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The four types of intuition managers need to know

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Abstract In today's rapidly changing but data-rich environments, managers at all organizational levels need to use appropriate intuition, balanced with analytic thinking, to create and capture opportunities. Intuition is often thought of as a single construct, but our 2-year longitudinal study of multiple managers developing opportunities uncovered four distinct types of intuition: expert intuition, based on previous experience; creative intuition, based on a sense of direction for a novel solution; social intuition, based on a sense of interpersonal relationships; and temporal intuition, based on a sense of the timing being right to create or capture an opportunity. We offer a range of recommendations regarding the strengths and limitations of each type of intuition. With a more nuanced understanding of the types of intuition, managers will be better equipped to leverage the strengths—and be wary of the limitations—of intuition in their own decision-making and that of others.

1. Intuition in a digital world

Digital transformation of business has led to the ever-increasing availability and use of big data in managerial decision-making. Yet as Nell et al. (2021, p. 164) described, an "overreliance on quantitative data over holistic judgment and intuition" is the first trap of digitalization that hampers strategic decision-making. To counter this, Vincent (2021) suggested that integrating intuition with big data and artificial intelligence is the best means of improving decision-making in the current business environment, particularly when exploring new opportunities. So, while intuition has been of interest to management scholars as far back as Barnard (1938), it now has a renewed significance in understanding and improving decision-making in today's data-rich but highly dynamic business environments. The challenge for managers is finding the appropriate balance between intuition and analysis in making decisions relating to opportunities in uncertain environments. Too much

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reliance on intuition without a balance of data and analysis leads managers down a risky path of chasing untested hunches. Conversely, too much reliance on data and never trusting their intuition leaves managers stuck with paralysis by analysis; they wait for the perfect data to emerge, which may never transpire. Or, if the data does emerge, it is usually because someone else has already capitalized on the opportunity. Finding this balance and using appropriate intuition to guide exploratory action is becoming an essential skill for managers navigating uncertain conditions.

Modern dual-process theories from psychology have helped many managers better understand the role of intuition (Hodgkinson & Sadler-Smith, 2018). These theories treat intuition and analytic thinking not as opposite ends of a continuum, as was once popular, but rather as two systems or types of thinking and feeling about a situation that work in parallel. Type 1 processes are older in evolutionary terms and consist of a set of subconscious intuitive and automatic processes. Type 2 processes are more recent in human development and include reflective analytic thinking and reasoning (Evans & Stanovich, 2013). They each have their strengths and limitations and can be used together, to greater or lesser degrees, when assessing any given circumstance. Most managers could identify many types of analytic thinking that apply to their decision-making—for example, when conducting financial analysis, competitor analysis, strategic analysis, and many versions of technical analysis. Intuition, on the other hand, is still often considered a single construct. This is, however, a rather simplistic view of intuition (Dane & Pratt, 2009) and one that is not helpful for practicing managers, particularly when exploring new opportunities. To expand our understanding of this area, we examined the types of intuition used by practicing managers who were actively exploring and developing new opportunities within data-rich, high-tech environments. We uncovered four types of intuition these managers used at various times in the opportunity-development process. These types are expert intuition, creative intuition, social intuition, and temporal intuition. In this article, we will describe the nuances of these four types of intuition, when they are most valuable, and limitations to be aware of in their use.

2. Getting beyond "expert" intuition

Dual-process theories of cognition have, in recent years, helped academics and practitioners come to a much-improved understanding of managerial cognition (Hodgkinson & Sadler-Smith, 2018). These theories broadly describe two types of thinking and feeling. Type 1 processes consist of emotions, affect, and intuition. Type 2 processes include analytic thinking, language, and logic. But, as mentioned in Section 1, while historically these two types of cognition were thought of as opposing ends of a linear spectrum, we now understand that they are two separate systems that work—to more or lesser degrees—simultaneously. This means we do not operate with just one or the other of intuition and analytic thinking; we operate with both modes of cognition-affect at the same time. In some instances, one type or the other is dominant, but we need to better understand both types to balance them when needed. This is particularly true when deciding on novel opportunities. Within the dual-process framework, however, there remains much to be understood, as articulated by Hogarth (2010, p. 342):

> If one pushes the dual process idea further and, in particular, starts to look deeper into non-conscious and automatic processing, it becomes clearer that humans have many different information processing systems and that there are further useful distinctions to be made within the two processes of dual models.

Psychologists generally now support the view that intuition is multifaceted (Dane & Pratt, 2009; Gore & Sadler-Smith, 2011; Pretz et al., 2014; Sinclair, 2011; Sobkow et al., 2018), but despite this agreement, there is a dearth of research examing the types of intuition as used in managerial practice. We echo the sentiment of Shapiro and Spence (1997, p. 64) who stated: "The more we know about intuition, the better we will understand how and when managers can use it to their best advantage."

The type of intuition that has received the most attention in management is the immediate assessment of a situation that an expert with years of experience in a particular field is able to make. This is based on pattern recognition and subconscious comparison with complex schema that an expert has developed over time in a specific domain (Gore & Sadler-Smith, 2011; Sadler-Smith, 2016). This was famously described by Simon (1987, p. 63) as "analysis frozen into habit" after he studied chess grand masters and their ability to instinctively read a pattern of play and to make an immediate move in response. This was also the sole intuition of focus in Kahneman's (2011) widely read *Thinking Fast and Slow*, although this work almost exclusively focused on the biases

associated with its use. This type of intuition has generally been referred to simply as intuition (Dane & Pratt, 2007; Khatri & Ng, 2000; Simon, 1987), or as intuitive style (Saiz-Álvarez et al., 2013). If a more nuanced view has been taken, it has been described as expert intuition (Crossan et al., 1999; Dutta & Crossan, 2005), pattern recognition (Policastro, 1995), automated expertise (Miller & Ireland, 2005; Sinclair, 2011), problem-solving intuition (Dane & Pratt, 2009; Gore & Sadler-Smith, 2011), intuitive judgment (Dörfler & Ackermann, 2012), inferential intuition (Pretz et al., 2014), or implicit learning (Sobkow et al., 2018). Here we refer to this type as expert intuition, and we follow Dane and Pratt's (2007, p. 40) widely adopted definition of this as "an involuntary, difficult to articulate, affect laden recognition or judgment based on prior knowledge which is arrived at rapidly, through holistic associations and without deliberate or conscious rational thought."

Distinct from expert intuition is a more prospective type that is used when developing novel solutions. In contrast to expert intuition, which involves rapid analysis, this creative type of intuition involves holistic synthesis. This form of intuition employs different psychological processes from expert intuition, as Policastro (1995, p. 110) explained:

> Certain forms of intuition seem to operate as tacit pattern recognition, among experiences that have similar structure. On the other hand creative intuition seems to operate as a form of tacit pattern generation, entailing the organization of a novel structure.

This has been described as creative intuition (Dane & Pratt, 2009; Gore & Sadler-Smith, 2011; Sinclair, 2011), pattern generation (Policastro, 1995), entrepreneurial intuition (Crossan et al., 1999; Dutta & Crossan, 2005), holistic hunch (Miller & Ireland, 2005), intuitive insight (Dörfler & Ackermann, 2012), holistic intuition (Pretz et al., 2014), or coherence and insight (Sobkow et al., 2018). Here we refer to this type as creative intuition and adopt the definition as "a vague anticipatory perception that orients creative work in a promising direction" (Policastro, 1995, p. 99).

In social psychology, another type of intuition has been the primary focus. Here, it has been stated that "intuition plays a prominent part in interpersonal relations, in our judgments of other people and our behavior towards them" (Neisser, 1963, p. 1). One of the more prominent dual-process models, social cognitive neuroscience (Lieberman, 2000, 2007), has its roots firmly embedded in social psychology and social intuition. Social capital (De Carolis & Saparito, 2006) and the role of social networks (Greve & Salaff, 2003; Hoang & Antoncic, 2003; Jack, 2005) have been well established in research relating to developing opportunities, but the role of social intuition in the evolution of these relationships is not well understood. We refer to this type as social intuition and adopt Gore and Sadler-Smith's (2011, p. 310) definition of the same as "rapid and automatic evaluation of another person's cognitive and/or affective state through the perception and non-conscious processing of verbal and/or nonverbal indicators."

We note that, related to social intuition, there is an emerging field of research starting to look beyond individual intuition to the dynamics of team intuition (Samba et al., 2019), but in this study we have elected to remain focused on individuals, as we feel there is still much to learn at this level. We also acknowledge that coming from the field of ethics, another type of intuition—moral intuition—has been the main area of interest (Haidt, 2001; Sonenshein, 2007). Moral intuition has been defined as "the sudden appearance in consciousness of a moral judgment, including an affective valence (good-bad, like-dislike), without any conscious awareness of having gone through steps of searching, weighing evidence, or inferring a conclusion" (Haidt, 2001, p. 818). While there has been some suggestion it may be a distinct form of intuition (Dane & Pratt, 2009; Gore & Sadler-Smith, 2011), it is generally now accepted as another form of social intuition (Haidt, 2001; Tomasello, 2018; Woodward & Allman, 2007). We therefore include moral intuition within the broad category of social intuition.

Against this theoretical background, we wished to better understand how these multiple types of intuition are used in the field when navigating new opportunities. Hence our research question: What are the various types of intuition practicing managers use to navigate and develop a new opportunity?

3. The research

Researching intuition in the field presents several challenges, which is one reason there is little existing coverage in this area. We identified that, as opportunity navigation and development happens over time, so we would need to capture data over time to see the effects unfold. We therefore

chose to engage in a longitudinal study over 2 years. We selected the high-tech sector because it is data rich. It also has a high degree of environmental change, which would allow us to see the dynamics of opportunity development play out alongside the potential to use various intuition types to navigate uncertainty. We identified several experienced individuals who were actively seeking or developing opportunities at the time our study started. We were able to secure the participation of seven managers who were leading opportunity development efforts, as shown below in Table 1.

All participants were experienced managers, so we were able to draw on expert intuition as well as the other types of intuition we hoped to find. We did not want to rely on simple self-reporting as a means of capturing the role of intuition owing to known limitations (Hodgkinson, 2002) and so decided to use causal cognitive maps (Huff, 1990) as a means of engaging with participants. Cognitive maps are a visual representation of how an individual perceives the range of factors that influence a particular situation, environment, or strategic landscape and the causal relationships between these factors. To elicit the initial factors that make up the map, we used the Self-Q method, which explores the questions we ask ourselves, the questions we ask others, and the questions others ask us in relation to the strategic environment (Bougon et al., 1990). In this case, "the environment" refers to the set of conditions relating to the nascent opportunity. The participants wrote their most significant questions about this on individual sticky notes and placed them on a whiteboard. They were then asked to identify the causal connections between them; that is, if the answer to one of the questions became clear, how would that influence any others and, therefore, the overall perception of the opportunity? These causal connections were drawn on the whiteboard, and this initial map was photographed and codified for subsequent analysis, including a review with the participants at the subsequent sessions.

As we also wanted to avoid post-hoc rationalization and overattribution of intuition, which had been found previously (Blume & Covin, 2011), we then engaged with our participants on a quarterly basis about how they perceived their opportunities at that time. This was done by comparing their current perceptions with the previous quarter's cognitive map. If any changes were perceived over each period, they were captured on the new map. This indication of a changing perception was the flag for us to delve into the area(s) of most change at each session. In discussions, we uncovered the reason participants' perceptions changed about their opportunities. All conversations, including the construction of the initial causal map, and each review session with discussions on changes to the map, were transcribed, coded, and

Table 1. Research participants and the opportunities being developed

Participant	P1	P2	P3	P4	P5	P6	P7
Role	CEO	Founder	CEO	CEO	Founder	Founder	Founder
Experience	20+ years	20+ years	16 years	20+ years	17 years	17 years	16 years
Opportunity	New market niche for hardware product	New hardware product for existing market	Startup with new market for hardware product	New geographic market	New software products for new markets	Sale of company, investing in new technology	Startup with new software product and markets
Main challenge faced	How to define the value proposition for the new niche and how best to reach them	How data from a new sensor technology can provide new value for current customer segments	How to ramp up the IP from lab scale and who to partner with in the process	How best to replicate the business model in an entirely new region	How to quickly validate new product ideas with new markets	How to execute an exit strategy followed by how to decide on investment options	How to balance customer development and product development activities with limited resources
Sessions (Total = 42)	6	7	7	3	6	6	7

subsequently analyzed for indications of various types of intuition (Gioia et al., 2013). An example of a cognitive map, including the change over time and indicated by different colors used at each session, is shown below as Figure 1.

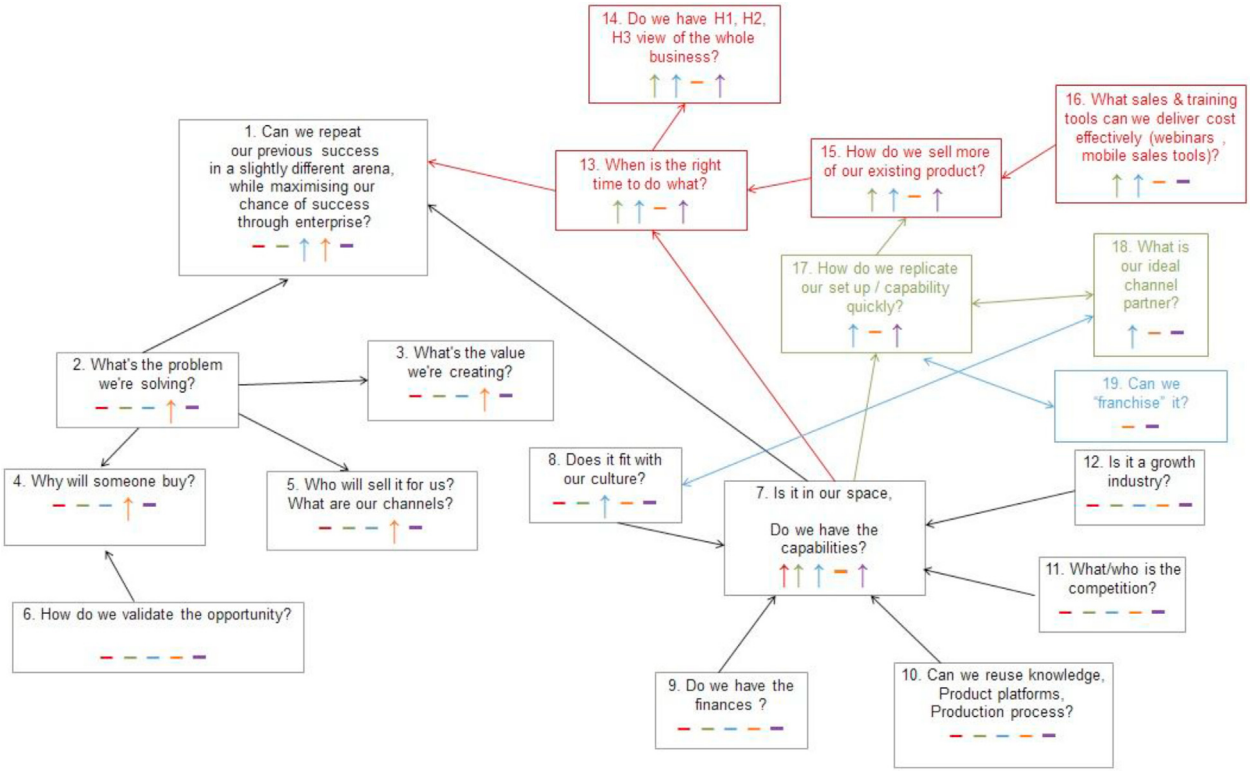
In analyzing the transcripts, we employed an action-based coding scheme largely using gerunds—verbs ending with "—ing"—to identify where the participants had taken action (Saldana, 2011). This was because we were looking for instances where action was taken because of, or was progressing with, some form of intuitive feeling or analytic thinking. Alongside this there were instances of in-vivo codes; that is, where they referenced their intuition or analytic thinking (explicitly and as reflected in the transcripts). NVivo software was used to conduct the coding and to organize the substantial number of primary codes from the thousands of individual source references. From there, a secondary round of coding was employed to draw together similar themes while also employing an abductive approach of systematic combining (Dubois & Gadde, 2002). We started with the initial framework based on the known, but empirically underresearched, elements of intuition. Then, in analyzing the data that emerged, we continually referred to the existing literature and definitions to establish the novelty in our findings.

4. The four types of intuition

Having analyzed all the data from the conversations with the research participants, there were many types of intuition at play at various stages in the process of opportunity development. Our findings are consistent with Dane and Pratt's (2009, p. 4) assertion that "these intuition types may also differ in certain ways with regard to the nature of their holistic associations, affect, and speed."

First, as expected, there were several cases of expert intuition uncovered. An example of this is when P7 identified a way to exploit a market opportunity for their novel chatbot and said, "This has been in my mind because of previous experience. Definitely very relevant, you see something and make an immediate connection which maybe someone who hasn't worked with affiliate programs would not have made." Similarly, P4 said, "I still knew what I wanted to do that had come from experiences I have had." Describing the rapid nature of this type of intuition, P5 said, "Gut feel that I can probably, sounds a bit arrogant but it's not, you can almost make a decision in a few minutes if you hear an idea, you think if it's got legs or not." Although this was an expected type of intuition, what was unexpected was that this was not the dominant type of intuition experienced by

Figure 1. Example of a causal map of one of the participants after six sessions



our participants. This may be because expert intuition happens very rapidly and so was difficult for us to catch. It could also be that because our participants were exploring dynamic, new opportunities, the similarity with their previous experiences may have been less relevant than if it had been an existing field.

Second, we uncovered many instances of creative intuition. This was the most common form of intuition in our study and was used by all participants to some extent. An example of this came from P2, who was investigating possible applications for a new sensor technology and said, "I was not doing any deliberate analysis. I was getting information from talking to people, people would give me something, in a semi random way and I was starting to feel something new about this whole domain." This feeling toward the opportunity was often reflected in a positive emotional reaction to the opportunity that developed over time. P1 described this as excitement but also noted he was trying not to get too excited by the promise of the new opportunity, which was a synthesis of two existing technologies. He said, "I get quite energized by the convergent space, we get excited by new ideas, but we have to be a bit measured." In these examples, we can see the effect-driven reaction to the potential future opportunity. P7 discussed this creative aspect but also said that it takes some time: "I do believe there is potential there, definitely. It's not an easy, smart phone app that it flies or doesn't fly, it's more like creating a movie and rolling it out." P3 spoke about how he found value in using incubation as a part of his decision-making process:

> I would work like a dog on doing due diligence, so I would ask all the questions write up a big thick report, but I'd leave the conclusion alone. And once I'd finished that process I wouldn't think about it for a day or two. Then I would set some time when I would literally put my feet up on the desk and just mull it over, would I be annoyed if we did this or you know if we passed on it and it was successful, um do I really want to be there through the next few years? And I'd just let a conclusion kind if emerge.

As we see in these cases and in contrast to the rapid nature of expert intuition, creative intuition takes time to unfold.

Third, we found several instances of social intuition. Although not used all the time, this was heavily relied on by all participants at some point in the development process. This was particularly the case if strategic partners, such as distributors or development partners, were sought out or relied on for some part of the opportunity to come to fruition. P2, when assessing his technology partner, said he asked, "What is the quality of the people behind the offering?" An interesting insight here is offered by P1, who was deeply engaged in seeking a suitable channel partner to help bring the new offering to market. He described his impressions, the reaction of the potential partner, and the significance of the social aspects that outweighed the business proposition:

> They were telling all the right stories and you spend time with them and then you just find that you have a similar view on life…what's happened to other people and even our own journey, and when all of those things lined up we felt really quite comfortable. Interesting when I first met with one of them the others were overseas and they spoke that night and X said his partner Y's first question was, not what's the business like, will they accept our proposition or anything like that, it was what's he like?[1]

P6's expression of this was:

> I suppose because when you are assessing someone's ability to get the job done or get it over the line you are drawing on some of this, but you are drawing on other things as well and we are talking about intuition.

P4 spoke about this in terms of relationship building and trust: "We are deepening the relationship out in China; we have a purchasing agreement with a number of companies, but we will start partnering with some distribution companies… and that's deepening that trust." In these cases, we can see the personal impressions of other people were heavily reliant on an intuitive, rather than an analytic, assessment.

The fourth type of intuition uncovered was unexpected, as it was common to most participants but not a type of intuition described in existing research. We refer to this as temporal intuition, which is the subconscious feeling of timing relating to the opportunity. There were several facets to the sense of timing. First, there was the feeling about the external market and the window of opportunity, as P1 described when his new offering was reaching market launch. He said, "Now customers are looking to change so now the timing is kind of right for that and in fact timing is right for us." P3 described his sense of urgency in preparing

[1] Individual names removed.

for a phase that would include capital raising by noting, "Part of my reason for timing this thing is that we don't want to get caught the last in the line for punch when somebody pulls the bowl."

In addition to the externally focused window of opportunity, there was often an internally focused aspect of temporal intuition, when participants asked, "Are we ready to do this now?" P6, who was evaluating an acquisition opportunity, described it this way:

> A high level of intuition as to when is the right time to do this, and part of it is our own maturity as an organization as well. Can we, you know one of the ways we kill a weed sometimes is by giving it a growth hormone. You know it grows so rapidly that it kills its resources and dies and I think there's a lot of you have to be at a certain stage of maturity in your business both revenue wise but also people skills wise before you can undertake acquisitions and not have them actually destroy you. So that's an intuitive thing, well it's analytical too but there's a certain sense that yes, we could do this, and it wouldn't kill us.

Other aspects of judging the timing of action involved evaluating the pace of change and sequence of events, including opportunity costs (Wood et al., 2021). This was articulated well by P7 who, in a software start-up environment, was aware of how delicate timing decisions can be and understood that they come with trade-offs. He asked: "Can we afford to do two things at the one time? My gut feeling, intuition tells me probably not." He went on to describe the trade-offs that must be made when involving an intuitive assessment of timing:

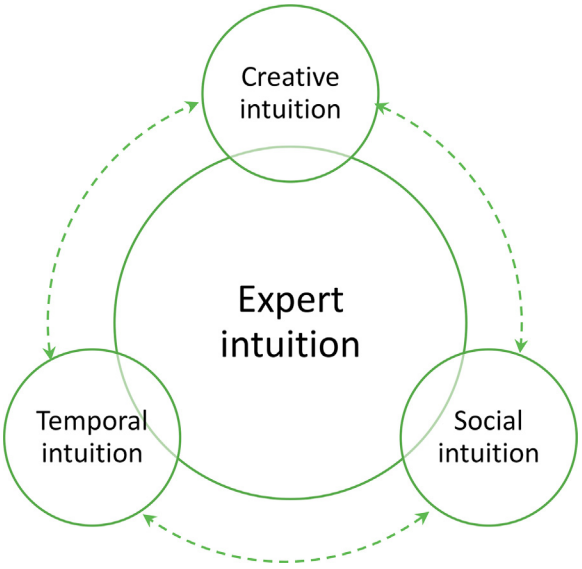
> That's the choices we make every day. How much effort do we put into improving our development environment? OK if we do it and broken down by day can we actually get a return on that in the next couple of weeks, if we don't get a return in the next couple of weeks, if we don't get an ability to do stuff quicker then we're not doing it. It's almost like you need to dig a trench and you have spades. And you also want to buy an excavator. Can you afford to buy an excavator? No. Can you build an excavator? Yes we can, but you will have to stop digging the trench.

Drawing from these observations, and in line with definitions of other forms of intuition, we define temporal intuition as a slow-to-form, affectively charged evaluation of timing for prospective action and pace of change based on complex patterns of multiple cues.

Temporal intuition, therefore, appears to be a key factor in decisions on a range of temporal dimensions, including initialization, pace, and chronology (Wood et al., 2021). We suggest that, as uncovered in our cases, each of these temporal dimensions has an internal and external temporal aspect to consider. We also suggest that, in addition to the linear conceptions of time that these dimensions imply, there are also cyclic temporal dimensions (Crossan et al., 2005) that temporal intuition plays a critical role in assessing. This is because many analytic tools used in business assume linear time. Temporal intuition then needs to be applied to determine issues of a cyclic nature. For example, entrainment (Ancona & Chong, 1996; Hopp & Greene, 2018), which refers to cyclic alignment, or being in phase with another organization's cycles, may be critical for the development of an opportunity. In the case of P1, this was present when he was assessing when to approach a strategic target. He noted, "And then you've just got to be around for when they are ready to make the change. Some of the biggest partners are you know they dictate the time, it's got to be ready in their evolution." We suggest that future research is needed to examine other areas where temporal intuition may be usefully employed.

Each of the four facets of intuition uncovered in our research had unique characteristics, as described above, but are also inherently interlinked in the individual's cognition-affect system; that is, in Type 1 processes (Hodgkinson & Sadler-Smith, 2018). As shown in Figure 2, expert intuition appears to have a central role and is applied along with the other types of intuition in some situations. As our participants encountered situations that would draw on the other types of intuition, they compared these with their experience of similar situations. Expert intuition is built over time through experience, and this appears to be a two-way relationship with the other aspects of intuition. For example, when evaluating new channel partners, P2 applied social intuition but also compared his previous experiences of finding distributors and of thinking about how those relationships evolved. In the process, each of these interactions where social intuition was used was also helping to build on his existing experience. There are also interactions, albeit weaker, among other forms of intuition. For example, temporal and social intuitions might be drawn on when evaluating partners to help decide whether the

Figure 2. The four types of intuition with overlaps and interactions between them



timing is right for a particular relationship. Creative and social intuitions interact when sensing the future potential and who can or should be involved. Creative intuition interacts with temporal intuition when getting a sense of a future novel opportunity and how quickly it may unfold. The full range of interactions between different types of intuition, the implications of those interactions, and potential conflicts between them were beyond the scope of this article but will provide rich opportunities for future research.

5. What this means for practicing managers

Managers must balance the need to avoid paralysis by analysis, while still making sound judgments with the available data. They may need the confidence to move forward with imperfect information at times. If they wait for all data to become apparent, the chances are the opportunity will be lost. P3 described this balance as being like crossing a river to get to an opportunity on the far side:

> It's a bit like seeing all the stepping-stones to get across the river versus not knowing there's a step there but having confidence that we'll find it if you lean forward. But if you wait till all the stones are there, it'll be gone.

As observed in our participants, managers rely on many types of intuition at various stages when they develop opportunities. Each type has its own strength and limitations that managers should be aware of, as summarized in Table 2.

5.1. Expert intuition

Expert intuition is best used when a situation is familiar and when the manager has several years' experience in a field. In these situations, expert intuition is helpful because an experienced manager can make a fast decision about a given situation. The limitation of this type of intuition is that we naturally tend to overestimate how similar our experience is to a given situation, and this can lead to falsely perceiving a situation as requiring a certain response. This type of intuition is also subject to systemic biases.[2] To counteract these natural limitations, managers should explicitly analyze the differences in the situation and compare these with their previous experiences before making hasty decisions. In some cases, the slight differences in the situation can be what creates the opportunity and so may require a different response to what was experienced before. We saw our participants use expert intuition successfully when the situation was like a previous experience. This was the case when P7 deployed an affiliate marketing program for the new product, which was like what he had done previously. P4 used a sales model that had worked for him before when he was trying to enter a new territory. In doing this, though, he was attentive to any warning signs that might indicate there was something different about the situation. The significant upside of using expert intuition in these situations is the speed at which the decision can be made.

5.2. Creative intuition

Creative intuition is most useful for a manager when an innovative new solution is required. This usually occurs because they are exploring a new opportunity or when a change in the environment requires a new solution. Creative intuition helps guide decisions about potential solutions that lead in a promising direction. It is not as rapid as expert intuition, however, and so guides the process of development over time as those developments unfold. Creative intuition does have three key

[2] See *Thinking, Fast and Slow*, (Kahneman, 2011) for a full description of these biases.

Table 2. Summary of strengths and limitations of the four types of intuition

Type of intuition	Strengths...	Most useful when...	Limitations...	Balance with...
Expert	Can help make rapid decisions	Situation is similar to previous experience	• Tendency to overestimate similarity of new situation to experience • Known biases	Analyzing differences from previous situations
Creative	Can help direct to innovative solutions	Entirely new opportunity space requires novel approaches	• Falling in love with our own ideas • Tendency to be drawn to novelty over value and additive over subtractive solutions	Testing potential early (including how to simplify) with small experiments and working in teams
Social	Can help build new working partnerships	Face-to-face building new relationships with customers or channel partners	• Need for social connection, so people like to be liked and to work with those like themselves • Misreading cultural influences	Putting agreements in place that formalize relationships
Temporal	Can help make decisions on entry timing	Deciding if time is right both externally and internally	• Overestimating past trends as predictors of the future • Assume rate of change is linear	Analyzing drivers of the rate of change internally and externally

limitations that managers need to understand. First, we need to beware of becoming too emotionally attached to our own ideas or allowing others who come up with ideas to become blind to alternatives. Commonly referred to as falling in love with our own ideas, this can become an issue, particularly when a person's ego and identity become too closely aligned with the solution. In these cases, any emergent failings associated with the solution become internalized as personal failings of the originator and are likely to result in confirmation bias (Kahneman, 2011). Encouraging teams, rather than individuals, to develop solutions can reduce these effects. The second limitation of this type of intuition is a natural tendency to be drawn to novelty over value. Radical new ideas tend to capture our attention and feel more exciting than more mundane solutions, even if the latter ultimately offer more value (Wells et al., 2010). Related to this is the third limitation, which is the apparently inherent tendency of people to favor additive, as opposed to subtractive, solutions to novel problems (Adams et al., 2021). In other words, when producing creative solutions, we intuitively tend to add additional elements as opposed to removing them, even when removing them is more effective and efficient. To counteract these limitations, managers should experiment and test ideas—including what can be simplified or removed—as early and as cheaply as possible and continue to do this throughout the process. Data from experiments can then be analyzed and used to balance the intuition. We saw our participants successfully use their creative intuition to create new opportunities, but they also balanced this with early experimentation to test their ideas. A good example of this was P2, who used new technology to create a novel diagnostic tool for existing clients. Early in the process, he tested his initial ideas with customers, the team, and commercial partners. Their feedback and the results of experimenting with prototypes were vital to shaping the offering, which was ultimately successful. Creative intuition is required to enable the creative action needed when creating innovative solutions in novel environments.

5.3. Social intuition

Social intuition is best used in developing new relationships with customers and with strategic allies, such as development or delivery-channel partners. The strength of this type of intuition is in quickly

establishing a sense of the people we will work well with over time. As businesses expand into new areas, they are more likely to need new strategic partners, so this form of intuition becomes increasingly valuable. The limitations of social intuition, however, mean that we are often drawn to people who we like on a personal level without fully understanding their business motivations. Similarly, we tend to work with people who are like us, when sometimes this is not the best approach (Luo & Deng, 2009). If someone has the same or a similar background, training, and experience as us, they often view the situation in a similar way, and this can limit our ability to see alternative perspectives. As with any social interactions, the behavior we exhibit and experience is heavily influenced by culture. Particularly in global business environments, social cues can be missed or misinterpreted because of a lack of understanding of different cultural norms (Hofstede, 2015). To balance these factors, managers should accompany social interactions with written statements and, in time, formal agreements that clearly state expected behaviors, actions, and goals for each party. With such agreements there should always be a review period built into the working relationship. This provides a means for both parties to exit the partnership, which is agreed upon before it is needed. During our study, P1 was successful in using his social intuition; he built a strong relationship with a new distributor in a new territory and, as a result, formal agreements were signed.

5.4. Temporal intuition

Finally, we use temporal intuition to decide whether the time is right for a particular initiative, in terms of external conditions and internal capability. The strength of this sense of the window of opportunity is that it helps initiate action and encourages an often-required sense of urgency. This sense of urgency drives action, which in turn is often needed in order to investigate and navigate the uncertainty. There are, however, some limitations with this form of intuition that we should consider. First, when evaluating change, we tend to overestimate the reliability of past trends when predicting future ones (Kahneman, 2011). Particularly in new or dynamic environments, industry trajectory can change quickly, which could have significant impact on decisions such as whether to enter a new market. Also, we are inherently poor at estimating nonlinear rates of change over time (De Langhe et al., 2017). Yet many changes in an environment—such as organic growth rates, network effects, and compounding costs—all occur with exponential dynamics. We suggest that to balance these limitations, managers should analyze the drivers behind the rates of change to better understand the dynamics and consequences that will influence timing-related decisions. When deciding to take on a strategic acquisition, P6 was aware of how his organization needed to be ready so the acquisition could be successful. He had slowed down the process so he could be confident that the time was right, and the merger was successful. From the external timing perspective, P3 always closely monitored the industry developments and assessed the timing for various stages of his technology's commercialization. Using this sense of timing, he was successful in several capital-raising rounds and recently signed a major commercial partnership agreement that will ensure the success of the company into the next phase of its development.

6. Conclusion

In the rapidly changing but data-rich environments that many organizations now face, managers at all levels of an organization need to be able to use appropriate intuition, balanced with analytic thinking, to guide their actions in creating and capturing opportunities. In this article, we have outlined the key aspects of expert, creative, social, and temporal intuition that can help guide decision-making and navigate ambiguous situations. We saw from our participants that, when navigating new opportunities, the types of intuition all played significant roles at various stages in the development of their successful opportunities. This was not at the expense of using smart analysis and relevant data but instead complemented or even directed them. This enabled action and, therefore, avoided paralysis by analysis. We hope that with this more nuanced understanding of multiple types of intuition, managers will be better equipped to leverage the strengths—and be wary of the limitations—of their own intuitive judgments and those of others.

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