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The Psychology of Entrepreneurship: Action and Process

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action theory, bricolage, cognition, motivation, effectuation, emotion

Abstract

We review the research on the psychology of entrepreneurship of the last decade. We focus on two key topics in entrepreneurship research: action and process. Combining action and process in a model of the psychology of entrepreneurship, we present the action theory process model of entrepreneurship and use it as a guiding framework for the review. We discuss theories of action, such as effectuation/causation, bricolage, theory of planned behavior, and action theory. Furthermore, we adopt a process perspective to discuss antecedents of actions in terms of cognition, motivation, and emotion and how they develop during the entrepreneurial process. The process perspective considers recursive relationships and dynamic changes in actions and their antecedents over time. We conclude that the action theory process model is a useful starting point to explain the psychological dynamics of entrepreneurship.

INTRODUCTION

This article is a sequel to our last *Annual Review of Organizational Psychology and Organizational Behavior* contribution on the topic of the psychology of entrepreneurship (Frese & Gielnik 2014). We think that it is no longer necessary to discuss the importance of entrepreneurship research for the domains of organizational psychology and organizational behavior or vice versa. Psychological approaches have been well-received in entrepreneurship (see Gielnik et al. 2021), and nearly all applied psychology journals now publish entrepreneurship research (e.g., Feng et al. 2022, Gielnik et al. 2020). We provide an overview of this research and focus on two topics that have been of particular interest in the last decade: actions and the process of entrepreneurship.

Entrepreneurship involves individuals' or teams' actions of discovering, evaluating, and exploiting opportunities (Shane & Venkataraman 2000). The role of actions continues to be an important topic of entrepreneurship research (Frese 2021, McMullen & Shepherd 2006), and we believe that it will become even more important in the future. In the previous review, we presented an action characteristics model of entrepreneurship, emphasizing that entrepreneurs' actions are critical for success in entrepreneurship (Frese & Gielnik 2014). The action characteristics model deals with action strategies and characteristics as well as the factors influencing action, for example, entrepreneurs' cognition, motivation, and emotion.

In addition to action, research in the last decade focused on the topic of processes in entrepreneurship (McMullen & Dimov 2013). A process refers to a sequence that describes the becoming of things and how they emerge, develop, or terminate over time. Adopting a process perspective in entrepreneurship is useful for two reasons. First, the actions of discovering, evaluating, and exploiting opportunities constitute a process with a prelaunch, launch, and postlaunch phase through which entrepreneurs proceed (Baron 2007). In the prelaunch phase, entrepreneurs discover and evaluate a business opportunity. In the launch phase, they acquire the necessary resources and set up organizational structures. Finally, they manage the growth and survival of the new venture in the postlaunch phase.

Second, entrepreneurship can be considered as a process because discovering, evaluating, and exploiting opportunities involves a recursive and iterative progression of actions rather than a linear sequence of actions (McMullen & Dimov 2013). Opportunities evolve and develop over time in a constant process of interactions between entrepreneurs' actions and feedback. Specifically, entrepreneurs start with a basic idea of a product or service and then take actions to elaborate the idea. They learn from the feedback that results from their actions and iteratively modify their opportunity. In the iterative process of taking action, gathering information, and learning about the viability of the idea, entrepreneurs use feedback to continuously update the features of the business idea. This process has been labeled the opportunity development process, and it entails the notion of pivoting, which means incrementally changing or radically redefining the business opportunity (see Vogel 2017).

In this review, we discuss the recent developments in entrepreneurship research. We present the action theory process model of entrepreneurship and use it as a guiding framework for the review. The action theory process model combines elements of the action characteristics model with the notion of process (**Figure 1**). The model provides an updated theoretical perspective on the psychology of entrepreneurship. The updated model puts action center stage and accounts for the dynamic nature of the entrepreneurial process. Specifically, the model considers the entrepreneurial process with the prelaunch, launch, and postlaunch phases, which unfold over time. Within each phase, action is critical to advance in the opportunity development process. According to action theory (Frese 2021), action follows the action sequence with the steps of goal setting; information seeking; action planning; and execution, monitoring, and feedback. Furthermore, the

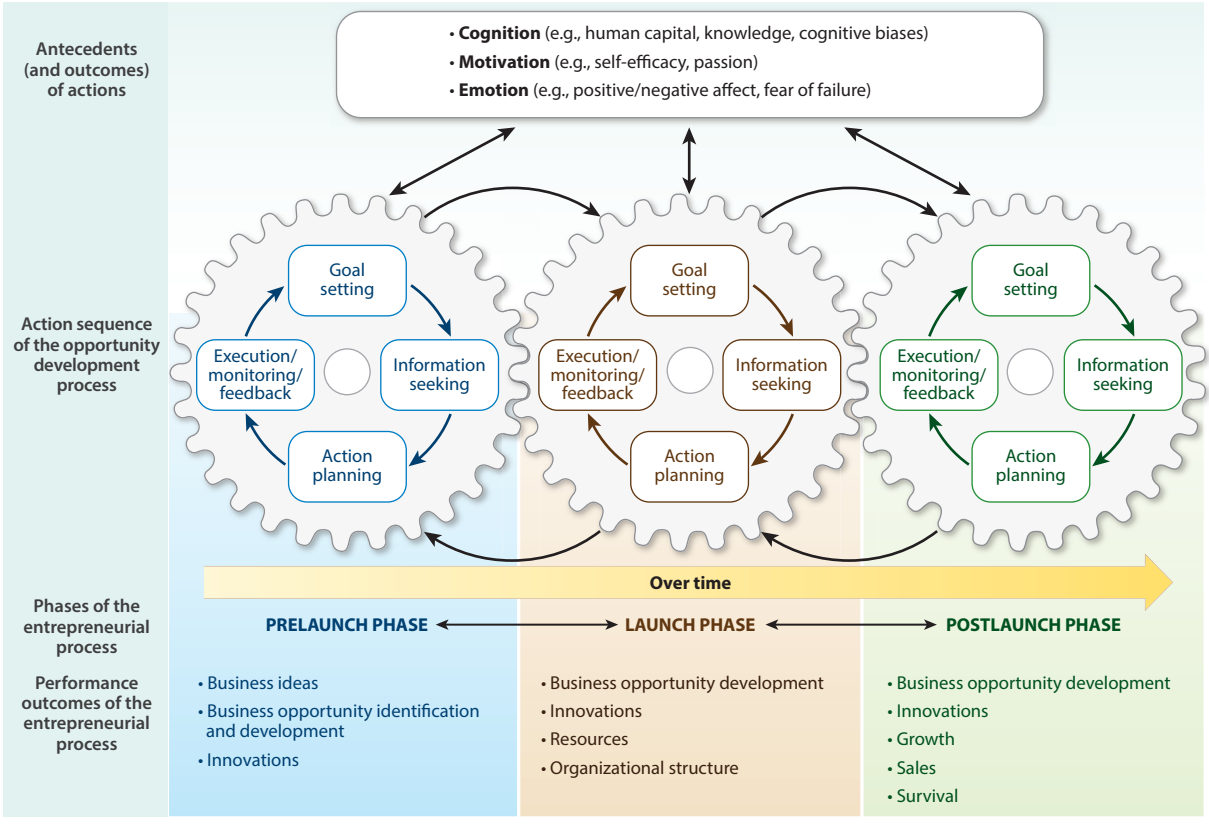

Figure 1

The action theory process model of entrepreneurship shows the recursive and iterative nature of entrepreneurship within and across phases. Entrepreneurship is a dynamic process unfolding over time as a result of entrepreneurs' actions. Actions are understood to cycle through goal setting; information seeking; action planning; and execution, monitoring, and feedback. Also, entrepreneurs pivot by moving back and forth between the phases to change or redefine their business opportunities. Furthermore, the model proposes reciprocal relationships between actions and their cognitive, motivational, and emotional antecedents. Performance outcomes are, for example, business opportunity identification and development; acquisition of resources; and business creation, growth, and survival.

model considers antecedents of actions in terms of cognition, motivation, and emotion. Importantly, the model accounts for the dynamics inherent in entrepreneurship in two ways: It first proposes reciprocal relationships between actions and their antecedents that unfold over time. It then proposes that entrepreneurship involves a recursive and iterative progression, meaning that entrepreneurs move back and forth between the phases of the entrepreneurial process.

THEORIES OF ACTION IN ENTREPRENEURSHIP

According to the action theory process model of entrepreneurship, action is the key success factor in entrepreneurship. All other psychological or contextual factors influence entrepreneurial performance indirectly through action or moderate the effect of action on entrepreneurial performance. For example, meta-analytic findings showed that strategic actions in terms of proactively exploring and exploiting new products or services (i.e., entrepreneurial orientation) mediate the effect of the business environment on business performance (Rosenbusch et al. 2013b). Longitudinal research showed that the availability of resources interacts with entrepreneurs' proactive

behavior to predict firm growth (Jacob et al. 2019). Furthermore, action is the key success factor in each phase of the entrepreneurial process. Dyer et al. (2008), for example, demonstrated the important role of proactive actions, such as questioning, observing, experimenting, and idea networking, for opportunity identification. Similarly, research showed the critical role of action in terms of performing start-up activities for launching a new venture (Carter et al. 1996) and in terms of business practices for managing the growth and survival of a venture (McKenzie & Woodruff 2017). Acknowledging the important role of actions in entrepreneurship, we present the theories of action in entrepreneurship that have been most influential in the last decade.

Effectuation and Causation

Effectuation theory differentiates between two logics or approaches of action: causation and effectuation (Sarasvathy 2001). Causation relies on predicting the future by forecasting what will happen and then planning for it, whereas effectuation emphasizes controlling the future by making things happen based on available means. More specifically, in causation, entrepreneurs take a specific goal or outcome as given and then assemble the necessary means or resources to achieve the goal. Causation thus relies on prediction and planning (and is often linked to a business plan). Entrepreneurs identify, evaluate, and exploit opportunities by analyzing information, deriving predictions about market trends, and then envisioning a product or service that is anticipated to meet the demands. Consequently, the availability of valid information is of particular importance to evaluate an opportunity and accurately predict its viability and market potential.

In contrast, the starting point of the logic of effectuation is to think about one's means or resources and then select a product or service that can be created based on the available means (Sarasvathy 2001). According to Sarasvathy (2001), effectuation is the new logic that is more typical of entrepreneurship. Entrepreneurs identify, evaluate, and exploit opportunities by asking strategic questions to identify available means (e.g., "What do I know and have?" and "Whom do I know?") and then use these available means to effectuate any possible opportunity. Effectuation also involves building strategic alliances with customers and competitors and leveraging contingencies into opportunities rather than regarding them as unwelcome deviations. Finally, effectuation involves the principle of affordable loss, which means that entrepreneurs should invest only financial resources they can afford to lose.

The theory is ambivalent on whether it views the two logics as distinct or as opposite to each other. In earlier writings, Sarasvathy (2001, p. 245) noted that "both causation and effectuation are integral parts of human reasoning that can occur simultaneously." In later writings, causation and effectuation were described more frequently as opposites, and effectuation was considered the better logic for entrepreneurship (Sarasvathy 2008). The underlying argument is that entrepreneurs operate in an uncertain environment, in which it is more effective to rely less on predicting the future. Furthermore, by using effectuation, entrepreneurs remain flexible and avoid negative side effects of planning, such as rigidity, escalation of commitment, or wrong planning due to bounded rationality. Yet, causation might be more effective for late entrants and large organizations when valid information is available to make better predictions (Sarasvathy 2001). Indeed, meta-analytic evidence has supported this proposition, showing that established firms benefit more from planning than new firms do (Brinckmann et al. 2010).

Effectuation theory has several merits. First, effectuation theory puts actions at the forefront of theorizing on entrepreneurship. It is one of the most cited theories in the field of entrepreneurship in the last decade, because it uncompromisingly emphasizes the importance of action, experimentation, and feedback to develop business ideas into viable products or services. Business opportunities develop because entrepreneurs change and adapt their initial ideas based

on feedback from the environment. Furthermore, business opportunities might emerge because of serendipitous findings that entrepreneurs cannot plan for. Effectuation theory has thus influenced the field of entrepreneurship by acknowledging the complexities of the opportunity development process.

Second, by suggesting use of available means as a starting point for engaging in entrepreneurship, effectuation theory provides a new perspective on overcoming resource constraints, which are often a critical barrier to entrepreneurship (Bischoff et al. 2020). Moreover, from the principle of available means follows a positive concept of the availability of limited resources. Even limited resources can be used effectively, and business creation does not necessarily depend on having access to huge financial resources. Indeed, a recent experimental study demonstrated that the effectuation logic and its focus on available means are useful to generate business ideas that can be readily implemented (Zhu et al. 2021).

Third, effectuation theory highlights the potential danger of deliberative (versus action-oriented) thinking in entrepreneurship. Deliberative thinking is characterized by abstract cognizing and pondering of different options (e.g., by doing desk research for a business plan), whereas action-oriented thinking involves planning how to implement and accomplish goals. Action-oriented thinking is more effective to make progress in the entrepreneurial process (Hopp & Greene 2018). Finally, effectuation theory emphasizes the importance of building strategic alliances and professional networks. Meta-analyses have supported this proposition by providing evidence for a positive relationship between networks and success in entrepreneurship (Rauch et al. 2016, Stam et al. 2014).

Despite the theory's merits, it has also been sharply criticized (Arend et al. 2015). The critique includes that the theory, like psychoanalysis, does not have clear and falsifiable hypotheses. Additionally, some of the propositions contrast with established theories in psychology about taking control and action. Specifically, Sarasvathy (2001) theorizes about taking control without prediction and proposes that effectuation has advantages over causation, because effectuation does not rely on trying to predict an uncertain future. Rather, effectuation is about controlling the future by taking action. However, it is hardly possible to control something that is completely erratic. Control implies having at least some idea of what will happen as a result of one's actions. Indeed, Seligman et al. (2016) argue that the human species can be described as homo prospectus, taking effective actions because of forward-looking capabilities, expectations, goals, and plans. These prospective characteristics are critical to experiment, test, and flexibly adjust when goals or expectations are not met. Accordingly, Sarasvathy's (2001) emphasis on experimentation is highly useful, but experimentation must be thoughtful, with the goal of understanding the underlying causal mechanisms. A causal approach of setting goals and planning is therefore necessary; otherwise, entrepreneurs would be like the pigeon in the Skinner box reacting with trial and error to environmental contingencies.

Furthermore, effectuation theory does not consider several psychological factors, such as goal setting, planning, and feedback processing, important for taking control and actions. For example, effectuation "does not begin with a specific goal" (Sarasvathy 2008, p. 73). However, Locke & Latham (2002) showed that specific (and high) goals lead to higher performance. Sarasvathy's (2001) notion of control similarly suggests that entrepreneurs' actions should be guided by feedback from the environment in a reactive trial-and-error manner instead of trying to predict and plan for the future. However, Frese et al. (2007) showed that a nonplanning, reactive approach is detrimental for success in entrepreneurship. Accordingly, some practical implications that follow from effectuation theory, such as "do not set specific goals" or "do not plan," might backfire (Arend et al. 2015). Given the importance of goals and planning for taking action and effectuating changes in the environment, it is not surprising that empirical findings have shown substantial and

positive correlations between causation and effectuation, suggesting that they are not independent or opposites (Cha et al. 2020, Chandler et al. 2011, Shirokova et al. 2020, Smolka et al. 2018).

Finally, empirical research has shown that effectuation is not an internally consistent logic or construct. Rather, the underlying principles of effectuation (i.e., available means, experimentation, strategic alliances, affordable loss, and flexibility) do not constitute a consistent factor but reflect different constructs that are weakly or sometimes even negatively correlated (Cha et al. 2020, Chandler et al. 2011).

A psychological perspective can help to address some of the critiques. For example, action theories in psychology have overcome limitations of behaviorism by describing the importance of intentions and goals (Miller et al. 1960). Behaviorism describes behaviors as a function of external reinforcement and environmental contingencies without referring to internal factors, such as goals and plans. Accordingly, there are similarities between effectuation and behaviorism, as both theories assume that (entrepreneurial) behaviors are reactive and shaped by the environment (Frese 2021). This leads to a theoretical conundrum. Effectuation theory emphasizes that entrepreneurs can influence and control the environment. Yet, the psychological prerequisites of such influence in terms of goals and plans that are needed to effectuate an outcome and control the environment are not accounted for. Integrating these psychological factors could help strengthen the theory of effectuation.

Bricolage

Bricolage describes how actions can be performed effectively under conditions of restricted predictability and high resource constraints (Baker & Nelson 2005). Specifically, bricolage is an action strategy that suggests using available resources and improvising (i.e., the temporal convergence of planning and action) instead of forming long-term strategic plans. Bricolage is defined as making do by recombining resources at hand for new purposes on the way to important goals. The definition implies that entrepreneurs identify, evaluate, and exploit opportunities by creatively recombining or reusing resources that are easily available to create and implement a novel product or service. Resources can refer to different domains, such as materials (e.g., upcycling waste), labor (e.g., people working for free), and skills (e.g., using self-taught or amateur skills).

A large-scale longitudinal study based on 2,489 Finnish entrepreneurs showed that bricolage predicted survival, suggesting that bricolage aids success in the entrepreneurial process (Stenholm & Renko 2016). Similarly, research using a longitudinal data set of Australian entrepreneurs showed that bricolage was positively related to firm innovativeness in terms of product/service, process, and marketing innovativeness (Senyard et al. 2014). This is interesting, because bricolage is often associated with imperfection, messiness, or second-best solutions. Yet, the findings suggest that bricolage facilitates finding creative ways to discover and exploit opportunities with existing resources, resulting in high innovativeness. Moreover, recent qualitative research demonstrated how bricolage contributes to sustainable local development in terms of social inclusion, cultural diversity, and environmental sustainability (Kim & Kim 2022). Examining new ventures during the economic decline and recovery of Detroit between 2012 and 2020, Kim & Kim showed that engaging in bricolage of local resources results in new venture growth in the form of scaling deep instead of scaling up. Scaling deep involves long-lasting growth that is deeply rooted in the local context. Whereas new ventures backed by venture capital often scaled up quickly and then vanished from Detroit, new ventures using bricolage scaled deep and remained in the region to implement customized solutions to local economic, social, and ecological problems. Thus, bricolage can foster local long-term development and lead to more locally focused and enduring contributions by creatively recombining resources that are already available.

Bricolage is useful because it is a falsifiable theory that focuses on a specific approach of how to engage in entrepreneurship. It is not a comprehensive theory of entrepreneurship (which is not its purpose) but seeks to explain a narrow aspect of action in entrepreneurship.

Financial Bootstrapping

One action strategy to finance a new venture is financial bootstrapping, which concerns the acquisition of resources to create a new venture without using formal external funding, such as loans or equity financing (Winborg & Landstrom 2001). Usually, entrepreneurs face financial constraints when entering the entrepreneurial process, and access to financial capital is one reason some entrepreneurs outperform others (Rosenbusch et al. 2013a). Entrepreneurs who proceed successfully through the entrepreneurial process manage to overcome financial constraints, for example, by using financial bootstrapping. In fact, most entrepreneurs use one or several forms of financial bootstrapping, such as withholding their own salary, joint utilization of equipment, and delayed payments, and thus achieve higher venture growth (Patel et al. 2011). Furthermore, entrepreneurs might reduce financial risk by choosing a hybrid path to entrepreneurship, engaging in the process of starting a new business while remaining in paid employment (Raffiee & Feng 2014). By remaining employed, entrepreneurs reduce the opportunity costs and require fewer additional financial resources to sustain themselves. Interestingly, hybrid entrepreneurs created business with a higher likelihood of survival than entrepreneurs who entered entrepreneurship full-time from the start (Raffiee & Feng 2014). A possible explanation is that hybrid entrepreneurs are more likely to abandon the process of starting a new business and remain in their paid employment status when it turns out that their business opportunity is not viable. Another interesting aspect of the study is that it examined individual characteristics as predictors of a hybrid path. The study found that people high in risk aversion and low in core self-evaluations were more likely to choose a hybrid path. The results suggest that individual characteristics can influence the form of entrepreneurial entry and entrepreneurial success (see also Rauch & Frese 2007). Note that in many textbooks, such entrepreneurs would be labeled as less risk-taking and thus less entrepreneurial. Yet, such a label does not consider the various forms entrepreneurship can take.

The Theory of Planned Behavior

A prominent theory in entrepreneurship is the social psychology theory of planned behavior (Ajzen 1991). Applied to entrepreneurship, it suggests that attitudes, perceived behavioral control, and social norms are antecedents of intentions to engage in entrepreneurship, and intentions in turn affect entrepreneurial behavior. The empirical evidence on the antecedents of intentions is vast in entrepreneurship (Schlaegel & Koenig 2014).

Unfortunately, research on the consequences of intentions is less frequent, even though research has provided some support for the link between intentions and behavior (Kautonen et al. 2015). This lack of research on the consequences of intentions is unfortunate because the link between intentions and actions is theoretically far more important given the central role of actions in entrepreneurship. Furthermore, studies examining the relationship between entrepreneurial intentions and behavior often suffer from methodological problems, such as issues of construct validity or overlap between independent and dependent variables, which might inflate correlations. For example, some studies measure not behavior but self-assessed capabilities (e.g., "I am capable of developing a business plan" or "I can save money to invest in a business"; Gieure et al. 2020), and measures of entrepreneurial intention sometimes capture plans instead of intentions (see Kautonen et al. 2015). Yet, theories of self-regulation suggest that plans must be differentiated from intentions, although plans facilitate the implementation of intentions (Gollwitzer & Sheeran

2006). By combining plans and intentions into measures of intentions, researchers therefore might confound different self-regulatory processes; this may lead to artificially inflated correlations between measures of intentions and behavior. Finally, studies sometimes measure prediction instead of intention (e.g., "I will try to take steps to start a business in the next 12 months"; Kautonen et al. 2015). A prediction might be based on an intention, but it is not the same construct.

To advance understanding of the applicability of the theory of planned behavior in entrepreneurship, research can build on findings from applied psychology, which show that intentions are important but not the only predictors of behavior. Rather, additional self-regulatory factors, such as implementation intentions, must be in place to translate intentions into actions (Gollwitzer & Sheeran 2006). Indeed, entrepreneurship research from the last decade that investigated moderators of the intention–action link provided theoretically meaningful insights into entrepreneurs' behavior. Longitudinal research building on theories of action regulation, for example, showed that implementation intentions or action plans are necessary to put into effect the intention to create a new business (Gielnik et al. 2014a, 2015a). Longitudinal research similarly showed that self-control strengthened the effect of intentions on taking action; in contrast, action doubts, which reflect a state of uncertainty about how to implement the intention, weakened this effect (van Gelderen et al. 2015). A longitudinal study with graduates from 64 Italian universities further examined the moderation effect of the social and environmental context on the intention–action link (Meoli et al. 2020). The study found that support by relevant others (e.g., parents, peers, and mentors) as well as by the university (e.g., courses, programs, and facilities helping entrepreneurs) strengthened the effect of intentions on new venture creation. However, an economic environment with many alternative job opportunities weakened the effect of intentions on new venture creation. Overall, these findings demonstrate the importance of individual and contextual factors in translating intentions into entrepreneurial action. This should be an area of interest for entrepreneurship scholars in future.

Action Theory

Action theory explains how effective actions are organized (Frese 2021). It is a broad meta-theory that includes aspects from the abovementioned theories, such as exploration and experimentation by effectuation theory (Sarasvathy 2001), the need to improvise and use bricolage (Baker & Nelson 2005), goal setting theory (Locke & Latham 2002), and the role of implementation intentions described by the Rubicon model (Gollwitzer 1999). Action theory describes actions as a recursive sequence of goal setting, information seeking, action planning, execution/monitoring, and feedback. Feedback is used to maintain, adapt, or abandon a goal, thereby completing the cycle. The recursive sequence of actions provides a theoretical framework to understand the process of taking action in entrepreneurship, as researchers have argued that entrepreneurship involves a recursive and iterative process of taking action to discover, evaluate, and exploit business opportunities (McMullen & Dimov 2013).

The starting point to interact meaningfully with the environment is developing some goal, which can be related to a general business idea for a product or service. Goals are internal representations of desired future states. Thus, any business idea for a new product or service that somebody intends to implement, and even just wanting to search for a business idea, can represent a goal. Goals initiate the action sequence. Indeed, research has shown that identifying a business idea leads to entrepreneurial goal intentions and ultimately entrepreneurial action (Eller et al. 2022, Gielnik et al. 2018).

Once an idea has been formed, entrepreneurs implement it by developing action plans, exposing it to the environment, obtaining feedback, and reflecting on the feedback to refine and improve

it. Entrepreneurship thus involves a feedback loop in which business ideas evolve and develop over time into elaborated business opportunities as a result of a continuous and iterative process of actions and feedback (Eller et al. 2022). Throughout this feedback loop, information seeking plays a particularly important role in developing an idea into a business opportunity. Information seeking concerns the search for relevant information about factors and boundary conditions facilitating or hindering the implementation of the idea and, further, the search for signals that indicate how to proceed in the action process. Finally, people's search for and interpretation of information depend on their prior knowledge and experience (Frese 2021).

Research has provided support for the important role of information seeking in identifying and developing business opportunities, in particular when the search is active and oriented toward diverse information. For example, active information search enhanced entrepreneurs' divergent thinking capabilities to identify innovative business opportunities (Gielnik et al. 2014b). Furthermore, Shepherd et al. (2022) demonstrated the positive function of engaging in open communication, which involves communicating with various stakeholders to obtain diverse and potentially surprising information. Open communication led to learning something new or unexpected, generating multiple alternatives, and being able to disconfirm conjectures about the business idea. In contrast, entrepreneurs who engaged in focused communication with a few specialists or experts explored only particular aspects of the business opportunity and did not identify unanticipated aspects. Ultimately, entrepreneurs who engaged in open communication made progress in elaborating their business ideas, whereas entrepreneurs with focused communication failed to develop their opportunities. The findings suggest that diverse information helps entrepreneurs to orient themselves in their business environment and obtain a better understanding of their business opportunity. Furthermore, Shepherd et al. (2022) showed that entrepreneurs sought information depending on their prior knowledge. A team of entrepreneurs with varied prior knowledge was more likely to engage in open communication and to attend to new information. In contrast, a team of entrepreneurs with homogeneous prior knowledge engaged in focused communication and searched for specialized and limited information.

The next step in the action sequence is action planning, the mental simulation or cognitive representation of behavioral steps that are needed to attain a goal. Action planning aids goal implementation by specifying the operational steps and procedures in terms of when, how, and under which conditions the actions to achieve a goal can be performed. Consequently, action planning interacts with goal intentions to predict the successful implementation of business opportunities (Gielnik et al. 2014a, 2015a). Action planning is thus important for goal achievement, and entrepreneurs should be encouraged to form if–then plans that specify when, where, and how to pursue a goal. Interestingly, action planning does not necessarily lead to rigidity and escalation of commitment but can be used to remain flexible in the opportunity development process and make necessary adjustments. For example, people can plan to flexibly adjust their current course of action when circumstances change and new information becomes available, thereby avoiding failure (Doerflinger et al. 2017, Legrand et al. 2017). Furthermore, entrepreneurs can use a strategy of opportunistic planning that involves proactively scanning for opportunities and allows adjusting when new opportunities emerge (van Gelderen et al. 2000). Accordingly, planning to be opportunistic and opportunistic planning are useful strategies for entrepreneurs.

Whether planning is effective in entrepreneurship is still a controversial debate in the field (see Gielnik et al. 2015b). For example, planning effectiveness may depend on contextual factors, such as a culture's uncertainty avoidance. Indeed, Rauch et al. (2000) suggested that planning is positively related to performance in countries high in uncertainty avoidance (e.g., Germany) but negatively related in countries low in uncertainty avoidance (e.g., Ireland). The explanation is that planning is culturally more appropriate and useful as a tool to reduce uncertainty in

high-uncertainty contexts. In contrast, some meta-analytic evidence points to planning having a lower impact on performance in cultures with higher uncertainty avoidance (Brinckmann et al. 2010). Newer evidence on cultural psychology discusses the differences in measurement of uncertainty avoidance and indicates that the uncertainty avoidance measure Brinckmann et al. used refers to something different than cultural practices of uncertainty avoidance in the sense of a society attempting to control and reduce uncertainty (Stephan 2022).

Finally, execution/monitoring and feedback are key steps in the action sequence. We jointly discuss execution/monitoring and feedback because feedback is inherently linked to action execution and monitoring. Execution/monitoring concerns the execution of the action plan and the comparison between the goal, action plan, and execution of the action plan. Feedback is information from the environment about current performance and the progress toward attaining the goal. Feedback is important in regulating behavior to reduce the discrepancy between the goal and the current state. Furthermore, feedback is important for learning and for deciding to maintain, modify, or abandon a goal. Positive feedback primarily results in maintaining the goal and repeating the behavior, whereas negative feedback can foster higher-level learning by questioning underlying assumptions and updating existing beliefs. This higher-level learning could ultimately lead to goal modification or abandonment (Frese 2021). In entrepreneurship, the entrepreneur's ability and flexibility to respond to negative feedback about the business idea are particularly important.

Entrepreneurship research has recently discussed execution/monitoring and feedback as part of the concept of pivoting (see Shepherd & Gruber 2021). Pivoting refers to a more-or-less radical change in a business opportunity. The opposite of pivoting is persevering, which refers to maintaining and continuing with the business opportunity. Pivoting features prominently in the lean startup framework, which proposes cycling through the opportunity development process by executing an idea in the form of a minimum viable product, monitoring its effect on customers, learning from customer feedback, and then pivoting or persevering (Blank 2013, Ries 2011). Basically, entrepreneurs continuously (re)formulate hypotheses about their business ideas and then conduct small experiments to receive feedback on the adequacy of their ideas and hypotheses. By testing conjectures and making modifications accordingly, entrepreneurs proceed iteratively through the opportunity development process. In this process, entrepreneurs constantly execute ideas and monitor the performance of the ideas to receive feedback and learn about the viability of their opportunity through interaction with their customers.

A randomized controlled trial investigated the effectiveness of the approach of executing, monitoring, and obtaining feedback to develop and implement a business idea (Camuffo et al. 2020). Entrepreneurs were assigned to a treatment group to learn the scientific method of designing and conducting rigorous experiments for executing their business ideas. The entrepreneurs experimented with different conditions (i.e., different versions of their product or service) to test specific hypotheses, for example, about different features of the product or service. Moreover, they monitored the performance of the business idea by establishing valid and reliable performance measures. The experiments provided feedback that entrepreneurs could use to learn and make decisions regarding modifying the business idea for the next round of execution. Participants in the treatment group increased in their likelihood to pivot (i.e., change aspects of the core value proposition) and ultimately generated higher revenue. Camuffo et al. (2020) concluded that an iterative process of execution, monitoring, and feedback reduced the odds of exploiting false-positive business opportunities. A further study investigated scientists who took part in a program to develop business opportunities based on their technological inventions (Leatherbee & Katila 2020). Participants were more likely to make progress in the entrepreneurial process and ultimately converge on a business idea when they probed hypotheses by conducting customer interviews to confirm or disconfirm hypotheses about their business ideas. Furthermore, probing

hypotheses led to generation of new ideas and the formulation of corresponding hypotheses that guided future decisions to pivot or persevere.

Importantly, the entrepreneurial action sequence including execution/monitoring and feedback is an iterative process that unfolds over time in several rounds. Specifically, Kirtley & O'Mahony (2020) showed that changes in the business opportunity (i.e., pivots) were not made in one "sweeping" move or following a single event but rather happened in a series of multiple (incremental) changes over time. Put differently, business opportunities gradually developed and evolved in a process over time via adding or removing one element at a time. The study further showed that new information might not affect entrepreneurs' beliefs about a business's viability. In fact, entrepreneurs predominantly decided to persevere instead of pivoting (Kirtley & O'Mahony 2020).

Interestingly, entrepreneurs might persevere for reasons other than strategic considerations to improve the viability of the opportunity. In this regard, Berends et al. (2021) examined different types of commitments to identify the underlying reasons why entrepreneurs decide to persevere when encountering negative feedback. They found entrepreneurs persevered because of temporal commitments, such as the timeline envisioned for the business and the timing of milestones, and relational commitments, such as commitments to other stakeholders. Grimes (2018) also showed that entrepreneurs might persevere because of commitments to their role as an entrepreneur and the identification with their business ideas. Because entrepreneurs identify with their initial idea and experience a strong sense of psychological ownership, they might reject negative feedback and decide to persevere. Thus, pivoting requires reconsidering the business idea and also one's identification with the initial idea. Hampel et al. (2020) further showed that it is not just entrepreneurs who identify with a specific business idea, but also other stakeholders, such as user communities. In case entrepreneurs did not manage stakeholders' resistance, for example, by seeking empathy, the stakeholders' identification with a business idea increased the likelihood of persevering. Thus, perseverance might result from a commitment or consistency bias and the simple continuation of the past. Pivoting often requires detachment from temporal and relational commitments.

Action theory uses the concept of personal initiative to understand why entrepreneurs successfully perform the steps of the action sequence. Specifically, the more personal initiative entrepreneurs show in each step, the higher their performance. Personal initiative is defined as self-starting, future-oriented, and persistent behavior. Self-starting implies that people set goals themselves and initiate actions to improve the status quo and differentiate themselves from other businesses or from general trends. Future orientation means that people anticipate and prepare for future threats and opportunities. Persistence implies that people maintain their goals and overcome barriers when they strive to change the status quo. Personal initiative's self-starting approach provides the impetus, and persistent behavior enables entrepreneurs to develop opportunities and create something new (Frese 2021).

Personal initiative is a descriptive theory of entrepreneurship with prescriptive elements that can be used to design training programs (Mensmann & Frese 2017). The theory was tested in a small-scale study (Glaub et al. 2014) and then in a large-scale randomized controlled trial with 1,500 microenterprise owners (Campos et al. 2017). The owners were assigned to three groups: a control group, personal initiative training, or traditional business training. The personal initiative training program involved teaching the facets of personal initiative (i.e., self-starting, future oriented, and persistent) along the steps of the action sequence (goal setting, information seeking, action planning, execution/monitoring, and feedback). Furthermore, personal initiative training involved teaching knowledge in the form of action principles (i.e., know-how or rules of thumb), which provide actionable knowledge about how to perform entrepreneurial tasks (more details in Mensmann & Frese 2017). The traditional business training included topics on accounting,

marketing, human resource management, and formalization. Follow-up surveys over two years showed that personal initiative training significantly increased entrepreneurs' firm profits by 30% in comparison to the control group, whereas traditional business training had no significant effect. Factors explaining the higher performance were innovations (including diversification of products and services), increased personal initiative, and higher capital and labor inputs.

Furthermore, Jacob et al. (2019) showed that personal initiative had a dual function for firm growth. Personal initiative was positively related to available resources (i.e., the possession of useful inputs for the business) and moderated the effect of available resources on firm growth. The authors argued that personal initiative helps entrepreneurs to actively use resources to introduce innovations and deal with anticipated threats, thereby translating resources into firm growth (Jacob et al. 2019). Finally, a longitudinal study showed that proactivity (i.e., anticipatory actions to identify and exploit opportunities) mediated the effect of psychological resilience on business survival (Chadwick & Raver 2020).

ACTIONS AND THEIR ANTECEDENTS FROM A PROCESS PERSPECTIVE

Since our first review (Frese & Gielnik 2014), several meta-analyses have examined the factors included in the action characteristics model (see **Table 1**). For example, action strategies in terms of exploration/exploitation behaviors and human resources practices positively influence firm performance (Mathias et al. 2018, Rauch & Hatak 2016). Moreover, cognitive factors that contribute to competent actions, such as general mental ability, emotional intelligence, creativity, and human capital, as well as motivational factors, such as entrepreneurial self-efficacy and entrepreneurial passion, positively influence entrepreneurial success, for example, in terms of opportunity identification, innovation, and firm performance (Allen et al. 2021, Canavati et al. 2021, Miao et al. 2017, Sarooghi et al. 2015, Zhao & Liu 2022). Finally, recent meta-analyses showed that personality in terms of the dark triad (Machiavellianism, narcissism, and psychopathy) is related to entrepreneurial success (Brownell et al. 2021).

In the following, we discuss recent findings on these factors in more detail. We focus on research examining the factors in light of a process perspective to develop the action theory process model, which combines elements of the action characteristics model with the notion of process in entrepreneurship. The core of the model is the action sequence including goal setting, information seeking, action planning, execution/monitoring, and feedback, which runs across the prelaunch, launch, and postlaunch phases of entrepreneurship. Furthermore, the model considers the dynamics of the entrepreneurial process by proposing reciprocal relationships between the psychological factors of actions, cognition, motivation, emotion, and performance. By accounting for the dynamics, the model considers changes in psychological factors over time as entrepreneurs engage in the entrepreneurial process.

Actions from a Process Perspective

In the last decade, entrepreneurship research adopted a process perspective and examined how entrepreneurs use the different action strategies of effectuation/causation, bricolage, and planning while proceeding through the entrepreneurial process. For example, research showed that entrepreneurs' use of effectuation and causation varies along the entrepreneurial process (e.g., Galkina et al. 2022). However, these studies did not test specific hypotheses that follow from effectuation theory but mainly described dynamic changes in effectuation and causation qualitatively, using codings that did not allow falsification of the theory. Accordingly, future quantitative research is necessary to verify the results. Nevertheless, the qualitative research

Table 1 Overview of meta-analyses on the factors of the action characteristics model of entrepreneurship

Factors	Authors	Topic	Main findings	Additional findings
Action and action strategies	Mathias et al. (2018)	Ambidexterity (exploration and exploitation)	Integrating (balancing) exploration and exploitation is positively related to firm performance ($r = 0.23$) ($K = 52$; $N = 13{,}198$)	The relationship is stronger for old versus young firms
	Rauch & Hatak (2016)	HR practices	HR practices enhancing skills, motivation, and empowerment are positively related to firm performance of small and medium-sized enterprises ($r = 0.228$) ($K = 56$; $N = 18{,}521$)	The relationship is stronger for young (versus old) firms, in high-tech (versus low-tech) industries, and under rigid (versus flexible) labor regulations
Cognition	Allen et al. (2021)	GMA and EI	GMA ($r = 0.082$) and EI ($r = 0.219$) are positively related to entrepreneurial success ($K = 40$; $N = 65{,}826$)	
	Brinckmann et al. (2019)	Human capital and planning	Education ($r = 0.144$) and general work experience ($r = 0.157$) are positively related to planning; entrepreneurial experience is not ($r = -0.013$) ($K = 31$; $N = 8{,}095$)	
	Canavati et al. (2021)	Human capital and entrepreneurial opportunity identification	General ($r = 0.06$) and specific ($r = 0.10$) human capital are positively related to venture idea generation ($K = 146$; $N = 851$–$327{,}365$)	General and specific human capital have indirect effects on the favorability of opportunity beliefs through venture idea generation; specific human capital also has a direct effect on opportunity beliefs
	Sarooghi et al. (2015)	Creativity and innovation	Creativity is positively related to innovation ($r = 0.463$) ($K = 52$; $N = 10{,}538$)	The relationship is stronger for large (versus small) firms, process (versus product) innovations, low-tech (versus high-tech) industries, and at high levels of collectivism and moderate levels of uncertainty avoidance

(*Continued*)

Table 1 (*Continued*)

Factors	Authors	Topic	Main findings	Additional findings
Motivation	Schlaegel & Koenig (2014)	Antecedents of entrepreneurial intentions	In path models, attitude (β = 0.12), subjective norm (β = 0.14), entrepreneurial self-efficacy (β = 0.16), and perceived behavioral control (β = 0.35), as well as perceived desirability (β = 0.34) and perceived feasibility (β = 0.18), are positively related to entrepreneurial intentions ($K = 123$; $N = 114{,}007$)	
	Miao et al. (2017)	Entrepreneurial self-efficacy	Entrepreneurial self-efficacy is positively related to firm performance ($r = 0.309$) ($K = 27$; $N = 5{,}065$)	The relationship is stronger for subjective ($r = 0.354$) versus objective ($r = 0.163$) measures of performance
	Zhao & Liu (2022)	Entrepreneurial passion	Entrepreneurial passion is positively related to entrepreneurial self-efficacy ($r = 0.56$), entrepreneurial effort ($r = 0.40$), and entrepreneurial performance ($r = 0.18$) ($K = 28$–37; $N = 8{,}930$–$10{,}253$)	Different conceptualizations and measures of passion [i.e., role-based entrepreneurial passion (Cardon et al. 2013), dualistic model of passion (Vallerand et al. 2003), passion for work (Baum & Locke 2004)] overlap and show similar empirical results
Emotion	Lerman et al. (2021)	Stress and emotional well-being	Challenge stressors are positively related to entrepreneurial performance ($r = 0.32$); hindrance stressors are negatively related to psychological ($r = -0.33$) and physiological well-being ($r = -0.16$) ($K = 38$; $N = 17{,}586$)	The relationship of challenge and hindrance stressors with well-being is smaller for entrepreneurs than for employees
	Stephan et al. (2022)	Well-being	Entrepreneurs have higher positive well-being (work and life satisfaction) than employees (standardized mean difference = 0.117); entrepreneurs and employees do not differ in negative well-being (standardized mean difference = 0.000) ($K = 94$; $N = 6.7$ million)	The differences between entrepreneurs and employees are more pronounced in countries with a strong rule of law, labor freedom, and high performance orientation

(*Continued*)

Table 1 (*Continued*)

Factors	Authors	Topic	Main findings	Additional findings
Personality	Brownell et al. (2021)	Dark triad	Machiavellianism ($r = 0.16$), narcissism ($r = 0.24$), and psychopathy ($r = 0.17$) are positively related to entrepreneurial intentions; Machiavellianism ($r = -0.22$) and psychopathy ($r = -0.10$) are negatively and narcissism ($r = 0.09$) is positively related to entrepreneurial performance ($K = 39$; $N = 11{,}819$)	
Demographic characteristics	Zhao et al. (2021)	Age	Age has a weak linear relationship with overall entrepreneurial success ($r = 0.02$) ($K = 102$; $N = 65{,}753$)	The relationship is negative for younger and positive for older entrepreneurs, implying a u-shaped relationship between age and entrepreneurial success; furthermore, the relationship is positive for subjective success, firm size, and financial success; zero for survival; and negative for growth
Entrepreneurship education/training and other interventions	Bae et al. (2014)	Entrepreneurship education and entrepreneurial intentions	Entrepreneurship education is positively related to entrepreneurial intentions ($r = 0.143$); the effect is nonsignificant when controlling for preintervention entrepreneurial intentions ($K = 73$; $N = 37{,}285$)	
	Chliova et al. (2015)	Microcredit	Microcredit is positively related to growth ($r = 0.08$), profits ($r = 0.11$), financial well-being ($r = 0.16$), health and nutrition ($r = 0.08$), education ($r = 0.05$), and female empowerment ($r = 0.21$) ($K = 90$; $N = 3{,}780$–$42{,}854$)	The relationship is weaker when the contextual situation of a country (e.g., education, political freedom, transparency) is better
Context	Rauch et al. (2016)	Social networks	Cohesive ($r = 0.164$) and diversified ($r = 0.182$) networks are positively related to performance ($K = 68$; $N = 16{,}364$)	The relationship of networks with performance is higher for subjective versus objective performance; the relationship of diversified networks with performance is stronger for large firms, in innovative industries, and in well-developed financial markets

Abbreviations: EI, emotional intelligence; GMA, general mental ability; HR, human resources.

suggests that causation and effectuation are not mutually exclusive, and entrepreneurs can use both strategies to achieve higher entrepreneurial performance (Galkina et al. 2022). Furthermore, research considering the process nature of entrepreneurship showed how entrepreneurs switch between causation and effectuation over time. For example, research on new product development in small firms analyzed innovation trajectories across several events and showed that effectuation was dominant in early phases of the innovation process, whereas causation was dominant in later phases (Berends et al. 2014; see also Reymen et al. 2015). In early phases, small firms were driven more by the available resources and engaged in a stepwise process in which goals and ideas were modified continuously. In later phases, small firms were more planful in their activities and investment of resources to achieve specific objectives (Berends et al. 2014). The findings suggest that the dominant strategy used by entrepreneurs shifts dynamically over time.

Going one step further, research has provided insights into the process underlying shifts in the use of causation and effectuation over time. Specifically, a qualitative study examined how causation and effectuation unfolded depending on the uncertainty entrepreneurs perceived along the entrepreneurial process (Jiang & Tornikoski 2019). In the beginning, uncertainty was absent, as entrepreneurs were confident about the value of their business opportunity. In this phase of certainty and confidence, causation dominated entrepreneurs' actions. Then, entrepreneurs often experienced unanticipated responses and consequences of their initial actions, resulting in doubt and a state of uncertainty. As a result, entrepreneurs began to shift from primarily using causation to engaging in more effectuation and using a mix of both approaches. Finally, entrepreneurs were able to reduce the uncertainty and regain stability. In this phase, causation dominated again (Jiang & Tornikoski 2019). In addition to uncertainty, Reymen et al. (2015) identified the availability of financial and human resources as well as stakeholder pressure as antecedents of entrepreneurs' shifts from one approach to the other. Increases in uncertainty and decreases in resources led to the decision to adopt effectuation. In contrast, decreases in uncertainty and increases in stakeholder pressure to focus on a specific technology, product/service, or market led to shifting to causation. In conclusion, the findings suggest that entrepreneurs adopt both strategies by variably transitioning between them. Causation and effectuation are complementary rather than competing strategies, which entrepreneurs flexibly use over time depending on situational conditions and constraints.

In line with this reasoning, Shirokova et al. (2020) demonstrated recently that the effectiveness of causation and effectuation is context dependent. They examined firm performance in an emerging economy during an economic crisis. Their findings showed that in a predictable environment characterized by little crisis, causation yields performance gains for firms, whereas effectuation results in losses. However, when the environment becomes more uncertain with increasing levels of crisis, the positive effect of causation on firm performance becomes weaker, whereas the negative effect of effectuation on firm performance turns positive. Consequently, in environments characterized by uncertainty and crisis, effectuation may outperform causation and vice versa. Thus, boundary conditions, such as context stability and predictability, moderate the effects of causation and effectuation on entrepreneurial performance.

Focusing on bricolage, Reypens et al. (2021) recently adopted a process perspective to investigate the temporal unfolding of entrepreneurs' use of bricolage in combination with other resource-seeking strategies in early stages of the entrepreneurial process. They examined entrepreneurs in a resource-constrained environment (Kampala, Uganda) and found that entrepreneurs consistently used bricolage at the inception stage of their ventures. Yet, entrepreneurs differed in strategy use in subsequent stages. Whereas some entrepreneurs continued with a high level of bricolage, others dynamically opted out and back into bricolage over time, combining bricolage with the acquisition of external resources. Engagement in the dynamic interplay between bricolage and resource seeking over time was often triggered by contextual factors, such as

participating in incubation programs or receiving grants. Furthermore, entrepreneurs who used bricolage in conjunction with resource-seeking strategies made more progress in advancing their ventures. The findings thus demonstrate that entrepreneurs' use of bricolage varies over time. Moreover, the findings illustrate how contextual factors influence entrepreneurial performance indirectly through determining the type and sequence of action strategies entrepreneurs choose.

Finally, Hopp & Greene (2018) adopted a process perspective to investigate temporal contingencies of the effect of planning on new venture performance. Longitudinal data on more than 1,200 US entrepreneurs showed that the positive effect of planning on new venture performance was contingent on planning timing, duration, and synchronization. Specifically, a plan had a positive effect when entrepreneurs spent no more than 3 months completing the plan to avoid opportunity costs in terms of time and other resources. Furthermore, entrepreneurs who planned 7 to 12 months into the entrepreneurial process achieved higher venture performance. Planning too early might lead to paralysis of analysis (i.e., encapsulation in information seeking; van der Linden et al. 2001), whereas planning too late prevents the unfolding of the positive effects of planning. Finally, a formal plan had a positive effect when it was synchronized with start-up activities including customer talks, promotion activities, and product preparation. These start-up activities are important for obtaining valid information and learning about the venture's viability in order to inform the plan in a meaningful manner. In contrast, a formal plan did not have a positive effect when it was done long before other start-up activities or when it was coupled with activities that characterize the preconception phase of the venture, such as defining the market or collecting competitor information. In this phase, the validity of the available information is limited, thus also limiting the usefulness of a formal plan. In conclusion, the sequencing and temporal ordering of planning and other start-up activities in the entrepreneurial process is critical for entrepreneurial performance.

Cognition from a Process Perspective

Entrepreneurs' cognition is an important determinant of entrepreneurial action. In the last decade, entrepreneurship researchers built on human capital theory and the literature on cognitive biases to investigate the influence of cognitive factors in entrepreneurship. Human capital theory suggests that people make investments, for example, in terms of education, training, and work experience, to gain specific knowledge and skills from which they can derive economic benefits (see Marvel et al. 2016). Indeed, meta-analyses provided evidence that human capital, in particular specific and task-related human capital, is positively related to entrepreneurial performance in all phases of the entrepreneurial process (Canavati et al. 2021, Unger et al. 2011). Considering the process nature of entrepreneurship, recent studies showed that the effects of different types of human capital (e.g., firm, industry, and entrepreneurial experience) vary over time, with initially positive effects becoming negative along the entrepreneurial process. For example, human capital, which is initially beneficial for entrepreneurial performance, eventually can lead to competency traps. Competency traps refer to being locked into past knowledge and routines (Hashai & Zahra 2022). As a consequence, new ventures become less likely to innovate, resulting in performance decline. Building on the notion of competency traps, a study based on high-technology start-ups in Israel examined the influence of entrepreneurs' prior firm and industry experience on new venture growth over time (Hashai & Zahra 2022). Entrepreneurs who had both prior firm and industry experience achieved the highest growth rates in the early years of a start-up. Prior firm experience may foster the development of a transactive memory system, facilitating knowledge transfer and task coordination. Moreover, prior industry experience provides entrepreneurs with knowledge about markets, customers, and industry practices, contributing to achieving high growth rates. However, experience, though beneficial in the early years of a start-up, might

create a competency trap in later years, negatively affecting growth rates. Specifically, entrepreneurs' experience increases the likelihood that they are entrenched in their past knowledge and rigidly manage the new venture along familiar paths. Indeed, entrepreneurs who had both prior firm and industry experience achieved the lowest growth rates in later years of the start-up compared to entrepreneurs who had only one or no prior firm or industry experience.

Besides human capital, the literature on cognitive biases has offered many interesting starting points to explain entrepreneurs' actions. Cognitive biases concern systematic deviations and distortions in people's evaluations and judgments (e.g., over- or underestimation), resulting in erroneous inferences, assumptions, or decision making (see Zhang & Cueto 2017). Cognitive biases play an important role in entrepreneurship because entrepreneurship is characterized by high uncertainty and complexity. Moreover, entrepreneurship is characterized by simultaneous information overload and a lack of historical information on the specific business opportunity. In such circumstances, biases, such as availability or anchoring bias, based on historical data can easily permeate people's evaluations and judgments (Zhang & Cueto 2017).

Entrepreneurship research has focused mainly on the cognitive bias of overconfidence and the related bias of overoptimism. Overconfidence concerns subjective certainty and refers most commonly to the overestimation of one's capabilities and expected performance relative to others. Relatedly, overoptimism refers to overestimating the likelihood of positive outcomes. Both cognitive biases thus involve positive expectations about future performance or outcomes (Zhang & Cueto 2017). Adopting a process perspective is particularly important to understanding the effects of overconfidence and overoptimism in entrepreneurship, because they are positively related to entrepreneurial performance in early phases (i.e., entrepreneurial entry) and negatively related to entrepreneurial performance in later phases (i.e., survival and long-term performance) of the entrepreneurial process (e.g., Koellinger et al. 2007). On the one hand, overconfidence and overoptimism help to cope with the risk and uncertainty inherent in entrepreneurship, thereby increasing the likelihood that people make the decision to engage in entrepreneurship. On the other hand, overconfidence and overoptimism may result in complacency, unrealistic expectations or forecasts, and reality shocks, consequently leading to lower performance and higher likelihood of abandoning the entrepreneurial process.

A recent experimental study built on prospect theory to examine antecedents of overconfidence and specifically emphasized the importance of taking a process perspective (Dubard Barbosa et al. 2019). A process can be conceptualized as a sequence of conjunctive events with different intermediate steps that are linked and in which all steps must be completed to achieve the ultimate outcome. Given this conjunctivity, the overall likelihood of achieving the outcome can be relatively low, particularly with a large number of events, even when the probability of succeeding in each single step is high. Applying this logic to entrepreneurship, the overall probability of success is relatively low because the entrepreneurial process includes a multitude of conjunctive events, all of which are critical for completing the overall process. Importantly, prospect theory suggests that people overestimate the likelihood of success when it depends on a series of conjunctive events, because they tend to ignore the conjunctive nature of the connection. In line with this reasoning, the conjunctive nature of the entrepreneurial process produces high confidence, positively influencing the decision to start a new venture (Dubard Barbosa et al. 2019).

In the last decade, several experimental studies further elucidated the emergence and consequences of overconfidence in entrepreneurship. For example, experimental research by Hooshangi & Loewenstein (2018) showed that the simple act of generating a business idea leads to biased evaluations of the economic value of the business idea, resulting in distorted decisions about idea exploitation. Specifically, generating a business idea increases the tendency to become overconfident in the promise of one's own idea and underconfident in the promise of other people's ideas.

The authors interpreted the findings in light of the literature on positive self-biases, suggesting that people become excessively enthusiastic and disproportionately attached to ideas they generate themselves, while being unaware of their biased judgments. Moreover, the findings are in line with the "Ikea effect," which describes an increased positive valuation of "self"-made products (Hooshangi & Loewenstein 2018). Focusing on the consequences of overconfidence, Gutierrez et al. (2020) provided evidence for a causal effect of overconfidence on entering a market, in particular when people believe that the outcome depends on their skills and not on chance.

Finally, research on entrepreneurs' cognition also examined the potential dark side of human capital, specifically, how human capital in terms of knowledge and experience might not only foster but also constrain entrepreneurial performance. These constraining effects have been subsumed under the so-called knowledge corridor. The knowledge corridor concerns the phenomenon that people's prior knowledge forms mental schemas that influence how they perceive, process, and interpret new information (Shane 2000). The same information might be discarded or processed and ultimately lead to very different reactions by people depending on differences in their mental schemas. Specific prior knowledge, for example, in terms of knowledge about markets, ways to serve markets, and customer problems, is crucial for identifying opportunities, because it provides the cognitive structure for mental operations to generate new ideas (Shane 2000). However, this specific prior knowledge might also limit the likelihood of identifying alternative opportunities, because it directs mental associations along certain cognitive paths but not along others.

Recently, research has focused on how entrepreneurs can "escape" the knowledge corridor and found that the degree and breadth of feedback and information sought from external sources increase the likelihood of identifying opportunities (Gruber et al. 2013, Marvel et al. 2020). For example, Marvel et al. (2020) showed that specific human capital in terms of prior knowledge about customer problems, existing markets, and ways to serve the market is negatively related to product innovativeness. This finding confirms the idea of a knowledge corridor. Furthermore, the negative effect of specific human capital on product innovativeness was weakened by the extent to which entrepreneurs sought and considered feedback. Similarly, Gruber et al. (2013) showed that external knowledge sourcing breadth—the extent to which entrepreneurs seek information from different groups such as suppliers, customers, and consultants—is positively related to identifying opportunities. Overall, the results suggest that external feedback and information facilitate making remote associations and going beyond the familiar to overcome the constraints of the knowledge corridor. Interestingly, prior entrepreneurial experience might not narrow but actually broaden the knowledge corridor. For example, entrepreneurial experience fosters exploratory perseverance, which refers to maintaining a broad choice set of alternatives and assessing various options in parallel (Muehlfeld et al. 2017). More specifically, people with entrepreneurial experience are more likely to keep exploring and evaluating different options from a broad choice set, even when the options conflict or when they had negative experiences with a particular option. In conclusion, prior entrepreneurial experience provides an additional route to escape the knowledge corridor caused by specific prior knowledge.

Motivation from a Process Perspective

Entrepreneurs' motivation reflects the intensity and persistence they are willing to direct toward entrepreneurship and is therefore an antecedent of entrepreneurs' actions (Shane et al. 2003). Research in the last decade demonstrated that a process perspective that considers the dynamics of the entrepreneurial process is particularly relevant to understanding entrepreneurs' motivation. In general, research in applied psychology suggests that motivation is a dynamic construct that constantly changes over time and that motivation is recursively linked to behavior, as it is both an antecedent and an outcome of behavior (Lord et al. 2010). Accordingly, research in

entrepreneurship transcended the unidirectional view of motivation as a driver of behavior. Specifically, an experience-sampling study with 111 entrepreneurs demonstrated that making progress in the entrepreneurial process predicted entrepreneurs' subsequent efforts (Uy et al. 2015). Research based on longitudinal and experimental data similarly showed that entrepreneurs' efforts predicted venture progress, which in turn increased their passion about entrepreneurship (Gielnik et al. 2015c, Tripathi et al. 2020). Taken together, these findings hint at a recursive relationship between action, progress, and motivation in entrepreneurship. Focusing on such a recursive relationship, Lex et al. (2022) recently showed in three different samples how entrepreneurial performance, self-efficacy, and passion reciprocally influenced each other over time. The process perspective ultimately suggests that entrepreneurs' motivation is not only an antecedent but also an outcome of entrepreneurial performance. Thus, entrepreneurs' motivation develops dynamically over time as a consequence of engaging and making progress in the entrepreneurial process.

The process perspective is also helpful in understanding the motivational function of entrepreneurial self-efficacy in entrepreneurship. Entrepreneurial self-efficacy concerns people's confidence in their capabilities to succeed in entrepreneurial tasks. Although a meta-analysis showed that entrepreneurial self-efficacy has a positive effect on performance in general (Miao et al. 2017), recent research suggests that some entrepreneurs might be overly self-efficacious, resembling the notion of overconfidence. For example, Baron et al. (2016) showed that entrepreneurial self-efficacy might lead to setting unrealistic or unattainable goals, thereby negatively influencing firm performance. Providing evidence for a curvilinear effect of entrepreneurial self-efficacy on performance, Gielnik et al. (2020) showed that the optimum level for creating a new business was approximately 90% confidence in one's capabilities. Furthermore, they considered the dynamics of entrepreneurial self-efficacy in the entrepreneurial process: Entrepreneurs who showed higher variability in entrepreneurial self-efficacy (i.e., ups and downs in their confidence over time) were more likely to display a calibrated form of self-efficacy at the optimum level of approximately 90%. The authors argued that the relationship between the static optimum at 90% and the dynamic variability of entrepreneurial self-efficacy over time were two sides of the same coin. The static optimum at 90% implies that entrepreneurs are confident enough to initiate the entrepreneurial process but not so confident they become complacent (see Vancouver et al. 2001). The same mechanism can be described from a dynamic perspective. When entrepreneurs experience ups in self-efficacy, they are motivated to initiate and maintain goal striving. Moreover, when they experience reduced self-efficacy (at a relatively high absolute level), their attention shifts to discrepancies, prompting them to invest more effort.

Another influential theory of the last 15 years to explain entrepreneurs' motivation is the theory of entrepreneurial passion, an emotion highly related to the field of entrepreneurship (Cardon et al. 2009). The theory defines entrepreneurial passion as an intense positive feeling associated with identities that are meaningful to the entrepreneur. The theory suggests that entrepreneurial passion has a motivating function via self-regulatory mechanisms. Indeed, empirical evidence supported this prediction, as entrepreneurial passion was positively related to venture growth through goal setting and goal commitment (Drnovsek et al. 2016). Moreover, entrepreneurial passion predicted entrepreneurs' perseverance, thereby increasing firm performance (Cardon & Kirk 2015, Mueller et al. 2017). Entrepreneurship research also built on the dualistic model of passion, which distinguishes harmonious from obsessive passion (Vallerand et al. 2003). Harmonious passion results from an autonomous internalization of an activity and fosters motivation to engage in the activity willingly. Obsessive passion, in contrast, results from external pressures or rewards, motivating people to engage in the activity because they feel compelled to do so. Notably, harmonious passion functions similarly to entrepreneurial passion. For example, harmonious passion positively influenced entrepreneurial behavior through the self-regulatory mechanism of

self-efficacy (Murnieks et al. 2014). A recent meta-analysis moreover showed that entrepreneurial passion and harmonious passion in entrepreneurship exert positive effects of similar effect sizes on entrepreneurial performance (Zhao & Liu 2022). In conclusion, passion in its different types is a motivational force driving entrepreneurial performance. Importantly, the motivational function of entrepreneurs' passion might go beyond the entrepreneurs themselves. In fact, Hubner et al. (2020) showed that entrepreneurs' passion is contagious and spills over to affect employee performance.

Emotion from a Process Perspective

Emotions and the underlying dimensions of valence (i.e., positive versus negative) and activation (activating versus deactivating) influence entrepreneurs' decisions and actions in the entrepreneurial process (Foo et al. 2015). In the past decade, research in entrepreneurship adopted a process perspective and considered that the experience of emotions fluctuates and changes over time. For example, Uy et al. (2017) investigated affective spin, which reflects people's tendency to experience high fluctuations in both positive and negative affect over time. The authors reasoned that high affective spin has negative effects on entrepreneurs' well-being and venture progress, because affective spin depletes resources to cope with affect fluctuations. The findings supported the reasoning, suggesting that entrepreneurs who can better regulate their emotions over time are more likely to make progress and maintain their well-being in the entrepreneurial process.

Furthermore, researchers examined changes in the specific emotion of fear of failure along the entrepreneurial process (Cacciotti et al. 2016, Kollmann et al. 2017). Fear of failure is an important emotion in entrepreneurship; research based on the Global Entrepreneurship Monitor survey showed that across 28 countries, fear of failure consistently reduced the likelihood of engaging in entrepreneurship (Arenius & Minniti 2005). Moreover, experimental research showed that fear of failure was negatively related to opportunity evaluation and exploitation during the entrepreneurial process (Kollmann et al. 2017). Investigating changes in fear of failure over time, Cacciotti et al. (2016) showed that fear of failure became stronger along the entrepreneurial process with the increasing commitments entrepreneurs made. Similarly, Kollmann et al. (2017) provided evidence that fear of failure is activated by a loss of financial resources, reduced social support, or lack of customer demand during the entrepreneurial process. Yet, fear of failure is reduced when entrepreneurs learn and improve their competencies in entrepreneurship (Cacciotti et al. 2016).

Entrepreneurship research in the last decade also showed that the role of fear of failure is more complex than a simple demotivating effect on entrepreneurs' decisions and actions to exploit an opportunity (Cacciotti et al. 2016). Specifically, entrepreneurs might perceive fear of failure negatively as well as positively. On the one hand, fear of failure is associated with negative affective arousal, such as depression, frustration, or strain. On the other hand, entrepreneurs might also experience positive affective arousal, such as excitement or a rush, because of their fear of failure. Furthermore, the different affective experiences might lead to different behavioral responses by entrepreneurs. The typical response is inhibition, which involves avoiding, delaying, or abandoning the entrepreneurial process. Yet, fear of failure might also have a motivational function, energizing entrepreneurs' behavior if it is considered as a challenge. Entrepreneurs might increase the intensity and persistence of their efforts to deal with the threats that elicit fear. This counterintuitive reaction is in line with theories of self-regulation, which suggest that negative emotions can result in higher motivation, because they are feedback indicating a discrepancy between the current state and the desired goal (Lord et al. 2010). Finally, fear of failure might lead to repression when entrepreneurs cannot cope with the threat and consequently try to suppress or dismiss the fear but eventually continue with their activities in the entrepreneurial process.

The different types of behavioral responses fear of failure causes suggest that it is not necessarily the emotions per se but the way entrepreneurs deal with and regulate them that explains emotions' role in the entrepreneurial process. Accordingly, recent research has adopted an emotion regulation perspective to examine entrepreneurs' modification of the experience of emotions and the consequences for entrepreneurial performance. For example, He et al. (2018) conceptualized entrepreneurial failure as an affective event that elicits negative emotions in the short term and ultimately affects entrepreneurs' learning. They looked at failure velocity, the rate at which entrepreneurs experienced failure events, and showed that the rate of failure events increased learning up to an inflection point beyond which the effect became negative. The reasoning is that at very high failure velocity rates, the elicited negative emotions interfere with entrepreneurs' cognition and motivation to learn from the failure events. Moreover, entrepreneurs high in emotion regulation continued to benefit from an increasing failure velocity rate even beyond the threshold that constitutes the inflection point for entrepreneurs low in emotion regulation. The findings thus demonstrate the important function of emotion regulation to counter negative emotions and maintain the capacity to learn in the entrepreneurial process.

Funken et al. (2020) also showed that error mastery orientation, which refers to taking a proactive and positive approach toward handling errors, had a function similar to emotion regulation in the relationship between experiencing and learning from negative events. Entrepreneurs who were high in error mastery orientation learned more when the number of experienced problems increased, whereas entrepreneurs low in error mastery orientation learned less. Again, the reasoning is that the negative emotions the problems elicited interfere with entrepreneurs' cognition and motivation to reflect upon and learn from problems. In such a situation, error mastery orientation helps to downregulate the negative emotions and thereby increases the likelihood of learning from the problem. Finally, in two separate studies, Stroe et al. (2020) showed that harmonious passion buffered the negative effect of dispositional fear of failure on experiencing negative affect during pitching competitions. When replicating the findings in the second study, the authors analyzed videotapes of entrepreneurs' facial expressions during the pitch to measure negative affect. Overall, the studies suggest that emotion regulation, error mastery orientation, and harmonious passion provide entrepreneurs with strategies and resources to cope successfully with the negative emotions they experience during the entrepreneurial process.

CONCLUSION

The field of entrepreneurial psychology has produced many insights and advanced the theoretical understanding of entrepreneurship and business creation (Gielnik et al. 2021, Gorgievski & Stephan 2016). In this review, we discussed recent research on the psychology of entrepreneurship and focused on two key topics in entrepreneurship research: action and process. The notion of process is inherent in entrepreneurship, because entrepreneurship is about transforming the current status and creating something new; entrepreneurship thus unfolds over time. Furthermore, action remains a key concept in entrepreneurship because transformation and creation are by definition acts of changing or making and necessarily require taking action.

Any review of a large and burgeoning field includes subjective elements, and that is also true of this review. However, we hope to have shown that a shift to a process perspective is happening already and is important for the advancement of entrepreneurship research (and organizational behavior, for that matter). Moreover, taking actions seriously as a starting point for entrepreneurship research is an outlook shared widely in the field. We suggest adopting a dynamic rather than static perspective to view actions and their antecedents in entrepreneurship. Entrepreneurs create the environment by changing it; at the same time, they change their actions, cognition, motivation,

Table 2 Research areas that follow from the discussion of the action theory process model of entrepreneurship

Topic	Research areas
Theories of action	■ Use experimental designs to test predictions of the specific theories of action (Campos et al. 2017, Camuffo et al. 2020)
Action theory	■ Identify actions and action strategies performed by entrepreneurs to be successful in entrepreneurship (Dyer et al. 2008, McKenzie & Woodruff 2017, Raffiee & Feng 2014) ■ Identify the sequencing and temporal dynamics of the actions performed by entrepreneurs to make progress in the entrepreneurial process (Hopp & Greene 2018) ■ Identify boundary conditions that enhance or weaken the relationships in the action sequence (Eller et al. 2022, Jacob et al. 2019)
Effectuation	■ Clarify the nature, structure, and interrelationship of the two logics of effectuation and causation (Cha et al. 2020, Smolka et al. 2018) ■ Use theoretical insights from applied psychology to extend the theory of effectuation (e.g., what are the psychological prerequisites of taking control/controlling outcomes, for example, in terms of goals or action planning) ■ Identify the boundary conditions that enhance or weaken the effects of the two logics on entrepreneurial performance (Shirokova et al. 2020)
Theory of planned behavior	■ Build on theories of self- and action regulation to identify individual factors to translate intentions into entrepreneurial action (Gielnik et al. 2014a, van Gelderen et al. 2015) ■ Use other theories to identify contextual factors that help to translate intentions into actions (Meoli et al. 2020)
Antecedents of actions (cognition, motivation, emotion)	■ Examine the dynamic interplay between antecedents and outcomes of actions along the entrepreneurial process (Cacciotti et al. 2016, Lex et al. 2022) ■ Examine how the influence of specific cognitive or motivational antecedents turns from positive to negative or vice versa along the entrepreneurial process (Gielnik et al. 2018, Hashai & Zahra 2022) ■ Examine how entrepreneurs' motivation and ultimately their personality or identity change as a consequence of engaging in the entrepreneurial process (Grimes 2018)

and emotions as they create. As a starting point to understand these dynamics, we introduced the action theory process model (new research suggested by this perspective is described in **Table 2**). Our model can and should be enhanced and empirically scrutinized, but we hope that this review is a fair representation and integration of ideas on actions in entrepreneurship in combination with a process perspective on actions, cognition, motivation, and emotion.

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