

Color inconsistencies across hazardous weather watches and warnings: Can standardized visual representation of risk improve public safety?

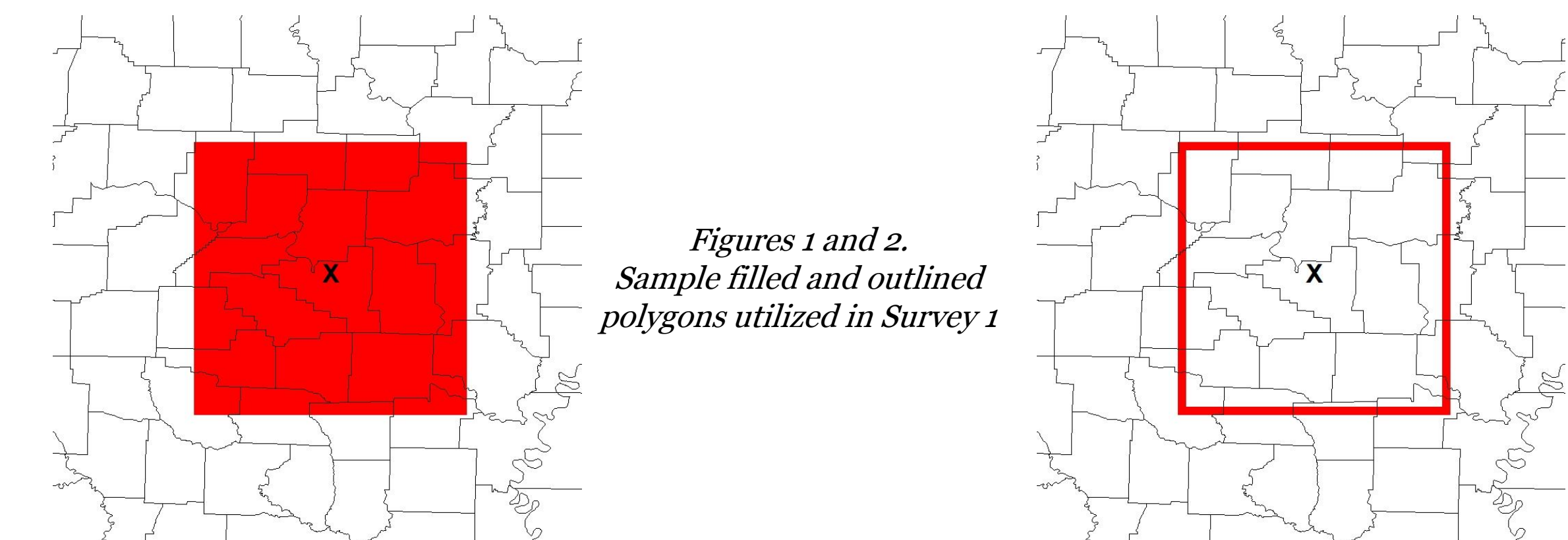
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INTRODUCTION

- Research has shown the color used to represent threat information can influence perceived risk and how individuals respond to watches and warnings. However, there is no standardized color scheme for hazardous weather products across the weather enterprise.
- There are visual stimuli associated with color and hazard perception, which could be useful to the meteorologist when considering how to disseminate information.
- This study's objective was to determine if color inconsistencies has a detrimental effect on a product's intended message utilizing two public surveys.

METHODS

- Survey 1 gathered data on the public's association of risk with color. Participants received twelve, randomized prompts asking about their perceived risk if located within a given area. Six colors were used including: red, orange, yellow, green, blue, and purple with filled and outlined versions of each color.
- Follow-up question: "Should colors associated with particular risks be used uniformly across the U.S.?"



- Survey 2 gathered data to better understand if people's perception of risk in the context of hazardous weather products is related to the type of product, the specific weather hazard, or a combination of the two. Respondents received four, randomized weather watch and/or warning products out of eight possible options.
- Questions utilized text from past watches and warnings with minor modifications made to remove the location and time. Hazards used included: tornado, severe thunderstorm, flash flood, and winter storm products.
- Follow-up question: "Do you feel that you associate a certain color with a particular hazard based on risk?"
- Statistical significance was determined utilizing the statistical software R. A non-parametric resampling method, the bootstrap method, and subsequent means were used to construct confidence intervals.

The public does associate colors with different levels of risk and desires color consistency on a national scale. Therefore the weather enterprise should utilize a national, uniform color scale based on risk when representing hazardous weather products.

DISCUSSION & CONCLUSIONS

- People use color to help determine risk and rely on whether a filled or outlined polygon is displayed.
- Regardless of the rank order of the hazardous weather products, the public does desire color consistency on a national scale. 92.90% of all survey respondents selected "agree" or "strongly agree" when asked "should colors be used uniformly across the U.S.", with 65.52% of all survey respondents selecting "strongly agree".
- Further results from this work show that individuals related risk to color. It was also shown that individuals perceive greater risk with warnings when compared to watches. The greatest perceived risk may be linked to experienced weather and warrants further study.

RESULTS

- Filled polygons, regardless of color, had statistically higher perceived risk than their corresponding outlined color polygons.

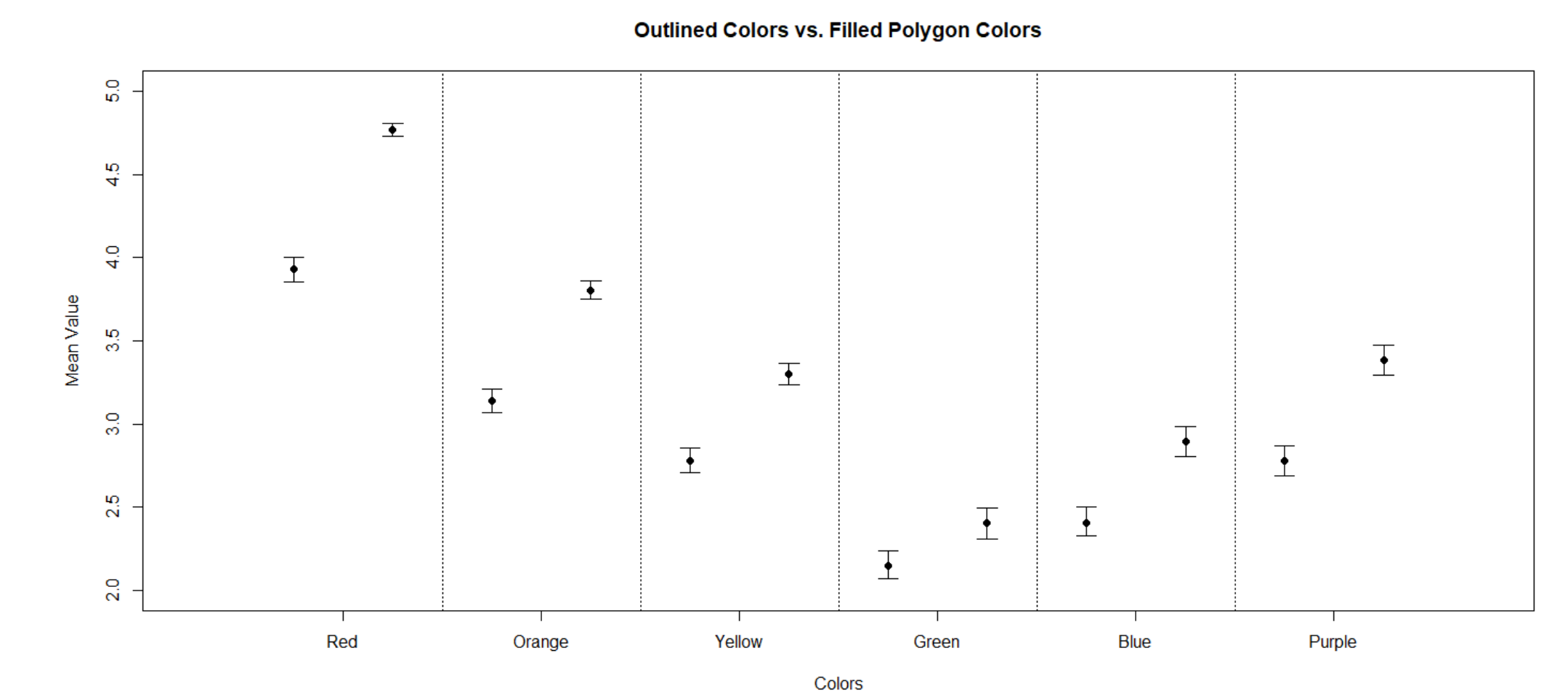


Figure 3. Survey 1 Outlined Colors vs. Filled Polygon Colors (outlined on the left, filled on right of each column)

- Hazardous weather warnings had statistically higher perceived risk when compared to their corresponding watch.

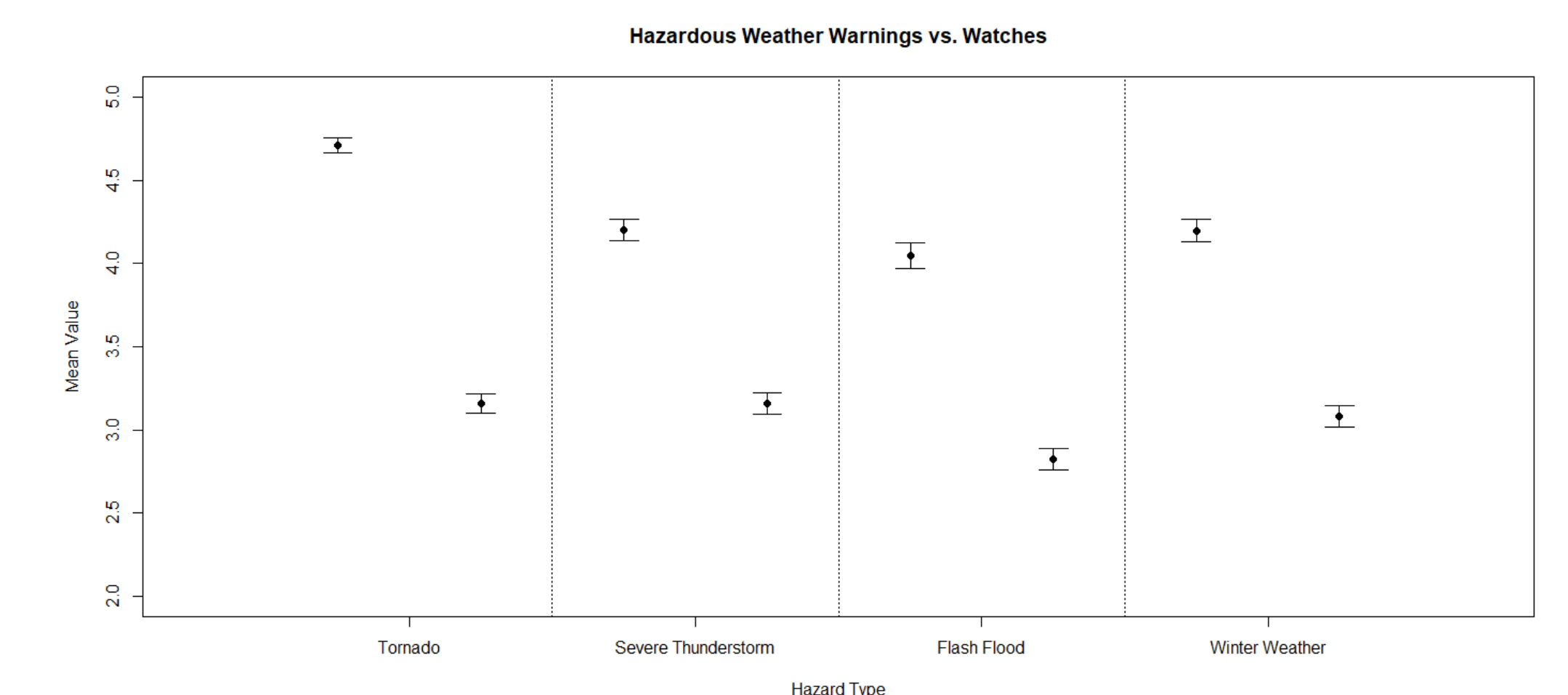


Figure 4. Survey 2 Hazardous Weather Warnings vs. Watches (warnings on the left, watches on the right of each column)

- Males associated statistically lower risk for all hazardous weather warnings and weather watches when compared with females.

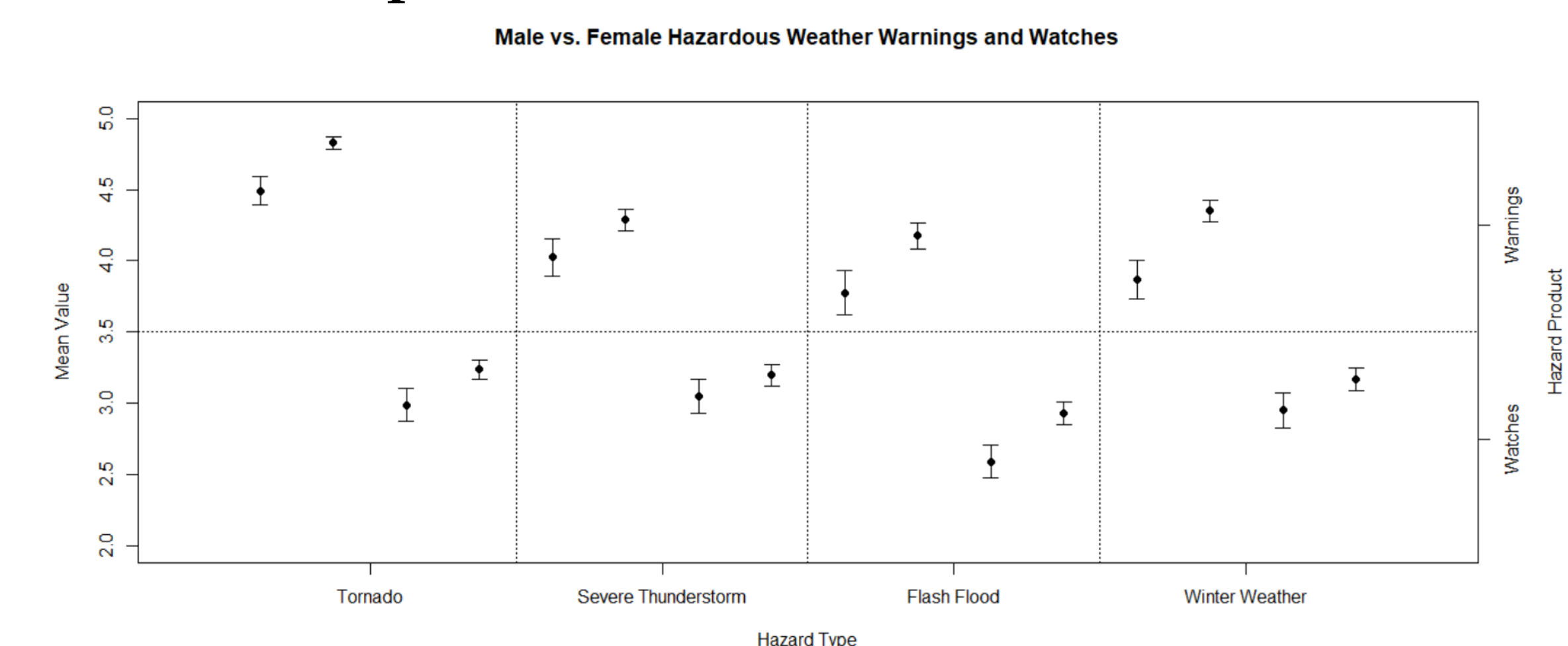


Figure 5. Survey 2 Gender vs. Hazardous Weather Warnings and Watches (male on the left, female on the right of each box)

- Age had statistically significant results from all hazardous weather watch types and severe thunderstorm, flash flood, and winter weather warnings.

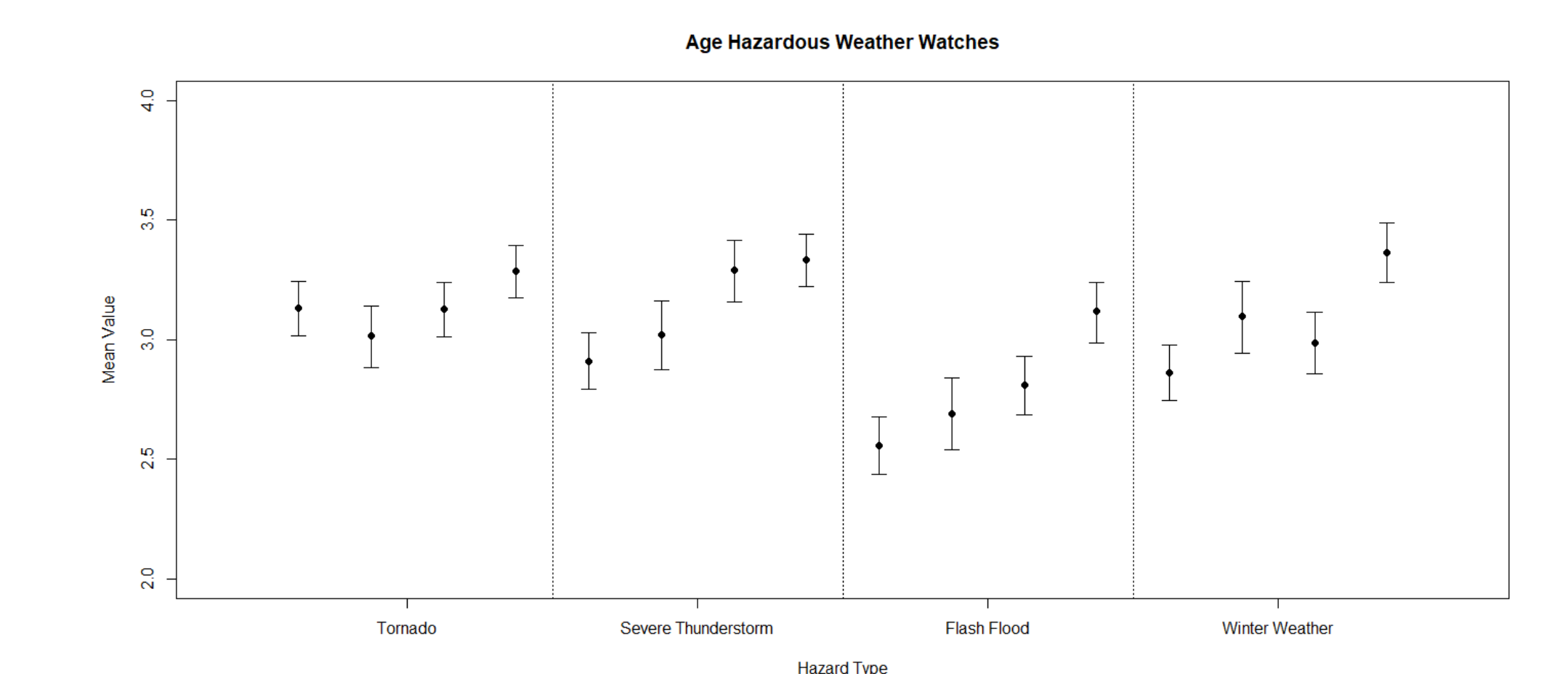


Figure 6. Survey 2 Age vs. Hazardous Weather Watches (from left to right in each column: 18-30, 31-40, 41-50, 51+)