

## CLOSE CALL AT THE BURNIE GLACIER CHALET

Christoph Dietzfelbinger

Bear Mountaineering and the Burnie Glacier Chalet

**ABSTRACT:** Putting the large volume of available information in a structure that serves to keep an operation in its acceptable risk band is one of the key challenges in guiding. I attempt to illustrate where problems can lie for a small organization. In February of 2010, I had a close call with my guests on a ski trip based out of the Burnie Glacier Chalet in the Coast Mountains of northwestern British Columbia. I remotely triggered a size 3.5 and a size 3 avalanche simultaneously on terrain I was considering for guiding. Since I had operated there for ten years at the time, and guided for over 35 years, I remain chastened by my failure to recognize the relevant problem that day. This was a 2 month old buried surface hoar layer which had led to an extensive cycle a month earlier. It had been well documented in January, but not tracked and described in February. This presentation analyzes the close call using Reason's Swiss Cheese model for my small organization. It explains the multiple failures at several levels of the operation, and what led to the conclusion of the incident without involvement. It integrates the technical aspects of observation, record keeping, and structured decision making with social and personal issues such as motivational bias on my part that can be found across the guiding industry. The oral presentation uses slides.

**KEYWORDS:** Reason's Model, confirmation and motivation bias, intuition, deep persistent weak layer, mindfulness.

### 1. INTRODUCTION

Close calls and accidents are just a step apart. While close calls do not have the serious consequences of an accident, they still manifest that risk management has at least partially failed. They allow analysis of a vector that pointed toward catastrophe, but ended so close to it that it became visible.

While the organization behind the Burnie Glacier Chalet is very modest – it consists essentially of me, sometimes another guide, and a cook – I try to operate as a high reliability organization. In this presentation, I have used Reason's Swiss cheese model to explore where my organization failed and which layers in it – combined with a healthy dose of luck – were able to prevent catastrophe.

Guides very often experience accidents and close calls as personal failure. Guides' self image is closely tied to their ability to prevent accidents and close calls. When this fails, guides often react with denial, withdrawal, or aggression. Being a guide, I understand how deeply my self image is chal-

lenged when I have made mistakes that could kill my guests and myself.

This large emotional investment makes it hard to debrief close calls – let alone accidents – in a non-judgmental way that allows a clear analysis of the event and shows ways to improve risk management. This presentation is an attempt. It closes with reflections on mental mechanisms that influence decision making.

### 2. SETTING

The Burnie Glacier Chalet is situated in the Bulkley Ranges of the Hazelton Mountains of west central British Columbia, Canada (Fig. 1). Its snowpack and avalanche regime is that of the northern Coast Mountains at a latitude of 54 degrees and 10 minutes. While the mountains are no higher than 2,700 meters, the large relief and abundant snowfall have led to extensive glaciation. The main glacier terminates at 1,000 meters which is also the lodge elevation. The avalanche regime is predominantly direct action as in most coastal snowpacks. When persistent weak layers form, they challenge the usual forecasting pattern that rely on storm-centered avalanche cycles that are followed by rapid settlement and stabilization.

The winter of 2009/ 10 had a long cold clear period in December that formed a widespread thick

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*Corresponding author address:*

Christoph Dietzfelbinger

IFMGA/UIAGM Mountain Guide

Bear Mountaineering & the Burnie Glacier Chalet

Box 4222, Smithers, B.C. V0J 2N0 Canada

info@bearmountaineering.ca



Fig. 1: Locator map for Burnie Glacier Chalet.

layer of surface hoar. While this is not really rare, these layers are usually destroyed by wind or, sometimes, rain, particularly early in the season, before they are buried. The lodge only starts operating by New Year's, so there are no weather or snowpack data for this period. When Ken Bibby and I arrived to teach a CAA Level I in early January, the slab on the buried surface hoar was extremely touchy. It was 30 to 40 cm thick at the time. When I set the first uptrack of the season, I remotely triggered numerous slides on this layer. There was no perceptible whumpfing, but the failures travelled up to 200 meters.

The course became really interesting by 15 January, when temperatures rose and it started to rain to about 1,600 meters. A break in the weather showed fracture lines up to 1,000 m wide that connected several bowls (Fig. 2). One of the most frequently used poor weather lines on Tom George Mountain also released, running through trees for several hundreds of meters. During the next few days, we considered our route selection

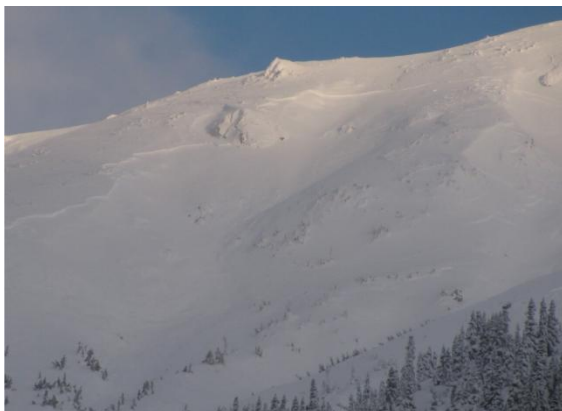


Fig. 2: Long, connecting fracture lines on Tom George Mountain on 15 Jan 2010.

very carefully while natural avalanches logged trees and ran to within 20 meters of frequently used uptracks. Teachable moments were not in short supply. There were no bookings for a month after this course and we shut the lodge down. I worked and taught in different areas with different snowpacks. No data were collected at the Burnie Glacier Chalet. It was not possible to keep informed via the InfoEx as the operation has no close neighbours. I returned on 12 February with a group of very competent and strong guests who ski with me every year.

The relationships that grow between a guide and a loyal, competent and generous group of guests are a guide's most valuable asset. Guides will go to great lengths to cultivate these relationships. Their input is good skiing or climbing, and they will strive to make sure that each guest experience is at least as good or preferably better than the last one. This easily leads into motivational bias where guides push the operational risk band to make sure these special guests are satisfied and will want to come back again.

Throughout the week, the ski quality deteriorated. We had found the surface hoar in a sheltered location in the high alpine at 2300 meters (Fig. 3). This limited our options in the alpine. At treeline and below, a short sunny period had crusted the solar aspects while cold aspects still had good snow. By Tuesday, we were casting about for good snow. The visibility was poor in the alpine. In terms of ski



Fig. 3: Location of high alpine site with buried surface hoar.



Fig. 4: Skiing on the northwest side of Tom George Mountain

quality, the north side of Tom George Mountain was desirable. This is a 500 vertical meter run to which all the bad words of avalanche terrain apply (Fig. 4): it's north facing. It's steep, uniform and cold. It's windloaded, and a massive cornice sits over top. But at least, it ends in a nasty terrain trap. And the skiing can be excellent.

We climbed Tom George Mountain in poor visibility. When we arrived on the flat summit plateau, I parked the group to find the entrance to the run. My plan was to thoroughly check the shallow slab potential before committing. I was hoping to cut a piece of the cornice and drop it on the slope before committing to it. As I approached the edge of the plateau, there was a large whumpf and a crack appeared in the plateau. The ensuing muffled thunder seemed to last a long time. When, after some contortions, we made our way to the edge, we saw a fracture line on the E side of the mountain that was about 200 m long and about 120 cm deep (Fig. 5). It had run to the flats for about 300 vertical meters. The surface hoar in the bed surface was easily visible with the naked eye. Further amazed investigation showed that the fracture line on the E side of the mountain was about 200 m wide and that the slab, 1.2 m thick on average, had run 400 vertical meters to the end of the runout in the trees. In the changing visibility, it took us a while to see that the failure had travelled around a rocky ridge through gentle terrain, and that another size 3 was triggered by a massive, over 200 m long cornice fall on the north side of the mountain. Our run had been wiped out. Without much discussion, we skied down the southeast side to the lodge and some drinking ensued.



Fig. 5: Fracture line over E side.

The morning forms of the 16th as well as those of the days before make no mention of surface hoar. They mention shallower slab potential, but miss the problem. As my esteemed colleague Rob Orvig was at Burnie for the first time, and did not have my information, the responsibility for that omission and the decisions that stem from it, is mine. I will make some remarks on what led to that omission later.

### 3. REASON'S MODEL

James Reason (1990 & 2008) considers an accident or mishap as something that is caused by failures on all levels of an organization. He expressly rejects the concept of human error, stating that the term is meaningless in the context. I had indeed not planned to stare down a bed surface on my intended run that day. The question is how I got to that place.

Reason understands the hierarchy of an organization as management layers that each manage risk, each in a specific way. Fig. 6 displays the most relevant layers in an organization. There is the management level where corporate culture and mission are determined. There is the operations level where workplace decisions are made and data are collected. There is the front line worker who drives the train, wields the scalpel or sets the

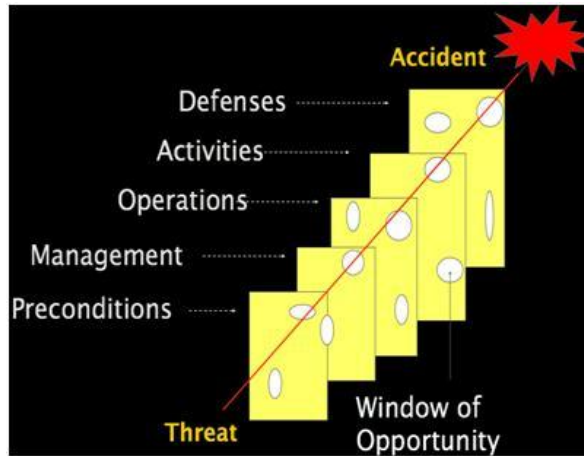


Fig. 6: Reason's model (Reason, 1990).

track. And finally, there are mechanisms that try to contain or reverse damage once all else has failed. That is the level of recovery and rescue skill in our world or, for example, a spill response in the mining industry, which may be nonexistent as recently demonstrated. Each organization exists in its specific environment which determines what dangers it faces: snow avalanches and alpine hazards are ours. Infections or wrong diagnoses are some of the dangers in hospitals, and so on. I'm using the term danger deliberately here: it is what's 'out there' and what could happen. Whatever is there becomes risk once something of value is exposed to it. And an accident happens when the trajectory of an event is able to pass through each management layer.

In my organization, for better or for worse, I am on all its levels. I have a certain vision and mission how things should be happening. I run the operation in the field most of the time, deciding on what happens every day, and collecting observations to support those decisions. I also set track, kick steps

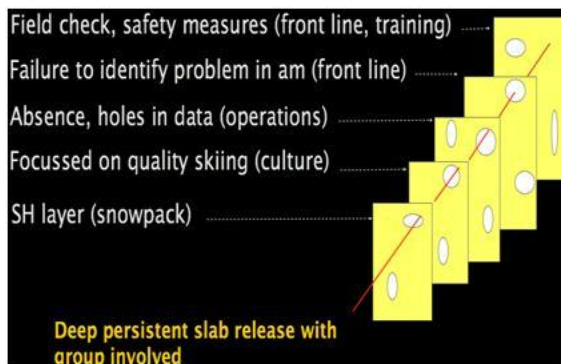


Fig. 7: Case study illustrated with Reason's model.

and place protection, and when something goes wrong, I am the first responder as well as the rescue coordinator. Fig. 7 shows the layers. In Reason's model, an accident happens when a threat – like a snow avalanche – penetrates all the layers of risk management in the organization. The holes in the Swiss cheese slices have to line up. Here is how I interpret this for this case study.

The environment is what it is – it contains snow that is at times unstable and terrain steep enough to slide. In backcountry ski guiding, few operations use methods of avalanche control to modify this layer. At the management level, there certainly is a focus on quality skiing. This is a necessary focus for a guiding operation. However, in this case, it led to a partial blindness, or a bias in the interpretation and weighing of information. We use the term operational risk band that each organization has to determine for itself. If the risks accepted are too high, then accidents are more likely and the organization might fail. But if the acceptable risks are set very low, then the organization might also fail because guests do come for quality skiing, and good backcountry skiing happens in avalanche terrain. A general lowering of the acceptable risk may not be the best strategy.

The closing of the lodge and the absence of data are also conditions that are beyond my control. When there are no bookings, it is impossible to keep someone at the lodge to collect data and maintain records. So incomplete data are part of the framework that is outside my control.



Fig. 8: Extent of the avalanche on the East side of Tom George Mountain.



#### 4. BIASES, HEURISTICS AND INTUITION

the failure to recognize the problem is not. How did I, after the events a month previous, and with all the guidance, training and experience I've had, come to ignore the possibility that the surface hoar would still be active in this site? I had no record of it releasing. It's true that the summit of Tom George Mountain is highly wind exposed, and that it is uncommon that surface hoar would be preserved there. However, we had found surface hoar in less exposed alpine locations earlier that week and abandoned a summit climb because of it. So there was an obvious breakdown in my information gathering process as well as in the decision making.

There is quite a bit of research on motivational and confirmation bias. Confirmation bias is usually defined as 'the tendency to favour information that confirms one's own preconceptions. Under the influence of a given desire or emotion, the arguer tends to focus on the evidence that seems to confirm his claim and, conversely, to overlook the evidence that seems to disconfirm it.' (Correia, 2011: p. 111). The bias applies to both evidence gathering and its evaluation. So quite clearly, I had disregarded relevant information and then evaluated this information in a way that confirmed my desire to ski this run with my guests.

However, some researchers argue that biases are not always and necessarily a bad thing. Like heuristics, they serve as important mental shortcuts. Biases allow for consistence in a person's cognition and can help in keeping objectives in focus. And, going further, here is a question that I have not seen asked very much: Where is the boundary between intuition, which we value highly in expert decision making, and biases and heuristics?



Fig. 9: Extent of the avalanche on the NW side of Tom George Mountain

Structurally, they are similar: They are all mental mechanisms that allow us to select the information we deem relevant, and to process that information much faster than we could do that by a formal analysis of all the factors. If we define intuition as the ability to understand something immediately and without conscious reasoning, the only aspect that differentiates it from a bias is that we usually understand intuition to be the result of experience tempered by study, while biases are understood to be unreflected. Most of us would agree that unchecked and unreflected biases lead to poor decisions. But that seems to be an argument after the fact: if it led to bad outcomes, the decision making process must have been flawed. This does not address the issue because at the time the decision is made, the outcome is not known.

I suggest that mental mechanisms such as biases, heuristics, and intuition exist on a continuum. Unchecked biases and unreflected heuristics on the one side will constrict both the information gathering and the decision making process to allow pre-existing goals and concepts to be confirmed. Well trained intuition selects the right information and makes the right decision. It is born from experience and study. Where the two sides converge, things get murky. I think that they converge for many of us. They certainly did for me on that day.

Biases seem to be unavoidable. Within a rational framework, we can do a lot to mitigate their effects. The structured joint decision making that Canadian avalanche workers use is a great help, although it is subject to group specific biases such as group think and the tendency to side with the majority. However, the ubiquity and pervasiveness of biases require strategies to address them. The formal joint decision making framework used in Canada provides considerable guidance, but it is, as shown here, by no means foolproof. There is research that argues that encouraging dissent in group decision settings can liberate the group's thinking (Nemeth and Goncalo, 2005: p. 175-179).

I'll close with a concept that is more philosophical or religious than scientific, namely mindfulness. I think that mechanistic and structural approaches to decision making need a spirit that fills them with vibrancy and meaning. The concept of mindfulness is relatively new in positivist science, and I like to think that it can supply the spark that keeps the concepts, processes, and structures fresh. Here is a definition: 'The word sati or mindfulness derives from a root meaning 'to remember,' but as a mental factor it signifies presence of mind, attentiveness to the present, rather than the faculty of

memory regarding the past. It has the characteristic of not wobbling, i.e. not floating away from the object. Its function is absence of confusion or non-forgetfulness. It is manifested as guardianship, or as the state of confronting an objective field. Its proximate cause is strong perception (thirasaññā) or the four foundations of mindfulness.<sup>i</sup> While the concept's origins are in Buddhist teachings, mindfulness is now regarded as 'paying attention in a particular way: on purpose, in the present moment, and nonjudgementally' (Kabat-Zinn, 1994: p. 4). While developing and applying mindfulness seems to be a long and difficult process, it could introduce an element outside the confines of our customary ways of thinking, and serve to keep the concepts we use fresh and meaningful every day.

## ENDNOTES

- i. From the Abidhammata-sangaha, an 11th or 12th century text by a Buddhist savant about whom so little is known that even his country of origin and the exact century in which he lived remain in question. Accessed via wikipedia.

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