Conceptualizing intuition as a mental faculty: Toward a ‘critique of intuitive reason’ and a process model of intuition

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In contrast with ‘metaphysical speculation’, good science should not only provide a plausible explanation for observable phenomena, but its theoretical explanations should also be empirically falsifiable and the tests should be ‘objectively’ replicable. Good science should allow us to make predictions and even risky predictions (i.e., predictions that put the theory to the test). Good science should also make progress, continue to deepen our understanding, and increase the certainty we have regarding our explanations. It could be argued that the scientific study of intuition does not yet comply with a number of these requirements. It is our purpose in this chapter to help make the scientific study of intuition more scientific, i.e., to approach the above demarcation criteria.

The demands on human cognition are rising because the complexity of problems and issues facing humanity are increasing and because decisions have increasingly further reaching consequences. Intuition is supposed to help decision-makers address complex problems, especially in dynamic and turbulent environments, even when few facts are available. If this claim is correct, the question is raised as to how, to what extent, and under which circumstances intuition can achieve this. To answer these questions, there is a need for a science of intuition because the claim is important and of great interest to humanity.

For many years, there has been a lively debate about the effects of using ‘intuition’ on performance (i.e., making more out of available data, resulting in better decision-making, evaluations, judgments, etc.), especially in difficult circumstances. In this debate, intuition has been conceptualized in various contexts and from various perspectives (Hodgkinson et al., 2008). It can be observed that
several fundamentally different conceptualizations of intuition have been used indiscriminately, and these have been confused and mixed with one another even within a single document. This lack of consistency in the use of the concept has led to contradictory predictions regarding its effects and the contingencies that moderate these effects and has thus blocked the development of a consistent theory. Furthermore, several attempts have been made to operationally define the construct, but these operationalizations are often incommensurable because partially distinct observable phenomena are combined or ‘the same’ observable phenomena are approached and interpreted from different perspectives, disciplines or logics. As a result of this uncritical use of the word intuition, confusion persists on theoretical and methodological levels, and there is little or no coherent empirical evidence available that unequivocally and consistently supports the existence or size of the beneficial or detrimental effects of intuition on human performance.

Additionally, a major semantic obstacle to the advancement of intuition research has been the fact that no clear distinction has been made between the mental faculty of intuition, personal preferences for its use, the various processes involved in building and using intuition, and the content of intuitions.

Therefore, the purpose of the present chapter is to conceptualize intuition consistently as a mental faculty. We provide a useful definition, critically review what is known about intuition in this light in terms of the processes involved, and propose to view intuition’s inherent potential and limitations in function of these processes.

**APPROACH**
In the late 1700s, there was no clear demarcation criterion to distinguish between ‘true knowledge’ and ‘metaphysical theories’, the latter being considered pure speculation without a possibility of empirical verification or falsification. The German philosopher Immanuel Kant was determined to resolve this issue by exposing the inherent limitations of human reason and thus proposing a universal ‘format’ of knowledge (Kant, 1787). The methodological approach Kant chose, a transcendental analysis of human reason that consisted of an investigation of the conditions for the possibility of knowledge, has inspired us in our attempt to make progress in the current debate about intuition.

We make a first attempt at conducting a transcendental analysis of the mental faculty of intuition and hope to identify and map the mental processes (i.e., the cognitive capabilities) that act as conditions for the possibility of intuitive knowledge, that is, enable intuitive insight, intuitive preference, or intuitive knowledge.

PREVIOUS CONCEPTUALIZATIONS OF INTUITION

Over the past two decades, intuition has been characterized as a cognitive ability or competence (Sternberg, 1997), an enduring style or personality trait (Allinson & Hayes, 1996), a cognitive style (Hogarth, 2001; Klein, 2003), a source of cognitive bias (Kahneman, 2011), and a vehicle for decision-making and problem solving (Dane & Pratt, 2007). There is still widespread confusion regarding intuition, although several attempts have been made to disentangle a range of related concepts (separating intuition from intuiting, the process from its outcome, and the phenomenon from its context, etc.), and many descriptions based on anecdotal evidence and categorizations of intuition as a cognitive ability have been proposed.
Two major streams have emerged in the intuition literature (Sinclair & Ashkanasy, 2005). The first stream views intuition as an experience-based phenomenon drawing on tacit knowledge accumulated through experience and retrieved through pattern recognition. Researchers in this stream mainly attribute differences in intuition-related cognitive performance to dissimilarities in the accumulated experience-base (e.g., Behling & Eckel, 1991; Brockmann & Anthony, 1998; Isenberg, 1984; Klein, 1998; Simon, 1987). The second approach stresses the importance of sensory and affective elements in the intuitive process (e.g., Bastick, 1982; Epstein, 1998; Parikh et al., 1994; Petitmengin-Peugeot, 1999).

While these two approaches potentially complement each other, they also leave open a number of issues about intuition. The first stream ignores, for example, that some aspects of the effects of intuition on cognitive performance may be independent of the contents of the accumulated knowledge base and may depend on a person’s cognitive capabilities to accumulate, memorize, access or use those contents. The second stream seems to ignore that intuiting is a physico-cognitive process that is distinct from the outcomes it produces.

Scholars’ recognition of the above outlined confusion in the intuition literature resulted in new definitions and conceptualizations. One of the broadly accepted characterizations of intuitions defines them as “Affectively charged judgments that arise through rapid, non-conscious and holistic associations” (Dane & Pratt, 2007, p. 33). However, this definition relies on several assumptions that may not be sufficiently general in some cases or that may be too restrictive in other cases. Do intuitions, for instance, always occur in the form of judgments? Whereas intuition is often used for making decisions, which requires making judgments, it can
also be used for other purposes, for instance, when developing creative ideas, collecting inspiration, and creating intuitive insights (Dörfler & Ackermann, 2012). Furthermore, what exactly is the 'matter' of the holistic associations, and how do they occur? Do these holistic associations go beyond linking conceptual entities? What is the role of emotions? People who use their intuition often report experiencing “feelings of knowing,” “vibes,” or “hunches” (Gore & Sadler-Smith, 2011), which may be physiological experiences and may be related to sensory (smells, noises, images, feelings on the skin, etc.) memories that are experienced again at the time of intuitive “hunch.” We therefore would argue that the holistic associations in intuiting should also contain physiological links and that what people feel at the moment of intuitive judgment may not necessarily be emotions. Finally, the definition appears to refer to the very last element of the intuitive process; it focuses only on the moment when intuition becomes conscious and is used. However, it ignores how the tacit knowledge base that enables intuition as an associative cognitive activity is built, for example, for making judgments.

**CONCEPTUALIZING INTUITION AS A MENTAL FACULTY**

As a major conceptual obstacle to the advancement of intuition research, we identified the fact that no clear distinction has been made between the mental faculty, personal preferences, the content and outcome, and the various processes that allow for the accumulation, memorization and access or use of intuition. Therefore, conceptualizing intuition as a mental faculty that facilitates the creation of intuitive insight (intuitive reason) could differentiate the concept of intuition from various potentially misleading associations.
Therefore, we propose not to define intuition in itself as expertise but rather as the condition of possibility for the development and use of expertise (in the form of intuitive insight or intuitive knowledge) in decisions or other cognitive activities. The extent to which individuals are able to use the faculty of intuition could be indicated by the term intuitive intelligence. High levels of intuitive intelligence would thus correspond to a high competency of using the faculty to produce intuitive insight. Furthermore, it would likely result in more creative and novel (i.e., more radical; Sinclair, 2011, p. 6) intuitive insights.

Interestingly, in many studies intuition is—at least implicitly—viewed as one of the human faculties and has been associated with—or described in terms that are reminiscent of—the mental faculty of intelligence (Gottfredson, 1997). Viewing intuition as a mental faculty appears largely consistent with, or at least not contradicting, several existing conceptualizations. In recent studies, intuition has been associated with apprehension (Bradley, 2011; Evans, 2010; Vaughan, 1990), (unconscious) thought (Dijksterhuis & Nordgren, 2006), direct knowing (Sinclair, 2011), learning (Laevers, 1998), implicit learning and memory (Lowenstein, 2000; Salas et al., 2010), tacit knowledge (e.g., Behling & Eckel, 1991; Brockmann & Anthony, 1998; Isenberg, 1984; Klein, 1998; Polanyi, 1966; Simon, 1987), expertise (Burke & Miller, 1999; Salas et al., 2010), creativity (Sinclair, 2010), a cognitive ability (Allinson & Hayes, 1996; Sternberg, 1997), and problem-solving (Eubanks et al., 2010; Style, 1979).

In our view, thinking, knowing, cognition, and many of the other conceptualizations found in the literature describe and categorize intuition as a human faculty and a form of reason, but the term ‘reason’ is often used for more
analytic types of cognitive ability. We contend that it may be theoretically productive to conceptualize intuition as a specific form of reason, and we will use the following paragraphs to show how this can be performed. Intuitive reason—like its analytical (Duncan et al., 2000), practical (Sternberg, 1999), social (Thorndyke, 1920), cultural (Earley, 2002), and emotional (Salovey & Mayer, 1990) counterparts—appears to reflect a mental faculty that allows us to learn from, adapt to and successfully address (changes in) the environment, which is in line with Sternberg (1999). Looking at the many definitions and conceptualizations of intelligence, intuition appears to be a form of reason that is distinct from all the other identified forms. Therefore, we define the mental faculty of intuition for the above-mentioned purposes as:

*The mental faculty that allows us to learn from (i.e., to build tacit knowledge from) and quickly and successfully adapt to or deal with changes in the world (i.e., to use that tacit knowledge) in a non-conscious, non-recursive, holistic way (i.e., in an associative way).*

**INTUITIVE PROCESSES**

Conceptualizing intuition as a mental faculty, *i.e.*, as intuitive reason, the competence to unconsciously build tacit knowledge and to use that knowledge, implies that at least two separate processes can be distinguished: the accumulation of experience and learning (Agor, 1989; Harper, 1988; Klein, 1998), on the one hand, and the production and recognition of patterns (Hodgkinson et al., 2008), on the other hand. Further analysis pushes us to the recognition that the extent to which an individual is capable of using these two processes may depend on a range of sub-capabilities. Figure 1 provides an overview of how the two main intuitive processes and the underlying capabilities contribute to the ability to intuit.
The need to approach intuition in a process framework has been acknowledged in the recent literature (Gore & Sadler-Smith, 2011; Topolinski, 2011). Our model is the closest to Gore and Sadler-Smith’s (2011) model. However, some important differences are noticeable. While these authors list all of the processes that may take place when intuiting, we analyze intuition as a human faculty. As a consequence, we distinguish the two processes of intuitive learning and using intuition for performance, and we do not need to distinguish domain-specific and domain-general processes.

Figure 1: The intuitive processes and their underlying cognitive capabilities
In the following paragraphs, we first describe the two processes that together form the faculty of intuition, and second, we discuss the cognitive capabilities behind these processes.

The two processes can be analyzed and described as follows:

1. Episodes of intuitive, experiential, or implicit learning (Epstein, 1998; Kaufman et al., 2010; Kolb et al., 2000) lead to the creation of a repository of tacit knowledge (Lieberman, 2000; Reber, 1989). The experiential or intuitive learning process appears to be triggered when we encounter something saliently new: a new object, situation, or state of affairs that does not appear to fit existing categories or schemata. During these non-conscious episodes of intuitive learning, dissonances with pre-existing knowledge or categories may be integrated into the repository and thus extend and ‘improve’ the existing knowledge base.

2. A discrete (instant) process of intuiting or making use of this repository of tacit knowledge for making fast judgments or decisions appears to be triggered, at least in some cases and in some people, by an urgent task, e.g., an urgent need to react, to judge, to evaluate, or to decide in a complex situation. This confrontation with a complex cognitive need appears to trigger the instantaneous matching of a current situation with available patterns, i.e., relevant parts of the repository. It involves the ability “to recognize salient environmental cues and rapidly match those cues to commonly occurring patterns, responding in ways that lead to effective problem solving and decision making” (Hodgkinson et al., 2008, p. 7).
We contend that two at least partially distinct sets of cognitive capabilities are required to allow an individual to successfully perform both processes. To allow intuitive learning, on the one hand, requires an individual to be highly sensitive to ‘dissonances’, which requires an openness to unfamiliar or unexpected (sensory) experiences (Weick, 1987). To successfully intuit, on the other hand, an individual must be able to access the repository of experiential or tacit knowledge and to not repress it in favor of ‘rational discursive’ knowledge. The intuiter should be able and ready to handle an entirely new situation by looking for analogies as a possible case or example of a pattern. The competence to handle complexity and to ‘see’ analogies or patterns seems crucial to the successful performance of this process.

These processes involve not only purely cognitive but also physiological aspects. During the learning process, information and tacit knowledge from sensory sources, the mind and the whole body is stored unconsciously (Tomasino, 2011). Additionally, since the work of Damasio et al. (1991) and Damasio (1994), it has become widely accepted that emotional (and physiological) processes can guide behavior, particularly decision-making (Bechara, 2004).

**COGNITIVE CAPABILITIES UNDERLYING THE TWO INTUITIVE PROCESSES**

Being able to successfully perform the above-described processes seems to depend on a range of underlying cognitive aptitudes or capabilities. The capability to learn intuitively or experientially depends on an individual’s abilities to discover patterns, to store non-verbal and non-conscious information and patterns into long-term memory, and to update old information and patterns or schemata (Sujan & Bettman, 1989) when facing important novel and non-matching information or experiences.
Schemata are organized mental structures or frameworks of pre-conceived ideas about the world and how it works. We can use schemata to make inferences and assumptions about how to interpret and process information.

Among these three underlying cognitive capabilities, the ability to discover patterns appears conditional upon 1) the individual’s alertness and sensitivity to dissonances between objects and situations (the ability to notice or the awareness of unfamiliar experiences), 2) the ability to develop an overall picture based on the differences and the similarities (the ability to separate relevant and irrelevant experiences), and 3) the flexibility of thinking, perceiving, and connecting different patterns to each other (Freudian picture of the rabbit/woman). Pattern updating depends on 1) the individual’s alertness and sensitivity to dissonances when a new situation, experience, or piece of information is encountered that does not fit the existing schema and 2) the individual’s openness and willingness to change and to adapt existing schemata in such situations.

The second intuitive process, namely using intuition to complete a specific task, requires accessing information stored in existing and possibly separate regions of schemata (Sujan & Bettman, 1989), matching them with the current task at hand, and making use of it for solving the task. The capability of managing this process depends on four main cognitive capabilities. First, it requires being able to see analogies across different contextual domains. For example, the ability to easily find one’s way in an unfamiliar city in the Netherlands relies on previous visits to other cities and unconsciously realizing that most Dutch cities are built in similar ways. Second, it entails the ability for and a positive attitude towards integrating issues
that are not commensurable into a ‘bigger picture’; these are often more qualitative issues. An example would be the mental activity of an interviewer during a job interview. The interviewer combines various features (behavior, dress, facial expression, grades, etc.) of the candidates into one global ‘image’. This synthetic cognitive activity may further require a third capability of changing the level of analysis (zooming in and zooming out) while not losing track of the overall aim and maintaining a focus on the task at hand. Additionally, the ability to successfully use intuition when facing certain tasks would likely be facilitated by the fourth ability of an individual to be aware of, listen to, and able to interpret physiological clues such as the ‘eureka’ feeling or positive emotions emanating from, for example, the discovery of useful similarities between the current task and past experiential knowledge or the feeling of uneasiness and discomfort when something feels not right. In line herewith, Sinclair et al. (2010) found that decision makers who are in touch with their emotions are more inclined to rely on their intuition.

While emotions can play an important role in intuition, it has also been shown that emotions that are unrelated to the decision task (i.e., incidental emotions; Fenton-O’Creevy et al., 2012) can have an influence on information retrieval (Mayer et al., 1990), can directly bias the cognitive processes engaged in decision making (Shiv, Loewenstein, & Bechara, 2005), can bias the value attached to outcomes (Gray, 1999), and can significantly modify risk perceptions and behavior (Lerner & Keltner, 2001). Feelings of anxiety, fear, disgust, or happiness have also been shown to influence risk-taking behavior (Lerner & Keltner, 2001; Maner et al., 2007; Miu et al., 2008). Current research streams establish that people who are able to regulate their emotions better during the decision making process can make
better decisions (Fenton-O’Creevy et al., 2012). For example, Heilman et al. (2010) showed that instructing participants to reappraise their emotions significantly reduces the unpleasant experience of these emotions and consequently significantly corrects risk-taking behavior.

**ILLUSTRATION**

To illustrate how the underlying processes may work, we present a simple example. A girl called Lara, age ten, has a Polish mother and a Dutch father. They live in the Netherlands and regularly visit family and friends in Poland. At one time, they got new neighbors and Lara had been curiously watching the new couple. After a while, she ran to her mother saying: “Mum, we may have a Polish lady next door, aren’t you happy?” With respect to intuition as a mental faculty, the important question is whether any adolescent or even grown-up in the same circumstances as Lara (for example, with the same type of family, similar amount of exposure to Eastern European faces) would equally well be able to draw the same conclusion. To understand this, let us look into what took place in Lara’s mind that led her to arrive at this conclusion.

Lara has been to Poland several times and met many Polish people. Because she has been living in the Netherlands, she also came across quite a few Dutch people. She unconsciously stored the features and even the connections among these features of people from these two countries and cultures in her memory and unconsciously contrasted them with each other. Without noticing, she was making a mental map (schemata) of face stereotypes. This process required the recognition of major differences in faces and facial structures of people coming from the two countries and also the identification of relevant facial features based on which the
categorization could be made. Additionally, every time Lara met new people from Poland and from the Netherlands she needed to identify features that did not fit in her existing schemata and flexibly updated them with the experience from the new encounter. When Lara ran to her Mother with the exciting news, she had been connecting all she unconsciously ‘knew’ about what people looked like and contrasting her stereotypes with the looks of the members of the new family next door. The man did not seem too interesting; he had a Dutch appearance, like all other neighbors. The lady, on the other hand, looked different; the lady’s looks did not fit with typical Dutch appearances. Lara did not consciously realize this whole process but felt that there was something unusual about the lady and for some reason she felt the urge to take a better look at her. As Lara searched her memory for similarities or patterns, she realized that the neighbor lady fit better with the Polish. She also realized what this might have exciting implications for her mother, the realization of which made her feel excited and happy and made her run to her Mum with the news.

So Lara’s seemingly simple realization is in reality a result of a set of rather complex and enduring processes. A large part of the processes took place unconsciously and only in the end entered into Lara’s conscious mind. An interesting question would be at which moment exactly the unconscious processes produced a conscious content. Lara probably holistically connected two things at that time; the feelings that the lady next door might be Polish and that her mother might be happy to have Polish neighbors.

It is likely that not everyone would have been able to carry out the whole mental process. As a matter of fact, Lara’s sister and brother of about the same age
(her brother is one year older and her sister is three years younger) were also peeking at the newcomers next door, but they did not come to the same realization. In line with this example, in biology and psychology face perception is referred to as a cognitive ability and is claimed to vary greatly among people (Farah et al., 2008; Zhu et al., 2010). Moreover, this example demonstrates that intuition can be used in non-decision making situations and illustrates how intuitive insights may occur and lead to intuitive judgment (Dörfler & Ackermann, 2012).

However, we must reveal that the new neighbor lady of Lara’s family was not Polish but Hungarian. So while Lara’s conclusion was not entirely correct, the connection she made is even more intriguing; she managed to find something typically Central Eastern European on the faces.

THEORETICAL IMPLICATIONS

The advantage of conceptualizing intuition as a mental faculty or an alternative form of reason is that researchers can now start developing psychometric or other ways to measure and test intuitive intelligence, e.g., by having subjects execute tasks in different dimensions and similar to the way ‘analytical’ intelligence is tested in various domains (visual, spatial, verbal, numerical). It remains to be established whether traditional experiments or survey methods are the most accurate and appropriate ways of capturing intuition or whether new methods such as fMRI could be more suitable. Even so, we must emphasize that the development of a unified measure and measurements of actual intuitive intelligence, i.e., the individual performance of the mental faculty, would most likely bring us substantially further in research determining antecedents of intuitive intelligence (genetic, hereditary,
environmental, age, experience), the potential of developing the intuitive intelligence (training, awareness etc.), and studying whether intuitive intelligence causes in some way better performance (in decision-making, in creativity, etc.).

Furthermore, the observation that someone has advanced intuitive capabilities does not necessarily mean that this person really utilizes these capabilities (to the extent he or she could) in real life. Following an appropriate conceptualization of the intuitive faculty and its underlying capabilities, and the development of valid measurement instruments, researchers could, for example, investigate what determines whether an intuitive capability is actually taken advantage of. They could also establish which related capabilities, such as emotional or cognitive capabilities, and which circumstantial factors would enhance its use.

**PRACTICAL IMPLICATIONS**

Identifying the factors that trigger and stimulate the use of intuition and tools to measure how individuals perform could be employed in many areas. It can be used in human resource management for checking whether someone has the required competences for a job that may require the use of intuition, for example, in jobs that require quick decision-making under complex and difficult circumstances.

Specific forms of intelligence can be developed, and evidence of significant links with personal performance has been established (Cote & Miners, 2006). In line with these findings, Tomasino (2011) argues that “intuition appears to be a faculty that can be systematically developed and consciously enhanced” (p. 255), and she supports this with evidence from previous research. Various examples indicate that intuitive intelligence could potentially be unleashed and improved by training and learning. This would likely result in improved personal and/or professional cognitive
performance. Our identification of several cognitive capabilities that potentially contribute to a better use of intuition can help develop training methods to help people be able to make better intuitive judgments and decisions. While some of these areas, such as alertness to dissonances either between objects or between objects and schemata, can be improved relatively easily, some other areas may be more difficult to develop. Additionally, the extent to which these capabilities can be unleashed and improved may be genetically and physiologically determined and, hence, may be different for each individual.

LIMITATIONS AND FUTURE RESEARCH

In this chapter, we provided a conceptual framework for explaining intuition-related phenomena from a cognitive performance perspective and a range of cognitive capabilities that together enable the mental faculty of intuition. Further research is needed to continue building and consolidating the science of intuition and intuitive intelligence. We cannot at this point be certain that our conceptual model is complete, nor can we determine the extent to which the model corresponds to empirical reality. Further conceptual development is needed to achieve this.

Another challenge that lies ahead is developing a valid measurement instrument that may help us empirically investigate the relationships among the various proposed capabilities and the relationship between intuitive intelligence and performance in various task domains. This would help us validate the proposed conceptualization. In our view, a next step will involve the development of reliable measures of the enabling cognitive capabilities. We acknowledge that the first part of the intuitive process, namely intuitive learning and its underlying facets, may be difficult to measure independent of the second part of the process, that is, task
completion while using intuition. However, measuring the second part of the process and its underlying abilities may be somewhat more straightforward. Regarding the ability to see analogies across domains, measurement could, for example, involve developing an assignment that would call for seeing similarities with respect to a logistical problem for an elevator and another one for a train. Measuring openness to physiological sensing could be conducted by requesting people to complete a task (to distract their attention), change the physical conditions (temperature/lightning/noises), and asking them to articulate what they “felt.”
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