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Book review:

Marta SINCLAIR 2011

Handbook of Intuition Research

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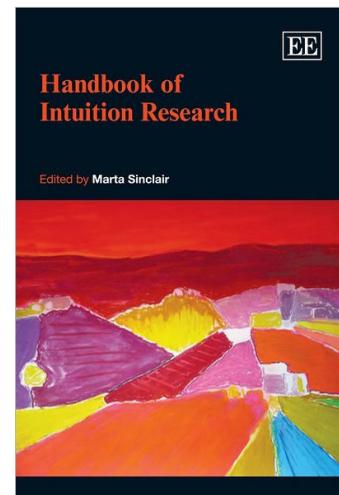
Book review

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Reviewed by

Yvonne Giordano,
GREDEG, Université de Nice Sophia Antipolis
ygiordan@unice.fr



Intuition is already a long-standing concern (Agor, 1984; Barnard, 1938; Simon, 1987) but it is often used as an “umbrella term” (Glöckner & Ebert, Chapter 14: 161), just as decision-making was in the past. For many years, under the influence of the tradition of heuristics and biases (HB) (Tversky & Kahneman, 1971, in particular), intuitive processes and outcomes have been considered as inefficient mental shortcuts. Then, a relative turn-around for research into intuition currently gives rise to many publications which show a great vivacity in many disciplines. Martha Sinclair’s book (she was Senior Lecturer at the University of Brisbane when it was published) is one effective illustration and comes just at the right moment to draw up a statement in a spirit of “respectful disagree[ment]” (xvi). Research on intuition - and the very definition of the concept - is highly controversial and the entire book illustrates the discordant views to which it gives rise. The work has been written with a clear intention: to lead intuition out of a retrenched area, dealing with sub-scientific processes and outcomes, and to give us fresh knowledge, specifically within and between cognitive psychology and neuroscience research. It discusses not only widely recognized works, but also other, less advanced contributions that prompt further research on the subject. We are left with no certainties once we are done reading, but rather a very stimulating invitation to continue exploring, and in particular in the domain of management, which was one of the very first fields to be concerned with intuition.

STRUCTURE AND CONTRIBUTIONS

The book is made up of five parts and twenty-one chapters. The first part (Conceptualizing Intuition, Chapters 1 to 5) investigates the many different facets of the intuitive processes, and discusses consciousness and affects. The second part (Functions of Intuition, Chapters 6 to

9) shows the links between intuition, on the one hand, and expertise, strategy, entrepreneurship and ethics, on the other. The third part (Intuition in Professional/Occupational Domains, Chapters 10 to 15) shows 'intuition-in-action' in various professional fields, including emergency medicine, law, movie sets and teaching. The fourth part (Nonlocal Perspective, Chapters 16 and 17) stretches the concept of intuition to its very limits by analyzing "noetic form and nonlocal intuition", far from assuming that intuitions are the result of processed information that we already possess or have been in contact with. Finally, the fifth part (Cultivating Intuition, Chapters 18 to 21) militates in favor of the idea that intuition is an available mental resource (mindfulness) and examines its qualities in relation to various activities, with a specific focus on higher education.

All of the thirty-six authors who contribute to this debate come from many and varied disciplines, which confers on the book a contrasted and pluralistic approach; this is to be welcomed in a work tackling such a controversial subject, which embraces such fields as cognitive and clinical psychology, neurobiology, medicine, management and organizational behavior, education, economics and physics. All the authors work in varied fields and use different methods, which supports the notion that intuition is of a cross-cutting nature: intuition is thus something which comes out as clearly in emergency medicine as it does in managerial decision-making or even the legal domain. As for the theme of decision-making, then, intuition does not specifically belong to a particular field, and some of the authors who contribute to the book are from clearly multidisciplinary institutions. Moreover, Martha Sinclair calls for the development of collaborations across multiple disciplines as well as the increase of empirically grounded research, both using experimental methods and in natural settings. Finally, the book exposes and discusses the most recent theories on the ways in which high-order animals learn, think and judge.

MAIN ADVANCES

With intuition, we know simply that we know something without knowing *how* or *why* we know it (Sinclair, Chapter 1: 4). Broadly speaking, intuition may be defined as "direct knowing" that arises through rapid, non-conscious and holistic information processing or holistic associations (Dane & Pratt, 2007: 33). After a long period of doubt and criticism surrounding this strange construct, intuition is now considered a legitimate subject of social scientific inquiry (Hodgkinson & Sadler-Smith, Chapter 5: 52). Evidently, researchers of the HB tradition have previously neglected intuition because of systematic errors and inferior choices made by experimental subjects. At the opposite of the HB tradition, Naturalistic Decision Making (NDM) (Klein, Chapter 6; Lipshitz, Klein & Orasanu, 2001; Salas, Rosen & DiazGranados, 2010) has emphasized the power of intuitive experts' judgments in specific real set-

tings. This book tries to extend intuition beyond the limited area of decision-making; it does so because this concept is now cross-pollinating our knowledge and the ways we learn and think in our everyday lives.

System 1 and System 2: dual processing models

One of the most important contributions to intuition is the development of System 1/System 2 theories. According to these theories, the associative learning system operates outside of awareness (System 1). By contrast, analysis is associated with the rational/deliberative system as intentional, primarily conscious, verbal and relatively affect-free (System 2). Humans process information in parallel systems, but there is no clear agreement about affects, their role and the time at which they are activated nor if the two systems are independent and travel through different pathways in the brain. The best-known theory is the Cognitive-Experiential Self-Theory (CEST) (Epstein, 2010 and Chapter 4), which claims that the two systems interact, working simultaneously and influencing each other as they do so. The intuitive system usually reacts first but another possible sequence is that the intuitive system reacts to the rational one, e.g. when a thought produced by the rational system instigates emotions or produces associations in the experiential one (Guzak & Hargrove, Chapter 9: 99). It seems that the mutual influence of the experiential and rational systems results in conflicts and compromises between them. Methodologically, each type of processing should be captured by an independent scale.

Nevertheless, CEST is not the only dual processing model. "Many of the current dual process models are *default-interventionist models* (authors' emphasis) assuming that both systems interact with intuitive processes being activated by default and deliberative processes being activated only if necessary to intervene and correct" (Glöckner & Ebert, Chapter 14: 161; Evans, 2008). Other models suggest that both systems interact in parallel. For the reader who remains uncomfortable with this recent psychological research, the book does not appear to be terribly instructive: it is necessary to muddle through the chapters to gain a better understanding of the divergences between the models. Plessner, Betsch and Betsch (2008) introduce these models in a more advanced way, but their book is also rather more inaccessible for the non-specialist reader. The special issue of the *Psychological Inquiry* review (21, 2010), probably written at the same time as this book, provides useful assistance in grasping some subtle arguments which fall beyond the scope of this review.

Meanwhile, other researchers such as Hammond (1996) maintain a "unidimensional view" (or "cognitive continuum view"): humans use one cognitive style at the expense of the other, with information 'travelling' along the same neural pathways. Rational/deliberative and intuitive styles are at the opposite ends of a single continuum. Each style is dependent on the degree of structuring of the task, its complexity, and its ambiguity (Guzak & Hargrove, Chapter 9: 100); one style may be preferred over the other. One "person cannot employ a high degree of intuition and deliberation at the same time" (Sinclair, 2010: 379). According to Sinclair, the apparent differences between these theories

may not be so vast: while dual-systems theories examine the process (intuit-*ing* as non-conscious information processing), the cognitive continuum theory deals with the outcome (intuition as a consciously registered outcome), i.e. the resulting cognitive style. Neuroscience seems to assert that the deployment of the two processes, deliberative and intuitive, depends to a large extent on the level of prior experience which echoes the NDM tradition.

Intuitive expertise and NDM

A significant amount of research has been conducted in the NDM framework, which explains the connections between intuition and expertise (Klein, Chapter 6; Lipshitz et al., 2001). This movement claims that in specific settings (uncertainty, time pressure, high stakes, permanently changing conditions, etc.), experts do not generate and compare sets of options but rather use their prior experience to categorize situations rapidly. Expertise is organized in highly sophisticated patterns which are context-dependent or domain-specific. Many NDM models exist; the Recognition Primed Decision model (RPD) of Klein is one of them and is “a blend of intuition and analysis” (Klein, Chapter 6: 74). The “pattern matching” is a speed tacit knowledge process which compares the observed situation with typical situations already encountered in prior experience. Then, using mental simulation, the decision-maker imagines an option until it appears to fit the situation. According to Klein, the pattern-matching element is the intuitive part (System 1, fast and unconscious) and the mental simulation is the conscious and analytical part (System 2, slow and deliberate). “A purely intuitive strategy relying only on pattern matching would be too risky because sometimes the pattern matching generates flawed options” (Klein, Chapter 6: 74). When testing the prediction from the RPD model, the first option the expert considers is usually satisfactory, which “exemplifies Herbert Simon’s notion of satisficing” (Klein, Chapter 6: 74). Training in intuitive decision-making allows a person “to size up situations more quickly, recognize problems and anomalies of the situation and feel confident when selecting the first course of action” (Bakken & Haeren, Chapter 11: 127). The NDM movement has contributed to the work of numerous types of professional: army small-unit leaders, Navy commanders, jurors, anesthesiologists, airline pilots, nurses, highway engineers, etc. (see also the special issue of *Organization Studies*, 27(7), 2006).

Linking intuition with NDM would seem to limit the application of intuition to experts alone. According to Sinclair, this is only one – and quite a narrow – view of intuition as relying exclusively on experiences which we already possess. The distinction between inferential and holistic intuition is useful to understand why intuition must be considered in a broader sense.

Inferential and holistic intuition

In the framework of NDM, experts’ knowledge is organized in highly sophisticated patterns coming from their previous accumulated experiences. In this specific case, intuition is termed “inferential” by Pretz

(Chapter 2) because experts' knowledge is organized in a meaningful way, allowing them to rely on the long-term memory of these typical and automatized configurations. They automatically recognize familiar situations and intuitively know how to react with remarkably high speed and accuracy by trusting intuition (Pretz, Chapter 2: 19 & 23). Thanks to relevant methodological work tools such as cognitive task analysis (CTA, Crandall, Klein & Hoffman, 2006), the experts are partly able to expose some of the inferences used. This kind of process is also called "matching style" by Sinclair (Chapter 1: 10). Nevertheless, intuition can also be of a holistic type. It is non-sequential and usually deals with the high-speed synthesis of "unconnected memory fragments" (Sinclair, Chapter 1: 5) in a new framework which is incompatible with conscious deliberation. The outcome is something new and is close to what Glöckner and Ebert (Chapter 14) call "constructive style". It seems that holistic intuition is appropriate in highly complex problems and may be used also by non-experts in their daily lives.

Inferential intuitive judgments... rely on...	automated analyses
Holistic intuitive judgments... rely on...	holistic integration of cues

The link between complexity and intuition has a corollary: the link between intuition and expertise in a given field. For Pretz (Chapter 2: 22-24), the novices mainly use a holistic intuition because they do not have enough knowledge to use an analytic approach. As soon as experience grows, the "intermediate experts" start to become familiar with and handle the rules, so that they can give analytic responses. When a high level of expertise is reached, inferential intuition - supported by sophisticated domain knowledge - becomes possible. Yet, this does not exclude holistic intuition, when the issue is felt to be highly complex (e.g. an important number of variables and/or a completely new phenomenon). For Sinclair, the NDM literature is interesting but does not exhaust knowledge of the intuitive processes because mainly focused on inferential intuition.

Creative intuition

Beyond the field of decision, intuition also includes creative properties as exposed by Strick & Dijksterhuis (Chapter 3). For the "Unconscious Thought Theory", intuition can produce something fundamentally new, which then paves the way to creativity (the "Aha ! moment" in Chapter 3 ; "insight" in Chapter 5, or "Euréka !" in Koestler, 1965). This theory studies the combination of or alternation between active searches for information on an issue, where the individual searcher is goal-oriented, and incubation periods, where he stops any active attention (period of "distraction") to listen finally to what he feels ("gut feeling"; Gigerenzer, 2007). "Distraction" is a phase of diverted attention; it acts as a 'bubble' that puts to sleep poor heuristics or the setting on rigid patterns to promote a fresh look on the issue. This incubation interlude should not be merged into passivity because the subject knows he has to find the solution (he is goal-oriented). Unconscious thought is goal-dependent, i.e. without a goal, people do not engage in unconscious thought. The same idea, called "defocused attention", is developed by Duggan and

Mason (Chapter 7: 83) about strategic intuition: “insights do not come to those who simply ignore problems or wait passively for solutions to bubble to consciousness”.

Therefore, with Hodgkinson & Sadler-Smith (Chapter 5), we need to identify the roles played by incubation and intuition in the processes leading to insight. Along Hogarth’s lines (2001: 254), we can say that “insight” is “typically reserved for those moments when people suddenly realize that they can “see into” the structure of problems” (Hodgkinson & Sadler-Smith (Chapter 5: 53) so that the solution suddenly enters conscious awareness. This subjective experience is followed by a “strong conviction of certainty”. Laboratory studies (e.g. the Remote Associates Test) support the role of incubation and intuition in the process leading to insight. Sinclair (Chapter 1) considers that we must expand intuition to creation and not limit it to a domain-specific expertise: our everyday experiences are also a source of intuition. Strategic management and entrepreneurs (Chapters 7 and 8) combine existing dispersed patterns in novel and creative ways. We must go beyond expertise to link intuition with broad experience accumulated in the past directly or indirectly via reading, seeing and hearing. Finally, even if creative intuition seems instantaneous at the “Eureka!” moment, it is not always immediate: a long period of incubation may be necessary. For some researchers, the positive properties of incubation may be related to the role of a state characterized by “psychophysiological coherence” (McCraty, Atkinson, Tomasino & Bradley, 2009; Tomasino, Chapter 21); this state would be “a state of optimal function” which is associated with emotional stability, reduced stress and negative emotions and an increase in positive emotions (Tomasino, Chapter 21: 254).

Intuition in critical occupations: life, death and law

The third part of the book (Intuition in professional/occupational domains, Chapters 10 to 15) will perhaps ‘speak louder’ to management scholars. Since intuition is discussed through concrete occupations, the authors seem to consider that its virtues are greater than experimental laboratory models tend to show. This is mainly due to the fact that the contributors deal with critical situations (emergency nursing and emergency medicine, firefighting, aviation, crisis management) but also with apparently counter-intuitive occupations as legal expertise.

Langan-Fox and Vranic (Chapter 10: 111-119) underline the role of intuition in what they call “critical settings”: “may be because of the gravity of their decisions, professionals in these occupations do not take intuition lightly [...] intuition is a *vital* construct” (authors’ emphasis). Nursing intuition, for example, appears to be an important component of medical diagnosis. The authors show that knowledge, experience and expertise are reciprocally dependent and interact permanently so that intuition is a valid behavior not only in emergency but also in clinical nursing. Intuition is mixed with analysis and is also efficient in detecting instantaneous danger elsewhere, such as in air-traffic control, military combat or law enforcement. Here, intuition is heavily linked with training, observing cues and signals that indicate danger, responding to emergencies and noticing with all our senses and not only over-relying

on our vision: “our senses are stronger than we think” (Langan-Fox and Vranic, Chapter 10: 117). In other words, intuition is linked with mindfulness (Dane, Chapter 18).

Paradoxically, if classic military decision-making models omit or diminish the role of intuitive decision-making in the outcome of military operations, military command demands continuous adaptation to dynamic and vital situations along the lines of the advice offered in the Crisis Management Manual of the Norwegian Police (Bakken & Haerem, Chapter 11: 123). In contrast with a sequential view of decision-making, the authors show that, even in this kind of context, conceptualizing intuition and analysis within a dual process perspective, working in a complementary manner, is starting to become more common. According to the authors, crisis management, which is the term usually adopted in military or rescue settings, requires both processes, as more recent military models show (Bakken & Haerem, Chapter 11: 124). Due to the specific context of crisis, which involves time pressure and task complexity, conscious deliberation is not always possible. Intuitive processing could and should be learned in parallel with analytical thinking because of time pressure in particular.

We believe that one of the most interesting chapters is that written by Glöckner and Ebert (Chapter 14) on legal intuition and expertise. The extensive consequences of legal decisions are one reason for this, while the other is the ‘fine-grained’ analysis put forward by the authors. Based on dual processing models (System 1/System 2), they explain that “hunches” or “feelings” are a necessary condition for making valid legal judgments which are usually highly complex in difficult cases. Of course, this does not mean that judges should avoid deliberating: legal judgment “must be supplemented by deliberate processes that enables for correcting of biases” (Glöckner and Ebert, Chapter 14: 157-58). An example is given about the simplest class of intuitive processes, associative intuition, which should be avoided in legal judgment. This process refers to direct affective responses to stimuli that result from previous experiences with sufficient similar stimuli, e.g. a defendant who is similar to another individual of whom the judge has experience (Glöckner and Ebert, Chapter 14: 161).

Another (positive) class of intuitive processes is matching intuition, which is essential for lawyers because “it quickly provides them with a feeling of how similar cases have (on average) been decided before. This is particularly important in common-law countries like the US, where legal arguments are heavily based on precedent cases” (Glöckner and Ebert, Chapter 14: 162). This second type of intuition refers to the NDM framework. A third class of intuitive processes (constructive intuition) builds consistent interpretations on the basis of evidence and prior knowledge. This type of intuition often leads to quick holistic impressions. In legal decision-making, the “story model” “posits that jurors impose a narrative story organization on trial information... Meaning is assigned to trial evidence through the incorporation of that evidence into one or more plausible accounts (stories) describing ‘what happened’ during events. The best story is selected, based on coherence, coverage, goodness-of-fit and uniqueness. This process of story con-

struction may involve deliberation but may also emerge spontaneously” (Glöckner and Ebert, Chapter 14: 162-163). Of course, intuition may have pitfalls and biases, and deliberation with a view to re-checking and imagining the opposite interpretation usually helps to reduce errors.

The role of affects

The whole book shows that intuition includes affective components. Emotions and affects interfere with or support intuitive processes, but what is not clear is whether they precede (affects as antecedents) or compose (affects as a process component) the process and/or confirm the outcomes coming to consciousness. For Dane and Pratt (2007), intuition is an affectively charged judgment: those authors consider affects to be a component of the process but the question of the stage of feeling is not clear. Coget (Chapter 12) discusses the role of emotions in intuitive decision-making, and not mood, which is a more fuzzy and permanent state. The author does not discuss the ‘dark side’ of emotions. He proposes a “critical decisions vortex model” of “how rational decision making, intuitive decision making and emotions supplement, complement or impede each other” (Coget, Chapter 12: 134). This model is a meta-process of thinking, intuiting and feeling. He shows that, while overwhelming emotions can interrupt decision-making, emotions of a lower intensity possibly energize action and facilitate empathy. For example, intuition can alert physicians to revisit an earlier diagnosis based on rational conclusions. This model is also tested in two other contexts whose characteristics are very different from emergency rooms: movie sets and wineries.

While mainstream research has developed models of intuiting related to cognitive processes within the brain, a few studies sustain that the heart, a “hold-held notion” is involved in the psychophysiological and emotional processes that underlie - and precede - intuiting experience (Tomasino, Chapter 21). Intuition is then considered as a *whole-body process* “by which intuitive perception occurs and also [...] appears to enhance intuitive receptivity” (Tomasino, Chapter 21: 247, *author’s emphasis*). Congruent with research of Immordino-Yang and Damasio (2007), in positive emotional states, when the heart generates a harmonious, coherent rhythm of activity, the resulting pattern of cardiac afferent input to the brain contributes to cortical facilitation, whereby higher cognitive faculties are enhanced (McCraty et al., 2009) and may be trained with specific tools.

METHODOLOGICAL ISSUES

The book provides and discusses different methods in experimental and natural settings, from seminal research dealing with systematic biases associated with certain types of intuitive judgments (laboratory experiments in the HB tradition) to recent work using interdisciplinary

techniques (e.g. in the NDM framework). Methods used by scholars to elucidate how intuition processes are numerous and controversial. From knowledge elicitation methods to neuroimaging, many techniques are used to “track” intuitive processing and outcomes (Hodgkinson & Sadler-Smith, Chapter 5: 60; Tomasino, Chapter 21). Due to people’s bias to favor positive rather than negative outcomes, scholars must study the whole range of intuitive processes, i.e. “the hits and the misses”, which is not an easy task. First, ‘think-aloud techniques’ may not be sufficient; secondly, intuitive processing cannot necessarily be elucidated because of its tacit nature.

A number of NDM researchers use CTA (Crandall et al., 2006) in order to identify the cues and strategies used by experts in their intuitive judgments but without being able to explain why experts made their decisions. One of the reasons is that experts possess practical intelligence which is not easy to account for. Most of the techniques aim at retrospectively recovering intuitive episodes such as Critical Incident Technique (Flanagan, 1954), while others try to capture intuiting at the moments of its occurrence (Hodgkinson & Sadler-Smith, Chapter 5: 59). The former are subject to sources of bias and inaccuracy, while the latter are relatively time-consuming or may need researchers to be present. The latter is not necessarily possible nor in tune with “on-the-spot” intuitive episodes, e.g. in some dangerous or specific contexts (medicine, air-traffic control, rescue, etc.). Ethnographic research and phenomenological inquiry could be another means to gain a first-hand description of one specific domain of experience. Guided introspection based on psycho-phenomenological methods would also offer the potential for higher levels of ‘granularity’ in natural settings (Petitmengin, 2006, 2009).

By contrast with eliciting techniques, other recent physio-neuro techniques are used in laboratories in order to identify intuition episodes and physical manifestations of intuitive processes. Functional Magnetic Resonance Imaging, Electroencephalography and Skin Conductance Responses are three kinds of neuroimaging techniques aiming at tracking “somatic markers” that inform decisions and therefore “operate in advance of conscious awareness” (Hodgkinson & Sadler-Smith, Chapter 5: 62). In Chapter 21, Tomasino confirms that “electrophysiological studies have typically shown that the body responds to a future, randomly selected stimulus *4-7 seconds before* (*author’s emphasis*: 249) the stimulus is experienced”. The book invites researchers to develop more interdisciplinary research using multiple and mixed methods in order to cross-fertilize their views of this “complex and intriguing phenomena” (Hodgkinson & Sadler-Smith, Chapter 5).

CULTIVATING INTUIT-ING?

The last part of the book deals with “cultivating intuition” and begins with an interesting chapter written by Dane (Chapter 18). One of the main ideas is that intuition is linked to “a *mindful* state of consciousness in which [...] attention is directed toward present moment phenomena” (*author’s emphasis*). Dane explains that “one who is in a mindful state of consciousness attends to [...] both *external* (environmental) and *internal* (intra-psychic) phenomena, as each is integral to the moment in which one is engaged [...]. Mindfulness has been described as the clear and single-minded awareness of what actually happens *to us* and *in us* at the successive moments of perception” (*author’s emphasis*: 222). This last argument, according to which individuals tend to notice more internal phenomena than they otherwise would, is very important: mindfulness is associated with high levels of self-concordance with respect to implicit (non-consciously based) and explicit (consciously evaluated) affective states. We can easily link these arguments with those of Weick and Sutcliffe’s work (2006), as the author says himself: mindfulness would be a condition, an aware resource of deeply rooting for *intuit-ing*. Thus, according to Kuhnle (Chapter 19), Burke and Sadler-Smith (Chapter 20) and Tomasino (Chapter 21), intuition could and should be honed through training and integrated into higher education and other occupations such as those discussed earlier in the book (e.g. management, medicine, aviation, rescue, etc.).

In spite of deep divergences between some authors, it clearly emerges from this book that intuition gathers many contributors from different scientific disciplines which engage in efficient dialogue, and in particular psychology and neuroscience, which is unsurprising in the modern world. Both these disciplines, along with ergonomics and education, are currently supplying fruitful research on intuition, while management is, rather, waiting for more results and teaching methods. This variety reveals connections that one would have deemed improbable years ago, e.g. the article recently written by Kahneman and Klein (2009), who operate according to opposite traditions (HB vs NDM). This article shows a starting convergence that the book underlines with optimism on page 59: “a psychology of intuitive judgment and decision-making that ignores intuitive skills is seriously blinkered” while “a psychology of professional judgment that neglects predictable errors cannot be adequate” (In Kahneman & Klein, 2009: 525).

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