



Public Winter Weather Condition Comprehension Given Department Of Transportation Tools

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Introduction

Winter weather poses a large threat to travelers across the United States. To mitigate these driving risks, state Department of Transportation (DOT) agencies communicate driving hazards through various online sources. However, there is no federal regulation governing the level of detail required by each state entity, creating a huge variety in the types of information available to drivers (Sorensen 2000). To investigate how this variety impacts interpretation and decision making, we asked:

- What Department of Transportation map products most effectively convey the risks associated with winter weather conditions to travelers?
- Which hazard is perceived as the most dangerous to winter weather driving?

Methods & Data

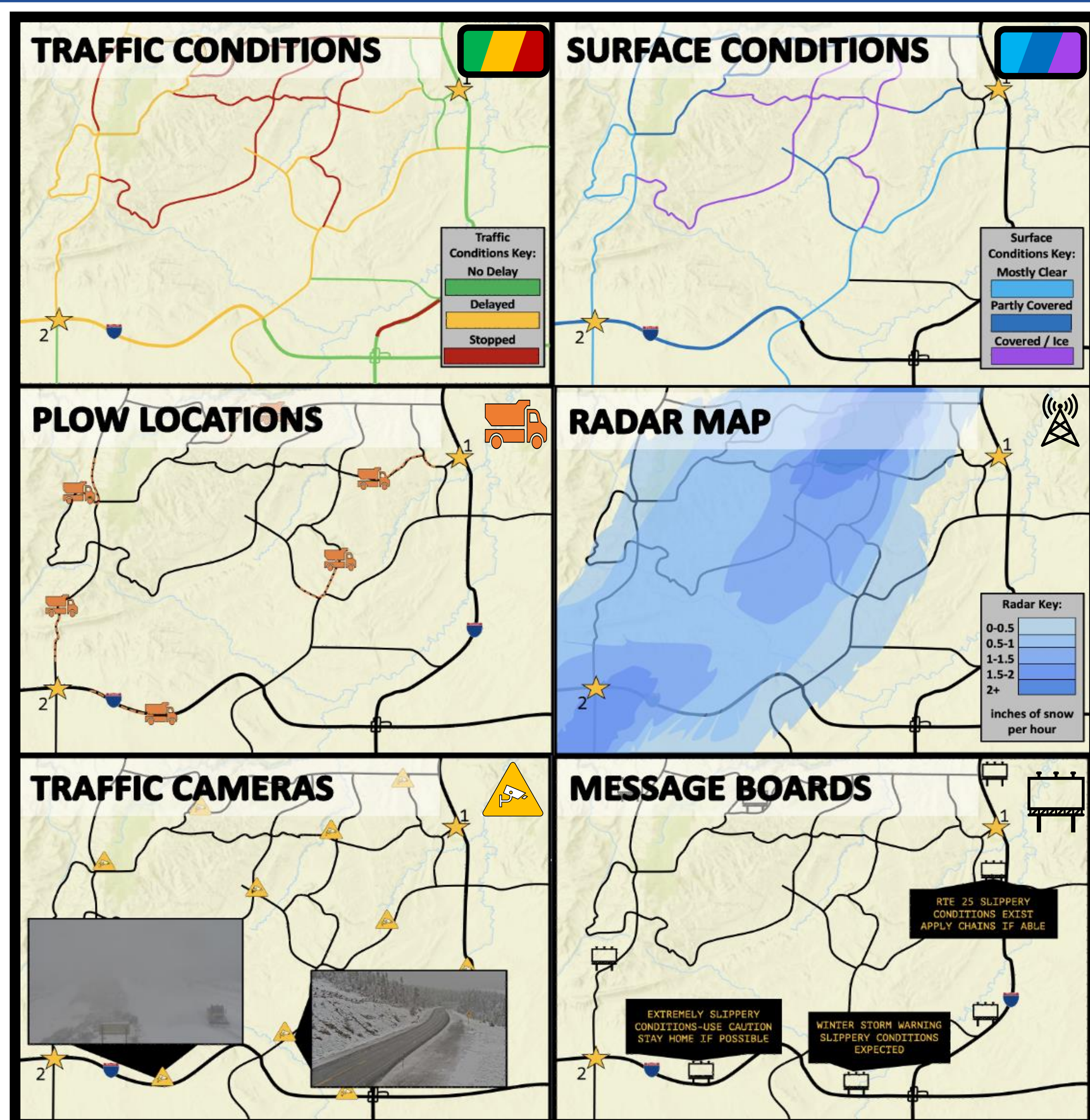


Figure 1: Hypothetical state maps showing each tool as used in the survey. We fielded a survey via social media focused on a *hypothetical winter weather event in a hypothetical state*. The state includes a road network, upon which various DOT products can be overlaid (see above). The products were shown to the survey participants in a random order to mitigate bias. After viewing each map, participants were asked questions about the **usefulness** and the **level of understanding** of the tool presented. Finally, participants were also asked demographic questions, questions about winter weather familiarity, and questions about perceived risk with each hazard. *To view the full survey, scan the QR code above.*

Quantitative Survey Results

Q: How concerned are you about winter weather impacting your travel from location 1 to location 2?

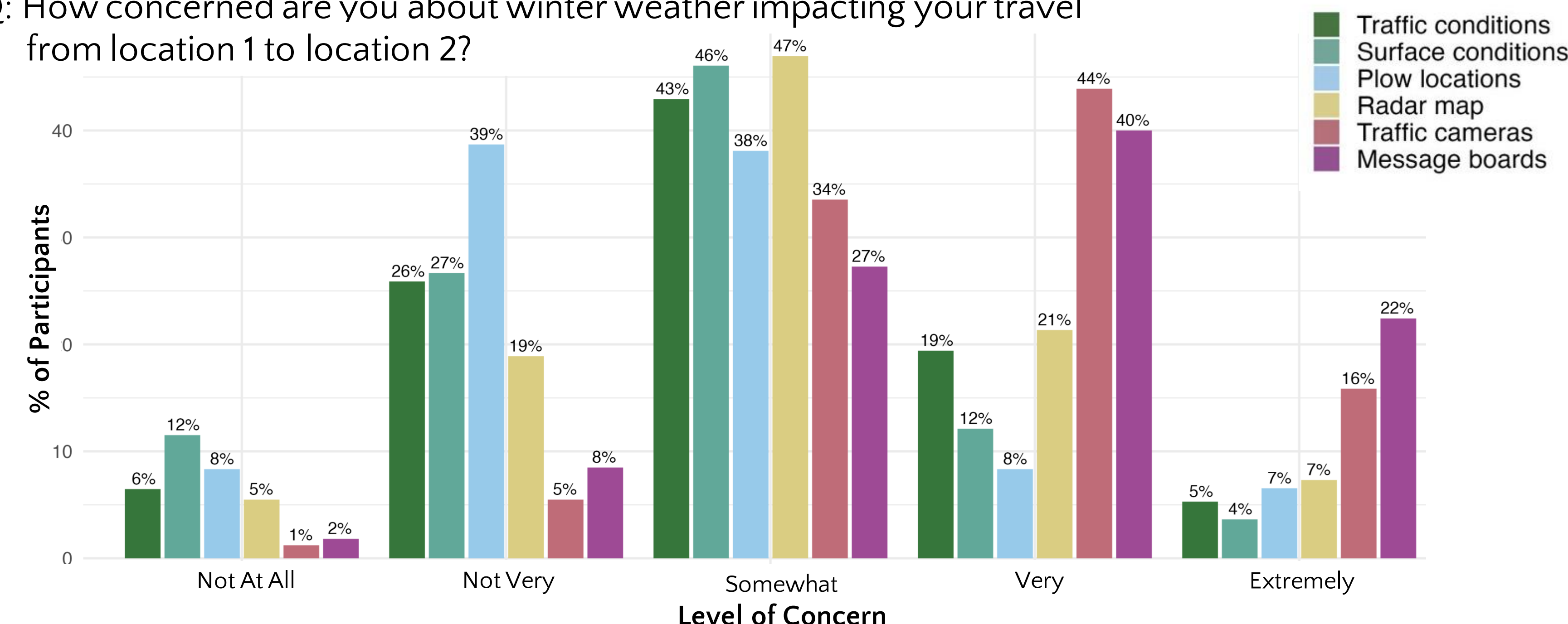


Figure 2: Likert scale breakdown of effectiveness of tools to convey weather risks

Q: Given the six tools shown, rank them based on how likely you would be to use them to make decisions about traveling.

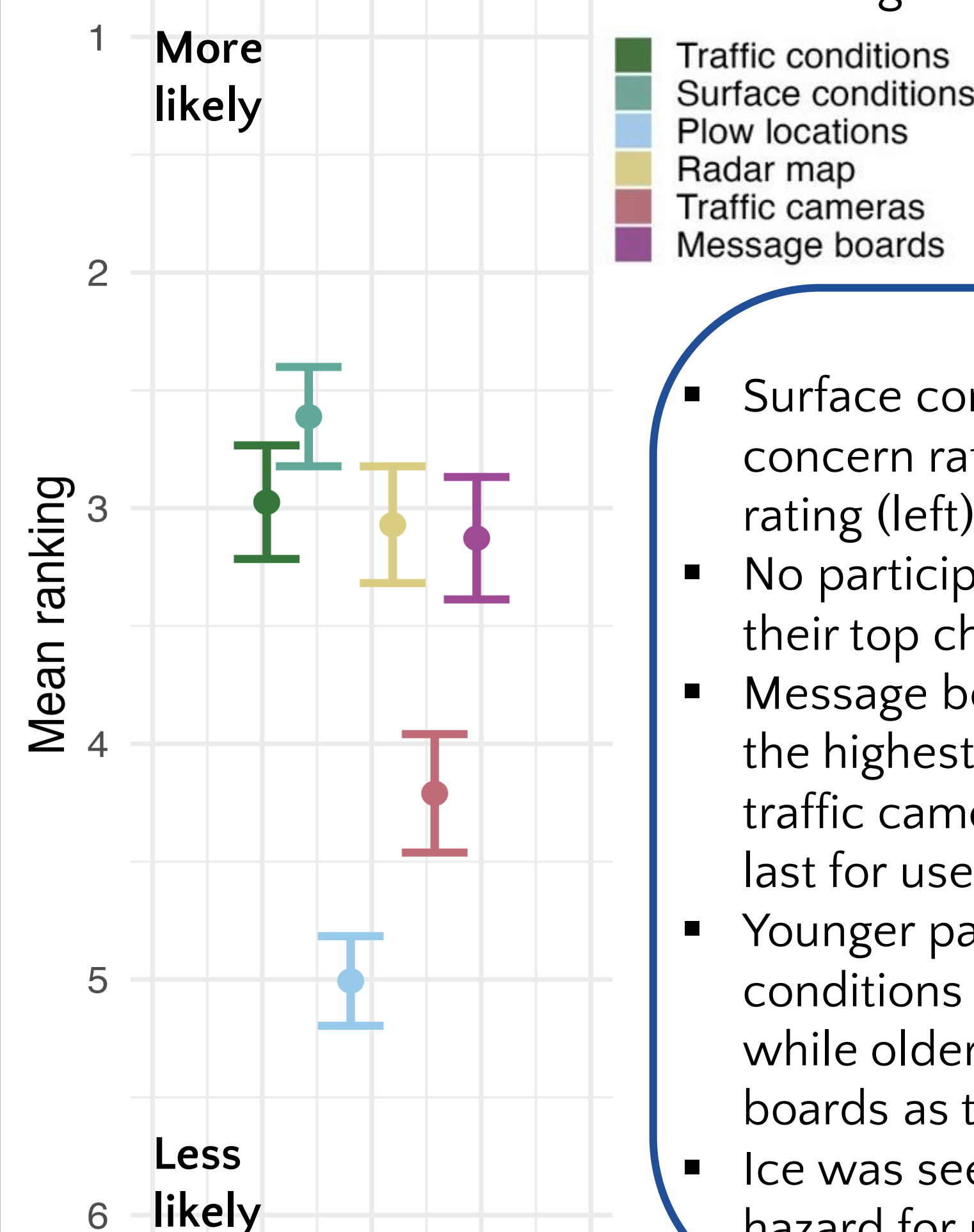


Figure 3: Mean ranking of tools

Q: Please rank the following winter weather hazards based on what you think is the most impactful to driving.

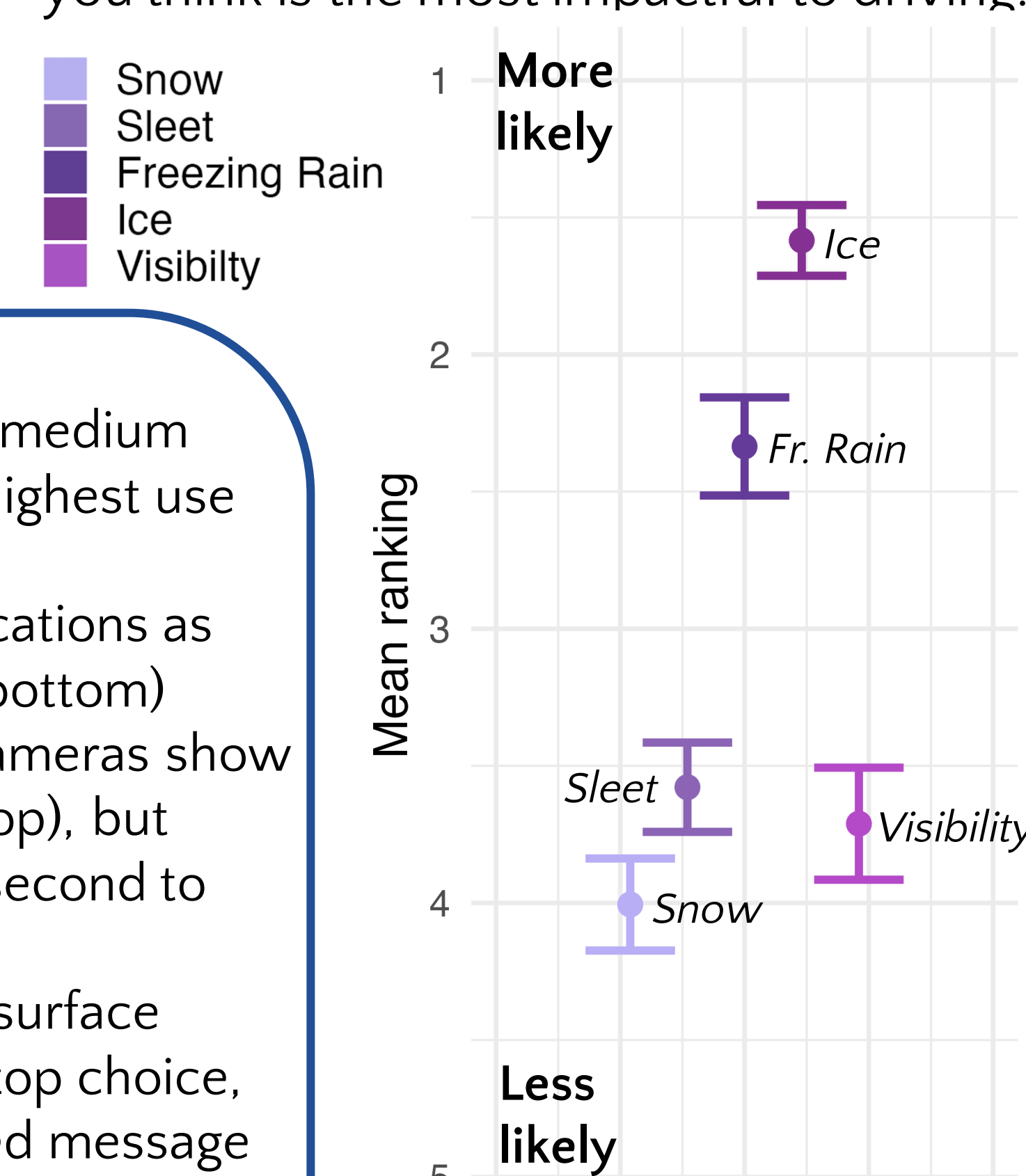
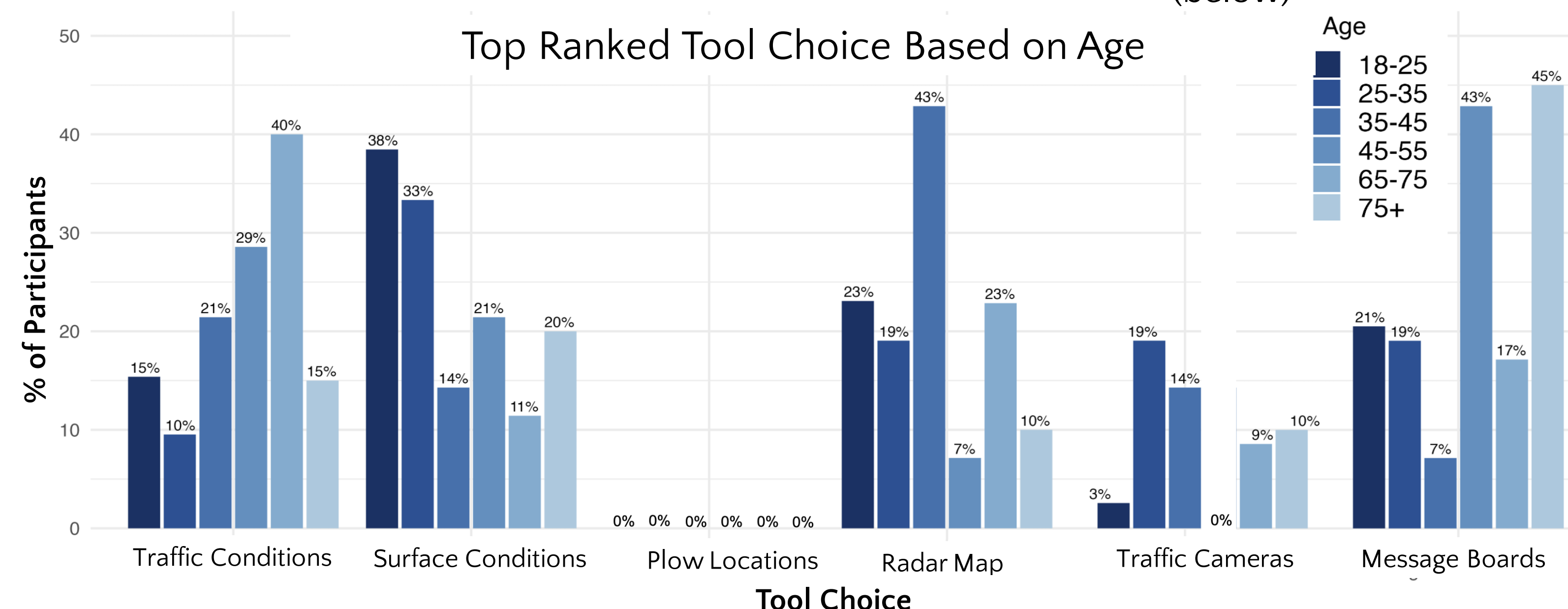


Figure 4: Mean ranking of weather hazards (above)

Figure 5: Top Tool choice by age (below)



Key Takeaways

- Surface conditions showed a medium concern rating (top) and the highest use rating (left)
- No participant chose plow locations as their top choice for use (left, bottom)
- Message boards and traffic cameras show the highest concern ratings (top), but traffic cameras were ranked second to last for use (left)
- Younger participants ranked surface conditions and radar as their top choice, while older participants ranked message boards as their top choice (bottom)
- Ice was seen as the most concerning hazard for road travel (right)

Qualitative Survey Results

Traffic Conditions: Participants were **most familiar** with this tool. Many say that they currently use it for daily commuting or on other mobile applications.

Surface Conditions: Many found this tool to be the **most useful** as it quickly conveys information in a familiar way but worry about color choice and understanding the legend.

Plow Locations: Participants said plows were not **relevant** to their travel plans, and that it would be useful to know direction of travel and if they are plowing or applying material.

Radar Map: Radar is overall easy to understand. Participants wanted **time loops** to gauge motion and intensity, and some did not have context for snowfall amounts.

Traffic Cameras: Cameras are useful to get an understanding of current conditions, such as visibility and surface conditions, but there is a **lack of cameras** in rural areas.

Message Boards: This tool is **largely location & message dependent**. Direct advice like "STAY HOME" is the most helpful. Some worry about timing and language access.

Discussion

Based the results of the survey, we suggest:

- The creation of consistent tools across states to improve understanding and familiarity.
- All tools should have an option of a color-blind scale.
- Snowplows may not be necessary to include as they do not convey enough information alone and DOTs prefer not to have them on their sites for safety reasons.
- More camera locations and message board locations are needed, especially in rural areas.
- People prefer to use the tools in conjunction with each other, making it hard to test them alone.

This preliminary work shows that different products illicit different levels of concern and likelihood of use. More research needs to be done to understand how different visualizations of the same product influence concern and use. It is also important to note that this survey was fielded with a convenience sample (i.e., on social media) and as such, it is not representative of the entire US population. Further work should seek out feedback from people with less knowledge of meteorology and populations in more rural areas.

Acknowledgements & References

Sorensen, J. H., 2000: Hazard Warning Systems: Review of 20 Years of Progress. *Nat Hazards Review*, 1, 119–125.

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