Extended Abstract: How Hurricane Visualization Tools Affect the Public's Perception of Risk and Preparedness

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Abstract - We discuss the design and preliminary findings of research conducted in Spring 2020 that seeks to understand the effect of hurricane visualization tools on individuals' perceived risk and subsequent preparedness for incoming storms. We focus on the narrative elements in hurricane risk tools, exploring how these elements affect Central Florida residents' levels of anxiety about and preparedness for incoming storms as a result of using visualization tools.

Hurricane visualization tools, narrative visualization, perceived risk, risk communication.

EXTENDED ABSTRACT

To explore the effects of visualization tools on the public's perception of risk, we conducted a three-part qualitative survey, content analysis, and interview study. Our aim was to identify the most common visualization tools used by the public to learn about potential hurricane paths and risks; assess these tools according to information visualization principles to determine to what degree they rely on narrativizing hurricane risk; and connect the narrative aspects of visualization tools with their influence on the public's anxiety, risk perception, and resulting hurricane preparedness. In this presentation, we discuss preliminary results and discuss connections to the technical communication and risk communication literature.

In Part I of the study, participants self-reported their experiences learning about and preparing for hurricanes via an online survey asking them about their hurricane preparedness, including the tools they use to track and learn about hurricanes, the steps they take to prepare for storms, and their concerns about approaching hurricanes. Part II's thematic content analysis focused on the narrative elements in the primary risk visualization tools that survey participants described. In Part III, follow-up interviews with a subset of survey participants helped us better understand their emotional responses to both hurricane preparedness and various risk communication tools.

Our emphasis on narrative follows previous research in science and risk communication. Stories have been shown to both persuade and increase scientific comprehension in non-experts [1], and are beneficial to technical communicators, who can begin to look at individuals and cultures as complex and layered rather than holistic [2]. We define tools taking a narrative approach as those that emphasize storytelling. For example, a narrative tool might present an approaching storm as a series of events linked through cause and effect rather than as a meteorological event surrounded by scientific uncertainty.

Though information visualization, narrative, and risk communication are established research foci within technical communication, prior studies have not focused on how the narrativity of visualization tools can help or hinder risk communication. For example, previous work on the impact of color schemes on risk perception has examined "accuracy, perceived risk, and perceived helpfulness" of visualizations communicating the threat of hurricane storm surge [3, p. 69]; the communicative effectiveness of the so-called "cone of uncertainty" (a graphic depicting the probable path of a particular storm) [4]; and the perception of storm surge potential by the public and by experts [5]. Our study analyzes specific visualization tools with an aim of determining how tools that narrativize risk can affect the public's anxiety levels, thus adding to this body of knowledge.

REFERENCES

[1] M. F. Dahlstrom. "Using narratives and storytelling to communicate science with nonexpert audiences," *Proc. Nat. Acad. Sci.* vol. 111, no. 4, pp. 13614–13620, 2014.

[2] J. M. Perkins. "Narrative, rhetoric, and lives: Doing ethnography." In *Narrative and Professional Communication*, J. M. Perkins and N. Blyler, Eds. Westport: Greenwood, 1999, pp. 63–77.

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[3] K. Sherman-Morris, K. B. Antonelli, and C. C. Williams. "Measuring the Effectiveness of the Graphical Communication of Hurricane Storm Surge Threat." *Weather, Climate, and Society*, vol. 7, pp. 69–82, 2015.

[4] A. Cairo. "Uncertainty and Graphicacy: How Should Statisticians, Journalists, and Designers Reveal Uncertainty in Graphics for Public Consumption?" in *Power from Statistics: Data, Information, and Knowledge*, 2017.

[5] B. H. Morrow, J. K. Lazo, J. Rhome, and J. Feyen. "Improving Storm Surge Risk Communication: Stakeholder Perspectives." *Bull. Am. Meteorological Soc.*, Vol. 96, pp. 35–48, 2015.