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The role of planning in outdoor adventure decision-making

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ABSTRACT

This article explores the influential role of planning on recognition-primed decision-making. Considerable prior thinking occurs and there is a need to trace and account for the cognitive processes that precede and guide decisions in dynamic outdoor environments. Seven expert leaders from four countries were interviewed about memorable decisions made on outdoor journeys with an educational focus on land, sea and ice. Four stages of planning were identified: (1) long-term preparation; (2) formal leadership meetings; (3) day-by-day planning on route and (4) thinking immediately prior to the event. The stages sequentially capture the planning progression, illuminating the cognitive processes at each stage to culminate in option selection. In each decision situation, planned goals and actions were implemented through the creation and re-creation of micro-plans. As windows of opportunity presented themselves, the flexible execution of plans was a key feature. Planning provided the solid bedrock upon which decisions were made.

KEYWORDS

Outdoor leadership;
recognition primed
decision-making;
planning

Introduction

In this paper, we examine the relationship between the in-the-moment decision-making (DM) of expert leaders in the field and their prior planning processes. Leaders make numerous decisions before and during an excursion and field-based research with backpacking groups identifies decisions that are based on logistics, safety, pedagogy, the environment and group dynamics (Boyes & Potter, 2015). Some decisions are simple and others complex, many are inconsequential and a few are crucial. Planning processes, with strong links to an institutional or company curriculum, influence many of the decisions. For instance, goals, techniques and progressions for learning safety skills like river crossing are pre-planned and potential locations identified for en route application. Appropriate to the educational environment, leaders are knowledgeable, qualified and experienced. Primed by careful preparation, their ability to make sense of field-based situations and to work adaptively and intuitively draws from their years of practice in a range of terrains. It is notable that DM has been rated by outdoor leaders as having the highest importance of all leadership skills (Collins, Carson, Amos, & Collins, 2018).

Outdoor adventure activities like backpacking and sea kayaking are undertaken by students, tourists and recreationists, where the differences between the user groups are increasingly blurred (Boyes & Houge Mackenzie, 2015). Correspondingly, the role of leadership has traditionally been defined as teacher for education groups, guide for tourists and leader for recreational groups. While the boundaries blur, learning is important to all domains and the role of the leader increasingly has educative,

social facilitation and emotional management roles (Carnicelli-Filho, 2013). Outdoor recreation programmes are common in formal and tertiary education and, for example, in New Zealand, outdoor recreation participation has increased dramatically, especially in ageing populations, female participants and ethnic groups (Ministry of Business Innovation & Employment, 2016). Fuelled by the social media, greater tourist demand for more individual and authentic learning experiences can be observed (Lamont, 2014). Although presented with a localised flavour, programmes in many countries are homogenised and globalised to appeal to locals, students and the international adventure tourism market. In effect, the adventure curriculum has been internationalised (see Swarbrooke, Beard, Leckie, & Pomfret, 2003).

In the naturalistic decision-making (NDM) context, Xaio, Milgram, and Doyle (1997, p. 323) define planning as: '...the process of preparing and enriching the action resources needed for efficient functioning in complex environments.' Klein (2007, p. 79) outlines planning as '... the process of choosing and organising courses of action on the basis of assumptions about what will happen in the future.' Planning forms an essential component in all outdoor excursions to advance adventure and learning, to minimise accidents and to protect the environment (Gair, 1997; Kossef, 2003). Planning clarifies goals, considers timeframes, maintains stability, reduces oversights and identifies problem areas. In safety management, planning is mandatory with strategies such as first aid and evacuation plans required by custom, policy or statute (Haddock, 2004). Goals and objectives are aligned to the participants and the organisation. More crucially, planning provides a framework to enhance a leader's ability to adapt to eventualities and can reduce the cognitive load at the time of making a decision (Collins et al., 2018).

In 2007, Klein proposed flexexecution as a paradigm for flexible execution of planning processes. Plans were seen as malleable roadmaps of procedures, followed to achieve goals. Furthermore, plans have now evolved as vehicles for learning and re-planning with leaders discovering, managing and refining goals while pursuing them in the field. Flexexecution is sensitive to windows of opportunity, much like the teachable moment. Macquet and Pellegrin (2017) proposed the inclusion of a planning link in the naturalistic DM models. They observed that experts anticipate a developing situation and plan a decision before the situation develops. If anticipated events and actuality match, planned actions are implemented. If not, other actions are considered. Moreover, on occasion leaders modify the situation features or goals to fit the planned action.

Critique of classical DM centres on the challenges and inflexibility of following predetermined plans made redundant in rapidly changing field-based situations (Zsombok & Klein, 1997). Klein (1999) identified limitations in leaders' abilities to plan for such situations. He acknowledged that stable environments permit precise plans but rapidly changing environments favour modular plans that permit rapid improvisation. Field-based planning is a continuous process where plans are refined and adjusted over time as information becomes available. There is agreement in NDM that planning is useful to clarify broader intentions, learn more about situations and to calibrate shared understandings between leaders. Developing a shared situational awareness supports better improvisation. Therefore, being clear about the task, purpose, rationale, constraints, objectives and antagoals (unwanted outcomes) of an activity is important to situated intuition (Klein, 1999). These factors underpin leaders who are creative, adaptive and intuitive.

There are a growing number of empirical studies that report on the role of planning. Xaio et al. (1997) focussed on the NDM planning behaviour of anesthesiologists who drew from past experience and made extensive use of preparatory strategies. Their planning was a combination of both mental and physical activities that clarified desired goals and provided appropriate resources, consideration of potential problems and contingency response plans. The anesthesiologists strongly resisted generating sets of planned action sequences. They found situational awareness and identifying problems more valuable than providing solutions. Their planning involved developing discriminating cues, or sensory signals that stimulated a response, and having multiple contingency plans available. Having engaged in mental rehearsal, they only needed the cues to invoke the action.

In NDM studies of sporting contexts, athletes and coaches spend considerable time developing the skills and shared mental models of the offensive and defensive plays typical to their sports. In particular, goals and roles are learnt and clarified. Volleyball players practised typical situations and actions which were then adapted in the game situation (Macquet, 2009). Likewise basketball players learnt flexible and adaptive plays that would be called on to meet changing game situations. The players themselves also needed to be flexible and adaptive so on cue they could adjust the nature and timing of their actions (Macquet & Kragba, 2015).

Longer-term mental preparation readies leaders for specific decision situations. Prior experience and premeditation processes enable leaders to recognise situations as typical before and in the moment they arise. McLennan and Omodei (1996) describe experts' cognitive processing immediately before engaging in decision-making. They used the descriptor 'pre-priming' where: '...the decision-maker engages in mental simulations of the likely nature of the situation and possible actions prior to the activation of true recognition processes on encountering the actual incident' (p. 1062). They propose that pre-existing knowledge structures are activated by mental simulation of possible situations bringing relevant information from memory into heightened accessibility. This supports Kahneman and Klein's (2009, p. 520) assertion that '[decision making] ...intuition is nothing more and nothing less than recognition.'

Naturalistic decision-making (NDM)

Outdoor education situations have compelling similarities with the conditions studied by NDM researchers. NDM research is based on observations of how experts make field based decisions. These situations contain uncertain dynamic environments, changing and evolving goals, occasional time pressure, action and feedback loops, multiple players, meaningful consequences and organisational goals and norms (Zsombok & Klein, 1997). Natural environments pose constantly evolving challenges and social contexts that engage individuals and foster tightknit groups. As the experience unfolds, situations are multiphasic varying in stability and complexity (McIntyre & Roggenbuck, 1998). Situations often contain elements of risk and require experienced leaders with specialised knowledge. In contrast to non-educational settings, outdoor education situations have overarching pedagogical and environmental contexts where leaders provide opportunities to learn about the practices, the environment and the culture. Opportunities are created to model and rehearse safe and quality practice, including decision-making itself (Boyes & Potter, 2015).

While there is considerable research applying NDM to a very wide range of leadership domains (see Gore & Ward, 2017), a growing body of inquiry confirms the applicability of applying NDM in outdoor education. Whereas decision-making can be seen as the thinking that results in the selection of a course of action from several alternatives, a key precedent is comprehensive situational awareness largely based on matching cues to prototypes in memory. In the outdoor education context, situational awareness and option selection have been the focus of work by Boyes and O'Hare (2003, 2011), Beare and Lynch (2005), Boyes and Potter (2015) and Aadland, Vikene, Varley, and Moe (2017). In addition, Galloway, Ewert, and Shellman (2003) confirmed the presence of the NDM field settings in the outdoor education context. Other NDM research completed by Galloway (2002, 2005, 2007, 2012) looked at the outdoor decisions of novices and experts.

Focussing on a sports coaching perspective and drawing on a synergy of classical and naturalistic DM, Collins and Collins (2016, 2017), investigated the planning and decision-making processes of adventure sports coaches. Coaches drew on their epistemological values and domain specific expertise to form an epistemological chain that acted as a framework to support planning, pedagogy, professional development, analysis and DM. Furthermore, they observed constant auditing and reflection based on a metacognitive, nested, reflective process (Collins et al., 2018). Collins and Collins (ibid) identified that coaches employ a continually evolving process comprising a resource audit (e.g. physical resources available); a pedagogic audit (e.g. individual learning needs

& teaching strategies) and a decision-making audit (e.g. venues, evaluation). In the thinking processes that precede an event it is unclear where classical and naturalistic decision processes occur and merge with the critical and reflective thinking of the cognitive process. An area for future research is the question: how much of planning is DM?

In research examining the development of judgement and DM in mountain leaders, Collins et al. (2018) identified the information that was influential to the decisions and the key processes by which decisions were made. Metacognition was identified as a key unifying process to '... assist the naturalistic "gut feel" processes' of DM in-action (ibid, p.140), and reflective evaluative thinking afterwards. In many ways this is similar to the microcognition component of the NDM concept of macrocognition which Klein, Ross, and Moon (2003) saw as an encompassing framework of cognitive processes including planning, situation assessment, adaptation, DM and coordination. Galloway (2012) applied macrocognition to outdoor leadership and identified the professional context of outdoor leadership to contain a repertoire of practice (Seaman & Coppens, 2006), ethical frameworks (Mitten, 2002) and adaptive expertise (Tozer, Fazey, & Fazey, 2007). Leaders in the outdoor domain share a profession, albeit applied in a number of contexts, e.g. alpine, cave, etc. In each of the domains there is a shared body of specialist knowledge and across the domains there are common elements e.g. group management. Together, these constitute a community of practice (Collins et al., 2018, Wenger, 1998), which also promote the development of swift trust in newly formed groups (Meyerson, Weick, & Kramer, 1996).

Other key findings of Collins et al. (2018) were the identification of diverse mental models where planning engaged leaders in an analytical cognitive process similar to classical DM and at other times the more intuitive processes of NDM. The recognition of cues and patterns is similar to the sense making of NDM and the evolution of planning through creativity, adaptability and flexibility are hallmarks of flexicution.

Recognition Primed Decision Making (RPD) is a commonly used NDM model where a leader's experience is employed to recognise and understand decision situations. Making sense of a situation involves a process by which experts give meaning to their experiences in an applied situation. This is created by the interaction of in-the-moment plausible goals and environmental cues, creating an expectation of meaning that leads to the consideration of possible actions. In Klein, Moon and Hoffman's (2006, p. 71) words: '... a motivated, continuous effort to understand connections (which can be among people, places, and events) in order to anticipate their trajectories and act effectively.' Often the selected option is generated intuitively as the first considered, or if there is insecurity, the option is analysed by mental simulation for its workability. Only if flaws are uncovered will another option be considered. Generally more time is spent in sense making than in option selection (For a fuller description of RPD see Boyes & Potter, 2015).

The RPD model incorporates dual processing. While recognition triggers an automatic Type one intuitive response, at times Type 2 analytical processes incorporating long-term memory are employed, especially in clarifying situational awareness and in the simulation of candidate options (Kahneman & Klein, 2009). Pedagogical tools such as the sea kayaking checklist proposed by Aadland et al. (2017) can contribute strongly to the analytical planning processes that underpin situational awareness.

Having established a background and rationale for the research, this paper explores the research question: How are field-based decisions influenced by planning processes? In addition, we address the more specific questions: What is the purpose of planning? What planning takes place and when? How does planning influence pattern recognition and option selection?

Method

Participants

In concert with the globalisation of adventure, our focus was international, concentrating on activities that included an educational dimension from programmes in tertiary institutions and

adventure tourism. Hence, seven expert leaders (L1-7) were selected from four countries—Canada, Denmark, Germany and New Zealand.

The four researchers are located in these countries and hold highly respected outdoor education profiles based on long and extensive personal and teaching experience in a range of outdoor pursuits. In addition, they hold tertiary education positions in outdoor education and are immersed in contemporary theory and practice. Drawing from the researcher's reflexivity, the intention was to identify general features linked to the experienced leaders' processes of decision-making. From extensive discussion between the researchers, we were confident of more similarities than differences in practice across the four countries and activities. On beginning the interviews and analysis we kept open minds to embrace cultural differences and similarities as they emerged. From their insider knowledge and contacts, each researcher purposively recruited participants based on agreed criteria including a high level of expertise, a proven track record, outdoor instructor qualifications, at least 20 years of experience, a focus on adventure activities and field credibility. The proposed selection of leaders from each researcher was discussed in the group of researchers aiming to get an overall sample that matched the agreed criteria and represented a variation according to age, gender and type of activity (kayaking, climbing, etc.). We followed Kahneman and Klein's 's (2009) definition of experts as those recognised within the profession as having the skills and abilities to perform at the highest level. Table 1 highlights the demographic and contextual information of the decisions made of the participant leaders we studied.

Data collection and analysis

Ethical approval for the research was obtained from the University of Otago ethics committee. This included standardised procedures to store information, maintain confidentiality, provide information to interviewees and obtain informed consent.

Semi structured interviews were conducted, guided by a hybrid cognitive task analysis (CTA) method where the cognitive structures and processes of a decision are identified. A knowledge audit (KA) was incorporated, that identifies other cognitive skills and capabilities of the interviewee that are relevant to the context (Borders & Klein, 2017). Beginning with a specific decision, the KA approach explores the background knowledge and broader elements of expertise that underpin a decision. In particular the focus is on the facts, information and skills gained through experience, and the links to the planning process. Commonly employed by NDM researchers, CTA focuses on a leader's lived experience in real world tasks in dynamic work settings. The intention is to capture the knowledge and skills that experts use to perform complex tasks (Crandall, Klein, & Hoffman, 2006).

The interviews were retrospective with the advantage of access to the decision situations and the leaders' reflections on the events. The limitations are that leaders may forget events or distort the details. To some extent these shortcomings were overcome by the CTA interview process

Table 1. Demographic and contextual information of the participants.

Leader	Country	Age	Gender	Activity	Context
L1	Canada	43	M	Dog sledding	Commercial company; 1 week conducted in Norway, 8 clients, 2 guides
L2	NZ	52	M	Tramping	Tertiary education; 7-day Southern alps journey; 8 students, 1 leader
L3	Denmark	45	M	Sea kayaking	Tertiary education; 3-day Journey, 8 students, 1 leader
L4	Germany	64	M	Sea kayaking	North Frisia North Sea. 1 leader, 6 participants
L5	Denmark	41	M	Crossing the ice sheet	Commercial company; 27 days cross-country skiing; 6 clients, 1 leader.
L6	NZ	45	F	Tramping	Tertiary education; 7-day Southern alps journey; 8 students, 2 leaders
L7	Canada	40	M	Canadian canoeing	Commercial company; 14-day trip; 2 leaders with 10 company executives

where time was taken to rebuild the decision context and only memorable decisions were followed. The on-going co-construction of concept maps assists the memory process. Crandall et al. (2006) recommend that independent verification or findings replicated across interviews can achieve greater confidence in the outcomes and we followed this advice.

To obtain quality data and consistency we developed a semi-structured interview guide augmented by potential consequential questions to allow leads to be followed in an ad hoc manner. We focused on a memorable journey or experience where leaders had to make key decisions that occurred within the prior two years. The journey was discussed in general before specific decisions became the focus. For each decision we asked the participants to describe the situation and identify key cues, meanings, options and the outcome. We were also interested to know if the decision was made fast and intuitively or needed time and analysis. We then moved to discuss the influence that planning had on situational understanding and decisions. From our collective experience, we hypothesised that planning contains four stages: (1) long-term preparation; (2) formal leadership meetings; (3) day-by-day planning on route and (4) thinking immediately prior to the event. Information was sought on these stages and how they influenced the decision. To conclude, questions were asked about teachable moments and how planning influenced the identification and enactment of these. Finally some general questions were asked about planning and decision-making.

The interviews took between 30 and 80 min and the data were recorded in the language of the home country. The Danish and German interviews were then transcribed into English to allow accessibility.

Results

To capture planning activities in specific outdoor contexts, we present case studies of three decisions, each with different modes of travel and from different countries. From a total of 10 situationally specific problem-solving decisions generated in the seven interviews, we purposively selected three decisions offering the richest data. While there are unique aspects to each travel mode and country we focus on the human decision-making process as the relative constant. The intention is to examine how planning influences a decision, and to clarify the content and timing of the planning. Subsequent to the case studies, we consider the broader implications of the data.

Case studies

The three cases are: a Canadian crossing of an icecap in Norway, a backpacking journey in NZ, and a sea kayaking trip in Denmark (see Table 2-4). In each case we profile the decision situation and outcome. We examine the preceding preparation and consider the influence of planning on situational understanding and option selection through cue recognition and understanding. The cases are presented in tables that sequentially capture the planning progression, culminating in option selection.

Case study one—dog sled expedition

The first case (L1) is based in Norway where a group of eight clients and two guides from a Canadian company are engaged in a seven-day commercial dog sled expedition across arctic terrain. The decision is based around a large hill which is approached on day four and the key decision needs to be made whether to ascend the hill or take an alternative route. A number of factors including the condition of the participants, the dogs, the sleds, the snow and other environmental factors come into play in understanding the situation on the day.

The two leaders began planning a year ahead particularly focusing on the clients, the gear available and the dogs. After physical assessment of the participants and a shakedown trip of three days, an appropriate route with alternative options was confirmed. As the departure date loomed,

Table 2. Quotes about planning processes underpinning a decision on a dog sled expedition.

	Planning stages		
	Formal meetings	Day-by-day thinking	Immediately prior
Long-term preparation			
...started one year in advance. Normally we take 3–4 months ... especially with custom trips that are unique to situation, place and time.	The other guide did a shakedown trip with the clients.	The hill trip is in our trip plan... but we have an alternative. We assess the clients and how well they are on the sleds, how well the dogs are pulling, what the environmental conditions are, the snow conditions.	As a leader, you piece it all together like you are putting a puzzle together...and you place yourself in that picture ... and figure out how to manage it.
What gear is available?	A morning debrief with clients.	We sort of lead into it [making the decision] over the course of the days.	
Who are the people on the trip?	The other leader and I met each evening.	At the back of the train I am skiing and thinking.	
We start physical assessments [of clients] months in advance.		I am looking for polar bears and processing: How are people doing? How do people look on the sleds? How are people working together? Who fits best with each other and with which dogs? Who needs less weight on their sled?	
What is the route ...			
Ensure that the route and the people line up.			
... [sort] my own personal gear.			
The dog planning doesn't hit me until I am in the dog yard.			

General comments on planning for this decision

You need a complete understanding of the entire trip, lots of background information...

If you don't have the experience of that location, it's hard to understand the intricacies of the plan.

Planning informs our situational understanding more than anything

With background information ... you end up with a picture of what's going to happen and you place yourself in that picture.

You make a plan ... so that you have a whole series of options. And then every day is a separate plan. You modify planning on-the-fly ... You have to think about modifying it all the time (See [Table 3](#)).

the leader we interviewed was actively planning and preparing resources like his personal gear, meeting with the other guide, checking out the dogs, thinking through the clients, accessing long-term weather, determining local conditions and thinking through the route. The shakedown trip gave valuable information about his clients. By the time the trip began the leader had a complete understanding of the whole trip in his mind.

Once the journey commenced, the leaders met in the evenings and conducted morning debriefs with the participants. Meetings were to stock take as the trip developed and to prepare for the day ahead. In effect, each day developed a new micro-plan. Constantly monitored key information was sought: client assessment, how well they are on the sleds, how well the dogs are pulling, what the environmental conditions are like especially the weather and snow pack. The leader used the analogy of a puzzle: '... putting a puzzle together...and you place yourself in that picture ... and figure out how to manage it.' [Table 2](#) presents verbatim quotes from one of the leaders (L1) of the dog sled journey regarding four stages of their planning process before attempting the big hill and demonstrates how his planning underpinned his decisions.

The planning processes were such that the decision to ascend the hill was gradually made over the preceding days. As it became clearer that this group could tackle the hill, preparations began, such as lightening the sleds as much as possible. Mostly this involved dogs and people eating their way through their food supplies. When the day dawned and participants, dogs, sleds, weather and snow conditions were favourable, the leaders confirmed their plan to negotiate the hill. The objective was completed successfully.

At the time of making the decision the leader drew on his considerable cognitive resources based on his life's experiences to date. In-depth knowledge of the route was essential. Extensive planning, solid preparation and good communication underpinned performance. The leader's planning sharpened his mind and readied the resources for the specific nature and requirements of the decision context.

Case study two—managing an injury on a backpacking journey

The second case (L2) involved a group of seven tertiary students and an instructor on an 8-day backpacking journey in the Southern Alps of New Zealand. On a day climb to the summit of Mount Alfred a group member developed a debilitating knee injury and couldn't walk without considerable pain. The leader decided to leave her on the ridge in the sun and shelter, and collect her when the group came back down.

In long-term planning, once the composition of the group was known, the leader was able to assess the capabilities of the individuals and build a picture of the overall strength of the group. This led to thoughts about the kind of journey to be undertaken and a possible route plan. Ongoing weather information and the latest ground conditions helped build the profile. In-depth knowledge of the area enabled knowledge of the possibilities and variations to adjust levels of challenge. Packing personal and group gear provided further opportunities to visualise the trip. We now move to [Table 3](#) where quotes of the leader (L2) elaborating on his decision-making processes at different points prior to the student's knee injury on the backpacking journey are clustered.

Two leaders' meetings were held with the five leaders engaged with three different groups. One was held before meeting the students on campus and the other on-site, preceding the first day of the journey. In the meetings a wide range of material was covered including clarification of goals

Table 3. Quotes about planning processes underpinning a decision on a backpacking journey.

Planning stages			
Long-term preparation	Formal meetings	Day-by-day thinking	Immediately prior
I looked at the med forms and made an assessment.	Leaders meetings A clear understanding to become	Four days out I can see us having a good time on that ridge [Mt Alfred]	[She] developed a really nasty knee injury that mean't she couldn't walk without a great deal of pain. Before we got to the ridge she was having difficulty.
Is this the A-team or is this team a crock. I remember thinking I have a super-doooper group here.	comfortable living and moving in that environment A revision of the latest techniques	Preparing the group for the challenge ahead I am constantly assessing people and establishing ... their strengths and their demeanour	On the way up we spent some time working on the knee.
I am developing my thoughts for what's possible and what sort of trip	A [local] leader in touch with the local conditions We review on-the-ground safe	A nightly mountain weather report by mountain radio. That comes into play in [daily] route selection, track selection	Injured person—very fit, ... sensible and capable When Maddie was no longer able to move, I was focussing on an option
I know the challenges in there and I am prepping for the possibilities	operating procedures and other practices [We base it] on the	I know the challenges of it. It looks easier on the map but the reality on the ground is different	Beautiful weather ...sun and shelter on the ridge. Student was comfortable with the option to rest and wait for the group to return
Make sure I've got what I need. As I am putting gear in I am projecting myself forward.	long range weather forecast Emergency procedures Choosing potential routes	I went down and had a visual look [at the river] to see how many braids were running, the Cumecs reading and I knew it was a possible option.	... happy with the idea of staying on her own.
Outdoor first aid certification & group first aid kit	Meeting the students Medical information		
Knowledge of the route, obtaining latest weather & track information	forms, students prior experiences, expectations You go through with the group—what do you want to see?		
Visualising the trip	Tailoring the trip to the needs & capabilities of the students		
Thinking of ways to ramp-up or down, the level of challenge in that area.	So we talked about it—how Mt Alfred would be good		

General comments on planning for this decision

It comes less from planning and more from my experience
It is pre-planned ... it just kind of presents itself as an option
Because I know the route I know future events (See [Table 4](#)).

and objectives, consideration of potential routes, logistical arrangements, an update on latest techniques, a review of the safe operating procedures and discussion of the long-range weather forecast. In the second of the meetings final routes were shared, logistics finalised, the latest weather considered and information on local conditions provided. The students' meeting enabled the leader to meet his group of eight tertiary students, determine prior experiences, discuss medical information, determine objectives and gain agreement on a route.

On a day-by-day basis, the leader was constantly assessing the individuals and the group. Supplemented by a nightly mountain weather forecast and with in-depth experience of the route, the leader was in a strong position to adjust the specific pathways and the overall route selection. The river level was checked as a potential escape route if things went wrong.

Before the injury situation developed, the leader already knew a good deal about the student. By the time she was immobile, an option had been developed which was then auctioned. Undoubtedly his knowledge of the student and the route strongly influenced his decision. The leader thus felt the decision was taken almost intuitively drawing more on his experience and less from the planning.

Case study three—Sea kayak crossing

From the outset, the leader was highly experienced and ensured that he was up to date with current regulations and guidelines. He knew the prospective area well and began by developing prototype plans and backup plans appropriate to the needs of the group. He also considered safety management plans and how to prepare the students for emergencies such as multiple capsized situations. The weather forecast was variable. As the key danger was presented by the strait crossings on the journey, these hazards were discussed with students in their formal and informal meetings. Appropriate to a learning situation the students were presented with the overall journey

Table 4. Quotes about planning processes underpinning a decision on a Sea kayak crossing.

Planning stages			
Long-term preparation	Formal meetings	Day-by-day thinking	Immediately prior
Knowing the area pretty well. Looking at maps and looking at the journey.	The weather [forecast was variable]	[On an earlier crossing] the group had started to spread out. Some were reasonably comfortable with it. They were surprised how much they had to work.	It started early in the morning when I woke up. I am going through the scenarios.
I do much reflection on my own experience and some regulations and standards.	It was quite obvious that the crossings were the crux. Being clear about the criteria for a no go ... write it down. To the group & yourself.	The weather was right on the edge and over.	I considered a lot of pros and cons.
One thinks first what people should get out of this journey.	I had in mind the possibility of ... the ferry. I talked openly with the group about this.	How is the group, how strong? Focus on two students I think had problems. I wanted to be close to them.	The wind is harder than the standards prescribe.
Then I look at what could go wrong.	The group being responsible for the planning process. The group would take Plan A and plan it. It is not easy for them to make a plan B—you do not know what conditions you have to consider.	We went down to the water and talked about it—what happens further out. Go through all these considerations.	What is the worst thing that could happen here? It definitely was a gut feeling ... and the gut feeling is changing fast.
I always think of plans A, B & C. I have a satellite phone, we could always be taken out [Plan C].	We had done buddy rescues and talked through what if?	We talked 'what if' a few times through the trip.	We paddle down to the site and I keep a very close eye on the conditions and watch how they paddle.
What do we need to execute this plan?			They all seemed fresh... they were quick to get going ... they are making jokes ... and doing well. It triggers me to say we'll do it!

General comments on planning for this decision

The overall plan influences each decision

The thoughts I had before ... did not quite match the actual situation.

The plan must never overshadow the trip. I let myself be very easily affected by the situation.

Experience is important. Guidelines can be a support for this.

Learning often occurs more spontaneously. It is based in situ and not meticulously planned....

concept and encouraged to develop their own plan and backup plans for the group. The Sea kayaking leader's (L3) quotes in [Table 4](#) demonstrate his decision-making processes at different stages before the Sea kayak crossing.

On a day-by-day basis the leader continued to build his knowledge of the group members by observation and interaction. Their Sea kayaking education continued with direct experiences and discussion of 'what if' questions. As the day loomed and a decision needed to be made about the crossing, the weather was marginal but the individuals and the group itself were functioning very effectively. This observation provided the trigger for the leader to approve the crossing which was completed with aplomb.

The leader felt that the overall plan influenced all of his decisions. However, because of the dynamic nature of the environment he was very responsive to daily cues and was open to the situation being the primary driver of his decisions. He felt that his experience was the primary driver and planning supported this, and experienced or remembered it as a gut-feeling.

Discussion

Drawing from all seven interviews, we summarise the planning processes of the leaders and consider the implications for decision-making. This is followed by consideration of the theoretical implications of the data particularly in relation to situational understanding, flexexecution and the RPD model.

Planning processes

For all seven leaders, long-term preparation began well before the event. The planning consistently involved: (1) consideration of the people as individuals and as a prospective group; (2) determining a geographical locale and route and (3) personal preparation.

In many ways, human factors were the paramount determinants in the journeys. As L7 stated: '60% of your time ...your skill set needs to be people skills.' All leaders gathered as much information on their group members as possible. This took the form of medical information, experience levels, physical fitness, dietary needs, individual goals and anything else relevant. In the words of L2: 'I am developing my thoughts for what's possible and what sort of trip.' One leader (L5), began physical fitness preparation of clients a year before the trip and another (L1) conducted physical assessments months in advance. Most leaders obtained information by mail or internet and others held face-to-face meetings. Collins and Collins (2016) describe the focus on individuals as a pedagogical audit.

All of the groups were engaged in moving through and living in natural environments in the open air, selected and adjusted to provide an appropriate level of environmental challenge. What differed were the modes of activity and the natural features of specific places. Knowledge of people's goals and capabilities coupled with other planning knowledge determined locations. On-the-fly decision-making was enabled by environments that afforded on-site 'ramping-up or ramping-down' (L2) of challenge.

To be able to fully engage in a place meant to know it well and these leaders knew their places intimately. Over time, in-depth knowledge was accumulated from repeated visits. As a leader put it: 'You need a complete understanding of the entire trip, lots of background information...' (L1). In essence, the information included route knowledge, local terrain and features, track/sea conditions and the all-important weather conditions. Weather is often tracked for weeks ahead to build detailed knowledge and to identify trends. In some cases, leaders made site visits to confirm current information. The hazardous parts of trips were given particular thought: '... I look at what could go wrong... I always think of plans A, B & C.' (L3). By looking ahead the leaders are future proofing: 'I have all the variations in my head.' (L4); 'Because I know the route I know future events.' (L2). These locational aspects are described by Collins and Collins (2016) as a decision-making audit.

Once the group is known, a potential route determined and the departure date looms, the leader's attention turns to the collation of group gear and logistics (resource audit—Collins & Collins, 2016). As this takes place, cognitive processes are actively engaged: 'As I am putting gear in I am projecting myself forward ... visualising the trip.' (L2). Gear decisions can have an immense downstream impact on DM options.

Each leader engaged in extensive personal preparation. Included was the gathering of personal gear, working on personal fitness, ensuring qualifications were updated, reflecting on policies & guidelines and making arrangements to be absent from family and work sites. These factors gave confidence and peace of mind to the DM and focused the mind on the task ahead.

Formal meetings

All of the leaders held organised meetings with their participants prior to their journeys. Leader 6 described the substance of their meeting: '... we went through the route, the expectations of the students, the weather, the gear in-depth, ... food and menus, the first-aid kit... We got a pretty good idea of how they might get together and how they communicate together... We planned the whole trip from there'. Leader 5 described: '... packing everything and talking the expedition through ... preparing physically and mentally.' Most groups also discussed sound environmental practices. Safety factors were high on the leaders' minds. In a form of risk disclosure, some chose to talk the participants through the difficult parts of their journeys and outline backup plans for different weather conditions and eventualities.

In an institution where multiple groups were involved, leaders-only meetings were an invaluable process. Here, institutional goals and expectations were shared, no-go areas outlined, weather forecasts discussed, latest gear and techniques presented, mandatory risk management plans compiled and emergency and evacuation procedures considered. Local knowledge was sourced and the leaders shared their intimate knowledge of routes and conditions. This undoubtedly sharpened the minds of those involved and laid the base for empathetic situational awareness.

Making sense of a situation to form a coherent mental picture involves the combination of knowledge and experience recalled from memory and the perceived information flowing from the real world (this is also known as apperception—see Hoffman & Militello, 2009). Long-term planning culminating in the formal meetings provided highly relevant schemata in long-term memory. Leader 1 stated: 'Planning informs our situational understanding more than anything. With background information ... you end up with a picture of what's going to happen and you place yourself in that picture.' It is intuitive to say that thorough planning creates updated memory patterns, perceptions of control (Young, 2010), and a solid basis for subsequent cognitive associations.

Informed by long-term memory and directed by consciousness, meaningful mental models are produced in working memory as the senses seek out salient cues from the social and natural environments (Endsley, 2004). While debate considers whether situational awareness is a process or product (Salmon et al., 2007), we consider both the process of situation assessment and the product of situational awareness to be salient. Planning augments the identification and comprehension of cues through prior identification and mental rehearsal. 'You make a plan ... so that you have a whole series of options' (L1). Planning also assists in knowing beforehand what critical cues to look for and their meanings. This leads to effective recognition, comprehension and projection of the future status of the situation enabling implementation of an option or recalibration and re-planning (see Hoffman & Militello, 2009).

Thinking on the day

Most groups held morning meetings to discuss what the day held. Where more than one leader was involved, dialogue between leaders was incessant. The day-by-day thinking was dominated by

continuous monitoring of people and environment conditions. 'I am constantly assessing people and establishing their strengths and demeanour' (L2). 'Weather determines daily route selection, track selection ...' (L4). 'We went down to the water and talked about it—what happens further out' (L3). '... how well the dogs are pulling, what the environmental conditions are' (L1). As events unfold, there is a seamless flow of cognitive process between long-term memory and working memory. Often decisions are half made well before the crux is met, e.g. choosing to climb a peak (L2) or to make an exposed sea crossing (L3). Alternatives are lined up and thought through in the context of the present: 'The hill trip is in our trip plan ... but we have an alternative' (L1). The planned action and alternatives are forefront in the mind, right until the time comes to commit to an action.

Providing the people and the environment continue to be favourable, at the point in the journey when a commitment is required, the planned action is executed. If conditions are unfavourable, other options are followed. One observation we have is that pre-priming regularly begins well before the event and not just immediately preceding it. In the case of leader 2, a student's knee injury developed over time so the options were explored well before the moment came when the student could continue no further. Leader 3 describes making a decision on the basis of a gut feeling. There is debate whether the gut feeling really is a 6th sense or subconscious recognition of key information creating an intuitive response. It is recognised that decisions draw on tacit knowledge that may be difficult to articulate (Kahneman & Klein, 2009). On consideration, informed by a community of practice, there were a lot of cues in the reported situations that could create emotional, intuitive feelings in-the-moment.

Flexible execution

The flexible execution of plans was a feature across the decisions. Every day each leader was presented with unique combinations of events. These were often: 'different to what you visualise [beforehand]' (L6). 'The thoughts I had before ... did not quite match the actual situation' (L3). In effect, the plans were malleable roadmaps. In the words of leader 1: 'You make a plan ... so that you have a whole series of options. And then every day is a separate plan. You modify planning on-the-fly ... You have to think about modifying it all the time.' Leader 2: 'The plan must never overshadow the trip. I let myself be very easily affected by the situation'. Finally some prophetic words from leader 7: '... plan A never works!'

All of the decisions were in clearly structured situations with achievable goals. Klein (2007) identified flexecution as bridging the gap between planning and execution where experts adapt a plan while executing it. In particular, the concept applies where goals are unclear or ill-defined. However, none of the leaders in the present study reported such situations. Rather, the conditions were highly dynamic but planned goals and actions were able to be implemented. Minor elaboration and reframing occurred as windows of opportunity presented themselves. Adaptation occurred but not to the point of radical departure from planned actions. On rare occasions complete breakdown does occur where situations become ill-defined and disaster occurs. Our leaders did not report such instances. Rather their planning focussed on prevention of such events.

The redefinition of goals and the creation and re-creation of micro-plans can be seen as vehicles for learning. A similar evolution of planning was also reported by Collins et al. (2018). Retrieving and applying knowledge to contextualised problems requires an assimilation and accommodation process (Piaget) leading to deepening experience levels. Leader 7 believed: 'The longer you are in the leadership role ...there are more tools in the toolbox...'. Kahneman and Klein (2009) espouse that there are two necessary conditions for the development of intuitive expertise. Firstly, high validity (real) environments, and secondly opportunities to learn and develop skills. The discussed decision situations contain both conditions.

Conclusion

By examining decisions and prior planning processes of an international cohort of highly experienced leaders, we cast light on the influential role of planning in outdoor decision-making. The leaders originated from four countries and were remarkably homogenous in their perspectives. Through taking a fresh look at planning from an international and case study perspective, we have determined stages in the planning process: long-term planning, formal meetings, day-by-day planning and planning immediately prior to a decision crux. These stages provide a framework for understanding the information processed, the timing and sequence of its acquisition and the role of prior experience in the formation of preparatory schemata in long-term memory. Strong links are provided to the RPD theoretical model.

For the practitioner, planning prepared resources, gathered information on participants, determined goals, established flexible timeframes, set routes and alternatives, evolved environment protection strategies, identified problem areas, considered alternatives, gathered up-to-date detail on weather and ground conditions and prepared participants for action. En masse this information provided a solid bedrock upon which decisions were made and supports the work of Collins et al. (2018).

For the teacher and educator in the outdoors the study strengthens the focus on the importance of planning to ensure that safety, logistics and pedagogy are catered for before leaving for an expedition in an educational context. Planning is vital to enable effective decisions in changing situations. To develop skilled intuition, we believe the ongoing development of planning competencies in real world scenarios complemented by opportunities to execute and learn from making-decisions is essential to the ongoing development of leaders (see also Collins et al., 2018; Kahneman & Klein, 2009).

Our research found that solid preparation coupled with experience enabled anticipation of the evolution of a situation and effective master plans were devolved into micro-plans to guide specific decision options. Contextualised by the social and natural environment through continuous monitoring of people and environment conditions, many decisions were made well beforehand through a learning process to predetermine decision options. Balanced by the schemata in long-term memory, mental models were continually reshaped in working memory from key information flowing from situational awareness. The flexible execution of plans was a hallmark of practice. An examination of planning has furthered a line of enquiry, complements the work of Collins et al. (2018) and provides empirical support for Macquet and Pellegrin's (2017) call for planning to be included in the RPD model.

Disclosure statement

No potential conflict of interest was reported by the authors.

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