

The Underpinnings of Intuition¹

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*“The intuitive mind is a sacred gift and the rational mind is a faithful servant.
We have created a society that honors the servant and has forgotten the gift.”*
Albert Einstein

Understanding intuition puzzled many researchers. Only philosophers were feeling comfortable to think about intuition not only as a legitimate but also as a possibly superior form of knowledge (see e.g. Bergson, 1911, 1946; Jung, 1921: §770; Spinoza, 1677: Part 5). It was thus during this early stage of intuition research, that philosophy provided the basis for one of the most fundamental claims in the human studies: if we were to fully understand human consciousness, we must also understand intuition. In fact, as David Chalmers (1998: 110) argues, intuition is ‘the very *raison d’être*’ why we know so little about human consciousness. Thus, psychologists started to develop the so called ‘dual process theories’ that later also found recognition within management and organization research. Although intuition has thus found its way into mainstream research, we cannot say that we have a widespread agreement about some fundamentals of intuition, i.e. whether it can be ultimately reduced to firings of neurons, should it be regarded as a complex mental phenomenon, or whether we should regard it as something mystical. Of course, in this intuition is not fundamentally different from other mental phenomena, only due to its peculiar characteristics discussed below, the possibility of looking at it in different lights is more apparent. However, we believe that this lack of agreement will not prevent scholarly attempts to understand intuition better. And, for now at least, researchers with very different

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beliefs seem to be able to build on one another's results and work together in the joint endeavor to catch the essence of this particularly interesting and beautiful mental phenomenon.

Although intuition as a valuable tool used by managers, particularly top executives, for making good decisions, seemed reasonable, it was not before Chester Barnard (1938) published his seminal book 'The Functions of the Executive' that exploring intuition started. Although Chester Barnard was a practitioner himself, his book has been widely accepted in academe, and in the field of intuition it marks the beginning of the scholarly interest in intuition. The first academic inquiry to allow for including intuition was Herbert Simon's work on 'Administrative Behavior' (first edition published 1947) that led to one of the most cited descriptions of intuition: "Intuition and judgment – at least good judgment – are simply analyses frozen into habit" (Simon, 1987: 63). This was followed by the study by Weston Agor (1986), the first empirical research on managers' intuition, in which he explored both successes and failures – this has a symbolic value, as it shows that those who argue for the importance of intuition are not necessarily blind to the failures of intuition.

In this chapter, we portray intuition in the context of decision making by combining understandings from a variety of areas and drawing on both practitioner as well as academic sources. We limit, for the sake of understanding, intuition to consist of intuitive knowledge that is often accompanied by somatic and affective charges, thus ignoring the multi-potential aspect of intuition and more generally of cognition (see e.g. Dörfler & Szendrey, 2008). We establish a link between intuition and different levels of expertise, but essentially focus on intuition at the highest level of expertise.

What is intuition?

*“Intuition isn’t the enemy, but the ally, of reason.”
John Kord Lagemann*

Perhaps the easiest way to conceptualize intuiting is to see it as a way of ‘direct knowing’, that is, knowing “without any use of conscious reasoning” (Sinclair & Ashkanasy, 2005: 357). Although this is certainly not an all-encompassing explanation, most people seem to understand it intuitively, and thus we adopt it as our starting point. Direct knowing means that knowledge is not achieved by the step-by-step reasoning that typically characterizes the academic view of decision making but through a process that somehow seems to bypass these steps. Usually, when a concept is so vague, such as intuition at this point, we often contrast it with something, i.e. explain it through what it is not. Thus, intuition is often contrasted with analysis or with rational methods. However, none of these contrasts seem to stand scrutiny. The opposite of analysis is not intuition but synthesis. It is true that intuition often entails synthesis, and this is the point where Mintzberg (1994) challenged Simon on his conceptualization of intuition as being ‘analysis frozen into habit’, arguing that intuition is about synthesis, which you will never achieve through analyses. Yet, synthesis can also be achieved through step-by-step reasoning, not only by means of intuiting. Similarly, intuition sometimes seems simply to bypass the analytical steps, without necessarily providing synthesis. However, unless we understand what happens when we intuit, we cannot be sure that there was no synthesis involved in the process of bypassing the steps of the analysis. It is also possible that bypassing the analytical steps happens by synthesizing these steps. As we will show later, rationality also cannot be contrasted to intuition; on the one hand the opposite of rational would be irrational, on the other hand, ‘ratio’ means mind, and so anything that comes from the mind is by definition rational. Furthermore, we also know

about many different forms of rationality, and some of these, such as Simon's 'bounded rationality' leave ample space for intuition. In the dual process theories intuition is sometimes labelled parallel in contrast with the sequential mode of reasoning but what we really know is that intuition is non-sequential, we don't really know whether it is parallel or not. Daniel Kahneman's (2011) recent work on fast and slow thinking seems to be to the point, although there are other ways of fast thinking beyond intuition, such as guessing. It seems that we have not much else to go on than to talk about intuitive vs. non-intuitive reasoning.

We distinguish between two kinds of intuition, these can be conceptualized as '*intuitive judgment*' and '*Intuitive insight*' (see detailed argument in Dörfler & Ackermann, 2012; Stierand & Dörfler, 2016). Intuitive judgment is what we primarily associate with decision making, more precisely, with a particular step in the decision making process, usually called choice or decision taking, which is concerned with the evaluation of the decision alternative(s). Intuitive insight is, conversely, the intuition of the creatives, it is getting us to a solution to a(n ill-structured) problem. It is important that it is about *a solution* rather than *the solution*, as a variety of new solutions can be created. However, intuitive insight may also appear in the decision making process, only it is not associated with the decision taking phase but rather with creation (often mistakenly referred to as generation) of decision alternatives. However, in what follows, we primarily focus on intuitive judgment.

We also want to emphasize that we do not argue for an exclusive use of intuition. What we expect to see in decision making, is a cycle of intuitive and non-intuitive steps, pretty much as described by Bergson (1911, 1946). Decision makers usually follow non-intuitive reasoning as long as they can, i.e. as long as there is more information to gather and more time to gather it, however, when time is pressing and when information is scarce, decision takers use

intuitive judgment. Then they need to get into a non-intuitive mode again, to develop an explanation that justifies their intuitive judgment. The process is similar in the case of creativity, for example when creating decision alternatives (see more details in Dörfler & Eden, 2014). It is important that the non-intuitive explanation always follows a flash of intuition and, although it often provides a meaningful explanation or even justification for the intuitive outcome, it may or may not have anything to do with what happened in the process of intuiting. Recognizing the cycles of intuition and non-intuition gains further importance when we consider that for a long time it was assumed that intuitive and non-intuitive reasoning are on the opposite ends of a single dimension and consequently the same person could only be good at one of these. More recent research (Hodgkinson et al., 2009), however, suggests that these are two different dimensions. Thus we argue that for good decision making we need good intuition as well as good non-intuition. The intuitive and the non-intuitive minds are friends not foes.

Expert intuition

*"[...] with talent and a great deal of involved experience, the beginner develops into an expert who intuitively sees what to do without recourse to rules nor to remembered cases.
Hubert Dreyfus*

Our own interest in intuition stems from a workshop in which one of us was involved with the board of executives of a large telecom company. As the importance of knowledge came up, it became clear that the board members only considered 'textbook'-type knowledge, so we drew a quick schematic diagram about positioning intuition as a separate knowledge type (Dörfler et al., 2011). While they quickly understood intuition as condensed expertise (Weick,

1995: 88), it was less easy to explain that it is not simply about experience, as experience does not automatically convert to expertise. In the words of Klein and Weick (2000: 19):

“The only thing that the passage of time achieves is to move you closer to retirement or termination. Too often, we treat experience as a noun rather than as a verb, something to accumulate.”

Hence, experience is indispensable but not sufficient for becoming an expert. What matters most is what we do with that experience – we need to learn from it in order to develop expertise. In line with Dane and Pratt (2009), we see expertise as a precursor to trustworthy intuition; this view in the literature is emphasized by terms, such as ‘intuition-as-expertise’ (Sadler-Smith & Shefy, 2004), ‘intuitive expertise’ (Kahneman & Klein, 2009) or ‘expertise-based intuition’ (Salas, Rosen & DiazGranados, 2010).

The notion of expertise can also explain much of the disagreement in the management and organization studies field about the usefulness of intuition. If we take a closer look at those studies that claim to have provided experimental evidence on the failure of intuition (including Bowers et al., 1990: 97; Schoemaker & Russo, 1993: 27; Trailer & Morgan, 2004), we will usually find experiments targeted at intuitions of novices. Remarkably, we did not find a single instance where this was not the case. These experiments are typically, but not exclusively, conducted with students; for instance, Trailer and Morgan (2004) observed that undergraduate business school students make poor intuitive judgements in the field of physics. But, why would business school students have intuition in physics? In contrast, those who have found empirical (usually not gained through experiments) evidence of intuition working well in their respective fields of interest (including Burke & Miller, 1999 in management; Hayashi, 2001 in leadership; Keren, 1987 in the game of bridge), typically

focused on intuition at high level of expertise. Due to the relatively small number of studies providing empirical, and particularly experimental, evidence about intuition in management, our argument is not conclusive but we find it intuitively convincing.

The significance of expertise for intuition can also be approached from the opposite end, from the development of expertise. There are three key models, developed using very different methodological approaches, that explain levels of expertise. The first was originally put forward by Simon and his various collaborators (e.g. Chase & Simon, 1973a; Chase & Simon, 1973b; Gobet & Simon, 1996a, 1996b, 2000), using an experimental approach. Then, the Dreyfus brothers developed their model using phenomenology (e.g. Dreyfus, 2004; Dreyfus & Dreyfus, 1986; Kreisler & Dreyfus, 2005). And, finally, Dörfler et al (2009) presented a purely speculative model of expertise levels. Whilst these models have been developed using different methods, they are complementary and have a common touchpoint in acknowledging that intuiting becomes the dominant mode of knowing at the highest level of expertise.

Currently, there seems to be considerable agreement that intuition works well *only* at a high level of expertise (cf. Hogarth, 2001; Kahneman & Klein, 2009; Prietula & Simon, 1989; Salas, Rosen & DiazGranados, 2010). Daniel Kahneman, who pointed out numerous flaws of intuition, always deliberately focused on commonsense-level intuition, and criticized those painting a positive picture of intuition for not emphasizing that it is only intuition at high level of expertise that works well – the intuition of experts he also finds useful.

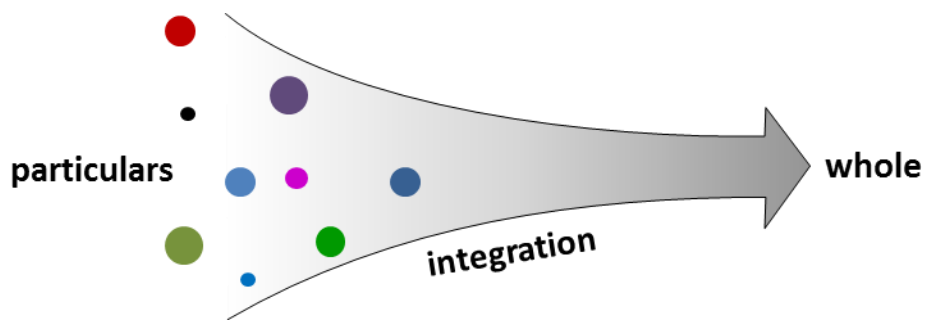
The process of intuiting

“Intuition is not something that is given. I’ve trained my intuition to accept as obvious shapes which were initially rejected as absurd [...]”
Benoit Mandelbrot

We do not exactly know what happens when we intuit, for “much current knowledge rests largely on researchers’ speculative arguments and abstract theorizations” (Sadler-Smith, 2016). Little empirical research has been done to date, only a fraction of this is qualitative, and only a small part of that focuses on the subjective experience of intuiting. Therefore, what we present here is how we speculate about what happens when we intuit, using Polányi’s (1962, 1966a, 1966b) work as our starting point (see Dörfler & Ackermann, 2012).

Polányi’s original argument is concerned with *tacit knowing* more generally, but it also works for intuiting. Let us consider exploring a room with a stick with our eyes closed. Initially, we would be paying attention to what we feel in our fingers, such as the vibrations of the stick, the angle under which it is inclined, changes of direction, etc. These feelings are the *particulars* in the process of tacit knowing, they take place on the near end of the stick (*proximal term*), and they belong to the realm of *subsidiary knowing*. If we continue exploring the room a little longer, we will soon start picturing the room at the far end of the stick (*distal term*). Thus, our attention turns from the particulars to the *whole*, to the picture of the room that is still forming in our mind, and this whole is what we focus on, thus we label it as *focal knowing*. The process of tacit knowing is then an *integration* process, in which the particulars are integrated into the whole and the particulars seem to be dissolved in this process. Initially some particulars will probably belong to the tacit realm, others to the explicit, but the integration process is tacit, and as soon as the focal whole emerges, we lose awareness of the

particulars. We cannot tell anymore about the feeling in our palm, we can only tell how we picture the room.



Adapted from Dörfler and Ackermann (2012: 554)

Figure 1: The process of intuiting

The above example was perhaps not what immediately comes to mind when thinking of intuition, but has the advantage of having the particulars and the whole on the two different ends of the stick and thus we find it useful to start with. However, recognizing a face or writing a poem can be described in a very similar way. We could tell some characteristics of a face we recognize, before the actual recognition happens, and we can know the rules of grammar, letters, etc. when writing a poem. However, when we are actually in the process of recognizing the face or writing the poem, we will have no idea which facial characteristics we have seen when the recognition took place or which rules of grammar we have used when the poem was written. What is really interesting is that if we describe the facial characteristics of someone we have not seen for many years, we will recognize the face even if the characteristics we described beforehand have changed; we may not even notice that those characteristics have changed. Hence, we frequently don't even know what particulars we use to recognize the focal whole.

Although some would perhaps question whether recognizing a face or writing a poem qualifies for intuition, the process of intuiting works the same way in the case of intuitive judgments as well. The particulars would include our explicit expectations and the information we have about the decision alternatives but can also include things we may have no idea about, such as a move or a look of our negotiating partner. When we make the choice, we will not know what particulars we used. If we come up with an ex post explanation, that may or may not have anything to do with how we actually made that choice.

We are quite confident that the above description of the process of intuiting holds, but we could not say that it is particularly detailed. Although further empirical studies, particularly first-hand accounts of intuitors, may shed further light on some details, we must expect that we may never or for a long time have a good and detailed description of the process of intuiting. However, good descriptions or models do not make for good intuition. The expertise of the intuitor does.

Features of intuition

“Intuition is what you know for sure without knowing for certain.”
Weston Agor

What makes distinguishing intuitive from non-intuitive reasoning so difficult is that there is no one single characteristic along which this contrast can be made. In this section, we provide a set of six characteristics. These together can do the job: all six are necessary for identifying intuition, and if any one of them is missing, then it is something else (cf Dane & Pratt, 2007; Dörfler & Ackermann, 2012; Kahneman, 2003: 698; Sadler-Smith, 2008: 13). Three of these

refer to the process of intuiting, and three to the outcome of this process we call intuition and have conceptualized earlier as intuitive knowledge.

Intuiting is instantaneous or, at least, very-very fast. In this respect, it is similar to guessing, however, it is guessing which is “frequently correct” (in line with Simon, 1983: 25). This speed of intuiting is particularly important today, when the time pressure is constant. As Handy (1995: 49) puts it “By the time you know where you ought to go, it’s too late to go there.” But how is intuiting so rapid? According to Prietula and Simon (1989: 121-122), intuiting is a leap by which the expert bypasses the analytical steps and overcomes limitations of attention and of memory (both short-term memory (STM) and long-term memory (LTM)). We become aware of the right answer before consciously realizing it by relying on our experience without having to analyze everything (Klein & Weick, 2000). This pattern recognition that helps bypass the steps of deliberate reasoning are not limited to situations the decision maker already knows. Expert decision makers will recognize patterns in new situations, not only in situations with which they are already familiar. This means that we should understand the patterns as particulars that are integrated in the whole in the process of intuiting, and this whole may be something we see for the first time.

Intuiting is spontaneous. This means that intuiting does not require effort, at least at the moment when it happens (cf Agor, 1984: 75). However, this also means that intuition cannot be produced at will (Isaack, 1978: 918). This does not mean that the decision makers just need to lay back and wait for intuition to arrive; hard work is needed beforehand, and then the intuiting happens in this relaxed state (see e.g. Hadamard, 1954 for numerous examples). The work needed for good intuition is not limited to the work on the particular problem; it includes all the previous work in the discipline or in the problem area and has a strong link to

the level of expertise (Prietula & Simon, 1989). This means that intuiting brings together everything we have experienced in our field in various contexts and can have bearing on the decision situation at hand (cf Rowan, 1986: 83). In terms of the intuiting process, we could say that the intuitor can only integrate the particulars they have, and that involves all their knowledge in the discipline, in the problem area and about the context.

Intuiting is alogical. The terminology to describe this feature of intuiting is slightly different in every case: Kahneman and Tversky (1982: 124) describe it as “an informal and unstructured mode of reasoning, without the use of analytic methods or deliberate calculation”, Barnard (1938: 301 ff) calls it a ‘non-logical’ process to contrast it to the logical process of reasoning, etc. However, the message is the same every time: intuiting operates *independently* of the general principles of reasoning that Russell (1946: 379) calls logic. We call this mode of reasoning *alogical*, meaning that it neither follows (*logical*) nor contradicts (*illogical*) the rules of logic. For similar reasons we can describe intuiting as arational, meaning that it is not rational or irrational, simply independent from the rules of rationality. It is important to note that qualifying intuiting as alogical actually does not tell us anything about its modus operandi, we only know what it is not. The question is whether we will ever discover some set of rules that intuition seems to follow. We believe that it is likely that we will not, as the particulars are of very personal nature embracing apart from the accepted knowledge in the discipline and in the problem area also the subjective aspects of these as well as of the current context and also the personal history of the intuitor. However, we agree with Simon (1987: 61) that “... intuition is not a process that operates independently of analysis; rather, the two processes are essential complementary components of effective decision making systems.”

Intuition is gestalt or a 'holistic hunch' (Beveridge, 1957: 73; Hayashi, 2001: 64; Miller & Ireland, 2005; Morris, 1967: 158; Sinclair & Ashkanasy, 2005: 357). This means two things. On the one hand, that intuition is about the 'big picture' of the decision situation, including the broad context, far reaching implications (and the implications of the implications, etc.) that are usually not considered in step-by-step reasoning, as the probabilities would be considered very low. But it also takes into account what we could call 'invisible parts' that are inaccessible to deliberate step-by-step reasoning, what is sometimes referred to as the unknown unknowns. On the other hand, intuition also involves the totality of the intuitor. This view is also fully in harmony with how the Dreyfus brothers (see '[Expert intuition](#)' section) describe the highest level of expertise, i.e. that the totality of the situation is intuitively perceived and the response involves the complete personality in an intuitive response. This does not mean, however, that intuition needs to be vague. Intuition is about the 'essence', it means seeing the 'big picture' as well as the relevant detail and being able to quickly switch between the two (Dörfler & Eden, 2014). Thus the (expert) intuitor will be able to see which detail needs to be changed as well as how this will affect the big picture.

Intuition is tacit. Hayashi (2001: 60) asserts, based on numerous interviews, that top executives cannot describe the process of intuiting much beyond labelling it "professional judgment", "intuition", "gut instinct", "inner voice", or "hunch". Dane and Pratt (2007: 36) therefore characterize intuition as nonconscious, meaning that the outcomes of intuiting are accessible to conscious thinking but how one arrives at them is not. On the one hand, this seems sensible based on how we described the process of intuiting in the previous section. On the other hand, tacitness is very difficult to accept for the schooled mind, as our schools educate us to require sound reasoning or even proof for our choices. However, this is only as

we are focusing on the wrong side of the schooling when we think about decision making, on the mathematical mind. In arts, if we paint a picture or write a poem, we are not required to provide a justification why we see things a particular way. So we are back to Barnard's point of talking about the 'executive arts'. If want to make use of our intuition, we have to accept that it is tacit. This, however, does not mean that we cannot provide a non-intuitive justification that explains why the intuitive judgement makes sense, only we need to know that this explanation is likely not how we arrived at the intuitive judgment – and that we will never know how we arrived at it. Thus we can say that the tacit nature of intuition is an additional reason why we need intuition and non-intuition to work in cycles.

Intuitors are confident about their intuitions. The explanations discussed under the previous feature serve to make others accept the intuitor's judgement – the intuitors usually do not need justification. Jung (1921: §770) distinguished four psychological functions: thinking, feeling, sensation, and intuition. He emphasizes that intuitive knowledge “possesses an intrinsic certainty and conviction”. This certainty is one of the most commonly described features of intuition emphasized by both decision makers and great scientists. One of the most often quoted examples is Poincaré's story (e.g. Damasio, 1994; Goldberg, 1983b; Hadamard, 1954; Polányi & Prosch, 1977; Vaughan, 1979); probably because it is striking that his intuition 'told him' the opposite of what he was trying to prove previously and later he proved this opposite. It is important to note that the built-in feeling of certainty of intuitive knowledge does not mean that intuition is infallible. Sadler-Smith (2008: 28) quotes critiques of intuition saying that “intuition is sometimes wrong but never in doubt”. Nobody claims that non-intuitive reasoning always gets it right. We also must not expect this from intuition. However, when it is the non-intuitive reasoning that fails us, this is easier to accept, as we

simply did some steps, these can be checked afterwards, and it is relatively easy to blame the failure to something external. However, if intuition is tacit and we don't have much more to go on than saying that 'I really feel confident that I am right' and then we find that we did not get it right, we can only blame ourselves. Not to mention that others will blame us as well. However, if we also know that intuition is not infallible, we have a good starting point for our intuitive endeavors.

There are two further things that are sometimes mentioned as features of intuition/intuiting. The first is the somatic effects, the second is the affective charges. Bodily feelings (somatic effects) are often associated with intuition as this seems to be part of the language of how our intuitions speak to us. Expressions such as 'gut feeling', 'butterflies in the stomach' and similar are not simply metaphors, many intuitors have their particular somatic effects tell them that they have arrived at an intuitive judgment. We do not consider the somatic effects as features of intuition as there seem to be a great variety and they do not seem to be a necessary aspect of intuition and non-intuitive judgments may also be accompanied with somatic effects. We can also hear that intuitions to be accompanied with emotional effects. Decision makers often seem to be in love with their intuitive judgments. Most authors, however, are very cautious about the affective charges, and usually we can read that intuitions are 'often affectively charged', suggesting that this may not always be the case. We will probably learn more about this, considering that intuition research is still in its infancy. However, we have also seen decision makers being in love with their statistics tables, feasibility studies and pie charts. Therefore, we do not consider emotions to be a necessary feature of intuition, but if we notice emotions we are more likely to expect intuition.

Enhancing intuition

"[...] the methods of scientific inquiry cannot be explicitly formulated and hence can be transmitted only in the same ways as an art, by the affiliation of apprentices to a master."
Michael Polányi

From what we have said so far about intuition, we believe there is no doubt left about the importance of intuition for expert decision takers. However, based on the process and features of intuition, it does not seem straightforward how one can become better at intuiting. As we have shown both that at high level of expertise intuition becomes the dominant mode of knowing as well as for reliable intuition is only available at high level of expertise, it is probably clear that becoming more knowledgeable in the particular knowledge domain helps in bettering intuition. We could consider this to be a generic way of enhancing intuition. The second group would include direct ways of enhancing intuition, meaning that these ways focus on directly making intuition better. These direct ways often involve various mental exercises that the intuitors can perform themselves or in groups with or without supervision. There is, however, one direct way of enhancing intuition that stands out: the master-apprentice relationship. The third group of intuition enhancement ways we call indirect ways, as their focus is not on intuition itself but something that relates to or interacts with intuition, namely the context of the intuitor, the awareness of intuition and the action taken based on intuition. In this section, we do not engage in the generic way, as that could include everything that we know about learning. We also do not tackle most of the direct ways as the academic basis of these are not particularly elaborate. The exception is the master-apprentice relationship, which we briefly describe, as it stands out both in its significance as well as how much we know about it. We also provide brief description of the indirect ways.

The master-apprentice relationship is a widely accepted mode of achieving the highest level of expertise, and we have explored it at length elsewhere. (Baracscai, Dörfler & Velencei, 2005; Dörfler & Eden, 2014; Dörfler & Stierand, 2009; Stierand, 2015) We have argued that it seems to be the only known way of passing on tacit knowledge and thus the only direct way of learning intuition from someone else. The essence of the master apprentice relationship is that it is wrong both to follow and to abandon the master's way; however, from this struggle, a new master emerges. What happens in regarding intuition is best expressed by Polányi (1966a: 14): *"A novice, trying to understand the skill of a master, will seek mentally to combine his movements to the pattern to which the master combines them practically."* So the apprentice is watching the master using her/his intuition, perhaps ask questions about it and then apply what Polányi (1946) termed 'intelligent imitation' – which is imitation that is adapted to personality, context and problem. Of course, the master provides feedback on the apprentice's intuition and the apprentice gradually evolves into a master.

Creating an intuition-friendly environment. It is often emphasized in the literature as well as in personal communication with intuitive people we have talked to that they need to hide the intuitive origins of their achievements and provide a post-rationalized well-structured argument instead. Such environments discourage the use of intuition. Therefore, creating intuition-friendly environments at personal, interpersonal and organizational levels can make a great deal of difference. At a personal level, this means putting our minds in a state where it is more open to intuition and accepting intuition. For example, it is well documented that reading poetry, enjoying art, music or extreme sports, sitting in the woods or consuming *"philosophical food"* (Agor, 1984: 75) can help liberating the mind from 'uninspiring' problems and may foster intuitive and creative ways of thinking. The interpersonal context means

people who accept intuition as a valid form of knowledge and can discuss it with the intuitor. Sadler-Smith and Shefy (2007), for instance, emphasize the importance of promoting the development of intuition through feedback. Finally, in an intuition-friendly organizational context it is acceptable to admit for using intuition – which does not mean that an argument does not need to be provided to substantiate the intuitive judgement. However, those who proved themselves as good intuitors may gradually enjoy benefits of providing the argument later or not at all. This is particularly important for organizations in turbulent environment, when the response time is of crucial importance.

Increasing awareness of intuition. Experienced intuitors are usually very good recognizing and interpreting their intuitions. However, those who just start relying on their intuitions, often fail to notice or find it difficult to distinguish intuition from other phenomena, including hopes and fears, that may have similar somatic and affective characteristics. Knowing our bodies and emotions is very important in this sense. On personal level self-observation, reflection and keeping diaries can help (Cartwright, 2004; Goldberg, 1983a: 193-194; Vaughan, 1979: 205). At an interpersonal level discussing intuitive experiences with peers and persons of trust can be helpful (e.g. Agor, 1984: 66). At organizational level, we can only be supportive of the use as well as development of intuition; not only in terms of the above noted techniques but also by supporting master-apprentice relationships.

Acting upon intuition. Creating a supportive environment is likely to help intuition occur, better awareness will help to notice and understand intuitive leaps, but then we also need to act upon intuition. When the intuition happens, should not delay the action, think it through again, check by means of structured step-by-step reasoning ‘just in case’ and so forth. If intuition is not followed by action, we will never really know whether it has worked in the first

place. There are no techniques suggested explicitly for improving *how* we can act upon intuition but many of the previously mentioned techniques also support action. Reflecting helps learning from previous actions and poetry, art, philosophy may help achieving an actionable mindset. Discussing it with peers provides examples as well as feedback. An organizational environment that supports intuition also supports acting upon it; most importantly, it does not sanction severely when intuition led to bad outcome through action. Of course, intuition is not always right, and neither is the non-intuitive step-by-step reasoning. While we cannot allow poor outcomes all the time, in the case of non-intuitive step-by-step reasoning people are not usually penalized for a single failure – intuitors should be treated the same.

While it is clear that we cannot simply set up courses or read a couple of books to increase our intuition, we wanted to show that there is much that we can do to support the development of intuition. A number of these things is not unique to intuition and not so alien to our culture, such as peer discussions, reflection and reflexivity, the master-apprentice relationship, etc. We make huge efforts to improve our non-intuitive step-by-step reasoning capabilities – if we do as much for intuition, it should be sufficient.

So is intuition mystical?

“I propose that the goal of science is to make the wonderful and the complex understandable and simple – but not less wonderful.”
Herbert Simon

Having gone through the process of polishing the initial picture about intuition from various perspectives, we are back to the initial question: Is intuition mystical or not? Lieberman (2000: 109) suggests that intuition is at best regarded as mysterious and unexplainable. To

the contrary, Davenport and Prusak (2000: 11), argue: “We arrive at an answer intuitively, without knowing how we got there. That does not mean the steps do not exist – intuition is not mystical. It means we have so thoroughly learned the steps that they happen automatically, without conscious thought, and therefore at great speed.”

Our answer is somewhere in-between these two. We believe that it is useful to try to understand intuition in the academic sense of the word. However, as intuiting happens almost instantaneously and intuition is tacit, there is a limit to this. We agree with Isaack (1978: 919) that “*intellect cannot completely understand the intuition since the artificial tools, preconceived categories, and symbols used by the intellect only represent reality and are not the substance of reality*”. However, this should not stop us in trying to understand intuition. But we need intuition to make sense of intuition.

References

- Agor, WH (1984) *Intuitive Management: Integrating Left and Right Brain Management Skills*, Prentice-Hall, Englewood Cliffs, NJ.
- Agor, WH (1986) The Logic of Intuition: How Top Executives Make Important Decisions, *Organizational Dynamics*, 14(3): 5-18. [http://dx.doi.org/10.1016/0090-2616\(86\)90028-8](http://dx.doi.org/10.1016/0090-2616(86)90028-8)
- Baracskai, Z, Dörfler, V & Velencei, J (2005) *Majstor i kalfa (Master and Apprentice)*, Sinergija, Zagreb, Croatia. [Published in Croatian]
- Barnard, CI (1938/1968) *The Functions of the Executive*, Harvard University Press, Cambridge, MA.
- Bergson, H (1911) *Creative Evolution*, Henry Holt and Company, New York, NY.
- Bergson, H (1946/1992) *The Creative Mind: An Introduction to Metaphysics*, Citadel Press, New York, NY.
- Beveridge, WIB (1957/2004) *The Art of Scientific Investigation* (2nd ed.), Blackburn Press, Caldwell, NJ.
- Bowers, KS, Regehr, G, Balthazard, C & Parker, K (1990) Intuition in the context of discovery, *Cognitive Psychology*, 22(1): 72-110. <http://www.sciencedirect.com/science/article/B6WCR-4D5XC4T-3G/1/eef8eb477b34a852db158e2f37f9be79>
- Burke, LA & Miller, MK (1999) Taking the Mystery out of Intuitive Decision Making, *Academy of Management Executive*, 13(4): 91-99. <http://dx.doi.org/10.5465/AME.1999.2570557>
- Cartwright, T (2004) Feeling your Way: Enhancing Leadership through Intuition, *Leadership in Action*, 24(2): 8-11. <http://proquest.umi.com/pqdweb?did=670515911&sid=1&Fmt=2&clientId=46002&RQT=309&VName=PQD>

- Chalmers, DJ (1998) *The Conscious Mind: in Search of a Fundamental Theory* (paperback ed.), Oxford University Press, New York, NY.
- Chase, WG & Simon, HA (1973a) The Mind's Eye in Chess, Chase, WG *Visual Information Processing*, Academic Press, New York, NY: 215-281.
- Chase, WG & Simon, HA (1973b) Perception in Chess, *Cognitive Psychology*, 4(1): 55-81. <http://www.sciencedirect.com/science/article/B6WCR-4D6RJR4-53/2/d368b90478edf5d8b9ee81a894eff330>
- Damasio, AR (1994/2005) *Descartes' Error: Emotion, Reason, and the Human Brain*, Penguin Books, New York, NY.
- Dane, E & Pratt, MG (2007) Exploring Intuition and its Role in Managerial Decision Making, *Academy of Management Review*, 32(1): 33-54. <http://dx.doi.org/10.5465/AMR.2007.23463682>
- Dane, E & Pratt, MG (2009) Conceptualizing and Measuring Intuition: A Review of Recent Trends, Hodgkinson, GP & Ford, JK *International Review of Industrial and Organizational Psychology* (Vol. 24), Wiley, Chichester, UK: 1-40. http://media.wiley.com/product_data/excerpt/08/04706800/0470680008.pdf
- Davenport, TH & Prusak, L (2000) *Working Knowledge: How Organizations Manage What They Know* (paperback ed.), Harvard Business School Press, Boston, MA.
- Dörfler, V & Ackermann, F (2012) Understanding Intuition: The Case for Two Forms of Intuition, *Management Learning*, 43(5): 545–564. <http://dx.doi.org/10.1177/1350507611434686>
- Dörfler, V, Baracskaï, Z & Velencei, J (2009) Knowledge Levels: 3-D Model of the Levels of Expertise, *AoM 2009: The 69th Annual Meeting of the Academy of Management*, 7-11 August 2009, Chicago, IL.
- Dörfler, V, Baracskaï, Z, Velencei, J & Ackermann, F (2011) *Facts, Skills and Intuition: A Typology of Personal Knowledge* (Management Science Working Papers, working paper), Strathclyde University, Glasgow.
- Dörfler, V & Eden, C (2014) Understanding 'Expert' Scientists: Implications for Management and Organization Research, *AoM 2014: The 74th Annual Meeting of the Academy of Management*, 1-5 August 2014, Philadelphia, PA. Electronic version: <http://dx.doi.org/10.5465/AMBPP.2014.10732abstract>
- Dörfler, V & Stierand, M (2009) Investigating the Extraordinary, *BAM 2009*, 15-17 September 2009, Brighton.
- Dörfler, V & Szendrey, J (2008) From Knowledge Management to Cognition Management: A Multi-Potential View of Cognition, *OLKC 2008: International Conference on Organizational Learning, Knowledge and Capabilities*, 28-30 April 2008, Copenhagen, Denmark. Electronic version: <http://www.viktordorfler.com/webdav/papers/MultipotentialCognition.pdf>
- Dreyfus, HL (2004) *A Phenomenology of Skill Acquisition as the basis for a Merleau-Pontian Nonrepresentationalist Cognitive Science* (unpublished). Electronic version: <http://ist-socrates.berkeley.edu/~hdreyfus/pdf/MerleauPontySkillCogSci.pdf> (accessed 29/12/2010)
- Dreyfus, HL & Dreyfus, SE (1986/2000) *Mind over Machine*, The Free Press, New York, NY.
- Gobet, F & Simon, HA (1996a) Recall of Random and Distorted Chess Positions: Implications for the Theory of Expertise, *Memory & Cognition*, 24(4): 493-503. <http://www.psychonomic.org/search/view.cgi?id=1334>
- Gobet, F & Simon, HA (1996b) Templates in Chess Memory: Mechanism for Re-calling Several Boards, *Cognitive Psychology*, 31(1): 1-40. <http://dx.doi.org/10.1006/cogp.1996.0011>
- Gobet, F & Simon, HA (2000) Five seconds or sixty? Presentation time in expert memory, *Cognitive Science*, 24(4): 651-682. <http://www.sciencedirect.com/science/article/B6W48-41WSC68-4/2/83c8cd00262a31865c778304223942c3>
- Goldberg, P (1983a) The Intuitive Experience, Agor, WH (1989) *Intuition in Organizations: Leading and Managing Productively*, Sage Publications, Newbury Park, CA: 173-194.
- Goldberg, P (1983b) The Many Faces of Intuition, Agor, WH (1989) *Intuition in Organizations: Leading and Managing Productively*, Sage Publications, Newbury Park, CA: 62-77.

- Hadamard, J (1954) *The Psychology of Invention in the Mathematical Field*, Dover Publications, New York, NY.
- Handy, C (1995) *The Empty Raincoat: Making Sense of the Future*, Arrow Business Books, London, UK.
- Hayashi, AM (2001) When to Trust Your Gut, *Harvard Business Review*, 79(2): 59-65.
- Hodgkinson, GP, Sadler-Smith, E, Sinclair, M & Ashkanasy, NM (2009) More than meets the eye? Intuition and analysis revisited, *Personality and Individual Differences*, 47(4): 342-346.
<http://www.sciencedirect.com/science/article/B6V9F-4W84GR5-2/2/a60ac4b2b44ee7b34d4a4b9ac7f52498>
- Hogarth, RM (2001) *Educating Intuition*, University of Chicago Press, Chicago, IL.
- Isaack, TS (1978) Intuition: An Ignored Dimension of Management, *Academy of Management Review*, 3(4): 917-922. <http://dx.doi.org/10.5465/AMR.1978.4289310>
- Jung, CG (1921/1990) *Psychological Types*, Princeton University Press, Princeton, NJ.
- Kahneman, D (2003) A Perspective on Judgment and Choice: Mapping Bounded Rationality, *American Psychologist*, 58(9): 697-720. <http://content2.apa.org/journals/amp/58/9/697>
- Kahneman, D (2011) *Thinking, Fast and Slow*, Farrar, Straus and Giroux
- Kahneman, D & Klein, G (2009) Conditions for intuitive expertise: A failure to disagree, *American Psychologist*, 64(6): 515-526.
<http://psycnet.apa.org.proxy.lib.strath.ac.uk/journals/amp/64/6/515.html>
- Kahneman, D & Tversky, A (1982) On the study of statistical intuitions, *Cognition*, 11(2): 123-141.
[http://dx.doi.org/10.1016/0010-0277\(82\)90022-1](http://dx.doi.org/10.1016/0010-0277(82)90022-1)
- Keren, G (1987) Facing uncertainty in the game of bridge: A calibration study, *Organizational Behavior and Human Decision Processes*, 39(1): 98-114.
<http://www.sciencedirect.com/science/article/B6WP2-4CYG2X0-BY/2/47bc4960fae485620d80efe2f7b98efe>
- Klein, G & Weick, KE (2000) Decisions: Making the right ones. Learning from the wrong ones, *Across the Board*, 37(6): 16-22.
<http://search.ebscohost.com/login.aspx?direct=true&db=ofs&AN=510099826&authtype=shib&site=ehost-live>
- Kreisler, H & Dreyfus, HL (2005) *Meaning, Relevance, and the Limits of Technology: Interview with Hubert Dreyfus* (Conversations with History), Institute of International Studies, UC Berkeley.
- Lieberman, MD (2000) Intuition: A Social Cognitive Neuroscience Approach, *Psychological Bulletin*, 126(1): 109-137. <http://content2.apa.org/journals/bul/126/1/109>
- Miller, CC & Ireland, RD (2005) Intuition in strategic decision making: Friend or foe in the fast-paced 21st century?, *Academy of Management Executive*, 19(1): 19-30.
<http://dx.doi.org/10.5465/AME.2005.15841948>
- Mintzberg, H (1994) The Fall and Rise of Strategic Planning, *Harvard Business Review*, 72(1): 107-114.
- Morris, WT (1967) Intuition and Relevance, *Management Science*, 14(4): 157-165.
<http://dx.doi.org/10.1287/mnsc.14.4.B157>
- Polányi, M (1946) *Science, Faith and Society*, Oxford University Press, London, UK.
- Polányi, M (1962/2002) *Personal Knowledge: Towards a Post-Critical Philosophy*, Routledge, London, UK.
- Polányi, M (1966a) The Logic of Tacit Inference, *Philosophy*, 41(155): 1-18.
<http://dx.doi.org/10.1017/S0031819100066110>
- Polányi, M (1966b/1983) *The Tacit Dimension*, Peter Smith, Gloucester, MA.
- Polányi, M & Prosch, H (1977) *Meaning* (paperback ed.), The University of Chicago Press, Chicago, IL.
- Prietula, MJ & Simon, HA (1989) The Experts in Your Midst, *Harvard Business Review*, 67(1): 120-124.
- Rowan, R (1986) *What It Is*, Agor, WH (1989) *Intuition in Organizations: Leading and Managing Productively*, Sage Publications, Newbury Park, CA: 78-88.
- Russell, BA (1946/2004) *History of Western Philosophy*, Routledge, London, UK.
- Sadler-Smith, E (2008) *Inside Intuition*, Routledge, London, UK.

- Sadler-Smith, E (2016) 'What happens when you intuit?': Understanding human resource practitioners' subjective experience of intuition through a novel linguistic method, *Human Relations*, 69(5): 1069-1093. <http://dx.doi.org/10.1177/0018726715602047>
- Sadler-Smith, E & Shefy, E (2004) The Intuitive Executive: Understanding and Applying 'Gut Feel' in Decision-Making, *Academy of Management Executive*, 18(4): 76-91. <http://dx.doi.org/10.5465/AME.2004.15268692>
- Sadler-Smith, E & Shefy, E (2007) Developing Intuitive Awareness in Management Education, *Academy of Management Learning & Education*, 6(2): 186-205. <http://dx.doi.org/10.5465/AMLE.2007.25223458>
- Salas, E, Rosen, MA & DiazGranados, D (2010) Expertise-Based Intuition and Decision Making in Organizations, *Journal of Management*, 36(4): 941-973. <http://vnweb.hwwilsonweb.com/hww/jumpstart.ihtml?recid=0bc05f7a67b1790e029d610c70c618e1e7a103d48ec260a169ce81520d132cdaefb009c97c7503ee&fmt=H>
- Schoemaker, PJH & Russo, JE (1993) Pyramid of Decision Approaches, *California Management Review*, 36(1): 9-31. <http://proquest.umi.com/pqdweb?did=288936&sid=1&Fmt=3&clientId=46002&RQT=309&VName=PQD>
- Simon, HA (1947) *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization* (1st ed.), Macmillan, New York, NY.
- Simon, HA (1983) *Reason in Human Affairs*, Stanford University Press, Stanford, CA.
- Simon, HA (1987) Making Management Decisions: the Role of Intuition and Emotion, *Academy of Management Executive*, 1(1): 57-64. <http://dx.doi.org/10.5465/AME.1987.4275905>
- Sinclair, M & Ashkanasy, NM (2005) Intuition: Myth or a Decision-making Tool?, *Management Learning*, 36(3): 353-370. <http://dx.doi.org/10.1177/1350507605055351>
- Spinoza, B (1677/2000) *Ethics: Demonstrated in Geometrical Order*, Oxford University Press, New York, NY.
- Stierand, M (2015) Developing Creativity in Practice: Explorations with World-Renowned Chefs, *Management Learning*, 46(5): 598-617. <http://dx.doi.org/10.1177/1350507614560302>
- Stierand, M & Dörfler, V (2016) The Role of Intuition in the Creative Process of Expert Chefs, *Journal of Creative Behavior*, 50(3): 178-185. <http://dx.doi.org/10.1002/jocb.100>
- Trailer, JW & Morgan, JF (2004) Making "Good" Decisions: What Intuitive Physics Reveals About the Failure of Intuition, *Journal of American Academy of Business, Cambridge*, 4(1-2): 42-48. <http://proquest.umi.com/pqdlink?did=524073511&sid=4&Fmt=4&clientId=46002&RQT=309&VName=PQD>
- Vaughan, FE (1979) *Awakening Intuition*, Anchor Books, New York, NY.
- Weick, KE (1995) *Sensemaking in Organizations*, Sage Publications, Thousand Oaks, CA.