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Intuition
Myth or a Decision-making Tool?

Abstract *Faced with today's ill-structured business environment of fast-paced change and rising uncertainty, organizations have been searching for management tools that will perform satisfactorily under such ambiguous conditions. In the arena of managerial decision making, one of the approaches being assessed is the use of intuition. Based on our definition of intuition as a non-sequential information-processing mode, which comprises both cognitive and affective elements and results in direct knowing without any use of conscious reasoning, we develop a testable model of integrated analytical and intuitive decision making and propose ways to measure the use of intuition.* ***Key Words:*** *affect; cognition; decision making; intuition; managerial knowledge*

In an attempt to come to grips with a world of dynamic change and globalization, organizations today are searching for new management approaches to decision making. Authors such as Hayward and Preston (1998) argue that linear rational models do not perform satisfactorily for businesses operating under rising pressure and ambiguity (see Andersen, 2000; Kuo, 1998). In the arena of managerial decision making, for example, Nutt (1999) reported that rational decision-making strategies struggle to reach the 50% success mark. Since many of the requirements for bounded rationality are becoming more difficult to satisfy (Eisenhardt and Zbaracki, 1992; Langley et al., 1995), Eisenhardt (1989) and Wally and Baum (1994) suggest that organizations have begun to embrace more holistic approaches to non-programmed decisions. In particular, their new openness to investigate alternative decision-making methods has been facilitated by the threat of high decision costs (Tomer, 1996). The impact is further exacerbated by increased time pressure (Kuo, 1998), inadequate information (Agor, 1984; Goodman, 1993), and fast-paced change (Andersen, 2000), along with other factors triggered by new economic and technological forces since the 1980s (Hunt, 2000). These factors have led management researchers to question the effectiveness of rational decision

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making as the only viable alternative. New conceptual frameworks, such as the irrationality of the 'garbage can theory', however, also fail to provide comprehensive solutions (see Langley et al., 1995). Other researchers (Andersen, 2000; Eisenhardt, 1999) therefore resorted to exploration of less tangible concepts, such as intuition, but have not progressed to the point of developing a workable model. We argue that the answer might lie in complementing the management tools that have withstood the test of time with new approaches, responsive to today's changed business environment.

Search for New Management Approaches

The model we propose is in accord with Langley et al.'s (1995) conclusion that decision-making processes are partially driven by emotion, imagination, and memories crystallized into occasional insights. This perspective is also consistent with Eisenhardt and Zbaracki (Eisenhardt, 1979; Eisenhardt and Zbaracki, 1992) who stress the importance of a multidimensional approach to decision making, encompassing bounded rationality as well as heuristics, insight and intuition. Eisenhardt (1999) argues in particular that intuition seems to give managers a better grasp of the changing dynamics in which they have to operate nowadays.

What we suggest therefore is an integrated model of analytical and intuitive decision making where both approaches are used in a complementary and iterative fashion; and the dominance of either approach is determined by dispositional and contextual factors (Burke and Miller, 1999). Our position is based on previous research into intuitive decision making and judgement, catalysed by developments in neuroscience (e.g. Agor, 1986, 1989; Lieberman, 2000) and psychology (e.g. Bastick, 1982; Epstein, 1990; Forgas, 1994). It is further reinforced by the recent interest shown by decision support systems theorists (e.g. Kuo, 1998; Sauter, 1999) in using such an integrated model for the development of decision programmes.

Research by Isenberg (1984) and Burke and Miller (1999) has provided empirical evidence that, in ambiguous situations or under other previously described conditions, decision makers tend to use intuition in conjunction with rational analysis. These findings concur with Behling and Eckel (1991) who suggested that intuition is useful in situations where problems are poorly structured. The results of Parikh et al.'s (1994) study also tell us that managers are more likely to use intuition when solving ill-defined problems without existing precedents, which is usually associated with non-routine decisions (see Simon, 1960). Agor (1984) arrived at a similar conclusion; that intuition is most useful when the manager is faced with conflicting facts or inadequate information. Other factors leading to non-sequential information processing associated with intuition have to do with the perceived importance of the decision (Goodman, 1993) and its potential impact on the decision maker (Kriger and Barnes, 1992). Findings from the few field studies conducted so far (e.g. Agor, 1984, 1986; Parikh et al., 1994) illustrate, however, that although many managers acknowledge reliance on intuition, its use seems to be differentiated by job category, culture, and personal characteristics.

In the western business world, governed for centuries by reason, the pendulum seems to be swinging back to the midpoint, allowing for reintegration of such fuzzy concepts as intuition (Ferguson, 1999; Schulz, 1998). The main challenge therefore is how to study this evasive and mostly non-conscious phenomenon objectively using scientific methods (Bastick, 1982; Petitmengin-Peugeot, 1999). As Davis-Floyd and Arvidson (1997) have demonstrated, this may necessitate an interdisciplinary approach that merges insights from diverse perspectives. Unfortunately, our literature review indicates that such attempts are rare. Nevertheless, through a multitude of disciplines including neuroscience, psychology and phenomenology, intuition has entered the domain of management. The current challenge of organizational science, as Brown and Eisenhardt (1998: x) succinctly point out, is to formulate our newly gained knowledge into theoretically sound ideas that are viable and 'relevant to the pragmatic world of business'. In order to do so, we need first to desist from defining intuition by what it is not, such as anything that does not fit into the category of analysis or rationality (see Hammond et al., 1987).

What Is Intuition?

Intuition as a construct seems to have been immune to scientific inquiry for centuries. Too elusive to define and too difficult to measure with instruments available at the time, it has been relegated to the realm of philosophy. However, concepts such as Spinoza's high road to ultimate truth or Bergson's attainment of direct contact with prime reality (see e.g. Banerji, 1998; Westcott, 1968) bear little relevance for organizational science. So the question remains: How can intuition, operating mostly beyond consciousness through feelings and images, be mapped? When the challenge was taken on in the cognitive sciences, researchers had to struggle with a lack of vocabulary to describe intuitive experiences, as poignantly documented by Petitmengin-Peugeot (1999). This linguistic inadequacy may have been caused by a decline in contemplative approaches that used introspection as a valid method of investigation (Revel and Ricard, 1998). As a result, terms to describe these processes seem to have disappeared from the secular lexicon.

The lack of agreement about what constitutes intuition, accentuated by sparse terminology, has resulted in a profusion of inconsistent or even contradictory definitions. This makes it difficult, as Hammond et al. (1987) caution, to compare findings across studies. Even more disconcerting is the vagueness of many available definitions, reflected in the underlying structure of the developed instruments that attempt to assess the construct. This, in turn, poses difficulties for research replication and puts the appropriateness of the measures for other studies in doubt. Despite these concerns, and although some measures have not withstood the test of factor analysis, they still appear to have substantial face validity (see Agor, 1986, 1989). This might be the most reassuring indication that our endeavour to glean the essence of intuition is worthwhile. But first, similarly to the domain of learning style (Sadler-Smith, 2001), we need to define the construct and to identify appropriate tools to measure it.

Given the ephemeral nature of intuition, it is not surprising that most empirical research was initially restricted to qualitative techniques. These include attempts to

capture the intuitive process through self-introspection (Ferguson, 1999), as well as investigation by means of in-depth interviews (Landry, 1991; Little, 1991) or journal content analysis (Morris, 1990). An evocative model of the intuitive experience was constructed by Petitmengin-Peugeot (1999) in her phenomenological inquiry. All these efforts, however, were based on studies of relatively small groups of individuals with a reported intuitive ability. Thus, even though these processes were meticulously documented, their generalization and application to management practice seem to be limited at best.

Other more quantitatively oriented research at the individual level of analysis appears to have stalled in the exploratory phase. Burke and Miller (1999) and Parikh et al. (1994), for example, simply asked decision makers whether and under which conditions they used intuition. In this instance, the applied instruments served as tools to define the construct but not necessarily to measure it. Another stream of research has been dedicated to the refinement of scales within a particular discipline, mostly psychology (e.g. Epstein et al., 1996), with only a limited application to management studies. At the organizational level of analysis (especially in the domain of strategic management), the use of intuition has usually been established by a few self-report items probing respondents' general preferences, rather than context-specific use (see e.g. Khatri and Ng, 2000). Others (e.g. Wally and Baum, 1994) attempted to measure intuitive preference and actual use simultaneously. On closer examination, it is apparent that many studies failed to identify clearly whether they focused on intuitive predisposition, preference, ability, or actual use. This presents a further challenge for comparative research. Overall, there seems to be very little continuity across researchers even within a single discipline.

Our review of the extant literature confirmed conclusions reached by Boucouvalas (1997) and Shirley and Langan-Fox (1996) that most definitions fall into two broad categories. In the first category, researchers view intuition as an experience-based phenomenon that draws on tacit knowledge accumulated through experience and retrieved through pattern recognition (e.g. Behling and Eckel, 1991; Brockman and Anthony, 1998; Isenberg, 1984; Klein, 1998; Simon, 1987). The second category is represented by research that stresses the importance of sensory and affective elements in the intuitive process (e.g. Bastick, 1982; Epstein, 1998; Parikh et al., 1994; Petitmengin-Peugeot, 1999).

Despite the linguistic and conceptual differences surrounding intuition, we have been able to discern three commonalities. Most researchers acknowledge that (1) intuitive events originate beyond consciousness, (2) information is processed holistically, and (3) intuitive perceptions are frequently accompanied by emotion (Shapiro and Spence, 1997). In addition, as we have argued earlier, any attempt to capture such a multifaceted and ambiguous construct requires a multidisciplinary and multilevel perspective. In this respect, the study of intuition shares similarities with investigations of emotion (Ben-Ze'ev, 2000; Parikh et al., 1994).

Defining Intuition

Based on an extensive literature review, our own exploratory research into the relationship between intuition and emotions, and anecdotal evidence from in-

formal interviews and observations of managers at work, we define intuition as *a non-sequential information processing mode, which comprises both cognitive and affective elements and results in direct knowing without any use of conscious reasoning* (Epstein et al., 1996; Shapiro and Spence, 1997; Simon, 1987; Sinclair et al., 2002).

Our definition is anchored on the three commonalities that we noted earlier. Moreover, absence of consciousness has played a dominant role in most previous research, and seems to be linked to the non-verbal quality of the construct. For example, Crossan et al. (1999) explain the frequent use of images and metaphors in the intuitive process by the fact that it precedes verbalization, at least on the conscious level. Similarly, Petitmengin-Peugeot (1999) and Rowan (1986) describe intuition as subconsciously perceived and synthesized impressions. Taking a business perspective, Wally and Baum (1994) portrayed intuition as a non-conscious ability. In order to circumvent a lengthy discussion about the subtleties of sub-, un- and non-consciousness, we have adopted the term *non-conscious*, encompassing all levels beyond an individual's consciousness.

The notion of non-sequential (holistic) information processing appears to be generally implied in the literature to date. It has been traditionally based on the Jungian concept of 'big picture' or seeing things in the broad context (see Andersen, 2000; Singer, 1994). The more contemporary strategic perspective, on the other hand, stresses directness of knowing (see Behling and Eckel, 1991; Brockman and Anthony, 1998) and global ability to synthesize 'unconnected memory fragments into a new information structure' (Mintzberg et al., 1998: 164). Despite the difference in focus, both streams seem to agree on the non-linear, non-sequential nature of holistic processing.

Consequently, intuitive processing could be likened to a non-conscious scanning of internal (in memory) and external (in environment) resources in a non-logical, non-temporal manner in order to identify relevant pieces of information that are fitted into the 'solution picture' in a seemingly haphazard way, similar to assembling a jigsaw puzzle. When the assembled pieces start making sense, the 'big picture' suddenly appears, frequently accompanied by a feeling of certitude or relief. The non-conscious aspect is reflected in being unaware of any reasoning going on in our mind prior to the 'appearance' of the solution.

Following from this discussion, our definition builds on Isenberg's (1984) and Simon's (1987) concept of intuition as a non-conscious, quick pattern recognition and synthesis of past professional experience and expertise. According to this interpretation, experienced decision makers circumvent analysis in favour of holistic scanning of memory for similar events or situations. On retrieving this information, they creatively reorganize the chunks of information into a new inter-related pattern, all of which occurs without any conscious processing (Klein, 1998, 2003). This definition precludes the use of intuition among novices, however, because they lack the required experience and domain-specific expertise (Behling and Eckel, 1991; Isenberg, 1984; Simon, 1987). Mintzberg (1989) and Langley et al. (1995) take a different position and argue that less experienced decision makers may also arrive at solutions intuitively. Under this premise, everybody, regardless of experience and expertise, can draw on their subconscious to grasp a whole new structure. This view finds support in Baylor's (2001) tentative conclusion that novices might be intuitive *because* they lack analytical knowledge of the subject that would interfere with their ability to generate novel insights.

Even though proponents of experience-based intuition focus solely on the cognitive elements of the construct, our own findings indicate that intuition includes also an emotional or affective component (Sinclair, 2003). This view is consistent with conclusions drawn by, among others, Bastick (1982), Epstein (1998), and Petitmengin-Peugeot (1999). In this article, we use the words 'emotion' and 'affect' interchangeably to facilitate understanding. Our model, however, views *affect* as an umbrella term for all emotional states (Forgas, 1994), such as intense and short-lived *emotions*, lingering non-specific *mood,* and subtle transient *affective feelings* (see Frijda, 1993; Petitmengin-Peugeot, 1999). We also distinguish between affective *trait* as a stable personality disposition and affective *state* as a temporary feeling (see Forgas, 2001; Lazarus, 1999).

When we investigated the relationship between intuition and affect in an exploratory study (Sinclair et al., 2002), we found that positive types of emotional response are indeed positively related to intuitive preference (AIM: Agor, 1989). Conversely, we discovered a negative relationship between intuition and negative types of emotional response. This relationship, however, seems to be more complex.

A closer examination of accounts of intuitive processes revealed three scenarios. First, in the pre-intuitive stage, affect (either trait or state) may preclude or facilitate access to intuition, depending on the context (Elsbach and Barr, 1999; Palmer, 1998; Vaughan, 1979). In this role, affect acts as a determinant (if it has a direct influence on the use of intuition) or a moderator (if it affects the impact of another factor). Second, during the intuitive process, some people tend to use affect as their preferred mode of reception (Sinclair, 2003; see also Agor, 1984; Bastick, 1982; Cappon, 1994; Vaughan, 1979). In this case, affect becomes a component of the intuition construct itself. Finally, in the evaluation stage, individuals experience confirmation of the 'genuine' nature of intuition through a specific feeling, such as relief or certitude (Cappon, 1994; Petitmengin-Peugeot, 1999). We see this as an accompanying symptom of the intuitive process.

Our proposed integration of cognitive and affective components within a single construct also provides common ground for the experience-based and affect-based views on intuition that we introduced earlier. The proponents of experience-based perspective (e.g. Simon, 1987) tend to regard emotion as detrimental to the intuitive process (Simon, 1987). Hammond et al. (1987) caution, however, that this concept of intuition as 'expertise frozen into habit' (see e.g. Klein, 1998) might reduce intuition to a form of 'non-conscious analysis'. The defenders of the affect-based perspective, on the other hand, focus mostly on the diverse role of emotions in the intuitive process, but they do not investigate the relationship further (e.g. Mintzberg, 1989). Affect proponents also stress the importance of knowledge outside the individual's domain of expertise as an important source of intuitive insight (Monsay, 1997).

The expertise/affect divergence was partially addressed by Crossan et al. (1999: 526) who distinguished between *expert intuition* that relies on past pattern recognition and *entrepreneurial intuition* that enables decision makers to connect patterns in a new way. Crossan and her colleagues concluded that both types originate in the *averbal* domain, using imagery and metaphor instead of words. Expert intuition is mostly *non-verbal* (i.e. the process has become so internalized that it does not require any deliberate thinking but, on deeper probing, it could be verbalized), and thus linked to tacit knowledge (Brockman and Anthony, 1998;

Klein, 2003). Entrepreneurial intuition, on the other hand, tends to operate preverbally (i.e. no language exists to describe the process), which is consistent with Epstein's (1998) preconscious quality of experiential processing that is imbued with affect. This finds support in empirical reports of entrepreneurial intuition that frequently mention the presence of emotions (see Hayashi, 2001; Monsay, 1997). On reflection, it seems that expert and entrepreneurial intuition represent two overly narrow aspects of the same multidimensional construct that encompasses both cognitive and emotional elements. Therefore, our construct definition incorporates both components.

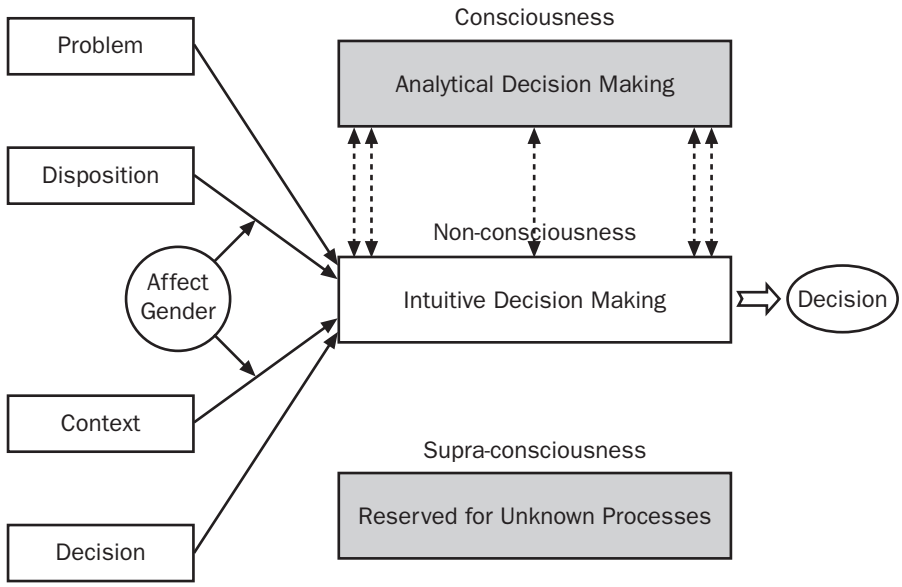
Conceptual Framework

Although researchers such as Schoemaker and Russo (1993) argue that rational approaches yield the best outcome, others (e.g. Agor, 1986; Behling and Eckel, 1991) maintain that many managers are turning to 'gut feelings' to assist their problem solving and decision making, especially under complex or uncertain conditions. The underlying question for model development is the relationship between the rational and intuitive approaches. Isenberg (1984) and Sauter (1999) concluded for instance that these processes are complementary, which means that they can be concurrent. Instruments constructed on this premise view intuition and rationality as orthogonal dimensions (see e.g. Hodgkinson and Sadler-Smith, 2003), and therefore measure them separately. Simon (1987) treated these as lying on a continuum, however, where a relative contribution of each approach is determined by dispositional and contextual factors. Instruments developed on this theoretical foundation treat intuition and rationality as opposite poles along the same dimension, and therefore view them as mutually exclusive.

Drawing on psychological theories of information processing (e.g. Epstein, 1990), our position is that there exist parallel cognitive systems—rational and experiential—anchored on the conscious and non-conscious level respectively. This view finds support in empirical evidence (e.g. Burke and Miller, 1999) and in our own conclusions that some decision makers use both approaches equally (Sinclair, 2003). Consequently, the model we propose views analytical and intuitive decision making as independent yet interconnected. This implies that both approaches are equally valid, but each can be appropriate in different contexts (see Figure 1). Our approach is consistent with Epstein (1998), who postulated in his Cognitive-Experiential Self-Theory that there are two separate ways of information processing. One is emotional (experiential-intuitive), while the other is intellectual (rational-analytical). Epstein et al. (1996: 391) contend that 'people process information by two parallel, interactive systems' that interface in a harmonious manner, although they operate in a different way.

In summary, our model holds that the rational and experiential systems function in a complementary fashion beyond our awareness (Denes-Raj and Epstein, 1994), with experientially based intuition acting as default (Cappon, 1993; Denes-Raj and Epstein, 1994). Each mode supports a different decision-making approach, suitable for a different type of problem solving. The analytical approach of the rational mode is intentional, mostly verbal, and relatively affect-free (Epstein et al., 1996). It adheres to abstract rules of analysis and logic and, as such, can yield precise

Figure 1 Decision-making model



answers to complex factual problems (Denes-Raj and Epstein, 1994). The intuitive approach of the experiential mode operates quite differently. As an automatic, preconscious mode, it functions in a holistic, mostly averbal manner and maintains close links to affect (Epstein et al., 1996). It is context-specific and explains complexity through associations and metaphors (Epstein, 1998). Therefore, it often operates by approximation, which is intrinsically imprecise.

The dominance of either approach seems to be determined by personal disposition and decision-making context. Research to date suggests a range of different factors, although they have been dealt with in rather vague generic terms. Moreover, the focus seems to differ according to the research discipline. For example, Burke and Miller (1999) highlighted the importance of situational influences related to the type of decision and problem. Epstein et al. (1996) stressed the role of personal factors, including emotional involvement. Mintzberg et al. (1998), on the other hand, argued that organizational context is paramount. Extrapolating on all findings, we conclude that intuitive decision making is affected by four broad categories of factors: (1) problem characteristics, (2) decision characteristics, (3) personal disposition, and (4) decision-making context. In other words, the use of intuition appears to be a dynamic process, contingent on a range of specific triggers. In this respect, we agree with Thompson's (1967) conclusion that decision makers might benefit from consciously matching their approach with the decision task and situation. Therefore, our decision-making model (see Figure 1) considers the antecedent stages of the intuitive process and includes the above-listed four categories of determinants (see also Sinclair et al., 2002).

As we stated earlier, the non-conscious selection of a decision-making approach is also influenced by affect. Shapiro and Spence (1997) concluded that an affective aspect generally accompanies intuitive events. Their position is consistent with

Epstein's (1998) findings that experiential processing uses emotions as conduit. A similar view is also reflected in Forgas's (1995) Affect Infusion Model. This model incorporates four information-processing strategies with a different potential for affect infusion, which indicates how much the processing and its outcome are influenced by emotions. Three of these strategies—heuristic, substantive, and motivational—involve affective elements.

With respect to the extent of conscious processing, the heuristic and substantive decision-making strategies in Forgas's (1995) model bear similarity to Epstein et al's (1996) rational and experiential information processing. In Forgas's model, however, both modes are infused with affect. Forgas argues that decision makers tend to use heuristic processing when in positive mood, which indicates favourable conditions to proceed. Negative mood, on the other hand, evokes the need for careful analysis. It implies that the selection of an intuitive or an analytical approach might be influenced by current mood (as a temporary emotional state) of the decision maker. This inference is consistent with empirical findings reported by Elsbach and Barr (1999) in their study of complex decision making. It also finds support in Ashby et al.'s (1999) conclusion that different affective states appear to have dissimilar effects on memory, judgement, and processing strategies. It has to be noted, however, that heuristics and intuition are not the same thing, although they tend to be confused in the literature. Based on Tversky and Kahneman (1983), we view heuristics as low-effort rational strategies, where decision makers rely on presented data to make a conscious guess, which may result in a biased estimate. Intuition, on the other hand, implies the absence of any awareness of the process used to reach a conclusion (Epstein et al., 1996; Shapiro and Spence, 1997). In this respect, direct knowing is different from guessing.

Another scenario for affect infusion is implied by the motivational strategy of Forgas's (1995) model, which is relatively affect-free. Nevertheless, since it is guided by the decision maker's strong desire to find a solution, this strategy is likely to be *triggered* by a high-intensity emotion. In this case, the effect on intuition is determined by the intensity of the experienced emotion rather than its positive or negative nature (Forgas, 1995). For example, anger may act in the same way as excitement. A closer examination of intuitive responses, however, reveals two patterns. In the first instance, the emotion appears to function as a trigger if the decision maker uses it as a conduit to reach the desired outcome (see Palmer, 1998). This position finds support in accounts of intuition being propelled by a strong desire to solve a problem (see e.g. Monsay, 1997). The second pattern seems to evoke an opposite effect as a result of the decision maker focusing on the emotion itself. In this instance, the emotion may interfere with the intuitive process by blocking its signals (Petitmengin-Peugeot, 1999; Vaughan, 1979). For example, being absorbed by fear is a frequently cited reason for an intuition block (see e.g. Emery, 2001). Regardless of the affect infusion strategy, all scenarios we have described fall into the antecedent stage of our model and can be classified as determinants or moderators of the intuitive process, depending on whether they have a direct effect or interact with other factors.

An additional factor that has attracted research attention is gender, although findings have been inconclusive. While some results (Agor, 1986; Pacini and Epstein, 1999; Parikh et al., 1994) support the commonly held belief that women are more intuitive than men, others have not identified any significant differences

(Taggart et al., 1997). Several studies even reported women scoring higher on analysis (Allinson and Hayes, 1996; Kirton, 1994). A question arises therefore as to whether these inconsistencies might be a result of differently construed measures. According to research into gender differences in non-verbal communication, female decision makers seem to have better access to intuition than their male counterparts because of their superior encoding and decoding skills, which are, in part, a result of their higher oestrogen levels (Lieberman, 2000). In view of the fact that non-verbal communication encompasses information about emotions and affect (DePaulo, 1992), it is not surprising that we found most contradictory findings in studies that did not consider affective components of intuition (Sinclair, 2003). Consequently, there is a need to investigate whether the use of intuition is affected by gender per se, or whether it is a result of female decision makers having generally higher levels of emotional traits and affect-based attitudes (see Booth-Butterfield and Booth-Butterfield, 1990; Simonton, 1980).

Our discussion so far has been limited to processes occurring on a conscious or a non-conscious level. In the future, however, it might be necessary to depart from the conceptual framework of personality theories in order to explain intuitive insights beyond the scope of non-conscious pattern recognition (Palmer, 1998). The supra-conscious level, which is suggested by transpersonal psychology (Vaughan, 1979) and resurfaces as a possibility in Parikh et al.'s (1994) cross-cultural study, may serve as a useful vehicle to explore such phenomena as the 'sixth sense' (Nadel et al., 1992; Naparstek, 1997), and to determine whether these modes represent yet another facet of intuition. The notion of a higher level of consciousness seems to be supported by controversial developments in physical sciences, such as Bohm's (1983) concept of implicate order, where energy unfolds into space, time and matter. His position concurs with a recent discovery in quantum physics about the dual nature of matter, which implies that it can exist at the same time locally and non-locally (see Suzuki, 2002). Similarly, Sheldrake (1987), in his theory of morphic fields, proposed that knowledge can be communicated across space and time through 'morphic resonance'.

Such notions may sound less mystical from Varela's perspective of 'authentic presence' (see Jaworski, 1998: 179) that accepts the possibility of alternate realities. This approach might require a revival of contemplative introspection (Revel and Ricard, 1998), at least on the level of dissolved self-consciousness of the 'flow experience' described by Csikszentmihalyi (1997). Nevertheless, we lack scientific tools to test this part of our model at present. Consequently, at this stage we focus on the conscious and non-conscious levels (anchoring analytical and intuitive decision making, respectively) that have been already established.

What Can Be Tested?

Much has been written about rational decision making and its measurement, so our discussion of what can be tested will focus on intuition. Further, and in view of the discrepancies concerning intuitive predisposition, preference and ability that we noted earlier, it seems important to examine the intuitive process in its entirety. This position is further reinforced by our conclusions that intuitive decision making is a context-specific process (see Sinclair and Ashkanasy, 2002/2003).

Therefore, our model includes antecedent as well as outcome stages. Since the dispositional and contextual factors of the antecedent stage can be tested using traditional methods (see Sinclair, 2003), we focus our attention on the outcome stage and examine how to measure the use of intuition in decision making, or at least the predisposition to use intuition.

To gain a better understanding of measurement issues, we reviewed the available instruments that may be suitable for decision-making research in order to examine their underlying structure. Among these, we identified four measures that deal with intuition as a complex and multifaceted construct and are thus in accord with our own conclusions discussed earlier (see also Sinclair et al., 2002).

Intuitive Management Survey (AIM: Agor, 1989)

At the time of our investigation, the AIM was the most frequently cited intuition measure. Moreover, it is one of the very few that have been used in management context by researchers other than the developer. The main objective of the AIM is to measure predisposition and further development of 'the ability to make practical management decisions successfully on the basis of feelings', even when faced with conflicting or inadequate information (Agor, 1984: xii). It was developed, however, from the 'intuition-sensing' items of the Myers-Briggs Type Indicator (MBTI: Myers and McCaulley, 1985), which assesses intuition and analysis as opposite poles on the same dimension. Although this is in conflict with our theoretical framework of parallel information processing, we examined the factorial structure of the construct in order to identify the captured aspects (see Sinclair et al., 2002). Our analysis determined that the questionnaire items grouped into two factors. The first appears to assess reliance on tacit knowledge and pattern recollection, which is consistent with cognitive elements of our definition. The second factor seems to evaluate global information processing (our non-sequential component) and, to a lesser degree, emotional responsiveness (a partial coverage of our affective component). Even though some items imply non-conscious processing or direct knowledge, these elements could not be clearly separated in the analysis.

International Survey on Intuition (ISI: Parikh et al., 1994)

The ISI was developed for a cross-cultural study that, to our knowledge, is the only large-scale organizational research into intuitive decision making beside Agor's (1984, 1989) work. In the ISI, Parikh and his associates argue that intuition is a multilevel and multi-contextual phenomenon. Similar to the AIM, however, the ISI views intuition and rationality as mutually exclusive, which is contradictory to our theoretical underpinnings. Moreover, the quantitative elements seem to focus on knowledge-based aspects of intuition (our cognitive component) and deal with emotional elements only marginally. Other aspects of our definition are covered mostly in exploratory statements that are not suitable for modification as an outcome measure. A major drawback from the perspective of our research is therefore the lack of definition of the construct. The ISI was designed to explore how individuals interpret intuition rather than as a general measure of its use.

Rational-Experiential Inventory (REI: Pacini and Epstein, 1999)

The REI conforms to our model, in that it treats intuition and rationality as two independent dimensions. Moreover, the instrument attempts to distinguish between engagement and ability on both scales. Experiential engagement sizes up the respondent's favourable attitude to intuition, which is also reflected in Parikh et al.'s (1994) ISI, while experiential ability relates to one's ability to rely on intuitive impressions. Also in this respect, the instrument is consistent with our definition. The scale measures ability as a dispositional preference, not actual use, however. Contrary to the other two measures we reviewed, the questionnaire items gauge emotional elements of intuition (the affective component of our definition) but do not seem to cover experience-based aspects (our cognitive component). Probing into direct knowing and absence of conscious processing appears to be under-represented as well.

Intuitive Profile (IQ2: Cappon, 1993)

This is the only non-verbal instrument we were able to identify. It comprises an extensive visual test of information processing. The underlying dimensions seem to tap well into holistic scanning and knowledge-based pattern recognition (the non-sequential and cognitive components of our definition), although they do not include emotional elements (our affective component). In addition to the aspects assessed by the other reviewed measures, IQ2 also evaluates problem-solving speed and ability to deal with incomplete information, which is consistent with the reported role of intuition in fast-paced decision making under risky or ambiguous conditions (Wally and Baum, 1994) and time pressure (Nutt, 1999; Thompson, 1967). The visual nature of the instrument allows for intuition to be tested separately from rational thinking, which implies access to direct knowing without conscious processing. In this respect, IQ2 concurs with our theoretical framework. Its laser-video format and considerable length (one and a half hours), however, present a considerable obstacle for large-scale organizational studies.

Discussion of Intuition Measures

It is notable that our review of the selected intuition measures did not discover any instrument that would comprehensively evaluate the use of intuition as defined in the model we propose. Based on our theoretical discussion, an appropriate questionnaire design would require that intuitive and analytical decision making are measured separately. As stipulated in our definition, the intuitive scale needs to comprise items that assess non-sequential information processing, experience-based pattern recognition, emotional responsiveness, direct knowing, and absence of conscious processes. Nevertheless, while self-report questionnaires such as those we included in our review represent the most commonly used method in quantitative studies, they appear to capture only some facets of the construct.

This does raise a question as to whether a comprehensive measurement is ever going to be achievable by means of a single tool. We therefore propose a cautious approach in the spirit of triangulation (see Jick, 1979) that would use a combination of measures, with each of them tapping into a different facet of intuition. Thus we advocate that intuition researchers seek to supplement ques-

tionnaires with other instruments that can cast a more penetrative light on intuition in organizational studies. In this respect, we have identified three alternative approaches that may counterbalance some shortcomings of questionnaire measures: (1) a description of the decision-making process provided by the participant; (2) a word-count of the description (verbalization); and (3) a measure of the time needed to make the decision (latency).

As a minimum precaution, we suggest that intuition researchers compare questionnaire results with a record of the study participants' descriptions of how they approached a particular decision. Although still reliant on self-report, such a reflective measure may provide additional insights. Furthermore, using content analysis (see Holsti, 1968), the description can be coded to generate a quantitative score that might be used to verify the questionnaire results. Our research indicates, however, that respondents find it difficult to isolate their verbal assessment of intuitive use from references to rational thinking (see Sinclair, 2003). As mentioned earlier, this may be caused by the lack of appropriate vocabulary (Petitmengin-Peugeot, 1999). This limitation extends to questionnaires as well as self-description. Nevertheless, content analysis of the description makes it easier to evaluate the use of intuition more accurately.

The second alternative measure we propose is a simple word-count of the descriptions. In accordance with the theoretical assumption that intuition is mostly averbal (see Brockman and Anthony, 1998; Epstein et al., 1996), we anticipate that those who use predominantly intuitive decision making would not be able to describe in detail how they arrived at their decision. As a result, their descriptions should be shorter.

With respect to latency, as discussed earlier, we include this alternative measure on the basis that intuition is defined as direct knowing (Behling and Eckel, 1991). Since such direct knowing would be likely to circumvent time-consuming logical processes (Bastick, 1982), we hypothesize that those using intuition would need less time to make the decision than in the case of analysis. Latency and verbalization, however, do not allow for a clear separation between intuition and analysis. Despite these shortcomings, such a combined use of measurements will hopefully offer a more conservative and realistic assessment of the studied phenomenon.

The Journey Ahead

The model we have proposed represents a small step toward the identification of different facets of intuition. Our own gut feeling tells us that this will be a long, ongoing process. Although we have conducted testing under experimental and field conditions (see Sinclair, 2003), an accurate measurement of intuitive decision making remains a challenge. Despite its imperfections, the operationalized model promises to shed more light on the inner workings of intuition that could further our understanding of this phenomenon. We are hopeful that these findings might have a positive effect on managerial training in decision making. This, in turn, could lead eventually to improvement of decision quality, and thus have an impact on organizational performance. In this respect, our research takes a different approach from prescriptive strategic models that tend to link intuitive decision

making directly to performance indicators, without paying due attention to the definition and measurement of the decision-making processes that ultimately cause the performance outcomes.

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References

Agor, W. H. (1984) *Intuitive Management: Integrating Left and Right Brain Management Skills*. New York: Prentice Hall.

Agor, W. H. (1986) *The Logic of Intuitive Decision Making: A Research-based Approach for Top Management*. New York: Quorum Books.

Agor, W. H. (ed.) (1989) *Intuition in Organizations: Leading and Managing Productively*. Newbury Park, CA: Sage Publications.

Allinson, C. W. and Hayes, J. (1996) 'The Cognitive Style Index: A Measure of Intuition-analysis for Organizational Research', *Journal of Management Studies* 33(1): 119–35.

Andersen, J. A. (2000) 'Intuition in Managers: Are Intuitive Managers More Effective?', *Journal of Managerial Psychology* 15(1): 46–67.

Ashby, F. G., Isen, A. M. and Turken, U. (1999) 'A Neuropsychological Theory of Positive Affect and Its Influence on Cognition', *Psychological Review* 3: 529–50.

Banerji, B. K. (1998) *Intuitive Creativity*. London: Avon Books.

Bastick, T. (1982) *Intuition: How We Think and Act*. New York: John Wiley and Sons.

Baylor, A. L. (2001) 'A U-shaped Model for the Development of Intuition by Level of Expertise', *New Ideas in Psychology* 19: 237–44.

Behling, O. and Eckel, N. L. (1991) 'Making Sense out of Intuition', *Academy of Management Executive* 5(1): 46–54.

Ben-Ze'ev, A. (2000) *The Subtlety of Emotions*. Cambridge, MA: Bradford/MIT Press.

Bohm, D. (1983) *The Future of Humanity* (videotaped dialogue between Krisnamurti and David Bohm). New York: Mystic Fire Video.

Booth-Butterfield, M. and Booth-Butterfield, S. (1990) 'Conceptualizing Affect as Information in Communication Production', *Human Communication Research* 16: 451–76.

Boucouvalas, M. (1997) 'Intuition: The Concept and the Experience', in R. Davis-Floyd and P. S. Arvidson (eds) *Intuition: The Inside Story*, pp. 3–18. New York: Routledge.

Brockman, E. N. and Anthony, W. P. (1998) 'The Influence of Tacit Knowledge and Collective Mind on Strategic Planning', *Journal of Managerial Issues* 10(20): 204–19.

Brown, S. L. and Eisenhardt, K. M. (1998) *Competing on the Edge: Strategy as Structured Chaos*. Boston, MA: Harvard Business School Press.

Burke, L. A. and Miller, M. K. (1999) 'Taking the Mystery out of Intuitive Decision Making', *Academy of Management Executive* 13(4): 91–9.

Cappon, D. (1993) 'The Anatomy of Intuition', *Psychology Today*, 26(May–June): 40–91.

Cappon, D. (1994) *Intuition and Management: Research and Applications*. Westport, CT: Quorum Books.

Crossan, M. M., Lane, H. W. and White, R. E. (1999) 'An Organizational Learning Framework: From Intuition to Institution', *Academy of Management Review* 24(3): 522–37.

Csikszentmihalyi, M. (1997) *Finding the Flow: The Psychology of Engagement with Everyday Life*. New York: Basic Books/HarperCollins.

Davis-Floyd, R. and Arvidson, P. S. (eds) (1997) *Intuition: The Inside Story*. New York: Routledge.

Denes-Raj, V. and Epstein, S. (1994) 'Conflict between Intuitive and Rational Processing: When People Behave Against their Better Judgment', *Journal of Personality and Social Psychology* 66(5): 819–29.

DePaulo, B. (1992) 'Nonverbal Behavior and Self-presentation', *Psychological Bulletin* 111: 203–43.

Eisenhardt, K. M. (1989) 'Making Fast Strategic Decisions in High-velocity Environments', *Academy of Management Journal* 32(3): 543–76.

Eisenhardt, K. M. (1997) 'Strategic Decisions and All That Jazz', *Business Strategy Review* 8(3): 1–3.

Eisenhardt, K. M. (1999) 'Strategy as Strategic Decision Making', *Sloan Management Review* (Spring): 65–72.

Eisenhardt, K. M. and Zbaracki, M. J. (1992) 'Strategic Decision Making', *Strategic Management Journal* 13(Special Issue): 17–37.

Elsbach, K. D. and Barr, P. S. (1999) 'The Effects of Mood on Individuals' Use of Structured Decision Protocols', *Organization Science* 10(2): 181–98.

Emery, M. (2001) *PowerHunch! Living an Intuitive Life*. Hillsboro, OR: Beyond Words Publishing.

Epstein, S. (1990) 'Cognitive-experiential Self-theory', in L. Pervin (ed.) *Handbook of Personality Theory and Research*, pp. 165–92. New York: Guilford Press.

Epstein, S. (1998) 'Emotions and Psychology from the Perspective of Cognitive-experiential Self-theory', in W. F. Flack and J. D. Laird (eds) *Emotions in Psychopathology: Theory and Research, Series in Affective Science*, pp. 57–69. New York: Oxford University Press.

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

Ferguson, G. (1999) *Cracking the Intuition Code*. Chicago, IL: NTC/Contemporary Books.

Forgas, J. P. (1994) 'The Role of Emotion in Social Judgments: An Introductory Review and an Affect Infusion Model (AIM)', *European Journal of Social Psychology* 24: 1–24.

Forgas, J. P. (1995) 'Mood and Judgment: The Affect Infusion Model (AIM)', *Psychological Bulletin* 117: 39–66.

Forgas, J. P. (2001) *Handbook of Affect and Social Cognition*. Mahwah, NJ: Lawrence Erlbaum Associates.

Frijda, N. H. (1993) 'Moods, Emotion Episodes and Emotions', in M. Lewis and J. M. Haviland (eds) *Handbook of Emotions*, pp. 381–403. New York: Guilford Press.

Goodman, S. K. (1993) 'Information Needs for Management Decision-making', *Records Management Quarterly* 27(4): 12–23.

Hammond, K. R., Hamm, R. M., Grassia, J. and Pearson, T. (1987) 'Direct Comparison of the Efficacy of Intuitive and Analytical Cognition in Expert Judgment', *IEEE Transactions on Systems, Man, and Cybernetics* 17(5): 753–70.

Hayashi, A. M. (2001) 'When to Trust your Gut', *Harvard Business Review* 79: 59–65.

Hayward, T. and Preston, J. (1998) 'Chaos Theory, Economics and Information: The Implications for Strategic Decision-making', *Journal of Information Science* 5(3): 173–82.

Hodgkinson, G. P. and Sadler-Smith, E. (2003) 'Complex or Unitary? A Critique and Empirical Re-assessment of the Allinson-Hayes Cognitive Style Index', *Journal of Occupational and Organizational Psychology* 76: 243–68.

Holsti, O. R. (1968) 'Content Analysis', in G. Lindzey and E. Aronson (eds) *The Handbook of Social Psychology*, vol. 2, pp. 596–692. Reading, MA: Addison-Wesley.

Hunt, J. (2000) 'The Anatomy of Organisational Change in the Twenty-first Century', paper presented at the Australian and New Zealand Academy of Management (ANZAM), Sydney, NSW.

Isenberg, D. J. (1984) 'How Senior Managers Think', *Harvard Business Review* (Nov–Dec): 81–6.

Jaworski, J. (1998) *Synchronicity: The Inner Path to Leadership*. San Francisco, CA: Berrett-Koehler Publishers.

Jick, T. D. (1979) 'Mixing Qualitative and Quantitative Methods: Triangulation in Action', *Administration Science Quarterly* 24: 602–11.

Khatri, N. and Ng, H. A. (2000) 'The Role of Intuition in Strategic Decision Making', *Human Relations* 53(1): 57–86.

Kirton, M. J. (1994) 'Adaptors and Innovators at Work', in M. J. Kirton (ed.) *Adaptors and Innovators: Styles of Creativity and Problem Solving*, pp. 51–71. London: Routledge.

Klein, G. (1998) *Sources of Power: How People Make Decisions*. Cambridge, MA: MIT Press.

Klein, G. (2003) *Intuition at Work*. New York: Currency Doubleday.

Kriger, M. P. and Barnes, L. B. (1992) 'Organizational Decision-making as Hierarchical Levels of Drama', *Journal of Management Studies* 29: 439–50.

Kuo, F.-Y. (1998) 'Managerial Intuition and the Development of Executive Support Systems', *Decision Support Systems* 24: 89–103.

Landry, L. (1991) 'A Study of the Experience, Use and Development of Intuition', PhD dissertation, University of Massachusetts.

Langley, A., Mintzberg, H., Pitcher, P., Posada, E. and Saint-Macary, J. (1995) 'Opening up Decision Making: The View from the Black Stool', *Organization Science* 6(3): 260–79.

Lazarus, R. S. (1999) *Stress and Emotion: A New Synthesis*. New York: Springer Publishing.

Lieberman, M. D. (2000) 'Intuition: A Social Cognitive Neuroscience Approach', *Psychological Bulletin* 126(1): 109–37.

Little, J. S. (1991) 'The Intuitive Counselor: A Study of Development and Training for the Use of Intuition in Counseling', PhD dissertation, University of Massachusetts.

Mintzberg, H. (1989) *Mintzberg on Management: Inside our Strange World of Organizations*. New York: The Free Press.

Mintzberg, H., Ahlstrand, B. and Lampel, J. (1998) *Strategy Safari: A Guided Tour through the Wilds of Strategic Management*. New York: The Free Press.

Monsay, E. H. (1997) 'Intuition in the Development of Scientific Theory and Practice', in R. Davis-Floyd and P. S. Arvidson (eds) *Intuition: The Inside Story*, pp. 103–20. New York: Routledge.

Morris, L. E. (1990) 'Strategies and Tactics to Access Intuition: A Look at the Moment of Solution', PhD dissertation, Virginia Polytechnic Institute and State University.

Myers, I. B. and McCaulley M. H. (1985) *Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologists Press.

Nadel, L., Haims, J. and Stempson, R. (1992) *Sixth Sense*. New York: Avon Books.

Naparstek, B. (1997) *Your Sixth Sense: Activating Your Psychic Potential*. San Francisco, CA: Harper Collins.

Nutt, P. C. (1999) 'Surprising But True: Half the Decisions in Organizations Fail', *Academy of Management Executive* 13(4): 75–89.

Pacini, R. and Epstein, S. (1999) 'The Relation of Rational and Experiential Information Processing Styles to Personality, Basic Beliefs, and the Ratio-bias Phenomenon', *Journal of Personality and Social Psychology* 76(6): 972–87.

Palmer, H. (1998) 'Introduction to Inner Knowing', in H. Palmer (ed.) *Inner Knowing*, pp. xv–xxi. New York: Jeremy P. Tarcher/Putnam.

Parikh, J., Neubauer, F. and Lank, A. G. (1994) *Intuition: The New Frontier in Management*. Cambridge, MA: Blackwell.

Petitmengin-Peugeot, C. (1999) 'The Intuitive Experience', *Journal of Consciousness* 6(2–3): 43–77.

Revel, J.-F. and Ricard, M. (1998) *The Monk and the Philosopher: East Meets West in a Father–Son Dialogue*. London: Thorsons/HarperCollins.

Rowan, R. (1986) *The Intuitive Manager*. Boston, MA: Little, Brown and Company.

Sadler-Smith, E. (2001) 'A Reply to Reynold's Critique of Learning Style', *Management Learning* 32(3): 291–304.

Sauter, V. L. (1999) 'Intuitive Decision-making', *Communications of the ACM* 42(6): 109–15.

Schoemaker, P. J. H. and Russo, E. J. (1993) 'A Pyramid of Decision Approaches', *California Management Review* 36: 9–31.

Schulz, M. L. (1998) *Awakening Intuition: Using your Mind–Body Network for Insight and Healing*. New York: Harmony Books.

Shapiro, S. and Spence, M. (1997) 'Managerial Intuition: A Conceptual and Operational Framework', *Business Horizons* 40(1): 63–9.

Sheldrake, R. (1987) 'Mind, Memory and Archetype: Morphic Resonance and the Collective Unconscious: I', *Psychological Perspectives* 18(1): 9–25.

Shirley, D. A. and Langan-Fox, J. (1996) 'Review of Intuition', *Psychological Reports* 79: 563–84.

Simon, H. A. (1960) *The New Science of Managerial Decision*. New York: Harper & Row.

Simon, H. A. (1987) 'Making Management Decisions: The Role of Intuition and Emotion', *Academy of Management Executive* 1(1): 57–64.

Simonton, D. K. (1980) 'Intuition and Analysis: A Predictive and Explanatory Model', *Genetic Psychology Monographs* 102: 3–60.

Sinclair, M. (2003) 'The Use of Intuition in Managerial Decision-making: Determinants and Affective Moderators', PhD dissertation, The University of Queensland.

Sinclair, M. and Ashkanasy, N. M. (2002/2003) 'Intuitive Decision-making among Leaders: More than Just Shooting from the Hip', *Mt Eliza Business Review* 5(2): 32–40.

Sinclair, M., Ashkanasy, N. M., Chattopadhyay, P. and Boyle, M. V. (2002) 'Determinants of Intuitive Decision Making in Management: The Moderating Role of Affect', in N. M. Ashkanasy, W. J. Zerbe and C. E. J. Härtel (eds) *Managing Emotions in the Workplace*, pp. 143–63. Armonk, NY: M. E. Sharpe.

Sinclair, M., Noordink, P. J., Ashkanasy, N. M. and Chattopadhyay, P. (2002) 'Measuring Intuition Using AIM: Scale Reliability and Relations with Measures of Emotional Responses', *Australian Journal of Psychology* 54(2): 130.

Singer, J. (1972/1994) *Boundaries of the Soul: The Practice of Jung's Psychology*, 2nd edn. New York: Anchor Books.

Suzuki, D. (2002) *Nature of Things: Intuition*. Television programme on videotape. Originally released by Canadian Broadcasting Corporation, 2002. Aired on Australian SBS, 1 October 2002. Sydney, NSW: SBS.

Taggart, W. M., Valenzi, E., Zalka, L. and Lowe, K. B. (1997) 'Rational and Intuitive Styles: Commensurability across Respondents' Characteristics', *Psychological Reports* 80: 23–33.

Thompson, J. D. (1967) *Organization in Action*. New York: McGraw-Hill.

Tomer, J. F. (1996) 'Discussion of Modes of Economizing', *Journal of Economic Behavior and Organization* 29: 261–2.

Tversky, A. and Kahneman, D. (1983) 'Extensional versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment', *Psychological Review* 90: 293–315.

Vaughan, F. E. (1979) *Awakening Intuition*. New York: Doubleday.

Wally, S. and Baum, R. J. (1994) 'Personal and Structural Determinants of the Pace of Strategic Decision Making', *Academy of Management Journal* 37(4): 932–56.

Westcott, M. R. (1968) *Toward a Contemporary Psychology of Intuition: A Historical, Theoretical and Empirical Inquiry*. New York: Holt, Rinehart & Winston.

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