



HUSSMAN SCHOOL
OF JOURNALISM AND MEDIA

UF | College of Journalism
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Electrical &
Computer Engineering

Tailoring Generative AI Chatbots for Multiethnic Communities in Disaster Preparedness Communication: Extending the CASA Paradigm

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Motivation



How can we apply the newest AI innovations to help multiethnic communities prepare for hurricanes?

We develop different prototypes of GPT-4 chatbots to communicate hurricane preparedness information to diverse communities and test their effectiveness.



Background: Disaster Preparedness & Multiethnic Communities

Challenges of chatbots in Disasters:

- Chatbot deficiencies (e.g., lack of empathy)
- Language & cultural issues
- Systemic racism, lack of trust

Potential of Generative AI (GenAI) Chatbots:

- Enhanced levels of humanness and personalization.
- Transform generic information into interactive and personalized communication.



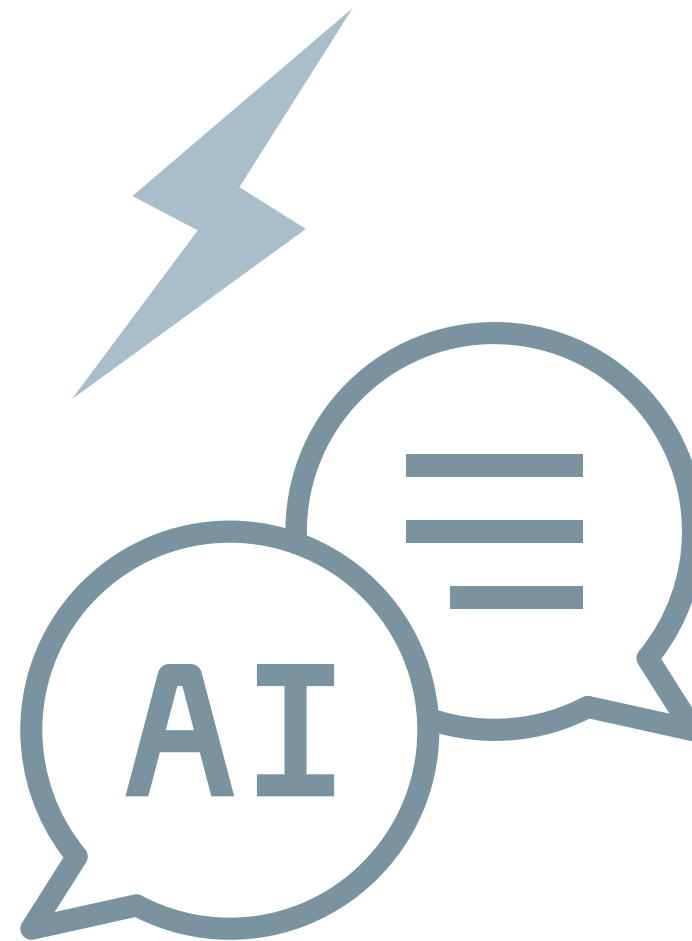
Theoretical Framework



The CASA (Computers Are Social Actors) Paradigm:

People respond to computers as if they were actual social actors, applying social rules and behaviors to interactions subconsciously (Nass & Moon, 2000).

--> **Anthropomorphism** is key to foster trust and engagement.



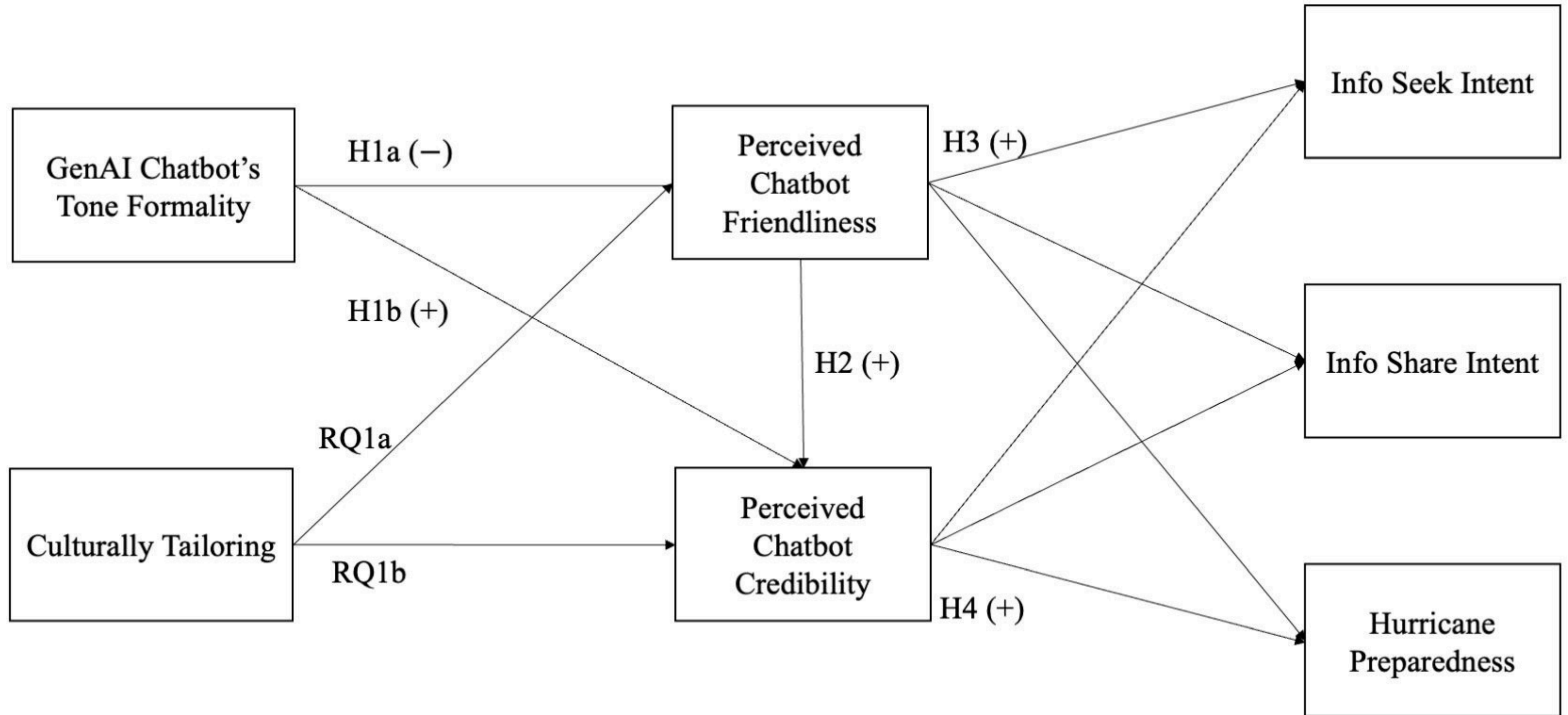
Conversational Tone:

- A conversational tone can make interactions natural and friendly, fostering positive relational outcomes (Kelleher, 2009).
 - In operationalizing conversational tone, we focus on tone formality.
-

Cultural Tailoring:

- Adapting messages to cultural traits of a group, enhancing effectiveness (Huang & Shen, 2016).
 - Users respond to culturally tailored chatbots as if they are interacting with an in-group member.
-

Key Variables/Hypotheses



Methods

Online between-subjects experiment:

- GenAI chatbot tone formality (formal vs. casual) * Cultural Tailoring (present vs. absent)

Participants:

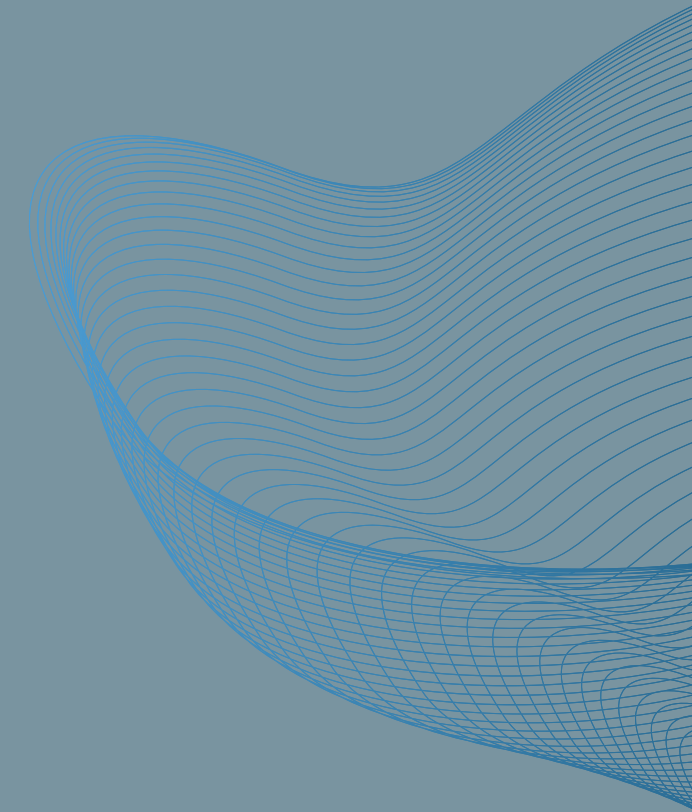
- Recruited through Prolific.
- 441 Black, Hispanic, and Caucasian residents in Florida.

Procedures:

- Imagine an upcoming hurricane.
- Random assignment on Qualtrics through custom URLs.
- Interact for > 5 minutes and complete the questionnaire.

Key Measures:

- Chatbot perceptions: friendliness, credibility
- Disaster outcomes: preparedness, info seeking & sharing intent



Methods (cont.)

Chatbot Development:

- Programmed using PHP and interfaces with GPT-4-1106-preview via OpenAI's API.
- Our web server supports up to 100 concurrent users.
- Features include adaptive prompts, chat logs/timestamps etc.

System Prompts:

- For all conditions: Asking GPT-4 to role-play a local official agent and provide hurricane prep info.

Manipulation Prompts:

- **Tone:** using a formal, official vs. casual, informal tone.
- **Cultural Tailoring:** language option, culturally familiar agent name, concern for the ethnic community etc.

Hello, my name is **Marco Ruiz**, and I'm with the Florida State Disaster Management Agency. I'm here to provide you with important hurricane and storm updates. We understand the unique concerns of our **Latino and Hispanic communities**, and we want to ensure you have access to the resources and information needed for thorough preparation. If you have any question or if you need **information in Spanish**, please let me know. It's crucial to have a disaster plan that includes a list of local shelters, a well-stocked emergency kit with necessities such as water, non-perishable food, medications, and important documents. Also, consider reinforcing your home and understanding your evacuation zone. How can I assist you further today with preparing for the upcoming weather conditions?

Type your message...

Send

Example: **Culturally tailored** chatbot
in a formal tone



Results

| Communication-Related Topics | Definition | Examples |
|-----------------------------------|---|---|
| Anthropomorphism | Users interacted with the chatbot as if it were a real human, including expressing emotions (e.g., anxiety, gratitude), providing positive responses, greeting the chatbot, or asking whether it is safe. | e.g., Thanks, you were very informative! e.g., I heard this really hard song that reminded me of a hurricane what's your favorite. |
| Personalization | Users provided personal information such as zip code or location, or indicated preferred languages (e.g., English) to access personalized information. | e.g., I don't like the slang you are using. e.g., English is fine. e.g., Altamonte Springs. |
| Disaster-Related Topics | | |
| Hurricane forecast | Hurricane arrival forecasts, eye, categories explained, flood zone status checking, how to receive alerts, and how to find links. | e.g., How can I make sure I receive timely alerts and warnings? e.g., What are the different hurricane categories? |
| Hurricane preparation | Home preparation (e.g., securing windows) and emergency kit essentials such as water and food prior to hurricanes. | e.g., ways to protect my home from hurricanes. e.g., what specific non-food household supplies should I have on hand for a storm? |
| Safety measures during hurricanes | Power outages, generators, gas tanks, sandbag pickup locations, water | e.g., affordable generators e.g., If power is out, can they |

Manipulation Checks

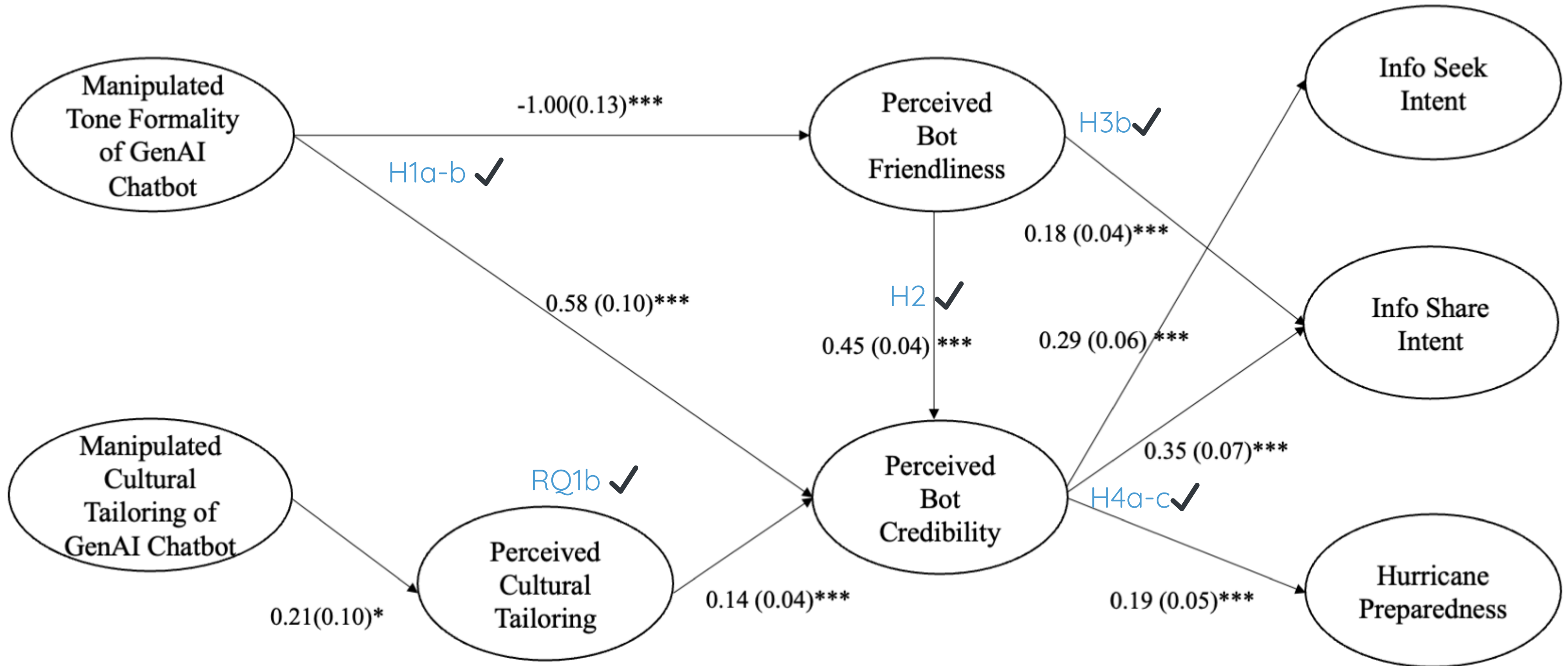
- Significance supported by self-report & automated measures of chat logs.
- A medium effect size of tone and a small effect size of cultural tailoring.

Computational Analysis

- Average interaction = 6 min, 42 s
- # of texts: 3,615 for subjects, 4,233 for GPT-4 chatbots.
- BERTopic analysis revealed 2 communication and 6 disaster topics.
- Informal tone increased anthropomorphism.



Key SEM Results (Full Sample)



$\chi^2(92, N = 441) = 129.5, p = .006, CFI = 0.99, SRMR = 0.031, RMSEA = 0.030, 90\% CI [0.017, 0.042], p = .998$

Takeaways



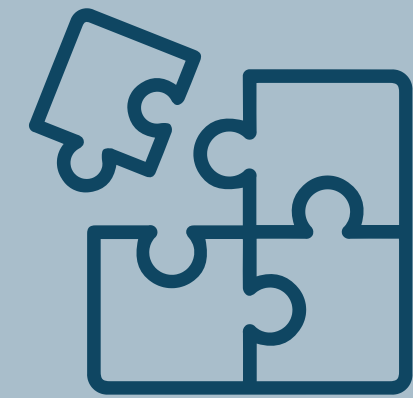
Human-Machine Comm

- The importance of tone in human-like chatbot design.
- GenAI's capacity to culturally tailor and personalize local disaster info.



Disaster Preparedness

- Culturally tailored GPT chatbots enhance user perceptions and disaster outcomes.
- Humanizing chatbots through an informal tone could undermine credibility and disaster outcomes.



Experimental Design

- Theoretical constructs can be validly manipulated through GenAI and prompt engineering.
- Mixing self-reports and chat log data to offer nuanced and robust results.

Limitations and Future Directions

Recruitment of Minority Participants

- Focus on a small sample of Black & Hispanic.
- Additional ethnic groups?

Responses of GenAI Chatbots:

- Provide somehow generalized information.
- Augmenting GPT 4 with local data.

GenAI models:

- Results are based on a specific GenAI model.
- New multimodal models?





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