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Playing Chess or Painting Pictures? Unpacking Entrepreneurial Intuition

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We present a longitudinal, empirical study of the entrepreneurial opportunity development process, focused specifically on intuition in multiple forms. By following the opportunity development process for several participants over a two-year period, we were able to extract empirical instances of various types of intuition applied to the development of entrepreneurial opportunities. We found that the entrepreneurs in the study used at least four distinct types of intuition: problem-solving, creative, social, and temporal. Of these, we propose temporal intuition as a type not yet discussed in extant literature, while the others have not previously been studied in the entrepreneurial context. There are strong connections between these various aspects of intuition, and we discuss how the four types interact in a dynamic, unfolding process we tentatively define as opportunity intuition.

Introduction

Dual process theories of cognition have gradually crossed over from psychology to managerial and entrepreneurial research and are now generally accepted as the most relevant theories for understanding individual cognition in entrepreneurial settings (Hodgkinson & Sadler-Smith, 2018; Sadler-Smith, 2016; York & Danes, 2014). Within the dual process framework, however, there remains much to be understood, as articulated by Hogarth (2010):

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. (p. 342)

One such nonconscious, automatic process demanding deeper examination is intuition. The definition of intuition has been an area of some contention in entrepreneurship, management, and organisational cognition studies although, in recent years, there has been widespread acceptance of a definition developed by Dane and Pratt (Baldacchino et al., 2015). This definition states that intuition is “an involuntary, difficult to articulate, affect laden recognition or judgement based on prior knowledge which is arrived at rapidly, through holistic associations and without

deliberate or conscious rational thought” (Dane & Pratt, 2007, p. 40). This, however, assumes a single type of intuition, although the authors expanded their definition to propose multiple types of intuition soon after (Dane & Pratt, 2009). The 2007 definition describes what can be referred to as expert or problem-solving intuition. This is where an individual has built up a wealth of expertise over time and has a complex, domain-relevant schema that drives an affective reaction to a similar situation as it is encountered (Gore & Sadler-Smith, 2011). Simon (1987) provided an often-quoted description of intuition as “analysis frozen into habit” (p. 63), which also reflects this expert view. Simon developed this perspective through studying chess grand masters and how they were able to intuitively make an immediate decision on their next move based on recognising the pattern of play.

In contrast to the expert view of intuition, other types of intuition can be defined, such as that which supports exploration of new ideas, novel connections, and emergent relationships. This type of intuition is required for innovation and change (Crossan et al., 1999). This was (perhaps unhelpfully for entrepreneurship scholars) referred to as entrepreneurial intuition in Crossan, Lane, and White’s (1999) model of organisational learning. Within this view, intuition is not only based on pattern recognition but is more focussed on novel future potential and is generally recognised as an antecedent of creativity (Dörfler & Ackermann,

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2012). As outlined by Sadler-Smith et al. (2008) this form of intuition “relies less on the expert knowledge base of individuals, and more on the creative capacity to recognize gaps and identify possibilities” (p. 46). Linking creative capacities and envisioning the future, entrepreneurs are sometimes said to paint a picture of the future (Sarasvathy, 2001). Many popular entrepreneurship start-up tools leverage this metaphor with various versions of canvases. So when examining intuition in entrepreneurship we need to consider whether entrepreneurs are playing chess or painting pictures. Are they doing both or is it something else?

Psychologists today generally support the view that intuition is multi-faceted (Dane & Pratt, 2009; Gore & Sadler-Smith, 2011; Pretz et al., 2014; Sinclair, 2011; Sobkow et al., 2018). However, entrepreneurship research has been slow to acknowledge this. In their broad review of publications from leading journals examining intuition in entrepreneurship Baldacchino et al. (2015) only found six of 25 papers made any reference to multiple types of intuition. In concluding their review with questions for future research they ask “is ‘entrepreneurial intuition’ a specific type of intuition? If so, what exactly is it?” (Baldacchino et al., 2015, p. 223). Sadler-Smith (2016) in defining aspects of intuition in entrepreneurship states that “further field studies are required in establishing the phenomenological nature of intuitive decisions in the entrepreneurial context” (p. 221). Alongside a deeper understanding of the types of intuition involved in entrepreneuring comes the need to understand how different types interact with each other, therefore implying a dynamic element. We adopt the perspective as proposed by Mitchell et al. (2005) that, particularly in opportunity development (Dimov, 2007), intuition is a dynamic process rather than a static property or trait. To date, relatively few intuition studies in entrepreneurship have even acknowledged the multi-faceted nature of intuition (Baldacchino et al., 2015), and we are not aware of any studies examining this aspect of intuition empirically in dynamic entrepreneurial practice. With this in mind, we sought to provide answers to two significant questions that contribute to expanding knowledge in this area. First, what are the types of intuition used by individuals in entrepreneurial practice? And second, how do these types of intuition interact in the opportunity development process? To examine these questions we undertook a two-year longitudinal field study, engaging with several entrepreneurs who were actively developing opportunities. In the sections that follow we will outline the existing research into the multi-faceted aspects of intuition relevant to entrepreneurship. This is followed by a description of our innovative research method involving the longitudinal use of cognitive maps. We will then discuss our findings of the four types of intuition used by entrepreneurs in our study and the dynamics at play. We conclude with implications for future research and practice.

Multi-faceted intuition

Intuition has been acknowledged as a key factor in entrepreneurship as far back as Schumpeter (1934) who said the following:

Here the success of everything depends on intuition, the capacities of seeing things in a way which after-

wards proves to be true, even though it cannot be established at the moment, and of grasping the essential fact, discarding the unessential even though one can give no account of the principles by which it is done. (p. 85)

Intuition in entrepreneurship—as in managerial and organisational cognition studies generally—has largely been treated as a single construct (Baldacchino et al., 2015). The primary type of intuition that has been studied to date is the rapid and affect-based judgement of a situation that is based on pattern recognition with complex, domain-relevant schema that have been built up over time as expertise in the field (Gore & Sadler-Smith, 2011; Sadler-Smith, 2016). This has been simply referred to as intuition (Dane & Pratt, 2007; Khatri & Ng, 2000; Simon, 1987), or intuitive style (Saiz-Álvarez et al., 2013). Where a more nuanced view has been taken, it has been described as pattern recognition (Policastro, 1995), expert intuition (Crossan et al., 1999; Dutta & Crossan, 2005), automated expertise (Miller & Ireland, 2005) or just expertise (Sinclair, 2011), problem-solving intuition (Dane & Pratt, 2009; Gore & Sadler-Smith, 2011), intuitive judgement (Dörfler & Ackermann, 2012), inferential intuition (Pretz et al., 2014), or implicit learning (Sobkow et al., 2018). As introduced earlier, this can be thought of as the experienced chess player’s intuition as they rapidly respond to the pattern of play.

Where multiple types of intuition have been examined in research, the first distinction to be made with the expertise analysis-based type described above, is a more holistic, synthesis-based type that is used in developing novel solutions. This has been described as pattern generation (Policastro, 1995), entrepreneurial intuition (Crossan et al., 1999; Dutta & Crossan, 2005), holistic hunch (Miller & Ireland, 2005), creative intuition (Dane & Pratt, 2009; Gore & Sadler-Smith, 2011; Sinclair, 2011), intuitive insight (Dörfler & Ackermann, 2012), holistic intuition (Pretz et al., 2014), or coherence and insight (Sobkow et al., 2018). As summarised in [Table 1](#), what each of these descriptions has in common (as opposed to expertise-based, problem-solving intuition) is that, while this creative mode of subconscious processing is not necessarily as rapid, it provides a feeling about the potential for some emergent novel combination based on the synthesis of broad, holistic associations. This has direct relevance to entrepreneurship, particularly if we view opportunity development as a dynamic, creative process (Alvarez & Barney, 2007; Davidsson, 2015; Dimov, 2007; McMullen & Dimov, 2013), and this type of intuition in the process is also a dynamic feature rather than a fixed trait (Mitchell et al., 2005). As discussed earlier, this can be thought of as the artist’s intuition as they paint a picture.

A smaller subset of these studies have also proposed other types of intuition. Of particular interest, Gore and Sadler-Smith (2011) describe social intuition as the “rapid and automatic evaluation of another person’s cognitive and/or affective state through the perception and nonconscious processing of verbal and/or nonverbal indicators” (p. 310). This type of intuition has been the primary type of interest in social psychology for some time, where it has been stated that “intuition plays a prominent part in interpersonal relations, in our judgments of other people and

Table 1. Different types of intuition in the existing literature

Key works delineating different types of intuition / type 1 processes	Analysis based (playing chess)	Synthesis based (painting pictures)	Other types
Policastro (1995)	Pattern recognition	Pattern generation	
Crossan et al. (1999) Dutta and Crossan (2005)	Expert intuition	Entrepreneurial intuition	
Miller and Ireland (2005)	Automated expertise	Holistic hunch	
Dane and Pratt (2009)	Problem solving	Creative	Moral
Gore and Sadler-Smith (2011)	Problem solving	Creative	Moral and social
Sinclair (2011)	Expertise	Creative	Foresight
Dörfler and Ackermann (2012)	Intuitive judgement	Intuitive insight	
Pretz et al. (2014)	Inferential	Holistic	Affective
Sobkow et al. (2018)	Implicit learning	Coherence and insight	Subjective intuitive abilities

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 & Saporito, 2006) and the role of social networks (Greve & Salaff, 2003; Hoang & Antoncic, 2003; Jack, 2005) have been well established in entrepreneurship research, but the role of social intuition in the evolution of these concepts is not well understood. In our chess player and artist analogy this type can be thought of as the intuition used when a chess player has a sense of how their opponent may react to a specific move, or the artist senses the tastes of a patron who might buy the finished painting. Or, if they need someone else to help paint a part of the work, a feeling that they work together to the same vision.

There are also several other subtypes of intuition that have been proposed. Dane and Pratt’s (2009) reconceptualisation included moral intuition, which was also subsequently adopted by Gore and Sadler-Smith (2011). Sinclair (2011) proposed a framework for examining intuition that included intuitive foresight as a prospective type of intuition distinct from expertise and creative intuition. Pretz et al. (2014) and Pretz and Totz (2007) in developing and refining three types of intuition and a measurement scale, suggested the emotional aspect of intuition should not be assumed to be a necessary part of some types of intuition and should, therefore, be treated as a separate element. Most recently, Sobkow et al. (2018) defined subjective intuitive ability as the metacognitive feeling associated with and preference for using intuition. This was in addition to implicit learning (similar to problem-solving intuition) and coherence and insight (similar to creative intuition). Their survey based empirical research, concluded they were able to measure at least these three distinct types of intuitive ability, although many questions remain about the distinctions and interactions between these types of intuition.

As described earlier, research on intuition in the field of entrepreneurship has historically centred on the problem-solving, expert view of intuition. Baldacchino et al. (2015) found only six of 25 papers examining intuition in entrepreneurship made any reference to multiple types of intuition. Even where it has been explicitly labelled as entrepreneur-

ial intuition, there have been several conflicting definitions used. When contrasting it with expert intuition, Crossan et al. (1999) described entrepreneurial intuition as the unconscious exploration of new ideas, which recognises the possibilities in novel connections or emergent relationships and is required for innovation and change. Mitchell et al. (2005), in an attempt to clarify the construct, developed a working definition of entrepreneurial intuition that they described as “the dynamic process by which entrepreneurial alertness cognitions interact with domain competence (e.g., culture, industry, specific circumstances, technology, etc.) to bring to consciousness an opportunity to create new value” (p. 667). In developing this definition, however, they used a proximity-to-consciousness psychological model, which has now been superseded by dual process theories (Sadler-Smith, 2016). Most recently, in theorising a domain-specific construct, Sadler-Smith (2016) defined entrepreneurial intuition as “affectively charged recognition and evaluation of a business venturing opportunity arising as a result of involuntary, rapid, non-conscious, associative processing” (p. 213). As mentioned earlier, he also stated that this is an under researched aspect of entrepreneurship that requires further empirical examination.

Other researchers also have described the nuances of intuition in entrepreneurship as under-researched, with several calls for closer examination. Sinclair, Sadler-Smith and Hodgkinson (2009) said “the ways in which intuition, and in particular the role of mental simulation, operates in the business venturing context to foster creativity, innovation and entrepreneurship is an area which requires further research” (p. 406). Blume and Covin (2011) also suggested that “the relationship between intuitive ability and opportunity recognition ability would seem to be strong and worthy of empirical examination” (p. 148). We aimed to answer these calls by examining two key research questions. First, what are the types of intuition used by those in entrepreneurial practice? Second, how do these types of intuition interact in the opportunity development process? In other words, are entrepreneurs using their intuition like chess players or like painters when developing opportunities?

Method

In approaching our research questions (and given the general difficulty in examining intuition) we needed to design a method that would capture participants' perceptions and feelings about their evolving opportunity in as close to real time as possible. We also wished to avoid simple self-reporting, which is known to be flawed in examining intuition, particularly as entrepreneurs have been known to post-hoc rationalise their actions with an over attribution of intuition (Blume & Covin, 2011). First, we decided that to best capture the dynamics at play, a longitudinal study would be most effective (Saldana, 2003) and would respond to calls for more longitudinal research within entrepreneurship (McMullen & Dimov, 2013). We selected the hi-tech sector as a suitable setting due to the relatively high rate of change in the environment that would ensure the dynamics could be captured in a reasonable timeframe of two years.

We decided to employ causal cognitive maps as a tool for structuring the conversations with the participants, all of which would be recorded, transcribed, coded, and analysed (Gioia et al., 2013). Cognitive maps have been used in similar research when trying to gain insight into how an individual perceives a complex situation and the various relationships between ideas including the role of intuition (Clarke & Mackness, 2002; Regeer & Palmer, 1996). By using the cognitive map in a longitudinal setting we sought to capture the changing perception of the opportunity space which would then allow us to explore why the perception had changed. Cognitive maps are not often used in this longitudinal way but are well suited to the task (Huff, 1990). In defining the initial nodes for the causal cognitive map, we needed to avoid researcher bias; we had to avoid seeding the map with overly generic constructs or our own perceptions of the opportunity based on the participants' comments. To avoid these issues, we employed the Self-Q method for the initial map node generation. In this method the participants are asked to initially define the unanswered questions that they ask themselves about the opportunity, they ask others, and others ask them (Bougon et al., 1990). They are then asked to identify the relationships between the unanswered questions (nodes), which create the causal connections. This initial map was constructed with post-it notes for each node and freehand connections created between them, which were done on a white board. This was then codified for the subsequent conversations, which took place approximately quarterly (due to participants' international travel, however, this schedule was, at times, difficult to maintain).

At the subsequent sessions the participants reviewed the previous cognitive map and proceeded to check each node, indicating if they were more or less confident in having an answer to the questions and, therefore, any changes to the relationships between them. They often had new questions come onto the map and, occasionally, a question had been resolved so was removed. At these sessions all changes were recorded as colour coded so that, over time, the change in the map could be seen, as shown in [Figure 1](#). If there was a change identified from the previous map, we asked why or how that changed perception had come about. In this way we were able to focus on the current perception of the

opportunity space at each session and the reasons for the change. While this was still reliant on self-reporting of the situation, we avoided post-hoc rationalisation or over attribution to intuition or other processes because we were discussing a live situation. As with previous sessions, all conversations were recorded for transcription, coding, and analysis.

As described in [Table 2](#), the participants were all experienced entrepreneurs in the hi-tech sector and were recruited for the study because they were actively developing opportunities as the research began. While all participants fit in the broad category of hi-tech firms, they represent several industries. These range from healthcare-related fields to industrial electronics, software services, and machinery manufacturing. For practical reasons, and given the frequent access required, they were all located in Christchurch, New Zealand, which was easily accessible to the researchers. One of the participants, Mr. C, moved away from the area approximately one year after the start of the project and was not able to continue, hence him participating in fewer sessions. Typical of the gender imbalance in the hi-tech sector, all participants were men.

All conversations with the participants were transcribed and several rounds of coding were undertaken on the resulting data. Because we were most interested in examining the participants process and the either intuitive or analytic cause of actions, the main coding method used was process-based coding. This uses gerunds (i.e., nouns formed from verbs and ending with “-ing”) to describe the action of interest (Saldana, 2011). For example, our first-order codes included investigating, synthesizing, trusting, partnering, and searching. This was supplemented with some in vivo coding, where the participants' own words were used to describe an aspect of an action. These are placed within quotations to signify that they came directly from the language of the participants (Saldana, 2011). Our first-order codes included “gut feel”, “what's been done before” and “lot of uncertainty.” Nvivo software was used to organise the codes from 1,196 individual references from the 42 source transcripts. Twenty-six initial codes were created and secondary rounds of coding allowed for consolidation of similar codes. The second-order concepts and relationships then emerged from this data (Gioia et al., 2013; Saldana, 2011). We adopted systematic combining to then compare these with the existing literature to define emergent concepts and find gaps in our knowledge (Dubois & Gadde, 2002, 2014).

Findings

In the process of the longitudinal data collection and analysis (which, with the abductive method, was an iterative process) (Dubois & Gadde, 2002), it became apparent that there was no one type of intuition or analytic cognitive process being used exclusively by any of the participants in any of the opportunity development situations examined. The highly dynamic and novel nature of each of the opportunities meant that a range of intuitive and rational approaches were used at different times by each participant. The coding and subsequent combination of like terms into higher order concepts reflected this (Gioia et al., 2013). As an example, codes of “what's been done before” and “gut

Table 2. Research participants

Participant	Role	Experience in role (or similar roles)	Area of opportunity	Number of sessions
Mr. B	CEO	20+ years	Creating new market for hardware product	6
Mr. D	Founder/ Director	20+ years	Creating new hardware product for existing market	7
Mr. S	CEO	16 years	Start-up creating new market for hardware product	7
Mr. C	CEO	20+ years	New geographic market development	3
Mr. G	Founder/ Director	17 years	Creating new software products for new markets	6
Mr. M	Founder/ Director	17 years	Sale of company, investing in new technology	6
Mr. A	Founder / CEO	16 years	Start-up with new software product and market	7
Total	-	-	-	42

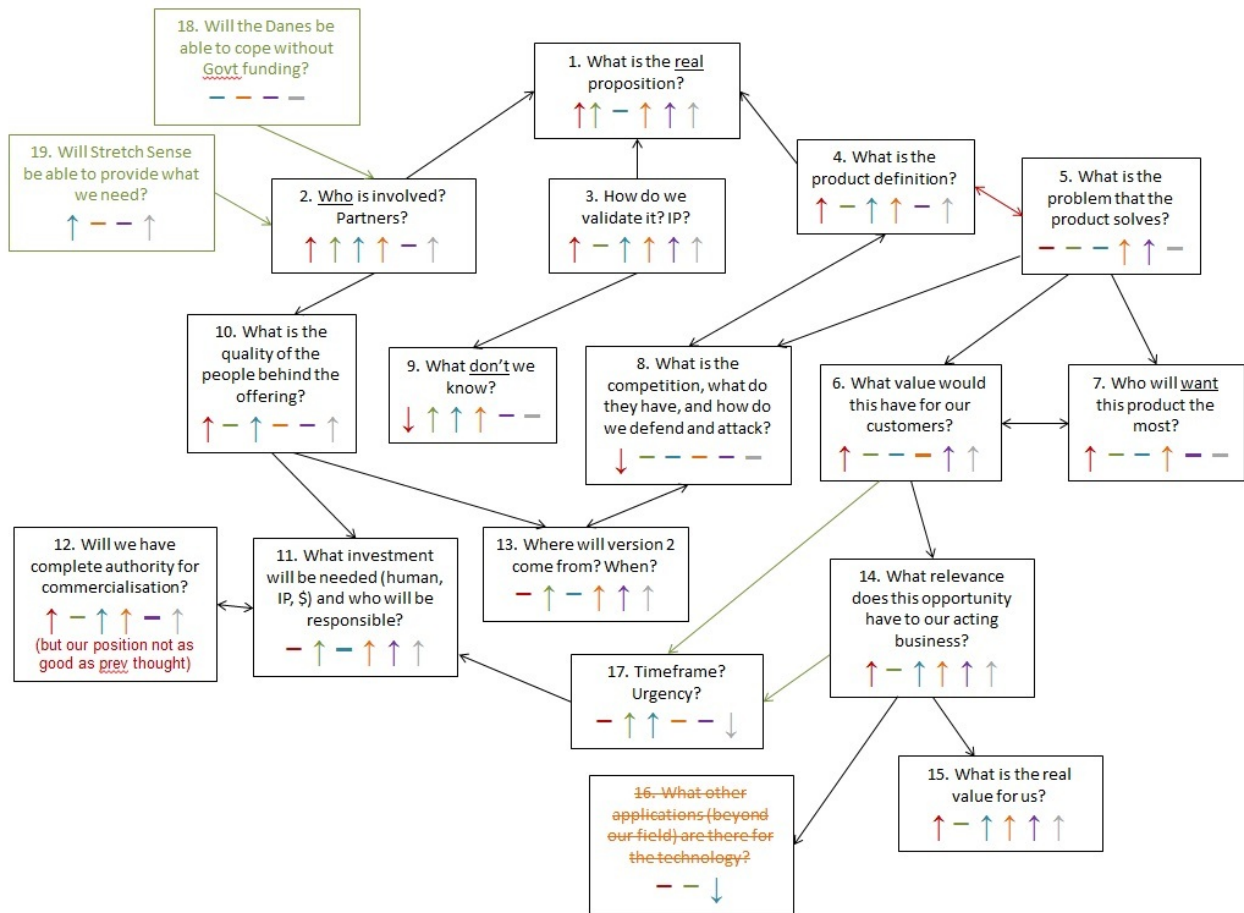


Figure 1. An example of cognitive map after seven review sessions

feel” and “acting”, were related to problem-solving intuition. Gore and Sadler-Smith’s (2011) definitions for the various types of intuition were used, except for temporal intuition, which is a new concept and, as such, we propose a new definition. The data structure is shown in Table 3 and each emergent concept will be examined in further detail.

Multiple types of intuition

We found that there were at least four distinct types of intuition, each of which had a part to play at different times in the entrepreneurs’ unfolding perception of an opportunity. First, there was problem-solving intuition. As we

Table 3. Data structure showing types of intuition

First-order codes	Second-order concept	Definition	Illustrative quotes
<ul style="list-style-type: none"> • “What’s been done before” • “Gut feel” • Acting 	Problem-solving intuition	“Domain-specific, expertise-based response to a tightly structured problem based on nonconscious processing of information, activated automatically, eliciting matching of complex patterns of multiple cues against previously acquired prototypes and scripts held in long-term memory.” (Gore & Sadler-Smith, 2011, p. 307)	“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.” – Mr. A.
<ul style="list-style-type: none"> • Feeling for an opportunity • Synthesizing • Incubating • Validating 	Creative intuition	“Slow-to-form affectively charged judgment occurring in advance of an insight that combines knowledge in novel ways based on divergent associations, and which orients behaviour in a direction that may lead to a creative outcome.” (Gore & Sadler-Smith, 2011, p. 309)	“That’s where this whole conversation or two conversations we’ve had have come out are more about the possibility of linking in accelerometers as well as stretch sensors and the sort of combination of the data that we think will have real interest.” – Mr. D.
<ul style="list-style-type: none"> • Judging people • Partnering • Trusting • Understanding others 	Social intuition	“Rapid and automatic evaluation of another person’s cognitive and/or affective state through the perception and nonconscious processing of verbal and/or nonverbal indicators.” (Gore & Sadler-Smith, 2011, p. 310)	“So it did take a long time of getting to know each other and then at the end the business arrangement was relatively straight forward and even the way in which people conducted themselves in that it was collaborative, it wasn’t out to screw each other.” – Mr. B.
<ul style="list-style-type: none"> • Predicting the future • Moving quickly • Timing 	Temporal intuition	Slow-to-form affectively charged evaluation of timing for prospective action and pace of change based on complex patterns of multiple cues.	“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 organisation as well.” – Mr. M.

had expected to find from these experienced entrepreneurs, there were some instances of subconscious pattern recognition drawing on experience, which allowed for rapid judgements. Mr. G described this as a “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”. Similarly Mr. C said “I still knew what I wanted to do that had come from experiences I have had.” These examples of this type of intuition align well with Gore and Sadler-Smith’s (2011) definition of problem-solving intuition, as shown in Table 3 alongside another example from Mr. A. This is an analytic, expertise-based subconscious process where some aspect of the opportunity being examined is viewed as similar to a previously encountered situation. As a result, a rapid, affective reaction is produced that strongly influences judgement about the course of action. In keeping with a parallel-competitive framing of dual process theory (Hodgkinson & Sadler-Smith, 2018) we note that, even though based on complex, domain-relevant schema built through expertise, this problem-solving aspect of intuition strongly influences judgements. It does not mean, however, that conclusions are immediately leapt to, as some previous definitions of expert intuition may suggest. In other words, the entrepreneurs in our study sometimes used their intuition like experienced chess players.

Second, we saw creative intuition. This is a synthesis-based, subconscious process of drawing disparate elements together to create new combinations that are novel and valuable in pursuit of the opportunity. Creative intuition was slower to emerge and often took some weeks or even months to be fully realised. It also has an inherent future

focus. Mr. B described it by saying “so this stuff again is all stitching together and what’s it’s doing is it’s helping us sell more of our existing product but it’s also setting us up to do things in the future.” Mr. A described this creative aspect by saying “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.” Again, the examples from our study of this type of intuition reflect Gore and Sadler-Smith’s (2011) definition of creative intuition, as shown in Table 3 along with another example from Mr. D. This has many parallels with creativity. In particular, creative intuition aligns with the concept of bisociation, where different planes of knowledge meet to create something new (Koestler, 1977). This is one key reason domain knowledge and diversity of knowledge and experience are important, as they are where knowledge from different domains are synthesised so unique opportunities can be created and developed. Incubation has been described as a key part of the creative process (Sadler-Smith, 2015; Wallas, 1926) and this subconscious processing works relatively slowly to produce affectively charged possibilities following the conscious and effortful immersion in the field. Mr. S said 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 of emerge.

These results of creative intuition are often more tentative than the judgements that came from problem-solving intuition, and so analytic processes are then used in testing the novel outputs to find or confirm the potential value for the opportunity. In other words, the entrepreneurs in our study were frequently using their intuition like artists painting a picture and were using this type of intuition much more often than that of a chess player.

Third, there was social intuition. This is where affect laden sub-conscious assessments are being made about the other people involved in the opportunity development. This is based particularly on verbal and non-verbal cues from interactions with others. In the early phases of the opportunity development this is often reflected through developing empathy for users. Mr. D described it this way:

There's a bit of data but it pretty much still an experience and gut feel, it's very much based on our intuition and understanding of the customers' world. It's empathy. It's that empathy of what their world represents. More and more that's what's driving, to be honest, that's what's driving our decision making.

Later in the process this often reflected in a sense of trust and confidence in potential partners (Walsh et al., 2020). Mr. D said that he "met all the people so in terms of this, this was quite a bit of, you know what's the quality of the people that was really, really important. In terms of the confidence". Mr. C described this by saying "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." Analytically, someone may have all the capabilities that, on paper, will help advance the opportunity. If, however, there is a feeling that they cannot be trusted or that they will be difficult to work with, this intuitive assessment has a strong bearing on judgements in this area. Although used at different times in the process, in the same way empathy with customers is used early in the process and trust in potential partners is formed later, the examples of this type of intuition broadly align with Gore and Sadler-Smith's (2011) definition of social intuition, as shown in [Table 3](#) along with an example from Mr. B. In other words, the entrepreneurs in our study frequently used their intuition to decide who they were painting with, along with shaping the work depending on who they were painting for.

Fourth, there was temporal intuition. This is where there is an affective, subconscious evaluation of the timing of the opportunity (i.e., the feeling that the "time is right"). In cognitive psychology humans' perception of time has been examined for many years, and different brain functions are used in evaluating aspects of time (Matthews & Meck, 2016). Only recently, however, have connections between emotion and perceptions of time been studied in detail (Droit-Volet & Gil, 2015; Yamada & Kawabe, 2011), and intuition has yet to be examined. Hoerl and McCormack (2019) proposed a dual process model of temporal cognition with temporal updating and temporal reasoning systems but were most focussed on the aspects that are unique to

humans, as opposed to animals, and so did not describe the human intuitive aspects of their typology. The temporal aspect of intuition found in our study has also not previously been identified in research examining multiple types of intuition. In our participants, this was reflected in decisions made regarding entry timing and the often-used metaphor of the window of opportunity. Mr. M said "we have seen windows of opportunity in the past as well... but these kind of opportunities, opportunities are time based aren't they, they're about time." Mr. B articulated this by saying "all of that kind of stuff about the timing and what's going on in market and some of the problems he's got is a feel, so that's the feeling." Although often externally focussed, temporal intuition was also seen in sensing the internal readiness for executing on the opportunity. Mr. B described this when he said "thinking about where we were, taking on these activities... was really because we felt we were ready. Whilst it wasn't quite there it was a bit of an intuitive act I suppose and the next thing for us." Mr. S described this in terms of having the confidence to move, but not waiting too long:

I think a bit of it is a level of confidence, 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.

Temporal intuition was also significant when participants assessed potential rates of change, such as growth or adoption rates, over time. Entry decisions are often made based on these rates of change and progress is monitored against them. Mr. G noted that "I think that's where it starts an impression or a gut or a feeling that things need to change or they are changing, and then I'd better have a look at that." Temporal intuition was also used in evaluating non-linear conceptions of time such as cyclic time (Orlikowski & Yates, 2002), which become important for decisions relating to entrainment (Ancona & Chong, 1996; Hopp & Greene, 2018) or synchronisation of the various cycles of customers or partners. Mr. B described this by saying "some of the biggest partners are you know they dictate the time, it's got to be ready in their evolution." We could find no existing definition in the literature describing temporal intuition. Therefore, in line with existing definitions of other types of intuition but based on our participant examples, we propose a definition of 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. In other words, the entrepreneurs in our study were using their intuition to decide when to play a certain piece or when to make a particular series of moves. Alongside this they were intuitively assessing the trends and directions in the art world to decide when best to unveil their painting or take it to an auction.

Interplay between types of intuition

In relation to the dynamic interactions between the various facets of intuition, we found that problem-solving intuition was applied as the default and so had a central and close relationship to the other three facets as shown in [Figure 2](#). For example, when creative intuition is being used to

explore new combinations or potential solutions, expertise-based, problem-solving intuition guides the initial phases where certain things that have been tried before are immediately discounted based on previous experience. Similarly, when applying social intuition (particularly when building trust), problem-solving intuition is used as an initial filter where common patterns of behaviour that have been seen before in relationship building are taken as either signs that things are developing in a positive direction or, alternatively, that there are alarm bells raised. Temporal intuition also involves problem-solving intuition being drawn on to compare timing with similar indicators from previous timing decisions. In each of these cases the expertise-based, problem-solving intuition is used as an early warning system. It is, however, specific to very similar situations previously encountered. In the unfolding of novel opportunities the similarity or dissimilarity between previous opportunities creates some doubt about the direct relevance of previous experience. The more novel the situation, the less similarity can be made with experience; therefore, problem-solving intuition has a weaker influence. Conversely, as an opportunity unfolds certain situations or problems are sometimes encountered along the path that reveal themselves to be like those previously encountered; therefore, problem-solving intuition is applied as those problems are encountered. Rather than specific answers, we found problem-solving intuition was applied as a judgement about the process or approach (i.e., when a recognised problem arose the problem-solving intuition was about a feeling of the best way to approach it based on a previously taken approach to resolve a similar situation). Generally, however, the further the opportunity developed, the more novelty there was in the situation. This resulted in less reliance on problem-solving intuition and more reliance on creative, social, and temporal intuition.

Based on our analysis of the participants, it appears the relationships between creative, social, and temporal intuition are not as strong as the connection to, but do have some interaction with, problem-solving intuition. Creative intuition and social intuition have some influence on each other, predominantly when creative solutions are being intuitively evaluated for their usefulness or perception of usefulness by potential customers. Alternatively, when building relationships that rely on social intuition, there may be cases where creative intuition can help define new ways in which a partnership can be structured. Social intuition and temporal intuition have some interaction when assessing partnerships. This interaction can lead to questions being asked about whether, even though the partnership may be otherwise beneficial, it is the right time for both parties to engage. Aspects such as perception of maturity of the partner organisation imply a temporal element, which will affect how the future relationship unfolds. In some cases, however, temporal intuition about the window of opportunity may influence the type of relationships that are sought or developed. We saw instances where our participants' strategic relationships were developed with a short time-frame in mind rather than in pursuit of an ongoing, long-term partnership. Finally creative and temporal intuitions interact when evaluating the future value of a potential solution. Is the time right for this novel solution? Alterna-

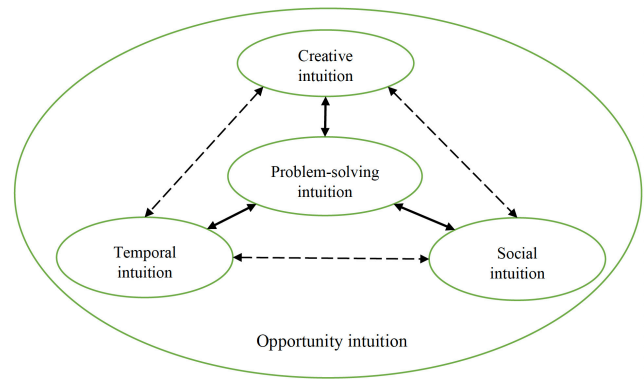


Figure 2. The dynamic interactions between types of intuition within opportunity intuition

tively, when deciding on entry timing, creative intuition may be applied to find novel ways of conducting the entry itself.

Discussion

Opportunity intuition

Our participants' perceptions about the opportunities in development was a dynamic, unfolding process (Dimov, 2007). That process aligns well with the notion of opportunity confidence, which is an individual's perception of the feasibility of an opportunity at any point in time (Davidsson, 2015; Dimov, 2010). The combination of problem-solving, creative, social, and temporal intuition uncovered in our participant cases can, therefore, tentatively be described as forming opportunity intuition. The overall feeling for the opportunity is the dynamic, affective subconscious contributor. This is balanced with rational analysis of the opportunity to provide an overall perception of opportunity confidence (Davidsson, 2015; Dimov, 2010; Walsh et al., 2020). We suggest that defining opportunity intuition in this way, as opposed to the ill-defined global construct of entrepreneurial intuition, best reflects the current perspective of entrepreneurship as the study of the actor opportunity nexus (Shane & Venkataraman, 2000). However, further research is needed to explore this relationship between opportunity intuition and opportunity confidence in more depth.

Research implications

We have answered the calls of earlier researchers who have highlighted the need for more empirical, field-based research into the nature of intuition in entrepreneurial settings (Baldacchino et al., 2015; Blume & Covin, 2011; Sadler-Smith, 2016; Sadler-Smith et al., 2008). In doing so we have three significant contributions to research into the role of intuition in entrepreneurship. First, we have identified, through empirical longitudinal field research, that intuition used in opportunity development is, indeed, a multi-faceted construct consisting of at least four subtypes. These are problem-solving intuition, creative intuition, social intuition, and temporal intuition. This challenges the prevailing assumptions in most entrepreneurship research

to date (Baldacchino et al., 2015) that intuition is a single construct and that it is largely based on expertise (i.e., problem-solving intuition). In our study, problem-solving intuition was certainly present and had interactions with the other types of intuition. It was not, however, the most common type, particularly when navigating a novel and emergent opportunity. We suggest that future research in entrepreneurial opportunity development should consider this more nuanced view of intuition, which opens the opportunity for closer examination of the characteristics of each type of intuition in a range of settings. Our research participants were all experienced entrepreneurs, so there is much to learn about how less experienced entrepreneurs use these different types of intuition and how they develop over time. We were also focussed on the very early stages of the opportunity development, so how the role of the various aspects of intuition are used in latter phases of exploitation also offers fertile ground for future research.

Second, we have identified a type of intuition not previously examined in research: temporal intuition. We propose a definition of 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. Time is an essential element when considering entrepreneurship as a process (Dimov, 2007; McMullen & Dimov, 2013). The role of intuition in assessing uncertainty about time warrants further investigation. This temporal uncertainty can comprise several elements, not just those to do with the linear conception of time and the external window of opportunity (which are reflected in the question “is the time right?”). There is also the internal assessment of readiness or maturity when an entrepreneur may ask “is the time right for us, right now?” There is also the notion of cyclic time when considering aspects such as external seasonality, customers’ cycles, internal design cycles, and frequency of operations. This requires a judgement not only about whether the timing is right but also whether we in synchronisation with our partners or customers. This synchronisation has been referred to as entrainment (Ancona & Chong, 1996; Hopp & Greene, 2018; Pérez-Nordtvedt et al., 2008). Our findings suggest temporal intuition has a significant role in decisions relating to pace of development, building capability, and entrainment. Future research examining these aspects of temporal decision making, which are all critical to entrepreneurship, should include the role of intuition in that process.

Third, we tentatively suggest these four types of intuition combine to form opportunity intuition, which may be a significant component of opportunity confidence (Davidsson, 2015; Dimov, 2010). Applying a parallel-competitive dual process lens (Hodgkinson & Sadler-Smith, 2018) to opportunity confidence, we consider opportunity intuition as a series of type one processes that work alongside type two opportunity analysis to provide entrepreneurs with an overall direction for future action in pursuit of an opportunity. Further research is required to expand on the interactions between the various processes in opportunity development. We suggest that this concept of opportunity intuition is a more useful descriptor than “entrepreneurial intuition,” which Baldacchino et al. (2015) noted requires clarity on exactly what it constitutes. This is because the term entre-

preneurial intuition has been somewhat muddled by prior studies where it has been used to describe creative intuition not only in entrepreneurial settings (Crossan et al., 1999; Dutta & Crossan, 2005), and has also been used to describe expertise-based problem-solving intuition, but simply in an entrepreneurial context (Mitchell et al., 2005). We hope the concept of opportunity intuition avoids this confusion and offers future research potential to examine the connection with opportunity confidence (Davidsson, 2015; Dimov, 2010).

We, therefore, encourage further research to examine the generalisability of these emergent findings (Simons et al., 2017). A limitation of this study was the small number of in-depth cases, with similar participants in terms of gender, industry experience, and geographic location. We expect there may be some differences that should be explored with respect to the role of experience. Clearly, novice entrepreneurs will be less able to draw on expertise to enable problem-solving intuition. Does this mean they favour more analytic approaches or use the other types of intuition? We do not expect gender to have a significant effect, but this assumption also requires further examination. In terms of location, we might expect national culture to have an influence on social intuition, how trust is gained, and relationships are formed. Again, we encourage future research to examine these effects. We have no reason to believe that the results depend on other characteristics of the participants, materials, or context.

We also note our research did not reveal specific examples of moral intuition. We do suspect this proposed subtype of intuition may also have a significant role to play in some opportunity development situations, but this remains a question for future research.

Practical implications

We echo the view of those who have called for greater recognition of intuition in management training and entrepreneurship education programmes (Brown et al., 2015; Sadler-Smith, 2016; Sadler-Smith & Burke, 2009). A greater understanding of the types of intuition experienced and used by entrepreneurs along with their interactions, as described above, is a welcome addition to aid in this endeavour. We have found in our own teaching, at MBA and undergraduate levels, that being able to discuss the unique aspects of each subtype of intuition enables a richer understanding of the strengths and limitations of intuition and the range of situations where it may be applied. Understanding the role of temporal intuition can have a significant impact on how entrepreneurial decisions are made. Even if all the analysis and intuition points to an opportunity, judgements involving both analysis and intuition on temporal issues may mean that the time is not right.

Similarly, for practicing entrepreneurs, having a greater understanding of the types of intuition and acknowledging the role they play in the development of opportunities is an important step that we hope will assist in developing more robust opportunities. Understanding the role of various types of intuition can help entrepreneurs understand why their proposition may or may not be adopted, even though indications are that they have created a compelling

opportunity. For example, a customer might see something as an appealing opportunity but one with poor timing. From the social intuition perspective, it may be that a customer needs to feel they trust the people involved. Does it remind them of a similar experience or situation drawing on problem-solving intuition? Or does it appeal and align with their view of the future and draw on their creative intuition? Examining emergent opportunities from different perspectives and acknowledging any intuition relating to each aspect should enable weaknesses to be acknowledged and addressed. This will result in the development of stronger opportunities.

Conclusion

Intuition is a multi-faced concept that is highly significant for entrepreneurship. In examining how entrepreneurs use intuition in the process of opportunity development, we empirically confirmed at least four types of intuition are used by entrepreneurs in practice. Problem-solving intuition is used to rapidly decide the best way to respond to a

situation that has been seen before. Creative intuition provides a sense of potential for novel solutions as they are in development. Social intuition helps develop empathy with users and trust with potential partners. Finally, temporal intuition provides a sense of good timing for various elements of opportunity development. Together, these types of intuition combine to create opportunity intuition, which is the subconscious component of opportunity confidence. We look forward to further research into these concepts and the relationships between them, which will help unlock a greater understanding of the process of developing entrepreneurial opportunities. Returning to our initial metaphor and question, we conclude that, yes, entrepreneurs are like chess players in how they use their intuition. But they are even more like artists painting a picture. Even more, they are like chess players and artists who regularly use intuition about who they are playing against, who they are painting with, and who they are painting for. They also use their intuition to decide when the right time is to make a particular move and when is best to reveal their painting.



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