TALKING THE TALK:  
Human Factors, Group Communication, and the Next Frontier in Snow Safety

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ABSTRACT

Over the past several decades, a major evolution has taken hold in snow safety: a paradigm shift from organized rescue to companion and, most recently, self-rescue. Recreationists have adopted the concept of fending for themselves through companion rescue and the use of modern avalanche beacons and strategic shoveling techniques. Even more recently, the concept of self-rescue has taken root, specifically with the adoption of avalanche airbags. However, while these advances have resulted in scores of saved lives, they are still only reactive devices and techniques that are used only after mistakes have been made in the field. The most effective way to protect lives is through proactive means, specifically avalanche education and an emphasis on the source of most avalanche incidents: human factors. While these issues are far-reaching and difficult to address, opportunities exist for improvement in skills and tools for planning, communication, and group management. We see this as the next frontier in the evolution of snow safety equipment and training.

1. CASE STUDIES

The most obvious human factor—and the most straightforward to address with technical solutions—is intra-group communication. This is the ultimate source of an inordinate number of avalanche and snow immersion fatalities. With significant advances in backcountry and sidecountry equipment over the past decade and the growth of “freeride” culture, steeper and longer lines are being skied faster than ever before. Recreationists with advanced riding skills, but underdeveloped avalanche skills, are increasingly pushing their limits. Partnering up for the descent, keeping teams together, and stopping at intermediate points of safety are less realistic than the days when 20 turns were enough. This creates challenging compromises in maintaining effective, real-time group communication.

The following are a selection of cases in which gaps in group communication resulted directly in an avalanche fatality or a snow immersion fatality:

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Two snowboarders and a dog traverse beneath the High Trail Cliffs during moderate, but rapidly increasing avalanche hazard during a significant storm event, triggering a class 2 avalanche (SS-AR-R2D2-I). Rider 1 escapes the avalanche but rider 2 and his dog are buried 18 inches below the surface. Rider 1 assumes rider 2 has also escaped the avalanche and he descends to the road in search of rider 2. Neither are equipped with avalanche beacons or two-way radios. After two more laps through the area, rider 2 calls 911 for assistance. Three days later, rider 1 and his...
A pair of skiers descend King Tut’s avalanche path in the East Vail Chutes during considerable avalanche hazard. Skier 1 is below a rollover, out of communication with skier 2—and not at a point of safety. An avalanche releases on the old snow layer (SS-AS-R4D3-O) and both skiers are caught. One is partially buried and able to rescue himself. The other is completely buried and located on the uphill side of a tree by a nearby party. He is evacuated by an organized rescue team and declared deceased.

A group of five very experienced and well-equipped skiers and snowboarders descend Tonar Bowl in the backcountry adjacent to Aspen Highlands. The first snowboarder drops in and rides to the bottom of the path. One of the skiers stops part way down the chute, but cannot be seen or heard by the skiers above. Two of those skiers move to points of safety in the trees on either side of the chute for a better vantage point. The final skier drops in and triggers a hard slab avalanche (HS-AS-3-G-B) that captures the skier stopped in the chute. Both are buried and killed.

Two hikers descending from the peak take a shortcut to save time late in the day in deteriorating weather conditions. One is caught in a small avalanche, but escapes unharmed. Neither is carrying avalanche rescue equipment or radios. The survivor searches the debris pile for 90 minutes, but does not locate his friend, so he descends to the bottom. The friend’s body is located later that summer over one mile from the debris pile. It is unclear when the two were separated and if the victim climbed uphill after the slide.

Two snowmobile-access skiers are making laps on Richmond Ridge near Aspen Mountain in high avalanche hazard. They are alternating driving the sled and skiing. Skier 1 arrives at the bottom, but not at the designated pickup point. He hikes back up the road to the top and finds the sled parked and skier 2’s skis no longer attached to it; he had decided to follow skier 1’s tracks. Despite both skiers using transceivers, skier 1 is not able to locate or communicate with skier 2. The following day, search and rescue volunteers follow a traverse below the groomed cat road and locate the victim in steep avalanche terrain, buried over four feet deep.

A 32-year-old advanced alpine skier becomes separated from his partner while skiing near the Panorama trail at Stevens Pass. His partner loses contact and reports him missing to the ski patrol. The initial search with patrol comes within 20 feet of his location. However, they are unable to spot him inverted in the snow in a dense stand of trees. He is found on a second pass through the area by a patroller equipped with a Recco detector. The victim could only be seen when standing directly over the tree well.

A 20-year-old Placer County man dies after falling inverted into a tree well while snowboarding with friends on the “experts only” Strawberry Fields run. His friends lose contact and become worried when he doesn’t make it to the bottom. They hike back up to search for him and he is later found deceased.

2. EXISTING COMMUNICATION TECHNOLOGIES

Would mobile, text, and smartphone technology have helped avert tragedy in these situations? Assuming there is coverage in these areas, then it is possible. However, phone technology has several disadvantages:
• While skiing, phones are usually not kept immediately available, but are often stored in the backpack or in a pocket. This makes immediate access difficult or impossible;

• Battery life can be heavily compromised in cold weather when the phone is kept in an accessible location exposed to cold temperatures;

• Using a cell phone requires connecting to the cell tower, dialing a number, then waiting for an answer; this is an impediment that prevents effective real-time communication, especially in time-sensitive hazardous situations;

• Mobile and smartphones cannot be used while moving, as they require using hands to call and answer the device;

• Mobile and smartphones are not glove-friendly; they are difficult to use without removing gloves;

• Most modern smartphones rely on body heat from the fingers to operate the touch screen; this makes them difficult to use in cold temperatures;

• Group members are not guaranteed to have each other’s mobile numbers entered in their phones;

• Carrying a cell phone can create a false sense of security that there will be cell service in the area at the time it is needed.

Smartphone applications such as iPTT, Voxer, and Walkie-Talkie exist that enable the user to communicate in real-time with others that have the same application. However, these applications require cell coverage and suffer from several of the drawbacks above. Several mapping applications such as Google Earth are available, however, that enable users to plan their routes in advance to proactively manage their risk in the backcountry.

3. SOLUTIONS

Backcountry travelers must communicate and agree on a plan and options prior to heading into avalanche terrain. Additionally, groups can further manage their risk by utilizing two-way radio communication in terrain that obstructs voice communication. These skills are increasingly being taught in avalanche courses. Most notably, in its avalanche courses, the American Institute for Avalanche Research and Education (AIARE) provides a Trip Plan and Communication Checklist in its field book that helps facilitate field decisions and pre-empt the human factors that can often lead to accidents.

Similarly, in an effort to prevent in-bounds incidents of Snow Immersion Suffocation, the National Ski Areas Association—in cooperation with the Crystal and Mt. Baker patrols—has published a set of guidelines for good partnering when skiing deep snow at ski areas. Both of these organizations are now advising the use of two-way radios in addition to cell phones as a way to maintain positive partner contact and improve these outcomes.

4. CONCLUSION

Snow safety has evolved over the years from reliance on organized rescue to relatively more proactive strategies such as companion rescue and self-rescue. However, prevention of rescues altogether requires a fully proactive strategy that addresses the most common sources of avalanche accidents: human factors. While clear communication and group management are essential human skills that are increasingly being taught in recreational avalanche courses, technical solutions should be used when good partnering skills fail. These should include tour planning tools, mapping applications, and real-time communication devices such as two-way radios.