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Understanding Intuition

The Case for Two Forms of Intuition¹

Viktor Dörfler – Fran Ackermann

Abstract

Since the recent rejuvenation of intuition research within the management literature, significant work has been done on conceptualizing intuition. Whilst remarkable progress has been achieved in many areas of intuition, the role of intuition in creativity remains comparatively under-researched. Through an extensive review of intuition literature, we believe that a reason for this could be that intuition in the management literature is generally conceptualized as judgement. In this paper we aim to extend our understanding of intuition in creativity by distinguishing between intuitive judgment and intuitive insight. Strengthening our case, this paper builds on two previous research projects. The first focuses on literature-based features of intuition and the second project builds a conceptual model of knowledge types. Further informing the argument is Polányi's distinction of focal and subsidiary awareness. These considerations lead us to propose that there are two distinct kinds of intuition – intuitive judgment and intuitive insight.

Keywords

creativity, decision taking, intuition, personal knowledge, tacit knowledge

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Introduction

The main contribution of this paper is introducing the distinction between intuitive insight and intuitive judgement. The significance of distinguishing between these two concepts is that it provides us with a better understanding of the role of intuition in creativity, which is the least understood and researched area of intuition in management research. Therefore, our findings help elucidate a better understanding of creativity and thus extend our knowledge of intuition. Moreover, this is potentially valuable to knowledge oriented organizations (Argyris & Schön, 1978; Davenport & Prusak, 2000) who place considerable emphasis on creativity, not only in the area of R&D, but also in a wide variety of business functions.

In order to fully understand the rationale behind the argument presented in this paper, relevant literature substantiating the development of our argument is examined and several conceptual models briefly discussed. In particular the paper explores the literature beyond management research to gather evidence about the use of intuition in creativity, and also ventures into Polányi's philosophy and Jung's psychology, amongst others, for helpful supplementary models.

Hodgkinson et al. (2008: 1) suggest that 'intuition lies at the heart of a number of dual-process theories of cognition'. These dual process theories came about since cognition appeared to be difficult to understand as a unitary construct (e.g. Evans, 2010). There are many variants of the dual process theories, each with slightly different versions of duality. The roots of this duality can be traced back to Socrates, Plato and Aristotle in the Western world; the first well-known one from the modern era is Freud's (1900) distinction of primary and secondary mental operations. Neisser (1963) gives an overview of this early period, to finally propose the dualism of sequential vs. multiple processing. Some more recent dualist conceptions include the extensional vs. intuitive reasoning (Tversky & Kahneman, 1983), controlled vs. intuitive mode of cognitive function and reasoning vs. intuition (Kahneman, 2003), rational vs. experiential, which is later referred to as analytical-rational vs. intuitive-experiential (Epstein, 1994; Epstein et al., 1996) and System 1 vs. System 2 (Frankish, 2010; Stanovich & West, 1998, 2000). Without trying to list all the different versions of the dual process theories (a review of models can be found in Evans, 2008) we indicate that they always distinguish between a process that comes close to intuiting and another which we can best describe as non-intuitive.² Regardless of which version of the dual process theories one accepts, the duality of intuitive and non-intuitive processing seems to have been widely recognised. For example, Barnard (1938: 291) recognized the importance of this duality for management and argued that, apart from good logical analysis, intuition is 'nowhere more indispensable than in executive arts'.

² There are various terms used as a contrast to 'intuitive', perhaps the most frequent being 'analytical'. Analysis does have some features that can be contrasted to intuition, most significantly that it is normally carried out step-by-step. However, the essence of analysis is dissecting things into smaller pieces, thus the opposite of analysis is actually synthesis rather than intuition. Furthermore, intuition can work in form of both analysis and synthesis. So the reason for using the term 'non-intuitive' is trying to avoid the vague use of terms as it may lead to contradiction and misunderstanding, as we will show later in the paper.

Research on intuition became increasingly popular in the last two decades in the management literature and in the academic world more generally (E.g. Akinci & Sadler-Smith, 2011; Osbeck, 1999; Osbeck, 2001). We see two reasons for this: (1) intuition is the perhaps least understood aspect of managerial cognition (Hodgkinson & Healey, 2011) and (2) without understanding intuition it is impossible to develop any meaningful conceptualization of cognition. For instance Chalmers (1998: 110) argues that intuition is ‘the very *raison d’être*’ of the problem of cognition. Thus the only consistent way of avoiding the problem of intuition would be to deny it completely; which would, in turn, mean denying the problem and the phenomenon of consciousness itself. Examining the conceptualization of knowledge, Polányi (1969: 106) compares intuition to a sleeping monster, which, once awakened, may destroy our view of knowledge altogether. However, we believe that if it is destructive trying to understand intuition then destruction is needed, as our view of knowledge and consciousness cannot be meaningful unless it accounts for intuition as well.

In this paper we propose a provisional distinction of two types of intuition which we call *intuitive judgement* and *intuitive insight*. This distinction helps us in developing a better understanding of *creative intuition*, which is perhaps the least understood of the various types of intuition (e.g. Dane & Pratt, 2009; Gore & Sadler-Smith, 2011; Sinclair, 2010). We believe that offering this conceptualization contributes towards the overall goal of improving our understanding of intuition more generally.

This paper builds on two previous research projects in which we were trying to establish intuition as a valid form of knowledge. In the first case (Dörfler, Baracscai, Velencei, et al., 2010) we examined the nature of personal knowledge to identify different knowledge types. We started from Ryle’s (1949) distinction of ‘knowing that’ and ‘knowing how’, to which we added three further types, ‘why’, ‘what’ and ‘it’. We concluded that both the ‘know why’ and the ‘know what’ belong to intuition. In the second case we surveyed the literature and identified a set of six features which define intuitive knowledge. (Dörfler & Ackermann, 2011) These six features of intuition resemble closely those of others (cf. Kahneman, 2003: 698; Sadler-Smith, 2008: 13). Three of these apply to the process of intuiting and three to the outcome of such a process, the intuitive knowledge. Intuiting is *rapid* (often labelled instantaneous), *spontaneous* (does not require effort and cannot be deliberately controlled) and *alogical* (meaning that it does not necessarily contradict the rules of logic but does not follow them either). The outcome of the intuitive process is *tacit* (in that the intuitives cannot give account of how they arrived at the results), *holistic* (also often called gestalt, as it is concerned with the totality of a situation rather than parts of it), and the intuitor feels *confident* about their intuition (with no apparent reason in terms of evidence). Alongside this process of searching for the features of intuition, we have recognized that all the reports, whether academic or practitioner, from a variety of fields, including management, psychology and philosophy as well as reports from artists and scientists from diverse fields, mention two major areas in which intuition is used: namely *decision taking* and *creative problem solving*.

Based on the above, we challenge one of the underlying assumptions of the vast majority of intuition research in the field of management: namely that all intuition is judgement. As many of the management scholars interested in intuition are coming from the discipline of decision making/taking, this assumption appears to be taken for granted, so much so that it is usually not explicitly stated. However, we believe that this implicit presumption limits our understanding of intuition, which is particularly salient in the case of creative intuition. As we

will show, distinguishing between intuitive judgement and intuitive insight does not contradict any of the findings arrived at when considering intuition-as-judgement, rather it adds an extra dimension to the previously suggested typologies and thus offers a richer picture of intuition. It also does not directly contradict the distinction between intuition and insight as two related but distinct constructs (Dane & Pratt, 2007; Hodgkinson et al., 2008; Hogarth, 2001). Instead it refines the distinction: namely there is intuitive and non-intuitive insight, just as there is intuitive and non-intuitive judgement.

As we will argue, we are not introducing a superfluous concept in an area which is already riddled with models and constructs. Instead we believe that based on previous research the distinction between intuitive judgement and intuitive insight can help us achieve a more nuanced and comprehensive picture of intuition. Although 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’, we believe that it is important to try from an ‘intuitive understanding of intuition’ to extract and logically develop concepts that can be debated.

In the next section of this paper we establish intuition as a form of knowledge, emphasizing that in this research we are only interested in intuition as it operates at high levels of expertise. This helps build the argument by providing scope and focus. Then we attempt to describe the process of intuiting; for this we need to first briefly revisit the concepts of focal and subsidiary awareness introduced by Polányi. Finally, we introduce our idea of distinguishing between intuitive judgement and intuitive insight, offering it for debate as an additional viewpoint in the ongoing development of the conceptual framework for intuition research. As part of this discussion, we illustrate how they can be integrated into the existing typologies as a new dimension.

Intuition as expert knowledge

*‘Inspiration comes only to the prepared mind.’
Pasteur (quoted by Simon, 1983: 27)*

In terms of knowing, we can use our knowledge to understand something through analytical step-by-step reasoning, e.g. comparing and contrasting alternatives, evaluating them, examining their characteristics, the associated costs and benefits, etc. However, such step-by-step reasoning is not the only way of knowing. Intuitive knowledge is often described by scientists (see e.g. Beveridge, 1957; Hadamard, 1954; Koestler, 1971) and decision takers³ (see e.g. Barnard, 1938; Campbell & Mintzberg, 1991; Sadler-Smith & Shefy, 2004; Simon, 1987). They just ‘know’, in a moment without knowing how or why they ‘know’. Thus the knowledge arrived at by means of intuiting we call intuitive knowledge. Based on an examination of a wide range of literature (for example social and cognitive psychology, history and philosophy

³ The term decision taking is used explicitly as a distinction from decision making where the former refers to deciding about a course of action whilst the latter is a more comprehensive concept which includes other phases apart from decision taking, such as collecting information (intelligence) and generating alternatives. (Cf. Mintzberg et al., 1976; Simon, 1977)

of science, education), in this section we argue for the validity of intuitive knowledge. Conceptualizing intuition as intuitive knowledge, although limiting the scope of the intuition field, enables us to apply arguments originally developed for the domain of knowledge to the domain of intuition. We also argue that intuition worthy of trust (cf. Hogarth, 2001; Kahneman & Klein, 2009; Salas et al., 2010) appears to be experienced by experts and thus we limit our research to expert intuition. These limitations help us make our argument for the two types of intuition tighter.

Intuitive knowledge

In spite of the large number of reports and studies in favour of intuition, it was not fully explored systematically in the mainstream academic literature until recently (e.g. Akinci & Sadler-Smith, 2012; Dane & Pratt, 2007, 2009; Gore & Sadler-Smith, 2011; Hodgkinson et al., 2008; Hodgkinson, Sadler-Smith, Sinclair, et al., 2009; Sinclair & Ashkanasy, 2005). The reason is probably, as Tsoukas (2005a: 142) says, that we prefer explicit knowledge obtained through well-defined, if possible standardized, procedures and conversely we mistrust intuitive knowledge obtained through ad-hoc or, at least, less-defined practices. However this perception has changed and more researchers are now recognizing that the deliberative conscious reasoning is not the only way of arriving at valid knowledge. (Hodgkinson, Sadler-Smith, Burke, et al., 2009: 279)

Of course, this does not mean that scientists have not used their intuition before, only typically they pretended that new knowledge has always been arrived at by the established 'scientific method' of the time (e.g. Schrödinger, 1958). Nevertheless, for decades there have been philosophers and scientists-turned-philosophers, fighting to establish intuition as a valid form of knowledge. For instance Bruner (1966: 2), after building up his reputation in the accepted mainstream psychology, argued for the important role of intuition, particularly in considering the most significant scientific achievements: 'Reaching for knowledge with the right hand is science. Yet to say only that much of science is to overlook one of its excitements, for the great hypotheses of science are gifts carried in the left hand.' Furthermore, he emphasizes (Bruner, 1977: 67) that it is usually the most esteemed scientists who earn the label 'intuitive', which in itself is a strong evidence that scientists find intuition valuable.

Spinoza (1677: Part 2, Proposition 40, Scholium 42) distinguished three kinds of knowledge: (1) opinion or imagination, (2) reason and (3) intuitive knowledge; and without much explanation declared that intuitive knowledge is the most powerful of the three (Spinoza, 1677: Part 5, Proposition 36, Scholium). Jung (1921: §770) distinguished four psychological functions: thinking, feeling, sensation and intuition. He was probably the first to emphasize the intrinsic certainty and self-referential nature of intuitive knowledge. Bergson (1946) similarly argued that intuition is a superior form of knowledge; furthermore arguing that no complex thought can be arrived at other than by means of intuiting. He sees the role of intuition (Bergson, 1911: 238-239) as helping to arrive at new ideas, after which we should abandon intuition and work on building the body of knowledge using the new intuitively obtained knowledge. Once we start feeling lost, we should get in touch with our intuition again (often undoing what we have done in the deliberative phase) and so forth in cycles. Therefore Bergson (1946: 33 ff.) argues for intuition as a method, particularly in metaphysics and in areas of complex, dynamic and abstract thinking, contrasting intuition to intellect.

It must be noted that identifying intuition with intuitive knowledge is a limitation. We do not intend neglecting intuition outside the area of knowledge, however this constraint helps provide a focus for this paper. Moreover it must be acknowledged that intuition also appears in other faculties, such as feelings and emotions. Gerard (cited by Vaughan, 1979: 66-80) distinguishes four levels of intuitive awareness: the physical, the emotional, the mental and the spiritual. Extending the examination of intuition to the other three faculties can foster a deeper understanding of intuition as well as explain the somatic and affective charges often reported about intuition. Elsewhere (Dörfler & Szendrey, 2008) we have focused on this multi-potential aspect of intuition and more generally of cognition.

Intuition at high level of expertise

When reviewing the literature on intuition, we initially believed that there is an additional feature, namely that intuition only appears where high levels of expertise exist. Some authors, for example, Crossan et al. (1999) and C. C. Miller and Ireland (2005) consider expert intuition as particular type of intuition. We briefly analyse these two considerations in order to illustrate why we view expertise as something that characterizes valuable intuition rather than being a type of intuition in its own right, and based on this examination limit our focus to intuition of experts.

Crossan et al. (1999: 526) distinguish between expert intuition and entrepreneurial intuition. They argue that the former is past pattern oriented; thus the experts 'almost spontaneously' apply their existing knowledge in a familiar or similar to familiar situation. On the contrary, the latter is supposedly future- and change-oriented, thus the ability to make novel connections and discern possibilities. The problem with this distinction is that the proposed two kinds of intuition reside in different dimensions. We can have different levels of expertise and we can be entrepreneurial to varying degrees. A possible relationship is that one needs certain minimal level of expertise to be entrepreneurial in any field and that higher level of knowledge means better entrepreneurship.

Miller and Ireland (2005: 21) distinguish between 'holistic hunch' and 'automated expertise'. The first 'corresponds to judgement or choice made through a subconscious synthesis of information drawn from diverse experiences', whilst the second is 'merely' subconscious application of learned rules. Of course, for the holistic hunch to be able to synthesize information from diverse experiences, that information needs to be there. So, again, this simple distinction cannot be maintained. It is also a well-known phenomenon that experts will not only be able to handle situations they have already experienced or for what they have learned rules (e.g. Sadler-Smith, 2008: 257) but will also be able to go beyond the existing knowledge.

Whilst many researchers consider intuition useful, other scholars argue fiercely against it. If we examine arguments from the latter, that is those who have provided experimental evidence on the failure of intuition (such as Bowers et al., 1990: 97; Schoemaker & Russo, 1993: 27; Triller & Morgan, 2004), we will see that many of them have examined novices' intuitions. For instance, Triller and Morgan (2004) observed that undergraduate students of business administration make poor intuitive judgements in the field of physics. In contrast, those who have found intuition useful in their respective fields of research (such as Burke & Miller, 1999 in management; Hayashi, 2001 in leadership; Keren, 1987 in the game of bridge), typically focused on expert intuition. As empirical (and particularly the experimental) evidence in the

area of intuition in management is relatively scarce, the previous argument is not conclusive but the findings appear to illustrate that expertise contributes to effective intuition (Salas et al., 2010).

What certainly appears to be the case is that intuition, at least good intuition, appears where there is high level of expertise. (See e.g. Kahneman & Klein, 2009; Prietula & Simon, 1989) This, however, does not help in distinguishing intuition from non-intuition. Even though one can learn certain analytical steps and apply them at a low level of expertise, higher level of expertise certainly entails both better intuition and better analysis. But there is something important about the relationship between intuition and the level of expertise. To approach the relationship between intuition and expertise from a different angle, it is possible to start from the research on levels of knowledge. There are three distinct streams of research on knowledge levels with very different approaches. Simon with various colleagues (e.g. Chase & Simon, 1973; Simon, 1996) and Ericsson (e.g. Ericsson, 1996; Ericsson et al., 1993) used primarily experimental approaches, supplemented with verbal reports. Dreyfus and Dreyfus (e.g. Benner, 2004; Dreyfus & Dreyfus, 1986, 2005) adopted phenomenological observations in various natural contexts. Dörfler et al. (2009) applied conceptual modelling based on a geometrical analogy and Gestalt-like examination of well-known phenomena. All these researchers argue that when one achieves a high level of expertise, intuition naturally emerges and at the highest level it becomes the dominant form of knowledge (for a more detailed overview see Gobet & Chassy, 2009). Therefore we agree with Dane and Pratt (2009: 5-6) that expertise is an antecedent to trustworthy intuition and hence we are only interested in intuition in those with a high level of expertise, what Sadler-Smith and Shefy (2004) call 'intuition-as-expertise', Kahneman and Klein (2009) call 'intuitive expertise' and Salas et al. (2010) call 'expertise-based intuition'.

Having established intuitive knowledge as a valid form of knowledge in the first part of this section, in the second part we limit the scope and narrow the focus: namely focusing on intuition as knowledge (and intuiting as knowing respectively) where considerable expertise is held, and we are trying to argue for distinguishing between intuitive judgement and intuitive insight as two meaningful forms of intuitive knowledge. To make this argument possible we need to look more closely at intuition at work, namely how the process of intuiting is structured.

The process of intuiting

According to Lieberman (2000: 109) intuition is at best regarded as mysterious and unexplainable. Seligman and Kahana (2009: 399) suggest that this might be because we do not understand its 'cognitive architecture'. Hammond (2010: 329) further argues that we should first become familiar with this mysterious process of intuition and therefore in this section we aim to shed some light on what lies behind the mystery – particularly as it will help develop our argument for the two forms of intuition. In order to describe the process of intuiting we first need to briefly revisit Polányi's model of focal and subsidiary knowing, which is based on his conception of tacit knowing (Polányi, 1966b; Tsoukas, 2005b). Polányi (1966a) argues that all tacit knowing can be explained on the basis of focal and subsidiary components and that, in turn, all knowing is, at least partly, tacit.

Focal and subsidiary

Whilst examining the act of knowing Polányi (1962a: 55-65) realized that e.g. when hammering in a nail, we are differently aware of the hammer and of the nail. What is the focus of our act, he called ‘focal awareness’ (driving in the nail); which is supported by ‘subsidiary awareness’ of everything else (feeling in our palm, hammer, etc.). Polányi (1966b: 7-19) used these two kinds of awareness to explain the act of tacit knowing. To help in conceptualizing the process of intuiting, we will briefly review Polányi’s model of the two kinds of awareness and the related concepts of focal and subsidiary and knowing, (following Polányi’s argument); to these we add the description of focal and subsidiary knowledge (following Baracscai, 1997: 107-110). The same train of thought in a wider scope can be found in Dörfler, Baracscai, Velencei, et al. (2010). In the next subsection, we will apply the distinction of focal and subsidiary to intuition and intuiting which will help us explain the structure of intuiting.

In his original description Polányi (1966b: 11) started by borrowing metaphors from anatomy:

“... we are aware of the proximal term of an act of tacit knowing in the appearance of its distal term; we are aware of that from which we are attending to another thing, in the appearance of that thing.”

For further clarification the use of these terms is illustrated through an example. If we try with our eyes closed to use a stick to explore a room, initially we will concentrate on the end of the stick in our hand, more precisely, on the feelings experienced in our fingers.⁴ Thus concentrating on the near end (proximal term) of the stick, even though we are really interested in what is at the far end of the stick (distal term), the room. However after a short period, we forget about the stick in our hand and start picturing the room’s layout. This is what is meant by attending *from* the proximal *to* the distal. Furthermore, Polányi (1962a: 55-65) realized that we are differently aware of proximal and distal. The awareness of the distal he calls *focal*, as it is in the focus, and the awareness of the proximal he labels *subsidiary*. In the previous case, the room is in the focus and we have subsidiary awareness of the feelings in palm, vibrations, etc. Using another example, whilst writing, the meaning of the text is in the focus and the letters, grammatical rules, etc. are in the subsidiary awareness. We can see that knowing the proximal is usually tacit as ‘our subsidiary awareness of a thing may not suffice to make it identifiable’ (Polányi, 1966a: 4) whilst knowing the distal is always explicit as ‘focal awareness is always conscious’ (Polányi, 1962b: 602).

What is in focus requires focal attention and that kind of attention can be paid only to one thing at a time (Anderson, 2005; Broadbent, 1958; Cherry, 1953; Deutsch & Deutsch, 1963; Sullivan, 1976; Treisman, 1964). This also means that the rest of the 7±2 ‘slots’ (Baddeley, 1994; G. A. Miller, 1956) in the working memory can only belong to the subsidiary attention. This also fits the previous examples about exploring the room and writing: we can pay focal attention to one *whole entity* (a single distal term) and subsidiary attention to multiple *particulars* (i.e. several proximal terms).

⁴ Polányi’s original example talks about exploring a cavern using a probe.

The above discussion of focal and subsidiary awareness follows from the literature. However, to apply the same line of thinking to intuition is not straightforward. Therefore we use the more overarching concept of ‘knowledge’ instead of ‘intuition’ to facilitate this exploration (as we limited the notion of intuition to intuitive knowledge, what applies to all knowledge/known should also apply to the intuitive subset of knowledge/known). Although there are various conceptualizations of the distinction between knowledge and knowing (see e.g. Nicolini et al., 2003; Polányi, 1962a, 1969; Tsoukas, 1998, 2005a), in the case of personal knowledge (as opposed to organizational knowledge) all these authors agree that knowledge is mental content. Knowing is then seen as a process through which knowledge is used, such as learning, thinking, or applying knowledge.

In considering again the example of writing, this time from the viewpoint of explicit and tacit knowledge, letters, words and rules of grammar belong to the explicit domain (i.e. these can be learned in the classroom). However we cannot teach in the classroom how to write a good poem (i.e. it belongs to the domain of tacit knowledge). As it was said previously, letters, words and the rules of grammar are the particulars (proximal term, subsidiary attention), whilst the poem corresponds to the whole entity (distal term, focal attention). Thus, the *subsidiary knowledge* is *explicit* and the *focal knowledge* is *tacit*. However earlier in the paper, when discussing Polányi’s work, we established that in terms of *knowing*, the distal is characterized by *explicit knowing* and the proximal is characterized by *tacit knowing*. So, the tacit-explicit relation now appears to be reversed (see Figure 1). We have identified an interesting contrast between knowledge and knowing. Whilst we can explicitly identify what we are focusing on (focal knowing), we are unable to actually provide an explicit description of this content (focal knowledge). This corresponds to being able to say that we are writing a (good) poem but this does not mean that we can put into words what a good poem is. Moreover, we usually cannot identify the particulars of the subsidiary attention (subsidiary knowing). However, if someone would point these out for us, we might be able to provide an explicit account about the content of these particulars (subsidiary knowledge). We cannot say which letters and rules of grammar we use when writing the poem but, if someone asked about them, we could explain them explicitly. The root cause of the difference is that tacit-explicit knowledge refers to the *nature of the content*; whilst the tacit-explicit knowing is about *identifying this content*.

	rules of grammar subsidiary	good poem focal
knowledge mental content	explicit	tacit
knowing identifying the content	tacit	explicit

Figure 1: Knowledge and knowing when writing a poem

So what we focus on can be characterized by tacit knowledge and explicit knowing, whilst our subsidiary awareness is characterized by explicit knowledge and tacit knowing. In the next subsection we apply these findings to intuition (intuitive knowledge) and intuiting (process of intuitive knowing) in order to understand the structure of intuiting.

The structure of intuiting

In this section we describe a characteristic which leads to an apparent contradiction between how Simon (1987) and Mintzberg (1994) see intuition; this contradiction, together with the focal-subsidary distinction serve as the starting point for understanding the structure of intuiting. According to Kahneman and Tversky (1982: 124) intuition is arrived at ‘without the use of analytic methods or deliberate calculation’, Vance et al. (2007) describe it as a non-linear mode of thinking, Barnard (1938: 301 ff.) calls it ‘non-logical’ to contrast it to the logical process of analytical reasoning, Rowan (1986: 84) defines it as ‘knowledge gained without rational thought.’ Although the terminology is slightly different, in every case the message is that intuiting operates independently of the general principles of reasoning that Russell (1946: 379) calls logic. We call this mode of operation *alogical*, meaning that it neither follows (logical) nor contradicts (illogical) the rules of logic.

Simon (1987: 61) emphasizes that intuition and analysis are not operating independent of each other but rather in a complementary manner. Furthermore, he states (Simon, 1987: 63) that ‘Intuition and judgement – at least good judgement – are simply analyses frozen into habit and into the capacity for rapid response through recognition.’ Mintzberg (1994) challenges Simon’s conception, arguing that intuition is about synthesis and synthesis can never be derived from analyses. Considering the foundational status of these two thinkers, it seems reasonable to ask whether this apparent contradiction can be resolved. Simon (e.g. March & Simon, 1993; Simon, 1983, 1992) usually explained intuition as experts recognizing patterns relevant to their experience. Kahneman (2010, personal communication) said that he was sure that Simon’s view of intuition includes synthesis, and this is completely consistent with the view of intuition as pattern recognition (e.g. Hogarth, 2010; Simon, 1987). Perhaps there is a simple answer to why Simon talks about ‘analyses frozen into habit’: analysis here may not mean the opposite of synthesis but the opposite of intuition, which seems plausible from the previous quote. This would mean that Simon meant ‘non-intuitions frozen into habit’ constituting intuition. Below we explore whether it is possible to understand how these non-intuitions may constitute intuition by applying to intuition/intuiting what we have discussed about knowledge/knowing in terms of the focal-subsidary distinction. Jung (1921: §772) starts from the end-product of intuiting trying to find its ingredients, and he finds that intuition can usually be decomposed into its constituents and by doing so the intuitor can arrive at a logical explanation of the intuitive outcome.

By combining the two descriptions (i.e. Jung and Polányi) it is possible to gain a better understanding of intuition. The distal term that we pay focal attention to, is the focal intuition/intuiting; it corresponds to the whole entity (the room we are exploring using a stick and the meaning of the text when writing). Based on the argument outlined in the first part of this section, we can expect that the *focal intuition* is tacit and alogical and that the *focal intuiting* is explicit and logical. As we can identify the outcome of intuiting, we can accept that focal intuiting is explicit and as its content cannot be taught in a classroom setting, the focal intuition is considered tacit. The proximal term of intuition, what we pay subsidiary attention to, is the subsidiary intuition/intuiting. Jung’s constituents belong here; they correspond to the particulars from the first subsection of this section (the near-end of the stick when exploring the room or the knowledge of letters and grammar when writing a poem). We expect that the *subsidiary intuition* is logical and can be put into words (as it could be taught in a classroom setting) and that the *subsidiary intuiting* is tacit and alogical (as we cannot identify

the particulars). Of course, we could pay attention to the particulars, only then we would probably lose the sight of the whole entity and focus upon a particular aspect; however, if we focus on the whole entity the particulars get submerged in the whole. (Polányi, 1961: 460)

What we have not explained so far, is how the subsidiary particulars come together into the whole entity on which we focus (Polányi, 1965: 802) in the process of intuiting. (Figure 2) This from-to process (Polányi, 1968: 30), by which the particulars fuse into the whole entity, lasts as long as the person sustains it. Polányi (1965: 800) calls this process ‘integration’ and he extends the concept of tacit knowing to this integrative process (Polányi, 1962b: 602):

What is subsidiarily known is tacitly known; but it seems appropriate to extend the meaning of ‘tacit knowing’ to include the integration of subsidiary to focal knowing. The structure of tacit knowing is then the structure of this integrative process, and knowing is tacit to the extent to which it has such a structure.

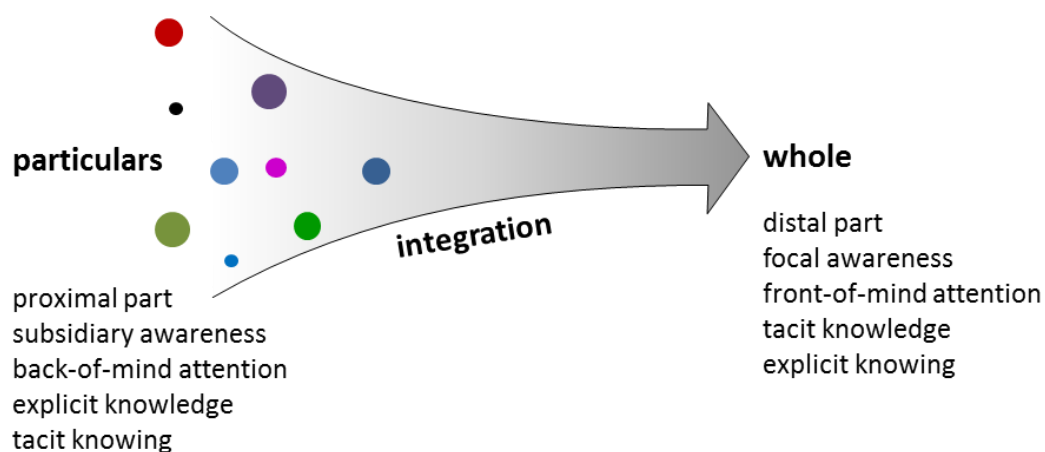


Figure 2: Focal and subsidiary intuition

For better understanding of subsidiary intuition, we need to figure out what the particulars are. Jung’s description helps here: these are the components of the explanation – this is why it always has to be obtained afterwards. There can be ‘rules’ to follow and ‘methods’ to apply – but they have little to do with how we arrived at the intuitive knowledge. We might have used some of the ‘rules’ or ‘methods’, only they have undergone a tacit process of integration and thus we cannot identify them. Elsewhere (Dörfler, Baracscai & Velencei, 2010) we have used the example of jokes which are logical with hindsight – but only with hindsight. The ‘rules’ and ‘methods’ cannot conjure the intuitive leap but once we have arrived at the intuitive outcome, we may use them to explain it. Sonenshein (2007) arrived at a similar model in the special case of moral decisions.

Now that we have described the intuitive process in terms of the particulars going through a tacit process of integration we put forward our main argument that we can conceptualize two distinct types of intuition – these are sufficiently similar to identify both as intuition but, at the same time, sufficiently different to distinguish between them.

Intuition in judgement and insight

One of the insights that emerged whilst reviewing the literature on the features of intuition was that most if not all accounts of intuitive knowledge can be located in one of two areas: decision taking and creativity. We came to the same conclusion through building a conceptual model of the types of knowledge, as noted above. Whilst not being sufficient grounds for a conclusive inference that there are only two different kinds of intuition (cf. Dane & Pratt, 2009; Glöckner & Witteman, 2009; Gore & Sadler-Smith, 2011), this insight became the starting point of this inquiry. However, in order to build a more solid foundation we examined in more depth prior empirical and conceptual work. Whilst there are other typologies of intuition in the literature, we adopted a different perspective from these, enabling us to gain a different understanding and which we believe helps move researchers closer to conceptualizing the role of intuition in creativity. Examples of these other typologies include Dane and Pratt (2009) who distinguish problem solving, moral and creative intuitions; Glöckner and Witteman (2009) who differentiate associative, matching, accumulative and constructive intuitions; and Gore and Sadler-Smith (2011) who identify problem-solving, creative, social and moral intuitions as primary types (the secondary types being composites of the primary types), etc. The three mentioned examples are very different. Dane and Pratt (2009) distinguish between various types of intuition, Glöckner and Witteman (2009) model is concerned with the processes underlying intuition, while Gore and Sadler-Smith (2011) offer a typology of intuition types as well as a model of the processes of intuiting underlying these intuitions. All these distinctions, however, appear to presume that intuition is judgement. Providing substance to our exploration, Sinclair (2010: 382) suggests that the decision paradigm of intuition is potentially too narrow to account for a broader picture of intuition. This recognition is our departure point and extending this narrow framework is what we want to achieve with this paper. We will also show that our distinction between intuitive judgement and intuitive insight can be added to the existing typologies resulting in a richer picture of intuition.

Intuitive judgement

We do not intend to provide a detailed discussion here on intuition specifically focused on intuitive judgement, as that would mean including virtually all intuition research in the field of management. Instead, we will explore a couple of reference points in order to extrapolate the research in the field into a conceptual foundation on which we can build our argument for delineating the concept of intuitive insight from the concept of intuitive judgement.

A large number of researchers whose work was explored in the literature review (including Agor, 1984, 1989; Barnard, 1938; Dane & Pratt, 2007, 2009; Dean & Mihalasky, 1974; Hodgkinson, Sadler-Smith, Burke, et al., 2009; Hogarth, 2001; Klein, 2004; O'Connor, 2002; Simon, 1987; Sinclair & Ashkanasy, 2005) talk about the role intuition plays in decision taking. It is frequently argued that decision takers tend to rely more on their intuition when they are in senior positions, in situations that are messy and where time is short. This resonates well with our above argument on intuition and expertise.

As illustrated in the extant literature (as noted earlier), intuition has been primarily examined in terms of its role in decision taking (within the management literature). For example,

when Barnard (1938: 235) describes intuition as being an important part of the executive process he talks about decision taking:

It transcends the capacity of merely intellectual methods, and the techniques of discriminating the factors of the situation. The terms pertinent to it are "feeling," "judgement," "sense," "proportion," "balance," "appropriateness." It is a matter of art rather than science, and is aesthetic rather than logical.

This is not surprising, as the framework for investigating intuition, in the management field, stems from observing decision takers – specifically that they often do not use the tools and techniques taught on management courses and described in academic decision books but rather rely on their intuition. In these situations, decision takers use their intuition in producing a judgement. This implies that the role of intuition in e.g. generating decision alternatives is not of primary concern, although it is often noted that intuition may play role in all phases of the decision process (e.g. Agor, 1989). As the term *intuitive judgement* is often used in much of the intuition literature in the field of management (e.g. Dane & Pratt, 2009; Gilovich et al., 2002; Hodgkinson, Sadler-Smith, Burke, et al., 2009; Hogarth, 2001) and it is also very descriptive, we keep this term and will use it for describing the intuition of the decision taker.

Intuitive insight

*‘... it is by logic that we prove, but by intuition that we discover’
Poincaré (1914: 129)*

The other part of the reviewed (non-management) literature (e.g. Bergson, 1946; Beveridge, 1957; Bruner, 1966; Hadamard, 1954; Hong, 2006b; Poincaré, 1914; Popper, 1968) focuses on intuition in creativity. There seems to be a general agreement that intuition is a necessary component of creativity (cf. Polányi, 1946; Polányi, 1962a, 1966b); at least, the creation of any great novum (new knowledge) appears to be based on intuition. Based on recent research involving in-depth interviews with Nobel Laureates and creative people of similar standing (Dörfler & Eden, 2011), we are inclined to believe that no significant creative result has been achieved in any other way than by means of intuition. Some of the management literature also mentions and, occasionally, discusses in depth the role intuition plays in creativity (e.g. Claxton, 1998; Dane & Pratt, 2009; Hodgkinson, Sadler-Smith, Burke, et al., 2009; Sinclair, 2010); however, apart from notable exceptions (Sinclair, 2010), intuition in creativity is still viewed as judgement. Naturally, the creative process may involve intuitive judgements, e.g. judging which path to pursue in the course of a research progress. However, we argue that there is intuition which is *not* judgement, which actually produces the novum (new knowledge). This is what we call *intuitive insight*.

Scientists, artists and philosophers as well as those examining scientists, artists and philosophers, report on the intuition of creative individuals. As Hadamard (1954) shows through a number of examples, the use of intuition in creativity (in his case in mathematical discoveries) is a rule rather than a curiosum. Popper (1968: 8) agrees and further argues that there cannot be a logical method of having ideas and that every discovery contains ‘a creative intuition’ in Bergson’s sense. The descriptions of intuition in this literature mention all the characteristics of intuition noted above or elsewhere in the management literature (e.g. Dane & Pratt, 2007;

Kahneman, 2003; Sadler-Smith, 2008). If we accept that those characteristics define intuition then what fits the definition has to be considered intuition.

Here we take a step back to approach the intuitive insight from the perspective of the insight as previously we approached it from the perspective of intuition. Several scholars, such as Hogarth (2001: 12, 250-254), Vance et al. (2007: 169-170), Sadler-Smith (2008: 30-31; 2009: 91) and Dane and Pratt (2009: 4) emphasize that there are a number of seemingly similar concepts in relation intuition, one of these being insight. Insight in these cases refers to the process of arriving at the solution of well-structured problems (Simon, 1973). Sadler-Smith and Shefy (2007: 189) explicitly talk about insight in ‘the context of a well-defined problem’, and they give examples in which people explain the way of arriving at a solution, this solution can be objectively checked for being correct and so forth. Solving well-structured problems, however, does not require creating new knowledge. As in the case of judgement, there may be two kinds of insight: an intuitive and a non-intuitive one (Figure 3). Non-intuitive insight is at work in the case of well-structured problems, a typical one being the Prisoner in the Tower (Sadler-Smith & Shefy, 2007: 189), whilst ill-structured problems call for *intuitive insight*.

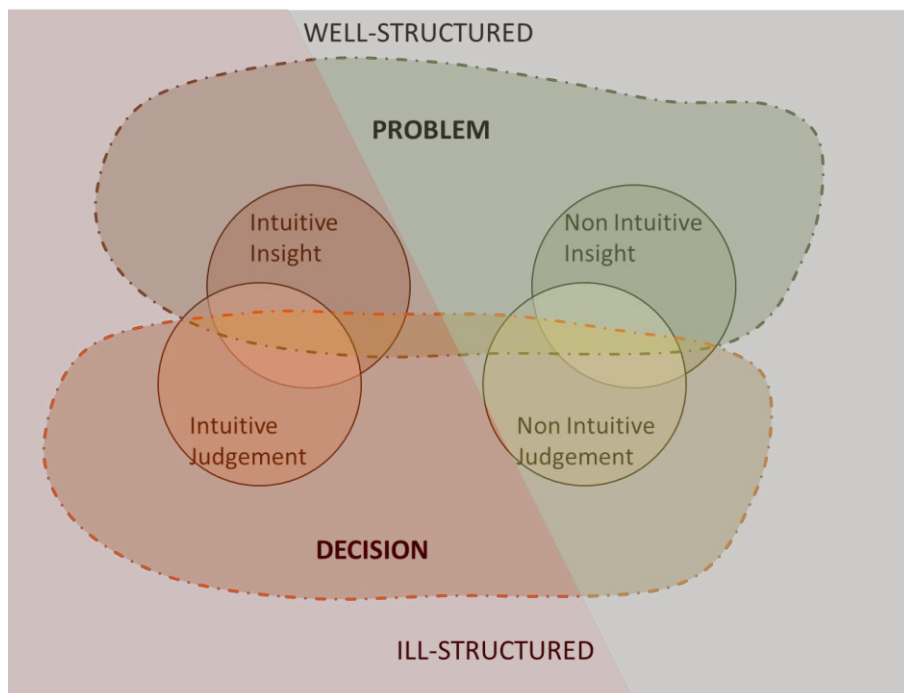


Figure 3: Intuitive and analytical parts of judgment and insight

Solutions of ill-structured problems arrived at by intuitive insight always have a degree of subjectivity and, even if the creative person can demonstrate the relationships between the parts of the solution, the way of arriving at this solution will remain inexpressible in words or other symbols. We provide three typical examples here for illustration. Gauss gives an account of a solution to a long-standing problem he obtained through intuitive insight (Hong, 2006a: 144): ‘The riddle solved itself as lighting strikes, and I myself could not tell or show the connection between what I knew before, what I last used to experiment with, and what produced the final success.’ More generally about his findings he says (Polányi, 1962a: 131): ‘I have had my solutions for a long time but I do not yet know how I am to arrive at them.’ Poincaré’s story is probably the most often quoted example of intuitive insight in science (see

e.g. Damasio, 1994; Goldberg, 1983b; Hadamard, 1954; Polányi & Prosch, 1977; Vaughan, 1979). Poincaré had spent a long time in a futile attempt to prove that there cannot be functions with certain characteristics, called Fuchsian functions. However, whilst on an excursion he forgot about his work and then, just when he was putting his foot on the step, in a flash of intuitive insight he not only realized that such functions can exist, but he basically defined the first known class of Fuchsian functions on the spot (Poincaré, 1914: 53): ‘I made no verification, and had no time to do so, since I took up the conversation again as soon as I had sat down in the break, but I felt absolute certainty at once.’ A good example from a field outside science is Mozart, who is often quoted trying to explain how for him music does happen in time but rather he conceives it as a whole. He also confesses (quoted by Goldberg, 1983a: 178): ‘Whence and how they come, I know not, nor can I force them.’

Sometimes, however, the creative person cannot even explain the relationships between the parts of the solution. This assertion is illustrated through cases when the relationships are eventually discovered only substantially later – and sometimes by people other than the creator of the novum. We illustrate this with two famous examples from the history of science. The first is an anecdote told by physicists about Dirac’s equations which are usually considered the second most brilliant result of theoretical physics (after Einstein’s theory of general relativity). Someone else had to point out to him that his equations actually predicted anti-matter, to which Dirac responded: my equations were smarter than I was. The other example is Darwin’s (1859) theory of evolution by natural selection. He introduced two concepts that signified only one phenomenon, namely ‘fitness’ and ‘natural selection’. It was only after Dawkins’ (1989) introduction of (selfish) genes into the theory of evolution that it became clear that we actually do need two concepts as we need to talk about the survival of fittest genes whilst the natural selection operates upon the individual members of species.

Thus drawing on literature from outside the field of management, we show that there is a type of insight which is obtained in a way that demonstrates the features we expect from intuition. This does not contradict the distinction between intuition and insight described by Hogarth (2001), Dane and Pratt (2007) and Sadler-Smith (2008) amongst others, as they are distinguishing between intuition and ‘non-intuitive’ insights. This is very important as the two are similar in many ways and they should not be confused. We, however, are adding a further nuance to this distinction by identifying a version of insight which is intuitive, thus also achieving symmetry with judgement which also has intuitive and ‘non-intuitive’ versions (see Figure 3).

Discussion of the two intuitions

Once we managed to conceptually delineate intuitive judgement from intuitive insight, we found some traces of similar ideas in the literature, although these were not elaborated in any substantial detail. Perhaps most importantly, Polányi (Polányi & Prosch, 1977: 96 ff.) distinguishes ‘strategic intuition’, which points to a direction worth pursuing, and ‘concluding intuition’, which gets us to a novum, to a (creative) solution of a problem. The first corresponds to intuitive judgement and the second corresponds to intuitive insight. Similarly, Bruner (1977: 62) talks about intuition in decisions and problem solving. Particularly, he uses the example of mathematicians (Bruner, 1977: 55-56) to describe intuition in judging whether a solution is correct or an approach to problem can be fruitful as distinct from intuition which

suddenly reaches a solution. In the management field, based on a series of empirical studies Agor (1986: 11-14) identified three ways in which executives use intuition: as an explorer, 'to foresee the correct path to follow' which corresponds to intuitive judgement; as a 'synthesizer and integrator' which comes close to intuitive insight; and as what 'might be termed eclectic', which is a combination of the previous two. These three works mention uses of intuition which come close to what we call intuitive judgement and intuitive insight; however, none of them delineates the two and examines the consequences of this delineation. Duggan (2007) attempts making a similar distinction, however, whilst he accumulated significant amount of interesting material, some of which can be used in support of our argument, he fails in creating meaningful categories and also chooses unfortunate labels. For example, 'ordinary intuition' is not clearly specified and sometimes it appears to be some sort of miscellaneous category. The distinction between 'expert intuition' and 'strategic intuition' resembles the previously mentioned expert vs. entrepreneurial intuition distinction. While some of Duggan's explanations suggest that he might have thought of something similar to our distinction between intuitive judgement and intuitive insight, his choice of category labels is very misleading. When we think of strategy, we normally relate it primarily to decisions and Polányi (Polányi & Prosch, 1977) used the same term with a meaning close to intuitive judgement. Therefore, while we think that there is significant amount of interesting discussions offered by Duggan, we do not think that his categories are viable as they stand.

As we have mentioned earlier, we see the distinction between intuitive judgement and intuitive insight as an additional dimension to existing typologies. For instance, in the case of moral intuition, we can have an intuitive moral judgement, e.g. classifying an action as good or evil, and we can also create a new moral value through intuitive moral insight, e.g. that all men are born equal. See examples in Figure 4 below.

	Intuitive judgement	Intuitive insight
Problem solving intuition	Deciding about an alternative or about a direction	Creating solution which entails new knowledge
Moral intuition	Judging whether an action is good or evil	Creating a new moral value
Aesthetic intuition	Judging something as beautiful or ugly	Creating something beautiful

Figure 4: Two-dimensional typology of intuition

In decision making⁵ as well as in creativity we also may find both intuitive judgement and intuitive insight. This is the very reason that it is so problematic to recognize intuitive judgement and intuitive insight as two separate types of intuition; they can rarely be attained in a pure form (see Figure 3). An intuitive decision process may not *only* involve intuitive judgements but also intuitive insights. For instance, generating decision alternatives may involve creativity and thus intuitive insight. Conversely, a creative process may involve, *apart from* intuitive insights, instances of intuitive judgement, e.g. when choosing in which direction to continue the research. However, the dominant role in decision taking is played by intuitive judgement and the dominant role in creativity is played by intuitive insight. Therefore we

⁵ This time referring to the more comprehensive process which includes decision taking.

cannot conceptualize creativity involving intuition without coming to terms about delineating intuitive judgement from intuitive insight.

In this section, we have argued that, there are certain differences between intuitive judgement and intuitive insight, however the six characteristics of intuition outlined in the introduction apply to both of them. Similarly, the structure of intuiting as an integrative process applies both of them. In the case of *intuitive judgement*, the decision aspects are tacitly integrated into a picture about what to do. In the case of *intuitive insight*, the components of the domain knowledge are tacitly integrated in a novel way producing knowledge that did not exist before.

Conclusions

Based on two earlier research projects (and exploration of the literature), we distinguish between intuitive judgement and intuitive insight. This way of conceptualizing types of intuition takes an alternative perspective from the typologies available in the literature; and we believe helps illuminate the role of intuition in creativity, which is less well conceptualized in the management literature than intuitive judgement.

The main limitation of the present inquiry stems from the initial assumptions, namely that we have only examined intuitive knowledge and not the other three levels of intuitive awareness (i.e. physical, emotional and spiritual). Therefore the results only apply to intuitive knowledge. Additional research will be needed to understand the relationship between intuitive judgement and insight in the other three intuitive faculties. There may also be synergies between all four to be explored. Another potential limitation is the observation made earlier that there are many ways of distinguishing between kinds of intuition, several of which were mentioned. We chose to distinguish two kinds of intuition based on the areas in which intuition *is used* and have come up with a conceptual process to delineate between intuitive judgement and intuitive insight and also how to delineate these forms of intuition from their non-intuitive counterparts. Other ways of identifying kinds of intuition may lead to different results and the relation of the present typology to other typologies could be of further interest. Finally, this paper is predominantly based on a critical review of literature and conceptual modelling building upon theoretical and empirical works of others. Therefore it lacks empirical support in the sense of purposeful observations or experiments; these remain open topics for further research.

Apart from the future research directions directly arising from the limitations of the current research, there are also several obvious areas for exploring the relationships of the two types of intuition proposed here to other constructs in the area of intuition. Three particularly promising paths from the previously discussed literature are Sonenshein's (2007) sensemaking-intuition model, the various models of knowledge levels and the two process oriented papers (Glöckner & Witteman, 2009; Gore & Sadler-Smith, 2011).

Our idea of future use of the model is twofold: First, we would like to provide a useful starting point for management researchers pursuing their inquiries into (or through) the area of intuition; second, we would like to provide a comprehensive tool for the educators of cur-

rent and future knowledge workers for explaining intuition. Additionally, we believe that better understanding of the role of intuition in creativity can be beneficial for knowledge-oriented organizations. With regards to our own future research, the present model is part of a larger project involving a series of models and aiming at a dynamic model(s) of knowledge and then at a dynamic model of cognition.

References

- Agor, W. H. (1984) *Intuitive Management: Integrating Left and Right Brain Management Skills*. Englewood Cliffs, NJ: Prentice-Hall.
- Agor, W. H. (1986) 'The Logic of Intuition: How Top Executives Make Important Decisions', *Organizational Dynamics*, 14(3): 5-18.
- Agor, W. H. (Ed.) (1989) *Intuition in Organizations: Leading and Managing Productively*, Sage Publications, Newbury Park, CA.
- Akinci, C. & Sadler-Smith, E. (2011) 'Intuition in Management Research: A Historical Review', *International Journal of Management Reviews*, (forthcoming).
- Akinci, C. & Sadler-Smith, E. (2012) 'Intuition in Management Research: A Historical Review', *International Journal of Management Reviews*, 14(1): 104-122.
- Anderson, J. R. (2005) *Cognitive Psychology and Its Implications* (6th edition). New York, NY: Worth Publishers.
- Argyris, C. & Schön, D. A. (1978) *Organizational Learning*. Reading, MA: Addison-Wesley.
- Baddeley, A. D. (1994) 'The Magical Number Seven: Still Magic after All These Years?', *Psychological Review*, 101(2): 353-356.
- Baracskai, Z. (1997) *Profi Döntések (Master of Decision Making)*. Nyíregyháza, Hungary: "Szabolcs-Szatmár-Bereg megyei Könyvtárak" Egyesülés. [Published in Hungarian]
- Barnard, C. I. (1938/1968) *The Functions of the Executive*. Cambridge, MA: Harvard University Press.
- Benner, P. (2004) 'Using the Dreyfus Model of Skill Acquisition to Describe and Interpret Skill Acquisition and Clinical Judgment in Nursing Practice and Education', *Bulletin of Science, Technology & Society*, 24(3): 188-199.
- Bergson, H. (1911) *Creative Evolution*. New York, NY: Henry Holt and Company. Electronic version: <http://books.google.com/books?id=iVnxWoia-9gC>
- Bergson, H. (1946/1992) *The Creative Mind: An Introduction to Metaphysics*. New York, NY: Citadel Press.
- Beveridge, W. I. B. (1957/2004) *The Art of Scientific Investigation* (2nd edition). Caldwell, NJ: Blackburn Press.
- Bowers, K. S., Regehr, G., Balthazard, C. & Parker, K. (1990) 'Intuition in the Context of Discovery', *Cognitive Psychology*, 22(1): 72-110.

- Broadbent, D. E. (1958) *Perception and Communication*. Oxford: Pergamon Press.
- Bruner, J. S. (1966) *On Knowing: Essays for the Left Hand*. New York, NY: Atheneum.
- Bruner, J. S. (1977/1999) *The Process of Education* (2nd edition). Cambridge, MA: Harvard University Press.
- Burke, L. A. & Miller, M. K. (1999) 'Taking the Mystery out of Intuitive Decision Making', *Academy of Management Executive*, 13(4): 91-99.
- Campbell, A. & Mintzberg, H. (1991) 'Brief Case: Strategy and Intuition - a Conversation with Henry Mintzberg', *Long Range Planning*, 24(2): 108-110.
- Chalmers, D. J. (1998) *The Conscious Mind: In Search of a Fundamental Theory* (paperback edition). New York, NY: Oxford University Press.
- Chase, W. G. & Simon, H. A. (1973) 'Perception in Chess', *Cognitive Psychology*, 4(1): 55-81.
- Cherry, E. C. (1953) 'Some Experiments on the Recognition of Speech, with One and with Two Ears', *Journal of the Acoustical Society of America*, 25(5): 975-979.
- Claxton, G. (1998) 'Investigating Human Intuition: Knowing without Knowing Why', *The Psychologist*, 11(5): 217-220.
- Crossan, M. M., Lane, H. W. & White, R. E. (1999) 'An Organizational Learning Framework: From Intuition to Institution', *Academy of Management Review*, 24(3): 522-537.
- Damasio, A. R. (1994/2005) *Descartes' Error: Emotion, Reason, and the Human Brain*. New York, NY: Penguin Books.
- Dane, E. & Pratt, M. G. (2007) 'Exploring Intuition and Its Role in Managerial Decision Making', *Academy of Management Review*, 32(1): 33-54.
- Dane, E. & Pratt, M. G. (2009) 'Conceptualizing and Measuring Intuition: A Review of Recent Trends', in G. P. Hodgkinson & J. K. Ford (eds) *International Review of Industrial and Organizational Psychology* (Vol. 24), pp. 1-40. Chichester, UK: Wiley.
- Darwin, C. (1859/1998) *The Origin of Species*. Ware: Wordsworth Editions.
- Davenport, T. H. & Prusak, L. (2000) *Working Knowledge: How Organizations Manage What They Know* (paperback edition). Boston, MA: Harvard Business School Press.
- Dawkins, R. (1989/1999) *The Selfish Gene* (2nd edition). Oxford: Oxford University Press.
- Dean, D. & Mihalasky, J. (1974) *Executive Esp*. Englewood Cliffs, NJ: Prentice Hall.
- Deutsch, A. J. & Deutsch, D. (1963) 'Attention: Some Theoretical Considerations', *Psychological Review*, 70(1): 80-90.
- Dörfler, V. & Ackermann, F. (2011) *Depicting Intuition: Towards a Definition* (working paper). Glasgow: Strathclyde University.

Dörfler, V., Baracscai, Z. & Velencei, J. (2009) Knowledge Levels: 3-D Model of the Levels of Expertise, *AoM 2009: The Sixty-ninth Annual Meeting of the Academy of Management*, 7-11 August 2009, Chicago, IL, Pages.

Dörfler, V., Baracscai, Z. & Velencei, J. (2010) 'Understanding Creativity', *Transactions on Advanced Research*, 6(2): 18-26.

Dörfler, V., Baracscai, Z., Velencei, J. & Ackermann, F. (2010) *Facts, Skills and Intuition: A Typology of Personal Knowledge* (working paper). Glasgow: Strathclyde University.

Dörfler, V. & Eden, C. (2011) *Exploring the Cognitive Abilities of Nobel Laureates*. Glasgow, UK: Strathclyde University.

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, Pages. Electronic version: <http://www.viktordorfler.com/webdav/papers/MultipotentialCognition.pdf>

Dreyfus, H. L. & Dreyfus, S. E. (1986/2000) *Mind over Machine*. New York, NY: The Free Press.

Dreyfus, H. L. & Dreyfus, S. E. (2005) 'Peripheral Vision: Expertise in Real World Contexts ', *Organization Studies*, 26(5): 779-792.

Duggan, W. R. (2007) *Strategic Intuition: The Creative Spark in Human Achievement*. New York, NY: Columbia University Press.

Epstein, S. (1994) 'Integration of the Cognitive and the Psychodynamic Unconscious', *American Psychologist*, 49(8): 709-724.

Epstein, S., Pacini, R., Denes-Raj, V. & Heier, H. (1996) 'Individual Differences in Intuitive-Experiential and Analytical-Rational Thinking Styles', *Journal of Personality and Social Psychology*, 71(2): 390-405.

Ericsson, K. A. (1996) 'The Acquisition of Expert Performance: An Introduction to Some of the Issues', in K. A. Ericsson (ed) *The Road to Excellence: The Acquisition of Expert Performance in the Arts and Sciences, Sports, and Games* Mahwah, NJ: Lawrence Erlbaum Associates.

Ericsson, K. A., Krampe, R. T. & Tesch-Römer, C. (1993) 'The Role of Deliberate Practice in the Acquisition of Expert Performance', *Psychological Review*, 100(3): 363-406.

Evans, J. S. B. T. (2008) 'Dual-Processing Accounts of Reasoning, Judgment, and Social Cognition', *Annual Review of Psychology*, 59(1): 255-278.

Evans, J. S. B. T. (2010) 'Intuition and Reasoning: A Dual-Process Perspective', *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, 21(4): 313 - 326.

Frankish, K. (2010) 'Dual-Process and Dual-System Theories of Reasoning', *Philosophy Compass*, 5(10): 914-926.

Freud, S. (1900/1913) *The Interpretation of Dreams*. New York, NY: Macmillan. Electronic version: <http://psychclassics.yorku.ca/Freud/Dreams/>

- Gilovich, T., Griffin, D. W. & Kahneman, D. (2002) *Heuristics and Biases : The Psychology of Intuitive Judgement*. New York, NY: Cambridge University Press. Electronic version: <http://www.loc.gov/catdir/samples/cam033/2001037860.html>
- Glöckner, A. & Witteman, C. (2009) 'Beyond Dual-Process Models: A Categorisation of Processes Underlying Intuitive Judgement and Decision Making', *Thinking & Reasoning*, 16(1): 1-25.
- Gobet, F. & Chassy, P. (2009) 'Expertise and Intuition: A Tale of Three Theories', *Minds and Machines*, 19(2): 151-180.
- Goldberg, P. (1983a) 'The Intuitive Experience', in W. H. Agor (ed) *Intuition in Organizations: Leading and Managing Productively*, pp. 173-194. Newbury Park, CA: Sage Publications.
- Goldberg, P. (1983b) 'The Many Faces of Intuition', in W. H. Agor (ed) *Intuition in Organizations: Leading and Managing Productively*, pp. 62-77. Newbury Park, CA: Sage Publications.
- Gore, J. & Sadler-Smith, E. (2011) 'Unpacking Intuition: A Process and Outcome Framework', *Review of General Psychology*, forthcoming.
- Hadamard, J. (1954) *The Psychology of Invention in the Mathematical Field*. New York, NY: Dover Publications.
- Hammond, K. R. (2010) 'Intuition, No! ...Quasirationality, Yes!', *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, 21(4): 327 - 337.
- Hayashi, A. M. (2001) 'When to Trust Your Gut', *Harvard Business Review*, 79(2): 59-65.
- Hodgkinson, G. P. & Healey, M. P. (2011) 'Psychological Foundations of Dynamic Capabilities: Reflexion and Reflection in Strategic Management', *Strategic Management Journal*, 32(13): 1500-1516.
- Hodgkinson, G. P., Langan-Fox, J. & Sadler-Smith, E. (2008) 'Intuition: A Fundamental Bridging Construct in the Behavioural Sciences', *British Journal of Psychology*, 99(1): 1-27.
- Hodgkinson, G. P., Sadler-Smith, E., Burke, L. A., Claxton, G. & Sparrow, P. R. (2009) 'Intuition in Organizations: Implications for Strategic Management', *Long Range Planning*, 42(3): 277-297.
- Hodgkinson, G. P., Sadler-Smith, E., Sinclair, M. & Ashkanasy, N. M. (2009) 'More Than Meets the Eye? Intuition and Analysis Revisited', *Personality and Individual Differences*, 47(4): 342-346.
- Hogarth, R. M. (2001) *Educating Intuition*. Chicago, IL: University of Chicago Press.
- Hogarth, R. M. (2010) 'Intuition: A Challenge for Psychological Research on Decision Making', *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, 21(4): 338 - 353.
- Hong, F. (2006a) 'The Enigma of Human Creativity: Hidden Messages from Nikola Tesla's Moji Pronalasci', in R. J. Halaši, I. P. Ćosić & T. J. Halaši (eds) *Naš Tesla (Our Tesla), Technical Science Monograph No. 18*, pp. 127-176. Novi Sad, Serbia: University of Novi Sad Faculty of Technical Science, and Society for the Promotion of Science Novi Sad.
- Hong, F. (2006b) Tesla Composed Like Mozart [Electronic Version]. *Celebration of the 150th anniversary of the birth of Nikola Tesla* from

http://www.med.wayne.edu/physiology/facultyprofile/hong/PDF%20files/Tesla_Composed_Like_Mozart.pdf.

Isaack, T. S. (1978) 'Intuition: An Ignored Dimension of Management', *Academy of Management Review*, 3(4): 917-922.

Jung, C. G. (1921/1990) *Psychological Types* (Vol. 6). Princeton, NJ: Princeton University Press.

Kahneman, D. (2003) 'A Perspective on Judgment and Choice: Mapping Bounded Rationality', *American Psychologist*, 58(9): 697-720.

Kahneman, D. & Klein, G. (2009) 'Conditions for Intuitive Expertise: A Failure to Disagree', *American Psychologist*, 64(6): 515-526.

Kahneman, D. & Tversky, A. (1982) 'On the Study of Statistical Intuitions', *Cognition*, 11(2): 123-141.

Keren, G. (1987) 'Facing Uncertainty in the Game of Bridge: A Calibration Study', *Organizational Behavior and Human Decision Processes*, 39(1): 98-114.

Klein, G. (2004) *The Power of Intuition: How to Use Your Gut Feelings to Make Better Decisions at Work* (paperback edition). New York, NY: Doubleday Currency.

Koestler, A. (1971) *The Act of Creation* (Danube edition). London, UK: Pan Books.

Lieberman, M. D. (2000) 'Intuition: A Social Cognitive Neuroscience Approach', *Psychological Bulletin*, 126(1): 109-137.

March, J. G. & Simon, H. A. (1993) *Organizations* (2nd edition). Oxford: Blackwell.

Miller, C. C. & Ireland, R. D. (2005) 'Intuition in Strategic Decision Making: Friend or Foe in the Fast-Paced 21st Century?', *Academy of Management Executive*, 19(1): 19-30.

Miller, G. A. (1956) 'The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information', *Psychological Review*, 63(2): 81-97.

Mintzberg, H. (1994) 'The Fall and Rise of Strategic Planning', *Harvard Business Review*, 72(January-February): 107-114.

Mintzberg, H., Raisinghani, D. & Théorêt, A. (1976) 'The Structure of 'Unstructured' Decision Processes', *Administrative Science Quarterly*, 21(2): 246-274.

Neisser, U. (1963) 'The Multiplicity of Thought', *British Journal of Psychology*, 54(1): 1-14.

Nicolini, D., Gherardi, S. & Yanow, D. (2003) 'Introduction: Toward a Practice-Based View of Knowing and Learning in Organizations', in D. Nicolini, S. Gherardi & D. Yanow (eds) *Knowing in Organizations: A Practice-Based Approach* Armonk, NY: ME Sharpe Inc.

O'Connor, E. S. (2002) 'Telling Decisions: The Role of Narrative in Organizational Decision Making', in Z. Shapira (ed) *Organizational Decision Making* New York, NY: Cambridge University Press.

Osbeck, L. M. (1999) 'Conceptual Problems in the Development of a Psychological Notion of "Intuition"', *Journal for the Theory of Social Behaviour*, 29(3): 229-249.

- Osbeck, L. M. (2001) 'Direct Apprehension and Social Construction: Revisiting the Concept of Intuition', *Journal of Theoretical and Philosophical Psychology*, 21(2): 118-131.
- Poincaré, H. (1914/2008) *Science and Method*. London, UK: Thomas Nelson and Sons. Electronic version: <http://www.archive.org/details/sciencemethod00poinuoft>
- Polányi, M. (1946) *Science, Faith and Society*. London, UK: Oxford University Press.
- Polányi, M. (1961) 'li.—Knowing and Being', *Mind*, LXX(280): 458-470.
- Polányi, M. (1962a/2002) *Personal Knowledge: Towards a Post-Critical Philosophy*. London, UK: Routledge.
- Polányi, M. (1962b) 'Tacit Knowing: Its Bearing on Some Problems of Philosophy', *Reviews of Modern Physics*, 34(4): 601-616.
- Polányi, M. (1965) 'The Structure of Consciousness', *Brain*, 88(4): 799-810.
- Polányi, M. (1966a) 'The Logic of Tacit Inference', *Philosophy*, 41(155): 1-18.
- Polányi, M. (1966b/1983) *The Tacit Dimension*. Gloucester, MA: Peter Smith. Electronic version: <https://books.google.co.uk/books?id=zfsb-eZHPy0C>
- Polányi, M. (1968) 'Logic and Psychology', *American Psychologist*, 23(1): 27-43.
- Polányi, M. (1969) *Knowing and Being*. Chicago, IL: University of Chicago Press.
- Polányi, M. & Prosch, H. (1977) *Meaning* (paperback edition). Chicago, IL: The University of Chicago Press.
- Popper, K. R. (1968/2004) *The Logic of Scientific Discovery* (2nd edition). London, UK: Routledge. Originally published as 1935.
- Prietula, M. J. & Simon, H. A. (1989) 'The Experts in Your Midst', *Harvard Business Review*, 67(January-February): 120-124.
- Rowan, R. (1986) 'What It Is', in W. H. Agor (ed) *Intuition in Organizations: Leading and Managing Productively*, pp. 78-88. Newbury Park, CA: Sage Publications. Originally published in Rowan, Roy (1986) *The Intuitive Manager*, Little, Brown and Company, Boston, MA.
- Russell, B. A. (1946/2004) *History of Western Philosophy*. London, UK: Routledge.
- Ryle, G. (1949/2000) *The Concept of Mind*. London, UK: Penguin Books.
- Sadler-Smith, E. (2008) *Inside Intuition*. London, UK: Routledge.
- Sadler-Smith, E. (2009) *The Intuitive Mind: Profiting from the Power of Your Sixth Sense*. Chichester, UK: Wiley.
- 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.
- Sadler-Smith, E. & Shefy, E. (2007) 'Developing Intuitive Awareness in Management Education', *Academy of Management Learning & Education*, 6(2): 186-205.

- Salas, E., Rosen, M. A. & DiazGranados, D. (2010) 'Expertise-Based Intuition and Decision Making in Organizations', *Journal of Management*, 36(4): 941-973.
- Schoemaker, P. J. H. & Russo, J. E. (1993) 'Pyramid of Decision Approaches', *California Management Review*, 36(1): 9-31.
- Schrödinger, E. (1958) 'Mind and Matter', in E. Schrödinger (ed) *What Is Life? With Mind and Matter and Autobiographical Sketches*, pp. 91-164. Cambridge: Cambridge University Press.
- Seligman, M. E. P. & Kahana, M. (2009) 'Unpacking Intuition: A Conjecture', *Perspectives on Psychological Science*, 4(4): 399-402.
- Simon, H. A. (1973) 'The Structure of Ill Structured Problems', *Artificial Intelligence*, 4(3-4): 181-201.
- Simon, H. A. (1977) *The New Science of Management Decision* (3rd edition). New Jersey, NJ: Prentice-Hall.
- Simon, H. A. (1983) *Reason in Human Affairs*. Stanford, CA: Stanford University Press.
- Simon, H. A. (1987) 'Making Management Decisions: The Role of Intuition and Emotion', *Academy of Management Executive*, 1(1): 57-64.
- Simon, H. A. (1992) 'What Is an "Explanation" of Behavior?', *Psychological Science*, 3(3): 150-161.
- Simon, H. A. (1996) *The Sciences of the Artificial* (3rd edition). Cambridge, MA: The MIT Press.
- Sinclair, M. (2010) 'Misconceptions About Intuition', *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, 21(4): 378 - 386.
- Sinclair, M. & Ashkanasy, N. M. (2005) 'Intuition: Myth or a Decision-Making Tool?', *Management Learning*, 36(3): 353-370.
- Sonenshein, S. (2007) 'The Role of Construction, Intuition, and Justification in Responding to Ethical Issues at Work: The Sensemaking-Intuition Model', *Academy of Management Review*, 23(4): 1022-1040.
- Spinoza, B. (1677/2000) *Ethics: Demonstrated in Geometrical Order*. New York, NY: Oxford University Press.
- Stanovich, K. E. & West, R. F. (1998) 'Individual Differences in Rational Thought', *Journal of Experimental Psychology: General*, 127(2): 161-188.
- Stanovich, K. E. & West, R. F. (2000) 'Individual Differences in Reasoning: Implications for the Rationality Debate?', *Behavioral and Brain Sciences*, 23(5): 645-665.
- Sullivan, L. (1976) 'Selective Attention and Secondary Message Analysis: A Reconsideration of Broadbent's Filter Model of Selective Attention', *Quarterly Journal of Experimental Psychology*, 28(2): 167-178.
- Trailer, J. W. & Morgan, J. F. (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.

- Treisman, A. M. (1964) 'Verbal Cues, Language, and Meaning in Selective Attention', *American Journal of Psychology*, 77(2): 206-219.
- Tsoukas, H. (1998) 'Forms of Knowledge and Forms of Life in Organized Context', in R. C. H. Chia (ed) *In the Realm of Organization: Essays for Robert Cooper*, pp. 44-68. London, UK: Routledge.
- Tsoukas, H. (2005a) *Complex Knowledge: Studies in Organizational Epistemology*. Oxford: Oxford University Press.
- Tsoukas, H. (2005b) 'Do We Really Understand Tacit Knowledge?', in H. Tsoukas (ed) *Complex Knowledge: Studies in Organizational Epistemology*, pp. 141-161. Oxford, UK: Oxford University Press. Originally published in Easterby-Smith, Mark & Lyles, Marjorie A. (2003) *The Blackwell Handbook of Organizational Learning and Knowledge Management*, Blackwell, Oxford.
- Tversky, A. & Kahneman, D. (1983) 'Extensional Versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment', *Psychological Review*, 90(4): 293-315.
- Vance, C. M., Groves, K. S., Paik, Y. & Kindler, H. (2007) 'Understanding and Measuring Linear/Nonlinear Thinking Style for Enhanced Management Education and Professional Practice', *Academy of Management Learning & Education*, 6(2): 167-185.
- Vaughan, F. E. (1979) *Awakening Intuition*. New York, NY: Anchor Books.