Decision-making under extreme uncertainty: eristic rather than heuristic

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Abstract

Purpose – This paper aims to introduce eristic decision-making in entrepreneurship. A decision is eristically made when it utilizes eristics, which are action-triggering short-cuts that draw on hedonic urges (e.g. sensation-seeking). Unlike heuristics, eristic decision-making is not intendedly rational as eristics lead to decision-making without calculating or even considering the consequences of actions. Eristics are adaptive when uncertainty is extreme. Completely novel strategies, nascent venturing, corporate venturing for radical innovation and adapting to shocks (e.g. pandemic) are typically subject to extreme uncertainties.

Design/methodology/approach – In light of the relevant debates in entrepreneurship, psychology and decision sciences, the paper builds new conceptual links to establish its theoretical claims through secondary research.

Findings – The paper posits that people adapt to extreme uncertainty by using eristic reasoning rather than heuristic reasoning. Heuristic reasoning allows boundedly rational decision-makers to use qualitative cues to estimate the consequences of actions and to make reasoned decisions. By contrast, eristic reasoning ignores realistic calculations and considerations about the future consequences of actions and produces decisions guided by hedonic urges.

Originality/value – Current entrepreneurial research on uncertainty usually focuses on moderate levels of uncertainty where heuristics and other intendedly rational decision-making approaches pay off. By contrast, this paper focuses on extreme uncertainty where eristics are adaptive. While not intendedly rational, the adaptiveness of eristic reasoning offers theoretically and psychologically grounded new explanations about action under extreme uncertainty.

Keywords Extreme uncertainty, Rationality, Eristics, Business venturing, Entrepreneurial decision-making

Paper type Conceptual paper

> The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man.
>
> -George Bernard Shaw
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> The future is open. It is not predetermined and thus cannot be predicted—except by accident.
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> -Karl Popper (1994, p. xiii)

Risk and uncertainty are the two major challenges that entrepreneurial decision-makers face (Shepherd *et al.*, 2015). Under risk, choices are informed by decision calculus as the availability of probabilistic data enables the use of inferential techniques for decision-making (Solway and Botvinick, 2012). By contrast, under uncertainty, decision-makers suffer from the lack of probabilistic data, complicating many entrepreneurial business decisions (Packard *et al.*, 2017; Peysakhovich and Karmarkar, 2016; Townsend *et al.*, 2018). Yet, decision-makers often cope with uncertainty satisfactorily by using heuristics, i.e. short-cut (often intuitive) solutions based on a single or a few cues (Artinger *et al.*, 2015; Huang and

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Pearce, 2015; Luan *et al.*, 2019; Suarez and Montes, 2019). However, effective use of heuristic reasoning necessitates substantial experience in the decision-making domain or familiarity with the problem to identify and judge relevant cues (Dane *et al.*, 2012; Schneckenberg *et al.*, 2019). When the decision-maker is dealing with a novel situation, uncertainties can be subjectively extreme for her, such that she endures a lack of meaningful qualitative information (cues) as well as quantitative information (Kurdoglu *et al.*, 2022). Completely novel strategies, nascent venturing, corporate venturing for radical innovation and adapting to shocks (e.g. pandemic) are often subject to extreme uncertainties, which impede not just quantitative probabilistic calculations but also heuristic methods.

How do entrepreneurs dare to take action under extreme uncertainty? This study suggests it happens via *eristic decision-making*, which is not intendedly rational. Eristic decision-making involves using eristics rather than heuristics. Eristics are action-triggering short-cuts that draw on hedonic urges (e.g. sensation-seeking). The authors derived the term "eristic" from Ancient Greek philosophy, which describes eristic approaches as tools to win without regard for the truth while describing heuristic approaches as tools to discover the truth (Kurdoglu and Ateş, 2022; Nehamas, 1990; Wolf, 2010). Unlike heuristics, which draw on information in the external environment and intend to capture a realistic assessment of the decision problem, eristics seek introspective reasons for action. In the absence of qualitative cues under extreme uncertainty, heuristics cannot properly function. However, eristics still offer another possibility: Directly following hedonic urges and bypassing an intendedly rational calculative problem-solving approach. In the short run, eristics can yield immediate outcome success only by luck as they do not involve setting action based on a reasoned assessment of the realistic consequences of an action. Yet, even after an immediate failure, eristics can still be favorable in the long run since they drive action necessary for learning and exploring opportunities (e.g. Gillier and Lenfle, 2019) – that would not occur if the action were solely based on an intendedly rational assessment of the likely consequences (e.g. Andersen and Nielsen, 2009).

Intendedly rational decisions follow a logic of consequence (notwithstanding effectuation [1]) in which decision-makers calculate (heuristically, logically or probabilistically) the consequences of available options, assign preferences to those estimated consequences and choose one of the options with preferable consequences (Cyert and March, 1963; March, 1994; Simon, 1978). In this regard, heuristic decision-making is essentially intendedly rational decision-making. By contrast, eristic decision-making is not intendedly rational as eristics lead to decision-making without consideration of the consequences of actions. Further definitions and related distinctions are presented in Table 1.

Without eristics, speculation and exploration could be severely limited as human action would be limited to intendedly rational action directed toward the exploitation of what is known and what is reasonable rather than an exploration of what is unknown and beyond reason. Eristics are adaptive for entrepreneurial decision-makers, as they can quickly ignite exploratory action (rather than inaction) and commitment, transforming a would-be entrepreneur into a nascent entrepreneur. Eristics provide the time and opportunity for exploring and developing learning potential under extreme uncertainty where rationally assessing, much less predicting, the consequences of an action is futile. As such, eristic reasoning and its irrationality (like a "reality whatever/be damned" attitude) can be responsible for propelling entrepreneurial action against all odds. While yet to be explicated and theoretically framed in terms of eristics, entrepreneurship literature is indeed no stranger to the potential connection and adaptive role in entrepreneurial decision-making. Extant entrepreneurship literature already hints at entrepreneurial eristics (i.e. eristics that entrepreneurs use for making decisions and initiating entrepreneurial action). For example:

	Heuristics	Eristics
Definition	Smart solutions based on a single or a few qualitative cues	Action triggering short-cuts based on impulses or affectual needs
Rationality	Intendedly rational by calculating consequences of action	Intendedly irrational by bypassing calculating consequences of action
Direction of reasoning	Problem-solving	Directionally motivational self-serving beliefs
Approach to truth	Seeking the truth	Apathy (indifference) to the truth (even extending to self-deception)
Goals of belief formation	Approximate accuracy (satisficing)	Wishful presumptions
Attention	External environment (exteroception)	Internal (bodily) environment (introspection)
Sources	Experience, learning or inborn characteristics	Hedonic urges (related to hormonal or neurological differences)
Most likely benefits	Exploitation – High possibility of immediate success) Intelligent action	Learning and exploring – Possibility of future success Emotionally disinhibited, non-intelligent, but relieving action
Applicability for entrepreneurs	Exploitation of known strategies, mature venture growth, incremental innovation, expected contingencies	Exploration of completely novel strategies, nascent venturing, radical innovation, unexpected shocks
Adaptation to levels of uncertainty	Moderate uncertainty: Meaningful qualitative cues exist	Extreme levels of uncertainty: Qualitative cues are either ambiguous or totally absent
Biases involved	Ignoring some part of the available information	Overconfidence, status quo bias, loss aversion and wishful thinking
Emotions involved	Sensemaking heuristic emotions: Liking, enjoying, fearing and surprising	Emotional eristic attachments: Passionate love or hate
Examples	• Recognition heuristic (choosing the recognized option) • Take the best (choosing an option which has the most discriminatory cue) • Imitate the successful • Imitate the majority • Tallying (choosing an option which has the highest number of positive cues)	• Follow your passion • Do what is exciting • Do what makes you feel less regretful • Do what you feel obliged to do • Do as you are supposed to do • Do as you wish or need • Do as someone brave does

Table 1.
Summary of the conceptual distinctions

(1) Follow your passion (Chen *et al.*, 2009)

(2) Do what you enjoy doing (Ryff, 2019)

(3) Do what excites you the most (Wiklund *et al.*, 2017)

(4) Do what makes you feel less regretful (Summers and Duxbury, 2012)

(5) Do what you feel obliged to do (Ryff, 2019)

(6) Do what your God/ancestors/spirits would expect you to do (Ganzin *et al.*, 2020)

(7) Do someone in your role/position supposed to do (Townsend *et al.*, 2010)

(8) Just do it as you wish/need (Wiklund *et al.*, 2018)

(9) Do it and everything will be great (Townsend *et al.*, 2010)

(10) Do it as fortune favors the brave (Hayward *et al.*, 2006)

The distinction between heuristics and eristics is an important contribution, as any method that does not draw on logic or probability is often mistakenly considered a heuristic rule (Shah and Oppenheimer, 2008). Distinguishing eristics from heuristics is not merely an issue of nomenclature. The conceptualization of eristics can explain the adaptiveness of non-intelligent decision-making driven by hedonic urges in contrast with intendedly rational (intelligent) approaches. The concept of eristics can be useful in explaining the adaptive functions of entrepreneurial passion (e.g. Cardon and Kirk, 2015), emotionally charged (e.g. Kollmann *et al.*, 2017) and impulsive (e.g. Lerner, 2016; Pietersen and Botha, 2021) decisions in entrepreneurship above and beyond the adaptiveness of heuristics (cf., Artinger *et al.*, 2015; Gigerenzer and Gaissmaier, 2011; Sarasvathy, 2001). Identifying eristics is also useful to reveal "animal spirits' and the biological roots (cf. Nicolaou *et al.*, 2021) of venturous decisions. Gigerenzer (2019, p. 3553) assumes that the animal spirits that Keynes (1936) famously refers to, that is, "*our spontaneous urge to action, optimism and hope, all of which make the wheels go round*", can be identified through studying the adaptiveness of heuristics. However, Gigerenzer neglects that the pursuit of hedonic urges (through eristics) can better represent animal spirits than heuristics do, as Keynes indeed refers to decisions that are not intendedly rational when he describes the animal spirits (Kurdoglu *et al.*, 2022). Similarly, the identification of eristics can explain what March (2006) describes as seemingly foolish exploratory actions that occasionally produce profound innovations.

In light of the current debates in entrepreneurship, psychology and decision sciences, the paper builds new conceptual links to establish its theoretical claims through secondary research. In what follows, the paper first elaborates on how entrepreneurial decision-makers adapt to extreme uncertainty through eristics, which is contrasted with adapting to moderate uncertainty through heuristics. As such, the paper explains the adaptiveness of decisions that are not intendedly rational. In the second part of the paper, further comparisons are made between heuristic and eristic decision-making. Besides, the unique features of eristic reasoning are presented within the context of entrepreneurial decision-making. The paper concludes by elaborating on the implications of the views suggested in the paper.

Adaptative decision-making under extreme uncertainty

To date, organizational theory, including entrepreneurial action theory, has largely been predicated on a reasoned judgment perspective (Lerner *et al.*, 2018a; McMullen and Shepherd, 2006) – e.g. realistically (accurately) understand the veracity of a potential opportunity. Yet, instead of an optimization strategy by probabilistic calculations or an approximation strategy by heuristics, decision-makers can also adopt a radically different reasoning motivation and pursue hedonic gains that do not depend on the foreseeable consequences of an action. This third option, i.e. following eristics, can be particularly adaptive when the uncertainty level is extreme.

Extreme uncertainty vs Knightian uncertainty

Since Knight's (1921) seminal book, uncertainty and risk are famously distinguished from each other. Risks are amenable to quantifiable probabilistic estimations, whereas uncertainties are not possible to be captured probabilistically with confidence (Artinger *et al.*, 2015; Packard *et al.*, 2017; Townsend *et al.*, 2018). Under risk situations, mathematical and probabilistic techniques are effective as they are useful in revealing optimal decisions. By contrast, under uncertainty, the optimal decision is usually intractable by these techniques

(Gigerenzer and Gaissmaier, 2011). Probabilistic calculations are not feasible under uncertainty, as it is not possible to have a closed set of options (alternatives), set of outcomes or both (Packard *et al.*, 2017). When sample space is unknown, it is impossible to quantify risks probabilistically. Dealing with such complications, boundedly rational decision-makers can use heuristics to make calculations to reach "satisficing" (sufficiently satisfactory based on aspirations) decisions (Simon, 1978).

Heuristic decision-making helps calculations under uncertainty as it shifts or limits attention to a reduced number of salient variables and lets the decision-maker ignore the rest (Gigerenzer, 2008). In this respect, heuristics are argued to be ecologically rational, therefore, adaptive under uncertainty (Gigerenzer and Gaissmaier, 2011; Luan *et al.*, 2019). However, the level of uncertainty that justifies the use of heuristics is limited to moderate uncertainty. Heuristics cannot work effectively under extreme uncertainty (Kurdoglu *et al.*, 2022). However, studies establishing the adaptiveness of heuristics under certainty (e.g. Gigerenzer and Gaissmaier, 2011) refer to Knightian uncertainty without recognizing different levels/shades of uncertainty (Arend, 2022). This might be because of Knight's emphasis on a moderate level of uncertainty where knowledge is partially available as Knight (1921, p. 199) argues: "The essence of the situation is action according to opinion, of greater or less foundation and value, neither entire ignorance nor complete and perfect information, but partial knowledge".

Knightian uncertainty (i.e. uncertainty with non quantifiable probabilities) is a broad concept that can be confusing as it subsumes a spectrum of uncertainty levels. At a level of Knightian uncertainty, probabilities are not quantifiable, but qualitative cues still exist such that the decision-maker is able to make a heuristic judgement confidently (i.e. moderate uncertainty). However, at a higher level of Knightian uncertainty, that is, when uncertainty is extreme, qualitative cues are either ambiguous or totally absent, which is close to complete ignorance. Extreme uncertainty is the focus of this present research.

Heuristics cannot be adaptive under extreme uncertainty, as heuristic calculations would suffer from a lack of meaningful qualitative cues that could provide sufficiently accurate estimations. Extreme uncertainty indicates the unavailability or weakness of information to render or trigger meaningful heuristics [2]. That is to say, heuristic cues that can be extracted from the available information are absent or too weak under extreme uncertainty to meaningfully formulate an intendedly rational choice (Le Masson *et al.*, 2019). Any heuristic cues, if available, may even be misleading under extreme uncertainty [3]. For instance, in assessing the prospects or next steps in developing new technology, heuristics may be meaningful if innovation is incremental, given the relative proximity and applicability of previous learning and routines. However, if it is completely a new technology or a radical innovation, previously formed heuristics will be of negligible utility — it may even be harmful to generalize old rules of thumb to new contexts. Under extreme uncertainty, the expected outcome of an action is —and will for some time remain— highly unpredictable. Thus, extreme uncertainty implies a protracted situation. Otherwise, an information search could dissipate extreme uncertainty and the situation would turn into moderate Knightian uncertainty (or even a situation of risk if probabilistic data becomes available). Under extreme uncertainty, the outcomes cannot be predicted *ex ante,* leaving the decision-maker epistemologically highly unconfident about the favorability or unfavourability of her decision.

When heuristic cues appear too weak or absent to make meaningful inferences about future and current reality, pursuing truth by *heuristic reasoning* is apt to be in vain. As such, under extreme uncertainty, as in many entrepreneurial decisions, particularly at the earliest stages of the entrepreneurial process (e.g. Schindehutte *et al.*, 2006), one can justifiably forego attempting to resolve the focal problem by heuristics and give up trying to understand the *environment* and instead submit to *inner hedonic urges.* In this sense, the decision-maker can

use *eristic reasoning* to capture other gains that can be achieved without a realistic assessment of the future and present. Thus, just as heuristic reasoning is adaptive under moderate uncertainty because of its utility in expected favorable outcomes, its counterpart eristic reasoning can be similarly adaptive (and even the basis for entrepreneurial action) under extreme uncertainty because of its utility in triggering action without forming realistic expectations.

Features of eristics vs heuristics

When Herbert Simon (1955) championed the study of bounded rationality, he described human cognitive limitations and how the use of heuristics overcomes these limitations. For instance, Simon (1956) introduced a model of foraging behavior where the forager uses heuristics to survive in a forest with modest calculations drawing on little information rather than making elusive utility-maximization calculations. Although the use of heuristics does not yield optimal outcomes and accordingly maximized utilities for decision-makers, Simon (1990) posited that heuristics are useful for their ease of use and satisfactory effectiveness in making intendedly rational and, therefore, adaptive calculations.

Following Herbert Simon's bounded rationality approach, Tversky and Kahneman (1974) pioneered the heuristics and biases research program, which empirically demonstrates that decision-makers are far from utility-maximizers as people often use heuristics leading to biases causing irrational inferences according to the standards of formal logic and probability. Behavioral economists accordingly discovered a variety of heuristics (i.e. representativeness, availability, adjustment and anchoring) that are tainted by biases (cf., Ariely, 2010; Kahneman, 2003; Thaler, 2016). Simon highly appreciated that line of research for demonstrating human cognitive limitations and the prevalence of heuristics; therefore, he nominated Tversky and Kahneman for the Nobel Prize (Augier and March, 2003).

However, despite Simon's endorsement of the heuristics and biases approach, Gigerenzer (2008) accuses Tversky and Kahneman of misrepresenting Simon's original vision as he indicates that many heuristics and their biased information processes are not inferior to logical and probabilistic calculations under uncertainty. To salvage the status of heuristics, Gigerenzer and his followers introduced a particular set of heuristics (i.e. the fast and frugal heuristics) that are demonstrably useful for adaptation to uncertainty. These heuristics can even outperform analytical methods with their accuracy and efficiency when information is scarce (Gigerenzer, 2018; Gigerenzer and Gaissmaier, 2011; Gigerenzer and Goldstein, 1996; Kruglanski and Gigerenzer, 2011).

The proponents of the fast and frugal heuristics approach championed the ecological rationality concept to describe the adaptive features of heuristics under uncertainty (e.g. Gigerenzer, 2008). In this respect, a heuristic decision is ecologically rational under uncertainty because of its sufficient prediction accuracy, efficiency (quickness and affordability) and frugality (utilizes little information) (Gigerenzer, 2019). The decision is argued to be ecologically rational if it matches the structure of the environment (cues, criteria and other information) (Gigerenzer and Gaissmaier, 2011). However, if the fast and frugal heuristics (e.g. recognition heuristic, take the best, imitate the successful or imitate the majority) are analyzed (cf., Artinger *et al.*, 2015; Mousavi and Gigerenzer, 2014), it is clear that these heuristics are all intendedly rational *independent of uncertainty*. These heuristics are tools for intelligent, practical calculations helpful to make decisions based on the logic of consequences (cf., Cyert and March, 1963; Harrison and March, 1984). In this respect, to call them rational, there is no need to measure their accuracy, frugality or efficiency levels under uncertainty. That is to say, even when those heuristics fail to produce adaptive outcomes, they still represent the use of rationality as a mindset, an epistemic stance or a thinking procedure. It is also worth noting that an irrationally made decision can yield an adaptive outcome, but that does not make it

rational. The point is that adaptation to uncertainty and rationality are separate issues, as it is possible to adapt to uncertainty by methods that do not involve intendedly rational calculations or assessments, especially when the uncertainty is extreme.

While the ecological rationality concept is useful for showing the adaptive benefits of heuristics, it just conceptually deals with intendedly rational means of adaptation to uncertainty and excludes other means. It seems that the fast and frugal heuristics approach ignores irrational means of adaptation to uncertainty as it is exclusively built on Simon's (e.g. 1955, 1956, 1990) bounded rationality models and the computational theory of mind (cf., Todd and Gigerenzer, 2003).

When Simon studied bounded rationality, he eventually aimed to develop artificial intelligence models (Simon, 1995). In a way, he neglected human irrationality and its adaptiveness as he took "adaptative intelligence" and "artificial intelligence" as synonymous concepts (cf., Simon, 1983). Simon (1967, 1985) was not ignorant of non-intelligent but adaptative factors (e.g. passion) present in human cognition. Yet his theory neglects the importance of factors like passion, unconscious drives and impulsively made decisions, as he suggested that non-intelligent adaptation is the exception rather than the norm (Simon, 1985).

Simon's computational theory of mind elegantly captures intendedly rational decision-making. Yet, growing evidence suggests that people can be subject to irrational factors such as superstitions (e.g. Bhattacharya *et al.*, 2018), supernatural beliefs (e.g. Boden, 2015), passions (e.g. Toth *et al.*, 2021), wishful thinking (e.g. Seybert and Bloomfield, 2009), self-deceptive decisions in different forms such as reality-denial or not wanting to know (e.g. Bénabou and Tirole, 2016) and directionally motivated reasoning in various forms (e.g. Simon and Shrader, 2012). As motivated reasoning research suggests, individuals tend to distort the truthfulness of their beliefs, especially when the available information is sufficiently ambiguous and when the truth is not self-evident (Mishra *et al.*, 2013; Noval *et al.*, 2018). Similarly, individuals are documented to perceive illusory patterns, including confabulating conspiracy theories and seeing objects which are not present, when they feel that they lack control because of uncertainties (Whitson and Galinsky, 2008). As such, it is not reasonable to assume that people exclusively adapt to uncertainty in an intendedly rational way through the use of heuristics.

Switching from heuristics to eristics for daring entrepreneurial action

While entrepreneurs usually have a mindset that is different from typical scientists (Kuratko *et al.*, 2020; Rindova and Courtney, 2020), entrepreneurs are certainly capable of benefiting from scientific reasoning (Camuffo *et al.*, 2020) as well as heuristic reasoning (Shepherd *et al.*, 2012). Yet, this paper posits that they do not always pursue truth and they can resort to eristics to initiate entrepreneurial action under extreme uncertainty, which cannot be explained by heuristic decision-making.

Intendedly rational use of heuristics requires practical calculative reasoning that focuses on a single cue or a few cues (and ignores other cues) to make sufficiently accurate (even if biased) calculations and decisions in an efficient way (cf. Gigerenzer and Brighton, 2009). The accuracy of such calculations depends on the accuracy of the beliefs that underlie the calculations. However, people can also form beliefs that are not intended to be accurate at all, as beliefs can be formed for self-deception, wishful thinking and other forms of directionally motivated reasoning (cf., Kunda, 1990; Schwardmann and Van Der Weele, 2019; Simon and Shrader, 2012; Zimmermann, 2020). Such beliefs that are not intended to be accurate support the switching from the use of heuristics to eristics that biasedly justify certain conclusions without any reliable cues to support these conclusions.

When individuals do not pursue true perceptions of reality – i.e. accuracy in their reasoning, they can form adaptive hedonic justifications for action (Mishra *et al.*, 2013), which

are here posited to be a feature of eristic reasoning. For instance, eristics like "follow your passion" or "do what excites you the most' represent the pursuit of hedonic goals enabled by directionally motivated reasoning. Expecting hedonic pleasures is different from making calculations about consequences, as one can wishfully form expectations. Neurological disorders such as ADHD (Attention-deficit/hyperactivity disorder) (Hatak *et al.*, 2021; Lerner *et al.*, 2018b) can also support using eristics. Likewise, hormones like testosterone can play their parts (e.g. Bendahan *et al.*, 2015; Norbury and Husain, 2015).

Eristics also allow entrepreneurs to play with their ideas in an unadulterated way [4]. Play is an inherent aspect of humans as well as other animals (Huizinga, 1955). While extreme uncertainty brings about anxiety, it can also spark a sense of enjoyable play, just like a daunting roller coaster experience comes with a thrilling adrenaline rush. After all, "[t]*o dare, to take risks, to bear uncertainty, to endure tension—these are the essence of the play spirit*" (Huizinga, 1955, p. 51). Yet, playing is not merely a hedonic exercise as it can unintentionally help discovery: Eristics that allow playing with ideas in unpredictable situations may lead to serendipitous business opportunities and innovations (cf. Austin *et al.*, 2012; Busch and Barkema, 2022).

Research indeed demonstrates that some individuals may take entrepreneurial action and pursue entrepreneurship for hedonic reasons (Stephan *et al.*, 2020) rather than engaging in a truthful assessment of their entrepreneurial ideas, the market, legality, etc. Such hedonic actions are often pursued on impulse, so there simply was not a reasoned assessment prior to action (Huang, 2018; Lerner *et al.*, 2018a). While such hedonic decisions can lead to considerable entrepreneurial success (Hunt *et al.*, 2022; Lerner *et al.*, 2018a; Shir *et al.*, 2019; Simon and Shrader, 2012; Walker *et al.*, 2020), they can also interfere with individuals successfully capitalizing on opportunities (Cacciotti *et al.*, 2016; Kollmann *et al.*, 2017; Lerner *et al.*, 2018b; Morgan and Sisak, 2016). In any way, such decisions are quite different from the heuristic decision-making processes that Gigerenzer and Gaissmaier's (2011) fast and frugal heuristics approach outlines.

As the fast and frugal heuristics approach conceived human cognition like an efficient computer, it cannot explain the adaptiveness of hedonically formed decisions made by eristics. Likewise, it cannot account for cognitive illusions (Kahneman and Tversky, 1996), non-consequential decisions (c.f., Bastardi and Shafir, 2000), or hedonic emotional regulations strategies of people (e.g. Tamir *et al.*, 2008), as well as decisions that are triggered impulsively by hormonal factors such as dopamine or testosterone (Nicolaou *et al.*, 2018; Norbury and Husain, 2015). Yet, such decisions can be adaptive for their hedonic features instrumental for coping with uncertainty. Thus, for adapting to uncertainty, the human mind does not necessarily deal with intelligent calculations that target accuracy, efficiency and associated practical problem-solving goals attributed to heuristics.

Another problem is that the fast and frugal heuristics approach focuses on the immediate success of a decision to call it adaptive and rational. Immediate outcomes can be misleading in judging the adaptiveness or rationality of a decision. Immediate success (as well as failure) of a decision does not negate the presence of irrationality in decision-making procedures. Rationality, adaptiveness and immediate decision-making performance should be analyzed separately. An irrationally made decision can be hedonically adaptive for coping with uncertainty, while it can yield failure in the short run. However, an immediate failure can also be adaptive by producing learning opportunities useful for future outcomes. For instance, following passions (e.g. Cardon *et al.*, 2009; Fisher *et al.*, 2018) can be an adaptive hedonic response to uncertainty, as passions can give the courage to face uncertainty. Following passion might lead to failure in the short run, but it can also lead to entrepreneurial success in the long run. Likewise, directionally motivated reasoning can help to reduce anxiety (e.g. Lamba *et al.*, 2020) or create pleasurable feelings (e.g. Mukherjee and Srinivasan, 2021) that can be useful to dare action under uncertainty.

As a case in point, consider an entrepreneur who is developing a radically new product based on newly discovered technology for a market that does not exist yet. These conditions evade a realistic assessment of entrepreneurial success, yet the entrepreneur can still invest in the product based on her faith because of the hopes associated with the pursuit (Hayward *et al.*, 2006, 2010). In this sense, eristic reasoning may be the fuel of entrepreneurial ventures and useful to dare entrepreneurship despite very high failure rates (cf., Klimas *et al.*, 2021). Similarly, eristic reasoning can help regulate entrepreneurs' sense of uncertainty as they wish (e.g. Griffin and Grote, 2020) so that they can find the drive to continue entrepreneurial action in the face of extreme and protracted uncertainties. By eristic reasoning, entrepreneurs may psychologically cope with vague chances of success when pursuing a product idea that requires radically new technology to target a new (i.e. unestablished) market. In comparison, most people would eristically refrain from any entrepreneurial action when they face extreme uncertainty.

Eristics are adaptive under extreme uncertainty, yet they are not necessarily instrumentally rational (i.e. means to a favorable end). Eristics are adaptive under extreme uncertainty for their immediate hedonic effects and their *possible* favorable outcomes (fortuitous exploration and learning) in the long run. Regardless of the outcomes, the purpose of eristic reasoning is to pursue a hedonic goal igniting action under extreme uncertainty. Thus, eristics only provide possibilities of eventual success, while adaptiveness of eristics under extreme uncertainty is valid irrespective of the eventual consequences. However, eristics are certainly not adaptive when uncertainty is not extreme, as it would be instead sensible to use heuristics for intelligently aiming at favorable outcomes. Thus, while the adaptiveness of heuristics stems from their expected instrumentality (which is feasible to be aimed at when there is moderate uncertainty), the adaptiveness of eristics stems from the fact that they do not require estimating the consequences of an action.

It is also important to acknowledge that some eristics may be used in nonadaptive ways as a cultural habit rather than as a reaction to extreme uncertainty. Just like heuristics can be learned culturally (Gigerenzer *et al.*, 2022), eristics can be rooted in culture, where some of them can be remnants of earlier extremely uncertain conditions which are no longer relevant (Sterelny, 2003). For instance, if an entrepreneur act based on what her God/ancestors/spirits would expect her to do (e.g. Ganzin *et al.*, 2020) because of cultural pressures, her action may not even provide any (including hedonic) benefits, particularly when action consequences are already foreseeable (under moderate uncertainty),

Eristic biases

It is useful to compare the biases involved in heuristics with biases in eristics. By definition of eristics, the biases for justifying certain conclusions for hedonic reasons rather than justifying the use of certain cues in a biased way in intendedly rational heuristic calculations should be attributed to eristic reasoning rather than to heuristic reasoning. The overconfidence bias, status quo bias, loss aversion and wishful thinking are prime examples of such biases, as they serve to satisfy hedonic desires at the expense of truth – because of, for example, emotional attachments to an idea, person, object, or state (cf., Shu and Peck, 2011). In this respect, overconfidence leads to an untruthful portrayal of oneself. Similarly, loss aversion stems from pursuing psychological comfort (i.e. reducing the anxiety of losses) at the expense of a truthful calculation. Likewise, the endowment effect leads to ignoring the true market value of one's belonging. Wishful thinking is the most striking example of self-serving inferences, as its label directly depicts detachment from reality.

In contrast to eristic biases, biases studied by the fast and frugal research program, such as recognition, take the best, tallying and 1/N (c.f., Gigerenzer, 2008) are biases of heuristics because of their intendedly rational character. These biases involve ignoring some of the available

information for efficiency and reduction of noise, while the cognitive motivation remains to be truth-seeking. For instance, as one of the fast and frugal heuristics, the 1/N heuristic (equally dividing money into all investment options) is recommended for financial investment decisions. The 1/N heuristic is biased in ignoring other relevant information as a calculation strategy aiming at accuracy. By contrast, eristics are biased for their hedonic, non-calculative character. Unlike the biases of fast and frugal heuristics, the biases of eristics (such as overconfidence bias) are usually not favorable in terms of the accuracy of entrepreneurial judgements (Barbosa *et al.*, 2019; Zhang and Cueto, 2017) and in terms of immediate entrepreneurial success in many cases (Hmieleski and Baron, 2009; Hogarth and Karelaia, 2011). Yet, they can be adaptive anyway if the level of uncertainty is extreme.

Eristic emotions

When a decision is analyzed, the possible roles of emotions should not be ignored (George and Dane, 2016). Emotions are products of desires and beliefs (Lazarus, 2006). Since heuristics and eristic reasoning involve different types of desires and beliefs, the heuristic vs eristic distinction is also meaningful to classifying emotions. As such, some feelings are heuristic; others are eristic. Heuristic feelings function as perception tools to make sense of the external environment and produce cognitive signals to prepare the body for the best response to environmental conditions. Thereby, heuristic feelings facilitate the sensemaking of the external environment. By contrast, eristic feelings, such as passionate love or hate, create compelling emotional attachments that can impede accuracy-seeking. Such eristic feelings are not about reacting to reality in the present or future. Instead, they are tied to past events and associations, which create dogmatic faith and closed-mindedness (see Price *et al.*, 2015) that obscure and reject truthful assessment of reality.

Lazarus (1991, 2006) states that emotions broadly have two functions; appraising and coping. Appraising is *"imputing relational meaning to our ongoing and changing relationships with others and the physical environment"* (Lazarus, 2006, p. 10). "*Coping is concerned with our efforts to manage adaptational demands and the emotions they generate*" (Lazarus, 2006, p. 10). Both heuristic and eristic feelings are for the appraisal and coping; however, they differ in terms of how they appraise and cope with reality. Heuristic feelings (such as liking, enjoying, fearing and surprising) are based on open-minded appraisals that are helpful for coping with reality in an intendedly rational way. As heuristic reasoning is based on "finding 'good reasons' to justify a decision" (Perelman, 1979, p. 32), one can use her intuitive feelings as unconscious recognition of heuristic information (Simon, 1997). By contrast, eristic feelings (such as loving, hating and disgusting) give rise to side-taking and dogmatic appraisal of reality.

Eristic feelings are based on hedonically coping with reality through biased assessments of reality. They create compelling emotional attachments to a person, idea or object. Eristic feelings are responsible for settling the competition among urges, which is particularly complicated for an intertemporal choice (i.e. deciding on an option that can change future options) (Ainslie, 2001). As such, eristic feelings ensure a faithful commitment. For instance, entrepreneurial passion is a good example of an eristic feeling. Eristic feelings like passion can be particularly useful to retain optimism (e.g. Lench, 2009) and achieve resilience (e.g. Hayward *et al.*, 2010; Korber and McNaughton, 2018) even when there is a lack of factual or logical reason to form a positive evaluation of the present and future reality.

Entrepreneurial passion shapes identities and creates personal attachments to entrepreneurship activities (Cardon *et al.*, 2009; Lex *et al.*, 2022). Entrepreneurial passion provides the necessary desire and powerful emotional force to engage in sustained entrepreneurial activities (Cardon *et al.*, 2009, 2013; Mueller *et al.*, 2017). In this regard, harmoniously felt entrepreneurial passion (i.e. when the desire is controllable) is an adaptive motivational factor at any level of uncertainty. When entrepreneurial passion is obsessively

felt, there is an unyielding urge for entrepreneurship (Fisher *et al.*, 2018) which is also adaptive if uncertainty is extreme. Passion lets the decision-maker consider and act based on their desires (Perelman, 1979, 1980) rather than on the reality of one's environment. At the most uncertain times in the venturing process, when it is simply not possible to meaningfully assess reality (much less prospectively assess the reality to come), passion can shift an entrepreneur's attention from ambiguous or distracting cues from the *environment* to cues from *inner urges*. In this way, the eristic nature of passion overcomes inaction or abandonment in the face of intractable environmental uncertainties (and harsh realities).

Eristic feelings are likely to dominate decision-making when there is extreme uncertainty, as it is adaptive to do so. Empirical research demonstrated that when uncertainty levels increase, reliance on affectual inputs increases (Faraji-Rad and Pham, 2017). As Lerner *et al.* (2015, p. 804) put it, "*affect is most likely to influence the judgement in complex and unanticipated situations*". Yet, eristic feelings represent excessive reliance on affectual inputs such that they distort intendedly rational decision-making processes, unlike heuristic feelings which support intended rationality by intuitively processing information from the environment.

Implications

Implications for research

Given the extreme and pervasive presence of uncertainty in entrepreneurship, the psychological literature on ecological rationality of decision-making (Artinger *et al.*, 2015; Gigerenzer and Gaissmaier, 2011; Mousavi and Gigerenzer, 2014) can only partially help to understand entrepreneurial decision-making (Kurdoglu *et al.*, 2022). For example, how should entrepreneurial passion be categorized? Neither probabilistic logic nor simplifying heuristics can effectively accommodate entrepreneurial passion. However, it is important to understand the role of different emotional influences in entrepreneurial decisions. The introduction of eristics provides scholars with a new landscape and framework, which accommodates and situates different forms of emotions (i.e. *affect-as-information* serving calculative heuristic judgments *versus* emotion serving attachment or side-taking impeding the search for truth). As such, the perspective presented in this paper opens a new conceptual path for researchers to explore the emotional nature of entrepreneurship.

Judgement-based explanations of entrepreneurial action exclusively attend to tools of intendedly rational decision calculus, including based on the individual's subjective utility function. In this regard, Foss and Klein (2012, p. 81) emphasize that "*while the exercise of judgment is a function (or, rather, a set of complementary functions), it is based on perceptions, skills and heuristics*". Yet, we posit that, at times, entrepreneurs may also resort to eristic reasoning based on hedonic urges and eristics, particularly when uncertainty is extreme. Empirical research has shown that it is simply not true that all action requires thoughtful planning or foresight (Hunt and Lerner, 2018; Wiklund, 2019). How much entrepreneurship would have never occurred if eristic reasoning had not served to get started and keep going in the face of insurmountable uncertainty? Further research should empirically establish to what extent entrepreneurs are inclined to reason eristically when the uncertainty levels approach extreme levels.

Entrepreneurs usually require financial support from investors who must be persuaded to elicit their financial support. When making their judgements under high levels of uncertainty, investors are known to rely on factual data about business viability as well as certain heuristic cues (Huang, 2018; Huang and Pearce, 2015), such as the enthusiasm of the founder (Shane *et al.*, 2020) or the displayed optimism and resilience of the founder (Dushnitsky, 2009) which are indeed not directly related to the quality of the entrepreneurial idea. In a way,

investors seem to be heuristically searching for entrepreneurs who eristically pursue their entrepreneurship projects. Researchers can explore this issue alongside exploring the eristics of investors funding entrepreneurship. For instance, investors are impressed by entrepreneurs' influence tactics like inspirational appeal (creating a sense of exciting opportunity), consultation (asking for suggestions from the evaluator) and collaboration (offering further help) (Lu *et al.*, 2018). As these factors are not heuristic cues for investors since they provide negligible information on the future of the entrepreneurial project, they may be eristic drivers as they please the investors hedonically. The lens of eristic decision-making can be helpful for researchers to produce further exciting findings.

Implications for practice

The theoretical perspective outlined in this paper offers at least three implications for practice. First, it legitimizes a particular way of decision-making for nascent entrepreneurs as it describes how eristic decision-making can be an adaptive option when there is extreme uncertainty. Many people aspire to be an entrepreneur or make innovations, but they lack the necessary experience or education. Such people may never realize their entrepreneurial or innovative dreams if they keep waiting for favorable conditions. The possibilities of eristic decision-making may seem foolish, so they may never dare entrepreneurial action. Yet, as March (2006) convincingly puts it, seemingly foolish actions can propel exploration as much as they can lead to disasters if things go wrong. Yet, identification of the adaptiveness of eristic decision-making enables *would-be entrepreneurs* to act and be nascent entrepreneurs, realizing that eristically made decisions are not as foolish as they may seem once extreme uncertainty is taken into account. Thus, eristic decision-making can be a liberating option for people aspiring to be entrepreneurs under highly uncertain circumstances.

Second, recognizing the adaptiveness of eristic decision-making can also be reinvigorating for venture investors, i.e. angels, crowd funders and private equity investors. Limiting venture investments to intendedly rational calculations would certainly kill the joy of the investing game. In a way, play is intrinsically rewarding. As Knight (1941 p. 817) argues, "*one would not play any game if the result could be accurately foreseen*". Thus, barring unethical practices, venture investors should perhaps deliberately allow themselves more room for eristic reasoning under extreme uncertainty. Equally important, however, is that venture investors should not romanticize eristics but rather refrain from using them in favor of smart heuristics and other decision logics when uncertainty is not extreme.

Third, possibilities of eristic decision-making can be helpful for managing radical innovation projects. Corporate entrepreneurship and innovation ideas require positive evaluations of investment decision-makers within organizations. In these evaluations, radical innovation projects often initially face extreme uncertainty that blurs their option value; many exciting innovation projects never take off due to the lack of supporting data about their potential market success (Mueller *et al.*, 2012). Companies should perhaps deliberately allow for eristic decision-making in these evaluations, granted that their failure would not threaten the company's future.

Conclusions

The identification of eristics has important consequences for entrepreneurial decision-making under uncertainty. To date, entrepreneurial decision-making scholars largely focused on decision-making approaches for intendedly rational decision-making. While heuristics can provide fast and frugal decision-making under moderate uncertainty (Gigerenzer and Gaissmaier, 2011), their applicability breaks down when uncertainty is extreme and protracted. In many entrepreneurial decision-making contexts, such as decisions

regarding radically new venture ideas (e.g. Frederiks *et al.*, 2019), the reality is so nebulous that instead of using heuristics, one needs to use *eristics* for decision-making. While intendedly rational analysis is futile under extreme uncertainty, eristics trigger commitment to an exploratory action, which can provide surprisingly favorable outcomes for entrepreneurs. Otherwise, it can be simply useful for learning in case of failure.

Intelligent decision-making requires information and an information processing capacity (March, 2006). Yet, as emphasized throughout the paper, entrepreneurial decision-makers sometimes lack any information to use their intelligence while they are also bounded by cognitive limitations. In these circumstances, they inevitably need to rely on other psychological and cognitive processes fed by hedonic urges rather than by information about reality. In a way, just as opportunity recognition is an entrepreneurial skill (Baron, 2006), ignoring reality at times could also be an entrepreneurial skill (de Holan, 2014) that is probably fed by eristic reasoning, particularly under extreme uncertainty. Further research is needed to examine whether entrepreneurs reason and act differently under different levels of uncertainty. In all respects, studying eristic reasoning can be a new window for researchers to understand the nature of entrepreneurial decision-making (cf., Shepherd *et al.*, 2019).

Notes

1. Within organizational scholarship, entrepreneurship scholars have also given considerable attention to *effectuation*: a behavioral strategy observed in expert entrepreneurs where they sometimes "take a set of means as given and focus on selecting between the possible effects than can be created with that set of means" (Sarasvathy, 2001, p. 245). Effectuation, as a set of heuristic principles and action strategy, is far richer than simple heuristics. It is a reasoned, intendedly-rational problem-solving approach (Lerner *et al.*, 2018a).
2. This paper here refers to subjective perceptions of uncertainty rather than objective features of the environments. As such, uncertainty level of a particular environment can be different for different people because of their perceptual and cognitive capacities as well as their experiences.
3. Even in relatively stable and clear contexts, heuristics developed in one context may be meaningless or even counter-productive in other contexts (e.g. heuristics for doing business in *New York City* vs in *rural China* vs in *Saudi Arabia* vs in *prison*).
4. We thank the anonymous reviewer for bringing up this issue.

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