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Glimpses into entrepreneurial cognition. The role of heuristic processing

Summary

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CHAPTER I. THEORETICAL BACKGROUND AND GENERAL METHODOLOGY

1.1 Introduction to research subject

Building on Simon's (1955) concept of bounded rationality and the studies on heuristics and biases by Tversky and Kahneman (1974), scholars have conceptualized the human cognitive system as comprising two distinct yet interrelated systems (Epstein, 1991; Kahneman, 2011; Stanovich & West, 1998). The first system is characterized as intuitive, associative, holistic, automatic, and fast, while the second is defined as slow, deliberate, and analytical (Kahneman, 2011). Decision-makers rely on both systems when making choices, yet individuals can be categorized based on their preferences for either an intuitive approach or a more rational and analytical style (Allinson & Hayes, 1996; Epstein et al., 1996; Scott & Bruce, 1995). Individuals who favor intuitive processing may rely on gut feelings and heuristics to navigate familiar situations swiftly, while those who prefer analytical reasoning may engage in thorough evaluations of alternatives when faced with more challenging problems. The strengths of each approach may vary based on context, as some decisions lend themselves better to intuitive judgments, while others necessitate a more methodical analysis.

The heuristics and biases model, pioneered by Tversky and Kahneman (1974), and the framework of fast and frugal heuristics (Gigerenzer & Todd, 2000) both explore how individuals navigate decision-making under conditions of uncertainty, yet they diverge significantly in their implications for decision quality and rationality. The heuristics and biases model stresses the systematic deviations from normative ideals, highlighting cognitive biases that can divert individuals away from established decision-making standards (Tversky & Kahneman, 1974). This model often portrays heuristics in a negative light, focusing on the errors they can induce.

In contrast, the fast and frugal heuristics framework emphasizes the adaptive nature of cognitive shortcuts, positing that these simplified strategies can enhance decision-making efficiency in certain contexts (Gigerenzer & Todd, 2000). Proponents of this approach argue that heuristics can be beneficial, especially in environments characterized by uncertainty, where the costs of extensive information gathering and analysis may outweigh the benefits. The emphasis here is on simplicity and ecological validity, suggesting that, under specific conditions, fast and frugal heuristics can yield more accurate results than more complex decision-making strategies.

Previous research has consistently showed that entrepreneurs often rely on heuristic and intuitive processing when making critical decisions (Allinson et al., 2000; Busenitz & Barney, 1997). Numerous studies have drawn attention to the prevalence of the representativeness heuristic among entrepreneurs, also highlighting a tendency toward overoptimism and overconfidence in their decision-making (Busenitz & Barney, 1997; Cossette, 2014; Forbes, 2005; Mitchell, 1994). These investigations predominantly emerge from the heuristics and biases framework developed by Tversky and Kahneman (1974).

While the literature on entrepreneurship has begun to embrace the fast and frugal perspective on heuristics, the number of studies adopting this approach remains relatively limited (Cristofaro & Gianetti, 2021; Loock & Hinnen, 2015). In one of the few studies that have investigated satisficing, Berg (2014) showed that successful entrepreneurs rely on a low level of aspirations when choosing a new location for their business. In another study based on the ecological rationality framework, Guercini (2012) showed that the "take-the-best" heuristic is used by entrepreneurs in the Italian fashion industry to predict the most demanded fabrics. Prior studies have also indicated that intuition that draws upon past experiences and expertise serves as a frequently employed strategy by entrepreneurs (Baldacchino et al., 2015).

We contend that research grounded in the heuristics and biases framework has greatly enhanced our understanding of entrepreneurial cognition, albeit primarily by highlighting the negative aspects of heuristics. But we also believe that Gigerenzer's perspective has the potential to deepen our understanding of how entrepreneurs make decisions by the means of heuristics and how these heuristics affect entrepreneurial behavior and performance. It is important to note that the studies presented in the present thesis incorporate both perspectives, but with a stronger emphasis on fast and frugal heuristics. Next, we briefly outline the objectives of the four studies conducted in this research.

1.2 Research goals

In the first study presented in this thesis, we examined a heuristic commonly employed in various decision-making contexts, including resource allocation and predictive judgments. This heuristic refers to assigning equal weight to all predictors in judgments and decisions. We conceptualize the equality heuristic as a counterpoint to the equity principle. According to Messick (1993), the equality rule offers the advantage of simplicity, requiring only a count of the individuals involved in the allocation process, and has the potential to reduce conflict in

many situations (Messick, 1993). Given that equity and equality represent two fundamentally opposing rules, individuals face the challenge of deciding whether to prioritize equitable or equal distribution of resources.

Previous research on resource allocation indicates that individuals tend to make different judgments regarding positive (gains) versus negative (losses) resources (Tornblom & Ahlin, 1998; Tornblom & Jonsson,1987; Van Dijk et al., 1999). Moreover, it shows that gender can significantly influence allocation decisions (Major & Deux, 1982). Consequently, this study focused on the utilization of the equality heuristic in the context of resource allocation. Although this research was conducted with a sample of students rather than entrepreneurs—making it the only study in this thesis that has not directly investigated an entrepreneurial cohort—it remains pertinent to the entrepreneurial landscape for at least two reasons. First, many businesses are initiated by entrepreneurial teams rather than individuals, and these teams often form both within and outside of organizational contexts (Harper, 2008). Furthermore, entrepreneurs frequently assume managerial roles within their enterprises, necessitating decisions about the distribution of positive and negative resources, such as salaries, bonuses, and penalties for employees. Therefore, allocation decisions are relevant in the entrepreneurial realm, as an entrepreneur's individual preferences for equality or equity can profoundly impact employee satisfaction and performance, as well as the dynamics within entrepreneurial teams.

In the second study of this thesis, our objective was to investigate the interplay between financial literacy, opportunity perception, and entrepreneurial intention, particularly in the context of utilizing cryptocurrencies in business. Prior research has underscored the significance and advantages of financial literacy at various levels—individual, business, and societal (Guiso & Viviano, 2015; Lusardi & Mitchell, 2014; Lusardi, 2019; Abad-Segura & Gonzalez-Zamar, 2019). Financial literacy is especially crucial for entrepreneurs, as it enhances their ability to recognize and capitalize on emerging opportunities (Anwar et al., 2020; Kang & Park, 2024).

Drawing on the dual processing model discussed in the preceding section, we posit that financial literacy is mainly associated with systematic analytical processing, given its focus on the accumulation of technical knowledge concerning economics and finance. Furthermore, unlike decisional or cognitive styles that are typically evaluated through self-report questionnaires, financial literacy can be objectively assessed via a brief test comprising just four questions (Lusardi & Mitchell, 2006). Hence, in this study, we explored the role of

financial literacy in shaping the perception of opportunities related to cryptocurrencies, with opportunity perception serving as a mediator in the relationship between financial literacy and the intention to engage with crypto. Additionally, we conceptualized perception of threats as a moderating factor that potentially undermines the aforementioned relationships.

In the third study of this thesis, we built upon the findings from the first two studies, focusing on the roles of heuristic processing and financial literacy in entrepreneurial decision-making. Previous literature highlights that experience is a crucial factor in the development of intuitive and heuristic-based judgments (Baldacchino et al., 2015; Bingham & Eisenhardt, 2011), though not all studies have reached this conclusion (Baron & Ensley, 2006). Consequently, our primary aim was to assess the impact of experience on the formation of heuristic and intuitive processing. Additionally, we sought to investigate the relationship between heuristic processing and future entrepreneurial intentions. Previous research shows that entrepreneurs who employ heuristic thinking are inherently more drawn to the entrepreneurial context (Busenitz & Barney, 1997). However, this idea is contrary to the heuristics and biases model, which suggests that reliance on heuristics may result in biases that ultimately may diminish entrepreneurial intentions. Furthermore, we aimed to determine whether the proposed mediation model holds for all entrepreneurs, irrespective of their levels of financial literacy.

In the fourth study of this thesis, we aimed to explore the role that fast and frugal heuristics play in the strategic decision-making processes of entrepreneurs, particularly in relation to the recognition, evaluation, and exploitation of opportunities. This research employs a mixed-methods approach to scrutinize how entrepreneurs leverage fast and frugal heuristics within their strategic choices. Our approach is twofold: it is confirmatory, as it is underpinned by a theoretical framework that encompasses fast and frugal heuristics and ecological rationality, while also being exploratory, enabling a nuanced analysis of how entrepreneurs apply these cognitive shortcuts. Additionally, this study builds on the findings from the third study presented in this thesis, investigating the relationship between a preference for intuitive and heuristic processing styles and factors such as experience, entrepreneurial intention, and financial literacy.

1.3 Importance of the research

The studies presented in this thesis are grounded in two prominent models of heuristics: the heuristics and biases model developed by Tversky and Kahneman (1974) and the fast and frugal heuristics model proposed by Gigerenzer and collaborators (Gigerenzer & Goldstein, 1996; Gigerenzer & Todd, 2000). While our research leans more heavily on the framework of fast and frugal heuristics, we acknowledge the significance of both models in elucidating the reasons behind individuals' decisions and identifying the specific conditions under which they resort to heuristic processing. Although it is well-established that entrepreneurs tend to utilize heuristics more than other professional groups, it remains unclear whether this reliance stems from personal preferences or arises from the intricate dynamics inherent to the entrepreneurial environment. More specifically, the third study helps answer these questions by investigating the mediating role that heuristic processing plays in the relationship between experience and entrepreneurial intention and the moderating role that financial literacy plays

Most research on decision-making heuristics in entrepreneurship has concentrated on heuristics such as representativeness, anchoring, overconfidence, and overoptimism (Cossette, 2014; Forbes, 2005). In contrast, this thesis shifts the focus to functional heuristics, including satisficing, similarity, take-the-best, equality (or tallying), and imitation (Artinger et al., 2014). As a result, the studies presented in this thesis contribute to a more nuanced understanding of the specific fast and frugal heuristics employed by entrepreneurs and the contexts in which they are most effectively utilized.

In studies two, three, and four of this Ph.D. thesis, we explored the role of financial literacy in entrepreneurial decisions. We posit that financial literacy serves as a vital cognitive resource for entrepreneurs, facilitating opportunity recognition and enhancing decision-making quality. It is especially crucial to understand how financial literacy interacts with heuristic processing, as the two represent distinct cognitive resources and strategies that together influence entrepreneurial success.

Examining entrepreneurial decisions and the influence of heuristics on these choices can provide valuable insights for practitioners, such as consultants, in shaping their interventions. By identifying heuristics that have a detrimental impact on decision-making, practitioners can work to mitigate their influence while simultaneously promoting the use of heuristics that yield positive outcomes.

1.4 General methodology

A key contribution of this PhD manuscript is the use of several designs to tap into the drivers and consequences of heuristic processing. By combining quasi-experimental, survey and qualitative analyses the manuscript provides a comprehensive view on the relevance of heuristic processing in the (entrepreneurial) decision processes. The first study in this thesis is based on an experimental design. To investigate the relationships between the variables in the study, we created decision scenarios using best practices from the specialized literature (Aguinis & Bradley, 2014). Specifically, we used vignettes to manipulate both the valence of resources and the gender of the team member making the most significant contribution to a gain or loss within a four-person team. This approach enabled us to construct scenarios that were not only realistic but also articulated in sufficiently general terms to ensure relevance for the majority of participants.

Studies two and three in this thesis employ a cross-sectional design, whereby all variables were collected simultaneously from a single source. To mitigate the potential for common method bias, we incorporated alternative measurement instruments alongside self-report scales. Specifically, we utilized a knowledge test to assess financial literacy (Lusardi & Mitchell, 2006) and employed decision scenarios to evaluate heuristic processing in strategic decision-making contexts. Despite utilizing only four questions to assess financial literacy, prior research demonstrates that this brief test serves as a valid indicator of financial knowledge (van Rooij, Lusardi, & Alessie, 2011, 2012; Ilies et al., 2019).

In evaluating heuristic and intuitive processing, we adapted the approach originally proposed by Fong et al. (1986) and further refined by Busenitz and Barney (1997). This method involves decision scenarios that juxtapose analytical/systematic thinking with heuristic/intuitive thought. Participants are required to select one option in a binary decision-making task while also providing explanations for their choices. These justifications are subsequently coded to categorize them as indicative of either intuitive or analytical thinking.

We assert that this method for assessing heuristic and intuitive thinking is superior to traditional self-report measures. Previous research highlights that attributions to intuition do not always correspond to its actual use in decision-making processes (Blume & Covin, 2011). In contrast, our approach enables a more objective capture of intuitive thinking, thereby enhancing the validity of our findings.

In the fourth study of this thesis, we used a qualitative methodology, specifically content analysis. We designed a semi-structured interview format that allowed addressing general questions regarding a significant decision entrepreneurs had made recently. Additionally, we included targeted questions that directly addressed specific fast and frugal heuristics. To analyze the qualitative data derived from these interviews, we developed a coding scheme following established guidelines found in the literature (Campbell et al., 2013) and systematically coded the interview responses. Study four also incorporates a quantitative component aimed at replicating the results obtained in study three. This integration of qualitative and quantitative methodologies allows us to categorize study four within the framework of a mixed-methods approach, as defined in the specialized literature (Creswell & Plano Clark, 2008).

CHAPTER II. ORIGINAL RESEARCH CONTRIBUTIONS[1]

2.1. Study 1: Sex differences in the allocation of positive and negative resources

2.1.1. Introduction

Whether people adhere to one allocation principle, or another depends on a multitude of factors. One such factor that has a strong impact on allocation preferences is the sex of the person making the allocation (Major & Adams, 1983, Major & Deaux, 1982).

Even though previous research on allocation decisions has investigated sex differences in depth and obtained some consistent and replicable differences, important gaps remain. For instance, most studies have shown that when people have to share a reward between themselves and other people, women adhere to the equality rule, and men adhere to the equity rule (Major & Deaux, 1982; Tornblom, 1992). However, when the participants are third party allocators, the results differ from one study to another (Stake, 1985). Previous research indicates that men tend to prefer equity and display generosity towards women, while women opt for equality and display overall generosity to third parties (irrespective of sex) in resource allocation (Callahan-Levy & Messe, 1979; Reis & Jackson, 1981). But these findings apply only to the allocation of gains. Previous studies have shown that people allocate gains differently to losses, but the results are contradictory. Some of them showed that in the case of losses the rule of equality is preferred, and in the case of gains the rule of equity, but others obtained opposite results, the rule of equity being preferred to a greater extent in the case of losses (De Dreu, 1996; Tornblom & Ahlin, 1998; Tornblom & Jonsson, 1987; Utz & Sassenberg, 2002). To our knowledge, no study has investigated the interaction between resource valence and the sex of the allocator.

It is important to investigate the interaction between resource valence and the sex of the allocator for at least two reasons. First, it allows us to see if sex differences discovered in the domain of gains also apply to the domain of losses. Second, it can be a potential explanation for the contradictory results obtained by studies that investigated the impact of valence of resources on allocation preferences. If the sex of the allocator interacts with the resources' valence, we can expect the results to differ depending on the sample used in the study (whether there are more female or male participants).

To investigate these aforementioned problems, we used an experimental setting consisting of a series of vignettes. The participants in the study (third party allocators) had to

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decide how to share a reward (or a penalty) among the members of a team, in the conditions where one of team members (a male or a female) had a greater contribution to the team's outcome.

2.1.2. Theoretical background

In social psychology, one of the first (and most influential) theories that attempt to explain how people form fairness judgments is Adams' (1965) equity theory. Drawing on Festinger's cognitive dissonance and social comparison theories (Festinger, 1954, 1957) as well as on the social exchange theory (Homans, 1961), the equity theory explains the injustice (inequity) that a person perceives through the discrepancy between his and other persons outcome/input ratios (Tornblom, 1992). Other authors have explored equality as a resource distribution decision rule (Messick, 1993). Equality, in this context, means ignoring individual contributions and offering the same amount of reward (or penalty) to all actors. As equity and equality are two conflicting rules, people have to choose whether they prefer an equitable or rather an equal allocation of resources. Of course, there are other rules that guide allocation decisions, and sometimes people combine several rules to make a fair allocation (see Tornblom & Kazemi, 2015, for a review on allocation principles and rules).

Sex related characteristics and allocation preferences

A prediction that men and women might differ in terms of allocation preferences can be traced back to Deutsch's (1975) theoretical work on the influence of the relationship between people on preference for a particular allocation rule. Specifically, according to Deutsch (1975), when the main goal of a relationship is to increase productivity, the equity rule will be preferred, and when the goal is to maintain harmonious relationships between parties, the equality rule will be preferred. Other authors have argued females' main interaction goal is to achieve social and interpersonal success, while males' main interaction goal is to strive for competitive, exploitative success (Kahn, 1972; Kahn et al., 1980). In line with this reasoning, several studies have investigated these predicted differences and showed that men and women differ in their preference for allocation rules when distributing rewards. In general, in these studies, men show a greater preference for equity and women a greater preference for equality (Austin & McGinn, 1977; Callahan-Levy & Messe, 1979; Greenberg, 1978; Major et al.,1989; Reis & Jackson, 1981). This finding is also consistent with the results of studies that use such simple economic tasks, such as ultimatum and dictator games (Croson & Gneezy, 2009).

When it comes to sharing resources among others, as is done in the third-party allocations' paradigm, the evidence is not conclusive. Some studies have failed to find a difference between the sexes (Austin & McGinn, 1977; Baker, 1974: Greenberg, 1978). Others, however, have shown that differences emerge under certain conditions (Major & Adams, 1982; Stake, 1985). But there is indirect evidence showing that women prefer equality to a greater extent than men in third-party judgments as well. For instance, in moral judgments (which are similar to third-party allocations) women show a greater concern for Care and Fairness (which is usually conceptualized as equality) (Atari et al., 2020; Graham et al., 2013). Thus, we can expect that women will prefer equality to a greater extent than men in third party allocations as well.

One of the conditions that seems to induce differences is the sex of the person for whom the allocation is made, same sex or opposite sex (Major & Deux, 1982). In one of the first studies that considered both the sex of the allocator and recipient, Austin and McGinn (1977) showed that men use the rule of equity when dividing rewards between two other men, and women use a combination of equity and equality when dividing rewards between two other women. Callahan-Levy and Messe (1979) showed that women tended to be more generous with all participants in the study, while men were more generous only with women. Reis and Jackson (1981) showed that there are no differences between the sexes when the sex of the partner is considered, both sexes being more generous with participants of the opposite sex, using the rule of equality, and the rule of equity with participants of the same sex. There is also meta-analytic evidence that in social dilemmas, women cooperate more than men in mixed-sex interactions, but men cooperate more in same-sex interactions than women (Balliet et al., 2011).

In conclusion, research on dyadic allocation shows that men seem to prefer the rule of equity with partners of the same sex, and equality with partners of the opposite sex, while women prefer the rule of equality with partners of opposite the sex. Thus, our first hypothesis is:

Hypothesis 1: Both sexes will use the equality rule with opposite-sex participants, and the equity rule with the same-sex participants, but women's preference for equity with same-sex participants will be lower than men's

Allocation of losses

Early research on allocation decisions focused on the allocation of positive resources, starting from the idea that these conclusions should also apply to negative resources (Sondak,

Neale & Pinkley, 1995). However, this assumption is debatable at least. There is considerable research that shows that negative information and events have an asymmetrical effect on judgements and behavior (Baumeister et al., 2001; Taylor, 1991; Tversky, & Kahneman, 1991). Subsequent studies investigated whether resource valence has an impact on allocation, however these studies reached contradictory results. Some of them have shown that the equality rule is preferred when losses are allocated, and the equity rule when gains are allocated (Tornblom & Ahlin, 1998; Tornblom & Jonsson,1987; Van Dijk et al., 1999). Others, instead, showed that the rule of equity is preferred in the case of losses, and the rule of equality in the case of gains (De Dreu, 1996). In our opinion, a potential explanation for this inconsistency may be the ignoring of potentially important variables such as the sex of the allocator.

Sex differences in the allocation of positive and negative resources

Studies in economic psychology have shown that women are more risk-averse (Charness & Gneezy, 2012: Croson & Gneezy, 2009) and this aversion to risk is likely due to loss aversion (Rau, 2014). One might argue that loss aversion would be particularly relevant to allocations between self and others, and to a lesser extent to third party allocations, where self-concern is not involved. But there are other areas in which women and men differ in terms of reaction to negative stimuli and information. For example, women respond more strongly to negative emotional stimuli (Andreano et al., 2014; Stevens & Hamann, 2012) and are more influenced by negative feedback (Roberts & Nolen-Hoeksema, 1989). This research supports the idea that there is a general difference related to how women and men process negative information and stimuli.

In line with the above arguments, we formulate the following hypothesis:

Hypothesis 2: Women's preference for equity will be stronger in the case of losses, while men's preferences will not be influenced by the valence of resources

2.1.3. Methods

Design

The design of the study was a 2x2x2 mixed factorial experiment with the following factors: the sex of the team member with the highest contribution to the team's outcome (Male vs. Female), resource valence (positive vs. negative), and the order of scenarios (the scenario with positive valence followed by the one with negative valence and vice versa).

Participants

We recruited 1st year undergraduate psychology students enrolled in an Experimental Psychology and Data Analysis Methods course to participate in a study about decision making in team contexts. We conducted a statistical power analysis that showed that in order to detect a small effect of $f = .1$, with alpha .05 and power $(1-\beta) = .8$, a sample size of 280 was needed. A total of 420 students (75 men) with a mean age of 23.78 (SD = 7.60) responded to our invitation.

Materials

In the decision-making scenarios, we presented a situation in which a team consisting of 2 men and 2 women worked on a team project, and the work resulted in either a reward of 1000 $ (due to high performance) or a penalty of 1000 $ (due to exceeding the deadline). One of the members had a higher contribution to the reward (because he worked harder) or to the penalty (because he was late with individual tasks). Beside the valence of the resources, we also manipulated the sex of the person who had the largest contribution to the reward (respectively to the penalty), but this time as a between-subjects variable, with half of the participants receiving scenarios in which a men was responsible for the reward (respectively for the penalty), and the other half receiving scenarios in which a women was responsible for the reward or the penalty.

After reading the scenarios, the participants had to decide how to divide the reward/penalty of 1000$ between the four members of the team, specifying for each member of the team the amount they should receive. For every participant, we computed a standard deviation score of the values, with scores equal to zero representing an equal allocation, and values other than 0, representing an equitable allocation (with higher scores meaning a greater preference for equity). We called this variable Preference for Equity.

Statistical analysis

The main statistical analyses were performed with IBM SPSS Statistics 23 and JASP 0.19.3.0 programs. Power analysis was performed using G*Power 3.1.4 (Faul et al., 2009). Before analyzing the data, we tested the assumptions of homogeneity of variance and normality.

2.1.4. Results

We performed a 2x2x2 mixed analysis of variance, with the valence of resources as a within-subjects factor, the sex of the person in the scenario who had the largest contribution (male vs. female) and order of scenarios as between-subjects factors and the sex of the third-party allocator (male vs. female) as a covariate (see Table 1).

Table 1

Results of the Mixed ANOVA for the Effects of Order, Sex (Manipulated), and Valence on Team Decision-Making

Variable	*F*	*p*	$\eta_p 2$
Between Subjects			
Order	0.142	0.707	0.000
Sex (manipulated)	0.172	0.679	0.000
Order x Sex (manipulated)	0.098	0.754	0.000
Within Subjects			
Valence	30.794	0.000	0.069
Valence x Order	0.844	0.359	0.002
Valence x Sex (manipulated)	0.694	0.405	0.002
Valence x Sex of allocator (covariate)	5.539	0.019	0.013
Covariates			
Sex of the allocator	0.334	0.564	0.001

As expected, the results revealed a significant interaction effect between the sex of the allocator and the resource valence. Women's preference for equity increased in case of losses (even exceeding men's preference for equity); $t(344) = 5.37$, $p < .001$, Cohen's $d = .28$. In contrast, men's preference for equity was not influenced by the valence of resources; $t(74) = .38$; $p = .970$, Cohen's $d = .00$. Thus, we can conclude that hypothesis 2 was supported by the data.

It should also be mentioned that the main effect of resource valence was statistically significant, the preference for equity being greater in the case of losses than in the case of gains. But this main effect was entirely due to the change of preferences in the case of women.

Contrary to our expectations (Hypothesis 1), the sex of the person who had the largest contribution had no effect on allocation preferences and did not interact with the sex of the allocator or with the resource valence (see Table 2).

2.1.5. Discussions

In this study, we investigated the impact of the sex of the allocator, the sex of the person who had the largest contribution to a gain or a loss situation, and the valence of resources on allocation decisions. Contrary to our expectations, the allocators' decisions were not influenced by the sex of the person who had the greatest contribution in the group. It should be mentioned that unlike most previous studies that investigated allocations in dyads (e.g., Reis & Jackson, 1981), our study addressed allocations within teams, thus it is possible that in the case of teams, the sex of the person who contributed more to the gain or the loss is an input with a lower weight in the allocation decisions.

Regarding the relationship between the sex of the allocator and the valence of resources, our results were similar to those of previous studies in terms of gains (Major & Deux, 1982), with women preferring equality to a greater extent than men. Thus, even in the third-party paradigm, where self-interest motives are not involved, these differences emerge. However, as predicted, these results did not apply in the case of losses. When women have to allocate resources with negative valence, our results showed that women's preference for equity increases (being even greater than men's preference for equity). In accordance with our expectations, in the case of men, the preference for equity or equality was not influenced by the valence of resources. Thus, our results show that women are more sensitive to information related to resource valence, an effect that may be due to women's greater loss aversion (Charness & Gneezy, 2012) and/or greater sensitivity to context (Kahn et al., 1971).

The fact that the gender of the person with the highest contribution has no effect on allocation decisions is unexpected. It is possible that this result is due to the characteristics of the task chosen in this study or to the characteristics of the sample (in other words, it is possible that in a population of non-students the expected effects would occur).

This study has some limitations. First of all, the smaller number of male participants could influence the results. The fact that the design was not balanced in terms of the sex of the allocator reduced the statistical power related to this variable. Then, the study participants are psychology students, so the results cannot be easily extrapolated to other relevant populations, such as team leaders in organizations.

Future research could investigate whether the results also apply when the self-other paradigm is used. In this case, the sex differences between gains and losses could be even more pronounced, because losses have a greater impact when self-concern motives are present

(Sondak et al., 1995). Future studies should also investigate the relationship between sex related characteristics and resource valence in other types of tasks and context.

2.2. Study 2: Cryptocurrencies and the Entrepreneurial Mindset: The Role of Financial Literacy in Driving Adoption

2.2.1.Introduction

Cryptocurrencies and digital entrepreneurship have become a modern reality (Phillips et al., 2023; Rawhouser et al., 2023; Saiedi et al., 2021). The use of cryptocurrency in entrepreneurship is a key component of digital entrepreneurial finance (Martino et al., 2020) and social media played an important role in disseminating information related to the technologies backing cryptocurrencies and their potential use (Bogusz et al., 2020). As novel transaction technologies in a well-established global financial market, cryptocurrencies bring forth both opportunities as well as threats to economic actors (Arsi et al., 2022; Demertzis & Wolff, 2018; Rawhouser et al., 2023). The most influential theoretical framework that tackled the adoption of cryptocurrencies in entrepreneurship builds on the Institutional Theory (Zucker, 1987), explaining intention to use cryptocurrency as a results of the institutional legitimation processes that emerge through rhetorical strategies (Phillips et al., 2023). Literature to date explored information exchange via social media (Bogusz et al., 2020), and theorized the institutional legitimation processes that drive cryptocurrency adoption (Phillips et al., 2023).

We extend this literature by exploring individual differences and attitudinal factors as antecedents of the intention to adopt cryptocurrencies in entrepreneurship. We build on financial literacy literature (Lusardi & Mitchel, 2014; Lusardi, 2019) and argue that entrepreneurial differences in their capacity to understand financial matters and effectively deploy various financial skills predict their intention to adopt cryptocurrencies. Moreover, we build on the Threat Rigidity Model (Staw et al., 1981) to argue that the way in which entrepreneurs perceive the opportunities and threats associated with cryptocurrencies are key attitudinal contingencies for the intention to use cryptocurrencies. On the one hand we argue that perceived opportunities in terms of transparency, access to global market and potential for new business models (Gomber et al.,2017; Matanovič, 2017; Schär, 2021) increase entrepreneurs' intention to use cryptocurrencies in their business. On the other hand, we argue that perceived threats related to price volatility, legal discrepancies and cybersecurity risks (Afzal & Asif, 2019; Arsi et al., 2022; Baur et al., 2018;) are factors that reduce the likelihood of using cryptocurrency in business.

Experience, financial literacy, and the perception of opportunities

Prior knowledge, experience, and expertise are among the most important factors that explain why some entrepreneurs recognize opportunities and initiate businesses, while others do not (Ardichvili et al., 2003; Mary George et al., 2016; Shane, 2000). There is a wealth of previous research that supports the positive effect of prior knowledge and experience on opportunity perception, recognition, and discovery (Ardichvili et al., 2003; Cliff et al, 2006; Corner & Ho, 2010; Marvel & Droege, 2010; Shane, 2000; Shane & Venkataraman , 2000; Zahra et al., 2005). According to Baron (2006) the recognition of opportunities depends partly on the mental frameworks developed based on previous experience and stored in the long-term memory. These frameworks, which may take the form of cognitive schemas, prototypes or exemplars, allow individuals to connect apparently unrelated information into patterns suggestive of new business opportunities (Baron, 2006). The content of these mental frameworks depends on previous life experiences (such as work or educational experiences) and knowledge accumulated over time, which help entrepreneurs form richer prototypes and store a greater number of examples of "successful opportunities" (Baron & Ensley, 2006). We build on these cognitive models of opportunity recognition in entrepreneurship to argue that entrepreneurial experience has a positive association with the perceived opportunities related to the use of cryptocurrencies.

Hypothesis 1: Entrepreneurial experience has a positive association with the perceived opportunities related to the use of cryptocurrencies in business.

A particular type of knowledge that can be useful to (at least some) entrepreneurs is financial and economic knowledge, also known in the literature as "financial literacy". Financial literacy can be defined "as knowledge of basic economic and financial concepts, as well as the ability to use this knowledge and other financial skills to manage financial resources effectively for a lifetime of financial well-being" (Hung et al, 2009, p. 12). Thus, financial literacy can be seen primarily as expertise and (technical) knowledge related to the fields of finance and economy. Previous work has highlighted the importance and benefits of financial literacy at the individual, business, and society levels (Abad-Segura & Gonzalez-Zamar, 2019; Guiso & Viviano, 2015; Lusardi & Mitchel, 2014; Lusardi, 2019). Because financial literacy is reflected in the broad span of knowledge and skills necessary to make informed financial decisions, including understanding investment risks, financial instruments, and market dynamics (Lusardi, 2019; Lusardi & Mitchel, 2014) we expect that financial literacy is a key antecedent for identifying opportunities in relation to the use of innovative digital financial tools.

In line with arguments presented by Baron (2006) and Gregoire et al. (2010), we can expect that the more (financially) literate entrepreneurs have richer and more diverse cognitive representations regarding the financial dimension of businesses, enabling them to connect the dots between seemingly unrelated events and facilitating the comparisons between the new and existing information. In turn, these processes will lead to the perception of new business opportunities regarding financial issues. In line with previous research showing that financial literacy fosters the recognition of opportunities (Anwar et al., 2020; Kang & Park, 2024), we expect the more financially literate entrepreneurs to recognize more opportunities related to innovative financial instruments such as cryptocurrencies.

Hypothesis 2: Financial literacy has a positive association with perceived opportunities associated with using cryptocurrency in business

Previous work, both theoretical (Krueger et al., 2000) and empirical (Hassan et al., 2020; Hou et al., 2022), supports the idea that opportunity recognition is an important antecedent for the intention to create or develop businesses. Moreover, students scoring high on recognition of opportunities trait, report stronger intentions to become entrepreneurs (Lim et al., 2023). Even though the recognition of opportunities is fundamental to entrepreneurship, it is not enough (Shane & Venkataraman, 2000), as in order to be successful entrepreneurs have to act and capitalize on such opportunities. Therefore, opportunities are constantly evaluated to decide whether they are worth exploiting (Ardichvili et al., 2003; Shane & Venkataraman, 2000) and many perceived opportunities will ultimately not be exploited. We see therefore the recognition of entrepreneurial opportunities in innovative financial instruments such as cryptocurrencies as the starting point of an evaluation process that ultimately leads to adoption.

Entrepreneurs scoring high on financial literacy are more aware of the broad range of benefits linked to using cryptocurrencies into entrepreneurial activities, ranging from making financial transactions more efficient by reducing transaction costs (Matanovič, 2017), elevating security when contemplating global markets expansion (Gomber et al., 2017), to access to smart contracts and novel financing models such as crowdfunding (Schär, 2021). These perceived opportunities, tied to elevated financial knowledge and skills make entrepreneurs more likely to consider cryptocurrencies as a valuable financial tool while seeking to differentiate their businesses, reduce costs, and leverage innovative financial technology. Thus, we expect the perception of opportunities to mediate the positive relationship between financial

literacy and experience on the one hand and the intention to use cryptocurrencies in business on the other hand.

Hypothesis 3: Perceptions of opportunities related to cryptocurrencies mediate the positive association between (a) entrepreneurial experiences and (b) financial literacy on the one hand and the intention to use cryptocurrency in business on the other hand.

Moderation hypotheses

While the perception of opportunities in relation to cryptocurrency is positively associated with entrepreneurial intention to use this financial innovation, perceived threats have the opposite effect. We build on the conceptualization of external organizational threats discussed in Connelly and Shi (2022) across the PESTLE dimensions (Political, Economic, Social, Technological, Legal and Environmental external factors), to argue that cryptocurrencies can also harm entrepreneurial activities as they present significant economic risks (stemming from market volatility), raise legal challenges (regulatory discrepancies and uncertainty) and bring technological (cybersecurity risks) and social threats (limited consumer protection) (Baur et al., 2018; Arsi et al., 2022; Afzal & Asif, 2019). According to the Threat Rigidity Hypothesis, (Staw et al., 1981) individuals, groups, and organizations show a restriction in information processing and a centralization of power and control when encountering threats and as a consequence fall back on old routines and engage in rather rigid responses (Mazzei et al., 2024). Because of this rigidity, we can expect that the positive relationship between financial literacy and intention to use cryptocurrencies will be attenuated by perceived threats in relation to cryptocurrencies.

Threats and opportunities are interpretations of changes emerging in the environment, including financial and economic. Thus, where some entrepreneurs see financial threats, others see opportunities. Yet, in situations where complex changes occur such as the emergence of complex financial technologies (cryptocurrencies, bitcoin), the same entrepreneur may perceive both opportunities and threats related to these innovative technologies. Previous research on attitude formation shows that the same event or stimulus can be perceived both negatively and positively (Cacioppo & Bernston, 1994). Moreover, previous studies show a weak negative correlation between perceived threats and opportunities, which shows that the two perceptions can coexist (Krueger & Dickson, 1994; Iederan et al., 2013). We argue that the intention to use cryptocurrencies reflects such a dynamic interplay between financial literacy

and perceived opportunities on the one hand and perceived threats in relation to cryptocurrencies on the other hand.

Hypothesis 4: Perceived threats attenuate the positive association between financial literacy and the intention to use cryptocurrencies in business.

Hypothesis 5: Perceived threats related to cryptocurrencies attenuate the positive association between perceived opportunities and intention to use cryptocurrency in business

2.2.2. Methods

Sample

We collected data from a sample of 134 entrepreneurs of small and medium-sized enterprises in Romania (39 women, with an average age of just above 37 years old) from various industries (tourism, sport, services, ICT, commerce, real estate, etc) in the Cluj-Napoca region in Romania.

Scales and procedure

Perceived opportunities regarding cryptocurrencies were evaluated with a three-item scale developed originally to capture threats associated with institutional change in Iederan et al., (2013). We have adapted the content of the items by asking participants to estimate the extent to which cryptocurrencies bring various business opportunities.

Perceived threats in relation to cryptocurrencies were evaluated with a three-item scale adapted from Iederan et al (2013). A sample item is "The use of cryptocurrencies will bring new threats and risks for my company". Cronbach's alpha for this scale is .68 and omega is .73, indicating a reasonable internal consistency for this scale.

Financial literacy was evaluated with an objective four-item knowledge test related to inflation, risk diversification, and interest compounding, containing four items developed by Lusardi and Mitchell (2006).

Intention to use cryptocurrency in business was evaluated with a single item, asking participants to report the likelihood of using cryptocurrency in the future ("Please rate the likelihood of using cryptocurrency in your company in the future"). Answers were recorded on a 1 (not likely at all), to 5 (very likely) Likert scale. This approach is aligned with the research on technology acceptance and previous research on cryptocurrency (Arias-Oliva et al., 2019).

2.2.3. Results

In order to test our hypotheses we have used the PROCESS macro, version 4.2 for SPSS (Hayes, 2012). The results of the stepwise approach are presented in Table 1 with heteroskedasticity consistent standard errors estimators (Hayes & Cai, 2007).

Table 1.

Results of the regression analyses for intention to use cryptocurrency.

	Intention to use		Perceived opportunities
	Model 1	Model 2	
Constant	2.87***(.61)	2.81*** (.44)	2.56*** (.63)
Gender	-.56* (.22)	-.42* (.19)	-.08 (.19)
Age	-.009 (.001)	-.004 (.01)	.001 (.01)
Education	.02 (.08)	.05 (.06)	-.01 (.07)
Entrepreneurial experience	-.02 (.02)	-.01 (.02)	-.03 (.02)
Organization size	.004 (.005)	.003 (.004)	.002 (.004)
Financial literacy (FL)	.22* (.11)	.08 (.08)	.22* (.11)
Perceived threats (PT)		-.29** (.10)	
Perceived opportunities (PO)		.76*** (.09)	
FLxPT		-.27** (.10)	
PoxPT		.0002 (.08)	
R^2	.13	.56	.07
F statistic	2.34*	16.44***	1.79†

Note: gender was coded as a dummy variable 0=men, 1=women;; unstandardized regression coefficients are shown with robust standard errors between parentheses (the H3 estimator was used); ***p<.001 **p<0.01, and *p<.05. † p<0.10

Entrepreneurial experience had a non-significant association with perceived opportunities regarding cryptocurrencies (B = -.03, SE = .02, p = .11), therefore Hypothesis 1 was not supported by the data. Financial literacy had a positive association with the perceived opportunities concerning cryptocurrency (B = .22, SE = .11, p = .03) therefore Hypothesis 2 was fully supported by the data. The conditional indirect association between financial literacy and intention to use cryptocurrency was significant irrespective of the level of perceived threats (for low levels of threats *indirect effect* = .17, SE = .08, 95%CI [.01,.33]; for average levels of perceived threats *indirect effect* = .17, SE = .08, 95%CI [.01,.34]; for high levels of threats *indirect effect* = .17, SE = .09, 95%CI [.01,.36]). Therefore, we can conclude that Hypothesis 3b was fully supported by the data. As the association between entrepreneurial experience and perceived opportunities regarding cryptocurrencies was not supported, the mediating role of perceived opportunities in the relation between entrepreneurial experience and intention to use cryptocurrencies, as stated in Hypothesis 3a was not supported. The interaction effect between perceived threats and perceived opportunities on the intention to use cryptocurrencies was not significant (B = .0002, SE = .08, p = .99), therefore Hypothesis 4 was not supported. The interaction effect between financial literacy and perceived threats was a significant predictor of intention to use (B = -.27, SE = .10, p = .007), with perceived threats attenuating the positive association between financial literacy and intention to use cryptocurrency in business, therefore Hypothesis 5 was fully supported.

2.2.4. Discussion

Our results contribute to the previous literature showing that prior financial skills, knowledge, and expertise are important antecedents for entrepreneurial opportunity recognition and intention (Alshebami & Al Marri; Anwar et al., 2020; Kang & Park, 2024). Also, our study is one of the first empirical attempts to investigate the relationship between financial literacy and the intention to use new financial instruments such as cryptocurrencies in businesses. Also, given the diversity of the sample in terms of industry provenance, we consider that the results can generalize broadly across entrepreneurial fields.

Second, our results show that entrepreneurial experience was not positively and significantly associated with perceived opportunities in relation to using cryptocurrency in business. A potential explanation of this result is that although entrepreneurial experience helps individuals identify entrepreneurial opportunities in general, the use of cryptocurrencies is a specific financial innovation that is not perceived yet as bringing substantial changes in terms of entrepreneurial opportunities.

Third, in line with the predictions of threat rigidity theory (Staw et al., 1981), our results show that the perception of threats attenuates the positive relationship between financial literacy and the intention to use cryptocurrencies. Contrary to our expectations, the perception of threats does not moderate the positive effect of literacy on the perception of opportunities. Together, these results answer the calls for explore the conditions of rigidity reactions in a novel context (Mazzei et al., 2024), suggesting that the perception of threats leads to rigidity especially at the behavioral or pre-behavioral level and not at the cognitive level, in which entrepreneurs do not intend to exploit the opportunities they perceive.

2.3. Study 3: A glimpse into entrepreneurial cognition: The moderating role of financial literacy in the relationship between entrepreneurial experience and intention as mediated by heuristic information processing

2.3.1. Introduction

Previous studies show a clear tendency of entrepreneurs to rely (at least on certain) decision heuristics and intuition in order to simplify highly complex decision situations (Allinson et al., 2000; Busenitz & Barney, 1997; Gilbert-Saad et al., 2023). Some of the heuristics used by entrepreneurs are derived from entrepreneurial experience and are used to design viable decision options or strategies when it is not possible to rely on objectively correct information, or when entrepreneurs have to imagine plausible futures in the absence of actionable knowledge in the present (Gilbert-Saad et al., 2023). Some authors have explained entrepreneurs' reliance of decision heuristics through their preference for intuitive/heuristic thinking that can be advantageous in situations of uncertainty, risk, ambiguity and time pressure, such as entrepreneurship environment (Busenitz & Barney, 1997; Simon et al., 2000), yet this explanation was not extensively tested. In their review of entrepreneurial cognition, Gregoire et al (2011) discuss several possible explanations for heuristic information processing in entrepreneurship, considering that these can be grouped into two large categories: factors that precede entrepreneurial activity, and factors related to the entrepreneurial activity itself. In light of the adaptive use of design heuristics in entrepreneurial choices (Gilbert-Saad et al., 2023) we argue that previous entrepreneurial experiences is essential for understanding why entrepreneurs tend to rely on intuitive and heuristic decision-making processes.

Entrepreneurial intention is a construct that precedes entrepreneurial activity and, not surprisingly, previous research has studied intention mainly among students or non-entrepreneurs (Moriano et al., 2011; Gorgievski et al., 2018). Exploring the nature of the relationship between heuristic/intuitive processing and entrepreneurial intention can provide insights into whether entrepreneurs truly favour such heuristic decision-making and are naturally inclined to engage in future entrepreneurial activities, as suggested by Busenitz and Barney (1997). We further contend that financial literacy can provide deeper insights into the relationship among the constructs discussed. Financial knowledge serves as an essential resource for entrepreneurs in various decision-making contexts. Therefore, we sought to test a model where the relationship between experience and future entrepreneurial intention is mediated by heuristic/intuitive processing, with financial literacy acting as a moderator between experience and heuristic processing, as well as influencing the indirect effect.

The role of experience in the development of heuristics and intuition

Previous research supports the idea that experience influences both heuristics and the intuitive processing that entrepreneurs employ when making business decisions. Literature to date has documented heuristics that are generic and impact on decisions in similar ways across the general population (Tversky & Kahneman, 1974; Gigerenzer & Gaissmaier, 2011), while some other decision heuristics are rather specific and derived from experience (Lock & Hinnen, 2016) and encapsulate generic information processing tendencies that synthesize the complexity of available information along decision lines that are developed through experience and tested throughout life in decision contexts sharing some similarities.

With regard to the first category, numerous studies based on the heuristics and biases model established by Tversky and Kahneman (1974) have demonstrated that entrepreneurs tend to rely more heavily on heuristics and biases—such as representativeness, overconfidence, and optimism—compared to other professionals (Busenitz & Barney, 1997; Cossette, 2014; Forbes, 2005). There is also evidence that entrepreneurs utilize certain heuristics from the fast and frugal heuristics paradigm, such as similarity and satisficing (Berg, 2014). Beyond empirical evidence, it can be argued that by definition some of the heuristics mentioned, such as representativeness or similarity, are based on mental models (such as schemas, prototypes or exemplars) formed as a result of past experience.

Previous research shows that repeated experiences of entrepreneurs lead to the formation/acquisition of specific heuristics. For example, Bingham and Eisenhardt (2011) showed that organizations develop a portfolio of heuristics from their experiences that allows firms to effectively seize fleeting opportunities in fast-moving markets, improving performance especially in complex strategic decisions. Building on the concept of design heuristics (Gilbert-Saad et al., 2023) argue that heuristic information processing emerges from experience and helps entrepreneurs to imagine possible futures in the absence of clear information in the present and to decide creatively when rational methods that rely on correctly combining and judging available information are not feasible.

Hypothesis 1: Previous entrepreneurial experience is positively associated with heuristic/intuitive processing in decision making

Heuristic processing and entrepreneurial intention

Some previous research supports the notion that intuitive cognitive styles positively influence entrepreneurial drive, suggesting that intuition and heuristics may provide entrepreneurs with a distinct advantage in navigating uncertainties within the business landscape (Armstrong & Hird, 2009). Conversely, drawing from the "heuristics and biases" theory (Tversky & Kahneman, 1974), it can be expected that an overreliance on heuristics may result in cognitive biases that adversely affect entrepreneurial performance, subsequently diminishing entrepreneurial intention. For example, such biases may distort entrepreneurs' perceptions of risk, resulting in poor decisions that jeopardize the success of their ventures. Therefore, while heuristics and intuition might initially fuel entrepreneurial drive, which allows entrepreneurs to generate the commitment needed for success (Simon et al., 2000), an excessive dependence on these cognitive shortcuts could ultimately reduce both entrepreneurial performance and intention.

Although we acknowledge the positive role of heuristic information processing in situations of extreme uncertainty (Bingham & Eisendardt, 2011; Gilbert-Saad et al., 2023), most entrepreneurial choices are not made under such extreme circumstances. Therefore, in the context of this study, we position heuristic thinking as a counterpart to analytical thinking and we propose that heuristic decision-making may be negatively correlated with entrepreneurial intention, primarily due to the biases that often accompany reliance on intuition. Therefore, our second hypothesis is:

Hypothesis 2: Heuristic/intuitive processing in decision making is negatively associated with future entrepreneurial intention

Beyond the direct effect of experience on heuristic/intuitive processing and the direct effect of heuristic processing on intention, we expect heuristic processing to mediate the relationship between experience and entrepreneurial intention. Consequently, we anticipate that heuristic/intuitive processing will serve as a cognitive mechanism for entrepreneurs that emerges from experience but ultimately results in diminished entrepreneurial intentions.

Hypothesis 3: Heuristic/intuitive processing will mediate the relationship between the entrepreneurial experience and future entrepreneurial intention

The role of financial literacy

A specific form of knowledge that can benefit certain entrepreneurs is financial and economic expertise, commonly referred to in the literature as "financial literacy." Financial

literacy can be defined "as knowledge of basic economic and financial concepts, as well as the ability to use this knowledge and other financial skills to manage financial resources effectively for a lifetime of financial well-being" (Hung et al, 2009, p. 12).

Since financial literacy encompasses a technical understanding of economics and finance, we can expect that it serves as a vital resource for entrepreneurs who approach their decision-making in a more systematic and analytical way. As individuals gain experience, those who lack financial literacy may be more likely to rely on heuristics and intuition, which can often lead to cognitive biases and suboptimal decision-making. In contrast, financially literate individuals are better equipped to integrate their experiences with analytical thinking, enabling them to navigate complex financial decisions effectively (Riaz et al., 2022). Drawing from this argument, we anticipate that financial literacy will moderate both the relationship between experience and heuristic/intuitive processing, as well as the indirect relationship between experience and entrepreneurial intention, mediated by heuristic/intuitive processing.

Hypothesis 4: Financial literacy will moderate the relationship between entrepreneurial experience and heuristic processing, the relationship being stronger for entrepreneurs with a lower level of financial literacy

Hypothesis 5: Financial literacy will moderate the indirect effect of prior experience on future entrepreneurial intention (via heuristic processing), the effect being stronger for a low level of financial literacy.

2.3.2. Methods

Participants

The study sample consisted of 151 Romanian owner-managers of small firms (up to 200 employees). Similar to previous research (Iederan et al., 2009), we therefore use a broader definition of entrepreneurship as decision-makers that are in charge of leading companies they also own. Of these, 12 participants were eliminated due to incomplete or uncategorizable responses regarding the heuristic decision making variable. The resulting sample consists of 139 entrepreneurs (45.3% women) with an average age of 35.42 (standard deviation=11.07, minimum=20, maximum=60).

Measures

Entrepreneurial experience was evaluated by the number of years the person has been an entrepreneur and we consider this indicator to be a rather objective measure of the experience gathered by the entrepreneurs throughout life

Financial literacy was evaluated with four questions regarding basic and advanced financial knowledge about interest compounding, inflation and risk diversification (Lusardi & Mitchell, 2007). The total score for financial literacy can fluctuate between 0 (no correct answer) and 4 (all answers are correct).

Entrepreneurial intentions were assessed with the scale developed by Linan & Chen (2009). This scale consists of 6 Likert type items that measure the intention to become an entrepreneur/open a company. Given that in this study we were interested in the entrepreneurial intention of current entrepreneurs, the items were modified so as to capture entrepreneurial intention in relation to new businesses. Cronbach's alpha for this scale was .856.

Risk-taking was assessed using the financial subscale (which can be further decomposed into gambling and investment) from the domain specific risk-taking (DOSPERT) scale (Blais & Weber, 2006). Cronbach's alpha for this scale was .767.

Heuristic decision making was evaluated using a procedure centered around the identification of heuristic thinking, adapted from Busenitz and Barney (1997) originally proposed by Fong et al (1986). Following Busenitz and Barney (1997) we created 3 decision scenarios that conflict the heuristic decision making with the more analytic one.

Next, all responses were coded using Fong's scheme (1986) and adapted by Barney and Busenitz (1997). Thus, all answers in which the participants appealed to intuitive, heuristic were coded with one. The answers in which the use of statistical data and optimization/maximization are present were coded with 0 (for example: I would need more information to make a decision, it is good to analyze the market as well as possible). The coding results were summed for each participant, so that a score from 0 to 3 was obtained (0 representing the use of analytical thinking in all scenarios, 3 representing the use of heuristic thinking in all 3 scenarios).

Statistical analysis

In the present study, statistical analyses were conducted using Hayes' PROCESS macro for SPSS (version 23), specifically employing Model 4 to test for mediation effects and Model 7 to examine the moderated mediation effect.

2.3.3. Results

Table 1.

Descriptive statistics

	Mean	SD	1	2	3	4	5	6	7
(1) Sex	0.45	0.5	1						
(2) Age	35.42	11.07	.059	1					
(3) Experience	7.15	6.93	-.035	.655**	1				
(4) Risk	28.46	6.12	.082	.152	.143	1			
(5) Financial literacy	2.40	1.04	-.151	.123	.087	.018	1		
(6) Heuristic processing	1.76	0.98	.104	.216*	.245**	.036	-.127	1	
(7) Entrepreneurial intention	22.00	5.90	-.241**	-.243**	-.167*	-.181*	.198*	-.253**	1

Notes: sex was coded as a dummy variable with 0= men and 1= women.

Descriptive analyses (means, standard deviations and correlations) are presented in Table 1. Table 2 presents the regression analyses. Models 1 and 3 in the table are the results of the mediation analysis performed with model 4 of the Hayes' PROCESS macro, in which experience is the predictor, heuristic processing the mediator and future entrepreneurial intention the criterion. Also, the control variables gender and risk propensity were introduced as covariates in the model. Model 2 contains the interaction effect between experience and financial literacy on heuristic processing, and model 4 contains the index of moderated mediation.

Table 2.

Regression analysis results

	Model 1	Model 2	Model 3	Model 4
	Heuristic processing	Entrepreneurial intention	Heuristic processing	Entrepreneurial intention
Constant	1.225** (.430)	26.894** (2.558)	.577 (.474)	29.150** (2.313)
Sex	.182 (.164)	-2.250* (.954)	.188 (.160)	-2.504** (.955)
Risk-taking	-.001 (.013)	-.139 (.077)	.0008 (.013)	-.136 (.078)
Experience (Ex)	.037** (.011)	-.105 (.070)	.121** (.031)	-.089 (.071)
Financial literacy (FL)	-.127 (.078)	.902 (.457)	.111 (.112)	
Heuristic processing (HP)		-1.070* (.498)		-1.207* (.499)
Ex x FL			-.032** (.011)	
Index of moderated mediation				.039* (.020) [.004;.09]
R square	.090	.169	.145	.144
F statistic	3.34*	5.41**	4.52**	5.67**

Note: sex was coded as a dummy variable 0=men, 1=women;; unstandardized regression coefficients are shown with standard errors; **p<0.01, and *p<.05.

The direct effect of experience on heuristic processing is statistically significant even in the presence of the other variables included in regression analyses (see models 1 and 3 in Table 2). Thus, we can conclude that the first hypothesis is supported by the results. The effect of heuristic processing is negative and statistically significant in the regression analyses (see models 2 and 4 in table 2). Thus, we can conclude that hypothesis 2 is supported by the data.

Hypothesis 3 refers to the indirect effect of experience on future entrepreneurial intention through heuristic processing. To test the indirect effect, we used the bootstrap estimated confidence interval. The value of the indirect effect is -.039, and a 95% CI [-.117, -.0006] did not include zeroThus, hypothesis 3 is supported by the data.

As can be seen in Table 2 (model 3) the interaction effect between experience and financial literacy is statistically significant (*B = .032, SE = .011, p = .004*). The R squared due to the interaction has a value of .054, which means that more than 5% of the variance in heuristic processing is explained by the interaction between experience and literacy. We can conclude that hypothesis 4 is supported by the data.

Regarding the indirect conditional effect (hypothesis 5), we can observe (model 4) that the index of moderated mediation was significant (B=.039, SE=.02), as the 95% bootstrap confidence interval with is [.004; .085] and thus does not include zero. The significant index of moderated mediation shows that the indirect association between entrepreneurial experience and entrepreneurial intention is explained through heuristic information processing only when financial literacy is low and average and not when financial literacy is high. The three levels of financial literacy were established in the same way as for the interaction effect between experience and financial literacy on heuristic processing, using the standard deviation method. For a low level of financial literacy the effect is -.093, *SE = .047, 95% C.I [-.199; -.014]*, for average level of financial literacy the effect is -.051, *SE = .030, 95% C.I [-.125; -.005]*, for high level of financial literacy the effect is -.01, *SE = .024, 95% C.I [-.073; .026].* Thus, the indirect effect of entrepreneurial experience on entrepreneurial intention via heuristic processing decreases proportionally with financial literacy, therefore we can conclude that hypothesis 5 was supported by the data.

2.3.4. Discussion

In this study, we explored the mediating role of heuristic processing in the relationship between experience and future entrepreneurial intention, as well as the moderating influence of financial literacy in this mediation. Our findings indicate that entrepreneurial experience positively predicted correlated heuristic/intuitive processing. This outcome aligns with the notion that, over time, through repeated experiences, entrepreneurs develop a set of mental frameworks that enables them to make swift decisions based on intuition and heuristics (Klein, 2015). This finding indicates that, at least to some extent, entrepreneurs' reliance on heuristics and intuition can be attributed to their accumulated entrepreneurial experience. Our findings

also indicated that heuristic/intuitive processing was negatively correlated with future entrepreneurial intention. This outcome is particularly noteworthy and contradicts Busenitz and Barney's (1997) idea that people with a more intuitive style are attracted to the entrepreneurial context. In contrast, our results suggest that those with a more analytical approach are more likely to wish to continue their entrepreneurial endeavours. This interpretation is further bolstered by the moderating effect of financial literacy within this model. Financial literacy serves as a buffer, indicating that the relationship between experience and heuristic processing, along with the mediating effect of heuristic processing, is only significant at lower levels of financial literacy. Therefore, the moderating effect of financial literacy suggests that experiential learning can yield more favourable outcomes when accompanied by a solid foundation of financial knowledge, thereby presenting a dual pathway where individuals with heightened financial literacy are more adept at overcoming the pitfalls associated with reliance on intuition and heuristics.

Future research should investigate, not only the number of years of experience, but also the specific mechanisms through which experience cultivates more heuristic and intuitive thinking. Entrepreneurial success or failure may play a significant role in this process. Furthermore, our assertion that heuristic thinking is linked to cognitive biases conflicts with findings from some previous studies. Additionally, combining intuitive thinking with analytical reasoning could yield particularly beneficial outcomes for entrepreneurs (Baldacchino et al., 2023; Bingham & Eisenhardt, 2011; Kickul et al., 2009). We join voices calling for more research on entrepreneurial creativity (Purc et al., 2023) to ask for more research that explores the role of heuristic information processing as an antecedent of entrepreneurial creativity.

An important limitation of our study is that the cross-sectional nature of the design does not allow us to formulate cause-effect relationships. Perhaps a longitudinal investigation of the observed effects would allow us to reach some more definitive conclusions. Although we used a cross-sectional design in which most of the variables were assessed by using the same source, the interaction effect is unlikely to be overestimated by the common method bias as indicated in the simulation study of Siemsen et al (2010).

2.4. Study 4: Fast and frugal heuristics in entrepreneurial decision-making. A mixed method approach

2.4.1. Introduction

Previous research indicates that entrepreneurs frequently rely on heuristic and intuitive processing when making critical decisions (Allinson et al., 2000; Busenitz & Barney, 1997). Numerous studies have highlighted the use of the representativeness heuristic among entrepreneurs, often revealing tendencies towards overoptimism and overconfidence (Busenitz & Barney, 1997; Forbes, 2005). These investigations predominantly stem from the heuristics and biases framework established by Tversky and Kahneman (1974), which often characterizes heuristics in a negative light. In contrast, a more contemporary perspective, championed by Gigerenzer and collaborators, reframes heuristics as valuable decision-making strategies that can be advantageous for decision-makers in specific contexts (Gigerenzer & Goldstein, 1996; Gigerenzer & Todd, 2000). This paper aims to examine the use of fast and frugal heuristics in the strategic decisions made by entrepreneurs through a mixed-method approach. More specifically, we sought to examine the degree to which entrepreneurs employ fast and frugal heuristics in their strategic decision-making processes. Our approach is twofold: it is confirmatory, as it is grounded in a theoretical framework (fast and frugal heuristics and ecological rationality framework), while also exploratory, allowing us to analyze the specific manner in which entrepreneurs use these heuristics.

2.4.2. Theory

Fast and frugal heuristics

Ecological rationality is a conceptual framework that extends the notion of bounded rationality (Simon, 1955), emphasizing the fit between decision-making heuristics and environmental contexts (Gigerenzer & Goldstein, 1996). This model posits that different decision-making strategies are adapted to specific environmental structures, suggesting that the effectiveness of a heuristic is not universal but rather contingent upon situational factors (Gigerenzer & Todd, 2000). According to this perspective, heuristics are understood as cognitive shortcuts that enable individuals to navigate complex and uncertain environments by relying on simple rules rather than exhaustive information processing (Gigerenzer & Todd, 2000).

Fast and frugal heuristics in entrepreneurship

Previous research on entrepreneurial cognition has focused mainly on heuristic and biases framework (see Cossette, 2014 for a review) and generally has given limited attention to the exploration of fast and frugal heuristics; however, the number of studies using this framework is growing (Cristofaro & Giannetti, 2021; Loock & Hinnen, 2015).

Satisficing

Even though it was not originally proposed as a heuristic, the satisficing principle can be viewed as a heuristic strategy that assists decision-makers in making choices with minimal information in complex situations. According to Herbert Simon (1955), satisficing is the opposite of maximizing and refers to the selection of a decision option that is good enough. Thus, decision-makers establish a fixed or variable aspiration level and begin searching for decision options, choosing the first one that meets their aspiration criteria (Artinger et al., 2015).

It can be argued that in conditions of uncertainty and increasing complexity, the pursuit of maximization becomes unrealistic, compelling entrepreneurs to rely on satisficing strategies (Artinger et al., 2015). Furthermore, satisficing can facilitate quicker decision-making, allowing entrepreneurs to act swiftly before their competitors do. By opting for satisfactory solutions rather than exhaustive evaluations, entrepreneurs can manage their cognitive load effectively, positioning themselves advantageously in competitive markets. In one of the few studies that explicitly investigated the satisficing heuristic, Berg (2014) showed that successful entrepreneurs rely on a low level of aspirations when choosing a new location for their business.

Take the best

Another heuristic strategy introduced by Gigerenzer and colleagues is "take-the-best" (Artinger et al., 2015). According to this strategy, a decision-maker ranks cues according to their relevance or validity for the decision at hand. If the first cue successfully distinguishes between alternatives and identifies a superior option, the decision-maker selects that choice. If it does not, they proceed to evaluate the next cue, continuing this process until a cue effectively discriminates between two or more options.

Similarity/analogical reasoning

Another heuristic that can be particularly useful in new situations, such as those often encountered by entrepreneurs. is the similarity heuristic. Read and Grushka-Cockayne (2011) introduced the similarity heuristic that closely mirrors the representativeness heuristic,

although they evaluated it using Gigerenzer's methodological framework. In entrepreneurial strategic decision-making, similarity judgments play a critical role. For example, Gavetti et al. (2005) demonstrated that these judgments serve as a powerful foundation for analogical reasoning.

Imitation heuristics

A growing body of research has recently focused on a specific category of heuristics known as imitation heuristics (Berg, 2014; Nikolaeva, 2014). Within the existing literature, two distinct types of imitation are commonly explored: imitate the majority and imitate the best. Entrepreneurs can leverage these imitation heuristics to navigate the complexities of their respective markets more effectively. By adopting strategies that have been successfully employed by the majority, they can reduce uncertainty and mitigate the risks associated with trial and error. Conversely, by emulating the best practices of industry leaders, entrepreneurs can position themselves to replicate successful outcomes in their own ventures.

Other decision-making strategies

In addition to the heuristics discussed previously, this paper also examines three additional decision-making strategies and processes, namely: optimization, intuition and opportunity recognition. First, we investigate optimization and maximization processes, particularly in contrast to the satisficing strategy. Optimization encompasses the pursuit of the optimal solution (Artinger et al., 2015), which involves a comprehensive search for decision alternatives, thorough gathering and evaluation of relevant information, and meticulous analysis based on this data. We also explored the role of intuition among entrepreneurs in our research. Prior studies have indicated that intuition, that draws upon past experiences and expertise, serves as a frequently employed strategy by entrepreneurs, particularly those with substantial experience (Baldacchino et al., 2015). Finally, we sought to analyze the processes surrounding opportunity recognition. Baron and Ensley (2006) contend that opportunity recognition is rooted in mental models—such as prototypes, exemplars, and schemas—that arise from previous experiences. These mental frameworks enable entrepreneurs to link seemingly disparate events and identify patterns that indicate potential business opportunities.

In this study, we used a mixed methods approach, combining qualitative data obtained from interviews and quantitative data from questionnaires, to investigate the extent to which entrepreneurs use fast and frugal heuristics in their decisions to recognize, evaluate, and exploit opportunities.

2.4.3. Methods

Sample

Our sample includes 49 Romanian entrepreneurs (21 women, mean age=34.76, SD =10.87). We deliberately decided to include entrepreneurs from as many industries as possible, such as commerce, technology, food industry, finance, hospitality, education, health, marketing, and so on.

Data collection

In the first step, we collected demographic data and a set of quantitative data using the following measurements: age, sex, experience, entrepreneurial intention, heuristic processing, risk-taking, financial literacy. A more detailed description of the scales can be found in the third study in this thesis.

We then conducted semi-structured interviews with 60 entrepreneurs. The semi-structured interview lasted, on average, about half an hour. During the interview, the entrepreneur was asked to describe a situation in which he decided to start a new business or to make an important change in an existing one, mainly because these situations can be considered of strategic importance and every entrepreneur has faced at least a few such situations. The questions referred to the decision-making options that the entrepreneur had, how they decided which is the best option, the sources of information and the amount of information taken into account, questions related to the context (time pressure, uncertainty), the social network (the role of other people) etc.

All interviews were transcribed verbatim in word documents. A total of 11 interviews were eliminated because they did not meet the pre-established quality criteria (either the entrepreneurs did not identify a relevant decision-making situation or they provided too little information to be meaningfully analysed).

Data analysis

The interviews were analyzed using content analysis. In the first step, we created the coding scheme. We included a total of 15 codes. The first author of this study coded 10 randomly selected interviews, and then modified the scheme where appropriate (adding, removing, and clarifying codes). The final coding scheme contains broad categories, subcategories, codes, code definition, examples, and inclusion rules. In the next step, the first author coded a number of 15 randomly selected interviews. Following Campbell et al.

(2013), we used the following procedure: the main author of the study coded the 15 interviews, marking in the document with a different color the text related to each code. The second coder, received the documents with the marked text, but without codes. Thus, the second coder had the task of coding the text units selected by the main author.

The agreement between the 2 coders was high (the degree of agreement - calculated by dividing the number of cases of agreement by the total - being 85.9%). After ensuring that the degree of agreement was good enough, the main author coded the remaining 24 interviews. Moreover, after going through the entire interviews, we realized that most entrepreneurs predominantly use either a decision-making style based on satisficing/intuition or one based on maximization. Thus, the interviews were coded with 0 if the predominant style was one based on maximization (the entrepreneur explicitly says that he/she searched for extensive information, made mathematical/statistical calculations or looked for the best alternative) and with 1 if the predominant style was one based on satisficing/intuition (if the entrepreneur said that he/she made an intuitive or emotional decision or made a decision without looking for too much information). Of the total of 49 interviews, 32 could be categorized according to this criterion (15 used an intuitive style and 17 an optimization-based style).

2.4.4. Results

To ensure that there was no selection bias, we analyzed the differences between the interviews that were categorized (n=32) and those that were not (n=17) and performed independent t-tests on the quantitative measured variables. The results showed that there were no significant differences between the groups.

Table 1. Results of content analysis of interviews

Decision strategy/heuristics	Example	The total number of interviews in which the concept was identified	The total number of instances where the code was identified
Maximization/ optimization	*"I searched for a lot of information on the internet, read a lot of articles, and purchased a few books on entrepreneurship and about European non-reimbursable funds."*	21	35

Satisficing	*"...and let's say I made that decision knowing about 40% of what awaited me…"*	13	27
Intuition	*"I know exactly what I want, I'm a more impulsive person, I like to take risks, I don't spend a lot of time analyzing things."*	8	12
Similarity	*"Yes, I made comparisons with other somewhat similar decision-making situations."*	16	22
Imitation	*"We always look at the big players in the field and investigate their development process."*	13	19
Take the best	*"…first you have to think about the well-being of the employees…"*	6	7
Quick opportunity recognition	*"…and generally you see opportunities pretty quickly."*	17	23

Table 1 presents some of the results of the content analysis. In the second column, we present a representative example for each heuristic/decision strategy. In the third column, we present the total number of interviews in which the heuristic or decision strategy appears, and in the fourth column, the total number of instances in which the heuristic decision strategy appears (given that in some interviews a heuristic/decision strategy was identified more than once).

Beyond counting the codes for each heuristic/decision strategy, we also performed a qualitative analysis of each category, integrating the results with knowledge from the relevant previous literature. Thus, we have reached the following conclusion:

1. More than half of the interviews can be classified according to the dominant decision-making strategy, one based on heuristics/intuition/satisficing or another based on optimization and maximization. In our view, this finding is particularly noteworthy, especially in light of recent studies suggesting that successful entrepreneurs often integrate both decision-making approaches (Baldacchino et al., 2023; Bingham & Eisendardt, 2011; Kickul et al., 2009).
2. In most interviews (27 out of 49) we found evidence of the use of similarity and imitation heuristics, which appear in different forms. First, as previous literature suggests, entrepreneurs use both the imitation of the majority heuristic and the imitation of the best

heuristic (Nikolaeva, 2014). For example, one entrepreneur stated: "*We always look at the big players in the field and investigate their development process*" (imitate the best) and another stated: "*If it works for them (competitors), I try to see how I can replicate these things."* (imitate the majority). Another interesting observation about these heuristics is that entrepreneurs draw inspiration from both the success and failure of others. For example, an entrepreneur made the following statement: "*Here's some advice I received a long time ago and which I've tried to apply as much as I could: Learn from the mistakes of others!*". Other entrepreneurs have made similar statements. In some specific cases (5 entrepreneurs) they stated that they looked exclusively at competitors' failures to avoid repeating these mistakes.

A notable observation is that two entrepreneurs specifically articulated the necessity for a new situation to bear substantial resemblance to prior experiences in order to effectively apply similarity judgments. This perspective aligns with the assertions made by Lovallo et al. (2012), which shows that some entrepreneurs learn accurate lessons (supported by scientific literature) from their own experience.

3. Seventeen out of the forty-nine entrepreneurs highlighted that opportunity recognition is often a rapid process for them, frequently occurring instantly (see table 1 for an example). In contrast, four respondents described opportunity recognition as a more deliberate and slower process. Moreover, the majority indicated that the decision to capitalize on a particular opportunity is based on prior experience. For instance, one entrepreneur declared: *"We managed to materialize in this idea everything we had as experience accumulated in the first 10-12 years."* This finding aligns with the work of Baron and Ensley (2006), who demonstrated that recognition is fundamentally a process of connecting information through mental models developed from prior experiences.

4. On a broader level, when we examine the entrepreneurial process through the lens of the three stages articulated by Shane and Venkataraman (2000)—discovery/recognition, evaluation, and exploitation of opportunities—several insights emerge. As previously discussed, the discovery and recognition process appear to hinge on heuristic and intuitive thinking, which is informed by mental models developed through prior experiences.

Mixed method analysis

Next, we combined the qualitative analysis with the quantitative analysis that is known in the literature as a mixed method approach (Almeida, 2018). As previously mentioned, we

divided entrepreneurs into two categories, those who use more intuitive, satisficing-based strategies and those who use maximization-based strategies. This division allows us to see if there are differences between the two categories at the level of quantitative variables, namely experience, heuristic processing (based on decision-making scenarios), and financial literacy.

Table 2. Differences between the two group of entrepreneurs

Variabile	Mean 1 (satisficing/intuition group)	Mean 2 (maximization group)	Mean difference	T test	P value
Experience	8.83	5.64	3.18	1.413	.168
Entrepreneurial intention	21.73	24.05	-2.32	-1.256	.219
Financial literacy	2.00	2.59	-.58	-1.339	.191
Heuristic processing (based on decision making scenarios)	1.6	0.88	.71	1.981	.057

First of all, it should be mentioned that no result is statistically significant, but we must take into account that the sample size is small. However, the differences are in the predicted direction and support the hypotheses and results of study 3 in this thesis. Thus, the group of entrepreneurs who rely on decision-making strategies based on intuition and satisficing have a higher level of experience, a lower level of financial literacy, a lower level of entrepreneurial intention and a higher level of heuristic processing (measured through decision-making scenarios). These results are consistent with the results of the third study presented in this thesis. An interesting result is that heuristic/intuitive processing measured through decision-making scenarios and intuitive processing measured through interviews correlate positively (r=.34, p=0.57), which shows that entrepreneurs demonstrate a certain stability in their decision-making style.

2.4.5. Discussion

In this study, we sought to explore the degree to which Romanian entrepreneurs managing small and medium-sized enterprises utilize the fast and frugal heuristics proposed by Gigerenzer and Todd (2000). Another aim of the study was to extend the results obtained in the third study presented in this thesis, and to see to what extent a preference for a more intuitive

and heuristic cognitive style is associated with experience, entrepreneurial intention, and financial literacy.

The results of the qualitative analysis show that entrepreneurs use fast and frugal heuristics in the processes of recognizing, evaluating, and exploiting opportunities. Among the three stages of entrepreneurship, heuristic and intuitive thinking are most prominently observed in the initial two phases: the recognition and evaluation of opportunities. Several factors likely contribute to this trend. First, many entrepreneurs articulated in interviews their understanding of the necessity to act swiftly on emerging opportunities, ideally before their competitors do. Consequently, engaging in a more systematic and time-consuming processes of information searching and analysis could result in missed opportunities for business development. Secondly, as it results from the interviews, entrepreneurs place a high value on experiential learning, which may reflect their intrinsic desire to experiment and discover firsthand the strategies are effective, or not, within their businesses. Concerning the process of opportunity recognition, our findings align with Baron and Ensley's (2006) research regarding the significance of mental models in the discovery of opportunities. Additionally, it is plausible that this process is influenced by a fluency or availability heuristic, whereby opportunities that are recognized more rapidly are perceived as more valuable. Future research could investigate the role that fluency and/or availability play in the process of recognizing opportunities.

A noteworthy finding is that, in their similarity judgments and imitative behaviors, entrepreneurs tend to place significant emphasis on negative examples, indicating a strong inclination to learn from the mistakes of others. From the point of view of prospect theory (Kahneman & Tversky, 1979) and the "bad is stronger than good" principle (Baumeister et al., 2001) such an approach makes sense. Negative events and stimuli tend to capture more attention and exert a greater influence on individuals' decision-making processes. By concentrating on negative occurrences—particularly those encountered by others—entrepreneurs can adopt a highly effective strategy that enables them to sidestep potential pitfalls that may result in significant losses. This observation somewhat challenges the findings of prior studies indicating that entrepreneurs tend to exhibit overoptimism and overconfidence (Cossette, 2014). Future research could delve into the contexts in which entrepreneurs are more inclined to concentrate on potential losses, as well as the specific circumstances that lead them to adopt a more optimistic outlook focused on gains. The results of the mixed analysis provide partial confirmation of the findings presented in the third study of this thesis, indicating that a more heuristic and intuitive decision-making style is linked to lower levels of entrepreneurial

intention and financial literacy, alongside greater experience. These findings underscore the notion that the use of heuristics is not inherently advantageous; rather, in certain contexts, it may contribute to biases that can hinder effective decision-making. We contend that further research is necessary to better understand the role that heuristics play in entrepreneurial decision-making before determining whether they ultimately assist or hinder entrepreneurs. Nevertheless, based on the findings of this study, both outcomes remain plausible.

CHAPTER III. CONCLUSIONS AND GENERAL DISCUSSIONS

The main purpose of the present thesis is to explore the role of heuristic processing in entrepreneurial decision-making. In the subsequent sections, we will discuss the theoretical, practical, and methodological implications derived from the findings of the studies presented throughout this thesis. In our research, we have largely drawn upon the framework of fast and frugal heuristics developed by Gigerenzer (1996), while also incorporating insights from the heuristics and biases framework by Tversky and Kahneman (1974). In the following sections, we will examine the theoretical, practical, and methodological implications of our findings.

3.1 Theoretical implications

In the first study, we investigated the impact of the sex of the allocator, the sex of the person who had the largest contribution to a gain or a loss situation, and the valence of resources on allocation decisions. Contrary to our expectations, the allocators' decisions were not affected by the sex of the individual who contributed most significantly within the group. Our results indicate that the sex of the allocator (the decision-maker) interacts with the resources' valence. Specifically, women exhibit a preference for more equal allocations in the context of gains compared to their male counterparts. Furthermore, when faced with losses, women's inclination towards equity intensifies, whereas men's preferences for fairness remain relatively stable and largely unaffected by the valence of the resources involved. Thus, our results indicate that women display a heightened sensitivity to information regarding resource valence. This effect may be attributable to women's greater loss aversion (Charness & Gneezy, 2012) and/or a greater sensitivity to contextual factors (Kahn et al., 1971). Our results emphasize the necessity for researchers to consider individual differences in their investigations, as well as how these differences interact with various contextual variables.

In the second study we aimed to examine the impact of both entrepreneurial experience and financial literacy on the intention to use cryptocurrencies in business. Our hypothesis posits that entrepreneurs leverage their experience along with their financial knowledge and expertise to navigate the complexities associated with cryptocurrency, perceiving it as both an opportunity and a threat to their enterprises, factors that ultimately shape their intention to adopt these digital assets. Our findings show that financial literacy serves as a positive predictor of the intention to utilize cryptocurrencies, influencing intentions directly and indirectly through the lens of perceived opportunities. The results of this study are important for at least two

reasons. First, our results contribute to the growing literature on the importance of prior experience and prior knowledge on opportunity recognition (Ardichvili et al., 2003; Mary George et al., 2016; Shane, 2000). Second, this study also represents one of the first empirical investigations of the relationship between financial literacy and the intention to adopt new financial instruments, such as cryptocurrencies, in business

In the third study, we examined the mediating role of heuristic processing in the relationship between entrepreneurial experience and future intentions, alongside the moderating influence of financial literacy within this mediation framework. We investigated the mediating role of heuristic processing in the relationship between entrepreneurial experience and future intentions, while also investigating the moderating influence of financial literacy within this mediation framework.

Our findings do not align with Busenitz and Barney's (1997) assertion that individuals who favor intuitive thinking possess a greater intention to pursue entrepreneurship. Instead, our results indicate that reliance on heuristics and intuition is associated with lower intentions to sustain entrepreneurial activities. We attribute this outcome to the potential for heuristics and intuition to introduce cognitive biases (Tversky & Kahneman, 1974), which can adversely impact performance.

Considering that heuristic processing significantly influences the relationships examined only at lower levels of financial literacy, we can conclude that heuristic processing and the more systematic processing associated with financial literacy represent distinct mechanisms for information processing and analysis. This suggests that entrepreneurs typically gravitate towards one of these two approaches.

In the fourth study, we investigated, through a mixed methods approach, the fast and frugal heuristics that entrepreneurs use in their decisions to recognize, evaluate and exploit opportunities. The results of the content analysis of the interviews show that entrepreneurs use the following heuristics and decision-making strategies: intuition, satisficing, similarity, take the best, imitation, recognition, fluency but also maximization/optimization. Interestingly, our findings indicate that the majority of entrepreneurs tend to favor either heuristic and intuitive processing or systematic and analytical processing, with only a small minority effectively integrating both approaches.

While prior studies indicate that a mixed information processing approach—drawing on both heuristics and intuition, as well as analytical reasoning—can be particularly

advantageous in entrepreneurship (Baldacchino et al., 2023; Bingham & Eisendardt, 2011; Kickul et al., 2009), our findings raise important questions regarding the extent to which most entrepreneurs are able to effectively integrate these approaches.

3.2 Practical implications

The findings from our studies yield several practical implications, which we outline below. First, heuristic and intuitive processing has been shown to have both beneficial and detrimental effects. On one hand, these cognitive strategies enable entrepreneurs to make swift decisions and capitalize on significant opportunities; on the other hand, an overreliance on heuristics may lead to cognitive biases. Consequently, it is critical for practitioners to understand the dual nature of heuristics to effectively plan interventions. In this context, self-regulation may play a pivotal role (Bryant, 2007). By fostering a deeper understanding of the impact of heuristics and intuition, entrepreneurs can better appreciate their effects on decision-making, ultimately leading to more adaptive choices that align with their environmental context.

In support of this notion, our results align with the idea that entrepreneurial teams could greatly benefit from a diversity of preferences for various cognitive styles and approaches to information processing. Specifically, teams that comprise both intuitive and analytical thinkers may leverage the strengths of these different styles to effectively identify relevant information within their environment. This combination allows team members to complement one another's perspectives, ultimately enhancing their ability to recognize and exploit entrepreneurial opportunities.

Furthermore, on one hand, our results underscore the significant role of financial literacy in entrepreneurial decision-making, showing that financial literacy equips entrepreneurs with the knowledge necessary to recognize a greater number of opportunities. On the other hand, it appears that financial literacy may hinder the process by which experience is transformed into heuristics and intuition. While it remains uncertain whether this phenomenon is ultimately positive, based on previous research, we believe that enhancing financial education to improve financial literacy can significantly assist entrepreneurs in effectively managing their businesses.

Our results also suggest that women and men make allocation decisions differently depending on the valence of resources. This could be relevant for entrepreneurial teams in which members decide how to share gains and losses. Understanding these individual preferences is essential to minimizing conflict and increasing cohesion and trust in such teams.

3.3 Methodological implications

In the studies presented in this thesis, we aimed to utilize a variety of measurement instruments while minimizing reliance on self-report scales. To assess intuitive and heuristic thinking, we employed decision-making scenarios and semi-structured interviews. We are confident that the results obtained support the validity of these instruments, as they not only mitigate common method bias (Podsakoff et al., 2024) but also reduce the influence of subjective factors, such as memory and respondents' perceptions regarding cognitive processes such as intuition or heuristics. More specifically, building upon the decision-making scenarios established by Busenitz and Barney (1997), we have created additional scenarios that juxtapose intuitive and heuristic-based thinking with analytical and maximization approaches. We contend that this methodology effectively captures the real-world application of intuition and heuristics, and our results support this assertion.

A methodological contribution of this thesis is that in the studies we have used different methods to measure the constructs of interest. Thus, in addition to self-report scales to measure variables such as entrepreneurial intention and risk-taking, we have used a knowledge test to measure financial literacy, and decision-making scenarios and semi-structured interviews to identify and measure heuristic/intuitive thinking.

3.4 Limitations

Our studies do have several limitations. First, three out of the four studies utilize a cross-sectional design, which limits the establishment of cause-and-effect relationships. However, it is important to acknowledge that conducting experimental studies on the phenomena we investigated poses challenges; laboratory conditions would hinder the ability to accurately measure complex issues such as the use of heuristics in strategic decision-making. A longitudinal investigation of the observed effects may provide a more comprehensive understanding and facilitate more definitive conclusions. Also, our predictors in the two

mediation models tested are experience and financial literacy, so it is unlikely that they are influenced by mediators such as heuristic processing and opportunity perception, or by outcomes such as entrepreneurial intentions. Given that, conceptually, such reversed causation is not plausible, we can conclude that our mediation path is theoretically grounded and empirically robust.

In addition, while our study employed a cross-sectional design where the majority of variables were measured from a single source, it is unlikely that the common method bias has led to an overestimation of the interaction effect, as evidenced by the simulation study conducted by Siemsen et al. (2010).

Another limitation of this study is that the first study was conducted with psychology students, which may hinder the generalizability of the findings to entrepreneurial populations. Consequently, further research is necessary to replicate these results with samples of actual entrepreneurs to enhance the validity and applicability of the conclusions drawn.

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