

## DIFFERENT TYPES OF INTUITION AT THE WORKPLACE: AN INTEGRATIVE REVIEW

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**Abstract.** To make good decisions, employees must manage their own intuitions and be able to anticipate decision-making in their work environment. How well this is accomplished has significant consequences for the workplace. A closer examination indicates that individuals utilize various types of intuition. People's work context is frequently omitted from studies on the use of intuition, resulting in a literature that omits vital aspects of decision-making. To assist applicable research in the workplace, our contribution to the management literature is a comprehensive overview of intuitive decision-making types. Current psychological assessment scales constitute a mature discipline, but they frequently lack the professional applications needed in business administration and economics. Considering this, the primary objective of this article is to assemble and assess many types of intuition and combine them into a new lens for research in the theory and practice of business using a multidimensional approach. It is comprised of rational choice theory, classical intuitive decision making, emotional decisions (gut feelings), fast heuristic decisions, unconscious thought, and anticipation. The overview of several scientifically proven measuring scales produces a theoretical foundation for future empirical study in business administration and economics based on these findings.

**Keywords:** decision style, deliberation, intuition, heuristic, anticipation, unconscious thought, workplace.

**JEL Classification:** D81, D83, M21.

### Introduction

Decision-making has long been viewed as a cognitive process resulting in the selection of a course of action among several alternatives (deliberation or rational thinking, effortful, planned, and analytic) and intuition (affective and spontaneous decisions and automatic processes) in domain-specific and domain-general approaches (Tichá et al., 2010). Particularly in business schools, decision-making is taught as rational analysis. However, tacit knowledge and heuristics have received increasing attention in the business literature in recent years (De Vries et al., 2008; Elbanna, 2006; Gigerenzer & Gigerenzer, 2011; Launer et al., 2022; Svenson et al., 2023; Svenson et al., 2020; Svenson et al., 2022; Zhang et al., 2021). In the practice of economics and business administration, the concept of intuition has not yet entered the mainstream. The new way of looking at intuition in business that is presented here should lead to new ways of measuring it and new ways of teaching it, therewith adding value.

Critics of behavioral economics typically stress the rationality of economic agents (Myagkov & Plott, 1997), it is even stated that no behavioral research can establish an economic theory (Maialeh, 2019). However, behavioral economics is the effort to increase the explanatory and predictive power of economic theory by providing it with more psychologically plausible foundations (Angner & Loewenstein, 2012). It was Tversky and Kahneman (1973) who described the irrationalities in human decision making which started a new era in behavioral economics (Einhorn & Hogarth, 1981). Heuristic decisions based on knowledge and experience entered the literature on behavioral economics (Gigerenzer & Selten, 2002). This original approach is valuable to integrate the concept of intuition into economic theory.

Business administration relies on psychology to provide conceptualizations of intuition. Literature on measuring intuition with validated survey scales like cognitive-experiential self-theory (CEST) by Epstein (1994), Rational Experiential Inventory (REI) by Epstein and Pacini

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(1999), General Decision Making Style (GDMS) by Scott and Bruce (1995), Perceived Modes of Processing (PMPI) by Burns and D’Zurilla (1999) describe intuition in a cognitive, dual-process, domain-specific approach. In their unified scale to assess individual differences in intuition and deliberation (USID) Pachur and Spaar (2015) developed a domain-general measurement scale assembling these different types of intuitions and scales. These scales are well developed but hard to use in business environments. Specific categories are missing, need to be adapted, or need a new theoretical basis.

The existing scales describe spontaneous decisions based on the automated process theory approach. The concept of heuristics by Gigerenzer and Todd (1999) is commonly used in business. Heuristic decisions are considered to occur spontaneously; however, the underlying basis are trainings and education. The common concepts cannot manage all phenomena of heuristics in everyday practice. An extension of the theoretical basis appears feasible. Affective intuition is grounded on psychology and sociology, however, a deeper explanation based on neuroscience is important. Cognitive science may help explain the underlying processes of daily practice in business decisions. The anticipation of future developments, particularly important in strategic management, in existing approaches is seen as a type of affective intuition or a hunch. An expansion towards more parapsychological intuition promises additional insight. In general, most approaches towards intuition describe spontaneous decision-making. Also, we know from practice that business managers may take their time to think through decisions with times of distractions from the problem. This approach is completely missing in the existing measurement scales. We argue that the theory of unconscious thinking may describe this decision process best. These adaptations, extensions and changes are important for researching intuition in business.

Therefore, the theoretical basis of different types of intuition needs to be qualitatively analyzed towards their appropriate use in improved measurement scales for business. The different approaches are from various academic fields such as psychology, sociology, neuroscience, medicine, business administration, and parapsychology. Therefore, each approach must be critically reviewed, qualitatively analyzed with a tabular, and graphical method for better understanding. Based on this single analysis, the categories of intuition will be assembled newly to better describe intuition in managerial processes. The new combined approach will be based on the analysis by Launer and Çetin (2021), who documented empirical support for the validity and reliability of this approach (Launer et al., 2020). This is in line with the arguments of Malewska (2015) who points out that there is a lack of systematization and holistic approaches towards intuition. Akinci and Sadler-Smith (2012) described new ways for intuition research based on their comprehensive literature review. The contribution of this article lies in presenting an overview of a body of knowledge and to highlight blind spots

regarding empirical phenomena that are not covered by existing concepts. To achieve their aims, the greatest literature reviews have a narrow focus on a certain subset of the available literature (Torraco, 2005). The article reviews various competing models, and organizes their concepts in a systematic way, as suggested by Torraco (2005, p. 365).

There are plenty of definitions for intuition (Taggart, 1997), because intuitive decision-making is still an intangible phenomenon remaining ambiguous (Sinclair, 2014). To develop a more business-oriented approach, the different intuition styles need to be newly described in a more holistic, open definition. Jung (2014) described intuition as an unconscious, primary mode of perception, e.g., sensing, intuition, thinking, and feeling. The approach was further developed to the Myers and Briggs Indicator survey instrument (Myers, 1962), an adequately reliable self-report inventory (Carlyn, 1977; Myers, 1985). For Simon (1987), intuition is a subconscious pattern recognition that results from a rational, yet unconscious analytical thinking style.

Different types of intuition were proposed by Vaughan (1979) as “knowing without being able to explain how we know” similar to Goldberg (1989). Hogarth (2010) stressed the need to identify more types of intuition, classify the different mechanisms, and thereby specify their functions. Intuition was also described as psychodynamic unconscious (Epstein, 1994), heuristics (Chaiken, 1980), impression formation (Brewer, 1988), spontaneous (Fazio, 1990), affective associations or simple inferences tied to peripheral cues in the persuasion context (Petty et al., 2009) in combination with attitude or an impression of a person; or simply in an automatically or in a controlled fashion (Gawronski & Creighton, 2013).

Intuition is described in at least six separate ways as a personality trait; as an unconscious process; as a set of actions; as distilled experience; and as a residual category, and as a paranormal power or sixth sense (Behling & Eckel, 1991; Hogarth, 2001). Pretz et al. (2014) distinguish holistic, inferential, and affective intuition types. Intuition is also said to be a judgment based on emotion (Bastick, 1982), a phenomenon that is hard to explain. The interoception approach by Craig (2002) might help to better describe feelings in intuitive decision-making. His system constitutes a representation of “the material me”, and might provide a foundation for subjective feelings, emotion and self-awareness (Craig, 2003). The concept of somatic markers has also been missing from most accounts of intuitive decision-making (Damasio, 2006). The Somatic Marker Hypothesis is a neural theory of how emotions get stored in the brain and can be used for intuitive decisions (Denburg & Hedgcock, 2015). This theory improves intuition research by understanding the remembering of previous feelings. Other authors have defined intuition as being an “immediate, uncritical perception of the whole rather than the parts” (Hill, 1987). However, intuition is not always immediate or spontaneous. Intuition in the form of a sudden insight can come after hours, days, or weeks. There might be a time of distraction before

people decide intuitively as described in the Unconscious Thought Theory (UTT).

Therefore, it can be stated that intuition has attracted considerable scientific attention from many disciplines and paradigms including sociology, psychology, business administration, biology, and neuroscience (Hogarth, 2001) and a definition needs to integrate all views. Intuition is an unconscious, spontaneous or slow decision-making process over time based on holistic, effortless thoughts, learned heuristics, affective feelings and emotions, a perception without awareness as well as the capability for anticipation (Launer et al., 2020).

With this broad definition of intuition, decision making processes can be better described in business administration at the workplace. Dane and Pratt (2007) explored intuition and its role in managerial decision making in a broader approach. Liebowitz et al. (2018) described how well executives do by trusting their intuition in a more holistic approach. Usher et al. (2011) demonstrated enhanced decision quality, in a situation that attempts to preserve ecological validity, based on the UTT. Swami (2013) provided an overview of cognitive biases, systematic errors, and the use of heuristics in decision making. Woiceshyn (2009) reported on intuition by managers in the oil industry that they rely on their intuition in strategic thinking and self-awareness. In addition, intuition has been researched for hedge fund managers based on the interoception approach (Kandasamy et al., 2016). The role of slow deliberation for experts was researched by Moxley et al. (2012). Liebowitz et al. (2017) gathered a broad range of literature on intuition in business displaying the wide range of applied intuition. Moreover, Klein (1993) described intuition in business based on his Recognition-Primed Decision (RPD) Model, e.g., in rapid decision making situations in industries like fire fighters, military, and aerospace (Klein, 1998). These existing approaches provide contributions, yet they remain disconnected from one another.

In a new study by Launer and Çetin (2021), the original approach was tested for its reliability and validity. Therefore, the main goal of this article is to analyze, discuss and review different concepts on intuition for research in business administration. To develop measurement scales on different types of intuition for the use in business research and teaching the following building blocks are used: rational choice theory, intuitive decision making, emotional decisions, quick heuristic decisions, unconscious thinking, and anticipation. Based on the individual approaches, the new multi-disciplinary approach (Launer & Çetin, 2021) will be used to develop a more holistic approach. This holistic approach in business theory can also lead to a new basis for practice-based business research.

Therefore, the overall research objectives are:

- To provide a combination of different types of intuition leading to a comprehensive model targeted for business administration. In detail, the existing measurement scales for intuition should be improved, existing theories adapted, and new theories added. We

discuss the following common assumptions in the literature:

- The Rational Choice Theory is appropriate to describe rational decision-making.
- The Classical Intuition still appropriately describes unconscious intuition.
- Spontaneous intuition can be better described based on the theory of heuristics.
- Emotional Intuition may be described more thoroughly by neuroscience and medicine.
- The concept of Unconscious Thinking is missing in existing measurement scales and needs to be added.
- The concept of hunches needs to be broadened by parapsychology based on quantum physics and the Sheep-Goat scales.

### Research methods

Inspired by the tradition of integrative literature reviews (Torraco, 2005), we employ a qualitative analysis with descriptive, tabular, and graphical methods. This is appropriate to analyze existing approaches for intuition since the use of intuition in decision-making is a mature field in cognitive psychology. The different intuition theories were identified based on their key authors and critically discussed. Once an intuition type was defined, the most recent publications of the domain were analyzed. Therefore, our method included a search for peer-review articles, their selection, analysis, and synthesis. The respective intuition types were assembled to a holistic research approach by discussing the possibilities of an appropriate combination. This research method leads to a structured integrative review (Torraco, 2005) across different disciplines based on validated, prior works. We did not perform a systematic review or meta-analysis (Davis et al., 2014; Liberati et al., 2009). This was already done by authors like Shirley and Langan-Fox (1996), Akinci and Sadler-Smith (2012), Taggart (1997) as well as Nuthall (2019). Their results were incorporated in this research.

Simon (1955) and Tversky and Kahneman (1983) among others, established the foundation for what is now known as behavioral decision research in economics. We delved into the well-established intuition scales in cognitive psychology CEST by Epstein (1985), REI by Epstein and Pacini (1999), GDMS by Scott and Bruce (1995), PMPI by Burns and D’Zurilla (1999), CoSI by Cools and Van den Broeck (2007), PID by Betsch (2004) summarized in the USID by Pachur and Spaar (2015) as well as Pretz et al. (2014). To keep abreast with the evolving literature, we also considered works that cited these well-established contributions in cognitive psychology since 2022.

With this research design, we followed the approach of distinguishing between rational choices or deliberation and intuition in a bi-polar model (Betsch, 2004) based on existing research methods (see scales above) (Sinclair, 2014). A dual process model of understanding intuition follows the theoretical models proposed by Jung (2014) and Simon (1955). In general, a dual process model suggests that people can use two distinct processing systems

when making judgments (Dijksterhuis & Nordgren, 2006; Epstein & Pacini, 1999; Hogarth, 2010). A widely accepted measurement style is the distinction between rational thinking or deliberation and intuitive decision-making (Kruglanski & Gigerenzer, 2011). This psychological framework of human thinking, reasoning and decision-making assumes a dual-process structure of the mind, where an intuitive, automatic system operates alongside a deliberate, controlled one (Allinson & Hayes, 1996). The system that uses conscious effort is the deliberate system, whereas the system that does not is the tacit system. The tacit system, according to Hogarth (2001), is automatic, sensitive to context, and unconscious.

Based on this assumption, we deepened our research on heuristics with works by Gigerenzer and Todd (1999). For the enhancement of the emotional intuition, we drew on interoception research by Craig (2003) and somatic markers by Damasio (2006). To broaden the view on anticipation, we considered the research and scales by Bem (2011) as well as Thalbourne and Haraldsson (1980). We added the Unconscious Thought Theory (UTT) by Dijksterhuis and Nordgren (2006), which was missing from many accounts of intuition. Our methodology was guided by Sinclair's "Handbook of Research Methods on Intuition" (edition 2011 and 2014). This gives a solid foundation for further use in business research and the development of new scales.

## 1. Literature review

We lay out our the steps we have followed to assemble, arrange and assess (Paul et al., 2021) the literature in our research. The identification and acquisition of the literature was conducted in May 2021 through Web of Science (ISI). Starting with the inclusion criteria by using the term "intuition" in the topic (title, abstract and keywords). The "topic" category was chosen above the "text" category to

limit the search results to publications that focused solely on investigating intuition rather than other areas of the decision-making process. The search for papers was conducted notwithstanding the time impediments but constrained to journal papers and conference proceedings only in English and German language.

The number of papers on "intuition" evolved over time. It was only after 2004 that their numbers increased significantly. In 2020 alone, there were a total of 1,330 publications (journal papers and proceedings) that had the word "intuition" in their title, abstract, or keywords. Authors from the following countries contributed most to these publications: United States of America, England, China, and Germany. Finally, considering the research area, the highest number of publications concerned: Philosophy, Engineering Electrical Electronic, Computer Science Theory Methods, and Computer Science Artificial Intelligence – Table 1.

In recent years, an increased number of articles have been published as conference proceedings (mostly conceptual in nature). This may be interpreted as a lack of maturity of this phenomenon in the literature. Consequently, we draw from this that current research should focus either building on current theories or coming up with new ones.

To organize the data returned from the literature search the following six codes were assigned: rational, intuitive, emotional, heuristic, unconscious thoughts, and anticipation. Rules for excluding articles were established so that the remaining articles could be generated and advanced to the assessment phase of the review (Paul et al., 2021). At first, we removed all the duplicates. To continue, we eliminated predatory titles that try to capitalize on the success of original works by using the same titles (ibd.). The assessment of the literature consisting of evaluating and reporting is presented in the next section, highlighting distinct areas of past research (Torraco, 2005). As the different communities of practice are working in parallel new literature is published on a rolling basis. Therefore, we have carried out a simple Google Scholar search on March 4, 2023, to check for articles that have cited the most relevant cognitive psychology concepts in our review, and which have been published since 2022. The amount of citations and the amount of works citing the authors through publications in major business journals since 2022 are indicated in brackets CEST by Epstein (1985) [not cited in the best journals since 2022] and Epstein (1994) [5 of 5545], REI by Epstein and Pacini (1999) [2 of 590], GDMS by Scott and Bruce (1995) [1 of 1573], PMPI by Burns and D'Zurilla (1999) [not cited in the best journals since 2022], CoSI by Cools and Van den Broeck (2007) [1 of 327], PID by Betsch (2004) [2 of 200] summarized in USID by Pachur and Spaar (2015) [2 of 99] as well as Pretz et al. (2014) [1 of 121]. In a further step of purification unsuitable articles were removed, that were not published in journals satisfying the minimum requirement to be counted as scientific according to the exclusion criteria of the Norwegian Register for Scientific Journals,

Table 1. Quantitative research of publications on intuition

Research areas	Number of publications	% of 16,492
Philosophy	1,673	10.144
Engineering Electrical Electronic	1,449	8.786
Computer Science Theory Methods	1,334	8.149
Computer Science Artificial Intelligence	1,340	8.125
Computer Science Information Systems	1,105	6.700
Economics	765	4.639
Management	765	4.639
Education Educational Research	724	4.390
Computer Science Interdisciplinary Applications	627	3.802
Computer Science Software Engineering	618	3.747

Series and Publishers. The respective articles appear as an illustration of the current rate of development across the different intuition types in the remainder of the article.

Our aim is to offer a novel theoretical approach to the phenomenon of intuition at the workplace. As a result, we conduct a comprehensive review of the relevant literature and synthesize the findings into a substantial, original, and useful contribution to the body of knowledge on the subject (Torraco, 2005). The integrative literature review excels when multiple communities of practice are engaged in overlapping efforts to contribute knowledge to a phenomenon (Cronin & George, 2023), here the phenomenon of intuition is concerned. For a comparison of an integrative literature review with a systematic literature review, see the overview provided by Cho (2022).

### 1.1. Rational thinking and deliberation

The Rational Thinking Theory (RTT) is a well-established, economically shaped action theory of sociology and business administration (Simon, 1956) that describes conscious rational decision-making. Is it possible to apply the current assessment scales for intuition in business research and instruction?

Rational behavior, judgment and decision making are standard models for individual behavior in economic practice (Kahneman et al., 1982), and behavioral economics (Camerer, 1998, 1999; Camerer et al., 2004). Rational explanations of thought and behavior are central to our common sense understanding of each other's behavior (Bratman, 1987), are fundamental to explanations in economics and the social sciences (Binmore, 2008), and underpin cognitive information-processing (Anderson & Schooler, 1991; Oaksford & Chater, 2007; Tenenbaum et al., 2006).

In psychology, Epstein (1985, 1994) in the CEST, Scott and Bruce (1995) in the GDMS, and Burns and D'Zurilla (1999) in the PMPI describe conscious rational thinking. The rational system is reflective, conscious, intentional, effortful, analytic, and affect-free (Epstein & Pacini, 1999). Betsch (2004) described rationality in her PID inventory as deliberation. The Cognitive Style Indicator (CoSI) (Cools & Van den Broeck, 2007) and the USID scales (Pachur & Spaar, 2015) split deliberation into a knowing and a planning style.

Recent renderings of this body of work include Thanos (2022), De Neys (2022), and Dennin et al. (2022) who look into the complementary effects of intuition and deliberation. Alaybek et al. (2022) used a meta-analysis to document that reflective thinking is a significant predictor of success on the job. We do not have suggestions to improve these existing rational measurement dimensions and items. Especially the dimensions knowing and planning style by CoSI and USID seem to be state of the art.

### 1.2. Classical, holistic, uncritical perception and unconscious intuition

The classical intuition type, as described by Hill (1987), is a holistic intuition type integrating diverse sources of information in a Gestalt-like, non-analytical manner (Pretz

et al., 2014). Epstein (1994) described the items preconscious, automatic, effortless, and holistic in the CEST inventory. Burns and D'Zurilla (1999) also described an automatic processing type in their PMPI inventory. The question is whether this well-known notion of intuition is a separate dimension that can be used to study and teach intuition in business, for example.

Intuition can be positioned as interdependent from rational analysis rather than in opposition to it (Hodgkinson & Sadler-Smith, 2003). Before this, compelling empirical evidence for the view that these two types of processing are not opposites came from Epstein et al. (1996). These authors proposed two separate constructs (rationality/experience and analysis/intuition, respectively) that jointly contribute to behavior, the complementary role of these constructs is by now acknowledged (see, e.g., Thanos, 2022).

Unconscious intuitive decision making, as described by Pretz and Totz (2007) occurs without an explicit awareness or knowledge base, it is simply available. It is a perception of patterns, meanings, structures that are initially unconscious, but which nonetheless lead thinking to a certain decision (Bowers et al., 1990). It is an affectively charged judgment that arises through quick, unconscious, and holistic associations (Dane & Pratt, 2007) and it is difficult to verbalize (Goleman et al., 2002). Bastick (1982) characterized intuition as a sudden appearance and preconscious process. The USID scales by Pachur and Spaar (2015) describe intuition as spontaneous decisions, as described in heuristics theory, and affective theory (emotional including anticipation).

Reber (2017) described intuition as a kind of natural judgment process that takes place without conscious thinking and without an explicit awareness or knowledge base. Bowers et al. (1990) described intuition as a perception of patterns, meanings, structures that are initially unconscious, but which nonetheless lead thinking to a certain decision.

We argue that the classical, holistic, and uncritical perception is a different type of intuition that needs to be distinguished from unconscious intuition. We argue that the unconscious intuition (Newell & Shanks, 2014) needs to be further researched, in connection with the unconscious thought theory. Possibly the only difference in these types of intuition lies in their timing. The idea works well in both the classroom and in business analysis. However, more empirical study is needed to expand and develop this intuitive dimension. Empirical research by Launer and Çetin (2021) shows that these different intuition types can be clearly separated from unconscious intuition. The findings have confirmed that the intuitive styles of emotional, spontaneous heuristic, unconscious thoughts, and anticipation are structurally separate from each other but also from related constructs. Concerning the relations, rational decision making is negatively related to the emotional, quick heuristic, and anticipation type of intuition.

### 1.3. Spontaneous heuristic decisions and inferential intuition

Spontaneous decisions are described in the existing measurement scales as a snap decision, quick or immediate, swift decision, knowing based on experience and in memory of a similar situation (Burns & D’Zurilla, 1999; Epstein & Pacini, 1999). In the GDMS inventory, spontaneous decisions are described as “a sense of immediacy and a desire to get through the decision-making process as soon as possible” (Scott & Bruce, 1995). Burns and D’Zurilla (1999) describe spontaneous decisions in their PMPI based on the automated process theory. While making quick judgments is common in business, mastering this skill takes many years to acquire in each industry (Thanos, 2022). Common examples include the police, the fire department, and the emergency room. So that they can make quick choices in critical situations, they must undergo rigorous training. Our analysis maps out the theoretical works for evaluation, allowing for more informed decisions of this kind. Cognitive psychology and human information processing theory (Lindsay & Norman, 2013) describe spontaneous decisions in a two-process theory of human information processing automated and controlled processes. Automatic processing is described as an activation of a previously learned sequence of elements in long-term memory (Shiffrin & Schneider, 1977). It is initiated by appropriate inputs and then proceeds automatically without any control, without stressing the capacity limitations of the system, and without necessarily demanding attention (Schneider & Shiffrin, 1977).

Cognitive decision-making theory describes spontaneous intuition as implicit knowledge of an individual (Klein, 2003) acquired through experience as well as explicit and implicit learning processes. Thus, intuition is a process of pattern comparison based on so-called mental maps and action scripts (Klein, 1998), which are linked to the experiences of an individual in real world contexts (Goldberg, 2006). Intuition in this regard is a pattern recognition process based on mental maps and action scripts (Klein, 1998) in conjunction with an individual’s accumulated expertise in real world contexts (Goldberg, 2006). Intuition can lead from habits and abilities to a quick reaction based on pattern recognition (Simon, 1987). Thus, intuition is the result of implicit learning, in which the associations are stored in the brain without the learner’s awareness (Woolhouse & Bayne, 2000). This tacitly acquired body of knowledge gleaned from experience is referred to as a heuristic (Whitman, 2022) and should be seen as a distinct category of intuition.

Heuristics refer to the art of arriving at probable statements or practicable solutions with limited knowledge (incomplete information) and little time nonetheless (Gigerenzer & Todd, 1999). It represents an analytical process in which conjectural statements are made about a system based on available data. Tversky and Kahneman (1973) published well-known studies on frequently used heuristics including the availability heuristic, the

representativeness heuristic and the anchor heuristic. Gigerenzer et al. (2011) explored this fast decision making based on heuristics in detail and described intuition based on heuristics, even if he names it gut feeling in his popular monograph of the same title (Gigerenzer, 2007). In the context of ecological rationality, intuition is analyzed as to which types of work environments enable heuristics to achieve adapted goals (Chater et al., 2018). This is another reason why heuristics should be thought of as a different kind of intuition. We argue that the concept of heuristics better describes intuitive decision making at the workplace than automatic processing.

Klein (2003) investigates intuition as naturally evolving actions that rely heavily on actors’ work experience while making quick decisions. It is unlikely that people can apply analytical strategies and make analytical decisions in less than a minute. Accordingly, no alternatives are considered or probabilities estimated when making quick decisions. Klein (1993) refers to a “recognition-primed decision” (RPD) model. In doing so, he goes beyond heuristics and includes certain environmental situations. For this reason, seasoned leaders can quickly zero down on a decent alternative. The RPD model also assumes that experienced decision-makers evaluate an option by responding to mental simulations to determine whether it will work (Klein, 1993). We argue, the RPD model describes intuitive decision making better than the automatic processing theories.

Heuristics are slowly finding their way into business administration. Sander and Höttecke (2015) described experience-based intuition and its importance when making decisions in working life as “beyond rational choice”. Whitman (2022) described different types of heuristics in the context of behavioral economics. Auer (2017) and Sadler-Smith et al. (2022) described heuristic decisions in personnel selection. Gigerenzer (2015) examined heuristics as adaptive tools when making decisions with limited time. As we see it, the temporal dimension is crucial to the current approach.

As could be shown, heuristics describe a clearly different type of intuition and are based on a distinct theoretical basis. We argue that intuition models and scales of spontaneous intuition need to be extended by the theory of heuristics. Even if the research goals might be comparable, the theoretical underpinnings are not. In the teaching of business theory, this is crucial.

### 1.4. Emotional decisions (gut, heart and skin feeling as well as somatic markers)

In research and popular discourse, authors describe intuition based on feelings, e.g., gut feeling, and emotions. However, emotional decisions are much more complex than the term gut feeling implies. The idea of the so-called gut feeling originally dates to antiquity. At the time, people believed that the stomach was the central organ for intuitive decision-making. This gave rise to the abstract term “gut feeling”. Recent neuroscience research found

that when people listened to music that made them feel something, they tended to be more strategic when making economic decisions (Colombo & Iannello, 2022).

Epstein and Pacini (1999), Pretz et al. (2014), and Betsch (2004) described feelings as an affective type of intuition, Burns and D’Zurilla (1999) described intuition as emotional processing. Emotional intuition is more than just what you feel in your gut. It also includes how your heart beats and how your skin feels. LeDoux (1998) even related intuition to anger and aggression. This phenomenon, however, is established in medicine and neuroscience. We argue, intuition needs to differentiate emotional decisions based on a neuroscience approach and expand the theoretical basis of intuition research.

Different kinds of feelings and emotions can lead to intuitive decision-making. In business, these types of intuition are not described and need to be developed for use in research and teaching. To accept feelings as valid forms of intuition is not to deny the value of rationality or unconscious intuition. Both concepts have their limitations and can sometimes lead to poor decisions (Bonabeau, 2003; Haller & Hörmannspurger, 2013; LeDoux, 1998). Emotions can act positively to alert us to opportunities, and attunement to personal feelings (bodily senses) can lead to more informed personal decision making (Hallo & Nguyen, 2022).

Researchers suspect that microbiota release information from the intestine (Chater & Oaksford, 2012). The nerve fibers of the enteric nervous system transmit information from the mucous membrane to nerves of the intestinal-brain axis (Gershon, 1999). In order to ensure that the human organism is supplied with energy and nutrients to digest, the secretion of a whole range of digestive enzymes and other functional components (e.g., bile acids) is necessary (Kenrick & Funder, 1988). Humans may feel these processes in the orbitofrontal cortex of the brain’s frontal lobes (Barrett et al., 2004). The enteric nervous system is therefore known as the “second brain” (Sadler-Smith & Shefy, 2007). LeDoux (1998) suggested that the amygdala (a part of the limbic system of the forebrain involved in functions related to anger and aggression) can exert direct control over our actions before the higher centres of the brain are aware of it.

Emotional intuition based on feeling and emotions is a separate type of intuition (Launer & Çetin, 2021) and is gradually gaining more attention in the business literature (e.g., Brundin et al., 2022). It is important to understand our own body and its language to transfer feelings and emotions into business decisions (e.g., Walsh et al., 2022).

### **1.5. Anticipation, presentiments, precognition, and premonition**

In psychology and neuroscience, it is generally assumed that consciousness is the product of a series of random neuron interaction, but several aspects about consciousness remain a mystery. Wahbeh et al. (2022) summarize several cases, both anecdotal and experimental, in which

people perceived information from faraway places, from another person, from the future, where people gained talents above their normal capacity, or when the brain was obviously non-functional. To escape present day’s rationalism practitioners have consulted esoteric sources, astrology, as well as hand and card reading before (for an example from military operations, see, McRae, 1984). To develop a systematic, scientific approach, theories based on parapsychology may be relevant.

Many researchers try to explain atypical or paranormal decision-making (Honorton & Ferrari, 1989), anticipation of solutions, e.g. presentiments of future emotions (Radin, 2004), precognition (conscious cognitive awareness), premonition (affective apprehension) (Bem et al., 2015; Bem, 2011), extrasensory perception (ESP) (Thalbourne & Haraldsson, 1980), paranormal belief and experiences (Lange & Thalbourne, 2002), or automatic evaluation (Ferguson & Zayas, 2009). So far, they are waiting for wide-reaching support. The common scales on intuition describe an affective type of anticipating decisions, e.g., hunches. This is described in the REI inventory as well as in the USID scales. However, this description is extremely limited. Research can benefit from an opening towards parapsychology to describe many decisions taken in business. We argue, there must be a mix of survey questions (items) that go beyond unexplained hunches and parapsychological science to make the dimension more acceptable in business administration.

Radin (2004) is attempting to build an explanation model that is supported by solid science based on pre-cognitive effects or parapsychology. He described how people could anticipate events. In various experiments (Radin & Borges, 2009; Radin, 2004), he was able to prove that people can anticipate the future by taking measurements of skin resistance (principle of the lie detector, and the dilations of pupils). Recent meta-studies, which examined a total of up to 90 experiments and studies with anticipation (Bem et al., 2015), confirmed the effects measured by Radin (2004). His method allows for the scientific investigation of previously unexplained phenomena, which were discounted as coincidental in decision theory.

The extrasensory perception theory (ESP), described by Thalbourne and Haraldsson (1980), describes the extent to which the respondent believes in the paranormal (Thalbourne & Delin, 1993). The Australian Sheep-Goat Scale (ASGS) is commonly used to measure the belief in the paranormal. The survey scale contains items that index extrasensory perception (ESP), psychokinesis (PK), and life after death (LAD) (Drinkwater et al., 2018).

The term “anticipation” serves as a shorthand for these measurements and conclusions. This is a well-known term in the domains of sports, and it accurately captures the essence of the aforementioned areas of study. Hence, the phrase can be used in surveys for scientific studies. In business administration, anticipation is often understood as a deliberative process to reach decisions about the allocation of resources for contingencies, e.g., crisis

experience gained by an organization and its staff is essential for foresight (De La Garza & Lot, 2022). Here we see enormous potential for research on anticipation that targets individual decision-makers. Sport psychology uses the term anticipation also in connection with the anticipation of moves. A recent work on this topic (Schultz, 2013) deals with the anticipation of football goalkeepers. The relationship between anticipating external action and one's own movements as mental anticipation in the sense of forming a movement draft is important for comprehending anticipatory processes in sports.

In sports science, anticipating the effects of one's own action is reflected in the model of the "triadic phase structure of the action" (Nitsch, 2004) as the first stage before the realization and interpretation of the action. Through the postulated common coding of perception and action, the internal models that control one's own movement execution are also assigned the function of enabling the anticipation of the consequences of other people's actions (Grush, 2004). A model based on information processing that is equally applicable for anticipation as well as decision making was designed by Williams and Ward (2007). This model holds that athletes' decisions are made using peripheral awareness, pattern recognition and visual search behaviors (*ibid.*). However, there are many similarities with heuristic decision making put forth by Gigerenzer (2021), where it is called the gaze heuristic. Athletes don't anticipate something to emerge. They exert considerable effort and accumulate vast experience to perfect their sensory and motor skills. The conscious and unconscious minds are working together, yet there is no sign of anticipation.

### 1.6. Slow unconscious thinking

Decisions can also be made after a period of time and (unconscious) reflection, also called incubation or unconscious thinking (Dijksterhuis & Nordgren, 2006). Intuition theory gradually begins to account for situations where the decision-maker is distracted for a longer period. Most survey scales concentrate on spontaneous intuitive decisions; the amount of time allotted for a response is being utilized as a tool to encourage thoughtful consideration or deliberation (see, e.g., Lindberg & Stemmer, 2022). However, in business, most decisions are being made after some time, e.g., in management. As a result, we contend, our more comprehensive research approach needs to take time into account.

Unconscious thoughts are understood in the sense of an activation between semantic nodes, which can lead to the completion of a decision (Bowers et al., 1990). To make difficult choices, it's helpful to give one's mind a break through a process known as incubation or activation (Sadler-Smith & Shefy, 2007). The unconscious thought theory (UTT) assumes that people can make choices without consciously being aware of it. In contrast to fast unconscious intuitive decisions, the UTT assumes that intuition needs an incubation time. When the attention is withdrawn from decisions during problem solving

for a while, the mind unconsciously continues to work on the issue. As soon as the unconscious mind solves the problem, the solution comes to conscious mind spontaneously (Mayer, 1995).

The UTT assumes that the unconscious mind is capable of deciding on complex issues better than the conscious mind (Dijksterhuis, 2004). Unconscious thinking is superior to conscious thinking when it comes to resolving difficult problems that involve a large number of variables, but conscious thinking is superior when the problems involve a smaller number of variables (Goleman et al., 2002).

For Dijksterhuis (2004), unconscious thinking is simply the opposite of conscious thinking, as it includes any thinking processes that someone is not consciously aware of. Unconscious thinking leads to better decisions when it comes to complex issues. This is the basis for the "deliberation-without-attention" hypothesis: the quality of the choice depends on the relationship between the mindset (conscious or unconscious) and the complexity of the choice. Dijksterhuis et al. (2006) assessed this hypothesis in a series of studies that measured choice quality and post-choice satisfaction after participants made conscious and unconscious trade-offs. The studies supported the deliberation-without-attention effect: conscious thinkers were better able to make normatively more desirable choices between simple products, while unconscious thinkers were better able to choose between complex products. Moreover, after making a complex decision, conscious thinkers were less likely to be satisfied with their choice than unconscious thinkers (Dijksterhuis et al., 2006).

The weighting principle: consideration between objects of choice or the introspection of one's own thought process leads to less satisfaction in people than without introspection (Wilson & Schooler, 1991). Dijksterhuis (2004) deduced that people make better decisions when they are distracted, deriving the weighting principle from this.

The capacity principle: according to the cognitive psychologist Miller (1994), one cannot keep more than seven information units (chunks), plus or minus two, present in the short-term memory in conscious working memory. The size of the short-term memory is genetically determined and cannot be increased even through training. Unconscious thinking does not have this limitation (Dijksterhuis, 2004).

Conscious decisions on minor problems lead to better results, but in complex matters, unconscious decisions after distraction lead to better results (Dijksterhuis, 2004; Dijksterhuis & Nordgren, 2006). This describes the deliberation-without-attention-effect. Buying decisions for complex products fared better in the absence of attentive counsel, according to four studies with consumers, both in the lab and with actual buyers. Decisions after the distraction condition led to better decisions than in the deliberation or control condition. Models of consumer decision-making based solely on deliberative decision-making are oversimplified because they fail to account for intuitive



decision-making processes or the use of a hybrid of intuition and logic when complex “real world” judgments have to be taken (Lindberg & Stemmer, 2022).

The UTT gradually is becoming more well-known in the applied behavioral sciences (see, e.g., Sin et al., 2022), as well as in marketing (Mal & Davies, 2023). The UTT is quite different from other intuitive approaches due to the incubation time, or distraction. Many people describe their decision process as intuitive but not fast, Evans et al. (2015) suggest that when faced with a difficult choice, people’s reaction times tend to increase. There is no alternative explanation that might better characterize this delayed intuition. Managers reported, they decide intuitively after hours, days or weeks and they often do not know how their decision was made (Dijksterhuis & Nordgren, 2006). The advantage of unconscious thought is difficult to replicate (Čavojová & Mikušková, 2014). We strongly argue to add the UTT to the intuition inventory as an independent dimension. However, to develop appropriate scales, new empirical research is needed. Launer and Çetin (2021) analyzed a short set of three questions on Unconscious Thought. The UTT must describe every scenario in which a time-shifted choice appears beneficial so that it can be used in the classroom. This strategy has the potential to become the model’s most crucial feature as it is applied in business. All business choices, barring those involving an immediate threat to life or property, might benefit from a lag in time.

**2. Discussion**

To explain intuitive decision making at the workplace it was necessary to combine different approaches of rational thinking and intuition, neuroscience, and parapsychology. Our review demonstrated that the discussed aspects are necessary to provide a complete description of intuitions, to create measuring scales, and to design training modules to hone intuitive skills. To completely describe intuition in business, a multi-dimensional method combining all separate dimensions is required.

The abbreviation RIEHUA denominates our approach that accounts for the diversity of intuition (rational, intuitive, emotional, heuristic, unconscious thought, and anticipation) – Figure 1. The columns indicate the overlap between different fields of knowledge. The bottom column highlights the blind spots regarding survey scales for

empirical research into intuition. The theoretical gaps exist across the three themes heuristics, unconscious thought, and emotional decisions, as indicated in Figure 1.

The integrated, all-encompassing model is a first of its kind. Yet, tests and applications (Launer & Çetin, 2021) of this integrated framework are forthcoming. In this study, we highlighted the existing theoretical gaps and the ones that have been closed; the different dimensions are independent and complement each other. We argue that this combination of different intuition types can explain most intuitive decision-making in business. Further research is planned to further develop this holistic model in multi-country studies (Svenson et al., 2020). The new dimensions of the scales need to be evaluated, to determine if they are independent and describe business decision appropriately. The presented theoretical base is an excellent starting point for further research.

**Conclusions**

To this end, we agree with Akinci and Sadler-Smith (2012) that it is necessary to: (1) Strive for more careful conceptual framing; (2) Increase cross-disciplinary collaboration and integration; (3) Increase methodological rigor and pluralism; and (4) Pay closer attention to levels of analysis issues. The integrative review, which we developed based on our combined expertise and experiences of writing, editing, and reviewing intuition research, is intended to assist researchers in better comprehending the complex choices and related justifications that research on decision-making entails. We strongly encourage researchers to embrace the different types of intuition. Yet, our study will be evaluated based on how well it contributes to the intuitive art of management practice for us as academics working in an applied field (Akinci & Sadler-Smith, 2012).

**Limitations**

Despite of its unique contribution, our study has limitations. Firstly, the paper does not use a systematic literature review of a single subject, e.g., one type of intuition in one subfield of business. Second, in selecting the literature, the original key authors and their empirical results were used. Our purpose is to provide an integrative review of the most important work, that has developed within separate spheres of academia. This analysis targets the most

Rationality Deliberation	Intuition	Heuristics	Unconscious Thought	Emotional Decisions	Anticipation Precognition
Conscious	Unconscious		Conscious	Unconscious	
Cognitive Psychology				Neuroscience	Parapsychology
USID Scales		No scales		USID	Sheep-Goat Scales

Figure 1. Different dimensions of intuitive decision-making

important theories for business use. Reviews of intuition research in separate subfields of business can be used to further improve understanding of intuition.

### Implications for business research and practice

The occasion for this research is the dearth of a decision-making model based on intuition in business administration and economics. Our contribution is a new comprehensive framework based on existing, validated models. The presented approach describes nearly all types of intuitive decision-making needed in business: spontaneous and time delayed decisions, rational, emotional, and anticipative decisions as well as conscious and unconscious decisions. It describes a multi-dimensional, multi-disciplinary model based on different research paradigms.

### Implications for business theory and research

To further validate the results, develop single questions for measurement scales, and derive modules for teaching, further research is needed. A first valid, dependable, and consistent measurement tool researched by Launer and Çetin (2021) showed, these dimensions are independent dimensions. On the basis of these dimensions, it is possible to better construct research questions (items) that describe and explain intuition for research in business administration at the workplace and in economics (see, e.g., Whitman, 2022). The scales that were used in earlier studies did not adequately describe spontaneous decision making in a business context, and the human capability to anticipate future business developments was not specifically adapted to economic decision making. Unconscious thoughts developing in the human mind over a longer period were missing completely.

First, an apparent challenge for future research is to delve into the lack of a unified definition of intuition across disciplines and empirical support for the different types of intuition and its conceptual boundaries. All these instruments were developed in Western culture, so it remains to be investigated, in how far the approach must be adjusted to match workplaces around the world.

For instance, researchers could investigate the ways in which certain kinds of organizational environments or entire industries foster intuition, or the ways in which intuitive decision-makers interact with other intuitive decision-makers within the same organization using heuristics. Another avenue of investigation could be the ways in which certain kinds of organizational environments hinder their members to use their intuition. Amidst the digital transformation, intuition is sometimes portrayed as the antipode of human rationality (e.g., Korherr et al., 2022), so more research that sees an alliance between different kinds of intuition and the use of artificial intelligence is welcome (e.g., Tabesh, 2022). Given that particular workplace communities have developed strong preferences for either type of decision-making, further challenges would stem from training these groups to take into account different types

of intuition to bring about wisdom in the Anthropocene (de Figueiredo & Marquesan, 2022).

Despite the fact that this study was prepared against the backdrop of quantitative methodology, there is room for expansion in the areas of qualitative methodology (Svensson & Jacobsson, 2022) in order to resolve the discrepancies that exist between the two different research approaches. After all, intuitive judgments are, by their definition, singularly individual and subjective experiences, which may be captured through qualitative inquiry (Olekanma et al., 2022), having a close connection to ethnography (Svenson & Freiling, 2019), which may guide researchers in the inquiry process (Anderson, 2019).

Based on the presented approach with five categories of intuition more diverse business scenarios may be investigated. It is indeed probable that having this more detailed understanding of how decisions are made might guide research on services and goods more effectively. Based on this all-encompassing structure, the questions can be adapted to fit the needs of a variety of sectors.

Prior works (Launer & Çetin, 2021) developed the outlines of a model of strategic decisions based on intuition. In the Asian context we see empirical findings indicating that agile intuition at the top management level strongly fosters innovative behavior within the organization (Zhao et al., 2022). However, there is still a lack of research into the detailed effect of intuition on strategic choices, and thus, on the effectiveness and success of organizations. In operations management, models and approaches need to be enhanced through the dimensions of intuition presented in this paper. This may lead to new theory on intuitive business administration and a broader approach in economics.

### Implications for practice

By classifying intuitive processes into five categories, company managers can receive training tailored to their specific roles and the depth of their knowledge needs. When it comes to completing their work responsibilities, people in various fields require differing levels of intuitive aptitude. To indicate the clarity of the five categories of intuition, the following propositions are presented. The police, fire brigade, and emergency doctors need a spontaneous heuristic intuition. In the healthcare sector, an emotional intuition is salient. In management, the unconscious thought theory may explain decisions taken over time. There is a blend of emotional intuition, anticipation, and unconscious thinking that makes up intuition for strategic decision-making. Using these mental faculties well should be the mainstay of management development.

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