contradictory, or may be influences by the presence or absence of other factors | (Courtney et al., 2017; Drover et al., 2018; Plummer et al., 2016; Steigenberger & Wilhelm, 2018) |
| **Founder age influence on new venture funding is ambiguous: Mixed findings of the role that founder age plays in new venture funding** | Older founders are considered less capable of starting a new venture | (Ainsworth & Hardy, 2008; Azoulay et al., 2020; Gielnik et al., 2018; Kibler et al., 2015) |
| | Founder age has a weak, positive linear relationship with overall new venture success | (Zhao et al., 2021) |

**Table 3: Linking of Explanatory Conditions, Selected Articles**

| Condition | Author, Year | Theory | Method | Findings |
|---|---|---|---|---|
| Indices: Founder Age | (Kibler et al., 2015) | Social Exclusion Theories | Qualitative Case Study (22 interviews) | The relationship between age and entrepreneurship is subject to social influences; which affects older founders who do not fit withing the youthful image of a successful entrepreneur |
| | (Ainsworth & Hardy, 2008) | Enterprise Ideal Identity Theories | Qualitative Case Study (Australian Parliamentary Inquiry) | Older unemployed workers were viewed as unattractive and incapable of starting a business as compared to younger unemployed workers |
| | (Azoulay et al., 2020) | Entrepreneurship Theories | Quantitative Study (Administrative data at the U.S. | Mean founder age for the fastest growing new ventures is 45, similar when considering high |

| | | | | technology sectors. Contradicts prevailing view that emphasizes youth for successful founders. |
|---|---|---|---|---|
| | | | Census Bureau) | |
| Indices: Female Founders | (Alsos et al., 2017) | Signaling Theory | Qualitative Case Study | Female founders must communicate their credibility more strongly to overcome investor signaling interpretation gender bias |
| | (Brush et al., 2018) | Venture Capital Funding Conceptual Framework | Quantitative longitudinal study (6,793 companies from 2011-2013) | A significant gender gap remains between men and women entrepreneurs seeking VC funding |
| | (Kanze et al., 2018) | Regulatory Focus Theory | Qualitative Study of investor pitch competition presentations (189 companies) | Investors tend to ask female entrepreneurs more risk prevention-oriented questions which hinders their ability to raise capital |
| | (Yang et al., 2020) | Signaling Theory & Congruity Theory | Quantitative Study (2,324 new ventures) | Signaling influence is strongest when congruent with stereotypes associated with founder gender |
| Informational Signaling: Human Capital & Endorsement | (Ko & McKelvie, 2018) | Signaling Theory | Quantitative Study (235 companies sourced from Crunchbase augmented with data from LinkedIn) | Founders' human capital (education & founding experience) are important signals which impact the amount of venture capital first round funding. Financial commitments from other prominent investors are an influential factor serving as a certification which increases the new venture's credibility |
| | (Huang & Knight, 2017) | Exchange Theory | Conceptual | Two main types of signals: Informational & Interpersonal Signaling |

| | (Alsos et al., 2017) | Signaling Theory | Qualitative Case Study | Even an assertion by founders of expressed interest from other investors provided a credibility for the new venture founders which increased the likelihood of investor funding |
|---|---|---|---|---|
| | (Hsu, 2004) | Signaling Theory | Quantitative Study (Surveyed 149 start-up companies) | Endorsement of a new venture by prominent investors through a financial commitment are a strong signal to investors indicating credibility of the new venture |
| | (Matusik et al., 2008) | Judgement decision-making theories | Quantitative Study (Surveyed 66 venture capital firms) | Human capital signals (Founder education, Start-up experience and industry experience) help persuade investors |
| | (Bernstein et al., 2017) | Theory of the firm | Experiment using randomized set samples of 8,189 investor emails | Team human capital attributes are important to investors |
| | (Cooper et al., 1994) | Empirical findings from prevailing entrepreneurial research | Quantitative Longitudinal Study (1,053 new ventures surveyed) | Human capital (education & level of management experience) influenced both survival and growth of a new venture |
| | (MacMillan et al., 2022) | Empirical findings from prevailing entrepreneurial research | Quantitative Cluster Analysis (Survey 150 new ventures and 67 venture capital firms) | Identified broad classes of both successful and unsuccessful new venture clusters with each of the success classes having a look-alike failure class which is similar except for a flaw in the venture team |
| | (Busenitz et al., 2005) | Signaling Theory | Quantitative Study (surveyed 183 new ventures) | New venture team personal capital investments signal value and management's commitment to investors |

| | (Croce et al., 2017) | Empirical findings from prevailing entrepreneurial research | Quantitative Study (1,942 new ventures from an AI dataset, CrunchBase and LinkedIn) | New venture proposals are rejected at the screening phase more often for reasons related to the characteristics of the entrepreneur and management team and less often for the lack of business innovativeness |
|---|---|---|---|---|
| | (Maxwell et al., 2011) | Compensatory decision-making heuristics | Quantitative Study (150 AI/New venture interactions from CBC Dragon's Den TV show) | Investors use shortcut decision making heuristic (elimination-by-aspects) to reduce the available investment opportunities to a more manageable size rejecting an opportunity in the phase if it is diagnosed with a fatal flaw |
| Interpersonal Signaling: Profession Experience & Field of Interest | (Murnieks et al., 2011) | Homophily | Conjoint analysis (60 venture capital firms) | Investors favor investment opportunities from founders with similar decision-making styles |
| | (Ciuchta et al., 2018) | Signaling & Social Exchange Theories | Experiment (Evaluated 69 Shark Tank TV show clips) | Founder coachability is directly associated with investor funding willingness; which is moderated by the investor's coaching experience |
| | (Mitteness et al., 2012) | Affected Reactivity Theory | Quantitative Study (168 angel investment group applicants) | Perceived passion increases the chances of NVF, and the relationship is stronger for AIs who have a high openness personality or are motivated to mentor |
| | (Franke et al., 2006) | Homophily | Conjoint Analysis (51 venture capital firms) | Investors tend to favor new venture teams have similar training and professional experience |
| | (Drover et al., 2018) | Signaling & Cognitive Decision-Making Theories | Conceptual | Heuristic-Systematic Model: signal congruence and valence are important for decision-making; |

| | | | | incongruence increases the likelihood of individuals abandoning cognitive processing |
|---|---|---|---|---|
| | | | | |

**Table 4: Kaggle Dataset Field Descriptions**

1. Season Number - Season number

2. Season Start - Season first aired date

3. Season End - Season last aired date

4. Episode Number - Episode number within the season

5. Pitch Number - Overall pitch number

6. Original Air Date - Episode original/first aired date

7. Startup Name - Startup company name

8. Industry - Industry name or type

9. Business Description - Business Description

10. Pitchers Gender - Gender of pitchers

11. Pitchers City - US city of pitchers

12. Pitchers State - US state or country of pitchers, two letter shortcut

13. Pitchers Average Age - Average age of all pitchers, <30 young, 30-50 middle, >50 old

14. Entrepreneur Names - Pitcher name

15. Company Website - Website of startup/company

16. Multiple Entrepreneurs - Multiple entrepreneurs are present 1-yes, 0-no

17. US Viewership - Viewership in US, TRP rating, in millions

18. Original Ask Amount - Original Ask Amount, in USD

19. Original Offered Equity - Original Offered Equity, in percentages

20. Valuation Requested - Valuation Requested, in USD

21. Got Deal - Got the deal or not, 1-yes, 0-no

22. Total Deal Amount - Total Deal Amount, in USD

23. Total Deal Equity - Total Deal Equity, in percentages

24. Deal Valuation - Deal Valuation, in USD

25. Number of sharks in deal - Number of sharks in deal

26. Investment Amount Per Shark - Investment Amount Per Shark

27. Equity Per Shark - Equity received by each Shark

28. Royalty Deal - Is it royalty deal or deal with advisory shares

29. Loan - Loan/debt (line of credit) amount given by sharks, in USD

30. Barbara Corcoran Investment Amount - Amount Invested by Barbara Corcoran

31. Barbara Corcoran Investment Equity - Equity received by Barbara Corcoran

32. Mark Cuban Investment Amount - Amount Invested by Mark Cuban

33. Mark Cuban Investment Equity - Equity received by Mark Cuban

34. Lori Greiner Investment Amount - Amount Invested by Lori Greiner

35. Lori Greiner Investment Equity - Equity received by Lori Greiner

36. Robert Herjavec Investment Amount - Amount Invested by Robert Herjavec

37. Robert Herjavec Investment Equity - Equity received by Robert Herjavec

38. Daymond John Investment Amount - Amount Invested by Daymond John

39. Daymond John Investment Equity - Equity received by Daymond John

40. Kevin O Leary Investment Amount - Amount Invested by Kevin O'Leary

41. Kevin O Leary Investment Equity - Equity received by Kevin O'Leary

42. Guest Investment Amount - Amount Invested by Guests

43. Guest Investment Equity - Equity received by Guests

44. Guest Name - Name of Guest shark

45. Barbara Corcoran Present - Whether Barbara Corcoran present in episode or not

46. Mark Cuban Present - Whether Mark Cuban present in episode or not

47. Lori Greiner Present - Whether Lori Greiner present in episode or not

48. Robert Herjavec Present - Whether Robert Herjavec present in episode or not

49. Daymond John Present - Whether Daymond John present in episode or not

**50.** Kevin O Leary Present - Whether Kevin O Leary present in episode or not

**Table 5: Newly Constructed Dataset Sources**

| Data Field | Source: Kaggle | Source: LinkedIn | Source: Crunchbase | Wikipedia | Derived Estimate |
|---|---|---|---|---|---|
| Air Date | X | | | | |
| Startup Name | X | | X | | |
| New Venture Industry | X | | | | NAICS Code |
| Founder Gender | X | | | | |
| Funding Outcome | X | | | | |
| Shark Investor(s) | X | | | | |
| Founder Name | X | X | X | | |
| Founder Education (Year) | | X | X | | |
| Founder Education (Degree) | | X | X | | |
| Shark Education (Year) | | | | X | |
| Shark Education (Degree) | | | | X | |
| Founder Industry Experience (Years) | | X | X | | |
| Founder Industry Experience (Type) | | X | X | | NAICS Code |
| Investor Industry Experience (Type) | | | | X | NAICS Code |
| Investor Age | | | | X | |
| Founder Age | | X | X | | Undergraduate Degree Date + 22 years or Beginning work experience plus 18 years |

**Table 6: Key Dataset Elements**

| Case # | Pitch Number | Air Date | Founder Gender | Funding Offers | Number of Founders | Founder Max Age | Max Education | Previous NV Exp |
|---|---|---|---|---|---|---|---|---|
| 1 | 763 | 14-Jan-18 | Male | 0 | 1 | 34 | Masters | 0 |
| 2 | 767 | 21-Jan-18 | Male | 4 | 1 | 21 | Degree | 1 |
| 3 | 770 | 21-Jan-18 | Male | 0 | 1 | 54 | Doctorate | 0 |
| 4 | 771 | 21-Jan-18 | Male | 2 | 1 | 36 | Degree | 1 |
| 5 | 776 | 21-Jan-18 | Male | 2 | 1 | 30 | Degree | 0 |
| 6 | 777 | 21-Jan-18 | Male | 2 | 1 | 23 | Degree | 0 |
| 7 | 780 | 28-Jan-18 | Female | 2 | 1 | 36 | Degree | 0 |
| 8 | 781 | 28-Jan-18 | Male | 1 | 2 | 41 | Degree | 0 |
| 9 | 783 | 28-Jan-18 | Female | 1 | 1 | 29 | Masters | 0 |
| 10 | 785 | 28-Jan-18 | Male | 0 | 1 | 32 | Degree | 0 |
| 11 | 786 | 28-Jan-18 | Male | 2 | 2 | 27 | Degree | 0 |
| 12 | 787 | 28-Jan-18 | Male | 3 | 1 | 23 | Degree | 0 |
| 13 | 788 | 11-Feb-18 | Male | 1 | 2 | 29 | Masters | 0 |
| 14 | 789 | 11-Feb-18 | Male | 3 | 1 | 39 | None | 0 |
| 15 | 790 | 11-Feb-18 | Mixed Team M | 0 | 2 | 44 | Doctorate | 1 |
| 16 | 792 | 11-Feb-18 | Mixed Team M | 1 | 2 | 46 | Degree | 1 |
| 17 | 793 | 18-Feb-18 | Male | 3 | 1 | 31 | Masters | 1 |
| 18 | 794 | 25-Feb-18 | Female | 1 | 1 | 31 | Doctorate | 0 |
| 19 | 795 | 25-Feb-18 | Male | 0 | 3 | 25 | Degree | 0 |
| 20 | 799 | 25-Feb-18 | Male | 3 | 1 | 30 | Doctorate | 0 |
| 21 | 800 | 7-Oct-18 | Male | 0 | 1 | 27 | Degree | 0 |
| 22 | 801 | 7-Oct-18 | Female | 1 | 1 | 39 | Degree | 0 |
| 23 | 803 | 14-Oct-18 | Male | 0 | 1 | 23 | Degree | 0 |
| 24 | 804 | 14-Oct-18 | Mixed Team F | 2 | 2 | 31 | Masters | 0 |
| 25 | 807 | 21-Oct-18 | Male | 1 | 1 | 40 | Degree | 0 |
| 26 | 809 | 21-Oct-18 | Male | 0 | 1 | 35 | Degree | 1 |
| 27 | 811 | 21-Oct-18 | Male | 3 | 1 | 30 | Degree | 0 |
| 28 | 812 | 28-Oct-18 | Female | 0 | 1 | 41 | Degree | 0 |
| 29 | 813 | 28-Oct-18 | Male | 1 | 1 | 23 | Degree | 0 |
| 30 | 814 | 18-Nov-18 | Male | 2 | 1 | 34 | None | 1 |
| 31 | 816 | 18-Nov-18 | Male | 3 | 2 | 66 | Degree | 0 |
| 32 | 819 | 18-Nov-18 | Male | 1 | 1 | 34 | Degree | 0 |
| 33 | 821 | 25-Nov-18 | Male | 2 | 1 | 33 | Degree | 0 |
| 34 | 822 | 25-Nov-18 | Male | 1 | 1 | 36 | None | 0 |
| 35 | 823 | 25-Nov-18 | Female | 2 | 1 | 30 | Degree | 0 |
| 36 | 824 | 2-Dec-18 | Male | 0 | 1 | 44 | Degree | 0 |

| 37 | 825 | 2-Dec-18 | Mixed Team M | 2 | 2 | 27 | Degree | 0 |
| 38 | 827 | 2-Dec-18 | Male | 4 | 2 | 38 | Masters | 0 |

**Table 7: Data Calibration and Coding Descriptive Statistics**

| | Coded Data | | | | Calibrated Data | | | |
|---|---|---|---|---|---|---|---|---|
| | Max | Min | Avg | Std | Max | Min | Avg | Std |
| **Outcome Variable** | | | | | | | | |
| Investor Offer | 1 | 0 | 0.58 | 0.50 | 0.95 | 0.05 | 0.10-0.46 | 0.22-0.45 |
| **Founder Indices** | | | | | | | | |
| Founder Age | 66 | 21 | 34 | 8.89 | 0.95 | 0.05 | 0.42 | 0.24 |
| Female Founder | 4 | 1 | 1.61 | 1.13 | 0.95 | 0.05 | 0.26 | 0.36 |
| **Informational Signals** | | | | | | | | |
| Education | 4 | 1 | 2.29 | 0.77 | 0.95 | 0.16 | 0.51 | 0.22 |
| Experience | 1 | 0 | 0.18 | 0.39 | 0.95 | 0.05 | 0.22 | 0.35 |
| Multiple Offers | 4-2 | 0 | 1.00-1.55 | 0.79-1.24 | 0.95 | 0.05 | 0.43-0.50 | 0.32-0.35 |
| **Interpersonal Signals** | | | | | | | | |
| Experience Match | 1 | 0 | 0.05-0.42 | 0.22-0.49 | 0.95 | 0.05 | 0.95-0.39 | 0.20-0.44 |
| Industry Match | 1 | 0 | 0.00-0.69 | 0.00-0.46 | 0.95 | 0.05 | 0.05-0.67 | 0.00-0.45 |
| Academic Match | 1 | 0 | 0.20-0.34 | 0.40-0.47 | 0.95 | 0.05 | 0.24-0.35 | 0.35-0.43 |
| Technology Match | 1 | 0 | 0.29-0.75 | 0.40-0.48 | 0.95 | 0.05 | 0.24-0.73 | 0.37-0.41 |

**Note:** Summary statistics include 38 new ventures which were within the scope of the qualitative comparative analysis. Ranges are provided where statistics differed between the six case studies.

**Table 8: Qualitative Analysis Measurement and Coding**

| Outcome Variable/ Explanatory Condition | Measurement and Coding |
|---|---|
| **Outcome Variable** | |
| **Investor Offer** | An investment offer proposal from the investor to the founder coded as "1", "0" otherwise. |
| **Indices Explanatory Conditions** | |
| **Founder Age** | Estimated age of the oldest founder computed as the greater of 22 years following their undergraduate college graduation date or 18 years following the date of their first full-time work experience. |
| **Female Gender** | New ventures with all female founders coded as "4" and those with all male founders coded as "1". For mixed gender new venture teams, those with female CEO coded as "3" and those with a male CEO coded as "2". |
| **Informational Signal Explanatory Conditions** | |
| **Founder Education Level** | Highest degree earned by any of the founders with doctorate degree holders coded as "4", master's degree holders coded as "3", undergraduate degree holders coded as "2", and founders without a college degree coded as "1". |
| **Founder Previous New Venture Experience** | New venture with any founder having previous entrepreneurial experience as a founder or C-suite executive coded as "1", "0" otherwise. |

| Endorsement From Prestigious Investor | Number of offers proposed to the new venture from the four other "shark" investors excluding any offer from the case study investor, if applicable. |
|---|---|
| **Interpersonal Signal Explanatory Conditions** | |
| Founder/Investor Professional Experience Similarity | Coded as "1" if the investor's primary professional experience NAICS industry code matches the primary professional experience for any of the founders, "0" otherwise. |
| Founder/Investor Field of Study Similarity | Coded as "1" if any of the investor's academic majors match the academic major of any of the founders, "0" otherwise. |
| Founder/Investor Industry Professional Interest Similarity | Coded as "1" if the investor's primary professional experience NAICS industry code matches the founder's new venture industry, "0" otherwise. |
| Founder/Investor Technology Similarity | Coded as "1" if the investor had a technology business background and the new venture product or services are developed through proprietary scientific methods or information technology hardware or software development, "0" otherwise. |

## Table 9: fsQCA Model Output

### Investor #1

```
************************
*TRUTH TABLE ANALYSIS*
************************


File:   C:/Users/mhaki/OneDrive/Desktop/fsQCA/BCNOV21cal.csv
Model: BCOFFER = f(AGE, FEM, EDU, EXP, EXPMAT, EDUMAT, NVMAT, TECMAT, END)
Algorithm: Quine-McCluskey


--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.80102
                     raw          unique
                  coverage      coverage      consistency
                 ----------    ----------    ----------
~AGE*EDU*END       0.569565      0.234783      0.438861
FEM*~EXP*EDUMAT    0.413044      0.13913       1
AGE*~EDU*END       0.428261      0.1           0.530997
solution coverage: 0.808696
solution consistency: 0.508892
```
```
*TRUTH TABLE ANALYSIS*
************************


File:   C:/Users/mhaki/OneDrive/Desktop/fsQCA/BCNOV21cal.csv
Model: BCOFFER = f(AGE, FEM, EDU, EXP, EXPMAT, EDUMAT, NVMAT, TECMAT, END)
Algorithm: Quine-McCluskey


--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.80102
Assumptions:
                                                                       raw          unique
                                                                    coverage      coverage      consistency
                                                                   ----------    ----------    ----------
AGE*~FEM*~EDU*~EXP*~EXPMAT*~EDUMAT*~NVMAT*~TECMAT*END                0.341304      0.123913      0.80102
~AGE*FEM*~EDU*~EXP*~EXPMAT*EDUMAT*~NVMAT*TECMAT*~END                 0.334783      0.117391      1
~AGE*~FEM*EDU*~EXP*~EXPMAT*EDUMAT*~NVMAT*~TECMAT*END                 0.354348      0.136957      0.819096
~AGE*~FEM*EDU*EXP*~EXPMAT*~EDUMAT*~NVMAT*TECMAT*END                  0.352174      0.134783      1
solution coverage: 0.730435
solution consistency: 0.817518
```

**Investor #2**

```
************************
*TRUTH TABLE ANALYSIS*
************************


File:   C:/Users/mhaki/OneDrive/Desktop/fsQCA/MCNOV21cal.csv
Model: MCOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey


--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.805281
                            raw          unique
                          coverage      coverage      consistency
                         ----------    ----------    ----------
FEM*EDUMAT                0.328346      0.108661      1
~AGE*~EDU*~END*~EXPMAT    0.340945      0.0779527     0.57351
EDU*END*~TECMAT          0.403937      0.0503938     0.62561
AGE*EDUMAT*~TECMAT        0.292913      0.019685      0.815789
~AGE*END*EDUMAT          0.389764      0.101575      0.879219
AGE*~FEM*END*~TECMAT      0.319685      0             0.689304
solution coverage: 0.788976
solution consistency: 0.632177

************************
*TRUTH TABLE ANALYSIS*
************************


File:   C:/Users/mhaki/OneDrive/Desktop/fsQCA/MCNOV21cal.csv
Model: MCOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey


--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.805281
Assumptions:
                                                                    raw          unique
                                                                  coverage      coverage      consistency
                                                                 ----------    ----------    ----------
~AGE*~FEM*~EDU*~EXP*~END*~EXPMAT*~NVMAT*TECMAT                     0.232283      0.0826772     0.845272
~AGE*FEM*~EDU*~EXP*~END*~EXPMAT*EDUMAT*~NVMAT*~TECMAT              0.192126      0.0425197     1
AGE*~FEM*EDU*~EXP*END*~EXPMAT*~EDUMAT*~NVMAT*~TECMAT               0.192126      0.0425197     0.805281
AGE*~FEM*~EDU*EXP*END*~EXPMAT*~EDUMAT*~NVMAT*~TECMAT               0.162992      0             0.818182
~AGE*~FEM*EDU*EXP*END*~EXPMAT*~EDUMAT*~NVMAT*~TECMAT               0.198425      0.0354331     0.958175
AGE*~FEM*~EDU*EXP*~END*~EXPMAT*EDUMAT*~NVMAT*~TECMAT               0.188976      0.0393701     0.836237
~AGE*FEM*EDU*~EXP*~END*EXPMAT*EDUMAT*~NVMAT*~TECMAT               0.192913      0.0354331     1
AGE*~FEM*~EDU*~EXP*END*EXPMAT*EDUMAT*~NVMAT*~TECMAT               0.2           0.0425197     1
~AGE*~FEM*~EDU*~EXP*END*EXPMAT*EDUMAT*NVMAT*~TECMAT               0.192126      0.0425197     1
~AGE*FEM*EDU*~EXP*~END*~EXPMAT*EDUMAT*~NVMAT*TECMAT               0.198425      0.0488189     1
~AGE*~FEM*~EDU*EXP*END*EXPMAT*EDUMAT*~NVMAT*TECMAT               0.192126      0.0425197     1
solution coverage: 0.625197
solution consistency: 0.794
```

**Investor #3**

```
**********************
*TRUTH TABLE ANALYSIS*
**********************


File:   C:/Users/mhaki/OneDrive/Desktop/fsQCA/LGNOV21cal.csv
Model: LGOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.829932
                                    raw         unique
                                 coverage     coverage    consistency
                                ----------   ----------   ----------
~EDU*NVMAT*~TECMAT               0.322936     0.0990826    0.953929
~FEM*~EXP*END*~EXPMAT*TECMAT     0.422018     0.165138     0.767946
AGE*~FEM*EDUMAT*~NVMAT           0.216514     0.012844     0.753994
AGE*FEM*~EDUMAT*NVMAT            0.278899     0.0550459    0.802111
~FEM*END*EDUMAT*TECMAT           0.354128     0.0678899    0.923445
solution coverage: 0.73578
solution consistency: 0.740536
```

```
**********************
*TRUTH TABLE ANALYSIS*
**********************


File:   C:/Users/mhaki/OneDrive/Desktop/fsQCA/LGNOV21cal.csv
Model: LGOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.829932
Assumptions:
                                                                  raw         unique
                                                               coverage     coverage    consistency
                                                              ----------   ----------   ----------
~FEM*~EDU*~EXP*END*~EXPMAT*~EDUMAT*~NVMAT*TECMAT               0.273394     0.0990826    0.856322
AGE*~FEM*~EDU*~EXP*~END*~EXPMAT*~EDUMAT*NVMAT*~TECMAT          0.223853     0.0495412    1
~AGE*~FEM*~EDU*EXP*END*~EXPMAT*~EDUMAT*NVMAT*~TECMAT           0.223853     0.0495412    1
AGE*~FEM*~EDU*EXP*~END*~EXPMAT*EDUMAT*~NVMAT*TECMAT            0.216514     0.0422018    1
AGE*FEM*~EDU*EXP*~END*EXPMAT*~EDUMAT*NVMAT*~TECMAT             0.223853     0.0495412    1
AGE*FEM*~EDU*~EXP*~END*EXPMAT*~EDUMAT*NVMAT*TECMAT             0.223853     0.0495412    1
~AGE*~FEM*~EDU*~EXP*END*EXPMAT*EDUMAT*NVMAT*TECMAT             0.223853     0.0495412    1
AGE*~FEM*EDU*~EXP*END*~EXPMAT*EDUMAT*NVMAT*TECMAT             0.223853     0.0495412    0.884058
solution coverage: 0.612844
solution consistency: 0.890667
```

**Investor #4**

```
***********************
*TRUTH TABLE ANALYSIS*
***********************


File:  C:/Users/mhaki/OneDrive/Desktop/fsQCA/RHNOV21cal.csv
Model: RHOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.72524
                            raw           unique
                         coverage       coverage     consistency
                        ----------     ----------    ----------
END*TECMAT               0.431183       0.0967742     0.837161
~EXP*END*~EXPMAT         0.376344       0.00322586    0.694444
AGE*~FEM*~EDU*~EXP       0.378495       0.0580647     0.824356
~AGE*~FEM*EDU*~EXP       0.444086       0.0580647     0.606461
~FEM*EDUMAT              0.516129       0.132258      0.79602
solution coverage: 0.870968
solution consistency: 0.612708


***********************
*TRUTH TABLE ANALYSIS*
***********************


File:  C:/Users/mhaki/OneDrive/Desktop/fsQCA/RHNOV21cal.csv
Model: RHOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.72524
Assumptions:
                                                        raw           unique
                                                     coverage       coverage     consistency
                                                    ----------     ----------    ----------
~AGE*~FEM*~EDU*~EXP*END*~EXPMAT*~NVMAT*~TECMAT        0.229032       0.0462366     0.797753
~FEM*~EDU*~EXP*~END*~EXPMAT*EDUMAT*~NVMAT*~TECMAT     0.202151       0.0107527     0.77686
~AGE*~FEM*~EDU*~EXP*~END*~EXPMAT*EDUMAT*~NVMAT        0.246237       0.0548388     0.809187
~AGE*~FEM*EDU*~EXP*~END*~EXPMAT*~EDUMAT*~NVMAT*~TECMAT 0.244086      0.0763441     0.72524
AGE*~FEM*~EDU*~EXP*END*EXPMAT*~EDUMAT*~NVMAT*~TECMAT  0.187097       0.0580645     0.988636
AGE*~FEM*~EDU*~EXP*END*~EXPMAT*~EDUMAT*~NVMAT*TECMAT  0.190323       0.0612904     1
~AGE*~FEM*~EDU*EXP*END*EXPMAT*~EDUMAT*~NVMAT*TECMAT   0.187097       0.0580645     1
~AGE*~FEM*EDU*~EXP*END*EXPMAT*EDUMAT*~NVMAT*TECMAT    0.201075       0.0720431     1
solution coverage: 0.667742
solution consistency: 0.77335
```

## Investor #5

```
***********************
*TRUTH TABLE ANALYSIS*
***********************


File:  C:/Users/mhaki/OneDrive/Desktop/fsQCA/DJNOV21cal.csv
Model: DJOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.763636
                        raw          unique
                     coverage      coverage    consistency
                    ----------    ----------   ----------
~AGE*~FEM*EDUMAT      0.988235     0.988235     0.811594
solution coverage: 0.988235
solution consistency: 0.811594




Cases with greater than 0.5 membership in term ~AGE*~FEM*EDUMAT: 777 (0.93,0.95)
***********************
*TRUTH TABLE ANALYSIS*
***********************


File:  C:/Users/mhaki/OneDrive/Desktop/fsQCA/DJNOV21cal.csv
Model: DJOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.763636
Assumptions:
                                                      raw          unique
                                                   coverage      coverage    consistency
                                                  ----------    ----------   ----------
~AGE*~FEM*~EDU*~EXP*END*~EXPMAT*EDUMAT*NVMAT*TECMAT  0.741176     0.741176     0.763636
solution coverage: 0.741176
solution consistency: 0.763636
```

**Investor #6**

```
***********************
*TRUTH TABLE ANALYSIS*
***********************


File:  C:/Users/mhaki/OneDrive/Desktop/fsQCA/KONOV21cal.csv
Model: KOOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.772947
                          raw          unique
                        coverage     coverage     consistency
                        ---------    ---------    ---------
~AGE*~END               0.488288     0.2          0.68348
EDU*END                 0.452252     0.179279     0.656209
AGE*FEM*~EXPMAT         0.17027      0.009009     0.84375
AGE*~EXPMAT*EDUMAT      0.153153     0.009009     0.742358
solution coverage: 0.694595
solution consistency: 0.64627
```

```
***********************
*TRUTH TABLE ANALYSIS*
***********************


File:  C:/Users/mhaki/OneDrive/Desktop/fsQCA/KONOV21cal.csv
Model: KOOFFER = f(AGE, FEM, EDU, EXP, END, EXPMAT, EDUMAT, NVMAT, TECMAT)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.772947
Assumptions:
                                                                   raw          unique
                                                                 coverage     coverage     consistency
                                                                 ---------    ---------    ---------
~AGE*~FEM*~EDU*~EXP*~END*~EXPMAT*~EDUMAT*~NVMAT                   0.227027     0.0612613    0.828947
~AGE*~FEM*~EDU*~EXP*~END*~EDUMAT*~NVMAT*TECMAT                    0.193694     0.0486487    0.873984
AGE*FEM*~EDU*~EXP*~END*~EXPMAT*~EDUMAT*~NVMAT*~TECMAT             0.144144     0.0450451    1
AGE*~FEM*EDU*~EXP*END*~EXPMAT*~EDUMAT*~NVMAT*~TECMAT              0.198198     0.0693694    0.852713
AGE*~FEM*~EDU*EXP*~END*~EXPMAT*EDUMAT*~NVMAT*~TECMAT              0.144144     0.0450451    0.772947
~AGE*FEM*EDU*~EXP*~END*~EXPMAT*~EDUMAT*~NVMAT*TECMAT              0.163063     0.0639639    1
~AGE*FEM*EDU*~EXP*~END*EXPMAT*EDUMAT*~NVMAT*~TECMAT               0.145045     0.045946     1
~AGE*~FEM*EDU*~EXP*END*EXPMAT*~EDUMAT*~NVMAT*TECMAT               0.168468     0.0603604    0.857798
solution coverage: 0.614414
solution consistency: 0.830694
```

**Table 10: Sufficiency Analysis Overview**

| Results | Investor #1 | Investor #2 | Investor #3 | Investor #4 | Investor #5 | Investor #6 | Total |
|---|---|---|---|---|---|---|---|
| Consistency | 0.82 | 0.79 | 0.89 | 0.77 | 0.76 | 0.83 | NA |
| Coverage | 0.73 | 0.62 | 0.61 | 0.67 | 0.74 | 0.61 | NA |
| Cases (n) | 20 | 38 | 38 | 24 | 16 | 24 | 160 |
| Funding Offer Frequency (%) | 4 (20%) | 12 (32%) | 9 (24%) | 8 (33%) | 1 (6%) | 9 (38%) | 43 (27%) |

**Table 11: Sufficiency Analysis of Founder Age Influence on New Venture Funding Offers**

**Investor #1**

| Configurations | A | B | C | D |
|---|---|---|---|---|
| **Conditions** | | | | |
| **Signaler Indices** | | | | |
| Older Founder | ● | ⊗ | ⊗ | ⊗ |
| Female Founder | ⊗ | ⊗ | ● | ⊗ |
| **Informational Signals** | | | | |
| Founder Education | ⊗ | ● | ⊗ | ● |
| Founder Experience | ⊗ | ⊗ | ⊗ | • |
| Endorsements | ● | ● | ⊗ | ● |
| **Interpersonal Signals** | | | | |
| Experience Match | ⊗ | ⊗ | ⊗ | ⊗ |
| Industry Match | ⊗ | ⊗ | ⊗ | ⊗ |
| Academic Match | ⊗ | • | ● | ⊗ |
| Technology Match | ⊗ | ⊗ | • | • |
| | | | | |
| **Sufficiency Measures** | | | | |
| Consistency | 0.80 | 0.82 | 1.00 | 1.00 |
| Raw Coverage | 0.34 | 0.35 | 0.33 | 0.35 |
| Unique Coverage | 0.12 | 0.14 | 0.12 | 0.13 |
| **Overall Coverage** | **0.730** | | | |
| **Overall Consistency** | **0.817** | | | |

**Note 1**: ● represents the presence of a core condition and • the presence of a peripheral condition. ⊗ represent the absence of a core condition and ⊗ the absence of a peripheral condition. A blank space indicate that a condition may be either present or absent.

| Configuration Type | Apprentice | Certified Pro. | Long Shot | Phenom | Sponsor | Sure Bet |
|---|---|---|---|---|---|---|
| Configuration | C | A | | B, D | | |
| Case(s) # | 35 | 14 | | 20,17 | | |

**Investor #2**

| Configurations | A | B | C | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|
| **Conditions** | | | | | | | | | | |
| **Signaler Indices** | | | | | | | | | | |
| Older Founder | ⊗ | ⊗ | ● | ⊗ | ● | ⊗ | ● | ⊗ | ⊗ | ⊗ |
| Female Founder | ⊗ | ● | ⊗ | ⊗ | ⊗ | ● | ⊗ | ⊗ | ● | ⊗ |
| **Informational Signals** | | | | | | | | | | |
| Founder Education | ⊗ | ⊗ | • | ● | ⊗ | • | ⊗ | ⊗ | • | ⊗ |
| Founder Experience | ⊗ | ⊗ | ⊗ | • | • | ⊗ | ⊗ | ⊗ | ⊗ | • |
| Endorsements | ⊗ | ⊗ | ● | ● | ⊗ | ⊗ | ● | ● | ⊗ | ● |
| **Interpersonal Signals** | | | | | | | | | | |
| Experience Match | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | • | • | • | ⊗ | • |
| Industry Match | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | • | ⊗ | ⊗ |
| Academic Match | | ● | ⊗ | ⊗ | • | ● | • | ● | ● | ● |
| Technology Match | • | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | • | • |
| **Sufficiency Measures** | | | | | | | | | | |
| Consistency | 0.85 | 1.00 | 0.81 | 0.96 | 0.84 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Raw Coverage | 0.23 | 0.19 | 0.19 | 0.20 | 0.19 | 0.19 | 0.20 | 0.19 | 0.20 | 0.19 |
| Unique Coverage | 0.08 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.04 |
| **Overall Coverage** | **0.625** | | | | | | | | | |
| **Overall Consistency** | **0.794** | | | | | | | | | |

**Note 1**: ● represents the presence of a core condition and • the presence of a peripheral condition. ⊗ represent the absence of a core condition and ⊗ the absence of a peripheral condition. A blank space indicate that a condition may be either present or absent.

**Note 2**: Configuration D which contributed nil (0) unique coverage was excluded from the sufficiency analysis and associated typology qualitative discussion.

| Configuration Type | Apprentice | Certified Pro. | Long Shot | Phenom | Sponsor | Sure Bet |
|---|---|---|---|---|---|---|
| Configuration | A, B, I | C, E | | G, J, K | | F, H |
| Case(s) # | 11,33,37,12 | 38,17 | | 24,18,2 | | 4,31 |

**Investor #3**

| Configurations | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| **Conditions** | | | | | | | | |
| **Signaler Indices** | | | | | | | | |
| Older Founder |  | • | ⊗ | ● | • | ● | ⊗ | ⊗ |
| Female Founder | ⨂ | ⊗ | ⊗ | ⨂ | • | ● | ⨂ | ⨂ |
| **Informational Signals** | | | | | | | | |
| Founder Education | ⨂ | ⨂ | ⨂ | ⊗ | ⨂ | ⊗ | ⊗ | • |
| Founder Experience | ⊗ | ⊗ | • | • | • | ⊗ | ⊗ | ⊗ |
| Endorsements | ● | ⊗ | • | ⊗ | ⊗ | ⊗ | ● | ● |
| **Interpersonal Signals** | | | | | | | | |
| Experience Match | ⨂ | ⊗ | ⊗ | ⊗ | • | • | • | ⊗ |
| Industry Match | ⊗ | ● | ● | ⨂ | ● | ● | • | • |
| Academic Match | ⊗ | ⊗ | ⊗ | ● | ⊗ | ⨂ | ● | ● |
| Technology Match | ● | ⨂ | ⨂ | • | ⨂ | • | ● | ● |
| | | | | | | | | |
| **Sufficiency Measures** | | | | | | | | |
| Consistency | 0.86 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.88 |
| Raw Coverage | 0.27 | 0.22 | 0.22 | 0.21 | 0.22 | 0.22 | 0.22 | 0.22 |
| Unique Coverage | 0.10 | 0.05 | 0.05 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 |
| **Overall Coverage** | **0.612** | | | | | | | |
| **Overall Consistency** | **0.890** | | | | | | | |

**Note 1**: ● represents the presence of a core condition and • the presence of a peripheral condition. ⨂ represent the absence of a core condition and ⊗ the absence of a peripheral condition. A blank space indicate that a condition may be either present or absent.

| Configuration Type | Apprentice | Cert. Pro. | Long Shot | Phenom | Sponsor | Sure Bet |
|---|---|---|---|---|---|---|
| Configuration | G | | | C, H | B, F | A, D, E |
| Case(s) # | 27 | | | 2,38 | 25,22 | 12,31,30,16 |

**Investor #4**

| Configurations | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| **Conditions** | | | | | | | | |
| **Signaler Indices** | | | | | | | | |
| Older Founder | ⊗ | | ⊗ | ⊗ | ● | ● | ⊗ | ⊗ |
| Female Founder | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ |
| **Informational Signals** | | | | | | | | |
| Founder Education | ⊗ | ⊗ | ⊗ | ● | ⊗ | ⊗ | ⊗ | ● |
| Founder Experience | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | • | ⊗ |
| Endorsements | ● | ⊗ | ⊗ | ⊗ | • | ● | ● | ● |
| **Interpersonal Signals** | | | | | | | | |
| Experience Match | ⊗ | ⊗ | ⊗ | ⊗ | • | ⊗ | • | • |
| Industry Match | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ |
| Academic Match | | ● | ● | ⊗ | ⊗ | ⊗ | ⊗ | • |
| Technology Match | ⊗ | ⊗ | | ⊗ | ⊗ | ● | ● | ● |
| | | | | | | | | |
| **Sufficiency Measures** | | | | | | | | |
| Consistency | 0.80 | 0.78 | 0.81 | 0.73 | 0.99 | 1.00 | 1.00 | 1.00 |
| Raw Coverage | 0.23 | 0.20 | 0.25 | 0.24 | 0.19 | 0.19 | 0.19 | 0.20 |
| Unique Coverage | 0.05 | 0.01 | 0.05 | 0.08 | 0.06 | 0.06 | 0.06 | 0.07 |
| **Overall Coverage** | **0.667** | | | | | | | |
| **Overall Consistency** | **0.773** | | | | | | | |

**Note 1**: ● represents the presence of a core condition and • the presence of a peripheral condition. ⊗ represent the absence of a core condition and ⊗ the absence of a peripheral condition. A blank space indicate that a condition may be either present or absent.

| Configuration Type | Apprentice | Certified Pro. | Long Shot | Phenom | Sponsor | Sure Bet |
|---|---|---|---|---|---|---|
| Configuration | C | D | A | G, H | B | E, F |
| Case(s) # | 11 | 13 | 27 | 2,20 | 32 | 31,14 |

**Investor #5**

| Configurations | A |
|---|---|
| **Conditions** | |
| **Signaler Indices** | |
| Older Founder | ⊗ |
| Female Founder | ⊗ |
| **Informational Signals** | |
| Founder Education | ⊗ |
| Founder Experience | ⊗ |
| Endorsements | • |
| **Interpersonal Signals** | |
| Experience Match | ⊗ |
| Industry Match | • |
| Academic Match | ● |
| Technology Match | • |
| | |
| **Sufficiency Measures** | |
| Consistency | 0.76 |
| Raw Coverage | 0.74 |
| Unique Coverage | 0.74 |
| **Overall Coverage** | **0.741** |
| **Overall Consistency** | **0.763** |

**Note 1**: ● represents the presence of a core condition and • the presence of a peripheral condition. ⊗ represent the absence of a core condition and ⊗ the absence of a peripheral condition. A blank space indicate that a condition may be either present or absent.

| Configuration Type | Apprentice | Certified Pro. | Long Shot | Phenom | Sponsor | Sure Bet |
|---|---|---|---|---|---|---|
| Configuration | A | | | | | |
| Case(s) # | 6 | | | | | |

**Investor #6**

| Configurations | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| **Conditions** | | | | | | | | |
| **Signaler Indices** | | | | | | | | |
| Older Founder | ⊗ | ⊗ | ● | · | ● | ⊗ | ⊗ | ⊗ |
| Female Founder | ⊗ | ⊗ | ● | ⊗ | ⊗ | · | · | ⊗ |
| **Informational Signals** | | | | | | | | |
| Founder Education | ⊗ | ⊗ | ⊗ | ● | ⊗ | · | · | ● |
| Founder Experience | ⊗ | ⊗ | ⊗ | ⊗ | · | ⊗ | ⊗ | ⊗ |
| Endorsements | ⊗ | ⊗ | ⊗ | ● | ⊗ | ⊗ | ⊗ | ● |
| **Interpersonal Signals** | | | | | | | | |
| Experience Match | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | · | · |
| Industry Match | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ |
| Academic Match | ⊗ | ⊗ | ⊗ | ⊗ | ● | ⊗ | · | ⊗ |
| Technology Match | | · | ⊗ | ⊗ | ⊗ | · | ⊗ | · |
| | | | | | | | | |
| **Sufficiency Measures** | | | | | | | | |
| Consistency | 0.83 | 0.87 | 1.00 | 0.85 | 0.77 | 1.00 | 1.00 | 0.86 |
| Raw Coverage | 0.23 | 0.19 | 0.14 | 0.20 | 0.14 | 0.16 | 0.15 | 0.17 |
| 0.06Unique Coverage | 0.06 | 0.05 | 0.05 | 0.07 | 0.05 | 0.06 | 0.05 | 0.06 |
| **Overall Coverage** | 0.614 | | | | | | | |
| **Overall Consistency** | 0.830 | | | | | | | |

**Note 1**: ● represents the presence of a core condition and · the presence of a peripheral condition. ⊗ represent the absence of a core condition and ⊗ the absence of a peripheral condition. A blank space indicate that a condition may be either present or absent.

| Configuration Type | Apprentice | Certified Pro. | Long Shot | Phenom | Sponsor | Sure Bet |
|---|---|---|---|---|---|---|
| Configuration | B | D | A, C | F, G, H | | E |
| Case(s) # | 29 | 38 | 5,33,7 | 9,24,20 | | 4 |

**Table 12: Configuration Typology Definitions**

| Type | Configurational Overview | Configurational Conditions |
|---|---|---|
| **Apprentice** | Investor is attracted to a younger inexperienced founder with a similar background. Founder youth is substitutive for lack of human capital. Founder youth and homophily are complimentary conditions. | Founder age is absent coupled with the presence of interpersonal signaling and the absence of human capital (educational or experience) signaling conditions |
| **Certified Professional** | Investor is attracted by older founder with endorsement signaling from multiple interested investors substituting for lack of homophily conditions. Investor offer is contingent on endorsement credibility signaling. OR Investor is attracted to younger founder with strong human capital attributes despite lack of interpersonal signaling without endorsement signaling. Founder youth and human capital are complimentary conditions. | Informational signaling present with absence of interpersonal signaling <u>and</u> either founder age presence coupled with informational signaling or founder age absent |
| **Long Shot** | Investor is attracted to a founder despite lack of experience, homophily conditions or endorsement signaling. | Any founder age combined with the absence of informational and interpersonal signaling |
| **Phenom** | Investor is attracted to younger founder with strong human capital attributes and interpersonal signaling. Founder youth and human capital are complimentary conditions. | Founder age is absent with the presence of both informational and interpersonal signaling |
| **Sponsor** | Investor attracted to older inexperienced founder with a similar background. Founder age and homophily are complimentary conditions. | Founder age or age does not matter coupled with presence of interpersonal signaling conditions and an absence of informational signaling |
| **Sure Bet** | Investor is attracted to founder regardless of age with strong informational and interpersonal signaling. Age explanatory condition is contingent on combination of informational and interpersonal and signaling. | Presence of founder age or age does not matter coupled with the presence of informational and interpersonal signaling |

**Table 13: Comparative Analysis Typology Distribution**

| Configuration Type | Investor Case Study Offers | | | | | | Total Offers (Percent) |
|---|---|---|---|---|---|---|---|
| | Investor #1 | Investor #2 | Investor #3 | Investor #4 | Investor #5 | Investor #6 | |
| Phenom | 2 | 3 | 2 | 2 | | 3 | **12 (28%)** |
| Apprentice | 1 | 4 | 1 | 1 | 1 | 1 | **9 (21%)** |
| Sure Bet | | 2 | 4 | 2 | | 1 | **9 (21%)** |
| Certified Pro. | 1 | 2 | | 1 | | 1 | **5 (12%)** |
| Long Shot | | | | 1 | | 3 | **4 (9%)** |
| Sponsor | | | 2 | 1 | | | **3 (7%)** |
| Other | | 1 | | | | | **1 (2%)** |
| **Total Offers** | **4** | **12** | **9** | **8** | **1** | **9** | **43 (100%)** |

**Table 14: Typology Qualitative Descriptions**

| Configuration Type | Case # | Multiple Offers | Offering Investor(s) | Case Description |
|---|---|---|---|---|
| **Phenom** | | | | |
| | 2 | Y | #2, #3, #4 | Age 21 male with undergrad degree & new venture experience |
| | 9 | N | #6 | Age 29 female with master's degree at a tech new venture |
| | 17 | Y | #1 | Age 31 male with a master's degree & new venture experience |
| | 18 | N | #2 | Age 31 female with doctorate degree at a tech new venture |
| | 20 | Y | #1, #4, #6 | Age 30 male with doctorate degree at a tech new venture |
| | 24 | Y | #2, #6 | Mixed team of age 31 & 19 male and female with master's and no degree |
| | 38 | Y | #3 | Team of age 38 & 36 males with master's and undergrad degrees |
| **Apprentice** | | | | |
| | 6 | N | #5 | Age 23 male with undergrad degree |
| | 11 | Y | #2, #4 | Team of age 26 & 27 males with undergrad degrees at a tech new venture |
| | 12 | Y | #2 | Age 23 male with undergrad degree - multiple offers |
| | 27 | Y | #3 | Age 30 male with undergrad degree |
| | 29 | N | #6 | Age 23 male with undergrad degree at a tech new venture |
| | 33 | Y | #2 | Age 33 male with undergrad degree at a tech new venture |

| | | | | |
|---|---|---|---|---|
| | 35 | Y | #1 | Age 30 female with undergrad degree |
| | 37 | Y | #2 | Mixed team of age 27 & 24 male and female with undergrad degrees |
| **Sure Bet** | | | | |
| | 4 | Y | #2, #6 | Age 36 male with undergrad degree & new venture experience |
| | 12 | Y | #3 | Age 23 male with undergrad degree - multiple offers |
| | 14 | Y | #4 | Age 39 male with no degree at a tech new venture |
| | 16 | N | #3 | Mixed team of age 45 & 30 male and female with undergrad degree and no degree with new venture experience at a tech new venture |
| | 30 | Y | #3 | Age 34 male with no degree & new venture experience |
| | 31 | Y | #2, #3, #4 | Team of age 66 & 30 males with undergrad degrees |
| **Long Shot** | | | | |
| | 5 | Y | #6 | Age 30 male with undergrad degree |
| | 7 | Y | #6 | Age 36 female with undergrad degree |
| | 27 | Y | #4 | Age 30 male with undergrad degree |
| | 33 | Y | #6 | Age 33 male with undergrad degree at a tech new venture |
| **Sponsor** | | | | |
| | 22 | N | #3 | Age 39 female with undergrad degree |
| | 25 | N | #3 | Age 40 male with undergrad degree at a tech new venture |
| | 32 | N | #4 | Age 32 male with undergrad degree |
| **Certified Pro** | | | | |
| | 13 | N | #4 | Team of age 29 & 27 males with master's degree and no degree |
| | 14 | Y | #1 | Age 39 male with no degree at a tech new venture |
| | 17 | Y | #2 | Age 31 male with a master's degree & new venture experience |
| | 38 | Y | #2, #6 | Team of age 38 & 36 males with master's and undergrad degrees |

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