Understanding Travel Behavior in Avalanche Terrain: A New Approach

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Jordy Hendrikx[1], Jerry Johnson[2] and Ellie Southworth[1]

1: Snow and Avalanche Laboratory, Montana State University, Bozeman, MT, USA
2: Political Science, Montana State University, Bozeman, MT, USA

Jordy Hendrikx

ABSTRACT:

To date, most studies of the human dimensions of decision-making in avalanche terrain has focused on two areas: post-accident analysis using accident reports/interviews, and the development of tools as decision forcing aids. While both methods inform our study of decision-making, each has limitations with respect to construct validity (Are we actually measuring what we think we are measuring? i.e. decisions), and the role the decision tools play with respect to forcing vs. enhancing decisions.

We present an alternate method for understanding decision-making in avalanche terrain. Our project combines GPS tracking and logbook surveys of backcountry skiers as a method to describe and quantify travel practices in concert with group decision-making dynamics, and demographic data of participants during daily excursions into winter backcountry. Data gathering for this small pilot project took place during winter 2012/2013. We will present findings that shed light on real time decision making while traveling in potential avalanche terrain and small group decision-making practice.

METHODS:

- Overview: Pilot study in 2011/12 Winter
- Volunteers selected
- Completed pre-season survey
  - Demographics
  - Experience
  - Qualifications etc.
- Using handheld GPS to record ski tours
- Complete logbook after every trip

- Data analysis:
- Demographic survey analysis
- Terrain analysis (GPS tracks onto DEM) (Figure 1)
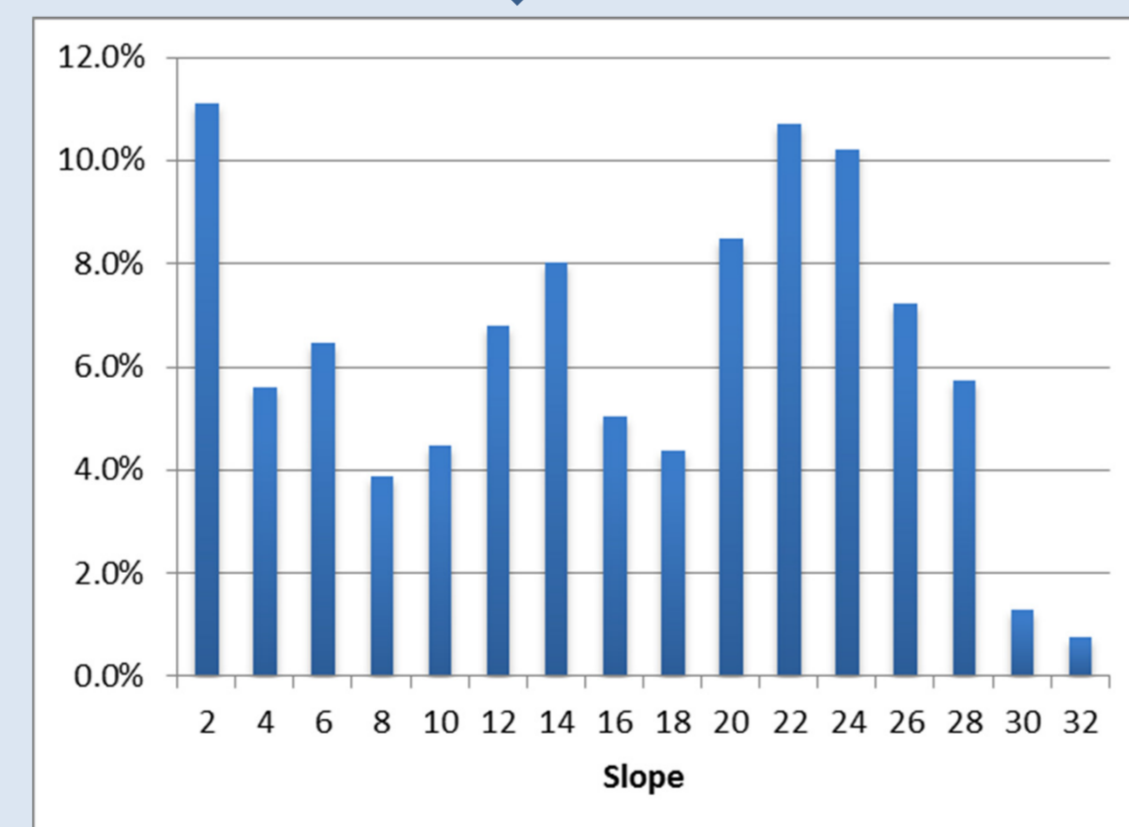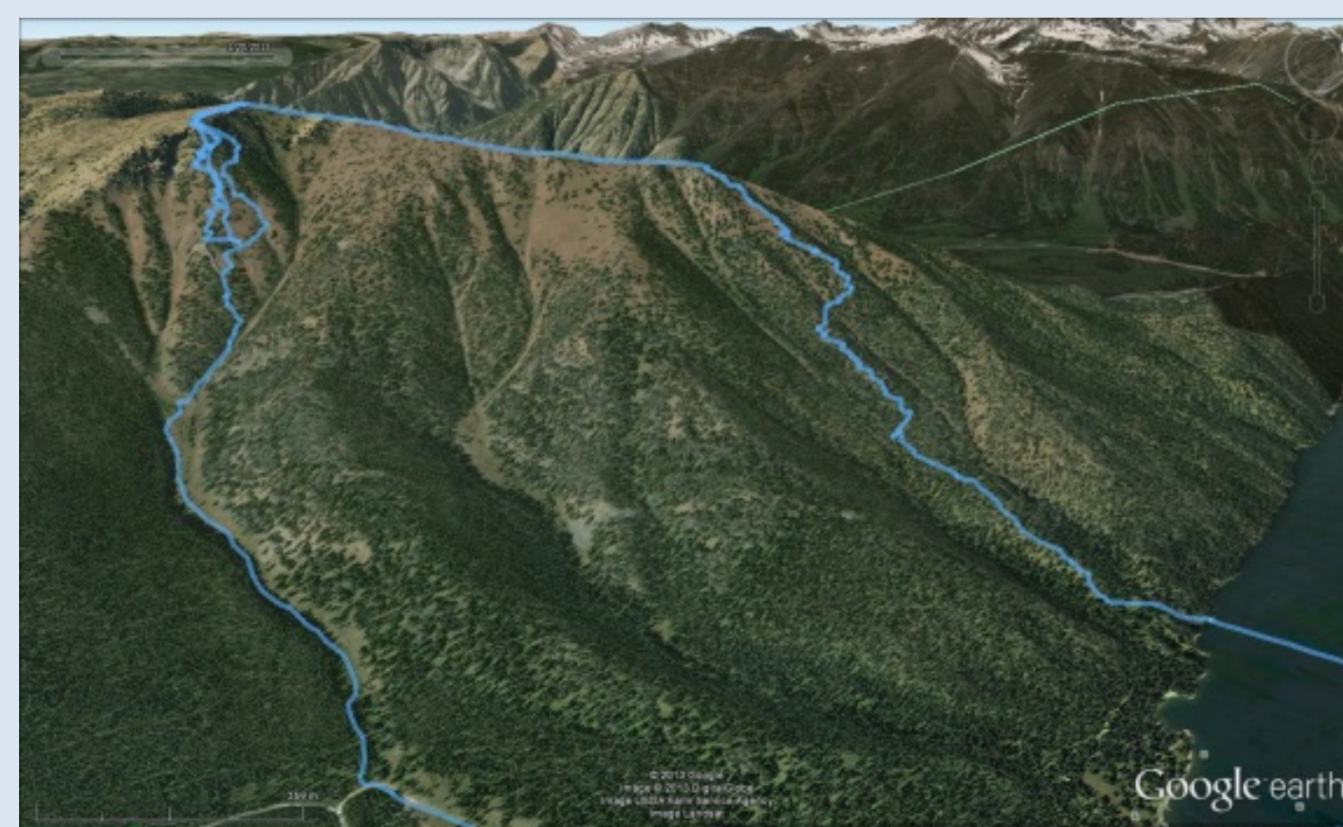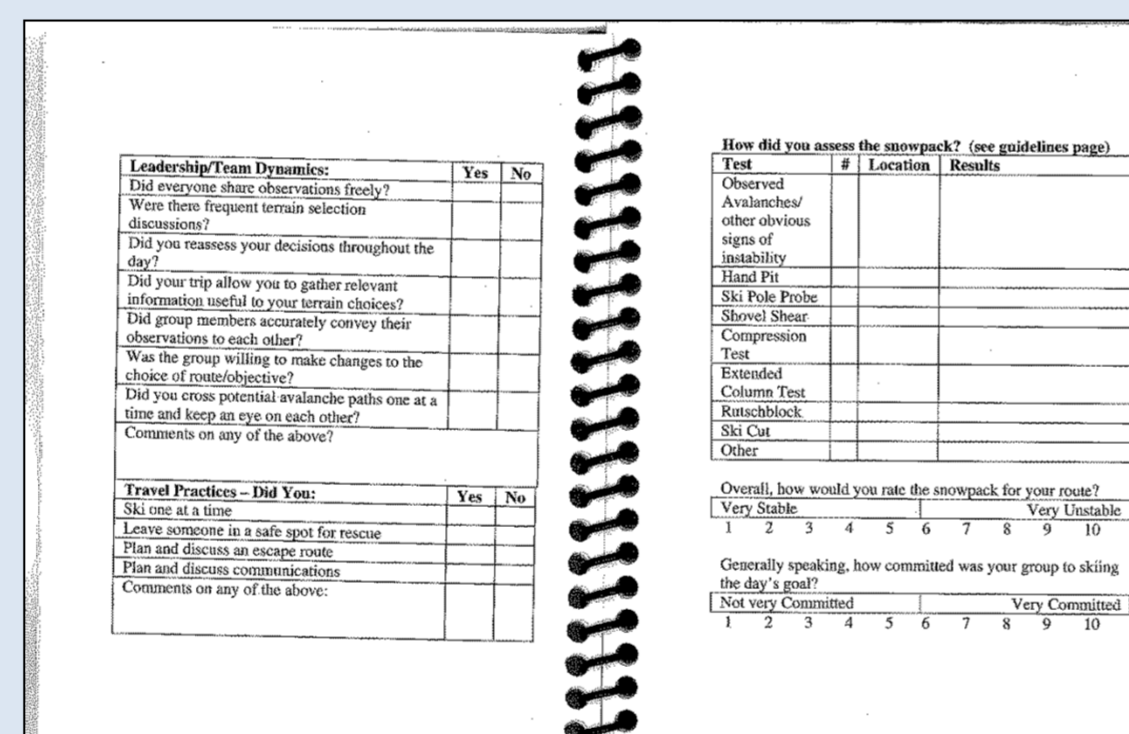 - Slope
  - Aspect
  - Trip length / duration

Figure 1. (A) An example of a GPS track log (shown in blue) overlain on Google Earth (Image courtesy of Google Earth, 2013); and (B) Example output data from this track showing the distribution of slope angles travelled on this day.

RESULTS & DISCUSSION:

We only present two relationships. The first is based on slope angle and posted avalanche hazard (Figure 2), and the other is slope and our "goal" parameter (Figure 3), which is a proxy for the commitment heuristic (McCammon 2004).

Figure 2. Slope angle (°) for the median, 90th, 95th and 99th Percentile of terrain travelled (y axis), plotted against posted avalanche hazard rating (x axis), coded; 1 for low, 2 for moderate and 3 for considerable.
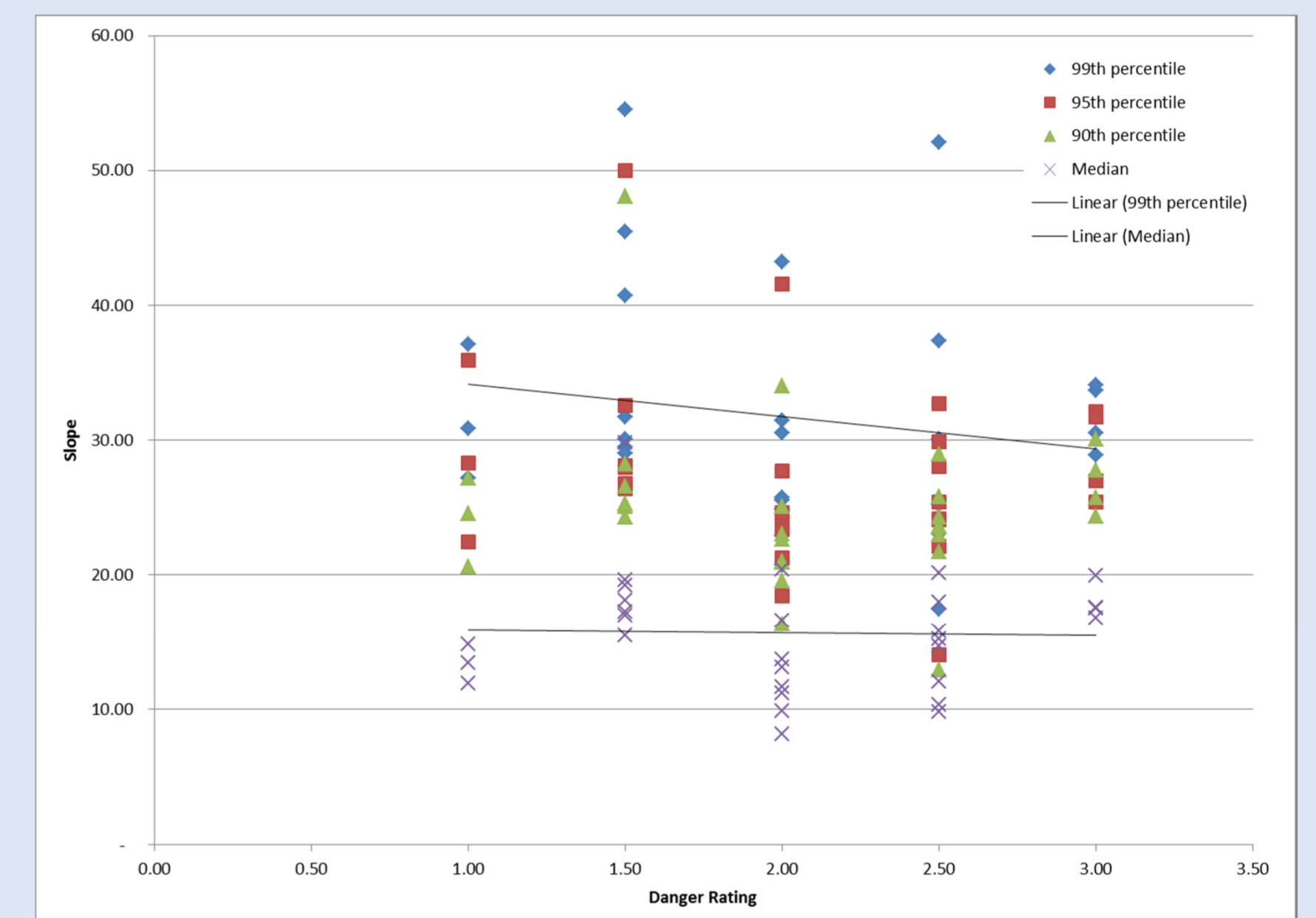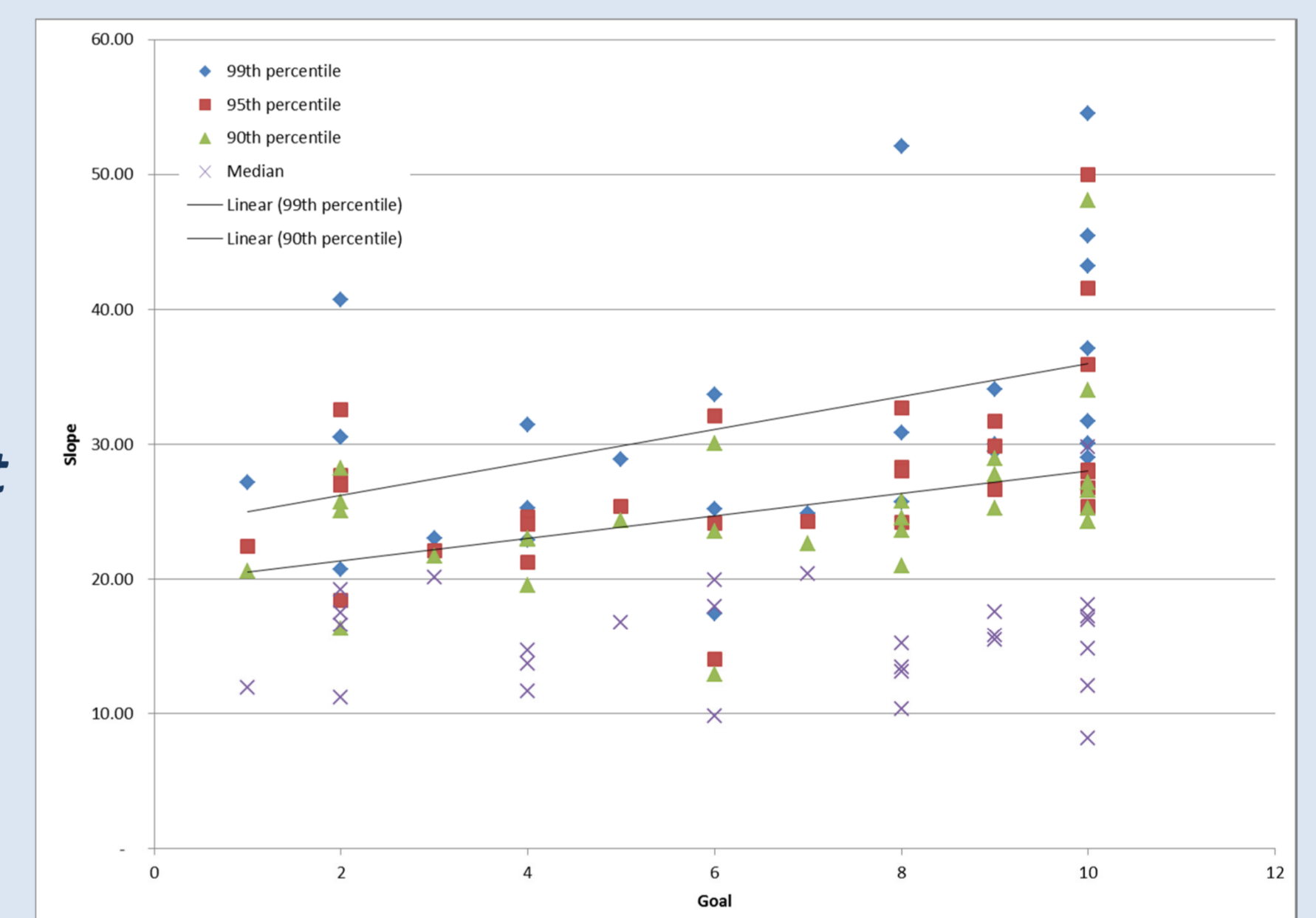

Figure 3. Slope angle (°) for the median, 90th, 95th and 99th percentile of terrain travelled (y axis), plotted against the parameter "goal", where a coded response to "Did your assessment of the snowpack affect the day's goal?" with the response scale 1 = not at all, to 10 = very much.

Initial results indicate that there was: (1) A weak negative relationship between the angle of slope skiers negotiated and the avalanche danger rating , and (2) Given a favorable avalanche hazard report, or assessment of local snow conditions, that skiers adjusted their goal upward – i.e. Their assessment of the snowpack affected the day's goal, in an upwards (more steep) direction. Transferability of these results are limited due to the homogenous and expert nature of the group.

NEXT STEPS

- For the 2012/13 Winter we have launched a new, Crowd Sourced data collection campaign to expand this work and enable greater exploration (i.e. a more heterogenous group)
- We will use a smartphone application called SkiTracks to track people more easily and enable rapid sharing of spatial data.
- We will use a smartphone optimimised survey tool to allow for easy and rapid completion of the daily post trip survey / logbook.
- We hope to collect hundreds, maybe thousands of tracks from all around the World
- For more information, or to participate go to: www.montana.edu/snowscience/tracks Or scan our QR code

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