Avalanche! Human Factors in Avalanche Avoidance and Survival

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Introduction
Avalanches kill roughly 15 people a year in Canada. However, 29 people were killed during the 2002/2003 season. In response, Parks Canada commissioned a report that recommended the development of a “made in Canada” decision tool to help users avoid avalanches. Subsequently, this tool, called the Avaluator, was developed by Haegeli and McCammon and was released on the market in 2006.

Objectives
1. Are claims made in the Avaluator supported by an independent analysis of the same historical data? Careful comparison between claims made in the Avaluator vs. previously published literature by the developers of the Avaluator are hugely inconsistent and reliance on the Avaluator may lead to many more accidents.
2. What are the most common human decision making errors committed by individuals travelling in the backcountry?
3. Are individuals travelling in the backcountry prepared for accidents? Do they carry the necessary self-rescue tools such as a beacon, probe and shovel?
4. Are avalanche-trained professionals more competent in avoiding avalanche accidents? According to a widespread view, avalanche-trained professionals are more competent in avoiding avalanches and human errors that lead to accidents than amateur recreationalists. Surprisingly, evidence for this claim is lacking.

Avalanche!
The first photo shows two large avalanches in Bow Summit, Alberta’s popular backcountry skiing terrain (taken on March 2, 2008). The second photo shows the run-out zone of the avalanche shown on the right in the first photo – note the size of the blocks of compacted snow.

Avaluator (Haegeli & McCammon)
"The avaluator is a new rule-based decision support tool for amateur recreationists ..." Go/No Go decision tool for inexperienced users...

McCammon (2004) vs. Avaluator
Top Figure: Percentage distribution of historical accidents by number of Obvious Clues reported by McCammon (McCammon, 2004, Fig. 2, p. 2) (orange) and extracted from Avaluator Card (purple). The distributions are vastly different.
Bottom Figure: Percentage of accidents prevented by number of Obvious Clues using McCammon’s data vs. Avaluator Card.
Summary: If you limit yourself to 4 or fewer clues, you will prevent:
> 98% accidents (Haegeli et al., 2006)
> 77% accidents (Avaluator)
> 23% accidents (McCammon, 2004)
Therefore, depending on which data or statement you believe you will prevent 23 to 98% of accidents...

Decision Making by Professionals
Two pro patrolmen on their avalanche control route... High hazard day... Many avalanches in area... Triggered and got partially buried by one avalanche already... Able to dig himself out...
Throws hand charge on a heavily loaded 45 degree lee slope above and both men decide to hang onto trees while waiting for the explosion and forthcoming avalanche...
Avalanche obliges, descends upon them, takes one off the tree, and buries him to his neck 50 ft lower...

Human Factors

Conclusions
Avaluator data are inconsistent with both McCammon’s (2004) data and our current data. The “4 or less (sic)” clue limit would prevent 77% of accidents when in fact they would avoid only 3% of them.
Avaluator Card data may lead to many unnecessary deaths by giving users false confidence in slope stability.

Results

Obvious Clues

Amateurs vs. Professionals

Amateurs

Professionals

Beacons

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