User Understanding of Hurricane Wind Potential Graphics

Kathleen Sherman-Morris[1], Karla B. Antonelli[2], Carrick C. Williams[2]
Mississippi State University
[1]Department of Geosciences, [2]Department of Psychology

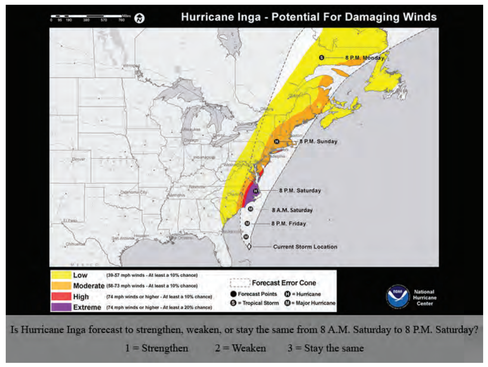
Hurricane Graphics Project Information

Project Goal: To improve the graphical communication of hurricane wind and storm surge potential by measuring the effectiveness of two new hurricane risk potential graphics.

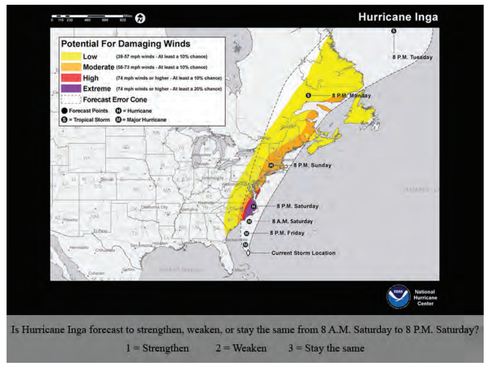
Components: The project had three components, an online survey, an eye tracking experiment and a legend comparison. The focus of this poster is the legend comparison, but background of the eye-tracking experiment is provided for context because both components utilized the same sample.

Sample: For the eye-tracking experiment and the legend placement comparison, 40 participants were recruited from the Starkville, MS area to view hurricane risk potential images and answer questions about the images. The participants viewed the graphics on a computer screen in the eye-tracking laboratory on the Mississippi State University campus. For each image a question/statement was displayed at the bottom of the screen that queried a specific element about the map. The sample consisted of 20 members of the local public, 9 experts, and 11 students

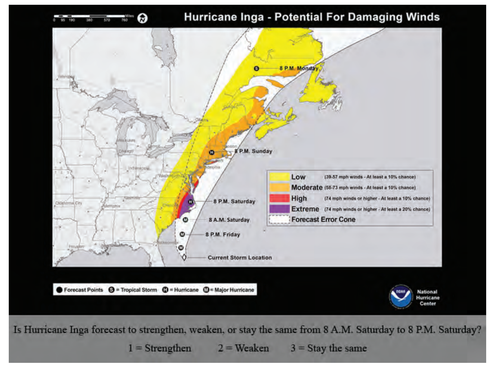
Wind Graphic Understanding/Legend Placement Comparison



"Bottom" Legend Placement



"Top" Legend Placement



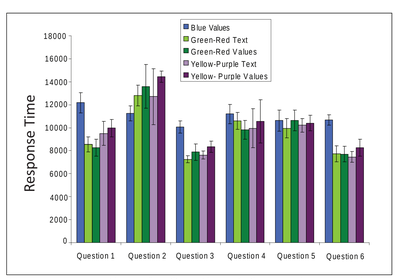
"Split" Legend Placement

Storm Surge Eye Tracking Experiment

Storm Surge Eye-Tracking Experiment Methods: We used a within-subjects design with five levels. Participants viewed images of storm surge predictions for 5 different storms using three color presentation modes and two legend types. Eight questions were presented for each storm . Participants were presented with two graphs that separately depicted each of the three color and two legend conditions and asked participants to choose which they felt did the best job of providing storm surge prediction information.

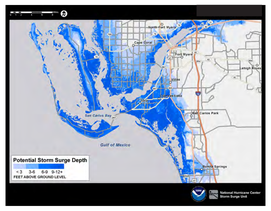
Response time results: Based on response time, blue was the most difficult to interpret. This was true for all questions except a direct comparison on the same map. Text references were easier to interpret than numerical values.

Accuracy results: While the green to red scale produced the most accurate results, accuracy was fairly high for all groups and color palettes.

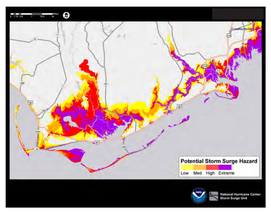


Mean response times for Questions 1-6. Error bars are the standard error of the mean.

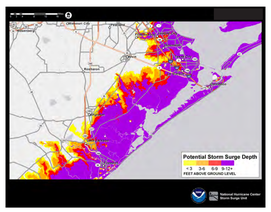
Blue Values



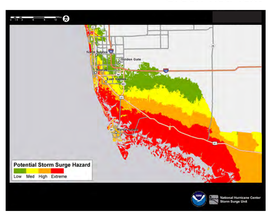
Yellow-Purple Text



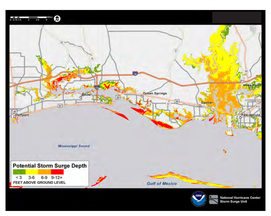
Yellow-Purple Values



Green-Red Text



Green-Red Values



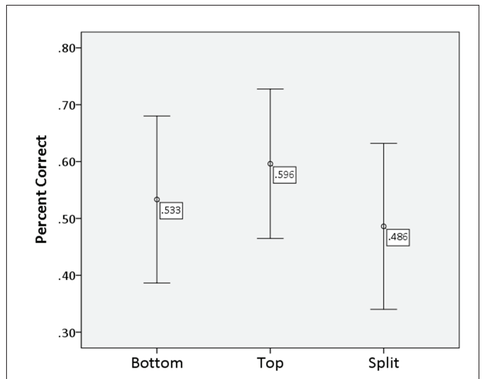
"Text" Legends

"Value" Legends

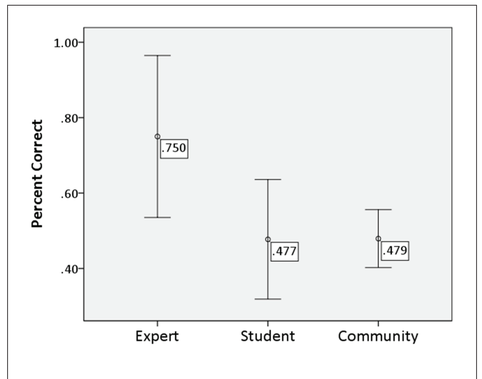
	Legend Type		Color Palette		
	Values	Text	Blue	G/R	Y/P
Experts (N = 9)	7	2	2	5	2
Community (N = 20)	9	11	2	14	3
Undergraduates (N = 11)	5	6	1	7	3
Total	21	19	5	26	8

Which of these maps do you think <u>does the best job</u> of informing the public about their storm surge risk?

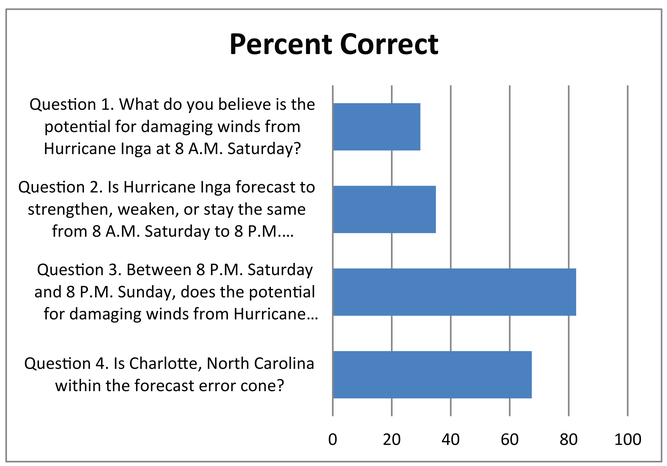
Legend Placement Comparison Methods: Participants were shown one of the three hurricane forecast maps above and asked four questions about it. The questions were designed so that participants would most likely need to use the legend in order to answer the questions. At the same time, they were questions a typical forecast user may want to know. Accuracy as a percentage of the four questions was examined for each legend placement and among the three groups. The chart below shows overall accuracy for each question.



Accuracy level among the three legend placement locations. Error bars show means with 95% confidence intervals.



Accuracy level among the three sample groups. Error bars show means with 95% confidence intervals.



Results: The top legend led to slightly higher average accuracy, but this was not significant. Experts did perform better on the four questions than the other two groups. Considering the whole sample, participants performed the worst on Question 1 (29.7% correct) and best on Question 3 (82.5% correct). It is unclear whether lack of hurricane knowledge or poor map reading skills had more influence on accuracy results.

Conclusions: There were no significant differences among the three legend placement options with respect to accuracy. A potentially more important result is the low overall accuracy. Even a question about whether a location is within the forecast cone was only answered correctly by 67.5% of participants. Future studies should examine how much the public understands about hurricane forecasts and examine accuracy of forecast interpretation among a general population who is more susceptible to hurricane threats,

Acknowledgments: This project was funded by NOAA, through the Northern Gulf Institute. The authors also thank Ethan Gibney, for creating the storm surge images.

MISSISSIPPI STATE UNIVERSITY