

THE ROLE OF INTUITION IN THE DECISION PROCESS OF SKI GUIDES

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ABSTRACT

The criteria individuals use and much of the decision making related knowledge base in professional, mountain guiding has remained poorly understood even to active practicing professionals. Many mountain guides might have difficulty in expressing exactly how field-based risk management decisions are made in particular, how intuition is used. The increased interest in decision-making is not unique to mountain guiding and the avalanche industry. There is much to be learned from how other fields have approached the challenge of understanding the complexities of the decision making process. Research that helps to describe the innovative practices and extant knowledge of mountain guiding will help theory and practice to be more in harmony. With an annual average fatality rate over the last ten years of just under two and a half fatalities per 100,000 skier days in the Canadian mechanized ski industry, it is not unreasonable to suggest that there is considerable knowledge entrenched within the daily activities of the practitioners (BC Coroner, 2003; Israelson, 2008). However it is arguable that even this number of fatalities is too many and all efforts should be made to reduce the number of fatalities in guided groups.

KEYWORDS: Decision making, intuition, expertise, confidence

1 RECOGNITION-PRIMED DECISION MAKING

The decision processes used by mountain guides in a wilderness skiing environment will likely fall within the broad realm of Naturalistic Decision-Making (NDM) (Kahneman, 2003; Weick, 2001; Zsombok & Klein, 1997). Klein (1998, p. 1) defines Naturalistic Decision-Making as "the study of how people use their experience to make decisions in field settings". This area of research has been refined by Klein (1993) and termed Recognition-Primed Decision-Making (RPD). The model hinges on the concept that expert decision makers use a singular evaluation approach rather than a comparative evaluation. In this singular approach, the decision maker selects the first option that works, rather than generating two or more options and then comparing them. Also termed satisficing, Simon (1997) describes the singular approach as the formulation of a decision that exceeds the minimum performance and outcome criteria established by the decision maker. Satisficing will not necessarily produce the best result, but it will be good enough.

Klein (1998) conducted studies on fire fighters, naval ship commanders, and commercial pilots and suggests that RPD strategies were used in 80-95% of the cases. Klein argues that RPD strategies are most likely to be used when the decision maker is reasonably experienced relative to the challenge and is faced by a high level of uncertainty, exacerbated by time pressure. Lipshitz (1993, pp. 110-111) describes six components of decision making in these real world settings and all six are well represented within the ski guiding environment.

1. Ill structured problems - Snowpack stability will vary considerably from place to place
2. Uncertain dynamic environments - Weather conditions can change rapidly
3. Shifting, ill-defined, or competing goals - Guest expectations may clash with safety parameters
4. Action / feedback loops - There may be minimal feedback on good decisions
5. Time pressure - Helicopter time is expensive
6. High stakes - Guests are paying \$1000/day and may die as a result of poor decisions

Klein (1998, p. 3) suggests that analysis is not the primary strategy used by experts in these high stakes, time critical, natural settings. He suggests that the use of intuition and mental simulation, the development of metaphors and the telling of

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stories are much more appropriate strategies and claims that these areas have not been extensively studied in real-world contexts.

Although there are certainly many similarities between the decision environments of Klein's research subjects and ski guides, there are also significant differences. The key element that stands out is the questionable reliability, or even existence of a feedback loop. The ski guide operates in an environment where feedback may be entirely missing. Obviously there is the potential for a poor decision to result in a fatality, but it is perhaps equally likely that nothing bad will happen at all. Poor decisions occasionally result in feedback in the form of near misses or accidents, yet there are also times when poor decisions do not result in any overt feedback. On the other side of the equation, a good outcome is not necessarily attributable to a good decision. Good decisions in ski guiding rarely result in direct feedback other than nothing bad happening. Inferences can be made as to the quality of the decision based on this non-result by those involved such as other guides, but the question as to whether it was a good or bad decision hinges on the perception of whether the actual outcome was representative of existing conditions.

2 THE ROLE OF INTUITION

Not only is there a lack of clarity within the literature as to exactly what intuition is, there are a variety of terms used interchangeably with intuition including: gut feeling, hunch, know-how, and tacit knowledge. The role of intuition has been the subject of much debate generally along the line of whether it is a rational or irrational process (King, 2002). Easen and Wilcockson (1996, p. 672) describe intuition as "an irrational process but with a rational basis". There is general consensus that as expertise develops, intuition becomes a more refined tool and is used more extensively. This section will clarify a definition of intuition and more specifically a definition of pattern recognition to set the context within which the connection between intuition and expertise can be further explored.

2.1 Definition of Intuition

Kahneman et al (1999, p. 697) describe the use of two systems within the decision making process. System 1 uses perception and intuition. It is driven by easily accessible thoughts that do not require much in the way of reflection. Operations conducted under System 1 are: fast, effortless, implicit, can be emotionally charged, governed by

habit and are difficult to control. System 2 uses reasoning. Operations conducted under System 2 are: slower, serial, effortful, potentially rule-based, and are consciously controlled. Easen and Wilcockson (1996, p. 667) argue that "intuitive thinking has certain essential features and involves the use of a sound, rational relevant knowledge base in situations that, through experience, are so familiar that the person has learned how to recognize and act on appropriate patterns". Cioffi (1997, p. 204) offers a different opinion by describing intuition as "...a subtlety of knowing operating beneath consciousness that is born of experience and available in memory for recall with a sense of appropriateness in clinical situations". Ruggiero (1997) voices a concern that intuition should not be used in isolation or as a replacement for analytical thinking, as it is not part of the conscious thought process. Herbig, Bussing, and Ewert (2001) equate intuition with tacit knowledge and describe it as something which is acquired implicitly as part of work, and not necessarily something which is reflected upon. As a result it may contain erroneous or problematic content. Dreyfus (2004) expanded on the definition by identifying six key aspects: pattern recognition, similarity recognition, common-sense understanding, skilled know-how, a sense of salience and deliberate rationality.

2.2 Pattern Recognition

Pattern recognition may be a crucial element in the decision process of ski guides as it occurs when previous experiences encompass a high degree of similarity or representativeness with a new situation. In this situation intuition can be particularly accurate. It allows experts to more rapidly access a greater amount of information and to come up with a better decision faster. Galloway (2002) describes pattern recognition as "chunking", a process which helps experts identify a greater complexity of response possibilities. Information is retrieved from the experience-generated knowledge base through the visualization of mental images.

Pattern recognition is an integral part of how intuitive inferences help the decision maker. There is disagreement within the literature as to whether experts are more adept at using intuitive inferences to look forward or backward in time. Looking forward in time is a prediction (e.g., "What is going to happen?"). Whereas, looking backwards in time is a diagnostic inference (e.g., "What has been going on that has led us to where we are now?"). Hogarth (2008, p. 92) argues that

experts seem to be more adroit at using backward inferences or diagnosis, as they are able to absorb the details and to recognize patterns quickly. This pattern recognition seems to be based in a greater understanding of what is normal versus what is abnormal. This contrasts with Vick's (2002) suggestion that experts use a forward reasoning process to more rapidly diagnose a situation, rather than a backward reasoning process. The forward reasoning process allows for the identification of key factors and then a rapid selection of a seemingly obvious solution (Weick, 2001). Certainly there is evidence that experts can and do use both processes; the argument is perhaps over which one is preferred or used first. Kahneman et al (1999) describe this as the intuitive-analytical interaction.

In a study of avalanche professionals, Adams (2005) reports that 88% of her participants used some level of pattern recognition in their decision-making process. The previous experiences of these avalanche experts had contributed to the accumulation of an extensive inventory of patterns. This helped them quickly make sense of new situations.

2.3 Arguments against the use of intuition

Easen and Wilcockson (1996) raise the question as to whether an intuitive decision could be considered "unprofessional" as the decision is not the result of a rational process and may be difficult to explain. They argue that the inability of the decision maker to explain this intuitive leap may be due to a complete bypassing of the linear reasoning process. When confronted with the reality of professional decisions being scrutinized by the courts in regards to legal liability, ski guides may feel exposed when the only explanation they have in defence of their actions is "It felt like the right thing to do at the time". Against the yardstick of scientific and rational thought "intuitive thinking is considered to be both inferior and unprofessional" (Easen & Wilcockson, 1996, p. 669). They argue that there are significant benefits to professionals when decisions based on intuition can be explained and accepted as valid, both internally by the decision maker and externally by other members of the profession, the general public and the courts.

There is no argument over whether intuition plays a role in the decision process. It is clearly acknowledged that if a decision maker's knowledge and experience is lacking, a decision based on intuition can be flawed and no better

than a misguided guess (Dreyfus, 2004). One of the questions that must be addressed is whether or not, or to what degree, validation of intuitive responses can occur accurately through an internal or introspective process. The discussion revolves around the extent to which we can identify and subsequently trust our intuitive responses. Intuition has a nebulous distinction within the realm of decision-making and will benefit from further study that clarifies its development and use.

3 THE LINK BETWEEN INTUITION AND EXPERTISE

3.1 Introduction

There is agreement within the literature that as expertise develops, decision makers are rewarded with more refined intuitive responses. A key element within the definitions of expertise is the role that feedback plays in improving decision accuracy. This leads to the development of domain specific intuition and expertise, which clarifies some of the differences between experts and novices.

Schon (1990, p. xi) uses the term technical rationality to describe expertise. He considers "professional competence as the application of privileged knowledge to instrumental problems of practice". Various authors (Benner, 1984; Dreyfus, 2004; Ericsson, 1996) have identified stages of mastery, or levels of expertise which play a role in how efficiently a complex situation may be resolved. In studies ranging from nurses to chess players, it has been identified and generally accepted that experts make decisions very differently from beginners (Atkins & McCammon, 2004; Benner, 1984; Galloway, 2002; Morrow et al., 2003; Starkes & Ericsson, 2003).

To develop a more complete understanding of the role of intuition in the decision process of expert ski guides will require a study of their performance in a professional arena such as the complex winter mountain environment of Western Canada. The value of studying decision making in this unique environment is rooted in the complexity of the problem, exacerbated by the paucity of feedback and extrapolated over the immensity of the terrain. On an average winter day, 150 guides make high consequence decisions, with significant implications for the safety of their guests, on the use of an area twice the size of Switzerland. Heliski groups rapidly move through this terrain, requiring numerous high consequence decisions in the completion of upwards of 8000 metres of

vertical descent in a single day. Although the InfoEx helps to pool knowledge about the snowpack structure, snow stability and the ease of triggering an avalanche, the potential for large degrees of variability from one area to its nearest neighbour adds a layer of complexity.

3.2 Definition of Expertise

Ericsson, Krampe, and Tesch-Romer (1993) conducted a study on high level musicians and through an analysis of their diaries concluded that experts committed to roughly 10,000 hours of dedicated practice, typically over a 10 year period. This notion is supported by studies: on chess players (Charness, Krampe, & Mayr, 1996), in medicine (Patel, Kaufman, & Magder, 1996) and on athletes (wrestlers, skater and golfers; (Starkes, Deakin, Allard, Hodges, & Hayes, 1996). However, it is important to recognize that ten years of experience does not make an expert. Experiences can be empty or full, with full experiences maximizing the learning potential inherent within a given situation. "Experience by itself is no guarantee of expertise, since all too often people have the same experience over and over and do little to elaborate those repetitions"(Weick, 2001, p. 16). Vick (2002, p. 324) argues that expertise is dependent on two integral elements: the size of the knowledge base and the speed at which it can be accessed. This equates to the previously mentioned definitions of pattern recognition.

3.3 The Development of Expertise and Intuition

A number of conditions have been cited as being characteristic of events that foster the development of expertise and the subsequent impact on intuition. These include: a desire and motivation to improve, a well designed task that accommodates the learner's starting point, and timely access to high quality feedback (Ericsson, Krampe, & Tesch-Romer, 1993). Of these characteristics, feedback whether generated externally or internally through a reflective process, is generally considered the most important. A well-designed task performed by a highly motivated person can result in limited learning when high quality feedback is absent.

The type, quality and quantity of feedback will be dependent on the characteristics of the operational environment. If the only feedback is that which is inherent within the activity, there may be minimal opportunity for improvement in decision accuracy. However there are other ways to generate feedback beyond that which is implicit. The ski guide faces the challenge of interpreting

numerous, possibly conflicting environmental feedback clues such as a lack of recent skier-triggered avalanche activity despite a known weakness within the snowpack. High quality feedback will also come from other experts, so teams of guides such as those used by most mechanized ski operations will likely benefit from some form of decision analysis during the traditional evening guides meeting. As intuition likely plays a critical role in this interpretation, knowing if and how intuition is developed would be of great benefit to the guiding.

Hogarth (2008) argues that the critical element in the development of intuition is the quality and quantity of feedback. He describes feedback as being relevant or irrelevant in relation to the seriousness of the consequences, which are described as lenient or exacting. This will produce an environment that can be described at its extremes as either kind or wicked. A kind environment will have relevant feedback and lenient consequences, compared to a wicked environment, which will have irrelevant feedback and exacting consequences.

This has particular significance to the decision maker in avalanche terrain. The experience gained by expert ski guides will have been acquired in a combination of all manners of wicked and kind environments. Many decisions are made when there is the potential for catastrophic consequences and minimal, or irrelevant feedback available. The "cultural capital or the inventory of intuitions that guide behaviour" (Hogarth, 2008, p. 91) has the potential to be tainted by this lack of relevant feedback.

An analysis of the last two winters in Western Canada might provide an example of the role that the environment plays in the feedback process. Deep weak layers within the snowpack, which are notoriously difficult to assess in regards to the hazard they pose, plagued the winter of 2007-2008. The number of recreational avalanche fatalities was above average, yet there was not a single fatality in commercial groups (Klassen, 2008; Marshall, 2008). In contrast, the winter of 2006-2007 was characterized by frequent, regular storms and few, if any, persistent weak layers lingered in the snowpack. The total number of fatalities was less than half the five-year moving average, but 43% were commercial fatalities. This brings up two questions that contribute to the larger research question regarding the role of intuition:

1) Did professional guides do things differently during the winter of 2007-2008?

2) Was the winter of 2007-2008 a wicked environment in which the guiding community was merely lucky and has subsequently created the basis for potentially dysfunctional or bad intuitions to be formed?

Increases in the accuracy of decision-making also benefit from the feedback received through the commitment of errors and the recognition that these errors have occurred. Weick (2001) suggests that when the number of perceived errors is low, there is minimal opportunity to learn. It is only once the errors are detected that feedback can be elicited. Errors, which are not perceived or recognized as such, may actually lead to a false positive. For example, the decision to ski a particular slope will likely be considered valid when the result does not include a negative result such as an avalanche (Gonzales, 2008). It is the adjustment to these detected errors that increases the quality of the decision-making. Working towards an error-free performance in a highly complex unstable environment may in the long run be detrimental to the learning process.

3.4 Use of Intuitive Options

Simmons and Nelson (2006) suggest that people tend to choose intuitive options rather than non-intuitive ones. This is called an intuitive bias. Intuitive options come to mind easily and because of this they promote confidence. When other information comes to light that counters the immediate intuitive response, there is less likelihood that it will be considered as valuable as the intuitive option. There are a number of possible explanations. Intuitive biases come from the integration of two mental systems as described by Kahneman (2003). Since the first system is based on intuition, it can provide a quick answer to a decision problem. The second system requires a much greater level of reflection and is therefore slower, but has the benefit of adding information that was initially neglected. Doubt is a phenomenon that can develop during this reflective period.

The intuitive response may win out due to a number of possible factors. The heuristic systemic model proposed by Chaiken (1980) suggests that people are either unmotivated or unable due to overload, to update their initial intuitive response, whereas Kahnemann (2003) suggests that the second system is actually unable to sufficiently correct the initial assessment. This initial intuitive

response becomes the “anchor” As new information is processed, adjustments are made, but rarely do these adjustments go far enough.

Hammond (1993) proposes a Cognitive Continuum Theory in which intuition and analysis are placed on a continuum. The decision process typically pendulums back and forth along the continuum. When a decision based on intuition is unsuccessful, the tendency will be to move to a more analytical process. The reverse is also true, when analysis fails intuition gains a greater role. An additional issue is that some tasks are more apt to be solved through an intuitive process while others are best solved through an analytical process. The cognitive continuum needs to match the demands of the task.

Although there is general agreement as to the link between the development of expertise and the development of intuition, there is a lack of consensus within the literature as to the degree to which intuition should be trusted and used. Davidson (2005) argues that greater effort should be put into the use of the non-intuitive option and that the intuitive option has its place in the response to emergency situations, but is generally overused. Kahneman (2003) suggests that intuition is overused because it is easy. Ruggiero (1997, p. 15) includes the caveat that novices are rarely blessed with accurate intuition as it can be both uncontrollable and unreliable. He argues that the inclusion of intuition in the decision-making process is a welcome addition, but should not be used in isolation.

3.5 Intuition leading to confidence

Statham describes ski guiding and avalanche forecasting as operating in an “untidy world of uncertainty” (2008, p. 4) and that the degree of uncertainty will likely correspond to a level of confidence. Hogarth (2008) suggests that high levels of uncertainty will not necessarily produce low levels of confidence. In situations when high quality feedback on decision accuracy is not available, other measures may be used to measure the quality of the decision. The primary measure is that of confidence. If there is a strong intuitive response, it may feel like “the right thing to do”, and expressions of confidence in this intuitive response will be used to validate the decision.

Simmons and Nelson (2006) argue that the primary task of a decision maker is to evaluate the need to switch from the intuitive choice to the non-intuitive option. Key information includes the “constraints” that oppose or limit the initial intuitive

response and the intuitive confidence, which promotes the intuitive response. Generally the easier the intuitive response comes to mind, the more likely it is to inspire confidence.

3.6 Confidence

Confidence, and in particular over-confidence, may be responsible for leading decision-makers astray in attempts to convince themselves of the accuracy of their decisions (Dobbins, Kroll, & Liu, 1998). There is a link between confidence and accuracy, so it is important to know how well confidence is calibrated relative to accuracy. Although the ski-guiding environment is complex, it still comes down to the question “Can I safely bring my guests down this run?”

When intuitive confidence approaches 100%, constraint information becomes irrelevant. It may be impossible to convince someone to change their mind once they have a certainly held intuition. Overconfidence may result from an inability or unwillingness to adjust one’s confidence far enough, as the task difficulty changes.

4 SUMMARY

Within in the field of Recognition Primed Decision Making much has been said about the role of intuition, however there are gaps that demand further exploration. There is disagreement as to the role of heuristics. Some authors equate heuristics with intuition, while others suggest that intuition is a separate process. The role of the ski-guiding environment is of particular interest, as it allows poor decisions to masquerade as good ones, thus it is critically important to understand the role that intuition plays in this decision process. If there is an unrecognized flaw in the intuitive response, then the decision process will be compromised.

A shortcoming in the intuitive process may be due to the nature of the environment in which those intuitions were formed (Hogarth, 2008). These environmental influences will determine whether the intuitions are functional (good intuitions) or potentially dysfunctional (bad intuitions). If we know that our intuitions have been formed under “wicked” conditions, it is possible to be more questioning or less trusting of them. The winter of 2007-2008 was characterised by a more wicked environment and an above average number of avalanche fatalities, whereas the winter of 2006-2007 was characterised by a more kind environment and a below average number of fatalities. However there are dramatic differences

when professional versus recreational fatalities are compared. In 2007-2008 there were no guiding related fatalities, but in 2006-2007, three out of seven, or 43% of the fatalities were guiding related.

Two questions arise out of this:

- What role did the more sophisticated intuitions of expert decision-makers play in the decision process to reduce the number of fatalities in commercially guided groups?
- What role did the environment play in the development of these intuitions and how will the previous two winters affect that development?

Intuitions formed in 2007-2008 could be considered highly suspect, as it might be overly presumptuous to assume that more good decisions were made that year and were the cause of the zero fatality rate. Numerous anomalous events were catalogued in the 2007-2008 InfoEx reports, which fell outside the pattern recognition of the reporting professionals.

The nature of the environment has potential implications both for the development of intuition as described by Hogarth and also the use or value of intuition in a current decision making process. Recognising the characteristics of the environment will help to contextualise the value of intuitions formed at that time and may also help to clarify whether or not additional emphasis should be placed on the intuitive response to a current challenge.

Research needs to be conducted, that accounts for the role of the environment in the evolution of intuition within a culture that values hard facts and reasoning (Adams, 2005; McClung & Schaerer, 2006). The avalanche industry has developed a rigorous analytical process for snowpack stability assessment and forecasting through excellent research. The intuitive process, or Kahneman et al’s (1999) System 1 has been relatively unexplored in this arena. Hogarth (2008, p. 95) suggests that, “even experts can profit from coaching to refine their intuitive skills. Once skills have been over-learned, self-insight is difficult and a third-party perspective becomes necessary”. He argues that it is possible to replace ‘misleading’ intuitions with ‘correct’ ones and suggests that people can be trained to reduce their tendency to abandon good decision-making principles.

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