

Review on Cognitive Style in the Field of Entrepreneurship

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Abstract: Cognitive style is a personal preference for information processing, which affect the way individuals collect, analyze and process information. Research of cognitive style in organizational management has been very extensive. In recent years, some scholars have introduced cognitive style into entrepreneurial research. Based on reviewing the literature of cognitive style in the field of entrepreneurship in recent 30 years, this paper summarizes the concept of cognitive style and its dimension classifications in this field. Then, from the perspective of entrepreneurial process and behavioral agent, research on cognitive style in entrepreneurial field is divided into four topics in terms of cognitive style and entrepreneurial characteristics, cognitive style and entrepreneurial intention, cognitive style and entrepreneurial opportunity identification. As well as cognitive style and entrepreneurial performance. Finally, this paper proposes the future research directions.

1.Introduction

Since Witkin et al. defined cognitive style and did empirical research in 1962, the concept of cognitive style has gradually attracted the attention of scholars in various fields. After that, cognitive style has been applied in career and employment^[1], teamwork and interpersonal relationship^[2], education^[3], decision-making^[4], marketing^[5] and other fields. As a psychological concept describing individual preference in the way of processing information, cognitive style has attracted more and more scholars' attention in the field of entrepreneurship in recent years^[6-8]. In the process of entrepreneurship, entrepreneurs form entrepreneurial cognition according to the market, science and technology, politics and other information they acquire, and then process the information according to their own cognitive style and carry out entrepreneurial activities^[9]. Some scholars proposed that cognitive style has become an important field in entrepreneurship research^[10, 11].

Scholars in the field of entrepreneurship have studied cognitive style as early as the 1990s. Allinson and Hayes first linked the dimension of cognitive style to the characteristics of entrepreneurs. They believed that entrepreneurs and non-entrepreneurs could be distinguished by cognitive style^[11]. The follow-up scholars applied cognitive style into the research of entrepreneurial process. Firstly, in the aspect of entrepreneurial intention, Kickul et al found that MBA students with intuitive cognitive style were more inclined to carry out entrepreneurial

activities in the exploration stage of entrepreneurial process^[12]. Secondly, in exploring the relationship between cognitive style and entrepreneurial opportunity identification, Baldacchino's empirical research found that individuals with intuitive cognitive style have a stronger ability to identify entrepreneurial opportunities than individuals with analysis cognitive style^[8]. Finally, in studying the relationship between cognitive style and entrepreneurial performance, Zacca et al. explored the impact of conflict and intuition on new product development and entrepreneurial performance in SMEs. They found that rational decision-making is negatively related to the generation of innovative behavior, and the use of intuition can increase the performance of new enterprises.^[13]

Although scholars have made some achievements in the research of cognitive style and key elements of entrepreneurship, there is still insufficient research. Existing studies are mostly limited to excavating the direct effect of cognitive style on key elements of entrepreneurship, but few studies have addressed the moderating effect of cognitive style^[14]. Although research on cognitive styles in entrepreneurship has continued for nearly three decades, development is still in its infancy. What is the current state of research on cognitive styles in the field of entrepreneurship? Are there fixed dimensions of cognitive style categorization in research of entrepreneurship? Is there a fixed dimension of cognitive style classification in the research of entrepreneurship? Are all entrepreneurial key elements related to a specific cognitive style dimension?

The literature review can not only let scholars understand the research status of related fields, but also promote the development of an emerging research field. Based on reviewing the literature of cognitive style in the field of entrepreneurship in recent 30 years, this paper summarizes the concept of cognitive style and its dimension classifications in this field. Then, from the perspective of entrepreneurial process and behavioral agent, research on cognitive style in entrepreneurial field is divided into four topics in terms of cognitive style and entrepreneurial characteristics, cognitive style and entrepreneurial intention, cognitive style and entrepreneurial opportunity identification. Finally, the paper reviews these four research themes one by one, hoping to further promote the development of cognitive style in the field of entrepreneurship.

2.The Concept of Cognitive Style

There are two main views on information processing in cognitive psychology. One is the single-process view, which holds that analysis and intuition are not dichotomous, but a continuous straight line from one end (analysis) to the other end (intuition). Individuals possess both cognitive styles at the same time, but in different proportions. Another view is the dual-process view. This view holds that the two systems of analysis and intuition are independent of each other. Both can exist at the same time and can be switched at any time. The concept of cognitive style can be traced back to the 1930s. In the article "Personality: a psychological interpretation" published by Allport in 1937, to better describe the characteristics of personal personality, he creatively combined cognition and style, and proposed the term cognitive style^[15]. The concept of cognitive style is different in different scholars and different theoretical frameworks. Kagan defines cognitive style as a perceptual understanding of the environment and a stable preference for conceptual categorization in the environment^[16]. Messick defines cognitive style as stable attitudes, preferences and habitual strategies. This attitude determines an individual's patterns of perception, memory, thinking, and problem solving^[17]. Allinson and Hayes define cognitive style as the way people collect, process and evaluate information^[11]. Although the definition of cognitive style is different in the theoretical circle, most scholars agree with the definition of cognitive style by Witkin et al. in 1962^[18, 19]. Witkin et al. considered cognitive styles to be individual differences in people's perception, thinking, learning, solving problems, and connecting with others^[20]. The paper argues that the differences in

the definitions of cognitive styles by scholars are only different in descriptions, and their connotations are the same. Cognitive style is the way individuals prefer to perceive, collect, analyze and process information. The preference affects individual behavior.

Existing research shows that cognitive style mainly has the following five characteristics^[12, 21]. (1) Cognitive style is related to the way information is processed, not the content of the information. (2) Cognitive styles are ubiquitous. Individual cognitive styles can be assessed through corresponding measurement techniques. (3) The formation of cognitive style is closely related to individual genetic factors and experience factors. Once a person's cognitive style is formed, it is stable over a long time. (4) The sub-variables of cognitive style are bipolar. Scholars have completely opposite to the division of cognitive styles, such as intuition-analysis, whole-part, etc. (5) Cognitive styles describe the way of thinking that people prefer when dealing with surrounding information. It is a different thinking process. There is no difference between different cognitive styles. They all have a certain value.

3. Research Status of Cognitive Style in Entrepreneurship

This paper searches the relevant literature on cognitive style in entrepreneurship published from 1990 to 2021 (up of December 2021) and conducts a descriptive analysis of the number and year distribution of the literature. On this basis, the research topics of cognitive style in the field of entrepreneurship are preliminarily sorted out. The paper aims to explore the research status of cognitive style in the field of entrepreneurship.

The paper uses "cognitive style + entrepreneur*" as the keyword to conduct a subject search on Emerald and EBSCO. According to the search without setting time, it is found that cognitive style was first introduced into entrepreneurship in the 1990s^[11]. For further accurate retrieval, the paper sets the retrieval time from January 1990 to December 2021, and a total of 514 papers were retrieved. By quickly reading the abstracts and conclusions of each paper, the research literature on cognitive style in non-entrepreneurship fields and the literature that only mentioned cognitive style and entrepreneurial words in the full text were excluded. Finally, 47 papers on cognitive style research in the field of entrepreneurship were locked. Through analysis, the paper believes that the research on cognitive style in the field of entrepreneurship presents the following characteristics.

First, the research on cognitive style in the field of entrepreneurship is becoming more and more mature and has become a new research hotspot. Allinson et al. (1996) first introduced cognitive style into entrepreneurship research^[11]. Before 2002, there were few research papers on cognitive style in the field of entrepreneurship, with only 6 papers (accounting for 12.77% of the total). From 2002 to 2012, the number of relevant papers increased significantly, with a total of 21 (44.68% of the total). From 2012 to the present, there are 20 papers on cognitive style in the field of entrepreneurship (accounting for 42.55% of the total).

Secondly, in terms of research methods, relevant research mainly uses empirical research methods. Among these 47 papers, there are 42 empirical studies (89.36% of the total), which is dominant. A total of 3 literature reviews (6.38% of the total) and 2 are case studies (4.26% of the total).

Third, regarding the classification dimension of cognitive style research in the field of entrepreneurship, the existing research takes intuition-analysis as the mainstream. Among the 47 research papers, 3 literature reviews and 7 papers that did not specify the classification dimension of cognitive style were excluded. Of the remaining 37 papers, 27 used the intuition-analysis dimension (accounting for 73% of the total), and 4 used the adaption-innovation dimension (10.8% of the total), 4 papers used the knowing-planning-creating dimension (10.8% of the total), 1 paper used the linear-nonlinear dimension (2.7% of the total), 1 paper used rationality-intuition dimension (2.7%

of total).

Fourth, the subject of cognitive style research in the field of entrepreneurship is gradually deepened, and there is a trend of diversification. The Cognitive style was introduced into the field of entrepreneurship to explore its direct relationship with the characteristics of entrepreneurs. In the 1990s, most scholars linked intuitive cognitive style with the characteristics of expert entrepreneurs^[11]. After 2007, scholars turned their research focus to the mechanism of cognitive style on the elements of the entrepreneurial process. They associated entrepreneurs with intuitive cognitive style with entrepreneurial intentions^[22]. Then the research transitioned to the stage of entrepreneurial opportunity identification. Scholars believed that entrepreneurs with intuitive cognitive styles were more likely to find entrepreneurial opportunities^[8]. Subsequent studies have focused on exploring the relationship between cognitive style and entrepreneurial performance^[13].

The literature distribution of cognitive style research topics in the field of entrepreneurship is shown in Table 1.

Table 1: Distribution of research topics.

Research Level	Research Topics	Viewpoint	Papers
Behavior subjects	Entrepreneurial characteristics	Intuitive cognitive style is a characteristic of expert entrepreneurs	Buttner and Gryskiewicz (1993), Allinson et al. (1996), Armstrong and Hird (2009) etc.
		Entrepreneurs show a dynamic balance between the sub-dimensions of different cognitive styles	Groves et al. (2008), Armstrong et al. (2012) etc.
		Intuitive cognitive style is not associated with expert entrepreneurial characteristics	Cools and Van Den Broeck (2007) etc.
Entrepreneurial process	Entrepreneurial intention	Entrepreneurial intention	Kickul et al. (2009), Brigham et al. (2007) etc.
		Questioning the view that “intuitive cognitive style promotes entrepreneurial intention”	Barbosa et al. (2007), Chaston and Sadler-Smith (2012) etc.
		Questioning the view that “intuitive cognitive style promotes entrepreneurial intention”	Molaei et al. (2014) Deprez et al. (2021) etc.
	Entrepreneurial opportunity identification	Entrepreneurs with intuitive cognitive style have higher ability to identify entrepreneurial opportunities	Kickul et al. (2009), Baldacchino (2013) etc.
	Entrepreneurial performance	Complex relationship between cognitive style and entrepreneurial performance	Khatri and Ng (2000), Zacca et al. (2017), Sadler-Smith (2004), Lanivich et al. (2021) etc.

4. Categorical Dimensions and Measurement of Cognitive Style

In different research fields, different scholars classify cognitive styles differently, which leads to the diversification of the classification of cognitive styles. Based on the connotation of cognitive style, Witkin et al. divided cognitive style into a field-dependent cognitive style that is easily influenced by the surrounding situation and a field-independent cognitive style that is independent of the surrounding situation^[20]. In addition, cognitive styles are classified into reflection-impulsion^[16], whole-part^[23], adaption-innovation^[24], intuition-analysis^[11], rationality-intuition^[25], knowing-planning-creating^[26], etc. In the existing papers, compared with other classification dimensions, intuitive-analytic and adaptive-innovative cognitive styles have been more widely used^[11, 12].

4.1. Intuitive-Analytic Cognition Styles

Based on the single-process view, Allinson et al. divided cognitive styles into intuitive-analytic

styles^[11]. The single process view is a theory of psychology in individual information processing. The theory holds that analysis and intuition are not dichotomous, but a continuous line from one end (analysis) to the other end (intuition). Individuals have these two cognitive styles at the same time but in different proportions. Allinson et al. believe that individuals with the intuitive cognitive style process information based on "immediate judgments based on sensations and a holistic perspective"; individuals with the analytic cognitive style process information based on "reasoning and detail-oriented judgments". They speculate that the difference in the brain hemisphere may be the basis for differences in cognitive styles, and use intuition to describe how the right hemisphere thinks. Intuitive cognitive style is often the characteristic of successful entrepreneurs. They generally have a high-risk tolerance, are good at innovation, are more proactive, and are more inclined to solve problems with an open mind. Allinson et al. use analysis to describe the way of thinking of the left hemisphere. Analytic cognitive style is a characteristic of professional managers. They are good at reasoning, judgment, and detail processing. They are highly dependent on systematic investigation methods. To pursue goals, they tend to use structured methods to solve problems.

Before Allinson et al. developed the intuitive-analytic cognitive style scale, many cognitive style measurement methods were too cumbersome. For example, ECG measurement is not only time-consuming but also expensive. It can't be applied to large-scale organizational studies. Allinson et al. by interviewing more than 1,000 people, developed a cognitive style measurement method suitable for organizational situation research—the Cognitive Style Index (CSI). The Cognitive Style Index scale is a self-report questionnaire designed for managers and professional teams to measure the intuition-analysis dimension. The questionnaire includes 38 items, such as "tend to strictly abide by work regulations"; "like to engage in work with clear steps and clear logic"; "tend to analyze the details of the problem rigorously"; and so on. The two dimensions of intuition and analysis were measured using the agree-unsure-disagree three-scale method which assigned 2 points, 1 point, and 0 points respectively. Individuals with higher scores tend to have an analytic cognitive style. Individuals with lower scores tend to be more inclined to the intuitive cognitive style.

4.2. Adaptive-Innovative Cognitive Styles

Based on the definition of cognitive style, Kirton divides cognitive style into adaptive-innovative cognitive style^[24]. Like the intuitive-analytic cognitive style, Kirton believes that the adaptive-innovative cognitive style is not dichotomous, and there is no difference between the two. It is just that in some situations, a specific cognitive style may be more appropriate. On the one hand, adaptive cognitive style is characterized by precision, reliability, efficiency, regularity, and consistency. When solving problems, individuals with this cognitive style are mostly based on a comprehensive understanding and detailed investigation. They can do detailed work for a long time with high accuracy. On the other hand, individuals with innovative cognitive styles usually don't stick to the existing methods when dealing with problems. They are more inclined to find new ways and innovate solutions. However, individuals with innovative cognitive styles can't engage in meticulous work for a long time.

To meet the needs of empirical research, Kirton invited 20 senior managers to conduct interviews. Then he developed an adaptive-innovative cognitive style scale—the Kirton Adaption-Innovation Inventory (KAI). The scale is a single scale, including 32 items. The contents of the items include "tend to have a working environment with the perfect system"; "keep high accuracy in long-term work"; "good at solving problems but not good at finding problems"; etc. The score of a single item is 5 points. Individuals with higher scores are more inclined to innovative cognitive styles.

5. Research Topics on Cognitive Style in the Field of Entrepreneurship

This paper reviews and combs the literature on cognitive style in entrepreneurship in the recent 30 years. According to the entrepreneurial process, this paper divides the literature on cognitive style in Entrepreneurship into the following four topics. The four topics are cognitive style and entrepreneurial characteristics, cognitive style and entrepreneurial intention, cognitive style and entrepreneurial opportunity identification, cognitive style and entrepreneurial performance.

5.1. Cognitive Style and Entrepreneurial Characteristics

In the research on the relationship between cognitive style and entrepreneurial characteristics, scholars hold three views. The first view is that cognitive style is an important indicator to distinguish entrepreneurs and non-entrepreneurs. In the early 1990s, Buttner and Gryskiewicz found that entrepreneurs who had been in business for two years or less more had innovative cognitive styles than those who had been in business for a long time (more than eight years). They believe that innovative cognitive styles can be used to distinguish early-stage and mid-late entrepreneurs^[27]. Armstrong and Hird distributed the Cognitive Style Index questionnaire to 81 entrepreneurs in the early stage of entrepreneurship and 50 in the mature stage of entrepreneurship. The study found that compared with the mature stage of entrepreneurship, entrepreneurs in the early stage of entrepreneurship are more inclined to the intuitive cognitive styles^[18]. The results support the view of Buttner and Gryskiewicz. In addition to distinguishing entrepreneurs at different periods, scholars also believe that cognitive styles can distinguish entrepreneurs from business managers. Allinson et al. distributed the Cognitive Style Index questionnaire to 437 successful entrepreneurs and managers. The results show that successful entrepreneurs are more inclined to intuitive cognitive styles than ordinary managers^[28].

The second view is that entrepreneurs show a dynamic balance between different cognitive style sub-dimensions (such as intuition-analysis, adaption-innovation). Amstrong et al. believe that while acknowledging that entrepreneurs are good at using intuitive cognitive styles, it shouldn't be ignored that entrepreneurs may equally value analysis^[14]. Through empirical research, scholars found that the cognitive styles possessed by entrepreneurs are not single. Groves et al. conducted a questionnaire survey of 33 professional actors, 31 accountants, and 48 successful entrepreneurs from different backgrounds. They found that successful entrepreneurs showed a much higher balance of linear/non-linear thinking than professional actors (dominated by non-linear thinking) and accountants (dominated by linear thinking)^[29]. In fact, people are adaptable to the environment. Individuals choose the corresponding way to deal with problems in different situations. The two ways of dealing with information, analysis and intuition, are always intertwined.

A third type of research questions the above two views. For example, Cools and Van Den Broeck observed no significant difference in creating cognitive styles between entrepreneurs and healthcare managers. Healthcare managers did score higher than entrepreneurs in knowing and planning cognitive styles^[26].

5.2. Cognitive Style and Entrepreneurial Intention

Individuals with entrepreneurial intentions are more willing to take risks. They actively engage in entrepreneurial activities when facing opportunities^[30]. With the in-depth study of cognitive style in the field of entrepreneurship, some scholars believe that there is a connection between cognitive style and entrepreneurial intention^[31]. In the study of the mechanism of action of the two, scholars hold two views.

The first view is that the intuitive (innovative) cognitive style promotes entrepreneurial intention.

When Armstrong and Hird studied the relationship between them, they found that intuitive entrepreneurs showed higher entrepreneurial intentions^[18]. Kickul et al. carefully evaluate the role of cognitive style in entrepreneurial self-efficacy and entrepreneurial intention. They found that MBA students with intuitive cognitive styles are more inclined to carry out entrepreneurial activities during the exploration stage of entrepreneurship (i.e. the entrepreneurial opportunity identification stage). MBA students with analytic cognitive styles are more inclined to carry out entrepreneurial activities in the planning stage of entrepreneurship (i.e. the stage of preparing a business plan)^[12]. Some scholars have explored the relationship between cognitive style and entrepreneurial intention from the perspective of exit intention. Brigham et al. used the Cognitive Style Index scale to analyze 159 entrepreneurs of small high-tech enterprises. They found that in the low structured work environment, intuitive entrepreneurs showed lower exit intention than analytical entrepreneurs. However, in a highly structured work environment, intuitive entrepreneurs express higher exit intention than analytical entrepreneurs^[19].

The second type of research questions the idea that the intuitive (innovative) cognitive style drives entrepreneurial intention. Barbosa et al. found that when risk preference is low, college students with analytic cognitive styles are more likely to engage in entrepreneurial activities than those with intuitive cognitive styles^[32]. Chaston and Sadler-Smith constructed a research framework on entrepreneurial cognition, entrepreneurial intention, and enterprise ability. They found no significant relationship between intuitive information processing and entrepreneurial intentions^[33]. In addition, the relationship between cognitive style and entrepreneurial intention may be more complex. Deprez et al. found that cognitive style influences entrepreneurial intention through attitude^[34]. Molaei et al. explored the relationship between cognitive style and entrepreneurial intention by investigating 376 undergraduates from the Faculty of Behavioral Sciences and Engineering, University of Tehran. They divided entrepreneurial ideas into four dimensions: content, value, quantity, and novelty. The more entrepreneurial ideas, the higher the entrepreneurial intention of entrepreneurs. Therefore, the number of entrepreneurial ideas is an important factor for potential entrepreneurs to start a business in the future. Empirical research found that intuitive cognitive style can directly affect the content and quantity of entrepreneurial ideas. At the same time, analytic cognitive style affects the quantity and value of entrepreneurial ideas. Therefore, both the intuitive cognitive style and the analytic cognitive style positively affect entrepreneurs' entrepreneurial intention^[22].

5.3. Cognitive Style and Entrepreneurial Opportunity Identification

Entrepreneurial opportunity identification is a crucial part of the entrepreneurial process^[8]. Entrepreneurs judge the acquired information and try to identify business opportunities with potential benefits. It can be seen that the identification of entrepreneurial opportunities itself is a process of information processing^[35]. As a psychological concept describing the way of information processing, the influence of cognitive style on the identification of entrepreneurial opportunities has attracted the attention of scholars in the field of entrepreneurship. Scholars believe that entrepreneurs with intuitive (innovative) cognitive styles have a higher ability to identify entrepreneurial opportunities. Kickul et al. distributed the Cognitive Style Index questionnaire to 138 part-time MBA students. The study found that students with an intuitive cognitive style are more confident in their ability to identify entrepreneurial opportunities and less confident in their ability to evaluate, plan and allocate resources. In contrast, students with an analytic cognitive style are more confident in their ability to evaluate, plan, and allocate resources, but less confident in their ability to find and identify entrepreneurial opportunities^[12]. Baldacchino found that compared with individuals with analytic cognitive style, individuals with intuitive cognitive style have a

stronger ability to identify entrepreneurial opportunities^[8].

5.4. Cognitive Style and Entrepreneurial Performance

The goal of entrepreneurship is to generate economic benefits and promote social and economic development. Entrepreneurs are exposed to a large amount of information in entrepreneurial activities. How they collect, analyze and process this information directly affects how they make decisions, thereby affecting entrepreneurial performance^[6]. The current research on the relationship between cognitive style and entrepreneurial performance mainly explores the mechanism of different dimensions of cognitive style on entrepreneurial performance. In the intuitive-analytic dimension, Khatri and Ng surveyed owners of small businesses in the U.S. computer industry. They studied the impact of intuitive cognitive style and environmental instability (competition, technology, and government regulation) on entrepreneurial firm performance. They found that entrepreneurs with an intuitive cognitive style can promote organizational performance (financial and non-financial) in situations with high levels of environmental uncertainty. In a stable environment, entrepreneurs with an intuitive cognitive style are negatively related to corporate financial performance. At the same time, they did not find a significant relationship between intuitive cognitive style and firm non-financial performance^[36]. Sadler-Smith surveyed the owners of small and medium business owners in two different industries. He regarded environmental uncertainty as a moderator variable to explore the relationship between cognitive style and small and medium business performance. The results show that in the case of the high degree of environmental uncertainty, entrepreneurs with an intuitive cognitive style can promote firm sales growth and non-financial (operational efficiency, public image, goodwill, and product or service quality) performance^[6]. The results support the research results of Khatri and Ng. Zacca et al. also found that intuition can positively promote the performance of new enterprises^[13]. In the knowing-planning-creating dimension, Lanivich et al. explored the antecedent role of the entrepreneur's cognitive style in strategic approach selection and resource orchestration behaviors, and the relationship between these antecedent roles and enterprise performance. They found that entrepreneurs with planning and knowing cognitive styles rely on a causation approach and bootstrapping resource behavior, whereas entrepreneurs with a creating cognitive style choose an effectuation approach and bricolage resource orchestration behaviors to achieve firm performance^[37].

6. Current Research Shortcomings and Future Research Directions

After sorting out the papers on the application of cognitive style in the field of entrepreneurship, this paper finds that cognitive style has become an emerging hot spot in the field of entrepreneurship research. The study of cognitive style in the field of entrepreneurship is in the transition from the initial stage to the intermediate stage. Although the existing research has achieved certain results in terms of concept discussion, classification and measurement, and the relationship with the key elements of entrepreneurship, there are still the following problems that need to be further improved by follow-up research.

The future research framework is shown in Figure 1.

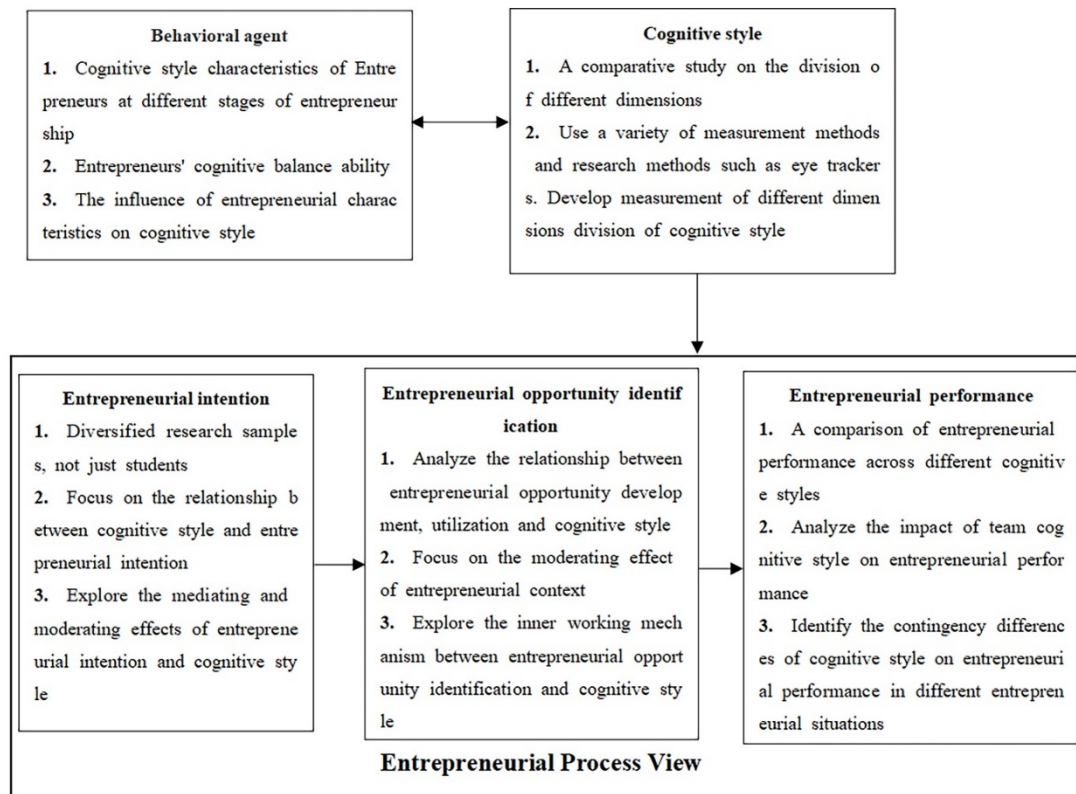


Figure 1: Future research framework.

First, cognitive style is the thinking mode that individuals prefer in the process of information processing. Different thinking modes correspond to the corresponding cognitive style dimensions. At present, the cognitive style dimensions selected by scholars in entrepreneurship research are mainly intuition-analysis and adaption-innovation. In addition, a small number of scholars choose the creating-planning-knowing cognitive style^[26, 38]. Different cognitive style classification dimensions correspond to different measurement scales, which leads scholars to conduct secondary research on the same research variables. It not only wastes research resources but also leads to different results of the same variable research, making the research conclusions inconsistent. In future research, scholars should conduct comparative research on cognitive styles of different dimensions, to unify the classification dimensions of cognitive style research in the field of entrepreneurship, and promote the consensus between the research conclusions of cognitive style in the same variable in this field. The measurement method of cognitive style should be further improved. Existing studies mostly use questionnaires, interviews, and other methods to measure subjects' cognitive preferences. Future research can simulate entrepreneurial practice through high-end technologies such as eye tracker and brain imaging, and directly measure the cognitive style dimensions used by entrepreneurs in the entrepreneurial process.

Second, in terms of the behavioral agent, Buttner and Gyskiewicz found that the cognitive styles of entrepreneurs in the early stage of entrepreneurship and the middle and late stages of entrepreneurship are different^[27]. This view provides new ideas for future research. In the process of entrepreneurship, is the cognitive style of entrepreneurs fixed? Future research can subdivide the process of entrepreneurial activity and explore the relationship between cognitive style and entrepreneurial characteristics at different entrepreneurial stage levels. Second, some studies have shown that entrepreneurs are not necessarily unidirectionally inclined towards an intuitive cognitive

style, but rather exhibit a dynamic balance between intuitive and analytic cognitive styles^[29]. This paper believes that the research on entrepreneurial characteristics and cognitive style can be divided into two stages: the single stage of cognitive style and the stage of balanced cognitive style. The later research is more inclined to the viewpoint of entrepreneur cognitive style balance^[39]. However, the theory of cognitive style balance ability still lacks the corresponding scale. Future research can focus on developing a scale of entrepreneurs' cognitive style balance ability to promote the development of cognitive style in the field of entrepreneurship. Finally, Westhead et al. believe that entrepreneurs with rich entrepreneurial experience prefer an intuitive cognitive style. They rely on intuition to make quick decisions^[40]. However, social cognitive theorists such as Osiyevskiy and Dewald believe that entrepreneurial experience makes entrepreneurs have thinking inertia, and then forms cognitive rigidity, which makes entrepreneurs more inclined to analyze and use existing resources^[41]. In future research, it is necessary to further explore the influence of variables such as the type of entrepreneur's experience (entrepreneurial experience, industry experience, management experience, etc.), the amount of experience, and the characteristics of experience (success or failure of entrepreneurial experience, industry experience correlation, subordination of work experience) on the entrepreneurs' cognitive style.

Third, in the research on the relationship between cognitive style and entrepreneurial intention, most scholars take college students or MBA students as research samples to explore the role of different dimensions of cognitive style on the strength of entrepreneurial intention^[12]. However, individuals engaged in entrepreneurial activities are not only students. Future research should break through the limitation of students as the main research sample, and popularize the study of cognitive styles and entrepreneurial intentions to wider entrepreneurial groups. Secondly, in terms of the entrepreneurial intention dimension, entrepreneurial intention can be divided into entrepreneurial goal intention and entrepreneurial execution intention. At present, the entrepreneurial intentions discussed by scholars are all defaulting to entrepreneurial goal intentions, and few studies focus on entrepreneurial execution intentions. In the future, scholars should supplement relevant research on cognitive styles and entrepreneurial execution intention. Finally, most scholars use the intuitive-analytic cognitive style. However, the existing research results are not completely consistent. In the future, we should further explore the internal mechanism of cognitive style and entrepreneurial intention. At the same time, we should further explore the mediating and moderating roles of entrepreneurial intention and cognitive style.

Fourth, the entrepreneurial process can be divided into entrepreneurial opportunity identification, entrepreneurial opportunity development, and entrepreneurial opportunity utilization^[42]. While focusing on the identification of entrepreneurial opportunities, future research should improve the cognitive style and the mechanism of the development and utilization of entrepreneurial opportunities. Secondly, the process of entrepreneurial opportunity identification is the process of information processing by entrepreneurs according to their cognitive style^[8]. Cognitive style and entrepreneurial opportunity identification are closely linked. However, scholars also failed to reach a consensus conclusion. Future research should further discuss the relationship between them and analyze the contingency differences of cognitive style and entrepreneurial opportunity identification in different situations. Finally, there is no conclusion about whether entrepreneurial opportunities are created by entrepreneurs or whether they exist waiting to be discovered by entrepreneurs. On the one hand, the intuitive cognitive style emphasizes the innovation ability based on the "holistic perspective" and tends to create entrepreneurial opportunities. On the other hand, the analytic cognitive style emphasizes the research ability based on "rational analysis" and tends to find entrepreneurial opportunity through analysis. Future research can explore the internal mechanism of cognitive style on entrepreneurial opportunities based on different viewpoints of entrepreneurial opportunity discovery.

Finally, Scholars use the two cognitive style dimensions of intuition-analysis and adaption-innovation to study the impact of cognitive style on entrepreneurial performance. Through empirical research and case analysis, they concluded that "intuitive (innovative) entrepreneurs can improve entrepreneurial performance to varying degrees" [6, 13, 36]. The paper believes that follow-up research can compare the impact of these two different classifications of cognitive styles on entrepreneurial performance. We can explore the relationship between the two with a variety of methods, and discuss the most appropriate cognitive style classification dimension for research on entrepreneurial performance. Secondly, the existing research objects are mainly to explore the influence of the entrepreneur's cognitive style on entrepreneurial performance^[42], and there are few studies at the team level. In the future, we can explore the mechanism of entrepreneurial team cognitive style on entrepreneurial performance. Thirdly, Sarasvathy, a famous entrepreneurial scholar, pointed out that in the process of entrepreneurship, the situation faced by entrepreneurs has Knight uncertainty, goal fuzziness, and environmental isotropy^[42]. Entrepreneurship research is inseparable from entrepreneurial situational factors, and cognitive style is also the way individuals deal with information based on situational factors^[9]. The research level of the relationship between cognitive style and entrepreneurial performance should further add entrepreneurial context. Future research can explore the contingency differences in entrepreneurial performance of entrepreneurs with different cognitive style dimensions in different contexts based on the research model of "cognitive style - entrepreneurial context - entrepreneurial performance". Finally, entrepreneurial activities are not achieved overnight, but a long-term process^[43]. Does the intuitive cognitive style contribute to increased entrepreneurial performance at all entrepreneurial stages? Future research should be based on the subdivided entrepreneurial process and follow the research model of "cognitive style-entrepreneurial stage-entrepreneurial performance" for further discussion, to provide a practical reference for entrepreneurs in different entrepreneurial stages.

7. Conclusions

This paper systematically organizes and analyzes the existing literature on cognitive style in the field of entrepreneurship. Based on existing studies, we clarify the concept of cognitive style. Cognitive style is the way individuals prefer to perceive, collect, analyze and process information. The preference affects individual behavior. In terms of classification dimension, the classification of cognitive style presents diverse characteristics. The current research is intuition-analysis and adaption-innovation as the mainstream.

In terms of research topics, this paper divides the research on cognitive style in the field of entrepreneurship into four themes from the perspectives of the behavioral agent and the entrepreneurial process. The four topics are cognitive style and entrepreneurial characteristics, cognitive style and entrepreneurial intention, cognitive style and entrepreneurial opportunity identification, cognitive style and entrepreneurial performance. By reviewing these four topics, this paper constructs a framework for future research on cognitive style in the field of entrepreneurship. We hope to provide some reference for future research on cognitive style in the field of entrepreneurship.

This paper argues that future research on cognitive style in the field of entrepreneurship should focus on the following issues. (1) Future research should unify the classification dimensions of cognitive style in the field of entrepreneurship, and adopt diversified measurement methods and research methods. (2) we should pay more attention to the influence of entrepreneurs' characteristics on cognitive style and the characteristics of entrepreneurs' cognitive style at different stages of entrepreneurship. On this basis, develop a scale of the entrepreneur's cognitive style balance ability. (3) Existing studies have made some achievements in the relationship between

cognitive style and key elements of entrepreneurship. However, there are still some problems that need to be further improved in the impact of cognitive style on entrepreneurial intention, entrepreneurial opportunity identification, and entrepreneurial performance. Future research should focus on the above issues to promote the development of cognitive style in the field of entrepreneurship.

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