ABSTRACT: Often, accidents involving avalanche-aware people can be ascribed to human factors, i.e. inappropriate risk management; professional mountain guides are particularly burdened with this problem. The risk management for backcountry skiing becomes even more challenging if more professionals are involved in guiding large groups. In this work we present the risk management adopted for guiding skiers into backcountry during the telemark festival “La Skieda” organized every winter season in Livigno, Italy. In particular, we stress the problems, which can affect a team of professionals working together in the field. During the whole week of the festival 10 to 12 UIAGM mountain guides guide about 350 people into the backcountry. A trait, and challenge at the same time, of this event is that telemarkers ask for excursions involving very large groups in order to enjoy the vibes of the community. Particular effort is put into the communication to the participants for both making them aware about the possible risks and repeatedly explaining the actual avalanche danger conditions. Moreover direct risk mitigation actions are taken such as: i) terrain surveys; ii) healthcare assistance during the excursions; iii) mandatory safety equipment; iii) emergency procedures. Aside from all these measures, we noticed a large part of the risk mitigation has to be done by directly working with the professionals. Building an efficient team of guides who generally are used to be alone in the terrain is the most demanding part. They need to share evaluations and impressions but, at the same time, trust and follow the decisions of the others. We need to be aware that a specific kind of heuristic traps can affect a team of professionals working together.

KEYWORDS: mountain guides, decision-making, human factor, heuristic traps.

1. INTRODUCTION

Traditionally, the avalanche safety management for groups moving in avalanche terrain is mainly focused on examining the physical aspects of avalanche phenomena (e.g. snow cover stability) (Zweifel and Haegeli, 2014). Munter (1997) defined three factors as crucial for avalanche accident prevention: i) conditions; ii) terrain; iii) human factor, which had to be considered at three stages: i) planning; ii) before leaving; iii) before entering a single slope. Since then, the impact of the human factor on avalanche accidents was deepened considering the different variables playing a significant role (e.g. individual motivations, leadership issues, communication, equipment influence) (e.g. Adams, 2005; McCammon, 2001; Harvey et al., 2012, Hohlrieder et al., 2005). Based on that, we became strongly aware that despite the best intentions, decisions could be lead astray, emotions, beliefs, motivations and biases (McCammon, 2009). If possible, these aspects are even more difficult to manage, since they are woven inextricably into our perceptions and judgments (Tremper, 2001). McCammon (2004) defined six unconscious heuristics as being widely used in decision-making in avalanche terrain: familiarity, consistency, acceptance, the expert halo, social facilitation and scarcity. These six processes are commonly named heuristic traps.

Professional mountain guides (MG) are not exempt from the risk of heuristic traps, e.g. expert halo (Zweifel and Haegeli, 2014; Adams, 2004). Probably due to the remote nature of mountain guiding (Walker and Latosuo, 2016), not many studies focused on the possible heuristic traps arising from situations where more professionals are guiding together (starting from the planning processes until moving in avalanche terrain). However, it is known that in groups with several people having the equal level of experience, it is difficult for the group to find a leader (Förster, 2009).
In this work we present the experience of professional guiding during the telemark festival "La Skieda". The festival takes places in Livigno (Italy) and, every year, for one week, more than 350 telemarkes (about 100-120 people a day) are guided for skitouring by a group of 10-12 professional mountain guides (UIAGM). Only two of the mountain guides are local, the general level of the skiers is medium to high and a particular demand of the participants is that they want large groups during the excursions (Fig. 1). The organization of the professional guiding during the event is described with a special attention for stressing the problems related to the dynamics originating from more professionals guiding together.

2. FRAMEWORK CONDITIONS OF THE FESTIVAL

The telemark festival "La Skieda" is at its 22nd edition. It takes place every year by the end of March in Livigno (Italy). Livigno is located in the middle of the Italian alpine range, at the border to Switzerland and South Tyrol and has a prevailing continental climate. Avalanche problems with persistent weak layers are common and, by the time of the festival, cycles of wet-snow avalanches have been frequently recorded. During this week, about 300-400 telemarkes have the possibility to participate at two different daily ski tours: a long one (about 1000-1500 m of positive elevation gain) and a short one (about 600-900 m of positive elevation gain).

A group of 10-12 MG is in charge of guiding the participants of the festival. A member of the organizing committee follows the team for better coordinating the MG activities with the other side events of the festival. The professionals of the local avalanche warning office are in charge of supplying: i) additional information on snow and weather conditions, ii) technical support for the risk management, iii) support for the decision-making and for eventual field observations, iv) an evening edition of the local avalanche danger bulletin and v) several maps for better presenting the planned excursions to the participants.

The preconditions of the professional mountain guides in charge of the task are: i) Certification of professional UIAGM mountain guide, ii) having telemarker skills, iii) large experience on snow safety, iv) only two of them are locals; v) at least 10 of them guiding at least for their second time during the festival vi) many of them have at least an extra-skill (e.g. telemark ambassadors, athletes, steep skiers).

The day before the festival starts, the MG split in groups and make different observations in order to check (most of them are not local) both the snow stability and snow quality conditions. The locations for the observations are selected in order to see the most critical conditions. During the evening a meeting is organized in order to share the observations, facts and impressions collected by the MG and the snow stability and snow cover data collected by the local avalanche office. This infor-
information, combined with the weather forecast, is considered for defining the excursions of the next day. If uncertainties are highlighted an advance party team of MG (eventually with one member of the local avalanche office) is sent in front of the main group. Every day, more detailed information is collected for assessing the actual snow stability (and snow quality) conditions. Day by day, tours on more remote areas are organized if conditions allow it: the choice between an excursion and another one is not only based on the terrain exposure to the actual avalanche problems but even how much it was skied previously in the season.

During the excursions, all the MGs are closely in contact by mobile phones and radios. They need to carry with them a first aid kit, spare parts of the equipment known to break easily (i.e. ski poles) and a kit for fixing possible equipment failures. Finally, a professional nurse member of the alpine rescue joins every excursion. Even if the MG split in only two large groups, maximum number of 10 participants for each one guide is fixed.

Strong attention is given for a straight communication towards the participants. This includes: i) the general risks related when moving in avalanche terrain; ii) the actual snow stability conditions and the reasons motivating the choice of the two excursions; iii) the measures taken for the risk mitigation; iv) the explanations for the taken decisions. Obviously, all the participants must carry their personal snow safety equipment (i.e. beacon, probe and shovel). Even if people are willing to stay in a larger group than 10 persons, the team of MG could decide to split them if safety problems are detected (e.g. too slow, low technical level).

In case of accident, clear emergency plans are defined and everything needs to be reported in written form to the organizing committee.

### 3. DISCUSSION

Moving in avalanche terrain with large groups is known to be a critical factor (Zweifel et al. 2016). Group dynamics strongly affect the safety of individuals and not much is known about the leadership dynamics when more professionals are working together.

Within the previous chapter the general organization of the guided excursions during the La Skieda telemark festival is described. However, there are other factors, which may be significant for reducing the risk sources.

We identified other important characteristics MG need to have for forming a good team during the festival: i) they need to be able to accept and respects ideas which may be different from their own, ii) they should always respect the credibility of the others; iii) they should place themselves at the same level of the others, accepting the role of other snow professionals, but concurrently making individual analysis.

We generally selected MG with strong personalities in order to put similar weight of every MG in the decision-making processes. On the other hand, this could turn into a problem if they barely obey to the opinion of others. In fact, during the trip planning stage a decision is taken only if all the MG agree; the same approach cannot be used while being in the field.

We noticed there is a strong difference in managing snow and stability data supplied by the local avalanche service and the feedbacks of the other mountain guides. At first, a general skepticism for accepting information by the avalanche forecasters is noticed; then, once established a good relationship, this source of information is always accounted for the decisions. On the other hand, the impressions and feedbacks from other MG are

### Tbl. 1: Classification of human factors. The heuristic traps evidenced in this work are in bold.

<table>
<thead>
<tr>
<th>Type</th>
<th>Objective – Conscious – Factual</th>
<th>Subjective – Unconscious – Emotional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual factors</td>
<td>Physical condition, equipment, explicit behaviour</td>
<td>Motivations, scarcity, familiarity, consistency, rivalry</td>
</tr>
<tr>
<td>Group factors</td>
<td>Number of participants, collective equipment, progression, velocity</td>
<td>Emulation, acceptance, expert halo, social facilitation, lose one’s sense of responsibility, rivalry, camaraderie</td>
</tr>
<tr>
<td>Organisation factors</td>
<td>Number of participants, collective equipment, progression velocity</td>
<td>Proven leadership of the leader, co-leadership</td>
</tr>
<tr>
<td>Social factors</td>
<td>Identified leader, time limits, logistical organisation</td>
<td>Group cohesion</td>
</tr>
</tbody>
</table>
more subjective and often a source of discussion and disagreement (no matter if MG have a good esteem of each others).

Moreover, we noticed for the MG feeling the direct responsibility of the single participants is more complicated than when working alone. With more MG, clear assignments of responsibility may be challenging. Sometimes there is the tendency to automatically transfer the responsibility to the entire group of MG, e.g. communicating an important decision to the participants.

If more leaders are working together, it is not easy to communicate and point out possible mistakes without reducing the credibility of the others; at the same time it is fundamental to promptly highlight dangerous conditions. It is a complicated mix of trusting the evaluations of the others and never stopping judging them independently. The potential formation of sub-groups with the team of MG can generate situations of rivalry and camaraderie, which could affect the objective nature of risk analysis.

These heuristic traps related to the coexistence of more leaders could be added to the classification of human factors proposed by Cierco et al. (2013): lose one’s sense of responsibility (Group factors), rivalry (Individual factors and Group factors), camaraderie (Group factors) (Tbl. 1).

Within the MG team, there were never issues related to different genders (until now only male mountain guides worked for the festival). It is not clear which leadership style is more suitable for more professionals working together.

A different approach could be to select one guide as the responsible of each excursion and using a more hierarchical organization (e.g. army group). However, this could mean to decrease the quality level of the team: some of the MG, since they have strong personalities, may refuse this kind of organization. Moreover, the legal ascription of responsibility is not clear if more professionals are working together while following the decisions taken by only one of them.

4. CONCLUSIONS

In this work we presented the general organization for professionally guiding very large group of people in avalanche terrain. Despite the general measures for reducing the risk are straightforward to follow, managing the decision-making dynamics of more than 10 professionals needs more in-depth analysis. In fact, a professional mountain guide is generally used to work alone or maximum with a second colleague. Classic leadership styles cannot be easily applied to this issue and new kinds of heuristic traps may occur (e.g. lose one’s sense of responsibility, rivalry, camaraderie). The different personalities of the mountain guides play a significant role in the decision-making processes and accepting the decisions of the others while always communicating their own observations and feelings is fundamental. Behavior dynamics like partly assigning the responsibility of some task (e.g. communicating the decisions) to other colleagues can significantly affect the safety of the group. Surely, more specific and in-depth analysis are necessary for better understand the dynamics of co-leadership organization in winter sport activities.

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