The “Jim Cantore Effect?” A Preliminary Test of Individual Difference-Induced Media Effects
Upon Hurricane Evacuation Decisions

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Note: This version adds labels for Table 1 and corrects a data entry error regarding the total hurricane fear rating for people low in intuition, which does not meaningfully affect the results.

It also adds a line in the results section regarding that finding. (10/25/2020)

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Abstract

We conducted this study to test for an interaction of media effects and individual differences that could affect hurricane evacuation decision-making. Participants responded in an online, Qualtrics-hosted survey to many demographic and individual difference questionnaires assessing decisions one would make in a hurricane evacuation. Participants were randomly assigned to one of two video conditions (reporter emotionality: high or low) and asked a number of questions about the field-reporting meteorologist they viewed. We predicted an interaction between intuitive thinking (which is faster and more emotional) and emotional reporting such that highly intuitive thinkers would be more likely to evacuate when presented with more emotional hurricane field reporting. This hypothesis was rejected. However, there was a main effect of intuition, whereby highly intuitive people expressed more fear for weather (but not hurricanes). Furthermore, there was a main effect of media condition: People exposed to highly emotional field reporting in general were more likely to evacuate. These results are discussed in light of meteorological communication standards and principles.

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Hurricanes have long posed a threat to coastal residents of the United States. Sociologists, geographers, and communications practitioners have, in turn, become increasingly interested in understanding the human response to these forces of nature. These researchers have studied, for example, perceptions of hurricane-track forecasts (Seinkbeil et al. 2020), hurricane hazards (Saunders and Senkbeil 2017; Senkbeil et al. 2019), household-level (Lindell et al. 2011; Solis et al. 2009) and wider societal (Dow and Cutter 1998, 2002; Morss et al. 2016; Rohli et al. 2018) evacuation decision-making, the impact of traffic patterns on evacuations (Dixit et al. 2008; Sadri et al. 2014) the role of social factors in deciding whether or not to evacuate (Collins et al. 2018; Ricchetti-Masterson and Horney 2013; Widener et al. 2013), and the obstacles faced by vulnerable populations in evacuating (Abramson and Garfield 2006; Casserly 2006; Ng et al. 2014; Osofsky et al. 2007; Redlener et al. 2007; van Willigen et al. 2002; White 2006).

But social, cognitive, and other psychologists are interested in examining questions related to hurricane evacuation decision-making, too. Some specific topics of investigation have included the influence of knowledge on hurricane forecast visualization interpretation (Boone et al. 2018); affective (i.e., emotionally positive or negative) and cognitive responses to hurricane warning messages (Villegas et al. 2012), Gulf Coast resident perceptions of hurricane destruction (Stewart 2011), self-efficacy beliefs in the evacuation process and their role in evacuation likelihood (Stewart 2015), and the relationship between individual differences, including political orientation and personality, in the evacuation decision-making process (Losee et al. 2019).

We aim to add to this body of literature by presenting a preliminary study at the intersection of meteorology, and both media and individual differences psychology. Specifically, we were interested in examining whether or not media effects and individual differences in intuition and weather-related fear interact to influence coastal U.S. residents' likelihood to evacuate in the face of an approaching tropical system—to examine if there exists a “Jim Cantore Effect” on hurricane-related decision-making, whereby the field reporter's emotionality impacts evacuation choices. The next section of the paper details the theoretical view applied for this study. Afterwards, we present our methodology and results, and then the final section will discuss our conclusions and implications for further understanding hurricane evacuation behaviors.

Intuition

Intuition is one-half of a dual-process model of cognition that also comprises rationality (De Neys and Pennycook 2019). It involves rapid, “gut”-based decision-making, whereas rationality is a slower, more deliberative decision style. Together, these two cognitive styles that dictate the ways in which people process the world around them, similar to empathizing and systemizing. In the empathizing-systemizing theory, empathy—the drive and ability to infer and respond to others' emotions—and systemizing—the drive and ability to construct logical, if-then type rules for the way the world works—are cognitive styles related to emotion and detail-orientation (Bolton et al. 2020). Indeed, looking to the literature, we find intuition correlated with empathizing and rationality with systemizing (Brosnan et al., 2014). Thus, these faster and slower analytical modes of processing are linked.

Method

Participants

One-hundred and six volunteer participants (72 women; 32 men; 2 nonbinary individuals; $M_{\text{age}}=47.05$, $SD = 15.87$, range: 18-76) were invited through social media to fill out a Qualtrics-hosted survey.² Participants reported their distance from the coast in 5-mile increments for the first 40 distance units and in 10-mile increments from 50 to within 140 miles of the coast. Another option was for those living beyond 150 miles from the coast. Most participants were living within 5 miles of the coast (17), between 5 and 10 miles (13), or between 90 and 100 miles (15). The remainder were spread out up to 130 miles from the coast. Only 31 (29.2%) of 83 respondents indicated having evacuated at some point in their lives, and most (51 of 105) had not attended or finished college.³ Nineteen individuals reported either personally having, or living with somebody who had, a disability which would make hurricane evacuation difficult (specific conditions not requested). Additional demographics in our supplemental, open data (an SPSS file available at <https://osf.io/5mvqn/>) included, for example, items on home ownership, type of home lived in, and participant-perceived structural home stability.

Procedure

All study procedures were approved by the Saint Leo University Institutional Review Board. Participants first responded to the various demographic items and then to individual difference measures of home attachment (author-created items for this survey), rationality and

² Racially, they were 96 European-American, 4 Latino/a, 3 Hispanic, 2 African-American individuals, 1 bi- or multi-racial individual, and 3 people from one or more other, unspecified backgrounds recruited through posts on Facebook (80, including 8 specifically from the "Weather Center" page), Twitter (9), and other social media sites such as Reddit (8). They were recruited across 9 states: 1 participant for Alabama; 2 for Georgia; 32 for Florida; 10 for Louisiana; 2 for Maryland; 39 for North Carolina; 12 for South Carolina; 7 for Texas; and 1 for Virginia

³ There were 13 current college students and 41 college graduates. Three degreed meteorologists took part.

intuition (Hamilton et al. 2016), trust in the news media (Prochazka and Schweiger 2018), fear of weather more generally, and hurricane fear.

First, the home attachment items were 5 statements original to this study (see Appendix A), measured on a 7-point, agreement-based Likert scale. Cronbach's α (alpha), a statistical tool (Cronbach 1951) used by psychologists to determine scale reliability, was calculated for all measures. Alpha scores range from 0-1, with 1 indicating greater inter-item correlation and therefore greater reliability. A standard of acceptable reliability generally starts at 0.70. The home attachment items were reliable with an α score of 0.95. Next, rationality and intuition were measured with the Decision Styles Scale (DSS; Hamilton et al. 2016). The DSS is made up of two 5-item subscales, responded to on 5-point, agreement-based Likert scales which separately assess one's tendencies for rational and intuitive thinking. Both subscales were reliable; intuition $\alpha = 0.88$, rationality $\alpha = 0.90$.

Media trust was assessed with 12 items (excepting the journalist-specific subscale) from the Trust in News Media Scale (Prochazka and Schweiger 2018). These were responded to on a 5-point Likert scale asking the participant about the perceived truthfulness of each statement. Examples include "The media pay the necessary attention to important topics," "The media address the essential points of the topics they cover," and "The information in the news coverage would be verifiable if examined." The media trust scores were reliable; $\alpha = 0.96$.

To measure hurricane fear, we followed methodology established by Losee, Smith, and Webster (Losee et al. 2019), who instructed participants to rate their agreement with a statement about several fear- and interest-based descriptive adjectives, scores for which were then summed to yield a total score. We used only the five negative (i.e., fear-based) adjectives for our analyses. They were reliable with an α of 0.89. To measure weather fear more generally, we used 10 items

from a scale created by one of the authors (FOWS, Fear of Weather Scale, Stewart, unpublished). Participants rated, on a 7-point Likert scale, how much they fear a particular weather-related outcome (danger; i.e., to oneself, to others, to one's belongings; and loss, e.g., of electricity, one's home, vehicle, or other property, or of access to such things as transport and healthcare). They, too, were reliable, with an α of 0.93.

After responding to these various items, participants were randomly assigned to watch, and then answer questions about, one of two videos featuring a meteorologist reporting live from the field during a landfalling hurricane. To select the two video stimuli used in the experiment, we first searched YouTube for videos featuring hurricane field coverage. Ten videos featuring Weather Channel meteorologist Jim Cantore were chosen as candidates. Then, a subset of the authors rated the videos based on the depicted tropical system's intensity and the emotionality of the reporting meteorologist. These videos were narrowed to 4 finalists which were put to vote and furthered narrowed to the two videos shown to participants. The author-reported mean storm-intensity, on a 1-7 Likert-type scale where 1 = least intense and 7 most intense, for video 1 (low emotion) was 6, with an emotion rating of 4. The mean storm-intensity rating for video 2 (high emotion) was 6.3 and the emotion rating was 4.3. These ratings provided some degree of objectivity to our decision-making. The chosen stimuli can be viewed online (high intensity/low emotion: <https://youtu.be/aeVShpJWeng>; high intensity/high emotion <https://youtu.be/MQh1z9HZqTc>). Storm intensity was constant; we only varied the perceived emotionality of the reporting meteorologist.

We desired to keep constant as many variables as possible so as to mitigate confounds (e.g., selecting both a female and male meteorologist or two meteorologists of the same gender). Thus, given his relative fame (and, in some circles, notoriety) among members of the public,

Weather Channel meteorologist Jim Cantore was chosen as the subject for both videos. This explains the low variability in rated emotionality between the two videos.

Results

A 2 (video condition: high/low reporter emotionality) x 2 (participant intuition: high/low) multivariate analysis of variance (MANOVA) tested for (1) the hypothesized interaction between intuitive thinking and Jim Cantore's perceived emotionality, and (2) potential exploratory interactions between weather and hurricane fear, with the prediction that those higher in intuition would be more likely to evacuate when exposed to more emotional reporting (but no hypotheses for fear). Partial eta-squared (η_p^2), a measure of the strength of the effect, and observed statistical power—both ranging from 0-1—are provided to give the results further context.

Our hypothesis was rejected; there was no interaction between intuition and reporter emotionality ($p > 0.2$). The MANOVA (Tables 1 and 2, presented next) showed, however, that people exposed to emotional hurricane field reporting in general were more likely to evacuate. Furthermore, highly intuitive people expressed a greater degree of weather, but not hurricane fear.

Table 1. Means and Standard Deviations for Two-Way Multiple Analysis of Variance.

Variable	Condition	Group	Condition		Total x Variable	
			<i>M</i>	SD	Total	
					<i>M</i>	SD
Evacuation Likelihood	High Emotion Video	High Intuition	5.14	2.18	4.43	2.41
		Low Intuition	4.19	2.25	3.88	2.22
					4.51**	2.25
					3.55	2.22
Evacuation Likelihood	Low Emotion Video	High Intuition	3.33	2.45		
		Low Intuition	3.61	2.19		
Weather Fear	High Emotion Video	High Intuition	46.71	13.34	39.56	11.82
		Low Intuition	35.85	9.17	37.25	12.42
					45.00*	14.29
					35.81	10.11
Weather Fear	Low Emotion Video	High Intuition	42.33	16.09		
		Low Intuition	35.77	11.02		
Hurricane Fear	High Emotion Video	High Intuition	6.57	3.32	6.22	3.01
		Low Intuition	6.04	2.89	5.63	2.98
					6.61	3.30
					5.66	2.84
Hurricane Fear	Low Emotion Video	High Intuition	6.67	3.46		
		Low Intuition	5.32	2.81		

Note. Significant total values indicated, * $p < 0.05$ ** $p < 0.01$.

Table 2. Multivariate Analysis of Variance Statistics

	df	SS	MS	<i>F</i>	<i>p</i>	Power	η_p^2
Video Condition							
Evac Likelihood	1	22.53	22.57	4.50	0.037*	.55	.06
Weather Fear	1	78.94	78.94	.60	.443	.12	.008
Hurricane Fear	1	1.52	1.52	.17	.682	.07	.002
Intuition							
Evac Likelihood	1	1.83	1.83	.365	0.547	.09	.005
Weather Fear	1	1205.20	1205.20	9.09	0.003**	.85	.11
Hurricane Fear	1	14.01	14.01	1.56	0.216	.23	.02
Error							
Evac Likelihood	77	385.143	5.00				
Weather Fear	77	10213.68	132.645				
Hurricane Fear	77	693.166	9.00				
Corrected Total							
Evac Likelihood	80	412.89					
Weather Fear	80	11709.73					
Hurricane Fear	80	715.56					

Note. Significant total values indicated, * $p < 0.05$. ** $p < 0.01$.

Figure 1. I: Intuition; R: Rationality; HA: Home Attachment; HF: Hurricane Fear; WF: Weather Fear; MT: Media Trust; EL: Evacuation Likelihood. Statistical significance indicated with correlations.

Next, correlational analyses (Figure 1; variable abbreviations follow) revealed the general relationships between intuition (I), rationality (R), home attachment (HA), weather and hurricane fear (WF and HF), trust in the media (MT), and evacuation likelihood (EL). Home attachment was significantly correlated with fear of hurricanes, $p = 0.041$; and intuition, $p = .045$.

It was non-significantly correlated with rationality and evacuation likelihood (both $ps >$

0.8). Media trust was significantly associated with both weather, $p = 0.001$, and hurricane fear, $p = 0.031$. It was further significantly correlated with intuition, $p = 0.022$; but non-significantly with rationality, $p > 0.8$.

Discussion

This study is to our knowledge the first to examine the possible existence of media effects on hurricane evacuation decision-making. Contrary to our prediction of an interaction between higher intuition and perceptions of field reporter emotionality, we found that people in general who are exposed to more emotional reporting tend to report a higher likelihood of evacuating in advance of an approaching hurricane.

We found, also, that more intuitive people living near the coast tend to exhibit higher degrees of weather, but not hurricane, fear. This is reflected by the finding that nearly half of the reporting sample (83 individuals; 49%) indicated having never evacuated for a hurricane or tropical storm. One possible explanation is geographic, in that many people who have not

evacuated live further from the coast. This is plausible considering our previously conference-presented version of this project, with 65 individuals in the statistical model living within 100 miles of the coast (versus 81 here, living within 130 miles), showed that higher intuition *was* associated with higher hurricane, as well as weather, fear (Bolton et al. 2019). Significance was lost once more people, further from the coast, were recruited. Both of these findings were small in magnitude, as denoted by their effect sizes, and underpowered. Consequently, and as this is preliminary research, we are not making firm inferences from these data. We do suggest, however, that further investigation is warranted. Other factors could be at play, considering that Gulf Coast residents underestimate hurricane impacts (Stewart 2011). As relates to our research questions here, it may be prudent to investigate whether there a benefit to showmanship or intensity of field reporting in conveying hurricane risk messages, or whether heightened displays of emotionality inhibit safety.

Home attachment's relationships in this study are intuitive. People who care more for their home express greater fear it will be damaged or destroyed in a hurricane. Intuition, further, is related to empathizing. Thus, it makes sense that slower, more deliberate thinkers would be able to reason through the situation and guard themselves against emotional attachment for their homes.

The relationship between media trust and weather and hurricane fear is intriguing. We did not specify any particular instructions or context in which those items should have been answered, nor were the items modified—they were left with general news media as the referent with no mention of trust in meteorologists. However, it is highly likely that is how participants understood them--that is, the meteorologist was increasingly seen as an authority figure as storm conditions worsened. This is not implausible; often, broadcast meteorologists are called upon as

the authority figure for all things science within the television station. Another, related line of thought is that when people see the tropical system's effects unfolding, their confidence in the media, regardless of referent, is increased (this is counter to the finding that confidence decreases when natural disasters do not pan out; Major and Atwood 1997; for example, speaking anecdotally, people sometimes become angry and speak out about poor forecast performance when a hurricane they have prepared for does not affect them). Weather forecast inconsistency, forecast outcome, and user trust all interact and influence the ways in which people form their perceptions of meteorologists (Burgeno and Joslyn 2020).

Limitations and Conclusions

The present study has several limitations. First, our hypothesis testing was restricted by a small sample; some of our results lack sufficient adequate statistical power. Thus, these findings are in need of replication before firm judgements and conclusions can be inferred. Next, as always with online studies involving self-report, the data are subject to impression-management concerns. That is, for example, did the participants try to "sniff out" the hypotheses in order to answer a certain way; did they fully comprehend and/or respond honestly to the survey items? We also did not collect data regarding how long participants had lived in their indicated coastal zone, and a final limitation concerns our video stimuli. Speaking anecdotally, Jim Cantore typically only reports (or is, at least perceived to report) in the most severe tropical weather situations and his affective range, as indicated by our consensus rating, appears highly consistent. Follow-up work should capture a greater emotional range in reporting, in order to examine how this might affect viewer perceptions. In conclusion, this study provides a novel and preliminary look at media-psychological effects on hurricane-related decision-making. Contrary to our prediction, we found higher evacuation likelihood is associated not with an interaction between

intuition and media emotionality but rather exposure to emotional hurricane reporting in general. Further research is needed to better elucidate and support this finding.

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Bolton originally conceived the study and analyzed the data with Ault. All authors participated in the study design process. Allen was the primary manuscript author with guidance and support from Bolton. All authors approved the final manuscript. Ault advised on statistics. Mogil, Toole, and Stewart provided subject matter expertise on meteorology, media effects, and the psychology of hurricane evacuation, respectively. This study was conducted without funding and we have no conflicts of interest to declare. We are grateful to high school student Aaron Serré for his assistance in early stages of this work, leading to its conference presentation. Bolton was supported academically during the period of this work by a Graduate Fellowship sponsored by the U.S. National Weather Service and awarded by the American Meteorological Society. The opinions, conclusions, and/or recommendations expressed here are those of the authors and do not necessarily reflect the views of the National Weather Service or American Meteorological Society.

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Appendix A: Home Attachment Items

1. I feel that my home is a part of me.
2. My home is very special to me.
3. My home is the best place for me to live.
4. I feel more comfortable in my home than anywhere else.
5. My home makes me happy.