

☒ go  
☐ no go

Powder!  
Avalanche danger?  
Impress my friend!  
Fear...

?









**Wow, that was nice....**

...but how stable was  
this slope?



WSL Institute for Snow  
and Avalanche Research SLF

# Avalanche risk in recreational activities: how people deal with uncertainty

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# Agenda

## 1. Uncertainty in avalanche terrain

*Uncertainty from human factors*

*Uncertainty from physical factors*

## 2. How people deal with uncertainty

*Four different strategies*

## 3. Overconfidence

*Why are people overconfident with their decisions*

*How to overcome overconfidence*

# The hidden weak layer in a slab avalanche

## ***Slab avalanches are:***

Fast

Large scaled

Dangerous



## ***For a slab avalanche we need:***

Steep terrain ( $> 30^\circ$ )

Slab (bonded snow)

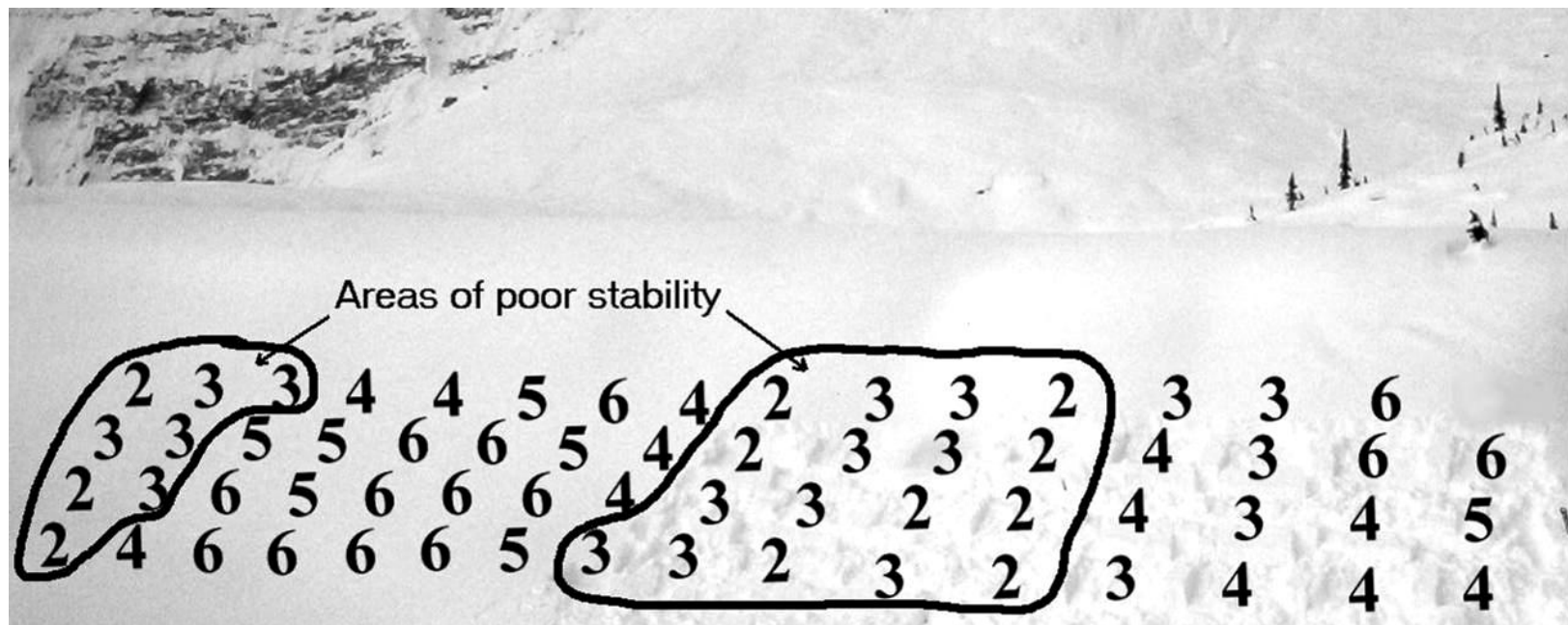
Weak layer

Trigger





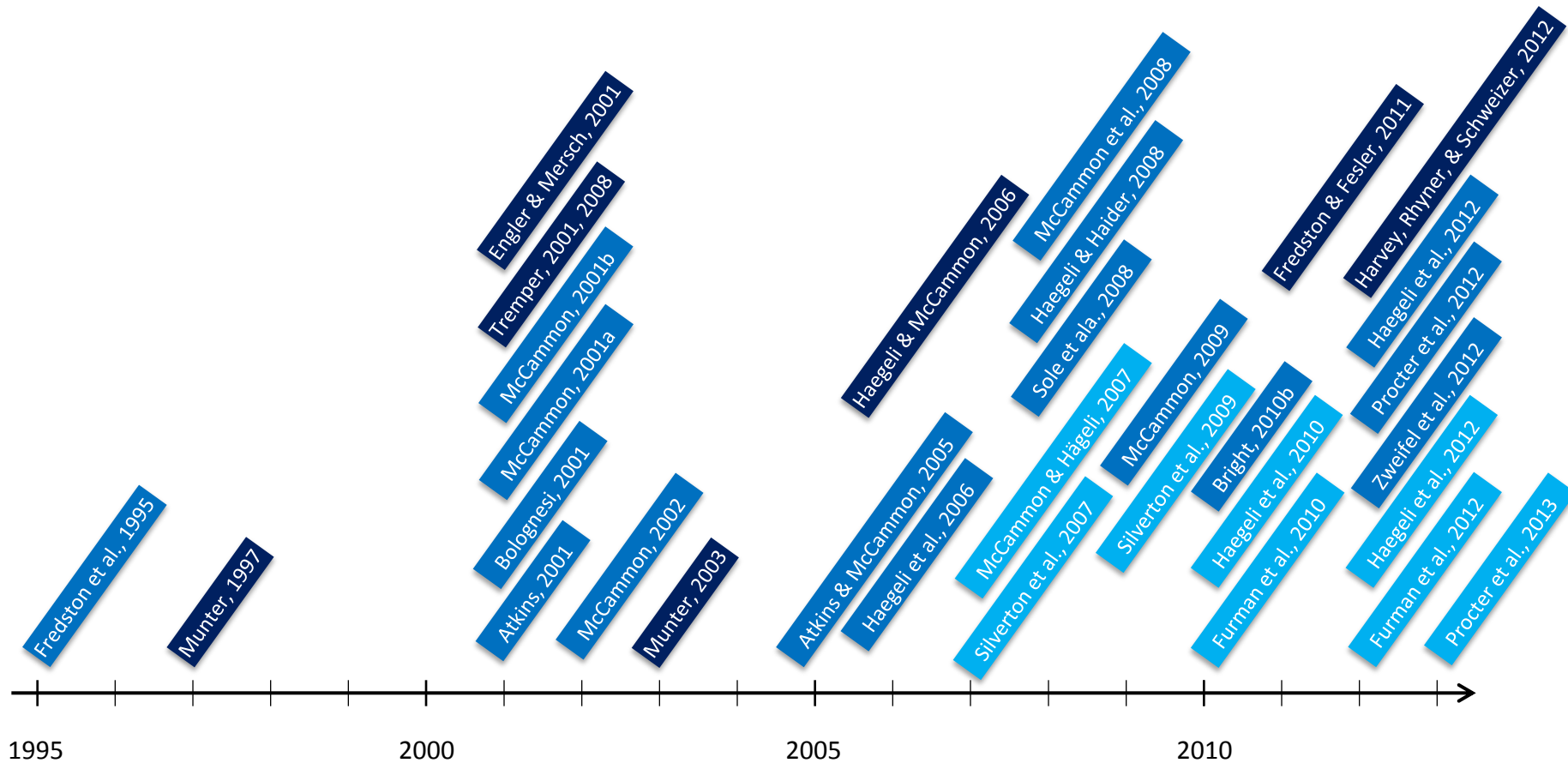
# Hot spots – or why stability tests don't work



Campbell and Jamieson, 2004

# Literature on human factors in avalanche terrain

Uncertainty





Herding instinct, risky shift effect →  
example of **group dynamics**

*„I think the bigger the group, the more dangerous it is, because you get a sense of safety and you don't question things the same way as when you are traveling in a group of two. “*

Backcountry skier, group interview 2013

# Familiarity → heuristic traps

*„This is the twelfth time we are doing this trip. I have been to Eggberg I don't know how many times. We don't need to plan anything anymore.“*

Backcountry skier, group interview 2013

# Munter introduces a paradigm change in decision making (1997)

	<i>Date</i>	<i>Location</i>	<i>fatalities</i>
Physical understanding	18/04/85	Samnaun (Val Gravas)	6
	01/04/88	M.S. Lorenzo (Val S'charl)	6
	04/05/88	Monte Sissone (Forno)	5
	28/12/89	Simplon (Nanztal)	6
	05/05/90	Gauli (Urbachtal)	7
	08/03/91	Gr. St. Bernhard	7
Strategic thinking	12/07/07	Jungfrau	6
	03/01/10	Drümännler	7
	26/03/11	Tsandéserte (Valsorey)	5



# Four different decision strategies

Rule-based

Intuition / Heuristics

Avoid / trivialize

Delegate

# Four different decision strategies

Rule-based

Intuition / Heuristics

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Delegate

*“I think we want to do this properly.  
We live here, we are locals, we know  
the hazard and we know what we  
can trigger.”*

Ski instructor, group interview 2013



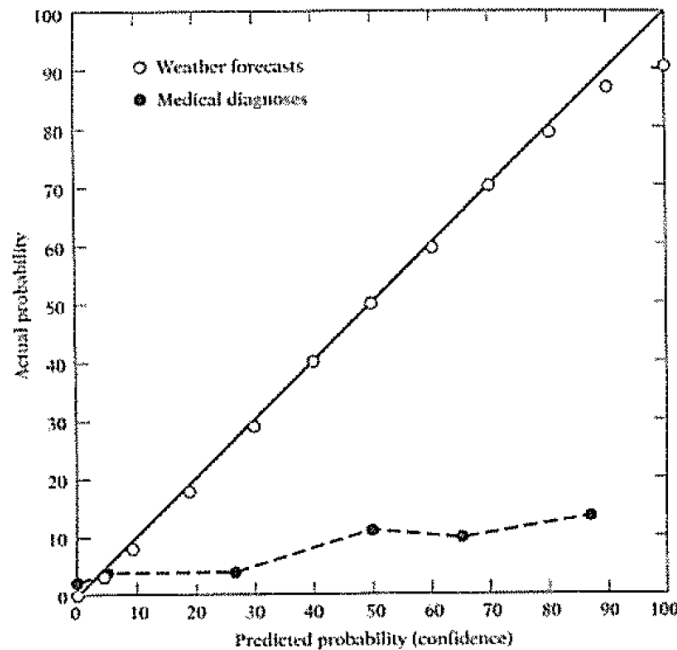
# Overconfidence = f(Feedback)

Ski a potential  
avalanche slope

Avalanche



No avalanche



Murphy and Winkler (1984)  
Christensen-Szalanski and Bushyhead (1981)

# Two advises to face overconfidence

1

Decide **rule-based**, don't rely on intuition

2

Make a **debriefing** after the trip:

*How safe was that trip?*

*Did we have any safety margin?*

*Was the trip at the limit of our accepted risk?*

# Summary

- *Sources of uncertainty from physical and human factors*
- *Human factors are under-researched*
- *Paradigm change in decision making from physical understanding toward more strategic thinking*
- *Four decision making strategies: (1) rule-based, (2) intuition or heuristic based, (3) trivialize or avoid decisions and (4) delegate decisions*
- *Overconfidence in decision making is a basic challenge if we want to further improve avalanche safety*



