The human behind "human factors"

A new look at the decisions and actions of recreational backcountry users.

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Introduction

Using the label of human error to explain the causes of avalanche accidents does little to progress effective intervention strategies. Instead, new models are needed for understanding human factors in complex conditions that go beyond heuristics and biases.

Research has shown that actions & decisions are inextricably linked to the conditions in which they are made. In recognizing the variability inherent in those conditions (pressures, constraints, goals, beliefs), intervention strategies can be fine tuned to address the context for action.

Qualitative research methods can draw out themes from the stories told by study participants about their experiences in the backcountry. This allows for a richer understanding of the sometimes subtle but important factors that Influence how decisions and actions get made.

Stories make meaning out of experiences

This methodology is coupled with the framework for the new view of error. In brief:

- Human error is the starting point for investigations, not the end (Rasmussen, 1986).
- Understanding the sense-making efforts of those involved is crucial (Dekker, 2006).
- Things often go right and wrong in the same way but the ability to learn from adverse events is limited by cognitive bias (Baron & Hershey, 1998; Ross, 1977).
- Failure is rarely attributable to a single cause (Marais et al 2004).
- Instead, multiple, small failures can interact to produce catastrophic results (Leveson 2004).
- Cause & effect in accidents may not be linear (Perrow, 1984) .
- Rather than focus on avoidance of negative characteristics, an emphasis on anticipating, responding and containing loss builds capacity to cope with complexity (Weick & Sutcliffe, 2007).
- Error is context conditioned (Woods et al, 2010).

Context aids in understanding actions

Methods

Qualitative research methods can generate deeper understandings about a specific user group. Appreciative Inquiry seeks to understand successful practices within a given context.

This pilot study included:

- In depth semi-structured interviews; non-randomly selected (identified as 'safe backcountry users' who follow accepted practice to manage risk in the backcountry in meeting their objectives).
- Participants were asked to described the conditions around their backcountry experiences – ranging from how and when they planned their trips, selected trip partners, group decision factors, techniques and processes for adapting to changing conditions.
- Results were analyzed for thematic similarities then further refined to 4 key concepts.

Participants were 28 – 39 years old with 4 – 15 years of experience and self identified as moderate to very experienced;

3 males, 1 female.

Research subjects in action – mountaineering, skiing and sledding in Alberta, British Columbia and the Yukon

Results

Early learning
Primary and early group experiences were key in socializing good risk management behaviour and sound decision-making. Findings showed technical avalanche knowledge solidified through strong mentorship and early inclusion in group decision making. Verbalizing thought processes to more experienced group members was beneficial.

Early mentorship is key

Group dynamics
Stable group dynamics were noted as important factors. Those with longer history and more joint experiences in risk management could more effectively handle greater variability among members (including unfamiliar partners/terrain or experience levels).

Definition of success
High performers were flexible on what a 'successful' day was. Dynamic conditions require adaptive strategies that consider the group's capacity over time, changing conditions and limitations of gear or weather. Being able to re-plan while in the field or sacrifice an objective was a common trait.

Flexible definitions of success are needed to adapt in dynamic conditions

Distinct from 'better safe than sorry' this was a complex, real-time risk assessment, synthesis and evaluations of sometimes conflicting goals and priorities.
Consensus amongst group members was important.

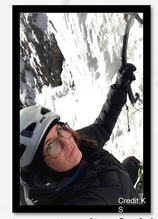
The role of trust
Implicitly or explicitly, it was found that trust is crucial to safe backcountry travel.

Yet, participants did not have a framework for how trust is established, how to assess whether trust was warranted with new partners or groups and, whether it should be tested over time.
Participants all described their initial trips into the backcountry involved implicit trust in those they traveled with. For such a critical element, it remains largely poorly understood in mountain contexts.

Conclusions

Many formal outdoor programs already acknowledge & emphasize these findings alongside technical skill development. Recognizing the **socio-technical interactions** in backcountry recreation is important for public avalanche safety intervention efforts to focus on:

- Reframing a finding of human error as a starting point in accident investigations. Instead, seek to understand why that action or decision made sense given the conditions faced instead of saying what "should" have been done.
- Targeting in-the-field learning opportunities through structured mentorship and encourage new forms of mentorship to broaden the community of practice.
- Emphasizing group performance skills as on par with technical skills for safety in mountain environments.
- Using context –based training scenarios where the signs are ambiguous and the goal difficult to sacrifice so participants have experience making tough calls.
- Encouraging reflection about *when* to trust others decisions & how to assess trustworthiness.



Target in-the-field learning

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