Every time an avalanche fatality hits the news, the skiing community tries to make some sense out of what happened. Some people want to know precisely what mistakes the victims made so they can avoid the same fate. Others want to know how anyone in their right mind could even conceive of backcountry skiing in Considerable conditions. As someone who often skis pretty big lines under a Considerable forecast, I find myself attempting to explain the process my partners and I employ when making decisions in avalanche terrain. It’s not easy using words to express a constellation of cognitive skills as complex and integrative as the ones I have learned. But I try to add my perspective to the discussion because I have been doing just that for nearly 40 years. I wrote something like the following in an online discussion on telemarktips.com in the aftermath of the recent Stevens Pass avalanche that claimed the lives of three well-known and very experienced backcountry skiers.

See “Skiing in Considerable Hazard” continued on page 20 ➜

The Avalanche Review
P.O. Box 2831
Pagosa Springs, CO 81147

...the probability of losing a single round of Russian Roulette is “only” 1/6. To last very long in the backcountry, the probability of an avalanche needs to be far lower.

—Jonathan Shefftz, Avalanche Lesson, pg 34
from the president

AAA MEMBERSHIP: Help Define our Strategic Plan

What’s our vision and what’s our strategy?

While these might seem like peculiar questions for the president to ask of the membership, the questions are honest and sensible. I hope you’ll help us answer these questions.

The avalanche profession continues to be an evolving order and so too should be our association. Formally, we are a member-driven association because members can elect or remove members of the board. Also, in member-driven organizations members express their wants and needs and their push is to the board. However, for 25 years we have operated more as a member-supported organization where the board drives the organization and the members support the board. This approach worked because we were small and relied on a high degree of volunteers (on whom we will still rely on in the future).

As our numbers grow we have employed executive directors. Currently Mark Mueller resolutely and ably directs our day-to-day operations.

Our association is ready to mature, especially as society – commercial, governmental and recreational – is now starting to recognize our profession and the importance of avalanche professionals. As a result (at least right now) our membership is growing and growing fast.

It’s time to evaluate our progress and look forward. We need to vision a future to the look to the future we have to decide what we want AAA to become and what we want to achieve for AAA and our members. This is your chance to be heard. For an organization to support its members, the organization must be member-driven. We want you to get involved.

With your input we can better evaluate our progress, formulate goals, strengthen our services, and enhance our growth. For all our members this will increase the value and recognition of the American Avalanche Association and position us for a strong and bright future.

To this end, I invite you to take a short survey to help us shape our strategic planning process. The survey will be available until the first of May. Your input is important to advance the avalanche profession:


At the May board meeting we will be working to define the association’s vision and begin development of our strategic plan. The target is to complete and implement the strategic plan at the fall membership meeting.

Thank you for your support. We look forward to hearing from you.

— Dale Atkins, AAA President

Best, Lynne Wolfe

from the editor

What’s YOUR Level of Risk Tolerance, Personally & Professionally?

This final issue of volume 30 of TAR is another fat one. There is finally time to collect stories and case studies from this winter, see how the weather history played out into avalanche stories. For this year, early drought led to a pervasive deep-slab problem. Patience and risk tolerance became the operative topics. I chose to focus on risk tolerance as the theme for the April TAR, especially on the differences between personal and professional risk tolerance. In the pages to come, you will find a wide variety of contributors weighing in on their views of risk. For perspective, I have drawn from the climbing and mountaineering community in addition to the avalanche community, as they have each been thinking hard about this topic for quite some time. Will Cagg’s brutally honest look at risk spanned some further introspection from other mountaineers; Phil Powers and Margaret Wheeler expand on that look with personal and professional perspectives. Charlie Ziskin’s insight into skiing during a Considerable danger is showcased on the cover for his ability to turn complicated decision-making into lucid prose; thanks Charlie and welcome back to the avalanche community. And speaking of lucid prose, I was able to pilfer Karl Klusen’s essay about the complexity of snowpack at the tipping point from the new CAC forecaster’s blog. Pop over there and have a look at the range of writing where those folks expand from the space/time limitations of daily forecasts.

I also thought that, since everyone else was doing it, TAR should have an article about airbags. But I wanted the TAR perspective to take a longer-term view, utilizing critical thinking and real statistics, so I enlisted Jonathan Sheffitz to do his trademark thorough job, which, sure enough, he did. See Enhanced Avalanche Survival from Airbag Packs on page 8.

You will also find a photo/essay montage from a late January avalanche cycle in the Tetons starting on page 14. Since I live in the Tetons I have ready access to great photos, and there is never a lack of drama here. A close personal brush with a big avalanche led to a set of reflections and some thoughts for the avalanche community at large. For balance please send me photos, stories, and reflections from your avalanche cycles as well – why should I claim the TAR bully pulpit all to myself? As always, letters to the editor are also welcome.

A few case studies, chosen for their relevance or important questions, some impressive photos and vignettes from a variety of venues, then a fiction piece from John Stimberis (with a wicked funny illustration courtesy of Matchstick Productions), round out this April TAR.

In his “From the President” column (above), Dale Atkins talks about updating the AAA mission statement. I’d like to underscore his words with a plea for your input. Write or call a board member with your avalanche cycles as well – why should I claim the TAR bully pulpit all to myself? As always, letters to the editor are also welcome.

The avalanche profession continues to be an evolving organization where the board drives the organization and members support the board. This approach worked because we were small and relied on a high degree of volunteers (on whom we still rely on in the future).

We look forward to hearing from you.

We want you to get involved. For an organization to support its members, the organization must be member-driven. We want you to get involved.

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Thank you for your support. We look forward to hearing from you.

— Dale Atkins, AAA President

Best, Lynne Wolfe

Bright colors spice up a grey Teton powder day up near the Plummer yurt. Photo by Jane Gallie
Thank You Donors

AAA thanks the following members for contributing an additional donation in 2011 to further our efforts. Donations totaled $14,043 and amounted to 24% of our total income in our fiscal year 2010/11.

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ISSW Steering Committee Report

Dates have been set for two future International Snow Science Workshops.

ISSW 2013, the second European ISSW, will be held in Grenoble, France, October 7-11, 2013. Currently plans include a one-day excursion to Chamonix.

ISSW 2014 will be held in Banff, Canada, September 28 - October 3, 2014. ISSW was previously held in Banff in 1996, and the first meeting in a format similar to ISSW was held there in 1976.

The ISSW steering committee has been consolidating information about past and future ISSWs at a single Web site. All things ISSW should be accessible at or linked from www.issw.net. Thanks to Dan Judd for donating the issw.net domain.

Currently, www.issw.net has general information on ISSW and a summary of each of the meetings. In addition, abstracts and/or paper titles and authors are available from 1996 onward through their archived Web sites. However, at the moment there are only full papers from ISSWs 1996, 2008, and 2009.

The ISSW steering committee is currently engaged in making all of the Workshop Proceedings, including full papers, available – dating back to the early Canadian meetings in the 1970s. A searchable online database is being produced by Montana State University (MSU) in cooperation with the ISSW steering committee. Direct funding for this project is provided by CAA and AAA with substantial contributions of time and expertise by MSU. The proceedings should be available online by the end of March. Visit www.issw.net for the latest updates.

—Rich Marriott, ISSW steering committee secretary

Avalanche Divas Event Set for September 17 at ISSW

The Avalanche Divas will again honor women in the avalanche field at the 2012 International Snow Science Workshop, which will be held September 17-21 at the Dena’ina Center in Anchorage, Alaska. Diva nominations can be emailed to Aleph Johnston-Bloom at snowaleph@gmail.com. Ladies, save Monday night, September 17, to celebrate with the Divas in Anchorage!
Mammut recently announced problems with some of the air cartridges sold with their airbag systems. The oldest models have a long-term safety problem and are being recalled to replace the pressure valve. Some of the newer RAS cartridges have displayed a glitch during refilling, which is not a safety issue but can be remedied by sending cartridges back to Mammut or simply repairing them at home.

**SNOWPULSE INFLATION-SYSTEM 1.0 AIR CARTRIDGE RECALL**

Mammut has just issued a recall for older Snowpulse “Inflation System 1.0” air cartridges. The Snowpulse cartridges (also called cylinders) are equipped with a pressure gauge, also known as a manometer. Over time, some of these pressure gauges have developed a leak that leads to a drop in air pressure and sometimes to all the air escaping. This means that the airbag will inflate insufficiently or not at all. To completely rule out the possibility of this risk, Mammut Sports Group AG has decided to replace all first-generation (Inflation System 1.0) Snowpulse cartridges. Since the full cartridge in these older models could potentially leak at any time, this is a safety issue that needs to be resolved immediately.

This recall only affects older Snowpulse cartridges; it does not affect any of the RAS cartridges manufactured either by Snowpulse or by Mammut.

**Which cartridges are affected by the recall?**

All first-generation Snowpulse cartridges that are compatible with Inflation System 1.0 are being recalled.

**How can I tell if my cartridge is part of the recall?**

All cartridges with a valve like the ones pictured at right need a replacement pressure gauge. The new Snowpulse cartridges for Inflation System 2.0 as well as cartridges from the Mammut Ride Airbag RAS are not affected by the recall.

**What exactly is the problem with the old cartridge?**

The cartridges are under enormous pressure, at 300 or 207 bar, which is measured with a pressure gauge on the cartridge neck. Some cartridges develop a leak over time, which leads to a drop in the air pressure and sometimes to all the air escaping from the cartridge. Even unused, stored cartridges can be affected by this loss in pressure. The cartridges can lose pressure at any arbitrary time.

According to investigations initiated by Snowpulse at the pressure gauge manufacturer, this has been traced back to a faulty testing procedure; during quality control, the pressure gauge was damaged by excessive pressure.

**Why are the new cartridges not affected?**

During the production of cartridges for Inflation System 2.0, the manufacturer of the faulty pressure gauges modified the test procedure so that this problem cannot arise in the future.

**Is there any charge for replacing the cartridge?**

No. Mammut will replace the pressure gauge on a defective cartridge 1.0 at no charge. In addition, mailing costs for returning it will be reimbursed.

**How do I return my cartridge?**

1) Return only the empty cartridge (without the backpack).
2) If the cartridge is full, carry out a test deployment of the airbag in order to completely empty the cartridge. First, make sure that the burst zipper for the airbag pocket is completely closed before you pull the release handle. Afterward, follow the steps outlined in the User Manual to again stow the airbag correctly. If you can’t find the manual, the instructions can be reviewed at www.snowpulse.com.
3) Remove the cartridge from the backpack. In doing so, don’t forget to re-attach the valve pin (see illustration) that remains on the end of the cable after deploying the airbag. The pin is necessary so that the cartridge can be properly refilled. You might need a pair of pliers to reattach it.
4) When sending in the cartridge, use the original packaging if it is available. If you no longer have the original packaging, pack the cartridge in a well-padded cardboard box so that it is protected from blows and impacts.
5) Include the recall form in the package so that the pressure gauge on the cartridge can be replaced. Visit www.snowpulse.com to download the required form.

**Where can cartridges be replaced in the US?**

If you live in the US, affected cartridges should be sent directly to the Mammut service center in Vermont. Contact the office to get a UPS calltag before you
Mammut encourages anyone with an issue to contact them and return the cartridge so that it can be repaired by the manufacturer. If the timing is difficult, shops or consumers may elect to perform the repair themselves. The fix is quite easy and takes only a few minutes with a few simple tools.

• Because this is not a safety issue, consumers who have a full cartridge may elect to send it in or repair it themselves AFTER the winter season.

• Mammut would like all retailers selling RAS packs to be familiar with the problem and able/equipped to perform the repair. It is worth a call to any shops that sell a lot of Mammut airbags, as well as popular refill locations, to let them know about the issue and how to resolve it.

• Replacement quick-disconnect fittings are currently unavailable. If they do become available, the protocol could change, so stay posted.

Those wishing to repair their RAS cartridges through Mammut’s service center in the US should call 800-451-5127. In Canada, call Mountain Sports Distribution (the Snowpulse distributor) at 250-344-5060.

GNFAC Human Factor Seminar Online

Videos from the Gallatin National Forest Avalanche Center Continuing Education Seminar on Human Factor on March 7, 2012, are now available on YouTube at www.youtube.com/playlist?list=PLEFAE2148A0027DF6&feature=view_all or search YouTube for AvalancheGuys.

Ortovox to Offer ABS Backpack in 2013

ORTOVOX, manufacturers of snow safety products, has entered a licensing partnership for the use of the ABS-Inside System for backpacks. Beginning in 2013, ORTOVOX will be adding avalanche backpacks to their arsenal of avalanche emergency equipment. Since 1980, ORTOVOX has been constantly evolving its product line and snow safety system to include avalanche transceivers, shovels, probes, backpacks, and now backpacks with avalanche-specific safety technology.

ORTOVOX backpacks have been an industry leader in the winter sports scene for 27 years, and the company has built a reputation for quality, functional design and focus on safety. The new licensing agreement enables ORTOVOX to integrate the ABS system into their own backpacks, further developing safety concepts with an eye on comfort and fit.

In the event of an avalanche, the ABS system helps improve active avalanche safety through the activation of the deployment handle installed on the backpack carrier system. A pressurized cartridge is pierced and gas escapes, inflating two integrated airbags in a matter of seconds. Although the airbags cannot prevent victims from being swept along by the avalanche, they help keep them on top of the snow and preventing death by suffocation, the main cause of death in avalanche accidents.

Ortovox to Offer ABS Backpack in 2013
That’s right. “Alta is for Skiers” is no longer the area’s only calling card… and if you ask long-time Alta avalanche forecaster Daniel Howlett, better known as “Howie,” the area has been defined by more than just skiing for quite some time. In fact, one could surmise that snow science has been as integral to the community as bubbles are to beer since 1885, when a catastrophic avalanche nearly destroyed the entire mining township of Alta, Utah. Since the early days of Alf Engen, who founded Alta Ski Area in 1935, many a powderhound-turned-snow-scientist has gained his avalanche bearings within the steep recesses of Little Cottonwood Canyon. The list includes Edward LaChapelle, Ed Adams, and Ethan Greene, just to name a few.

Today, although avalanche-mitigation efforts in the canyon plod forward with one howitzer round after another, the underlying science behind the earth-snowpack-atmosphere system seems to have come to a bit of a plateau. At least until recently when an atmospheric scientist at the University of Utah began to, of all things, start taking pictures of snowflakes.

With such a close proximity to the University of Utah and an annual mean snowfall accumulation of 500”, Tim Garrett, professor of atmospheric science at the University of Utah, has made Alta his preferred location for studying various atmospheric phenomena related to boundary layer snowfall and mixed-phase clouds. Still in its infancy, Garrett is leading the Wasatch Hydrometeor Aggregation and Riming Experiment (WASHARX), an experiment funded by the National Science Foundation. As part of this experiment Garrett and his research team have deployed several unique instruments around Alta Ski Area, including a one-of-a-kind camera designed to capture images of individual snowflakes, still in free fall, by means of stereographic photography.

Multi-Angle Snowflake Camera

The camera, termed the Multi-Angle Snowflake Camera (MASC), actually consists of three cameras offset from one another by 36 degrees. This multi-angle approach allows for a stereographic view of the snowflake as it passes through an infrared sensor, simultaneously triggering the shutter and flash mechanisms for the three high-speed cameras mounted to the frame of the instrument. Invented by Garrett and former University of Utah graduate in mechanical engineering, Cale Fallgatter, the intent behind the MASC was to develop a better empirical understanding of cold-cloud microphysical processes as well as improve upon existing cold weather forecasting models. According to Garrett, “All cold weather forecasting models rely on having accurate observationally based parameterizations for the relationships between snowflake mass, diameter, and fall speed. Also, these models need to be able to faithfully describe the complex and rapid processes of snowflake aggregation and droplet riming.” Working in cooperation with Alta Ski Area and Howlett’s environmental monitoring and technology company, Nohow Inc., alternative interests in the MASC have quickly spread to the avalanche forecasting community.

Applications to Snow Science

It is fairly well known that fundamental characteristics such as the size, shape, and extent of riming or aggregation of falling snowflakes can have a direct effect on the density and distribution of weak layers within a snowpack. But often, these variables cannot be identified until the storm board gets swept off or a snowpit excavated. Even then, because a snowflake’s metamorphism begins as soon as it hits the ground, not to mention the inherent human bias in the identification and measurement of crystal types, it can be difficult to acquire such basic characteristics with any kind
of accuracy or precision. With the advent of the MASC, there now exists both a systematic and automated method for deriving these most fundamental snowflake properties, all within their natural environment.

Thus far, the first to purchase a MASC unit specifically for avalanche-related research from the Garrett and Fallgatter spin-off company, Fallgatter Technologies, has been the US Army Corps of Engineers Cold Regions Research & Engineering Laboratory. Led by post-doctoral research scientist and former Mammoth Mountain Research & Engineering Laboratory post-doctoral research scientist and former Mammoth Mountain Research & Engineering Laboratory, Daniel "Howie" Howlett, visit:

• www.snow.ucsb.edu/cues/
• www.inscc.utah.edu/~tgarrett/Snowflakes/
• www.nohowinc.com

A former avalanche professional, Kevin Hammonds is currently working on a graduate degree in the Department of Atmospheric Science at the University of Utah. Although his research focuses more on the micro-physics of snow in the atmosphere than snow on the ground, he can’t help but keep one eye turned in that direction.

Critical Factors

When we are approaching the point where a significant change in stability from good to poor is expected, you will hear forecasters talking about "critical" factors such as load (how much weight has been added /is being added) and slab property (how stiff the layer of snow over the weak layer is). When the snowpack becomes unstable, we often say we have reached “criticality” or the “tipping point.” When a warm, windy storm rapidly dumps large amounts of new snow, the tipping point generally comes quickly – sometimes in a matter of hours. This scenario is usually obvious and relatively easy to forecast. When weak layers are incrementally loaded (small, cool, calm storms drop minor snowfalls) and the weak layers are complex mixes of different grain types, the tipping point arrives slowly, and it’s much harder to predict when and where criticality will be attained and how the avalanches associated with the tipping point will look.

The latter scenario I describe above should sound familiar; it’s what we are experiencing now. The recent dry spell left a complex sandwich of weak layers on the surface. I will not go into detail – read the recent and current forecasts for your region and other posts in this blog, and you’ll get an idea of what I mean. In the last week or so, these upper layers have been incrementally loaded by small snowfalls of low-density snow with little wind and cool temperatures. This new snow is now settling fairly rapidly and is very susceptible to transport by wind.

Looking at field data with a critical eye Friday, I could see a very gradual increase in avalanche activity – mostly human-triggered, mostly pretty small. In my opinion, as of Friday afternoon, the snowpack in most areas was in a state of
Enhanced Avalanche Survival from Airbag Packs: Why Can We Learn from the Data?

Story by Jonathan S. Shefttz

EXHIBIT 1: ABS Statistics

<table>
<thead>
<tr>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
<th>(g)</th>
<th>(h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Data set</td>
<td>Full Only</td>
<td>All ABS Incidents</td>
<td>Partial or None</td>
<td>Non-ABS Partners of ABS Users</td>
<td>Atkins Analysis</td>
<td>Colorado</td>
<td>Swiss 1980-99</td>
</tr>
<tr>
<td>(2) Caught skiers/riders</td>
<td>262</td>
<td>295</td>
<td>33</td>
<td>367</td>
<td>1224</td>
<td>2301</td>
<td>1469</td>
</tr>
<tr>
<td>(3) Fatalities</td>
<td>7</td>
<td>17</td>
<td>10</td>
<td>17</td>
<td>109</td>
<td>523</td>
<td>278</td>
</tr>
<tr>
<td>(4) Survival rate</td>
<td>97.3%</td>
<td>94.2%</td>
<td>69.7%</td>
<td>74.6%</td>
<td>91.1%</td>
<td>77.3%</td>
<td>87.0%</td>
</tr>
<tr>
<td>(5) Avoided fatalities</td>
<td>N/A</td>
<td>25</td>
<td>20</td>
<td>3</td>
<td>17</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>(6) w/ABS out of 100:</td>
<td>81</td>
<td>77</td>
<td>35</td>
<td>75</td>
<td>56</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

So when are you going to get an airbag pack? The question from my touring partner last season was not very surprising, and not only because he runs a company that makes such packs. Yet just a few short years ago, that question – especially in the US – would have been puzzling; only ABS made such airbags, and outside of a brief partnership with Dynafit, distribution in the US was somewhat obscure. But now for the current 2011/12 season and the upcoming 2012/13 season, airbags are available from four companies: ABS (with partners ARVA, Dynastar, EVOC, Millet, Ortovox, Rock Snake, Rossignol, Salewa, and The North Face), Snowpro/ Mammut, Backcountry Access, and WARY (with partner Mystery Ranch).

Airbag pack saves of avalanche victims, once relegated mainly to detailed data presentations on ABS’s Web site, are now broadcast on major television networks. The evidence is compelling that airbags work, whether via controlled tests with dummies, the underlying phenomenon on inverse segregation/grading, or the dramatic video footage.

Cost Versus Benefit

If that is good enough for you, then you can stop reading this article right here. But the economist in me is always comparing costs and benefits. In this context, the cost of an airbag pack is not its monetary price (which although significant is nevertheless not out of place given the financial value of all the other gear we take along on any ski tour), but instead the sizable (and also because the authors attempt to estimate the ratios, i.e., focusing on the survival rate for a small sample sizes are very small: just 33 and 67 (respectively). Tests can be performed for statistical significance to determine the probability that the survival rate differentials are attributable to random chance, but that still would not address the likely limited representativeness of such a small data set. (And other studies have already verified the statistical significance of the ABS survival rate advantage, although their data sets typically reversed the ratios, i.e., focusing on the survival rate for a small number of ABS users within a much larger population of caught skiers/riders.)

To address the non-ABS survival rate with additional data, turning to column (e), Dale Atkins (the president of the American Avalanche Association, among other qualifications too numerous to list here) has compiled his own analysis of Colorado avalanches over a time span comparable to the ABS data set, but with over four times as many caught as in the ABS data set. Out of 1224 caught skiers/riders (with most likely only a trivial percentage using ABS), Dale calculates a 91.1% survival rate. Columns (f) and (g) provide the data for a study of Swiss avalanche victims between 1980 and 1999. This study is notable both because of the 2301-person sample size, and also because the authors attempt to estimate data on ABS pack deployments. The most recent compilation is through August 2010, and the next update will be presented at the upcoming September 2012 ISSW in Anchorage.

The ABS dataset is almost entirely European: out of 249 total avalanches in the database, only 10 occurred in the United States and four in Canada. Since more avalanche incidents probably occur truly above treeline in the Alps than they do in the United States – where much of our backcountry skiing and hence avalanches are really “at” treeline and hence present the hazards for more trauma deaths – the ABS advantage might be mitigated by a higher trauma incidence. And ABS claims numerous survival advantages over its competitors. Therefore, the ABS track record in Europe might not be entirely applicable to the United States, or to its competitors’ designs. And both the past 2010/11 season and the current 2011/12 season have seen successful ABS saves as well as ABS fatalities, but augmenting the data set without the kind of complete picture provided by a comprehensive SLF update is probably inaccurate. So keep all those caveats in mind throughout the numbers that follow.

Examining the Statistics

Exhibit 1 provides a summary of the ABS data set in columns (a) through (d). Row (1) provides a description of the data set, row (2) lists the number of caught skiers/riders (however “caught” may be defined), and row (3) lists the number of fatalities. (Rows (4) and (5) will be explained in due course, as will the other data sets.)

As shown in column (a), row (4), and as stated on the ABS Web site – yet without much emphasis – the 97% survival rate is only for those 262 deployments in which ABS users successfully deployed the airbags with full inflation. The full number of attempted deployments in the ABS data set is actually 295, for an 88.8% successful deployment rate (as opposed to survival rate), i.e., 262 divided by 295. Of the 33 attempted deployments that resulted in either partial or no inflation of the airbags, four were users who did not properly prepare their packs beforehand, 18 were users who were unable to deploy during the avalanche, two were users who intentionally did not deploy the airbags, seven were technical malfunctions, and two were damaged by the avalanche.

Including the unsuccessful deployments, the actual survival rate is 94.2%, not 97.3% (which is rounded down to 97% on the ABS Web site). That certainly sounds very good – although still not perfect, as almost 6% of ABS users have died when caught in an avalanche. But how much better is it than skiers/riders without airbag packs?

Column (c) addresses the question of comparing the “natural experiment” (as we social scientists like to call it) of ABS users whose airbags failed to inflate fully. Their survival rate was only 69.7%. Another natural experiment is the survival rate of non-ABS users accompanying ABS users who were caught in an avalanche: their survival rate was 74.6%.

These sample sizes though are very small: just 33 and 67 (respectively). Tests can be performed for statistical significance to determine the probability that the survival rate differentials are attributable to random chance, but that still would not address the likely limited representativeness of such a small data set. (And other studies have already verified the statistical significance of the ABS survival rate advantage, although their data sets typically reversed the ratios, i.e., focusing on the survival rate for a small number of ABS users within a much larger population of caught skiers/riders.)

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the survival rate across all avalanches – both reported and unreported – based on the premise that many avalanches with caught yet unconfirmed skiers/riders are never reported. As shown in row (4), the survival rate of non-ABS users is 90.7%, and this data set reports an avalanche incidence of 77.3%, but the authors estimate that the true survival rate is a much higher 97.0%. Note that this latter figure is roughly comparable to Dale Atkins’ 91.1% figure.

Column (b) is from a study of Swiss and Austrian avalanches over a similar time frame, with a higher survival rate than for the exclusively Swiss study, although it may be biased due to the unreported estimate at all avalanches (i.e., both reported and unreported).

The Bottom Line

Avalanche professionals for the bottom line, in the form of rows (5) and (6). But first for an excerpt from a Powder Magazine interview with Dale Atkins, which has been widely quoted as well as misquoted:

I posed the following question at the National Avalanche School: Say we had a group of 100 people killed in avalanches. If we were to engage the services of the best doctors and nurses, and give them all the time there would get to live? According to Dale’s data set, that is the 3-out-of-100 figure that he cites. It’s a really big and important deal!

The question posed at the National Avalanche School (NAS) is answered in row (6), although the 3-out-of-100 figure is actually the answer to the question posed in row (5). In other words, for row (5), imagine a region in which 100 people have been caught in avalanches. Had they all been equipped with ABS packs (with their mainly European track record through August 2010), how many of those 100 people would get to live? According to Dale’s data set, that is the 3-out-of-100 figure that he cites. Using the other data sets, the figure is as high as 25 people.

But if the question is instead imagined as a 100 people who died in avalanches (as opposed to 100 people merely caught in avalanches, whatever the outcome), the range of 35 to 81 people actually matches up fairly well with the guessed range of “30 to 50-plus” by the NAS students.

Risk Homeostasis & Other Factors

Now for some additional caveats (as if all the preceding caveats weren’t enough). Avalanche beacons over time have become both more prevalent and easier to use (and the ability to assess avalanche data and analyses do attribute a noticeable survival advantage to avalanche beacons, despite the occasional “corporate lococtor” derisive appellation.) Even more recently, shoveling strategies have also become better refined and publicized. All of that would be expected to increase the non-ABS survival rate – as compared to the historical survival data reflected in the analyzed data sets – thereby narrowing the survival differential going into the future between non-ABS users (whose survival outside of trauma depends largely on specialized companion extractions) versus ABS users (whose advantage derives from not being buried in the first place, and hence whose survival would not be significantly improved by better beacon searching and shoveling).

Yet what about risk homeostasis? What about what? Perhaps in the past when ABS bags were more rare, people purchased and used them more frequently. But in the future, as they become more commonplace, their use could encourage more risky behavior. All of this is obviously entirely speculative, but still, as I write this right now, on one airbag company’s Web site, large letters proclaim, “GO BIG AND GO HOME.”

What Can Cars Teach Us?

Proponents of the risk homeostasis thesis often advance an analogy with automobile safety: automobiles have become safer over time, but we neglect that advantage by driving more carelessly. Isn’t that really not exciting news unless you’re one of those three people. Then it’s a really big and important deal!

EXHIBIT 2: Automobile Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>2009</th>
<th>1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatalities</td>
<td>33,808</td>
<td>36,399</td>
</tr>
<tr>
<td>Survival rate</td>
<td>98.9%</td>
<td>94.9%</td>
</tr>
</tbody>
</table>

(1) Data set only incidents or None ABS users Analysis reported estimated (various yrs)
(2) “caught” as defined by data set (often not explicitly).
(3) Fatalities 33,808 36,399
(4) Survival rate 98.9% 94.9%
(5) Avoided fatalities caught N/A 25 20 3 17 7 13
(6) Auto safety out of 100: Fatalities 4 77
(7) Total population 307,006,550 194,302,963
(8) Miles driven per capita 9,620 3,699
(9) Miles driven per million people 110 187


Row (7) provides the total US population, allowing row (8) to calculate miles driven per capita, which is clearly not the 2.6 times the 1965 figure. Now certainly the dramatic increase in miles driven per capita is attributable to factors other than advances in automobile safety, but still, if automobile safety had not been improving so much over time, then perhaps a consequentially rising death toll would have prompted further investments in inherently safer public transportation modes. Regardless, row (9) shows that automobile fatalities per million people in the US have dropped dramatically from 1965 to 2009, translating into a 41% decrease. Therefore, any risk-offsetting behavior (whether in the form of driving more dangerously or driving more miles) has been only partially offsetting, not fully.

So yes Virginia, even if Santa Claus might not really exist, technology can make us safer despite our unsafe impulses…although if I’m assigned to ski tour out to verify Santa’s existence or non-existence in some snowy clime, I’m still not sure personally if I’ll be wearing an airbag pack.

Risk homeostasis suggests that equipment advancements may not necessarily translate to increased safety, as people may drive more recklessly with better safety features. Although improved technology can save lives, it also introduces the potential for increased risky behavior. The balance between these factors is complex and requires ongoing monitoring and research.

Jonathan Shefftz is an AIARE-qualified instructor, NSP avalanche instructor, and AAA affiliate member. He can be reached at jshefftz@ps.fsu.edu. The American Institute for Avalanche Research and Education

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Surface hoar: what it is, and how does it form?

Simply put, surface hoar is the winter equivalent of dew. Water vapor condenses on the Earth’s surface – typically grass in the summer (dew) and on the snow surface in the winter (surface hoar or frost). The dew point is the temperature at which air becomes saturated. The temperature must go below the dew point for condensation to occur. The ideal conditions for surface hoar to form are clear, calm (really very light winds such as a few mph), and cool nights. There must be moisture available such as an open body of water or water vapor (high humidity). The winter process of dew is deposition, where water vapor skips the liquid stage and goes right into a solid due to cold surface temperatures.

The photos on this page were taken in the southern Kootenay Mountains of British Columbia on February 7, 2011, near Wildhorse Pass. The elevation is about 5000’, in a flat area that receives low-intensity sunlight for a few hours during the day. It hadn’t snowed for a week, and each night was perfect for sh formation. We had beautiful sunny days with high temps at the freezing point, then clear, calm, cold nights (lows of -10ºC) with barely a cloud in the sky.

Everywhere you looked there was sh of 5-15mm, and 30-50mm was also very common. This event was widespread to the Wildhorse Pass area and the Kootenay region. The surface hoar could be found on open slopes to the tightest of trees, regardless of elevation and aspect. The extremely large sh of up to 110mm was found in a flat, sheltered area that receives very little direct sunlight, both in intensity and duration for this time of year. There was a creek about 20m away that was open in a few spots, supplying moisture. You can really see the growth on the A, B, and C axis and multiple events on the crystal.

How will this surface hoar behave? Following 10 days of high pressure where the sh formed, we did receive 1mm of rain followed immediately by freezing rain, followed by 5cm of new snow the next day. The surface hoar was well preserved except for extreme solar aspects, and I fear that the freezing rain crust will only preserve it even more. There was no to very little wind during this time, definitely not enough to destroy any of the sh. Though it was only 5cm of new snow, steep slopes were sluffing fast and running long distances for such a small amount of new snow. Like anything, time and a keen eye will tell.

Chris Shelly worked as the snow safety director at Moonlight Basin for a number of years as well as the patrol and snow safety director at Ohua, NZ. He currently works as a mechanized ski guide and as the forecaster for H2O Guides in Valdez.
Avalanche Summary

The recent cycle of widespread natural avalanches running on the Feb 08 surface hoar is probably over. Explosive control and human triggering continue to produce avalanches on this persistent weak layer (PWL). The light new snow that is falling on Friday may be enough to cause some more natural activity on the PWL in areas that did not recently slide and have enough wind to develop a heavy windslab load. The new snow and wind may develop a soft surface slab that does not cause the PWL to fail, but may be large enough on their own to injure or bury a person. Avalanches that release on the PWL that is buried down about 70 cm have the potential to be very destructive.

Also see “The Tipping Point,” at right.

THE TIPPING POINT
continued from page 7

precarious balance – the weak layers were holding on by a fingernail as accumulations of new snow gradually piled up on top of them.

Yesterday’s data indicated this trend was continuing; a few more slides, a little bigger, still mostly human triggered. Preliminary reports are trickling in, this morning, and it looks like some regions got significantly more snow than forecast in the last 24 hours. On the west side of the Monashees east of Vernon, for example, there’s a report of 60cm of new snow – far more than was forecast. Places that got more snow and/or wind than was discussed in yesterday’s forecasts are likely now over the tipping point, and local danger ratings in those areas are almost certainly higher than what was forecast yesterday in areas where this occurred.

Human Factors

I think there’s also a human tipping point. After a long drought, people get frustrated and fed up with the poor riding conditions and eagerly await the arrival of new snow that will improve their backcountry experience. However, the arrival of new snow and the improvement in riding conditions in these situations is almost always associated with the arrival of the tipping point. The slower the tipping point comes, the more people get lulled into a sense of false security and the more they underestimate the potential consequences that result when the tipping point is reached.

For example, the current situation: complex weak layers + 10 cms new snow = great fun. + another 10 cm = great fun and a few small avalanches that get ignored. + another 5 cm = surprise! avalanche incidents/accidents occur but everyone’s too embarrassed to say anything, so others don’t even hear about it, and they get caught in larger avalanches until eventually there’s a serious wreck.

This is what we are seeing in some areas now, notably the South Coast Mountains and the North Shore: people got surprised and caught, some lost gear, and were partially buried, and they all shrank away embarrassed and didn’t tell anyone. This is probably also occurring or about to occur in the west-central Monashees and any other areas that went over forecast for snow, temperatures, or winds yesterday – we’re just not hearing about it.

Areas that have not gone over the tipping point yet will probably be there in the next few days when a bit more snow, wind, and/or warmer temperatures arrive. PLEASE: check with knowledgeable locals about what’s happening, look at the avalanche forecasts for your region every day, critically examine the weather factors that are driving the danger ratings and avalanche problems, then constantly observe what’s happening around you as you go into the mountains. If the avalanche forecaster rates danger Moderate in the Alpine – and that’s based on a weather forecast of 10cm new snow, -5.0, and light SE winds while you are seeing 40cms of new, +1.0, and a SW wind – you have to adjust your trip plans and terrain choices, or you will get caught by surprise. If your personal tipping point isn’t under control when the snowpack stability/avalanche activity tipping point arrives, you are just asking for trouble.

Karl Klasseen’s bio includes 35 seasons in the avalanche biz including ski area avalanche control; consulting; heli/cat ski guiding; ski tour guiding; reciro avalanche course curriculum development and instruction; public avalanche forecasting; and mountain guiding in Canada, New Zealand, USA, Europe. He is currently all of these. Public Avalanche Warning Service manager at CAC, chief guide at Monashee Powder Snowcats, CAA Professional member, ACMG Active Professional member, IFMGA member, ACMG/IFMGA mountain guide, CAA Level 3, founding director and past technical director of AIARE, past president of ACMG, past executive director of ACMG. His wife Mary Clayton is the CAC communications director; his son Aleks is 10. Karl laments that they are both better skiers than he is.
Close Call on Petes North

Turnagain Pass, AK
February 11, 2012
Chugach National Forest Avalanche Center Report
by Wendy Wagner

This remotely triggered avalanche caught, carried, and buried two skiers ascending an up-track on the westerly aspects of Petes North ridge near treeline. One partially buried (uninjured) and one fully buried (concussion).

Avalanche details: HS-ASr-R2-D2-I
Type: Wind slab. This was a 1-finger wind slab sitting on a thin layer (2” and less) of 4-finger low density powder over harder (pencil hardness) wind slab that acted as the bed surface.
Size estimate: 150’ wide x 5-700’ x 12-18” deep
Trigger: Remote from ~20-30’ left from corner of the right flank and stauchwall.
Weak Layer: Broken precipitation particles/decomposing fragments
Aspect: WNW
Angle: 37-43 degrees
Elevation: 2500’
Debris: ~3-5’ deep (fanned out to varying degrees)
Weather: Storm day.
Friday, February 10, the day before the avalanche, 8-12” of medium-density snow fell with 30mph east winds, gusting to 85mph. Temperatures near 30ºF.
Saturday, February 11, the day of the avalanche, 3-5” of similar density snow fell with east winds averaging 40mph and gusting to 95mph. Temperatures near 30ºF.
Avalanche danger rating: Considerable with pockets of High.

Events
Two parties of two skiers and one party of three were all skiing the low-angle sparse trees just below treeline under the western shoulder of the Petes North ridge. They were using caution, staying on low-angle slopes and aware of the avalanche danger. Right at treeline the slope steepens and looms ~500’ above the low-angle trees. The skiers were on the looker’s-left side of the shoulder and were descending from a safe flat area on the shoulder, right at treeline. The steeper slope above was to looker’s right from where they were descending. They suspected the slope was wind loaded, however it was also assumed that if it slid, the debris would be funneled into a small gully off to looker’s right and avoid the sparse trees where the skiers were recreating.

As five of the seven skiers had convened at the top of the treeline, the group when he felt a large collapse. Immediately the five skiers saw the slope above and to the side of them begin to fracture, and they began to yell, “Avalanche.” The skier whose two partners were still on the up-track, out of sight, began to run downhill after the debris. The other four skiers followed. The avalanche came within ~20’ of the group of five.

The five skiers convened where the debris stopped and saw one person buried to his waist struggling to remove himself. They quickly turned all beacons to receive and began a beacon search when someone noticed a hand near some small trees where the beacons were leading. They were able to dig out the back of the person and clear the airway quickly. Burial time was estimated at three, but possibly more, minutes from the time of the burial to clearing the airway. The skier partially buried was able to dig most of himself out and help with the rescue of his partner. Both buried skiers were able to ski out on their own power.

Note
The debris from this avalanche nicked one small 50’ section in the zig-zag of the “relatively” safe up-track (where skiers were caught). A small section of the up-track was also covered with a very small amount (1’ or less) of debris near the toe.

This was a close call that we all can take something away from. Some lessons learned:
• Extra caution is required when multiple groups are recreating on the same slope!
• Never underestimate where and what terrain features an avalanche can overrun.
• When visibility does not lend itself to seeing the whole picture clearly, placing a skin track even more conservatively than you may think necessary could save someone’s life – and possibly the life of a person from a different party.
• Keep your rescue skills honed. KUDOS to these skiers for their excellent quick response!
• Always keep your beacon batteries fresh.

Wendy Wagner is a CNFAC forecaster. 

Petes North: the micro-ridge wasn’t enough of a terrain feature to channel avalanche debris away from the treed apron. Another case of “know who is above/below you.”
A started yelling “Avalanche!" over and over, and I turned and started kicking and gliding back downslope toward where I thought C&D would be.

I had good downslope momentum going with my heels unlocked and my skins on. As soon as the angle increased, my speed picked up even more, and I had a victim in sight partially buried from the waist down and completely caked with snow. It was D, and there was gear downslope of him. I approached him from uphill and recognized him and asked him where C was.

He said he didn’t know, and I asked him to put his beacon on search mode. He either said he was trying or he already had, I don’t remember.

At that point I continued gliding downslope and while gliding removed the Tracker from my right pants pocket and felt the stretch from the lanyard that attached it to my zipper pull.

I usually don’t put it in my pocket – actually feel pretty strongly that it belongs in its harness on my torso. (For more thoughts on this point, see page 36.)

I turned the beacon to search mode and immediately had a signal 40 meters away. I started following the Tracker, but it was taking me toward the toe of the avalanche, and my distance to signal was increasing. I stopped moving about the same time the beacon decided to recalculate, and the refreshed signal it acquired started curving me to my left and back up toward D. I had dropped my poles and was able to move easily across the debris, too fast in fact for my beacon as I had to force myself to slow down, because it kept dropping and reacquiring the signal. Once I adjusted my pace the curve I was tracking turned into more of a straight line and the distance was in the single digits and rapidly decreasing.

I remember passing by a victim who was still partially buried, and I started seeing other rescuers come into the avalanche, and located C's and turned his off.

At that point I moved into a position to palpate his spine and was able to successfully palpate it cervical to lumbar. With C’s lowered level of consciousness I realize a full neuro assessment couldn’t be completed, but I was just going on what training I had – a WFR in 2005 with no recurrent training since the initial.

I think at that point, B diverted his attention toward confirming that there wasn’t another buried victim, and he was focusing on his beacon which was picking up several signals. One was mine which had reverted to sleep mode either unintentionally or automatically, and the other was C’s which was harnessed to his torso. I turned mine (which was still dangling its lanyard attached to my pants where I dropped it) off and located C’s and turned his off.

At that point, C stood up on his own, and I put my parka on him, then sat him down on a pack and did a
Some background
When you last heard from me, TAR readers, on January 23 I had just penned an editorial labeling myself as one of those people about whom I warn my classes, a human factor crucible, impatient for fresh powder. December drought had left the Tetons high and dry; two powerful storms stressed the weak snowpack and heightened powder fever. We submitted the February TAR, 30-3, to the printer the next morning, and I went skiing with two friends, also avalanche professionals who were intimately familiar with the intricacies and problems of the current Teton snowpack.

The day
After 3.76" of SWE from January 19-22 caused a huge avalanche cycle (see photos these pages), we were pondering where to ski on January 24. Mid-elevation trees were rejected out of hand; one friend vividly recounted the pockets of sturdy 3-4mm surface hoar perched on a melt-freeze crust that were well-preserved down in those same trees. A late-December hearty inversion had perhaps helped to cook the surface hoar and some of the widespread depth hoar with warm temps up high. And those were just the indirect problems to consider. Overnight temperatures had dropped to 4ºF with clearing skies; the first sunny day on a loaded snowpack. We opted to stick to the lower angle (33-34 degrees), skier’s left side of the south face of Taylor Mountain, stay in the shade and scoot out of there as the January sun rolled around south.

All the way up the southeast ridge we bantered back and forth, discussing and debating the merits of our arguments: snowpack, weather, terrain were all dissected for data and desire. I also asked my compatriots for input on the theme for TAR 30-4; we emphatically declared that today’s ski was just within our risk tolerance personally, but there were way too many unknowns to venture there professionally, on an avalanche course or with even the best ski clients. Charlie Ziskin’s essay on decision-making (see cover story) articulates the process we were trying to use.

As we stripped skins on the southeast shoulder, we noted a party above and to the northwest of us, skiing further out into the south face; we all remarked how that part of the bowl was beyond our risk tolerance. We were on good behavior as we inched beyond the shoulder, one at a time, to a safe spot tucked in thick trees. The skiing was fabulous, but there was an undertone of “can’t make any mistakes, this is serious terrain and conditions.”

The second pitch brought us lower onto the face, but a slice back to the ridge eased the slope angle and exposure. One of our party and an add-on friend departed; my good friend and long-time backcountry partner Fitz and I continued up for another lap, noting that the sun was beginning to make its mark, conditions changing, so we agreed that our next run would be even closer to the ridgeline, in the step/bench terrain.

The avalanche
We skied that second lap with no consequences, but noted that the previously light surface was starting to settle and moisten, acting more like a slab. We then descended glade to glade, garlanding back toward the up-track on the southeast ridge. We had stopped to look at a moose when we heard a loud “crack,” like a rifle shot. I thought it might be a huge collapse; Fitz thinks it might have been air blast.
noise, coupled with trees breaking. Shortly afterward, we saw waves of rolling powder cloud billow down the confined track, boiling up, sounding like a full-speed freight train. From our safe zone well out of the path our thoughts went to the other ski party who had been above us on the second lap; our shorter trip up the skin track put us ahead of them in the circuit.
As the cloud dissipated we sped to the valley bottom in time to see a drainage packed with snow; a final wave of slow-moving wet debris oozing toward us. We immediately began a signal search, our initial fears alleviated by the sight of one of the members of the upper team who told us none of them was involved, although he had indeed triggered the huge face by jumping on a rollover near a rock band. Attempting to release the recent wind slab, it went much bigger than he expected, down to the depth hoar/drought surface from December.

My partner and I went into “dealing” mode, thankful for years of training that helped us know what to do and how to stay cool in this situation. Worries were amplified by the fact that debris from the south face left side of the photo.

Reflections
On January 24, we were granted a rare opportunity to review our actions in the light of the huge slide that swept the face where we were skiing. On close examination, our tracks were still intact, you can see them on the far looker’s right of the face. Did this mean that we made good decisions? Well, we thought so, but we also acknowledged that, in many ways, we got away with it that day.
A quote from Karl Birkeland gave me some perspective:

Sounds like you guys ended up on the right side of the line. However, it also sounds like you ended up pretty close to the line. My experience is that if you are too close to that line too often, sooner or later you’ll end up on the wrong side of the fracture. The older I get – and the more I learn what I don’t know – the further I like to be away from that line.

Sometimes, however, in order to know where that line is, I must turn around and look, saying, “Oho there it is behind me – I have crossed it and now how do I escape this one gracefully?” Taylor Mountain allowed us all to escape without injuries or casualties, but now we are obligated to put that free ticket to use, to contemplate the lessons of the incident and of this winter of uncertainty.

Don’t outsmart the instability
The first free lesson reminds me not to underestimate the deep slab problem; underneath it is really a human factor problem, a patience issue that doesn’t heal overnight or after one storm. We even stress in our courses not to outsmart the instability. Did we do that? Perhaps. But I believe that our terrain management (staying in the planar lower-angle part of the bowl), not our intimate snowpack knowledge, kept our tracks in place as the steeper and windloaded freight train. From our safe zone well out of the path our thoughts went to the other ski party who had been above us on the second lap; our shorter trip up the skin track put us ahead of them in the circuit.

But the real fun was about to begin. The south face of Taylor Mountain is visible from much of the road down the west side of Teton Pass. The fracture line weaves in and out of the tops of the steep drainages along the south ridge, on the left side of the photo. The south face of Taylor Mountain is visible from much of the road down the west side of Teton Pass. The fracture line weaves in and out of the tops of the steep drainages along the south ridge, on the left side of the photo.

Frontcountry Safety Protocol
Story by Jay Pistono
The January 24 avalanche on Taylor Mountain’s east face into the Coal Creek drainage triggered another avalanche of discussion on proper snow and slope safety etiquette. At the heart of the conversation is the use of some active slope tests – ski/slope cutting or cornice chopping – sometimes considered appropriate protocol for testing a slope’s stability in the backcountry. This discussion has exposed that several areas in and around Jackson – and Teton Pass specifically – are now considered frontcountry by the Forest Service.

Frontcountry is a wild backcountry area that sees heavy use because of its proximity to populated areas and easy access. Frontcountry combines a high-risk, high-penalty alpine experience along with high use, and it’s important to adjust traditional backcountry thinking and activities to these unique dynamics. Here are some thoughts on frontcountry protocol with regard to active testing techniques on Teton Pass.

While active testing is definitely the sexiest of tests, consider all other resources at your disposal before cutting a slope, including:
• Study the Bridger Teton National Forest avalanche report.
• Take the extra 20 minutes to dig your own pit and get intimately familiar with the layers within the snowpack.
• Pay attention to results from any recent Gazex events.

Additionally, stay alert to the environment you are skiing in, including such factors as:
• Changes in the weather and acute temperature swings
• How quickly tracks are filling in
• A ski pole test to feel for layers
• How much snow is on and around trees
• Affects of wind events on the terrain

If you do decide to conduct an active test, first consider the following:
• Be absolutely certain that no one is below you.
• Make sure that there is a visible run-out path.
• Avoid testing on any slope when there is a road below. That’s WYDOT territory.
• Choose small testing areas (small slopes, small cornices) rather than big ones.
• Finally if you still feel like you have to test the slope, consider skiing another slope altogether.

Remember, slopes behave differently when they are tested than when they are skied. An upper-slope cut or cornice drop provides much more impact to a slope than a fall line ski track. Just because a slope has been skied doesn’t mean it won’t release with an active test.

Jay Pistono is the Teton Pass Ambassador, also known as the Ambassador. He is a longtime local backcountry skier and guide whose diplomatic skills extend to the Snake River in the summer as well.

Continued on next page ➤
**TAYLOR MUSINGS**

**continued from previous page**

things anonymously that we’d never say to someone’s face, but manners lubricate discourse. I’d like to make a plea for critical thinking, for the process of taking the time to gather information, considering it against facts and beliefs, then crafting an argument, being willing to change your mind, be convinced, listen and speak with thoughtfulness and civility. Often our instant response is reactive, defensive, based on ego. Over time we can gain clarity, lose our initial defensiveness, then really figure out how to change our behavior, learn the lessons, act like the evolved apes we are supposed to be. Perhaps this evolution will cause us next time to save that comment as a draft, re-read and edit it before hitting send.

**Likelihood and consequence: taking it another step**

One of the systems I use when making decisions at home or in the backcountry is analyzing likelihood and consequences. High likelihood leads me to attempt to minimize consequences, rope up on a glacier with thick soft snow over the crevasses.

With some, we talk about the size and distribution of the problem, factor in its sensitivity, then consequences point to the potential destructiveness of the avalanche against bodies or buildings. Skiers patrol large avalanche likelihood by use of explosives, jumping on rollers, executing ski cuts; but a regulated environment ensures that human consequences are minimized, slopes are closed, and no one is below.

The backcountry these days certainly remains a place to test oneself, to find wilderness, to make good or bad decisions and take the brunt of their consequences. I posit, however, that often unsaid but equally important is the potential damage to the community: a rescue helicopter crash in the inevitable storm can hold the deepest consequences for the rescuers. A mistake of assessment in heavily travelled terrain can affect casual passers-by; is that fair? For example, the recent loss of two rescuers, co-workers – much more than just rescuers, co-workers – much more than just the brunt of their consequences. I posit, however, that often unsaid but equally important is the potential damage to the community: a rescue helicopter crash in the inevitable storm can hold the deepest consequences for the rescuers. A mistake of assessment in heavily travelled terrain can affect casual passers-by; is that fair? For example, the recent loss of two rescuers, co-workers – much more than just rescuers, co-workers – much more than just the brunt of their consequences.

What obligations do we have to ourselves and to one another while in the backcountry? The Teton Pass Ambassador, Jay Pistono, has some guidelines and reactions printed on this story’s pages. As our backcountry becomes more traveled, we will need to surmount our competitive natures and communicate where we are going so we know who is above and below us, who we might affect directly or indirectly.

**Call for leadership**

I still treasure my collector’s volumes of The Teton Torrent, looking at accidents, not just the fatalities, is a fabulous learning tool. Before internet resources, I would photocopy case studies from the volumes and hand them out to the boys, trying to make them develop their own critical thinking. Fatalities since 1998/99 are catalogued on avalanche.org, but the analyses continue from previous page...
Above and left: Natural avalanches on the Beaver slide, west side of Teton Pass, become big piles that dwarf the WYDOT road-clearing machines. Photos by Jamie Yount, avalanche technician for WYDOT

Below: “Lucky Dog” on Wolf Mountain. Interesting that the largest, steepest slide path on the hill stayed intact, even after getting its legs cut out from underneath it. Photo by Doug Workman

For more about this storm cycle, see story and snow chart on page 26.
Silvertown: David Lovejoy triggered this cutbank when his ski tip touched the snow on the uphill side of the road. Things have simmered down some, but skier triggered slides are still likely on anything above 35 degrees. See story about this day on page 33.

Photo by Billy Mason, January 2012
TELLURIDE: We remotely triggered this avalanche with a L2 class from .30mi away (at 11300’, crown around 11800’). 20120211 1130 north aspect SS-AS-R3-D3-O/G ~500”x500” x 2-4” crown. Initiated a major collapse on small test slope, with visible cracks that travelled around small lake, and up north-facing slope. The photo sequence captured it. Crazy. Everyone is pointing to the small convexity that failed from initial collapse nearby…with the big avalanche just getting rolling above, unnoticed for another few seconds. Too much hang fire to investigate crown. However, later in the day as the light changed, we could see a faint yellow/brown dust layer on patchy bed surface. After an afternoon of many test pits on the bulge in the middle of the basin with ZERO noteworthy results with ECTs, PSTs, RBs. On the way out, Peter Inglis and I stopped to dig a pit at the location where we originally initiated the collapse. We found extremely weak facets sized 5-6mm below a knife-hard faceting melt freeze crust, with hints of the yellow/brown dust layer, and 3-4mm striated facets above the crust. Performed several stability tests, CT, PST. Results with the CT were CT12 Q1 Sc (sudden collapse). Results with the 2 PSTs performed were identical. PST 40/100 (End) just above that stout melt freeze crust.

SHASTA from Nick Meyers: Multiple (three off middle peak, two on steep aspects and rollovers below Heart Lake) natural avalanches on NE aspect above Castle Lake occurred late in the storm. Size R2D2 or 3. Blocky and cohesive debris from a wind-affected slab. Crown depth 24-40” deep. Failure on facets located above the crust, about .5-1” of facets on an east-facing crown. Appear to have failed during the storm with strong windloading from the SW winds. At least one slide appeared triggered by a cornice collapse.
SKIING IN CONSIDERABLE HAZARD
story by Charlie Ziskin, continued from cover

The Process is the Point
The process is the point...and the process is the challenge. I challenge myself to learn something about the snow every time I am out, and I challenge myself to manage my own decisions and participate in group dynamics in such a way that I am responsible for my contribution to the decision-making process. This is not about deciding on a goal and working towards it, but rather about understanding the dynamics of the environment and how they interact with one another. I want to know as much as I can about what I am dealing with, both in the here and now and in the past. My knowledge of local conditions in these places is my greatest asset. Without it, I am lost.

I pay close attention to the snowpack in every possible way every step of the way. We know where we are, what we have observed, and what we are going to do. But the places where we ski are not as many as some might expect. We gain an intimate knowledge of local conditions in these places as we return to them often. We not only follow the CAIC forecasts and reports, we also make our own detailed observations, which often add nuance and insight to the general nature of the forecasts. We parse this information through ongoing discussions throughout the tour. I want to communicate every little thing I observe, but I do balance and prioritize that information so that my partners don’t have to decipher my non-stop stream of consciousness. If I really think it’s important, I don’t hesitate to mention it. Naturally, larger groups present greater communication and other challenges.

We’ve all heard the rhetorical question, “Would you go into a bar if you knew there was a considerable chance of getting shot?” Honestly, I don’t think this question adds much value to my decision-making process. That’s because if I do ascribe to that, I simply would never ski in Considerable conditions. My decision is already made at that point. It is my nature that I do want to go out, and I do poke around to see what will happen. I want to know about conditions even on slopes that I will not ski. I can’t get anything else, I want to know something of the character of the surface layers. I can often find a little bit of that something without even touching the snow directly just by tossing a few rocks around at the slope and watching what happens when they hit the snow. Do they bounce off the adjacent 33-degree north-facing slope (just for example) is one I am intensely curious to know.

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Another view of the Snake River Range, Idaho/Wyoming border ski shot called "New Years." The slide on the left, H5-AS-D3R3-06, was triggered just after the January 18-20 natural avalanche cycle. The ski tracks in the photo trace a 30-degree ridge between the two paths (see related story on page 17).
What is your risk tolerance personally and institutionally?

Personally…Begin first with the general:

It seems to me that a discussion of risk tolerance has to include the ideas of perceived vs. actual risk exposure. Imagine a situation where someone’s personal risk tolerance is low, and his or her perceived risk tolerance is low – but his or her actual risk exposure is high. A low risk tolerance can be skewed by an offset in perceived risk so that a gap between perceived and actual risk means that this person’s risk exposure is skewed higher than they realize. Closing the gap between perceived and actual risk is one of the desired outcomes of avalanche education for both recreationists and professionals. This idea logically assumes that if people understand the amount of risk they are actually exposed to, they will make different decisions. Further, we have seen that one of the outcomes of the human factor (and human error) is that emotional reactions or desires can override the awareness of risk and consequence.

I think this situation probably applies to all of us in some degree or another. Do we truly “accept” the risks we are taking? I’m not so sure we do – rather, I think we have lapses in perception that disconnect us from understanding consequence. Perceived vs actual risk is related to the ideas of likelihood (What are the chances something will avalanche?) and consequence (What will happen if it does?), but most particularly the idea of consequence. Human factors and errors in perception – as well as our own desire NOT to see or think about what could happen – all work to blind us to consequence, and therefore to skew our risk perception.

From the general to the personal:

I have (I think) a conservative approach to risk in both my personal and my professional decision-making. My goal is to build in a buffer, a margin of safety, as a way to manage uncertainty. This is due to two convictions:

1. I have a general perception that when folks “hang it out there” in the mountains, they are most likely coming through unscathed due to luck and skill, but that luck figures in more prominently than they realize.
2. My current opinion is that we humans are not very accurate in our perception of risks. We can work very hard (and do, particularly in a professional context) to increase our accuracy of perceived vs. actual risks, but we have to accept that we will never fully know.

I use this idea of inaccuracy as one of my basic operating assumptions, and consequently build in a greater margin in my risk management. Engineers call it a safety factor: you double and triple check the calculations you make about how strong a piece of material or a wedge will be, but in the end you multiply your results by some number to allow for unforeseen errors. The more complex the situation, the greater the uncertainty, the higher the consequence… the higher the number.

Consider the following example. As a ski bum in Chamonix I was the classic profile: enough skill to get myself into high-risk terrain, but without an accurate understanding of my own risk exposure. What kept me out of trouble was my professional obligation to manage and minimize risk, without knowing it. My safety factor was N = 1.

Institutionally?

In the guiding context we have built-in conflicting dynamics of a higher risk exposure and the need for a decreased risk tolerance. The higher risk exposure comes from the environment we work in, and the need for a decreased risk tolerance is because we take on a higher level of responsibility for our clients than we would in a non-guided group. There are several factors that figure in the landscape. For example, the nature of the trip and the environment can bring with it different levels of risk exposure – consider the inherent risks of an introductory rock climbing course at a sport crag vs. a guided trip to a Himalayan peak. It is also important that clients understand that they themselves are taking on some risk. It is my professional obligation to manage and minimize risk, but to inform them that I cannot control the environment, and I cannot remove all risk.

Yet at its core, I think that the professional guided context requires a safety factor greater than N = 1. This factor is our means to manage uncertainty in a high-risk environment where we have responsibility for other people. As guides, we are continuously striking a balance between maximizing our clients’ reward and managing risk. Teaching guides to manage these points is one of the central challenges of guides’ education. It is also coming into focus as one of the most valuable forms of continuing professional development as guides build on more experience to the foundation of their training and certification. There are loads of resources out there to build tools and techniques to deal with human desires and errors. Operational risk management, systems approaches… the aviation, medical, and financial sectors have a lot to offer. But I think that our mountain community has some real opportunity here as well.

Continued on page 24
MANAGING RISK on Avalanche Courses: AIARE Perspective

Story by Tom Murphy and Colin Zacharias

Knowledge of avalanches, guiding, and teaching compose the foundation of a professional avalanche instructor. For both the person and the profession, this foundation is rooted in the practice of risk assessment and risk management.

Avalanche course providers and instructors embrace those elements and hopefully, encourage effective risk management methods that are recognized and practiced by both peer and profession.

The American Institute for Avalanche Research and Education (AIARE) provides course materials, instructor training, and continuing professional development (CPD) for avalanche course providers in the US. As part of the curriculum, a risk management plan is promoted. During the AIARE Instructor Training Courses (ITC) the risk management dialog begins with a discussion of personal vs. professional risk acceptance. Theoretically each individual operates within an acceptable risk band that contrasts risk and opportunity. If the risk is too low, there is missed opportunity and lessened experience. And, if the risk is too high there is consequence including injury, disability, loss of career or loss of life. The person engaging in the activity, and often, his community of peers, defines the theoretical parameters of the personal risk acceptance model.

The professional circumstance is different by degree. The stakes are arguably higher, the transparency of process clearer by necessity, and the operational methods of risk assessment and mitigation well documented and transferable between industries (for example the fact that pilots use checklists to ensure hazard factors are discussed prior to action does apply to the instructor assessing avalanche hazard). The consequences of avalanches in professional circumstances may include the cost of life and limb, the cost to materials (highways, building, lifts), and the protracted cost of the liability for those elements at risk. All of a sudden the risk is transferable to the company the instructor works for, its legal, financial, and insuring agents.

During instructor training instructors are encouraged to philosophically review their personal risk acceptance and personal motivation for traveling in hazardous terrain. The struggle can be palpable and the self-induced pressures real. There is pressure to ensure a value added experience: to get a few good turns, to combine big mountain terrain travel with avalanche learning. Who among us doesn’t want to do that and who doesn’t want to show their course participants a good time in the backcountry?

It’s old news that human factors and perception play a significant role in our ability to assess conditions, forecast hazard, and manage risk. Common mitigation themes include small team decision processes with clear rules of engagement and effective communication, structured training and education, and preparation and planning. Most “check and balance” solutions employ checklists to support field decisions and mitigate human factors that may negatively affect decisions. Risk Management practices are detailed in a risk management strategy.

One overarching theme is repeated: On instructional days where we travel through potential avalanche terrain, AIARE instructors look at proposed terrain through the student’s eye. The successful plan can employ a simple terrain use strategy. One overarching theme is repeated: the terrain is chosen in the field during a face-to-face instructor meeting. Each student should have a “voice” and a “vote” on each day’s terrain choice. This includes the skier of “new” or previously unfamiliar terrain as chosen for course use.

Instructors follow the same procedures for daily risk management that is taught and demonstrated to students. This includes a daily trip plan (use of the AIARE field book “Trip Plan” page) that is essentially a pre-trip risk forecast. This is one of the tools the student takes with them. After the course they can rely on it to continue the process of managing their risk in avalanche terrain.

Many students will return with friends to the same course location and terrain. They often repeat the now familiar tour – and likely in different conditions. If you are taking students into terrain where the decisions requires your expertise, requires you to lead through the terrain, or requires you to “thread the needle,” you may be doing your student’s a disservice. While modeling is often the best instructional method, and the essence of all terrain instruction, the student benefit comes from the instructor modeling in “student-led terrain.” Terrain that the students can also manage themselves– with coaching from the instructor. The risk benefit includes safer terrain margins and likely safer post course student practice.

The picture obviously includes a venue with terrain varied enough for daily terrain choices appropriate to conditions and the avalanche problem. As the devil is in the detail below are a few general recommendations to include in the Risk Management Plan:

Course Operating Area

- Terrain options suitable for each day’s activities determined prior to course start
- Terrain options are pre-viewed and discussed in pre-season staff training
- Terrain photos and quality topographic maps available for pre-course trip discussions
- Communications plan established

On a Level 3 AIARE course at Red Mountain Pass north of Silverton, CO, participants share observations and choose terrain appropriate for conditions. Story co-author Colin Zacharias leads the group (at left, pointing pole). Photo by Tom Murphy

- Rescue plan created specific to course operating area and includes outside agency response options.

Hazard Management and Course Operations

- Pre-course student logistics information that details expectations: the physical requirement, a time plan/ agenda, and a skill/knowledge prerequisite.
- Pre-course Instructor Meeting. At least one day prior to the course start review:
  - Student resume and skill/experience
  - Instructor review and documentation of current and forecast wx, snow conditions, stability/ hazard and avalanche conditions.
- Each day’s learning objectives and proposed terrain use.
- Each instructor takes terrain options that have been previously agreed upon by all instructors during the pre-trip instructor meeting. Alternatively, chosen in the field during a face-to-face instructor meeting. Each student should have a “voice” and a “vote” on each day’s terrain choice. This includes the skiing of “new” or previously unfamiliar terrain as chosen for course use.

Summary

- While the complexities of risk assessment and risk management are profound – given the fickle nature of ultimate consideration is the involvement of operations management/ownership during pre-course training, planning, and documentation. Those who steer the operation practices and purse strings need to be present to support the process of understanding, assessing and treating the daily avalanche risk. This ensures the intent to keep, not kibosh, best practices implemented by those most at risk.

Continued on page 24 ➔
A CULURE OF EXPLORATION

Reflections on Risk Perception & Tolerance

Story by Jaime Musnicki

Sunshine greeted us as we crested the knife-edge north ridge of Mount Queen Bess deep in the heart of the Coast Range of British Columbia. We were two instructors and three students having an adventure, out exploring for the sake of seeing where we could go and using our skills in the mountains. The weather had been perfect for the past three weeks of our month-long mountaineering course. This was not a common occurrence on the Teton Icefield. Our entire group of 15 was thrilled with our luck and psyched to take advantage of the good weather to explore an even more remote corner of the range on a five-day mini-expedition to Mount Queen Bess, a hiking granite buttress surrounded by glaciers. This unanticipated exploratory mission was a cool opportunity for our students to use their newly developed skills to plan and execute a fun, rarely explored side loop from our route traversing the Homathko Icefield. After three weeks in the mountains our students had demonstrated sufficient competence that we felt comfortable allowing them to plan and largely lead this mini-expedition on their own, with instructors acting as advisors, coaches, and mentors as needed. On this particular day, due to the steep technical nature of the snow and rock climbing, we, as instructors, were leading our attempt on Mount Queen Bess.

Weather luck always runs out eventually. That afternoon we began a slow climb of five hours up the Teton Icefield, taking north ridge as a storm bore down upon us from the west. Rappel from the ridge and descend a 50-degree snow slope with running protection. Snow/sleet/rain mixture stings our faces. Rappel the bergsulz to murky whiteness on the glacier below. Rappel down with darkness seeping through the white-out storm conditions. Beeline through whiteness across the glacier toward the invisible rocky spine of the west ridge, knowing that it’ll be better to bivy for the night, rather than out, for the night out in between the middle of the snow storm.

We reach the rocks just as darkness truly settles on us for the night. It’s a chilly night in a “puppy pale” for warmth, but we have water, a little food, and high spirits from the epic adventure of the day. The choice to bivy is an easy one when faced with the alternation of navigating the icelfall and heavy crevassing of the final two miles of glacier travel that separate us from our comrades back at camp. A basic likelihood and consequence assessment has led us to the conclusion that we will wait this one out tonight. While it might sound odd, after four days of backcountry travel, we are all a bit like children when something they can’t control appears. Around 2am the clouds that engulfed us have descended in the cooling night air to reveal a nearly full moon that illuminates our path across the glacier. We rouse ourselves and proceed under the moonlight back to camp, reaching just after four in the morning, exhausted and thrilled by the day’s adventure.

Managing Risk

In many respects, my personal awareness of risk and my risk tolerance have evolved in close conjunction, intertwined really, with my development as a NOLS instructor. Managing risk is what we do on a NOLS course, whether I’m skiing in the northern Tetons, mountaineering in the Waddington Range of BC, or rock climbing in the Tuolumne Meadows. Through professional and personal time in the mountains I have honed specific skills to manage risk, gained experience, and developed judgment. The risk-assessment tools I most frequently use are quite simple: weighing likelihood and consequence, acknowledging the number of “less than ideal” factors building up, identifying a situation’s human factors, maintaining open lines of communication with my colleagues/partners, paying attention to my own desires and ego. I have also learned to strike a balance between giving my students freedom to develop their own judgment through experience, perhaps by making mistakes, and choosing to draw the line and step in when the lesson is not worth the associated risk.

Much more of my career in the mountains over the past 10 years, occasionally reflecting on my personal risk tolerance versus my risk tolerance with students, I’ve frequently found myself thinking, “Well, I’m not going to do something on my own that I wouldn’t feel comfortable doing with my students.” In more recent years, however, I’ve found myself making more conservative decisions with my students than I may have made if I were on my own personal time with a competent partner. I’m not sure what has shifted in me. Perhaps, I am just becoming more aware of subtle differences in my professional versus personal risk tolerance levels, the weight of responsibility for other people leading me to choose a more conservative option. Perhaps my competence and skills as a skier, climber, and manager of risk have progressed far enough beyond those of my typical students that the difference between my competence and their competence is playing a larger role in what I’m willing to do. At the end of the day, I’d say that I want the same thing for myself and for my students—to enjoy the beauty and adventure of the mountains and to come home healthy and happy to ski or climb another day.

Culture of Exploration

Last winter, in my dual roles as NOLS winter instructor and program supervisor, I was involved in planning and executing a new 10-day winter route in the north end of Grand Teton National Park. This route was specifically for our Winter Instructor Seminar (WIS), a training opportunity for existing instructors to further develop winter camping and backcountry skiing skills. The ultimate goal of this annual seminar is to assess instructors as competent to work backcountry skiing courses for the school. One innate challenge on instructor seminars is finding a balance between providing opportunities for aspirants to make decisions with real consequences and operating within/setting an example of acceptable levels of risk in an institutional setting. This new route development process involved great learning for me, especially in the realm of crossover between personal and institutional risk tolerance, and how institutional risk tolerance can very between individuals within the same organization.

As I considered the fortuitous opportunity to pioneer a new seminar route in the northern Tetons, explore an area of the Park new to me, expand the terrain options for our winter program, and get paid all at the same time, I was excited. The set up seemed perfect. My experience, as a mountaineer for NOLS and personally, has allowed me to have a very strong knowledge of the terrain on some of our know winter routes. Exploration has become, without me consciously realizing it, a commonly accepted form of risk for me in both my professional and personal worlds. It is a piece of what I do and love about working for NOLS, this opportunity to take my technical and leadership skills and apply them in a completely new geographic region. I seek out new and relatively unknown terrain in the winter, I learned that even within the same organization, individuals can have vastly different risk tolerance levels based upon their varying professional and personal backgrounds. This is food for thought and good perspective as I continue in my various roles as NOLS field instructor, program supervisor, and personal adventurer.

Jaime Musnicki has worked for NOLS for the past nine years and lives in Victor, ID. She is a field instructor who teaches backcountry skiing, avalanche, mountaineering, and rock climbing courses. For the past three winters she has helped run the NOLS winter program in Teton Valley. These days Jaime spends time mentoring and training staff in the mountaineering and winter programs. She likes skiing with her friends’ dogs, especially the Goose.
of the avalanche phenomena – the solution begins with the choice of appropriate “teachable terrain.”

• The terrain in which the student learns best about avalanches and own limitations is terrain that they are able to manage. In this terrain the student can identify hazardous terrain, imagine consequence, create options, and importantly choose and act upon safer decisions.
• Quality learning often takes place in a low stress environment. During a student led activity, the worst modeling occurs when the instructor takes over the lead to reduce the likelihood of incident. The best modeling occurs in terrain where the student can see themselves, on their own, doing what the instructor is doing, and managing the same terrain. The instructor can model the student’s terrain choice with appropriate group management, travel techniques, and good communication.
• Each operation has a risk management plan that is reviewed and implemented by both management and employee. The plan includes pre-season instructor training and pre-course instructor meeting.
• All terrain choices are pre-discussed by the group of instructors. All terrain decisions are made using consensus. Everyone has a voice, and anyone has a veto.

These practices need not be onerous or impractical. The examples cited above are easy to execute and certainly can be expanded upon. These procedures should be transparent and shown to our students in an effort to show them the concern for group safety. After all, managing risk is a big part of what we’re teaching and what they’re expected to do for themselves after leaving the course.

Tom Murphy is the operations director for AIARE. He lived and worked in Alaska for 20 years building and operating the Hatcher Pass Lodge. He currently resides in Gunnison, CO. His claim to fame is having a letter to the editor in the first issue of TAR.

Colin Zacharias has worked in the avalanche and ski guiding industry since 1980 and is a certified ACMG Mountain Guide. His avalanche work included ski areas and highways before switching to full time ski guiding for CMH in the late ‘80s. After 20 years of heli guiding Colin transferred his focus to mountain guiding, avalanche education, guide training, and operational consulting and serving a post as the ACMG technical director. Currently, Colin is a CAA Professional Member and ITP Level 2 professional training program course leader. Since 2003 Colin has served as AIARE’s technical director, advising on curriculum development for both course content/materials and Instructor Training. As a mountain safety specialist he provides mountain safety direction and consulting for ski operations in both Canada and the US. Outside of the avalanche world Colin still guides private clients in the mountains and is employed in mountain safety for the old kim and television project. In this employ, work has taken him to Argentina, New Zealand, Borneo, Fiji, and most recently a third trip to his favorite country – Morocco. Colin frequently travels and works with his wife, Julia Tuffly, who is every bit the adventurer as Colin, working as a stunt woman, aerial dancer, choreographer and founder of the contemporary and aerial dance group, Aerial Duxce Society.

A GUIDE’S RISK TOLERANCE continued from page 21

This past year I participated in – and then facilitated – several group sessions focused on risk management for guides and instructors. The result is a collection of factors that can skew decision-making in our professional lives. I am mid-project in developing this list of factors into a tool for reflection designed to identify patterns in our decision-making, and in linking this tool to some of the ideas offered by Daniel Kahneman in his book, Thinking, Fast and Slow. The exercise is called “Human Factors for Mountain Guides,” and the basic outline goes like this:

1. Reflect on days when you had a near-miss, or finished the day with the perception that you were pushing it. Write down 1 - 3 of these; describe them in a few sentences.
2. Read through Human Factors for Mountain Guides (see next page).
3. Fill out the worksheet (a condensed summary of Human Factors for Mountain Guides, not included here) for each of your near-miss experiences, checking the boxes that enumerate factors you think might have applied on that day.
4. Use the worksheet to track your decision-making, with the goal of looking for patterns in your System 1 decision-making (see Kahneman).

How do you manage students/clients and their desires in the field? Any tricks or tips?

It seems there are two types of groups: students, i.e., folk that bring some level of availability class, and clients on a guided objective. Of these two, the instructional groups are often already focused on risk management as part of the course goals or curriculum, whether it is an AIARE LI course or an introduction to backcountry skiing course. In this context it is easier to identify and manage people’s desires. Being in the mountain environment means that people are presented with actual hazards and potential rewards that drive decision-making. And a successful course environment makes it easier (and emotionally safer) for people to both express the emotions these hazards and rewards create, and to examine how they affect decision-making.

For guided objectives, managing people’s desires can be much harder – in fact, I see it as one of the central challenges we face as guides. How do you manage students/clients and their desires in the field? Any tricks or tips?

To these ideas you can add the need for clear communication with clients of what the risks are for a given objective, and the ongoing assessment of my clients’ abilities and skills…on and on. And through it all, there is the clear and ongoing statement of goals for any given objective: “The goal is to get home safely.” It sounds obvious, but it is crucial to remind people whose emotions and desires may have internally overwritten this with, “The goal is to get to the top.”

Yet, the issue is not all analytical…

A few years back I was watching the movie, Steep, with a group of friends and co-instructors at the AMGA. We watched Doug’s segment in silence, in awe of his skills and person, and in sadness. Folks who were sitting there who knew and loved and hung out with Doug had seen the movie before, and yet there we were…silenced in our daily bustle by the images of him discussing risk and consequences.

When the movie ended, I suddenly wondered if the people sitting in that room and somehow been marked. It seemed that they fully understood the risk and the potential for loss and consequence, and yet they went on living out their lives in the presence of this knowledge. I am still pondering if this is true: have we all been marked in this way? Or is that actually a more emotional way of expressing the basic idea: that we do not truly perceive the risks that we take?

Resources

The Black Swan: The Impact of the Highly Improbable, Nassim Taleb, 2007

Heuristic Traps in Environmental Decision-Making, Ian McCammon, 2004

The Better the Team, the Safer the World: Golden Rules for Group Interaction in High Risk Environment, Gettleman-Diaumier and Karl Benford, 2004

The Human Contribution, James Reason, 2000

Safety at the Sharp End: A Guide to Non-technical Skills, Rhona Flin, Paul O’Connor, Margaret Cruikshank, 2009

Maladies like Kata (But Not Pyhs), Carol Tavris & Elliot Aronson, 2008

Coaching the Alpha Male, Kate Ludeman and Eddie Erlanson, Harvard Business Review

Influence: The Psychology of Persuasion, Robert Cialdini, 2006

Predictably Irrational: The Hidden Forces that Shape Our Decisions, Daniel Ariely, 2008

Thinking, Fast and Slow, Daniel Kahneman, 2011

The Checklist Manifesto, Atul Gawande

Emotional Intelligence, Daniel Goleman.

Margaret Wheeler is a ski, alpine, and rock climbing guide who has led trips throughout Europe and North America. As an active member of the guiding community, she is an instructor of guide training for the American Mountain Guides Association (AMGA) and serves on its board of directors and as president of the organization. She is involved in avalanche education through her work as an AIARE (American Institute for Avalanche Research and Education) instructor and trainer. In the development of her ski mountaineering career, Margaret has been a member of several women’s expeditions pioneering first ski descents in India and the Atlas Mountains of Mongolia. In 2006, she became the second woman in the United States to complete her international IFMGA/UIAGM guide certification. Margaret is co-author of the book, “Backcountry Skiing: Skills for Ski Touring and Ski Mountaineering.” She holds a bachelor’s degree in history from Dartmouth College and a masters in mechanical engineering from the University of Washington.
Results of the Group Brainstorm

In groups of three or four, guides and instructors worked together as a group to generate answers to the following question: What pressures have you experienced in your decision-making as a mountain guide? Answers from two different group sessions were combined and reorganized from the original brainstorm list into the following multiple categories. Going forward, the goal is to use these categories to build a tool for near-miss analysis.

Type 1: Pressures Created by our Relationships and Group Dynamics

Pressures created by dynamics outside of the group

1. Influence of guided groups. Pressure from other guided groups/parties. Competition between companies.
2. Influence of non-guided groups. Pressure from recreational parties: client says, “They went up, why didn’t we?” Influence from recreational parties: “bad example.”
3. Competition for resource. Resource scarcity. “We gotta get to the climb first,” rush to set up or take down ropes, first tracks, first to the base of the route.

Pressures created within the group

1. Diverging client expectations. Diverging expectations within the group of clients.
2. Diverging client abilities/fitness. Diverging physical or technical abilities within the group of clients.
3. Client-client pressures. Guests put pressure on each other based on differing abilities and agendas. Differences in client skill sets when they know each other: “She’ll be fine,” “He’s OK, it’s good for him.”
5. Guide-guidem communication breakdown. Lack of communication with other guides. The expert halo limits inter-guide communication – must satisfy owner/employer.

Pressures from our clients’ abilities (physical and technical)

1. Client pushes themselves too far. Client is tired/exhausted, and we’re far from home. Client is physically pushing it: exhausted, clients push themselves too far. Client is tired/exhausted, and we’re far from home. Client is physically pushing it: exhausted, clients push themselves too far.
2. Lack of alternatives. Client does not actually know what he/she wants from the trip. Tips are better with successful trips.
3. Lack of proper equipment. Client is not prepared with proper equipment – you arrive at a climb/trailhead, and client does not have the appropriate gear.

Pressures from clients’ mental/emotional/dynamic

1. Client lacks self awareness – technical, physical, emotional. Pressure from clients who want to “bite off more than they can chew.”
2. Client expectations are unreasonable given their skill set.
3. Client puts pressure on the guide to rate the client’s needs or is able to do.
4. Client doesn’t actually know what he/she wants from the trip.
5. Lack of respect for guide. Clients lack respect for the judgment of guides. Clients think they don’t need a “guide.” Clients will not follow guide directions for technical, movement, or self-care.
6. Poor personal skills. Clients are aggressive or unpleasing. Clients are poor communicators.

Pressures created by the guide’s expectations

1. Guide misreads guide responsibilities. Clients misunderstand the role and reason for hiring a guide. Lack of awareness or clarification by the office or the guide. Client wants to see the climb lead at his or her limit.
2. Lack of respect for guide. Clients lack respect for the judgment of guides. Clients think they don’t need a “guide.”

Pressures created by the guide’s physical, mental, emotional state

1. Pressures from our home lives. Guide feels responsibility to maintain home life and “bring home the bacon.” Guide feels guilt at being gone a lot. a. Guide is often away from home. b. Guide feels responsibility to support family. c. Emotional pressures from family and relationships.
2. Guide is hurt and clients are not. Example: altitude sickness.
3. Guide doesn’t get sick days. Guiding while not feeling great – pressure to perform physically and mentally despite your personal condition. “I am having an off day,” but I need to carry on anyway because I am the guide.”
4. Fatigue. Guide is physically pushing it – not enough food or water, it’s late in the day – guide is fatigued.

Pressures created by our ideas of self-worth

1. Personal goals – guide wants to summit or do first guided ascent.
2. Ego/pride connected to day’s outcome we want to “out guide” others. Desire for a perfect record season (12 for 12 on the summit)
3. Seeking acceptance by peers and/or clients. Trying to impress them.
4. Competitiveness: guide wants to go fast – be early back at camp or back at the hut. Fast for the sake of fast.
5. Scared Want to get first tracks or be the first on a route.
6. Errors. Guide doesn’t want to “look bad” – made an error and is trying to hide it.
7. Guide fear of missing out. Other guides are taking their clients to the top, so I don’t want to miss out.

Pressures to be professional. “I’m supposed to know the answer.”

Pressures from our own insecurities

1. Gender – female guide/male clients, wanting to prove you are as strong as a guide as your male peers.
2. Age – “I’m getting older, I need to do this now. I should be able to do it.”
3. Being the “go-between” – guide needs to prove him/herself. Pressure to move to quickly (as a guide) from learning to doing.
4. Locality or culture – “I’m not from here.”

Pressures created by our guide-client relationship

1. Pressures of good/return clients. They have been out with you before. You want to provide “the goods” for a good group.
2. Need to build/maintain reputation. Pressure to provide great experience – to ensure reputation and repeat business.
4. Financially obligated to deliver. Client feels responsible because the client paid money to deliver the product!
5. Desire for variety. Guide wants to get a client into new terrain (even if client doesn’t care either way).
6. Desire for client progression. Pressure to take clients (too) quickly through the transition from learning to doing. Pressure to assist client in achieving the guide-recommended goal.
7. Multiple attempts on the same objective. Client returning for the third time to the same objective.
9. Tips. Working for the tip can create negative pressure.

“Reverse” Pressures

1. Overconfidence/familiarity.
2. Routine – repeat objectives.
3. Over-confidence in equipment. “I’m not from here.”

Converging Factors: Multiple Challenges Ramp Up Pressure; Convergence of Challenges and/or Stressors

Concept: Taken alone, any one of the above factors may not be enough to derail a guide’s good decision-making. But when there are more than one of these factors/pressures, convergence can occur. This is concurrent with our thinking about risk management and accident analysis.

• Example 1: Weather is deteriorating, but we bail the clients will be unhappy and might ask for money back, especially if we get home early. But if we stick it out we could have a great day.
• Example 2: A business owner, weather and conditions lead to shutdown (example, day four of a heli-skiing week, and no one has skied yet).

Can you find a pattern? Use the above list as a tool to review and analyze near misses that you have seen or had.

Margaret Wheeler facilitated a presentation on Human Factors as part of AMGA Professional Development Clinics in October 2011. The above is a summary of results of the workshop sessions.
**A GIFT**

Story by Robby ReChord

To work in the NOLS winter program, instructors from other course types must go through our in-house five-day professional level 1 avalanche course. They must earn and complete our 11-field day winter instructor seminar. Our goal is to take these folks from varied levels of touring experience from “unaware incompetence” to models of proficiency or “deliberate competence.” This winter I’ve had the pleasure of working both of these courses in addition to my responsibilities as a winter program supervisor. We run two of the avalanche courses each season, one in December and one in January. Our December snowpack consisted of 70cm of facets topped by surface hoar up to 4cm on all aspects at low and mid elevations. The January course coincided with “The Perfect Storm.” I’ll let the chart speak for itself. The curved line represents snow height.

After the two classroom days these folks could barely make it out of the driveway, and even when they did, natural and explosively triggered avalanches on Teton Peak proved to be one of our classroom outings. Once they did get out, trail breaking was a monster! When the clouds lifted, the pass resembled a war zone with crowns and debris scarring even treed slopes that would fit the classic definition of “too tight to ski employs a supercomputer that processes information at a subconscious level and the “expert” acts without thought. This supercomputer processes information at a subconscious level and the “expert” acts without thought. This seems to be the case with this model. They can convey misinformation, or take a life of their own. Experts are more likely to seek feedback regarding the traps that expertise can present:

- Lack of awareness (brought on by the expectation that expertise is subconscious)
- Bias of our experience
- Fraudulence of our humanity
- Inappropriate transference of expertise in one realm to another
- The use of a gut feeling as a substitute for deliberate thought

In the original articles from which these models are developed, language on the value of reflection and deliberation. McCammon remarks that experts are more likely to seek feedback regarding both stability and instability of avalanche slopes and are more likely to review past experiences than novice. They are so much alike, they see similar patterns and put them into a particular context. These patterns are shaped by the traps that expertise can present.

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**LEVELS OF EXPERTISE MATRIX**

Article for the NOLS Staff Newsletter Nov 2010 by Gates Richards & Tod Schimpelenfing

We watched several different presentations at the recent Wilderness Risk Managers Conference use the matrix of levels of expertise – unconsciously incompetent to consciously competent. NOLS presents this model twice in the Leadership Education Notebook, and it’s used in NOLS’ field curriculum. We’re naturally skeptical of models, fearing that in our good intent to organize information and present concepts they can convey misinformation, or take a life of their own. This seems to be the case with this model.

We bristle every time we see this model presented with the implication that the subconscious competent is the highest level of expertise. Our concern about this model is the message it conveys regarding how an expert should act. It invokes Klein’s seductive Recognition Primed Decision model and a tantalizing image of an expert armed with multiple heuristics and a basket of expertise, who doesn’t need to think. Some have likened the expert brain to a supercomputer running in the background of the decision-making process. This supercomputer processes information at a subconscious level and the “expert” acts without thought. This may be helpful if it’s a trained automatic response to a recognized pattern: the kayak roll, self arrest, seeing the flaw in the climbing anchor. It may be harmful if the expert is unaware of the reasons for their actions and fail to recognize the causality fallacy – the assumption that their actions produced the positive results.

More specifically, our concern is that the linear model takes us to an end, where we can “exercise good judgment without much thought about it.” We worry that, like Malcolm Gladwell in the flawed Blink: The Power of Thinking Without Thinking, NOLS staff emphasize subconscious competence as the hallmark of an expert, and neglect teaching us the value of reflection and deliberation. We worry that, like Malcolm Gladwell in the flawed Blink: The Power of Thinking Without Thinking, NOLS staff emphasize subconscious competence as the hallmark of an expert, and neglect teaching us the value of reflection and deliberation. We worry that, like Malcolm Gladwell in the flawed Blink: The Power of Thinking Without Thinking, NOLS staff emphasize subconscious competence as the hallmark of an expert, and neglect teaching us the value of reflection and deliberation.

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As Lynne and I talked about this incident we attributed the first three positive factors (situational awareness, watchfulness, self-awareness) to what Lynne likes to refer to as intrinsic factors, also known as reflective competence (see sidebar below) or subtle pattern recognition, developed over many years of backcountry winter travel. In my capacity as an educator I role modeled the proper way. I had to flex my own tolerance for adversity, visions of me squawking at them to pay attention, document, and discuss will pop into their heads – thinking, “What would Robby do here?” similar to the visions I have of Lynne and Heavy D (Don Sharaf) any time I enter avalanche terrain. These are lessons that are internalized in the NOLS winter program come as it mindfully and reflexively perform a post-mortem test. I hear them challenging my route selection, test pit accuracy and efficiency, and pushing me to communicate succinctly.

I’m wondering if we need to somehow modify our training if this happens on day 13 of a 15-day training, or was it simply a fluke? Regardless, I know what I’ll be emphasizing next year, and inevitably something else will come up, demanding vigilant watchfulness on the part of trainers as we groom a new crop of winter professionals. Robby makes his home in Victor, Idaho, where he works at NOLS Teton Valley as a winter program instructor and supervisor, thinking about how people think.
PART 1 by Eric Knoff
On December 31, 2011, two people were killed in separate avalanches in the mountains outside of Cooke City, Montana. One victim was a skier, the other a snowmobiler, both Montana residents. During the three days before the accidents the mountains around Cooke City received over 3" of dense snow totaling 4" of SWE. Consistent northwest winds blew 30-40mph with gusts in the 60s during the storm. The new snow was deposited on a layer of facets formed during an unreasonably dry December. This rapid load produced unstable conditions, prompting the Gallatin National Forest Avalanche Center (GNFAC) to issue a backcountry Avalanche Warning for the area.

The initial Avalanche Warning for the mountains around Cooke City was posted at 5pm on Friday, December 30. At this time, 2" of SWE had been recorded over a 48-hour period at the Fisher Creek Snotel site (elev. 9100') near Lulu Pass, creating our official warning criteria of HIGH avalanche danger on all slopes. Issuing the Avalanche Warning in the evening allowed it to be picked up and disseminated by the media by early Saturday morning.

I was in Cooke City at the time and spent much of December 30 ski-touring around Lulu Pass. My partner and I experienced widespread cracking and collapsing and triggered a few small avalanches. Precipitation Intensity rates were high throughout the day, and the storm continued to rage as we reached town at 5pm. On Friday evening the weather forecast was for another 1-2' of snow to accumulate by the morning of Saturday the 31st accompanied by strong northwest winds.

As forecasted, an additional 2" of SWE totaling 1.5' of snow accumulated at the nearby Snotel site by Saturday morning. This new precipitation pushed the 72-hour storm total to 30' of snow equaling 4" of SWE. The GNFAC extended the avalanche warning through Saturday the 31st, New Year's Eve Day, which dawned clear and cold. Temperatures had only warmed to 8ºF, but sunshine and fresh powder had drawn a large number of skiers and snowmobilers to the slopes around Daisy Pass and Lulu Pass. By this time, my partner and I had remotely triggered a size-D2 avalanche near Cooke City and Lulu Pass. As we were loading our skis on the snowmobiles, I glanced across the valley just in time to watch a snowmobiler finish a turn midway up the northeast face of Mt Henderson. Suddenly, the slope broke around him, and he disappeared from my view in a wall of white. I couldn't tell if the snowmobiler who triggered the slide had been buried or if other riders were involved, but the sheer size of the avalanche made my partner and I both realize that the situation was serious.

I immediately radioed Cooke City Search and Rescue, and we headed to the scene. My partner and I both felt skiing to the scene was a safer option, and we arrived around the same time as search and rescue. Arriving on the scene, we were informed that a piece of the victim's boot had been visible on the surface, cutting down on search time. Members of the victim's party dug the rider out in approximately 12 minutes with his head buried 3' deep. The victim was pulseless, and party members initiated CPR. Upon arrival, search and rescue applied an AED without success. CPR was continued for approximately 45 minutes before a physician in Cooke City gave notification over the radio to end CPR. The rescue was concluded, and the scene was clear by 1:30pm.

The avalanche broke 500' above the rider, catching him while he was riding downhill. Due to the confined nature of the path, escaping the slide was nearly impossible. The slide ran a total of 1000 vertical feet. The crown of the avalanche ranged from 1-4' deep and propagated 300-400' wide. The slope angle at the trigger point was 35 degrees, but increased to 40 degrees near the upper portion of the crown. The debris ranged from 7-10' deep near the toe of the slide. US classification of the avalanche is SS-AM-DS-84.

PART 2 by Doug Chabot
Two hours after this incident, skiers triggered a slide south of Cooke City in the Absaroka Beartooth Wilderness approximately five miles to the south of first incident. The accident occurred a mile inside Wyoming up the Hayden Creek drainage near the base of Pilot Peak. This story is very different, yet equally tragic. A husband and wife drove to Cooke City from Bozeman to ski together after a hectic holiday. They spent the night in Cooke City and the following morning left in their telemark gear to follow a set of freshly broken ski tracks. About an hour later they met two skiers returning to town. The two skiers who broke trail found dangerous conditions and even remotely triggered a slide, which prompted them to turn around. They conveyed their avalanche concerns to the couple, who were also aware of the Avalanche Warning.

The couple continued on their tour. At the Montana/Wyoming border the husband decided they should turn on their beacons. He had an Ortovox Patroller while she had his 20+ year-old Ortovox F2. After turning it on he commented that the rechargeable batteries were weak. They continued touring despite widespread cracking and collapsing and weak batteries.

After breaking trail up a broad valley for close to a mile, the two skiers turned up an adjacent drainage with very narrow, steep walls. Many avalanche paths funneled into this gully from far above. Around 2pm they decided to ski out of the drainage and seek a more comfortable spot for continued on page 30
THE GRAND DELUSION

Story by Will Gadd

I recently attended a rare event: a memorial for someone who didn’t die in the mountains. This particular high-achieving friend died of alcoholism, but was his addiction really so different than my own devotion to mountain sports? He knew alcohol would kill him, but chose to drink. And I am increasingly certain that if anyone spends enough time in the mountains, he or she will die there.

I often hear friends make statistically insane comments such as, “You can die on the way to the mountains just as easily as you can die in the mountains.” That statement, for the record, is a stinking pile of self-delusional excrement that does not smell any less foul with repeated exposure. The ignorance behind those words makes me seethe internally – because I once believed exactly the same thing.

I do a lot of presentations about mountain sports, and sometimes share a list of dead friends to remind myself and the audience that the hidden price for the stunning photographs is all-too-regularly life itself. There are 27 names on my list. Not one of those friends died while driving to the mountains. Not one died on a commercial airline flight. To equate the risks of mountain sports to everyday activities like driving or even the chance of death from cancer is completely idiotic. Every friend on my list drove to the mountains a lot, and some even wrecked vehicles and spent time in the hospital from those crashes. But they died doing mountain sports.

As the list grows longer, I have a harder and harder time understanding why I take the risks I do out there. Yes, I’m careful; yes, I use good gear; yes, I run away a lot in the face of peril – but there are always elevated dangers in sports such as climbing, whitewater kayaking, and paragliding. Each friend’s death has been a crack in my mental foundation of “managed risk.” And then, two months ago, that foundation was shattered with the sound of someone’s spine breaking. I had launched my glider off Mount Lady MacDonald, north of Canmore, and was 500 feet above my friend Stewart when he plummeted into the rocks shortly after takeoff.

I almost puked in the air as I watched and heard him hit. I didn’t think anyone could survive the impact he took, and the spinning fall down the scree that followed. Thanks to prompt first aid from some great people who happened to be hiking in the area, and to a helicopter rescue team from Canmore, Stewart was in a good hospital only two hours after his accident. He remains there, with hopefully temporary spinal damage. I was thrilled when I heard that he had survived – unlike the dead, he would have the opportunity to say what he needed to his friends and family. He might even recover fully.

Just one week before Stewart crashed, I had the best flight of my life, straight over the iconic granite spires of the Bugaboos in southeastern BC. Pure joy is how I’d describe that flight. But I haven’t flown since Stewart’s accident in August; the thought honestly makes me nauseous. Why?

Strange, Stewart’s survival has affected me far more than if he had died. The difference with Stewart is that I can look into his eyes and see the damage. I can talk with Stewart and see the pain he is fighting through. While I admire the hell out of his courage and commitment to fly for every millimeter of progress, I also imagine not being able to see the damage. I can talk with Stewart and see the pain he is fighting through. While I admire the hell out of his courage and commitment to fly for every millimeter of progress, I also imagine not being able to see the damage.

I was thrilled when I heard that he had survived – unlike the dead, he would have the opportunity to say what he needed to his friends and family. He might even recover fully. But even in those instances I feel like I need to make a name for themselves in the industry, fuel their ego, or are genuinely interested in pursuing a purer form of their sport. I’m impressed, but also at times incredulous of these accomplishments.

We all experience the mountains in our own way and find our own personal joy from them. These days, skiing groomers with my kids is as joyful an experience as skiing a steep couloir in Grand Teton National Park. I love pushing my own limits, and that is what my guests can handle. Sometimes I have folks who are interested in pursuing a purer form of their sport. I’m impressed, but also at times incredulous of these accomplishments.

What I deal with more these days is a guide and educator is making decisions for individuals or groups. Most of the time it’s easy – I take the most conservative line, and that is what my guests can handle. Sometimes I have folk who are more advanced, and I can think about pushing them and the terrain a little more in an effort to 1) show them more advanced skills and 2) find better snow or a more exciting experience. But even in those instances I feel like I need to make the decision based on solid knowledge of the conditions and their abilities. I’m not making the decision for myself. The decisions I make on a day-to-day basis...
Where do we draw the line between pushing the limits of safety? I have a list of people who have pushed the line both personally and professionally, and they or their clients are not around to testify to the wisdom of their decision or to the benefit found from crossing the line.

in the mountains with clients affect my guests certainly, but more importantly they affect their loved ones – spouses, children, parents, and friends of the folks who are skiing with me that day. It would be a living nightmare to have to sit in front of those people and explain why I decided to take them to a place that killed or injured them. I often think about my Argentine friend and what he must be going through. I don’t think he’s working as a guide anymore. In Europe, he likely would have been prosecuted and put in jail if his decision was found to be unsound.

The hardest thing is when I have clients who are better skiers than me, and who have a certain agenda. It’s sometimes tough to ratchet them back and look at terrain and risk from my perspective. The problem is that I want to give them what they want, but I need to really think about my decisions and what could go wrong on those days. Here are some tools I use to help me make decisions and manage terrain:

Follow the snowpack on a daily basis.

By only knowing what is going on below can I hope to make wise, educated decisions about what to ski. Ask those you trust about what they are seeing and experiencing in terrain that you want to ski.

Know my clients’ abilities and desires.

Ask questions, find out what their goals are for the day and what they have done in the past. For bigger objectives, make sure they work their way up to their goals. Preparation is key.

Do a pre-mortem check.

What is the likelihood of something happening on this slope and what would the consequences be? What would really happen to that “safe zone” if the slope went big? If I got caught here, would my client be able to dig me out? Could I really hope to dig them out in time if something happened? Do I even want to risk that possibility?

Work the terrain.

Use the macro and micro terrain features to help keep you on the right side of the snow. Decided to ski the avalanche path? Ski the small ridge within it, for example.

Use double checks.

I will often “check” my decision with ALPRUTH and/or FACETS before dropping into an avalanche path. A great exercise that we did in AAI’s guide training this year is figuring out where on the FACETS scale each of us live in our decision-making model. I live in Acceptance – I want my clients to have a great time and to think I’m an awesome guide. That often affects my decisions, and I need to recognize that every day.

Reflection.

Every day list down and think about my day and the decisions I made. What could I have done better? Where did I make a questionable decision? What did I do well that I should remember for next time?

In the end, what’s important as a guide or personal skier is to always ask questions, to strive to learn more, to be open to questions or criticism from our peers. Humility will help to keep you on top and open to learning.

Christian Santelices believes that experiencing nature firsthand has the power to transform people’s lives. As a fully certified IFMGA/UIAGM mountain guide, professional photographer, public speaker, writer, and community activist, his career has been dedicated to helping facilitate this process. During the summer months you’ll find him working in the Tetons as co-chief guide for Exam Mountain Guides. The rest of the year he teaches avalanche courses, ski guides, and leads custom adventures and corporate community-building retreats worldwide through his guiding company Aerial Boundaries. He lives in Teton Valley, Idaho, with his wife Sue, daughter Mariela, and son Nicola.
GET IT DONE; STAY SAFE Reflections on The Grand Delusion Story by Mattie Sheafor

Years ago I worked with and became friends with Alex Lowe. Alex embodied the rare combination of genetic ability and the drive to proficiency that most of us dream of but never achieve. He was psyched like none other, and when he was in the mountains he wore a huge smile. But just ask him about Jenny and his three boys, and his eyes twinkled, his smile shine exponentially brighter as he spoke. He had a terrific smile anyway, but to see this man’s face actually become radiant – there was no doubt about what lit his heart up.

Alex’s passing shook my foundation. I received the news while on my own climbing trip in the Alps. A lot of us seemed to think if anyone was immune to these realities, it was definitely Alex. And in the wake of the sadness I remember considering that maybe I was done with climbing. When I next checked my email I found a last bubbly note from him exhorting me to do my best and enjoy every moment.

Earlier this winter I found myself belaying Alex’s youngest, now grown son at a frozen cliff and standing beside the man (one of Alex’s former partners) who stepped in as his dad years ago after Alex died in the avalanche on Shishapangma. It is different if than Alex was here, but it is still good. Something about Alex’s energy remains in those of us who can’t forget him.

I started climbing 25 years ago this month. Alex is but one of the 21 friends on my own list of those who have died in the mountains. One name belongs to my best friend, Karen, who disappeared after topping out on a rad Alaskan grade VII route, six years ago this May. I still think about her every single day. I’ve stopped considering that maybe I was done with climbing. When I next checked my email I found a last bubbly note from him exhorting me to do my best and enjoy every moment.

I can speak from the heart of what my 25 years of climbing have meant to me: remarkable landscapes shared with dear partners; the pleasure of the movement across a rock face, up surreal frozen waterfalls, spectacular desert towers, exposed ridges. I know the satisfaction of spending time alone on big walls with only hummingbirds for company, self reliant and self contained. I can describe the gifts of knowing fear, humility, and forging will and how I try to use this evolution of thought in my everyday life.

All of these things are relevant and have been useful for me, but if I’m going to be as honest as Will is in his essay, there’s a further stretch to be made. There is a kernel of elitism at the core of these arguments that doesn’t ring wholly true to me.

I cannot discount this possibility: that all the incredible ways in which climbing has informed and shaped my life might have been achieved walking a different sort of path, maybe becoming an avid disciple of another type of sport/discipline that holds less inherent risk. So I spent a little more attention to diversifying as I age, and maybe one day, if I work at it, standing in a river’s current watching a fish rise will teach me too. This is the route I’ve traveled though, it makes up a place to work toward greater capacity, and there is no room for masks – I love the simplicity. Pretense falls away quickly whether you are on the sharp end of the rope or trying to lift something heavy over your head. You either do or you don’t, no pretending. Only certain personalities seem to persist in these places, and generally they are ones I am predisposed to liking. It makes for an interesting camaraderie. In climbing we have this mutual vulnerability in spades. Nothing like sharing a portaledge and a poop tube to break down walls. Holding someone’s line while they try to ascend something at their limit is akin to a privilege, it is an act of trust and partnership to the core. This connection is the part I value the most.

Lately I think I have to be satisfied with the idea of holding competing tensions: No single day in the mountains would be worth losing time with the people I love or their suffering. No way. And, I love all that climbing accesses for me, both within and without. I churn about the inherent risk manifest in my sport, but attending to managing it every means at my disposal makes me present. And processing the accompanying fear/doubt does feel terrifically satisfying. Is that addiction? Rejuvenation? Evolution? It is what it is. Until I figure out a better answer, I will do my best to prepare. And my hopeful self will continue to withstand on wrinkle cream with SPF. We are younger than we’re going to be. Get it done, stay safe. And tell your people you love them as often as you can.

The Crucible

Why leave to climb? Why indeed. I ask myself this before every trip. I’m packing now to meet a climbing partner for a short but much anticipated trip. Someone who lost his best friend climbing too, who loves his wife like I love my boys, who has every intention of coming home safe and sound. And who feels, like me, that life is short, and we best get after it using our skills and building more memories.

In general, the mountain athletes have far more fallen friends than the soldiers – you wouldn’t think that, would you? But the soldiers don’t have to do mental gymnastics to justify to themselves and their families for continuing to put themselves in harm’s way. The altruistic motives of “for country,” and “for my brother next to me,” are pretty solid reasons. Some of these guys certainly like the rush of combat too, but are hesitant to admit it.

Rob Shaul is a professional strength and conditioning coach and the founder of Mountain Athlete in Jackson, WY.

THE MORALITY OF MOUNTAIN SPORTS Story by Rob Shaul

Occasionally we visit the moral/business aspects of mountain sports. One of my sponsored athletes, Mattie Sheafor (see story, above), a good friend of Will Gad’s, forwarded me her essay (see page 28) – and I thought it would be a good opportunity to poll the reactions of the rest of my athletes, asking if they think that, would you?

In general, the mountain athletes have far more fallen friends than the soldiers – you wouldn’t think that, would you? But the soldiers don’t have to do mental gymnastics to justify to themselves and their families for continuing to put themselves in harm’s way. The altruistic motives of “for country,” and “for my brother next to me,” are pretty solid reasons. Some of these guys certainly like the rush of combat too, but are hesitant to admit it.

Rob Shaul is a professional strength and conditioning coach and the founder of Mountain Athlete in Jackson, WY.

Cooke City Tragedies continued from page 27

lunch. The husband left the drainage, and his wife followed a few minutes behind. The drainage opened into a 50′ wide avalanche path. A few hundred feet up the path he triggered a small slide and yel led for his wife to grab a tree. The avalanche propagated uphill, releasing a majority of the slide path. The slide completely buried the husband and the dog, but the wife was not caught.

She turned her avalanche transceiver to “receive,” put her earpiece in, and started searching. She could only get a signal when the volume was on its highest setting, making it impossible to pinpoint. Weak batteries were likely the cause of this malfunction. She searched the debris for three hours and dug multiple holes in the snow, but was forced to abandon her effort to find her husband as it got dark. She skied back to town solo. That evening Search and Rescue went to the scene and retrieved the body.

Four days later, a canine miracle happened when the dog dug himself out of the debris and walked back to Cooke City. Looking for his owners, he sat outside the door of the hotel they had spent the night at.

The slope angle averaged 35 degrees in the starting zone with the steepest part measuring over 40 degrees. The crown face was 1-4’ deep and 800′ wide and ran 250′ vertical. The starting zone averaged a northwest aspect. The debris was split between two paths with the one the skiers were in being 50′ wide. The avalanche path was 10-12′ deep. US Classification of the avalanche is SS-AS-D2.5-R3.

Eric Knopp and Doug Chabot are forecasters at Gallatin National Forest Avalanche Center. At press time they are investigating another snowmobiler avalanche fatality that occurred near Cooke City on February 21.
It's always a great learning tool if we can spot or even provoke an avalanche from a safe distance. But getting close enough to ride them like a bucking bronco is certainly too close. It will make you look like a god or a hero when you do show clients “the goods,” but it is a very fine line we walk to get there, between taking them to “the best terrain” and being “totally safe.” Teaching or guiding in avalanche terrain requires that we take one extra step back from that line.

As a backcountry ski guide or an avalanche instructor your first priority should not be to impress your clientele with “the goods.” Foremost in your mind should always be, “Is this slope safe?” In reality this may be stated as, “Is this slope safe enough?” – safe enough to take my group onto without starting an avalanche.

Dragons and Bisons and Bears, Oh My

Everyone’s comfort level is different. Some will push the envelope a little further than others. It might be because they are a more aggressive skier, have a more confident personality, or have less experience. As a backcountry ski guide or an avalanche instructor, you always want to show your customer the best of the best, but the pressure to deliver can cause us to make bad decisions – a heuristic trap that isn’t really on the list we give to students! It’s not an easy job, getting as close as possible to the “goods” without ever over-stepping that boundary. But as professionals we need to be able to delineate where that boundary is on any given day. And if we don’t feel like we can, then we must step back even further, take it down another notch, until we can assure ourselves that we will not be awakening the dragon, pissing off the grizzly bear, or irritating the mighty bison.

Over the span of the last 30-some years Jim has worked as a mountain guide in the Cascades and Alaska, a climbing ranger in the Tetons, an avalanche forecaster in Alaska, a heli-ski guide in Wyoming, and an avalanche instructor. Jim is a AA/AAA certified instructor and also a meteorologist for Mountain Weather in Jackson, Wyoming.

Story by Roger Yim

What is your risk tolerance personally and institutionally?

How do you and your company manage students/clients and their desires in the field?

Essentially I try not to differ the two. I have always felt I would care for my clients and students similar to my loved ones and friends. So from this heartfelt position I try to make the best decision for the people, terrain, and situation I am in.

The differences for me are that with groups, clients, and students, I have the extra challenges of group size (especially cat skiing) and skill level (novices for students and clients). When I ski personally, I am usually with a smaller group. It is usually one to three people, and they have greater skills and ability to ski tougher lines. That being said, many of my non-professional friends rarely practice rescue skills but have good terrain and snowpack awareness.

On the flip side of things, when I work at a cat-ski operation where there is a high terrain familiarity and constant management of the terrain (i.e., pro-level obs, tracking of layers and avy cycles) I am always amazed what we can ski with clients on a daily basis, especially in times of instability or high hazard.

Conversely I am also amazed how conservative some of my clients are at those same times. On a NOLS course, there is a greater tradition of conservatism due to the low level of skills and “school” and not guiding context. However, during my most recent NOLS course, due to the amount of time we spent out there, we were able to ski 30+ slopes during a high hazard period because we had the time to gain confidence in the snowpack and certain terrain features. I think if I was skiing a different area with less time and knowledge I would be more prudent.

I read about your idea of the “Powder Demons.” (see TAR 30-3 editorial) I am a victim of the demons for sure. I have lived and worked in places, spent way too much money, taken endless courses and probably an unhealthy amount of time in search of skiing the “good stuff.” The motivation that makes me wake up at 5:30am for a dawn patrol with friends is the same energy I put into a guides’ meeting, trying to figure out where to ski. The same energy is put into choosing safe places, good snow, and everyone coming home in one happy, blissful piece.

This is a good thing, but the motivation we get to ski should not affect our clear, thoughtful, and ethical practice of backcountry skiing. When I feel clouded in judgment in either a professional or personal setting, I look at myself and realize how lucky I am to be skiing and have this choice in front of me. That perspective allows me to walk away because there is always another run, another day, and another time.

Roger Yim is the skiing Korean who can be found deep in the Tetons for NOLS and in the Selkirk Mountains for Retallack ski lodge.
What is acceptable risk in avalanche terrain while teaching? Can you ever take the risk meter to zero in the mountains? How much further do I push my risk threshold when I’m alone or with a partner or two versus when I’m teaching? All of these things have been running through my head since Lynne first solicited my opinion on this stuff. As I ponder it, I realize the answers are nearly as complex as the Wasatch snowpack right now, and I also realize both my teaching and personal thresholds have taken a tremendous step to the cautious side this season – or have they? I guess the first two questions may be the easiest and least complex. I believe it is a disservice to take students of avalanches into the mountains, teach them about the snow, and then avoid avalanche terrain no matter what the snow tells us. What does a student learn after careful evaluation, discussion, and testing reveals a stable snowpack, a solid group with all the skills and gear, and then a decision is made to ski the 28-degree slope? I trigger avalanches while on avalanche courses, which means I’m taking students into steep, avalanche-prone terrain. I also turn around and choose a mellower line or a different drainage more times than I remember. If we don’t use our own experience, skill sets, and judgement to guide our decision-making in front of students, then what are we really teaching them? I guess my first rule is that a student getting caught in avalanches, no matter how small, isn’t an option. Students unintentionally triggering avalanches doesn’t sit well with me either. So, I treat every field session like a guided ski tour, which I guess it essentially is. I always enter any avalanche slope first and perform whatever snow assessment may be necessary before bringing students out onto the slope. I try to guide students to think through the stability assessment and a go or no-go decision for the slope we are assessing. I have both changed student’s minds and had mine changed by their assessment and reasoning. The great thing about teaching in the Wasatch is that in most years, the snowpack is generally quite stable and straightforward. Many years and in many courses, students can be safely managed in complex avalanche terrain and steep slopes, which allows for great teaching opportunities for group management, terrain choices, and where and when to dig a pit or do a stability test. This season all bets are off and a different but maybe more impactful terrain management skillset and teaching opportunity has come into play. Since we buried the facets with a hard slab, I have become a master at seeking out small test slopes and pockets. Most of my field sessions have been spent on terrain at or below 30 degrees, with very careful consideration given to the terrain above and around me. I’ve also been quite leery of corniced ridges pulling into low-angle terrain. We currently sit in a deep–slab problem with a low chance to trigger a slide, but consequences are severe at best if you do find one. This season has drastically changed where I go and when. I have backed off a few notches in both my teaching and my personal skiing decisions. My personal risk threshold has certainly changed over the years, I feel more confident in my skiing, assessment skills, and avalanche-management techniques than I ever have. I am certainly willing to accept the possibility that I or one of my partners may trigger an avalanche while out skiing, and we often do. Most of the time it’s intentional; occasionally it isn’t. The deciding factor often boils down to what kind of avalanche are we dealing with? Soft slabs or hard slabs? New snow or old? Large and full of venom or small and predictable? This year I had big aspirations of skiing some lines I haven’t touched in years due to working too much and playing too little, but I’ve put them on the shelf until next year. As I constantly tell my mom, dying in an avalanche isn’t an option for me. In a year like this the meadow skipping and long, remote ridge walks seem to suit me just fine.

RISK AT AGE 50

Story by Phil Powers

With the burgeoning of backcountry skiing and the search for the best lines on the steepest powder, the likelihood of someone dropping in from above while we slogged up the valleys below is greater than ever. Those skiers are triggers. Judging the slopes and picking a route for one’s own party is hard enough. Wondering if someone will trigger an avalanche above us brings yet another concern to backcountry travel. Even climbing in summer presents the possibility that those above us might send missiles our way – it’s happened for years in places like Cathedral Ledge near North Conway. One of my dear friends was killed when someone recklessly lobbed a rock down a vertical face in the Wind Rivers. It’s one thing to worry about people above when one is on a face that is topped by a road, quite another while forging a new route in the Wind River Range.

Concern about other people is real. Any visitor to the mountains, frontcountry or back, must take the effect we might have on others seriously. Since some people don’t, be more wary than ever. Add “other people” to the list of hazards we confront when we venture out. It is a variable that, to me, seems unpredictable in a whole new way.
I once felt pretty good about my ability to manage risk. Reinhold Messner went so far as to argue that through his own experiences as a climber he gained such an edge that they might change the odds. In his essay, The Will to Survive, (2001) he wrote, “I would even dare to suggest that the climber who is in tune with himself and the world will not normally perish on a mountain.” Does this mean that every mountain accident has a spiritual cause?”

I felt that way myself once. Sleeping on the ground more days than not and climbing or skiing when I woke bred an awareness and a confidence that led me to believe I could keep myself safe on any terrain. I even felt that every mountain accident has a spiritual cause.”

Once in a while, I might find myself in a situation where the risks are great and the consequences could be dire. But I have always been able to manage the hazard. A choice was offered. They chose to go back to the flatland and spend the day raking leaves instead of tackling the terrain. They had the opportunity to be involved with the decision-making and risk management, their students’ desire to be out in fresh powder was outweighed by the element of fear. Prior to opening the decision-making up to the whole group, students’ perceived risk seemed low(er), and their risk tolerance seemed high(er) as they were guided. When ownership in the decision-making process increased, they moved away from the expert halo perception track, and correspondingly, their risk perception and tolerances shifted.

The outcomes from this experience had both short-term and potentially lasting effects. Students were able to experience a decision-making process where the outcome didn’t match their initial desire. The experience of pulling the plug and turning back on a premeditated plan is invaluable. Students were able to use class data to make a conservative decision in a real-life risk-management situation. This will hopefully have the lasting effect that, in groups with more experienced members, there will be a shift in how risk is perceived.

For me, too, this process was valuable. Without open communication, I wouldn’t have turned around at that point. My desire to provide an experience was replaced by managing fear in my students. Would we have had an accident if we continued? Would we have been able to manage the group within an acceptable risk tolerance? These are questions that won’t be answered, and while important to ponder, they take a backseat to the learning opportunities afforded to all on this day.

Chris Marshall is on the Adventure Education faculty at Prescott College and on the board of KPAEC, the Kachina Peaks Avalanche Center. He is taking spring of 2012 off from instructing courses in order to sample powder around the West. Congratulations to Chris for winning an AMGA course scholarship for 2012.

Phil Powers is a long-time climber with first ascents in the Alaska, Teton, and Karakoram ranges. He has authored two books on climbing and now serves as executive director at the American Alpine Club and co-owner of Jackson Hole Mountain Guides. He lives with his wife, Sarah, and children in Colorado.
AN AVALANCHE LESSON FROM MY FATHER
Story by Jonathan S. Shefftz

My father taught his two sons so very much, but he never taught us anything about avalanche safety. Except for passing along what he heard about how important spitting is if buried in an avalanche. Which of course is entirely worthless. Although all of that was okay, since we were just skiing inhounds back East anyway.

But I thought of my father recently when I was trying to Say Something Profound. At my AIARE Instructor Refresher Course this past fall, we discussed course closure, including Colin Zachariaes’s Where Do We Go From Here? article. I had never been very concerned with course closure – thank all my students for their hard work, pass out the official certificates and course evaluation forms, urge them all to continue with their education, and wish them well. What else was there to say? I’d already said everything I could possibly think of to say, whether in the classroom, in the field, or via feedback on the extensive homework assignments.

This year though was different, as it was the first year, in my six years of avalanche safety instruction, that a former student had been in an avalanche. Both the former student and his partner were okay, but I was not. I joked that the course had been very large with many untrained other instructors, and as I had no input on course content or format at the time, I could disavow all responsibility for the incident.

But a picture taken shortly before the incident was striking, almost haunting. The former student stated that he remembered seeing a fresh avalanche. Freshly wind-loaded snow sits on top of a water-ice bed surface. Since taking the course with me years ago, the former student has spent his winters as the caretaker of a nearby hut. My safety instruction – focusing on the obvious clues and such experience – couldn’t prevent that kind of avalanche incident? My father had taught history to many generations of university students, and although some learned more than others, at least all of them learned the basics, e.g., Hitler = bad (very much so). But if I hadn’t succeeded in teaching that such a freshly loaded wind slab on top of water ice in a steep avalanche path = bad (very much so), then what was the point of it all?

Now I fantasize how half full versus glass half empty, or rather in the context of avalanche safety class graduates, 99% effective versus 1% ineffective. But I nevertheless started mulling over the caretaker of a nearby hut. My safety instruction needs to be far lower.

And on days with nearly uniform instability and deep snow that renders lower-angle slopes into treacherous downhill trailbreaking, pretty much all backcountry skiing for turns has to be foregone.

This reminded me of a snow-related story my father often told me, often on the chairlift, or in the car driving to and from ski areas. He had not started skiing until adulthood. Which was hardly surprising, as skiing was considered the pastime for children of immigrant parents in urban Boston growing up during the Great Depression. Yet even aside from all that, he could not play outside during the winter with all the other kids from the neighborhood because of his childhood asthma, which was so poorly understood back then that cold weather was thought to be the trigger of the frequent terrifying attacks (for which no effective drugs were available yet). So his childhood memories are more about hiding from the cold by his mother (like she as a child had been protected by her family from the various marauding soldiers during the Russian Civil War, from which they barely escaped to America), as he heard the other children playing in the snow.

How he longed to join the other kids throwing snowballs, making snow angels, and sledding down hills! Those were very painful memories for him, although he always told them in a positive way, to emphasize how grateful he was to be able to ski as an adult (especially with his two sons).

For a backcountry skier to turn back from an enticing yet potentially unstable slope, or even foregoing any backcountry turn-oriented skiing, while others are out skiing there, and having fun, and probably coming back from that one outing just fine – that can be just as unhappy and lonely as a little kid shut away in a small house during the Great Depression.

But if you get to live like my father did to ski every year for over five decades straight, complete a fulfilling career, teach your two children to ski, see them marry and bless you with grandchildren, and in the last moment at the very final end have your wife of nearly five decades loyal as ever by your side…whether profound or otherwise, that’s my course closure.

Jonathan Shefftz is an AIARE-qualified instructor, NSP avalanche instructor, and AAA affiliate member. When he is not searching out classic freshness in southern New England or trying to convince skiers to run up and down ski areas in the NE Rando Race Series, he works as a financial economics consultant and has been qualified as an expert witness in both federal and state courts. He lives in western Massachusetts with his wife and toddler daughter, who has already learned about avalanche safety in the form of proper probing techniques (see photo below).

**Lethal Clients**

Remember to include the quote about how as a guide, your clients are always trying to kill you!

I think that seriously says a lot about how a guide has to survive the same risks, day after day, whereas for a client, the once-in-a-lifetime opportunity can lead to more risk taking. Note how the recent CMH fatality was an executive working in Dubai – that has to put lots of pressure on a guide to take risks.

Jonathan Shefftz

**Be Safe, Have Fun, Go Skiing**

Risk tolerance, risk perception, risk management, risk acceptance – what do these terms mean to me? On a professional and personal level? How do I differentiate or manage risk on a professional level as opposed to a personal level? Well, money for one – albeit not much, but money nonetheless.

For me the difference between professional and personal risk is a tomato/tomahawk. When I get paid to keep people safe I want to do just that, keep them safe. They think it is all about fun, which is just fine by me – educate them. I also want to show them a great experience and meet, or hopefully even exceed, their expectations. I have a priority list: be safe, have fun, then go skiing. I always try to keep it in this order. I also believe in being as aggressive (determined by my conditions and ability level) as I can and pushing back – never the other way around – and always sticking to my safety protocols. There is a difference between taking risks and taking chances, and therein lies the rub.

On a personal level I adhere to the same way of thinking, but now I am only taking care of myself and friends, not the public or paying clients. And yes, I owe myself and friends the same consideration as I do strangers who may or may not know I am looking out for them, and that they are looking out for me. At the end of the day if we are all smiling, can do it again tomorrow, and can call our parents and friends with only stories to tell. It was a good day and risk has been managed – till the next time.

Chris Shefftz worked as the snow-safety director at Moonlight Basin for a number of years as well as the patrol and snow-safety director at Ohau, NZ. He currently works as a mechanized ski guide and as the forecaster for H2O Guides in Valdez.

**The granddaughter getting an early lesson on avalanche safety in the form of proper probing technique.**
tricks for communicating risk

story by kent mcbride

my risk tolerances are much less than when i first began guiding (thank you, experience). i also believe that my tolerances are much less than what is expected of me institutionally, just like most guides would claim.

the way i manage my clients and students desires for risk-related adventure is to point out the hazards that i’m truly concerned about by getting as close as possible to existing risks while still assuring safety. just staying in the parking lot and telling my clients that ‘it’s not safe’ or ‘skiing isn’t good enough’—obviously there are exceptions, and they are based on judgment. getting out near the hazard also helps me stay in tune with minute changes in the snow. this year’s dangerous snowpack in the tetons is a prime example of curbing clients’ appetites for steep skiing in tricky hard slab conditions. simply put, the tetons have a very weak continental layer on the ground with a thick maritime slab-on-top.

during an hour approach you can highlight the key points of a level i avalanche course to help outline concerns to the client. an example of this might be digging a pit with a client to show them what layers exist and what these mean for overall stability or instability. if i don’t have time to dig a full pit for buried facets, i will ask clients to do a pole test by turning their pole upside down and pushing as far into the snow as they can, reaching into the resulting hole and pulling out a handful of faceted snow. this is an easy way to show weak structure.

getting up on a vista and passing around a pair of binoculars while pointing out numerous crowns with debris piles at their base is an easy way to convey hazards to my clients.

another interactive display of snow stability is to utilize the force that a group of four to five clients can generate by gathering in a flat safe zone and jumping together to cause a collapse… this really gets their attention and drives home the fact that the snowpack is very weak.

we start out skiing runs without any consequence, and if the clients are following directions and i have their respect, then we can move to more serious terrain. if you show them how much better they would have done if they followed your instructions, then really helps is discussing the hazards and what i’m trying to avoid. they respect this, and it makes everything seem a lot easier to understand. with education we become a team. i work with a lot of return clients, and we have mutual respect for each other. i try to treat them like ski partners and have fun.

kent mcbride is a uiagm guide who works with exam mountain guides, first ascent, and many others. he lives in jackson, wyoming, with his wife penny and son kai, who is a fool for homegrown strawberries.

fiction

she loves me, she loves me not. she loves me, she loves me not. she loves me...

story by john stimberis

she was so kind and full of promise when we last met, last winter. she arrived full of love, returning from an unexplained absence. she told me she learned her lesson; everything was going to be different this time around. and all was well until she left, again. my heart was broken. the landscape about us was a frozen wasteland in her absence. she met someone else, down south. i stared at an empty sky and longed for her return.

she returned, burst through the door and embraced me like she had never left. the door was wide open and the cold blew in. it felt good, so good considering she was here. i smiled, we played, and life was good again. but she had a few tricks up her sleeve. it wasn’t going to be so easy this time. love and longing; absence makes the heart grow fonder. her love was tumultuous, full of surprise and intrigue. she challenged me in so many ways, but we worked through it. best of all she was staying this time. maybe a little too long.

it felt like our winter together never really ended. when she did finally leave her memory was strong, a constant reminder that she was not far. the memory of our winter together continued to dominate our summer apart. so much so that summer never felt quite right. did it really arrive? will she really return? rumors started that she would. oh the rumors! the boys down at the ol’ cpc always seem to have a pulse on what’s happening. we stood upon the shore, the edge of the continent, staring into the future, awaiting her arrival. the memory of a lost summer faded just as the first sense of her arrival began to reach us. she’s a bit cold you know; our hands and faces felt the brush of her return in september along with the rain. the rain continued into october and november. she always brings rain and gray skies and the cold. that’s just the way she is. then she arrived, burst open the door and covered us in her love. she’s back and all is well. it’s going to be so good this time, i can tell. it’s finally real.

she needed to get away for thanksgiving, but by early december i was beginning to have my doubts. and i continued to wonder through the month. wonder turned to worry, until she sent a little love just before the new year. it was just enough to keep our hope alive and make us happy, but then nothing.

the rumors were out there. she was up north this time. something to do with her being somewhere near the gulf. but i knew better, she found someone else. alaska! damn it, he always gets the girl. by the time the news reached us it was getting pathetic. really alaska, do you need to rub it in? must you brag to all of us about how much you’re getting? but she slipped away while ak was bragging. she returned with a new attitude. she was here, but this time her love was like a roller coaster. cold, then warm, then cold again. all is stable, only to heat up again and send us into a tail spin. she iced me out and returned with a soft embrace, then iced me out again. she cried, soaked us in her tears, then she left again. the boys down at the ol’ cpc said she’d gone up north again, but don’t you worry, she’ll be back. they’re probably right, but i don’t know. maybe it’s time to grab a corner booth, and cry into my beer. you know i should call that guy from down south. sierra, i think? man, he’d understand. i hear she won’t even talk to him; left that poor boy high and dry.

John Stimberis is a highway forecaster for the Washington State DOT, vice-president of the AAA, and a fine amateur photographer. He steals time from a busy winter to write this meditative fiction.

attack of a nina

poster courtesy Matchstick Productions

expertise matrix

continued from page 26

replaced unconscious with unaware and conscious with aware. we want our students and instructors with their heads up, their eyes open, and their thoughts focused on the situation at hand. we have also added a fifth level to the matrix that reflects the paths the expert might take: either the reflective path of the true master or the complacent path of the false master.

we draw this model in a circle, indicating we move all the time between these levels of expertise. we draw a loop back to aware and competent and label that loop mindfulness— the intentional consideration of how we think that is vital in the lifelong process of developing our judgment, making us aware and competent master practitioners. we draw another loop of complacency, a trap of the expert who is not reflective and risks becoming unaware of their incompetence.

as educators, we should strive for reflective competence. the ability to intentionally develop our own judgment and to pass on the lessons we have learned to our students requires that we spend time reflecting on our decision-making process. how can we expect to teach others if we cannot articulate what we ourselves have experienced? in our opinion, the hallmark of an expert is not that she has reached a level of subconscious heuristic processing. it is that she has developed the intentional practice of self-reflection that allows her to understand why she subconsciously chose to follow or ignore the heuristic at hand. it is this willingness to question one’s underlying decision-making processes that allows one to truly become an expert. once an individual enters the cycle of mindfulness, she becomes a much better student and educator.

1 dreyfus hl, dreyfus se. expertise in real world contexts. organization sciences 2001; (1): 779-792.
2 adkins d, mcnamara m. differences between avalanche experts and novices, international snow science workshop sept 19–24, 2004, jackson, ny.
1. When I made contact with D, I should have ensured (aside from not skiing the backcountry that day) experience, teaching tool, etc. wrote this with the intent of it being used as a learning C, I was tunnel-visioned on my beacon search, so downslope from D's location. I also saw poles (which were D's) in the skin track and assumed he would be downslope in the incident. I remembered C being behind D on car and I went with C straight down the roadside with C&D. About halfway down, D traversed to the the skin track and assumed he would be downslope. I had no clear picture of D's condition other than knowing he could talk and didn't know where C was. I probably should have started my search from D's location rather than continue downslope. 2. I was using a beacon that belonged to Meaghan which I had experience with but not recent experience. I didn't have a good feel for how it searched or its sensitivity. I was borrowing hers because my own was analog and inferior. I have a Barryvox that was malfunctioning, and I actually gave it to Wendy earlier that week so she could refresh the software. Had I been as confident as I should have been in the use of the Tracker, I could have had a faster search. 3. After we located C, I should have realized how he was buried in relation to that tree and dug accordingly.

Thoughts on beacon storage on the body
My initial exposure to avalanche safety was as a ski patroller in high school. We were taught “beacons belong harnessed to torso over base layer of clothing under outermost layer.” In 2003 or so I took a level I class from Alaska Avalanche School along with the two victims from the avalanche last month, and we were taught “beacons belong harnessed to torso over base layer of clothing under outermost layer.” In 2007 I met my fiance while skiing with her and her boyfriend at the time. They were both mountain guides and were up here to take the AMGA test for ski mountaineering in Valdez, and they were wearing beacons in pockets. I brought this point up with him and made the argument that I am about to make. As a rescuer I can see why it is advantageous to have a beacon in the pocket, but as a victim I don’t see the advantage — in fact I see several disadvantages.

One swipe with a utility knife is all it would take to open up a sewn-in pocket, and then all you have connecting the beacon to you is a bungee lanyard? I once got caught up in a situation where I thought a buddy was caught up in a slide that he actually skied out of, but I didn't know that and couldn’t see it. It was an early season avalanche, i.e., a climax slide with a shallow snowpack, and the bed surface was shale. The debris ran down a draw and piled up in a terrain trap, and as I destroyed my skis billygoating down this shale-slope as fast as I could, I thought he's going to be hurt bad. Got down to the debris pile, started searching, got no signal, my heart stopped, looked right, and about a quarter mile away I saw a figure with a gnome-like mountain hardwear hat on and knew it was him — he skied out of it, but it fractured slightly above me as well, and I had to turn and face the slope to anchor myself. It was foggy that day, so I couldn't see him. If he had his beacon in his pocket and was caught in that one, I think his pants would have been ripped to shreds, and there's a good chance his bungee lanyard wouldn't have been enough to keep his beacon attached to him. He always harnesses his beacon to his torso. Getting thrown up against trees like C was? How much force does it take to separate a zipper? One branch can tear fabric easily; ever torn your ski pants before? Ever lost keys out of a pocket because you forgot to close it? Ever seen an open femur fracture in person? If that bone end is sharp enough to tear through skin muscle and connective tissue, you know it’s going through your pants. My beacon in my pocket sits right about mid-shaft, maybe slightly proximal lateral femur. Now if you are buried in an avalanche and have an open femur fracture and are relying on a beacon search to save your life, it might be a Hail Mary, but I want the chance. It just seems like this practice allows a lot of opportunity for beacon loss versus putting the harness on, and it troubles me that all of the professionals are adopting this practice. I keep bringing it up to everyone, and I just haven’t gotten an explanation that convinces me that it makes sense to do that. Is there anything published on this? What is avalanche education curriculum preaching these days?

Things I think I should have done differently (aside from not skiing the backcountry that day)
1. When I made contact with D, I should have ensured his beacon was not in transmit mode before I continued my search. I had no clear picture of D's