

Stop or go? An analysis of avalanche risk assessment behaviour of skiers

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Introduction

Winter sport activities such as ski touring off the slopes are very popular. Besides the positive effects of these activities for athletes and winter tourism, there are hundreds of avalanche accidents and up to one hundred avalanche deaths in alpine areas every year. Most of the avalanche victims triggered their avalanche themselves. Although there exists always a residual risk for avalanches, many of these accidents could have been avoided by assessing the risk correctly. Thus, one of the most important questions is why so many skiers have obviously misinterpreted the signs of high avalanche risks. Unfortunately, little knowledge exists, how skiers decide whether they can use a slope for a descent or not.

Research questions

This study examined the decision-making process of how out of bound skiers and snowboarders, ski touring and snowshoe hikers, decide to use an unmanaged backcountry mountain slope for a descent or not. The following research questions guided this study:

- How many and which risk indicators skiers take into account when they decide to descend or not in avalanche endangered area?
- Which risk indicators play a major role in their decision making?
- Do interactions between the "avalanche danger rating" and other factors influence skiers' decisions?

Method

An online visual conjoint-choice experiment coupled with 3d computer animations investigated the influence of several avalanche risk indicators on skiers' decision-making behaviour. This approach presented 256 3d-modelled mountain scenarios, which were described by eleven attributes (Figure 1). Each scenario consisted of a computer animated 3d film which showed a snow-covered slope and pictograms which presented additional risk indicators. The factors included those avalanche risk indicators, which are used by most of the risk management concepts.

Three main factor categories were explored: a) environmental factors: for example, avalanche danger ratings, slope gradients, slope directions, and weather conditions; b) social factors such as group size and other skiers descending the slope; and c) trip planning related factors such as time

effort needed for a save alternative route. The survey in German asked participants' intentions whether they would go downhill or not for 16 scenarios.

Data of 1466 participants from Austria, Germany, Switzerland and Italy were collected during the winter seasons of 2011 and 2012. The survey also asked socio-demographics, skiing experiences and recreation specialization in these winter activities. This research was supported by the Austrian Federal Ministry for Economics, Family and Youth, the Austrian Kuratorium für Alpine Sicherheit and the Austrian Association of Alpine Clubs (VAVÖ).

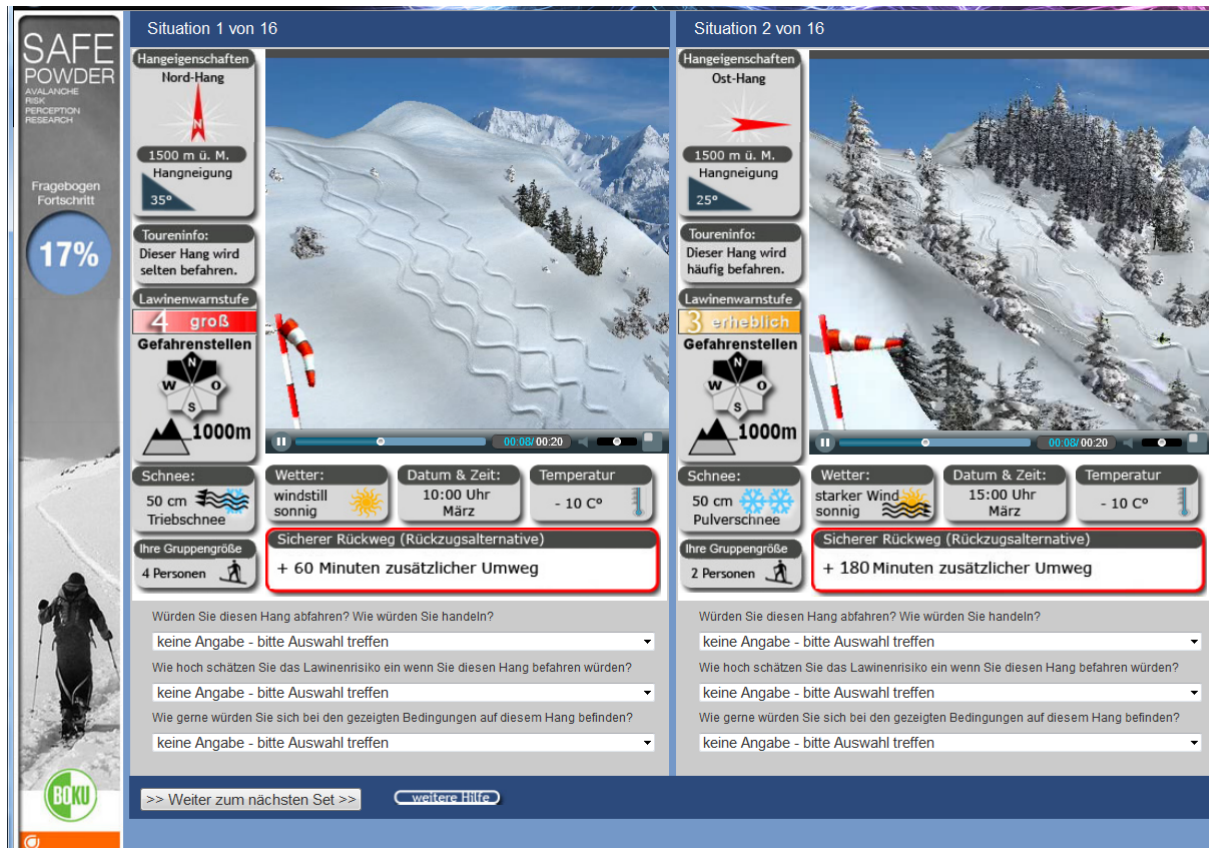


Figure 1. Examples of computer animated backcountry mountain slopes, which included eleven attributes

Results

Results indicated that all included factors and several interactions between these played a role in skiers' decision making. The avalanche danger rating had the strongest impact on their decisions, followed by slope steepness and snow type. Although all investigated factors played a significant role in the decision-making process, the major impact on decision-making was overwhelmingly based on two factors only. Respondents interpreted risk indicators mostly in the right way; however, missing information on risk factors was interpreted as a medium risk. For example, most respondents interpreted an unknown avalanche danger rating as a medium danger rating. Such an interpretation behaviour can be fatal.

Group effects could be observed. If there were already skiing traces in the snow cover or other skiers on the slope, most participants evaluated such conditions as safer as those without these uses. This safety perception can be delusive.

Study results are useful for the improvement of existing avalanche risk management concepts and decision support aids.