

# Human Factors in Avalanche Decision Making Among Mountaineers in Scotland



Ben Smith, Dr Evie Fioratou  
& Heather Morning





# Human Factors: Use of Heuristics in Mountaineers

- Human factors influence everyday decision making – we focus on mountaineering (McCammon, 2002, 2004)
  - Heuristics = “mental shortcuts used to help us make rapid decisions without formal analysis” (Croskerry, 2009)
  - Can be good by increasing efficiency and dealing with complexity
  - Can be bad by becoming thinking traps and causing inappropriate decisions
-

# Familiarity

- A route is presumed safe because it did not avalanche last time the participant was on it.
  - However conditions change and confidence built up from familiarity with the area may be wrongly placed.
-

# Social Proof

- A mountaineer may feel a route is safer because there are other people on it or other people have completed it without accident.
  - However, 90% of accidents occur on previously tracked routes.
-

# Scarcity

- Humans don't like restriction.
  - In a climbing sense, this means mountain goes may take more of a risk so that they are the first people to do a route in the day.
-

# Acceptance

- Activities are engaged in to gain notice or to be accepted by others.
  - In mountaineering terms, pressure may be felt to do a route because of other people around.
-

# Expert Halo

- The idea that a mountaineer feels safer following someone who is deemed more of an expert, if the delegation of power is to someone who is poor at avalanche decision making then the group may be at risk.
-



# Consistency

- The idea that once an initial decision has been made, subsequent decisions are a lot easier if consistency is maintained with the first decision.
  - In climbing terms, once goals have been set for the day, it is very hard to change that goal.
-

## Study aims

- 1) To evaluate the type and prevalence of human factors influencing decision making among winter mountaineers in Scotland, which may increase the risk of avalanche incident and fatality.
  - 2) To assess whether certain demographic and personal factors influence the prevalence of the same human factor decision making concepts among winter mountaineers in Scotland.
-

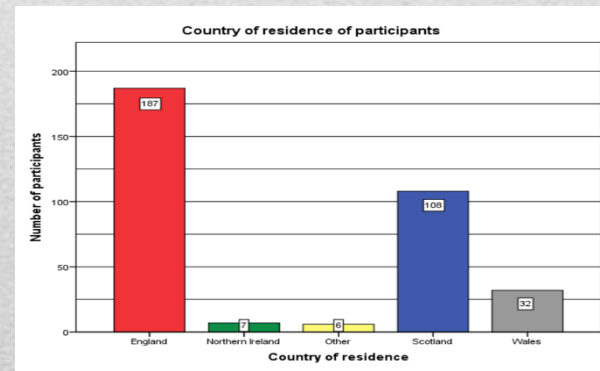
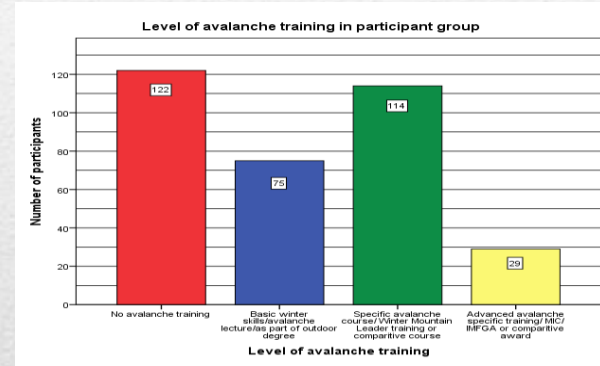
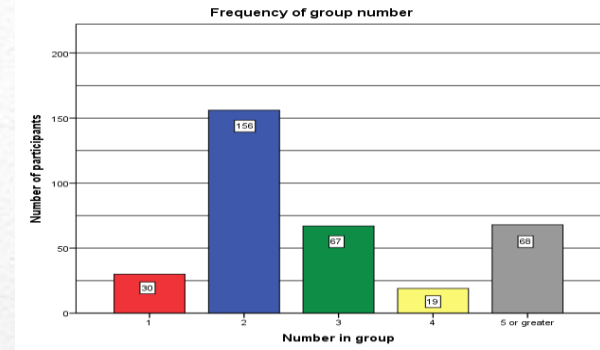
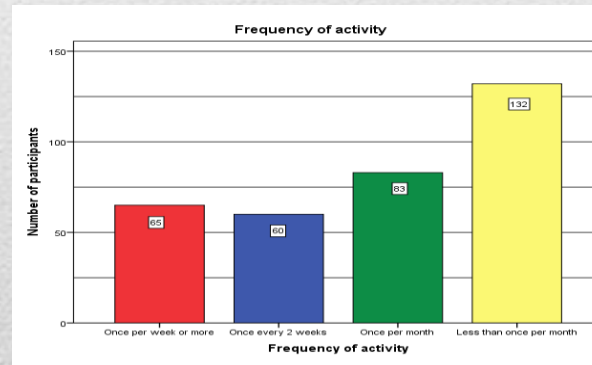
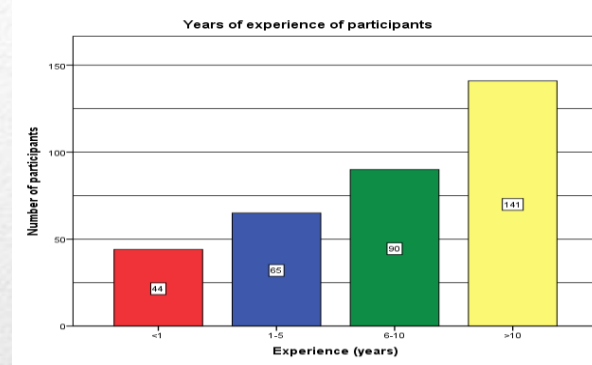
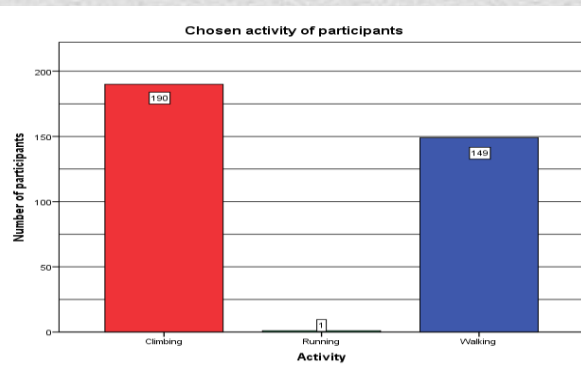
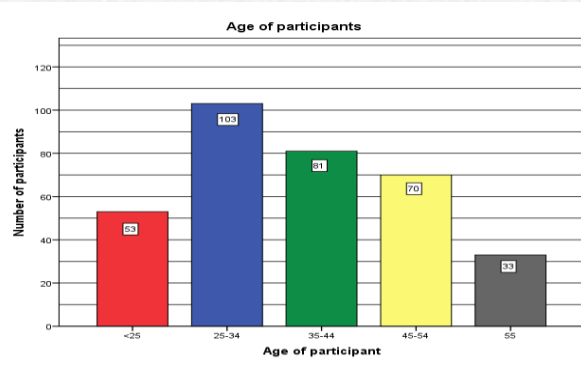
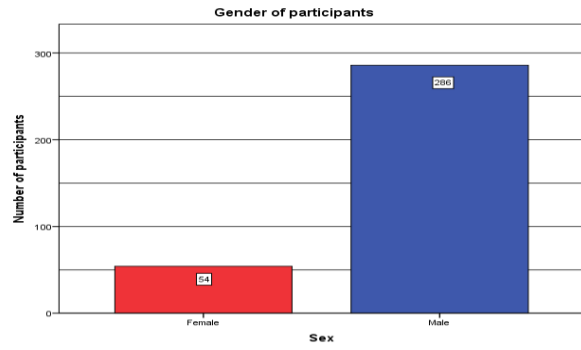
# Method

---

# Design

- Structured interviews based on McCammon's 6 heuristic traps as categories.
- Interviews carried out at the Cairngorm Ranger Base.





# Participants

- Thematic analysis of participant's answers created categories for quantitative analysis.
- Results were analysed to assess whether any personal or demographic factor influenced the prevalence of each heuristic trap decision making concept.

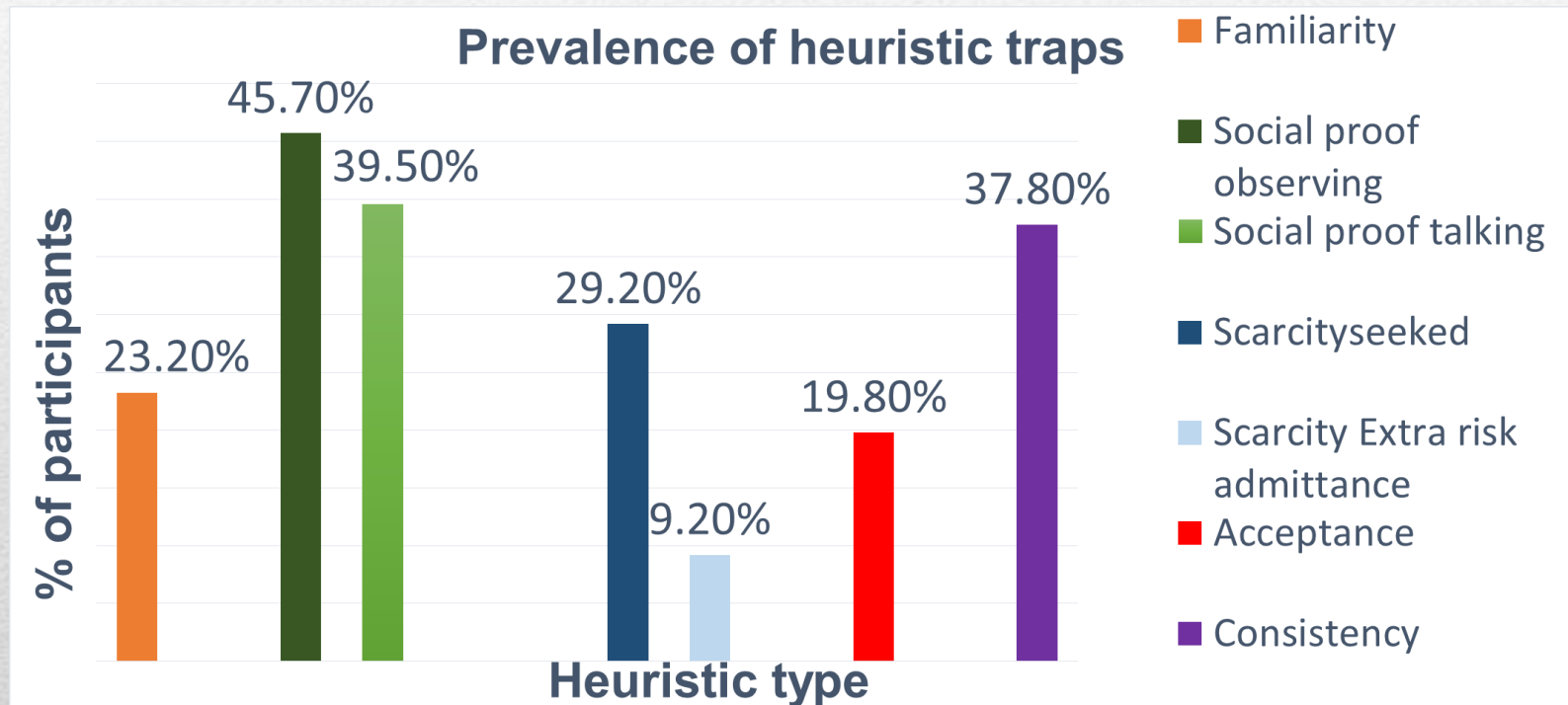
# Data Analysis

---

# Results

---

# Basic Prevalence





# Thematic Analysis: Expert Halo Heuristic Example



## **Influential Secondary factors ( $p < 0.05$ )**

**Activity of choice**~ Scarcity

**Age of participant**~ Acceptance

**Country of residence**~ Social Proof

**Frequency of activity**~ Social Proof, Expert Halo

**Gender**~ Acceptance, Social Proof, Expert Halo,  
Consistency

**No. of years' experience**~ Social Proof, Expert Halo

**Avalanche training level**~ Social Proof, Expert Halo

---

# Discussion

- All six potentially dangerous heuristic trap decision making strategies were present in our mountaineering population
  - Secondary factors found to significantly influence the prevalence of each
  - Improvement of avalanche training courses: heuristic traps and high risk situations catered to individual participants' needs
  - Raising awareness of the dangers of heuristic traps may encourage people to take part in avalanche courses
-

# Future Research

- Relationship between heuristics and practical avalanche planning
  - Elicitation of experts' decision making during their own avalanche exposure ~ case scenario development for future training
-



# Questions?

**[b.a.z.smith@dundee.ac.uk](mailto:b.a.z.smith@dundee.ac.uk)**

---