Decisions, decisions, decisions…*

Pascal Hägeli[1] and Grant Statham[2]

[1]Avisualanche Consulting, Vancouver BC (CAA ADFAR Project Manager)
[2]Parks Canada, Banff AB (Avalanche Risk Specialist)

You and your buddies are on a backcountry ski trip and after hours of hiking through a beautiful winter landscape you're there – you just made it to the top. You've been dreaming of this run all week, and since your friends don't know much about avalanches, the decision-making is pretty much up to you. Before leaving this morning you checked the avalanche bulletin, and at the trailhead you noticed about 10 cm of fresh snow on the trees. On the way up you observed some old avalanche debris and during a water break you even did a quick snowpack test: Compression Test Moderate down 25cm – clean shear on surface hoar. You now have all these different pieces of information, but how does it all fit together to help you make a decision?

Other articles in this series looked at the physical factors that produce avalanches (terrain, snowpack, and weather) and how to interpret related observations. This article focuses on the decision-making process and examines how to connect all of this information.

Risk Framework

It's an unfortunate irony of the backcountry that some of the very best and most exciting skiing and snowboarding is found in perfect avalanche terrain. We all know there is risk associated with backcountry activities, and when we choose to engage the backcountry in winter, we accept a certain level of risk. The crux of decision-making is to identify the risk associated with our route options, and then to make a careful and informed decision about whether or not that specific terrain remains within our personal risk comfort zone.

Risk is often described as the probability of an event happening weighed against the severity of the consequences. Traditional avalanche education has focused primarily on the probability, or chance of initiating an avalanche. However, the initial triggering of an

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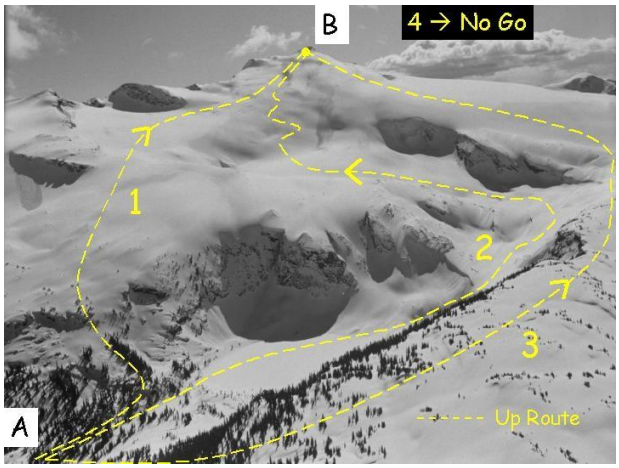
avalanche is only one side of the equation; equally important is what happens once the avalanche is initiated. The following questions are designed to help you assess avalanche risk more comprehensively, and to stimulate your thinking about what risk means to you.

What is the main avalanche issue today?

Ask yourself this question right from the beginning when you start thinking about a backcountry trip. Depending on the kind of instability, you can immediately make conclusions about the distribution of avalanche hazards and plan your route accordingly. For example, if you're dealing with a thaw instability on solar aspects, your trip plan should avoid south and west facing terrain in the afternoon. The same trip might be managed quite differently if your main concern is recently loaded windslabs close to ridge crests.



Several potential routes through alpine terrain, each offering different exposure to avalanche terrain. Your risk will be different depending on which route you select.
(Photo: Grant Statham)

Avalanche bulletin text provides information on the predominant kinds of instability, and forecasters will describe where these can be found - this will give you a huge head start on understanding the "character" of the avalanche hazard. Your job during the day is to verify this information - is the bulletin accurate or is everything different in the drainage you are skiing?

How easily can the instability be triggered?

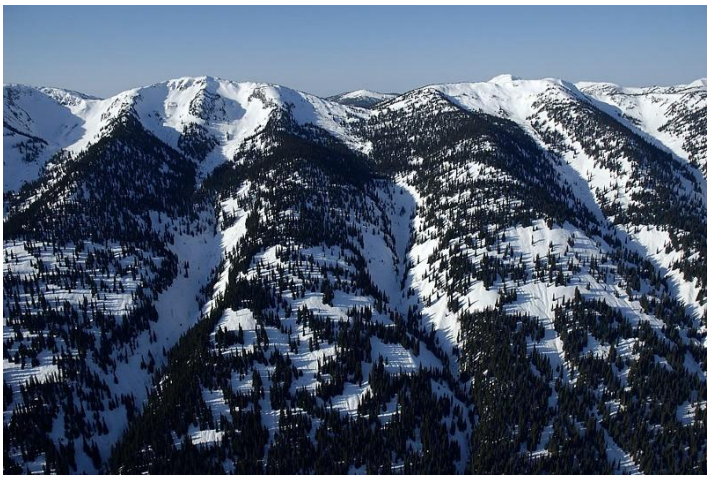
Once you have verified the instabilities, you need to determine how easily you might trigger one. In other words, what will it take to initiate an avalanche? Sometimes it is obvious - whumpfing sounds or natural avalanches are clear indicators - but not always. This part of decision-making receives a lot of attention through the use of snowpack tests, which can be used to quantify the strength of a weakness. These tests provide valuable information, but remember that assessing the strength of an instability is only one piece

of the decision-making puzzle - it is important to figure out how these test results fit into the big picture.

How far is an initial fracture going to propagate?

Your next step is to visualize the potential size of a resulting avalanche, and with this we shift our focus to the consequence part of risk. Fracture propagation describes how easily and how far an initial shear fracture can travel along the weak layer, and is critical in determining consequence as it influences the size of a potential avalanche.

Consider the following examples: You're skiing a steep face after a fresh dump of snow and with each turn you trigger little sluffs in the top 10 cm – this is an example of high instability and low fracture propagation. The resulting consequences of these small avalanches are minimal, keeping the avalanche risk relatively low and allowing an awesome run. Contrast this with a low strength surface hoar instability down 60 cm, where initial shear fractures can travel fast and far. The consequences of triggering this instability are far more serious. The avalanche danger is probably high and you can reliably anticipate large avalanches.



Forested terrain presents many route-finding challenges, including dealing with large open glades. Are they full of surface hoar? You need to know this to make an accurate assessment. (Photo by Kevin Taylor).

How do you assess fracture propagation? Use your eyes first; large or remotely triggered avalanches are sure signs. However, these signs are not always obvious and so you need additional tools to assess this property of the snowpack weakness. This is easier than you might think - fracture classification tests are easily incorporated into conventional snowpack observations. As well, recently developed techniques for interpreting snowprofiles using "lemons" or "yellow flags" help take the mystery out of where the

weak layer is. For more on these techniques, take a look at Bruce Jamieson's article in this same series.

What terrain options do I have to work with?

Terrain affects consequences in several ways. First, terrain has an effect on the size of potential avalanches. You might be traveling in undulating terrain with many small features, where the landscape is simply not capable of producing large avalanches. At the same time, catastrophic avalanches might be occurring in wide open bowls across the valley. Your personal avalanche risk is directly related to where you are positioned in the terrain. Second, consider terrain traps and what might happen if you get caught in an avalanche - above a cliff or in a deep gully even tiny avalanches have high consequences. Consider the earlier example of skiing that steep face after new snow. It was reasonable when you were on a large open slope, but what about if there was a cliff below you? Everything just changed – small sluffs matter and your avalanche risk just skyrocketed.

Always consider your position in the terrain and recognize that every time you move, even a few meters, your avalanche risk changes. Terrain is undeniably your best tool for managing consequences. You can see it, and you can choose how to interact with it – you are in charge of where you go in the terrain.

How will I manage the terrain appropriately?

Deciding to ski avalanche terrain is one thing, but figuring out how to actually do it and where exactly to go is another. Where you travel in relation to the terrain is of huge importance – the subtleties matter. Centre punching the start zone is your most committing move, but what about skirting the edges? Can you reduce your risk by snowboarding beside the start zone until you are lower down and below the most likely triggering locations?

Staying high on a piece of terrain is a good habit – being above the majority of the slab is a huge advantage. The lower you go into the start zone, the more committed you can become. Also, which direction are you traveling? Are you wearing skins and setting an uptrack or are you carving your board downhill? You are much less mobile when touring

up, and how you manage the terrain will be different depending on which direction you're heading.

The final decision: Am I comfortable with the level of risk?

After examining all these questions about degree of instability and consequences, you will have a better understanding of the existing risk and how it varies with terrain. While the snow conditions and terrain are given to you by nature, the route choice is yours. Based on your assessment, you can make terrain choices that adjust the risk to a comfortable level for you and your group. Managing risk is all about your position in the terrain. When the complexity of the snowpack threatens to overwhelm you, use your skills to find simpler terrain where you feel comfortable again. This comfort level is a personal choice and is different for everybody – some are willing to push a little more to achieve their goals, while others happily make more conservative choices. There is no right or wrong, but your decisions should be based on an informed risk assessment and should represent the risk tolerance of everyone in your group. A calculated approach to skiing avalanche terrain is essential - have a plan before you go and make sure everyone in your group knows what it is.

What is the best route through this complex terrain that suits the comfort level for risk in your group? Is there one?
(Photo Grant Statham)

More Information

Over the last few years, Parks Canada and the Canadian Avalanche Association have both been working on a number of projects to better understand the decision-making process, and to develop tools that can help you make more informed decisions. The ADFAR Project (Avalanche Decision Framework for Amateur Recreationists) of the CAA and the Avalanche Terrain Exposure Scale (ATES) from Parks Canada are

excellent examples of these efforts. If you would like to know more about the different initiatives, please visit our websites at:

CAA: ADFAR Project
http://www.avalanche.ca/default.aspx?DN=355,15,3,Documents
Parks Canada: ATES Project
http://www.pc.gc.ca/pn-np/ab/banff/visit/visit7a7_E.asp