Examining the Perceived Value of Professional Judgment and Decision Making in Mountain Leaders in the UK: A Mixed-Methods Investigation

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Abstract

This paper utilised a two-part mixed-methodology to examine the value placed on judgement and decision making by a sample of qualified mountain leaders in the UK. Qualified leaders (*N* = 331) completed a web-based survey and a smaller sample (*N* = 8) were then interviewed. Survey data showed that mountain leaders place greater value on their judgements and decision making when compared to the technical skills of mountain navigation and rope work; however, the process for developing these judgment skills was unclear. Interview data identified that judgment skills appear transferrable from other domains experienced by the leaders (e.g., emergency services, military) but are then recontextualised and modified for effective use within mountain leadership. The leaders facilitated this via a nested reflective process that combines in-action, on-action and on-action/in-context aspects that rely on metacognition. This combination of reflection and metacognition allows for rapid development of judgment making skills in-context. Implications for mountain leadership training are discussed.

Keywords: coach education; expertise; metacognition; reflective practice; survey

Introduction

As adventure sports continue to grow in popularity, creating what has been termed 'hard adventure' tourism (Beedie, 2003; Beedie & Hudson, 2003), UK government policy has focused on the use of the outdoors as a medium to promote health and wellbeing (Sport England, 2015). It has been reported that 48% of the UK population participate in adventure sport at least once a year (Cousquer & Beames, 2013; Taylor & Garratt, 2010). Among these activities and sports, and thus forming the focus of this paper, is mountaineering. Crucially, in response to this increased participation level, the demand for qualified leaders and instructors is clear. As such, this paper addresses the professional characteristics of mountain leaders.

At an organisational level within the UK, Mountain Training UK (hereafter referred to as MTUK) are the governing body that oversees the training of mountain leaders. As part of their role, MTUK administer and certify three different mountain leadership awards (summer, winter and international; see Table 1) to accommodate the mountaineering skills required across various conditions[1]. Notably, each award domain can be characterised as an open, dynamic and, at times, hyper-dynamic environment whereby the task demands are often highly fluid and variable. In summary, award certification requires the trainee leader to have pre-requisite personal and leadership experience within the relevant conditions, attend formal training courses, complete a first aid qualification and to consolidate their personal and leadership skills between training and assessment via ongoing logged evidence of 'quality mountain days' (QMDs) for each award (see Table 1). Overall, training to become a certified mountain leader takes several years of experience and training.

[1] IFMG Guides Carnet operates under a standalone scheme and are internationally qualified to operate on glaciated terrain and ski mountaineering.

Regardless of the award being undertaken, assessments are conducted across several days and nights. Indeed, there are distinct advantages to this length of assessment. Firstly, it affords the assessor a better understanding of candidates' expertise over representative timescales (e.g., while on an expedition, in poor conditions). Secondly, it almost inevitably tests candidates' abilities to lead, and adapt, within a dynamic environment that so typically characterises the eventual role.

Insert Table 1 near here

At present, the formalised training programme has an explicit technical focus on the skills associated with mountain leadership, such as; rope work, navigation and camp craft. Application of these declarative technical skills emerges in the experience requirements of the QMDs; that is, by increased 'doing' in practice. It is less clear, however, how the judgment, decision making and leadership skills that are required to be adaptable are actually developed and learnt. An equally essential aspect would also be the assessment of those hyper-dynamic interactions between judgement, decision making and leadership skill that are derived from those experiences (L. Collins, Carson & Collins, 2016; L. Collins & Collins, 2015, 2016a). In short, the development towards *adaptive expertise*.

Certainly, judgment and decision making has long been acknowledged as a critical component for successful mountaineering and its leadership. For example, Cousquer and Beames (2013) highlight judgment as a crucial aspect in the professional practice of International Federation of Mountain Guides (IFMG) and International Mountain Leaders (IML). Specifically, from the participant(s) perspective, it is identified that the led participants are *passengers* in the adventure,

experiencing a *perception* of risk without the skills to manage the *real* risk independently presented by a hazard (Loynes, 1996, Brown, 2000). Fundamentally, the *passenger* engages a leader to make judgments and decisions about the activity on their behalf. Therefore, it is important that the leader can adequately respond to a changing environment while catering for the adventurous expectations, abilities and safety of the group and individuals within it. Consequently, judgement and decision making skills appear critical for the outdoor leader.

In contrast to the adventure sports *coaches* identified by L. Collins, Collins and Grecic (2015), and expanding further on the notion of an *independent* performance, leaders in this context do not seek to develop independent performances in the participant(s). In fact, leaders may actively discourage an independent performance in their clients as part of safety management (ensuring the client behaves in a particular manner in a given situation) or because of a commercial interest (i.e., maintaining return clientele). Accordingly, mountain leaders contribute to the 'experience economy' (Pine & Gillmore, 1998), delivering the sensations, thrills and experiences sought, but in a manner that can be managed, made safe for and 'collected' (e.g., 'Munroe-bagging' in Scotland) by the participant. Leaders therefore operate to satisfy the requirements and ambitions of their client(s). Because of such activity *commodification* (Loynes, 1996), the traditional approach of 'apprenticeship' development has been replaced by formalised training, pre-requisite experience and assessments, eventually leading to certification as a mountain leader. In short, the training of leaders may have also become, or at least be perceived as also being, 'commodified'.

In doing so, however, this overlooks a growing realisation that the decision making load on leaders and coaches is high. In part, this is because the participant

has abdicated the complex decisions that are associated with independent participation in favour of a commodified adventure (Loynes, 1996) or collectable experiences and, in another, because of the inherent need to negotiate the nonlinear/complex environment–performer interaction. Within the context of adventure sport coaching, at least, L. Collins and Collins (2015) and D. Collins, Collins and Carson (2016) found preliminary evidence for a nesting of conscious/deliberate (i.e., logical thinking) and intuitive (i.e., gut feeling) decision making processes in order to manage such cognitive loads depending on the situational context and experience.

Therefore, the aim of this paper is to understand the relative value placed by UK mountain leaders on judgement and decision making, by considering the nature of those judgements and the manner in which they are developed. In doing so, the paper is presented in two progressive parts; a large-scale web-based survey (Part 1) and semi-structured interviews (Part 2).

Part 1

Firstly, we sought to assess the level of consensus regarding the value, development and deployment of judgement and decision making in a large sample of qualified mountain leaders via a quantitative online survey.

Method

Participants

Participants were 331 qualified mountain leaders (male = 287, female = 44). All were at least 18 years of age (M_{age} = 47.1 years, SD = 11), as required for mountain leadership accreditation. Ethical approval was provided by the University of Central Lancashire's ethics committee prior to data collection and each participant provided informed consent prior to taking the survey.

Procedure

A draft survey was constructed using the guidelines outlined by Carson, Collins and MacNamara (2013). This survey consisted of multiple choice ranking and rating questions, as informed by the professional judgement and decision making literature (e.g., Abraham & Collins, 2011; L. Collins & Collins, 2016a; Martindale & Collins, 2007). These were then presented to an expert panel for evaluation of effectiveness against the study's aims. These experts, three qualified mountain instructors and an experienced academic within the field of adventure sport, provided feedback and revisions were made to the survey. These revisions were resubmitted for approval to that group before a series of cognitive interviews were conducted (Willis, DeMatio & Harris-Kojetin, 1999) with a sample of eight representative participants; this step was included to remove any misunderstandings, inconsistencies, inappropriate response options and to expand the process performed by the expert panel. Final revisions were returned to the pilot participants for confirmation and an update provided to the expert panel for their consideration. The survey questions are available online (Supplementary File 1).

With the assistance of MTUK acting as a 'gatekeeper', the survey, provided via the online tool Survey Monkey (www.surveymonkey.com), was distributed by e-mail to approximately 4,000 qualified mountain leaders. An explanation of the study aims, purpose and an electronic link to the survey were provided within the e-mail. Progress through the survey was dependent on consent being provided at the start of the survey. Participants that completed the survey were offered the opportunity to enter into a prize draw to win one of three £50 vouchers as an incentive. All data were anonymised and the termination point for this survey set when stable levels where reached (achieved after ~65% of completed responses). The survey was

available for completion across a period of 2 months and did not take more than 10 minutes to complete.

Data Analysis

Data were analysed automatically by the website www.surveymonekey.com and presented descriptively in tabulated or graphical form (Figures 1 and 2).

Part 1 Results

Participants were asked to rank several skills, including decision making, in terms of their importance toward mountain leadership. As shown in Figure 1, decision making was ranked as the highest, closely followed by navigation and the ability to interpret conditions. Contrary to the large emphasis on technical skills within current accreditation courses, mountain leaders rated technical skills (e.g., rope work) as being least important.

Insert Figure 1 here

At a more specific level (see Table 2), participants expressed *strong agreement* for the notion that to be effective the mountain leader must exercise good judgment and, that learning from experience is a characteristic of effective mountain leadership. There was overall *agreement* that developing judgment skill is complex; with a number of participants *strongly agreeing*. There was greater spread of responses across the options when rating whether errors in judgment are inevitable and that good judgment is a product of poor judgment, therefore challenging the adage that good judgment is learnt from previous experiences of poor judgment. Results suggest that mountain leaders *neither agree nor disagree* on these statements;

in short, how judgment is developed is unclear to the participating mountain leaders in the study.

Insert Table 2 here

It is clear from Figure 2 that participants consider good mountain leadership to more often than not rely on logical thinking rather than the use of gut feeling responses (Figure 2A), and that this generally reflects *their* professional practice (Figure 2B). Whereas, in scenarios outside of the mountain leadership context, participants reported a lower extent of logical thinking in their decision making process; responses shifted slightly to a more balanced use of gut feeling and logical thinking (Figure 2C). There was little difference between participants' views on their learning contexts, only 11 more participants thought that their learning was carried out informally versus formally with the remainder expressing an even 50/50 split (Figure 2D). This challenges views regarding the value placed on formalised training for coaches and leaders and may be a consequence of the pre-requisite requirement prior to training. Data in Figure 2E suggests that mountain leadership requires a blend of decisions to be made in practice and planned for in advance. Less than 10% of participants reported a split equal to or higher than 90/10 (or 10/90). Perhaps reflecting the dynamic nature of these leaders' role, there were slightly more responses suggesting that decisions were made more often in practice. Finally, an overwhelming majority of participants categorised their pre-planned decisions as underpinned by logical thinking (Figure 2F).

Insert Figure 2 here

Brief Discussion

Data provide support for the notion that decision making is highly valued by mountain leaders. At the very least, this indicates a possible need for greater emphasis on decision training during training and assessment and, that such a modification is likely to be well received/supported by mountain leaders themselves. Although it is apparent that the development of decision making skill is an active, often logically thought through, process that is reliant upon experience, the overall lack of agreement on *how* it was best developed warrants further investigation. In this regard, data support previous findings (D. Collins et al., 2016) showing that decision making in adventure sport requires a blending of logical thinking and gut feel responses, which may provide a suitable start point for future development. As such, considering the similarly dynamic environment in which mountain leadership operates, it would be surprising if the cognitive demands were not similarly complex. Research to understand the possible mechanisms involved would therefore be a logical extension of this work.

Part 2

Having determined that judgment and decision making are highly valued by mountain leaders, we present a qualitative study to provide a richer and in-depth exploration of the development and utilisation of such judgement and decision making skills.

Method

Participants

A sample of accredited UK Mountain Leaders (N = 8, 6 males, 2 females; M_{age} = 48.1 years, SD = 10.85) were purposively selected based on, a) a willingness to participate as expressed at the end of the survey presented in Part 1, b) current

241 accreditation as a Mountain Leader (Table 3) and, c) over 5 years of experience post
242 qualification at Summer level. As such, participants also completed the survey prior
243 to interview. Ethical approval was provided by the University of Central Lancashire's
244 [university name removed for blind peer-review purposes] ethics committee prior to
245 data collection and each participant provided signed informed consent.
246
247 ***Insert Table 3 here***
248
249 ***Procedure***
250 Following analysis of survey responses from Part 1, a semi-structured interview guide
251 was constructed with the additional inclusion of questions/probes based on literature-
252 derived themes. The questions drew on critical incident technique (Flanagan, 1954)
253 as a "knowledge elicitation strategy" (Flin, O'Connor & Crichton, 2008, p. 222).
254 This approach was adopted to uncover any complexities when applying knowledge
255 within the mountain environment. Critical incident technique has been utilised in the
256 past with experienced decision makers, targeting key judgments during nonroutine
257 activities (Crandall, Klein & Hoffman, 2006; Flin et al., 2008; Hoffman, Crandall &
258 Shadbolt, 1998). The semi-structured nature of interviews allowed the interviewer to
259 elicit key information and for experiences to be explored in greater depth.
260 Specifically, the process involves a partnership between interviewer and interviewee
261 who select a key incident that can be clearly defined and then examined at a deeper
262 level. The key element is an exploration with the interviewee of what information
263 was influential when changing an assessment of the situation, or when selecting a
264 particular course of action (Flin et al., 2008).

This interview guide was piloted with six representative participants and feedback was sought regarding the content, structure and procedure. Amendments to the guide were made and then returned to the representative group for confirmation. The interview guide can be found in Supplementary File 2. Interviews were conducted at a convenient time for each participant and in a private location to ensure anonymity. The mean interview duration was 31 minutes and interviews were recorded on an electronic Dictaphone device that stored data in mp3 file format.

Data Analysis

Following the guidance provided by Braun and Clarke (2006), data were analysed using a thematic analysis. Accordingly, interviews were first transcribed verbatim and read several times to fully apprehend the essential features (Sandelowski, 1995). General impressions of these data were written in note form and shared between the researchers conducting the analysis (first and third authors). Secondly, driven by an interest in the decision making processes and its epistemological underpinnings, an initial deductive coding of response data was applied to each transcript; thus formally identifying relevant extracts. Thirdly, data codes were collated into lower-order themes based on common features, which were then grouped together under higher-order themes representing the highest level of abstraction. Within a fourth phase of analysis, these themes were subjected to review and further refinement by the researchers. The primary aim was to check for a shared understanding and interpretation of data and, therefore, the emerging themes as a whole data set. This process involved revisiting the original transcripts, interviewer notes and digital recordings, enabling themes to be reconsidered, combined, broken down and the generation of new themes. Importantly, the development of themes at any point during the analysis did not depend on the prevalence of a code, but rather, on what the

theme revealed about the decision making process and its philosophical underpinnings.

In addition to the steps outlined above to, the issue of trustworthiness was addressed through use of an additional researcher, who was not involved in the interviewing or coding process, independently coding a random sample of the transcripts (25%) to ensure inter-coder agreement. Data were coded against the developed themes and assessed for the level of agreement. Three disagreements regarding these differences in codes were discussed until a consensus was reached.

Results

Initial analysis identified 247 coded units. These were subsequently grouped into 70 lower-order, 15 mid-order and 5 higher-order themes (see Table 4). Higher-order themes were then discussed in the context of the second set of research questions; What value do UK mountain leaders place on judgement and decision making and, what are the characteristics of judgment skills in mountain leaders? Higher-order themes emerged during the analysis and formed the structured discussion outlined below. A variety of different length quotes from all the participants have been used to illustrate the points made throughout the discussion.

Insert Table 4 here

Brief Discussion

Metacognition

Metacognition (L. Collins et al., 2016) emerged as an overarching higher-order theme that links the four other higher-order themes. Data support recent proposals that metacognition forms an important aspect of the decision making process (L. Collins et

al., 2016). It is suggested that metacognition assists the naturalistic 'gut feel' decision making (NDM) processes whilst in-action. Furthermore, metacognition underpins the reflective process associated with maximising the learning from experience. In this respect, the blending of NDM processes and metacognitive attributes enables the leader to manage high cognitive loads associated with the in-action decision (L. Collins & Collins, 2015). Evidently two aspects emerged from the interviews; firstly, an ability to reflect on the process of the decision and the decision outcome. ML7 highlights a metacognitive capacity as follows, "So I purposefully stopped the group and tell them that I need to make a couple of decisions". As part of this decision to stop, the nature of the decision was reviewed and reflected on, and the consequences of the action and impact on the group was considered as part of the contextual framework for the decision.

Secondly, the capacity to anticipate changes in a situation and to accommodate those possible 'new' variables into the leadership decisions as an ongoing auditing process was apparent. Referring specifically to managing risks and illustrating the cognitive load, ML4 explained:

> Identifying and managing [anticipating] all the risks that are coming up. Even if they're only very slightly apparent. So the changes of weather, changes in the physical state of your group are things you need to make an effort to keep tabs on.

It seems likely that those anticipated changes are analogous in nature and draw on previous experiences of similar situations. However those changes may be metaphoric in nature when learning from experiences to inform novel situations or new context.

Diverse mental models

During planning processes, the mountain leader utilises predominantly a classical 'logical thinking' decision making (CDM) style (cf. L. Collins & Collins, 2016b, in adventure sport). Following sufficient volume of experience, the leader is able to anticipate, prioritise and plan for potential courses of action within specific contexts (i.e., the likelihood of implementing alternative plans). Moreover, these actions appear to be stored as a procedural chunk and highly associated with recognisable contextual demands (e.g., the clearly delineated Danger, Response, Airways, Breathing, Circulation [DRABC] procedure in First Aid situations). For example, ML1 described: "So I gave them [the lost walkers] my spare clothes to warm them up a bit. I always bring spare clothing" that are carried as a requirement by the mountain leader. ML3 highlights the valuable impact of such procedures within a more complex context that served to reduce the cognitive load:

> So I suppose using my first aid knowledge and the procedures that you learn in basic first aid going through your ABCs etc. [the delineated procedural chunk], actually asking the right questions I could see that [was] more than indigestion and to be honest with you, that was a fairly easy decision.

In addition, options may also be derived in an episodic manner, drawing from the knowledge within the leader's community of practice, as exemplified by ML8 in the following: "on slopes of this aspect after these conditions I anticipate 'X' conditions". Without experience of that *actual* slope, but by drawing on experience of similar slopes (aspect, shape, gradient etc.) in similar conditions, leaders often combine this knowledge with the advice of another leader who has direct experience of the slope in question.

An interesting aspect of the community of practice is the value placed on the provided information as being equal to the leader's own; in other words, there is a high degree of trust between mountain leaders. With this information, the leader generates a range of mental models/options that relate to a particular sequence of events, pivotal occurrences or combination of factors. This aspect of judgment and decision making is broadly classical in nature and allows the leader to rationalise, prioritise and reduce the range of options considered in-action, essentially narrowing the range of options considered and reducing cognitive demands on the NDM process. ML 8's statement that "But feels like relatively smaller decisions, really. But the big decisions you've made a long time ago" highlights the "big decision as part of the planned process". In this respect, the metacognition facilitates the nesting of CDM and NDM in the judgement and decision making process. This metacognitive capacity appears critical within the professional judgement and decision making (PJDM) approach advocated by Abraham and Collins (2011) and L. Collins et al. (2016) and, as we have demonstrated, is highly valued by these mountain leaders. Like their coaching colleagues, mountain leaders experience high cognitive loads and a strong metacognitive capacity would seem well developed to assist in managing this demand.

Judgment and decision making

As stated earlier, anticipation of particular events, pivotal occurrences or specific combinations of factors *prime* the leader in 'selecting' from a predetermined set of options. Metacognition allows the generation of heuristics that facilitate a quicker route to an option derived from CDM. This illustrates the nested synergy of NDM and CDM that may operate in the PJDM model. ML 8 describes the classical, logical-thinking part of the process at a crucial moment in a walking tour: "… you want to be

there when it's stable [the snow]" and also illustrates the result of actually arriving at that snow slope "… I was listening to my body then, when I realised that, kind of shaking knees means that you should really not be there."

While the crux had been planned for and anticipated, the decision not to cross the slope was based on a more naturalistic, gut feel, process arrived at in-context.

ML7 highlighted the on-action/in-context aspects of judgement and decision making identified by L. Collins and Collins (2015), while also anticipating the consequence in context. For instance, the group getting cold while the leader collects information to utilise in an apparently CDM process: "So I purposely stopped the group and tell them that I need to make a couple of decisions, stay here, put a layer on".

The mountain leaders appeared to attribute the in-action process to intuition, with ML1 suggesting that his intuition reflected him knowing he "had *The Force* with me basically". The leader's ability to rationalise their intuitive decisions appears to contradict such a belief, suggesting that this is not the case and that the term 'intuition' is misused in this context. We do not dispute that intuition forms part of the decision making process (Lufityanto, Donkin & Pearson, 2016), but suggest that it is overemphasised due to its perceived high value status among leaders and possibly because decision making is articulated from a solely CDM perspective. In short, aspects of decision making that are not classical in nature *must*, therefore, be intuitive because no other known terms can be applied.

Options that were generated changed in priority as the activity progressed and appear to be conceptualised as a set of loose parts that can be reconfigured to facilitate multiple outcomes in contexts (i.e., "now priorities are XYZ, while at other points the priorities will be ZXY"). This contributes to the high cognitive load attributed within

the decision making process and, once again, links the judgement and decision making process to the overarching/integrating metacognitive theme. The cognitive load is associated with the adaptation, flexibility and creativity of a blueprint plan that utilises preselected components, rather than constructing completely novel procedures in the field. Action plan components are selected based upon their capacity to be integrated. As such, appreciation of the context, situational awareness and demands is highly significant to the decision making process.

Contextual framework

Judgment and decision making skill facilitates the adaptability and flexibility required when utilising the loose parts, mentioned earlier, in a range of different configurations. This facilitating mechanism and associated metacognitive processes operate within a contextual framework that acts as scaffolding for the decisions. Consideration towards the environment, group, and their interaction is similar to the *situational awareness* described by Endsley and Garland (2000) and Banbury and Tremblay (2004). ML2 explains:

> We were quite a way down, you know. Actually, if the weather had been better, we'd have had different options…you know, to go high up in the Cairngorms. So if the weather had changed then we would have had different options.

Fixed parameters, such as group experience, size and nature, terrain, gradient and a limited range of anticipated or planned possibilities (e.g., task, conditions) act as scaffold supports for the judgements and decisions. This declarative knowledge demonstrates a deep understanding of the contextual framework. The contextual framework constrains the decision in practice. This extends the concept of situational

awareness (Flin et al., 2008) and Abraham and Collins' (2011) *situational demands* to encompass a greater 'projection of future state' than either description implies, however does require further research. Indeed, this 'anticipated state' is influenced by the practicality of the leader's decision, with the decision itself having an impact on the future state, as ML1 explains: "if I do X I need only consider Y and Z as possible alternatives". ML5 also illustrates the point clearly:

> and to be quite forthright, people saying 'right well if you don't reach this point by this time that's it we're turning round because if you go on you will then go over the time limit and you will be slower coming down'. The delay by proceeding resulting in the need to cross a snow slope that will be exposed to the sun and consequently more avalanche prone.

In not reaching a particular point on an ascent, the leader knows that the original plan is unachievable. In knowing that the ascent from a given point (e.g., a col) to the summit will take 2 hours, by not reaching that point with 2 hours to spare the final summit ascent becomes impossible. This appears to be facilitated by the predetermined options derived from the plan and supports identified earlier.

In addition to the standard operating procedures, specific mental models for action are generated via the planning process. These models draw on the experience *and* declarative, technical and nontechnical knowledge/skills of the mountain leader. These constructed models are specific to the context of the proposed activity (dependant on the contextual frame) and operate alongside the standardised, more routine, procedures. In this respect, the number of options available to the leaders in a given situation is reduced into a manageable load. Such preplanned options appear to reduce the leader's cognitive load in a given situation, selecting from a predetermined

short-list of options or tools available and, therefore, enabling the leader to be flexible and adaptive within the constructed contextual framework.

Declarative technical skills including rope-work and navigation are taught during training. Additionally, a range of nontechnical skills such as judgement and decision making that are associated with leadership, emerge from the reflective processes of the leader's own experiences or from previous formalised training (e.g., military, emergency services, police, business). In reality, the development of these nontechnical skills is frequently a combination of the two. ML2 described a particular course of action towards the summit of a mountain walk, "we're commando forces so it was…. Nobody gets left behind". ML6 draws on their experience within a military, paramedic role and states:

> I learnt a lot of decision making and being a leader through the military.…Leadership skills, teamwork skills was driven by that more than when I did my Mountain Leadership training.

In addition, ML6 also states "there's lots talked about reflective practice within my paramedic role". These nontechnical skills appear to be reconceptualised from other sources or developed via reflective and metacognitive skills. Importantly, both approaches to the development of judgement require the metacognitive capacity highlighted earlier. The first as part of the reflective process associated with learning from experience, the latter in the transfer of skills to new domains or contexts. It seems most likely that the two are interrelated and operate in synergy. Further examination of this complex process is worthy of further investigation.

General discussion

The aim of this paper was to understand the relative value placed by UK mountain leaders on judgement and decision making, by considering the nature of those judgements and the manner in which they are developed. In doing so, the paper addressed two questions: What value do UK mountain leaders place on judgement and decision making and, how are these judgment skills learnt, developed and refined?

What value do UK mountain leaders place on judgement and decision making?

Mountain leaders clearly value judgement and decision making skill, as evidenced by its top ranking position (above procedural technical skills) in the survey and important impact offered within the interviews. Indeed, results revealed an important recognition for practical integration of technical, leadership and judgment skills in a synergy for optimum effect. Despite its highly assigned value, however, decision making appears not to be explicitly taught during the mountain leadership training in the UK; at least not according to the in-depth interviews in Part 2. In our professional experience this is, likewise, generally common amongst other, more traditional, sports coaching qualifications. This deficit could be seen to represent misalignment between training and practice. Such perspectives are, however, in line with the PJDM approach that similarly places an emphasis on judgment and decision making *because* of its acknowledgment that leadership is complex, thus requiring adaptability and flexibility. Recent studies have recommended that training/assessment be more aligned with practice, with the need for a mixed assessment of *both* declarative technical skill and decision making (particularly in higher awards: L. Collins et al., 2016). Looking to the future, important questions for mountaineering training bodies are, therefore, what does it *mean* to be a mountain leader? What *are* the *essential* skills required by mountain leaders?

How are these judgment skills learnt, developed and refined?

There were two main mechanisms that leaders in this study suggested for how they were able to improve their judgment and decision making skills in their own practice. Expressly, transferred leadership and decision making skills from either other formalised training (e.g., emergency services or military) or via a process of experience and self-directed reflection were identified. The former required leaders to recontextualise existing knowledge and skills, or the reconstruction of that knowledge and skill, both however require quality practical experience as a mountain leader, reflective and metacognitive capacity. The processes of experiential learning, however, are not facilitated in the mountain leader training. As a result learning from the QMds is potentially ad-hoc in nature, relying on reflective skills that are, also, learnt and transferred from other contexts. In practice, this reflection on experiences is associated with an intention to act (Martindale & Collins, 2005) that relates to the goal associated with that judgement and is constrained by the contextual framework.

With the QMDs already required by MTUK as part of the formalised training, it would seem sensible to capitalise on leaders' ability to learn from such experiences. Accordingly, integrating metacognitive training (e.g., cognitive apprenticeship or decision training) alongside declarative technical and nontechnical skills, with a clear contextual framework that includes prioritised mental models, is an obvious way forward for future training. Indeed, this *might* require the leader to articulate their decision making and explain how it was derived. Crucially, such a requirement must be understood, bought into and valued by the trainee leaders and, finally, supported and reinforced by the community of practice.

Conclusion

In conclusion, there is much potential for research and development in judgement and decision making skills for mountain leadership. This study has identified that mountain leaders highly value these skills but are unsupported in knowing how to best develop them. We have explained that the existing training structure is advantageous for several reasons, including the duration, scope and practical requirements. However, we propose that, without formal support for developing good judgment and decision making skills, potential leaders are at a disadvantage when presenting for assessment. In short, greater efforts need to be directed towards *maximising* the QMD experiences which, in turn, we suggest will upskill the leadership workforce to support the UK's growing industry in the wake of recent health initiatives.

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Figure Captions

Figure 1. Ranking of skills (1 being the highest and 10 the lowest) in terms of their importance to mountain leadership.

Figure 2. Bar charts showing the extent to which participants believed good mountain leadership is dependent on gut feeling or logical thinking (A), their mountain leadership is dependent on gut feeling or logical thinking (B), decisions outside of mountain leadership scenarios are based on gut feeling or logical thinking (C), their mountain leadership decisions are developed informally or formally (D), their mountain leadership decisions are planned in advance or responsive in practice (E), and their planning decisions (prior to the activity) are based on gut feeling or logical thinking (F).

628 **Tables**

629 Table 1.

Qualification & Remit	Training Pre-requisites	Training content	Consolidation requirements	Assessment requirements
Summer Mountain Leader The scheme is intended for those leading groups in mountainous or remote country in the UK. The term 'summer' is used to describe any conditions not covered by winter.	Minimum age of 18 years. Minimum experience of 1 year in hill walking. Registration onto the scheme. Recorded a minimum of 20 QMDs.	Duration = 6 days. Group management Navigation Access and the environment Hazards (including steep ground and rivers) and emergency procedures Equipment Expedition skills Weather Background knowledge	The period between training and assessment varies in length for each person and is an opportunity for candidates to develop skills, paying particular attention to any weaknesses identified during the training course.	Duration = 5 days (including a two night expedition). Attend a Mountain Leader training course. Be familiar with the syllabus. Minimum of 40 logged QMDs. Hold a current first aid certificate, minimum 16 hours. Logged at least eight nights camping, including at least four nights of wild camping.
Winter Mountain Leader Winter can be defined as the time when snow and ice prevail or are forecast	Hold the Summer Mountain Leader award. Current experience of hillwalking and mountaineering in winter conditions in at least three	Duration = 6 days. Leadership and journey skills Navigation Snow and avalanches	The period between training and assessment varies for each person. The exact nature depends on the weaknesses	Duration = 5 days (including a two night expedition). Attended a Winter Mountain Leader training

and is not to be defined by a portion of the year.	different UK mountain locations. Be well practised in the personal use of ice axe and crampons. Recorded a minimum of 20 Winter QMDs.	Ice axe and crampon skills Security on steep ground Emergency snow shelters and holes Cold weather injuries Winter weather	identified during the training course. 10 Grade I climbs, or equivalent mountaineering routes.	course (or have been granted exemption). Be familiar with the syllabus. Minimum of 40 logged Winter QMDs. Hold a current first aid certificate.
International Mountain Leader	Completed the Mountain Leader award. Recorded a minimum of 20 International summer QMDs and 20 winter QMDs (UK or overseas). Referee to endorse their experience.	Duration = two 5 day training courses (summer and winter). The mountain environment International legal and economic situation Group management and leaders responsibilities Teaching Anatomy and physiology Physical ability Navigation Weather Security Emergency procedures Bivouac and survival skills	The period between training and assessment varies depending on the weaknesses identified during the training courses. Mountain Training UK encourage candidates to develop experience post training.	Duration = 9 days (4 summer and 5 winter) Summer Assessment: Attend an IML Summer training course. Be familiar with the syllabus. Pass the Speed Navigation Test. Hold a current first aid certificate. Experience since completing the IML Summer training. Winter Assessment:

	Expeditions Snow-covered terrain	Pass the IML Summer assessment Complete IML Winter training Be familiar with the syllabus Hold a current first aid certificate, minimum 16 hours. Minimum of 60 logged QMDs.

Table 2. *Ratings about Professional Judgment in Mountain Leadership.*

	Strongly Agree	**Agree**	**Neither Agree Nor Disagree**	**Disagree**	**Strongly Disagree**	**Average Rating**
Effective mountain leadership relies on good judgement skills	276	51	1	2	1	1.19 (Strongly Agree)
An effective mountain leader has the ability to learn from experience	272	52	4	3	0	1.21 (Strongly Agree)
Good judgement is a product of poor judgement	6	75	112	106	32	3.25 (Neither Agree nor Disagree)
Errors in judgement are inevitable	27	173	67	51	13	2.55

						(Neither Agree nor Disagree)
Developing judgement skill is a complex process	123	148	37	22	1	1.88 (Agree)

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633 Table 3. *Participant Qualifications*

Participant No.	Qualification(s)
1	Summer Mountain Leader
2	Summer Mountain Leader
3	Summer Mountain Leader Winter Mountain Leader International Mountain Leader
4	Summer Mountain Leader
5	Summer Mountain Leader International Mountain Leader
6	Summer Mountain Leader
7	Summer Mountain Leader Winter Mountain Leader
8	Summer Mountain Leader Winter Mountain Leader

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635 Table 4. *Organisation of Data Codes from the Thematic Analysis.*

Higher-order Themes	**Mid-order Themes**	**Lower-order Themes**
Metacognition	Anticipation of change	Conditions (e.g., terrain, weather) Environment Group Goal (link to plan B)
	Cognitive load	High Changing (i.e., across a day) Varied (i.e., reflecting the nature of the decision)
	Knowledge generation	Knowledge sharing Community of practice
Diverse Mental Models	'What if?' (anticipation)	Recognising situational cues Pivotal moments in group behaviour/skills Accumulation of minor occurrences that then become significant (i.e., pattern recognition) Prioritisation of alternative possibilities

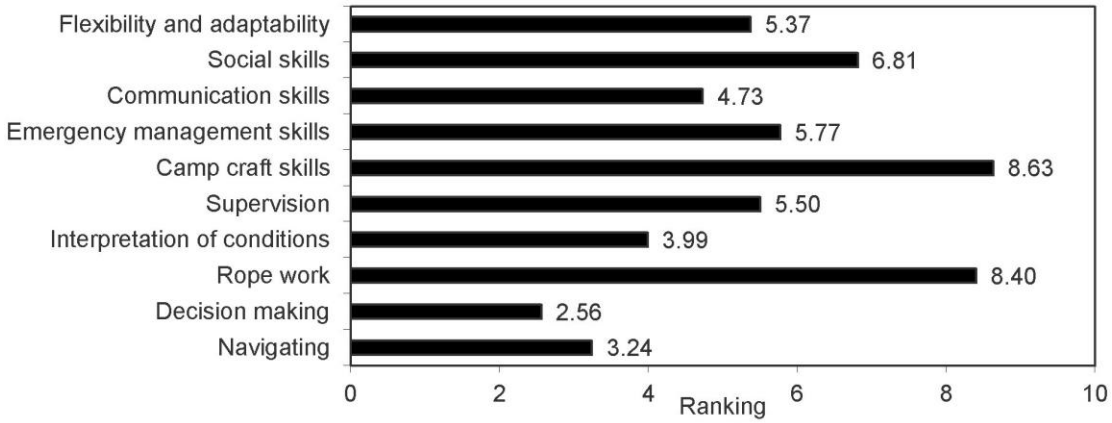
	Attending to realistic options (e.g., disregarding winter condition hazards in the summer)
Evolution of planning in accordance with anticipated situations	Creativity Adaptability Flexibility Pre-action planning
Engagement in the decision making process	Classical decision making Naturalistic decision making Recognition of emotional impact Synergy of classical and naturalistic decision making Misuse of intuition Metacognition
Contextual impact on DM ‘span of control’ management	Process (i.e., flexible application from own experience and knowledge) Protocols (i.e., derived from best-practice) Procedures (i.e., options to select from) Standing orders (i.e., external regulation)

		Routines (i.e., inflexible application of constructed knowledge)
Judgement and decision making	Reflection	In-action On-action On-action/in-context Reflective feedback Intention to act
	Feedback	Expectation to learn Explicit (i.e., requested from leaders) Implicit (e.g., body language, response from group) Emotional intelligence
	Community of practice	Value Use Access
Contextual Framework	Situational awareness	Group characteristics (e.g., size, make up etc.) Task (outcome, process) Environment (physical, social) Knowledge of conditions
	Interaction awareness	Contextual knowledge

	Contextual impact on group
	Contextual impact on task
	Anticipated changes
	Learning context
	Rapport with the group
Technical skills	Navigation
	Rope work
	Snow craft
	Emergency skill
	Tactics
	Supervisory skills
	Safety skills
Nontechnical skills	Adaptability
	Delegation
	Response/capacity to change
	Leadership styles
	Communication
	Empathy
	Emotional intelligence
Transferability	Military
	Emergency services
	Business
	Other life experiences

637 **Figures**

638 *Figure 1.*



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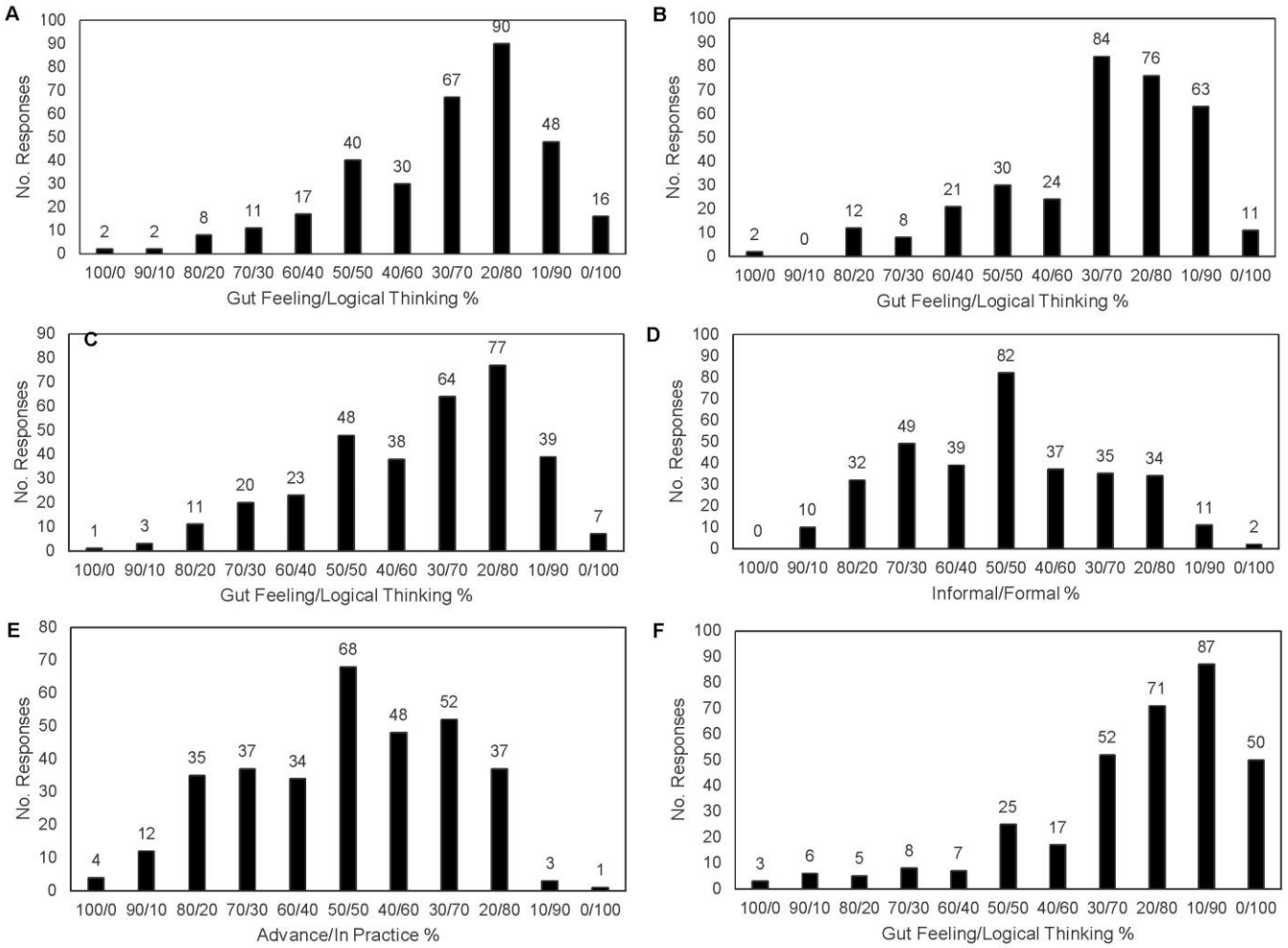
647 *Figure 2.*



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