



Behaviour in Extreme Situations – What We Can Learn from Mountaineers

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1. Introduction

Extreme alpine climbers regularly face and need to master very risky situations. They are experts in alpinism. But how do they deal with risks? Can we find parallels between their manner of dealing with risks and daily learning situations and everyday work? This article will attempt to answer these questions and will shine some light on our behaviour in extreme situations.

The fatal accidents of the two Swiss extreme alpine climbers Erhard Loretan and Joëlle Brupbacher last spring grabbed national attention: Erhard Loretan is the third person ever to have reached the top of all of the 8000m high mountains, a record he established in 1995. Despite that, he fell to his death at the Grünhorn in the Canton of Wallis, which is a mountain that is not considered to be particularly difficult. No other Swiss woman has reached the peaks of more 8000m-mountains than Joëlle Brupbacher, who was a cautious mountaineer and had always shied away from taking too much risk. Nevertheless, she died from exhaustion while climbing the Makalu in Nepal. She passed away in her tent at an altitude of 7400 meters. Why do experts misjudge and make fatal errors on subject matters they should have intimate knowledge of?

A popular saying in the alpine scene on dealing with avalanches is: "Expert beware: the avalanche does not know you are an expert!" There is another saying as well: In alpinism, there are two types of climbers: daring and old ones, but no daring old ones. These two sayings seem to suggest that it is precisely the experts who are more likely to misjudge certain situations.

2. Dealing with risk is a subjective matter

Mountain climbers' behaviour is influenced by the *situation*, the *individual* who is in that particular situation and by the *normative conditions*, such as the material being used or the opening time of a hut in which one wishes to sleep. The situation is characterized by the terrain and the weather. The individual – the mountain climber – is defined by his or her personality and skills and is a member of his social surroundings. This shows that the behaviour of alpinists in extremely risky situations is grounded and based on their subjective perception of that situation. Two people may see the same weather but interpret the situation differently.

The perception of risk is a mental process and depends on how the external information, which is picked up by the five senses, is processed and evaluated [1]. It is also important to remember that the perception and interpretation of certain situations is very personal and subject to one's personality and social surroundings. Moreover, one's perception of risk is influenced by personal experiences, attitude, expectations, ideas and beliefs. The human consciousness of external stimuli is based on a logarithmic and not a linear scale [2]: when the intensity of a sensory stimulus is doubled (e.g. the level of brightness), we register the increase of intensity as being lower than it actually was. This means that the assessment of risks is subjective and not proportional to the "actual" risk. Everyone possesses their own reality and assesses risks based on their own subjective perception of it.

2.1 Accidents at high altitudes are usually caused by experienced mountaineers

In 2010, 124 people died in the Swiss alps, 24 of which were women. Most of these deaths (44%) happened while hiking; only 24.2% were due to avalanches [3]. Ian McCammon showed that most of the accidents were caused by knowledgeable alpinists. He listed six heuristic cases which have always led to accidents in the mountains [4][5]:

- *Consistency*: If a clear goal had been set before the expedition (for example reaching a certain peak), it is only with great reluctance that people will give up on it, even if it means taking unnecessary risks. If such a goal is missing, the climbers tend to be more risk-averse.

- *Familiarity*: When highly educated mountaineers are hiking or climbing in a terrain they know well, they have a tendency of making risky decisions. Also, because they are very familiar with the area, their concentration tends to decrease.

- *Acceptance*: The predisposition of using certain activities to heighten one's recognition and social standing can lead people to take more risks. This tendency can especially be seen in men when women, or someone else they want to impress, are around.

- *The Expert Halo*: More often than not, the leader of a group is not the person with the most knowledge, but the person whom the group perceives of having the most knowledge – be it because he is older, uses professional material or acts self-confidentially. This means that people are seen as having knowledge they do not actually possess.

- *Social Facilitation*: After one group meets another group during their tour, they are more willing to take risks. However, there is a difference between groups with a different level of education: groups with little or no



education on avalanches were more careful after the encounter with the other group, whereas groups which have had education on avalanches took higher risks.

- *Scarcity*: The opportunity for a mountaineer to be the first person to conquer a new route led him to take more risks.

The group size influences accidents: small groups with one or two mountaineers are at a low risk of accidents. There is a larger probability for groups of more than 3 people to take risks due to trusting the faulty assessment of a so-called expert. Also, it seems as if setting a clear goal is very problematic for larger groups: the readiness to assume risk is higher than that of small and medium sized groups [4].

2.2 Experienced people assess the risks to be higher, but are also more willing to take them

Risk is usually seen as being a balance of the costs and benefits of a certain behaviour [6]. In contrast to risk, the possible consequences of certain events in an uncertain environment are known but their probabilities are not. In principle, risk can be calculated by multiplying the probability of the occurrence of a certain undesirable event with its costs or consequences [7]. An increase of one's level of expertise leads that person to overestimate the risks [8] while simultaneously accepting the higher risks and looking for a more difficult challenge [9]. Even though a lot of skiers know about avalanches, they do not use this knowledge correctly if they underestimate the risks and overestimate their ability to deal with avalanches correctly [10]. It is interesting to note that experienced "freeriders" assess avalanches of having a higher level of danger than laypeople do, the second assesses the danger level as being significantly lower [8]. This shows that in order to recognize risks, one must know that they exist. However, McCammon [4] could show that a higher level of education and a more intimate knowledge of the conditions did not lead to a lower acceptance of risk. The more educated a mountaineer is, the more he lives according to the motto of "maximal satisfaction with the highest acceptable risk". This claim is supported by the results of Slovic and Peters, who say that high-risk activities have higher payoffs than low-risk activities. In addition, if people regard the situation or behaviour which causes the risk (such as being in dangerous terrain) with favor, they will assess the risks as being low and the payoff as being high [11]. This leads to a dangerous situation where experts recognize or even overestimate the risks, but also behave in a riskier manner due to the higher payoffs. When behaving in this manner, the residual risk actually increases.

It is not an underestimation of the risks which leads to accidents, but an overestimation of one's own abilities to deal with a catastrophe successfully [12]. Interestingly, when skiers or snowboarders carry protective and lifesaving gear with them, they tend to take more risks. Finally, men take greater risks and have a higher opinion of their skills than women do.

2.3 From beginner to expert: The residual risk remains

In all sports, the participants can be divided into the categories *beginner*, *advanced* and *expert*, depending on their level of competence. Individual talent and learning speed determines how fast someone goes from one level of competence to the next. Most athletes in any given sport fall into the advanced category, while very few reach the expert level.

There are three phases which people go through when transitioning from a beginner to an expert [13]: In the first phase, the participants playfully make their acquaintance with the sport. After developing the basic and necessary skills needed for their particular sport, the participants continue to hone their skills by practicing intensively and systematically. During and at the end of that phase, they must decide if they want to turn their hobby into a full time job, which would then be the third phase. The level of skill it is possible to achieve is directly proportional to the amount of time spent deliberately practicing – practicing in an intense, purposeful and concentrated manner [14]. The highest level of performance is generally reached between the ages of 25 and 45 (whereas the optimal age can vary significantly from sport to sport). After that, the athlete turns to teaching [15].

Beginners start learning in a safe environment with an emphasis on having fun and gaining a positive experience. *Advanced* participants concentrate on increasing their knowledge and skill. An expert knows how to deal with difficult and challenging situations, has a very large skill set and a lot of experience and can well reflect the own movement behavior. However, with an increasing level of skill and experience, it gets more and more difficult to find themselves in a new (challenging) situation [16].

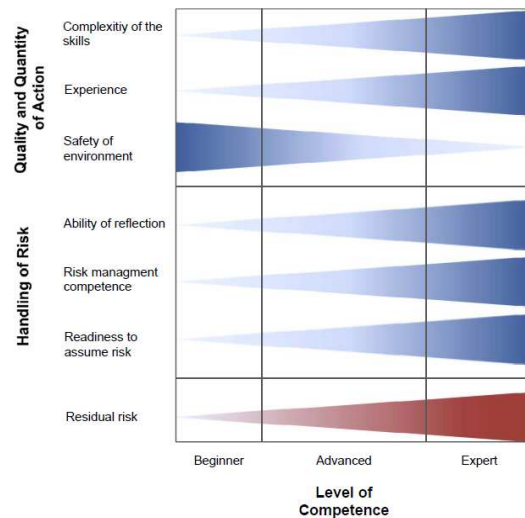


Fig.1. Quality and quantity of action and handling of risks as a function of the level of competence

This means that during the course of reaching a higher level of competence (Figure 1), mountaineers:

- increase the complexity of their movements
- gain more experience
- stray into increasingly dangerous terrain
- increase their ability of reflection
- find themselves struggling to increase the thrill factor of their adventures
- do not decrease their readiness to assume a risk
- thus increase their residual risk

3. Conclusion

We are tempted to translate these findings directly to the organization, but that would not be wise. However, they can help us spot potential problems within an organization.

3.1 Traps which may also exist in daily learning situations and work

Organization and leadership

- Unusual and risky activities are often encouraged by the particular philosophy of an organization and of one's superior. A number of employees or students also deliberately take risks when their boss or instructor is watching in order to impress him with their accomplishments. After all, being confident and showing initiative is good for furthering one's own career, even if it means one has to take larger risks. Most of the time it turns out ok.
- The organizational structure of an organization influences the risk behaviour of the students or the employees. Nobody feels responsible for dealing with complex threats.
- Managers and employees must make complex decisions while keeping the entire value chain in mind. However, this is not always possible, because a lot of times, expert knowledge is needed in order to understand a sub-section of the chain. This often leads to a dilemma [17]: Neither the manager nor the expert has enough knowledge of the value chain in order to be able to understand all of the consequences of their decisions.

Work climate and group dynamics

- The most vocal person in a group does not necessarily have the most knowledge on the given subject. A person can gain the status of being an expert without being it. However, a skilled moderator can mitigate the potential damages this can cause.
- A large group with a clear goal tends to ignore potential risks because they know where they want to go. Therefore, they do not think it is necessary to constantly be aware of risks.
- A critical manner should always be encouraged. The status quo should always be scrutinized. Being uncritical is the best prerequisite for a crisis [18].
- Once-in-lifetime opportunities should be scrutinized as well, because if something looks good at first glance, a more thorough examination may uncover some hidden risks.

Personality

- The higher the "expert status" of a person making decisions is, the higher the residual risk will be. A person is more willing to take higher risks if they have more intimate knowledge of a subject matter. This means: beware of the expert, if it really is one! Laypeople have the tendency to overestimate risks while experts have the tendency



to underestimate them. This is why the best results at work are gained from a group consisting of experts and laypeople.

- If people know that they will venture onto dangerous terrain, they will be more aware of risks. So knowing that one is in a dangerous situation will have a positive effect on one's behaviour – one is more careful. However, safety measures often backfire because they lead to people taking more risks than they would otherwise. So safety measures would have a more positive effect if the people behaved as if they were there were no safety measures in place.

- A large source of risk is overestimating one's own capabilities and not necessarily lacking knowledge. Being self-critical is a sign of maturity and not a sign of weakness.

- To conclude: people – be it mountaineers or “normal” people in everyday environment – who repeatedly find themselves in difficult situations should critically question their own skills.

3.2 ...but there are also differences

The risk aversion and caution of many experienced mountaineers can be a model for a lot of leaders. However, this is only valid as long as these leaders actually recognize and correctly assess the risks and refrain from taking higher risks with the hope of a large payoff. While being in the mountains, people accept a certain amount of subjective risk for the reward they gain from doing a certain activity. If the subjective risk is low, people have the tendency to actively put themselves in a position of a higher risk. It is often the case that risky behaviour leads to a higher reward, even in the normal learning or working environment. However: should one be tempted to do so?

Ueli Steck is one of the best solo-climbers and holds the world record for speed climbing in a number of different routes. What is the incentive for doing activities which may lead to a fatal accident? According to Ueli Steck, the risk is the incentive, because for him, a life without risk is not a life. He can live with a subjective residual risk of about 0.1%. Risk makes life valuable [19]. However, an organization cannot afford to think like this. A total failure of a single person may be acceptable, but a total failure of a system where a lot of people are affected is not.

Last but not least: does a good leader need to be a good mountaineer? No. Does a good mountaineer need to be a good leader? No, but he can. One does not automatically lead to the other, but neither are they mutually exclusive. Skills which were learned in the mountains can be effectively utilized at work.

(Was he swept away? Was it death by exhaustion? We do not know. The two causes of the accidents of Erhard Loretan and Joëlle Brupbacher will probably never be conclusively resolved.)

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