DR. LACE M.K. PADILLA - RESEARCH STATEMENT

My research group examines how to align data visualizations with human decision-making capabilities. I work collaboratively with domain experts to empirically test current visualization methods and develop new science communication techniques that capitalize on perception (i.e., how the visual system encodes information) and cognition (i.e., how the mind processes and reasons with the encodings) to reveal the true nature of their data to viewers. My program uses applied studies to generate and test scientific theories for how we make decisions with visualizations, improving science communication and preparing students to be educated information designers.

I integrate quantitative and qualitative research methods to evaluate the impact of visualization techniques on real-world judgments. These methods are grounded in HCI, decision-making, and visualization science, which produce practical recommendations for industry professionals and basic science. This interdisciplinary research program has produced an award-winning publication record spanning top-tier venues in both computer science and psychology (Tables 1 and 2), as well as more than $4 million in external funding (Table 3).

Uncertainty Visualization Theory

Understanding how to interpret uncertainty in data is a problem that affects businesses, scientists, policymakers, and the general public. Unfortunately, simple forms of uncertainty, such as variability, are challenging for even experts to comprehend. One of the key findings from my body of work is that common approaches for conveying uncertainty, such as 95% confidence intervals, consistently lead to reasoning errors [1, 2, 3, 4, 5].

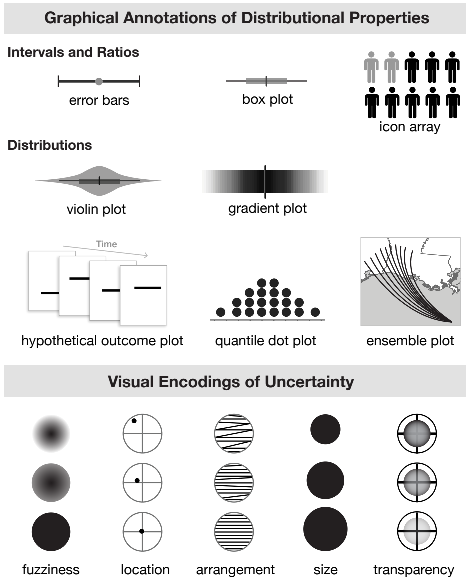


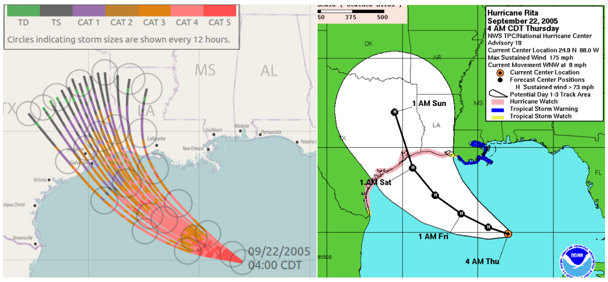
Fig. 1: Uncertainty visualizations reviewed in Padilla, Kay, Hullman [21].

My work has revealed that summary communication techniques of probabilistic data (see Figure 1 intervals for examples) evoke an incorrect categorical conceptualization of the data. I argue that the activity of mentally remapping summary communication techniques (e.g., confidence intervals, error bars, and box plots) to continuous probabilistic data requires superfluous mental transformations. In support of this theory, my group finds that 95% confidence intervals and text expressing temperature forecasts are more cognitively demanding and lead to worse performance in a resource allocation task than distributional visualizations (see Figure 1 distributions for examples [1]). In several studies, we have found that participants can intuitively understand distributional visualizations because of the one-to-one mapping between the data and visual properties [1, 5, 4, 2]. We summarize this theory in *The Science of Visual Data Communication: What Works*, published in **Psychological Science in the Public Interest** (impact factor: 17.6) [6].

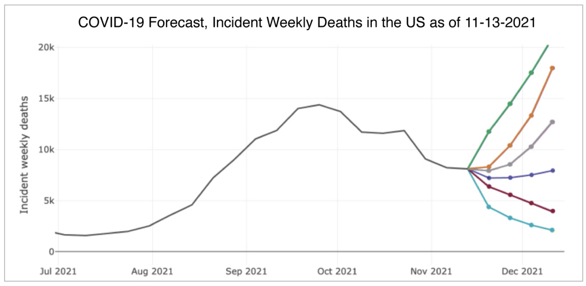
My recent work extends this theory from single uncertainty displays to multiple forecast visualizations, where viewers must reason across several competing predictions. In our CHI 2026 paper, which received a **Best Paper Honorable Mention (top 5%)**, we tested how people interpret multiple forecasts across median plots, 95% confidence intervals, standard deviation bands, density plots, and hypothetical outcome plots [7]. We found that viewers used multiple strategies: many mentally averaged across forecasts, while others adopted a winner-takes-all approach, selecting one forecast as the most likely outcome and effectively ignoring the others. This work provided the first empirical discovery and documentation of winner-takes-all reasoning in multiple forecast visualization interpretation. These findings advance our understanding of how people mentally combine multiple sources of uncertainty and strengthen modern theories of uncertainty communication.

Improving Decisions Using Visualizations of Uncertainty

While effectively communicating uncertainty is challenging, my group has developed and tested several cognitively optimized visualization techniques across multiple application domains, including forecasts of hurricanes (Figure 2a [4, 8, 9, 5, 10]), floods [11, 12], temperatures [13, 1], COVID-19 (Figure 2b [14, 15, 16], and AI sepsis diagnosis [17]. This line of research has been supported by multiple federal agencies, including the National Science Foundation, the National Institutes of Health, and the U.S. Department of Energy. Together, these awards contribute to an externally funded research portfolio totaling more than $4 million, as summarized in Table 3. For this work, I received the 2025 IEEE Visualization and Graphics Technical Committee **(VGTC) Significant New Researcher Award**. This award states that “Her work has pushed our fundamental understanding of the psychology of visualization, as well as been a driving force in uncertainty visualization.” This is the **most prestigious early-career research award in the visualization community**.



(a) Two methods for hurricane's forecasted path that lead to different risk interpretations [8, 9, 4, 5]. The left panel shows an ensemble forecast, and the right panel shows a 66% CI.



(b) Multiple forecast visualization (MFV) of U.S. COVID-19 mortality for November 13, 2021. Each line depicts a forecast from a different modeling group [15, 14].

Fig. 2: Examples of forecast visualizations developed and evaluated in my research, including hurricane path forecasts (A) and COVID-19 mortality forecasts (B).

One visualization application that my group has examined extensively is the Cone of Uncertainty produced by the National Hurricane Center (NHC: Figure 2a right), which shows a 66% confidence interval around a mean forecasted hurricane path. We find that participants perceive the boundaries of the cone as encompassing a categorical danger zone, leading them to incorrectly think that areas outside the boundary are safe, whereas areas within the boundary are uniformly high risk [5, 4]. Participants also incorrectly interpret the growing size of the cone not as increasing uncertainty, but as the size of the storm growing over time [5]. We developed an ensemble visualization technique that utilizes a visual metaphor of paths to convey the uncertainty distribution in the hurricane path forecast (Figure 2a left [9]). The ensemble visualization elicits significantly fewer reasoning errors than the other currently available techniques [4, 5]. My subsequent work that examined a new visual-spatial bias evoked when an ensemble line coincided with a location of interest received the **American Psychological Association Division 3 Early Career Award** [10].

My group is engaged in a similar process with COVID-19 forecast visualizations, receiving an NSF grant (#2028374) for this work. Our initial work found that some groups of people were more likely to share COVID-19 misinformation [18]. In a review of over 600 COVID-19 visualizations, we found that the two most common approaches to convey uncertainty were confidence intervals (60%) or multiple models or scenarios to express uncertainty (29%; [16]).

Inspired by this initial work, we developed a new visualization method, *multiple forecast visualizations* (MFV; Figure 2b), which received the **IEEE VIS Best Paper Award 2022**. MFV is a type of chart where uncertainty is encoded implicitly through the disagreement (or lack thereof) of multiple forecasts plotted in the same space, which informs readers about the range, shape, and concentration of predictions [15, 14]. In one study comparing real-time COVID-19 forecast visualizations with no uncertainty, 95% confidence intervals, and MFVs, we found that MFVs were most likely to change participants' beliefs about the COVID-19 risk to themselves and others [14]. In a second paper, in which we examined the best practices for selecting forecasts to include in MFVs, we found a trade-off between trust and task-based performance. Participants were most trusting of visualizations that showed less visual information, including a 95% confidence interval and a forecast with no visualized uncertainty (median forecast). Despite the high trust, the 95% confidence interval and median forecasts were the least likely to help participants accurately predict future COVID-19 mortality trends. We also found that participants maintained high trust even when we changed the label on a 95% confidence interval to 50% and 25% confidence. They did not proportionally scale their trust to the indicated interval size. Participants were most accurate in their predictions when they viewed 6-9 forecasts. This work indicates that **visualization design choices easily influence trust, and trust is not indicative of effective decision performance** [14].

Visualization Cognitive Theories

Various visual representations of the same information fundamentally change how people perceive and make decisions with data. Beyond perception, we know less about *why* different visualizations of the same data produce varying judgments. The lack of consensus about how and why visualizations influence our judgments is understandable, since identifying the underlying processes that produce different judgments is challenging. Nevertheless, understanding how humans reason with visual information is critical for accurately predicting a viewer's decision-making.

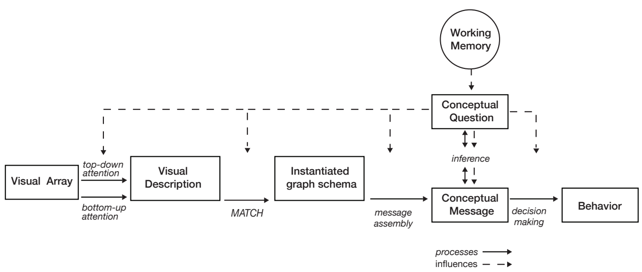


Fig. 3: Visualization decision framework integrating visualization, cognitive, and decision-making theories [19].

I developed the only modern decision-making model with visualizations that integrate current theories in visualization, HCI, and decision-making sciences (Figure 3 [19]). This framework provides visualization practitioners with a grounding theory to address visualization-reasoning errors and develop new visualization techniques. We utilized the Padilla et al. [19] model to identify four cross-domain findings (from HCI, computer science, cognitive science, and healthcare) that may constitute universal visualization principles in an extensive review. For example, we documented the new concept of *visual-spatial biases*, a category of bias unique to visual-spatial data communication. We have illustrated the application of our model using methods such as pupillometry [20] and individual differences in working memory [1].

More recently, we extended this line of work by formalizing a **theory of cognitive affordances in visualization** [21], translating classic affordance theory from psychology and HCI into a visualization-specific cognitive framework. This work moves beyond describing outcomes of visualization use (e.g., accuracy, speed, trust) to theorizing which information a visualization is most likely to communicate and why. The cognitive affordance framework characterizes the interpretation of visualization as a function of interacting design decisions and reader characteristics, yielding a hierarchical set of afforded information rather than a single intended takeaway. By explicitly modeling how encodings, arrangements, annotations, and data shape interact with reader knowledge, abilities, and prior beliefs, the framework provides a mechanistic account of why different visualizations of the same data reliably elicit different interpretations. Importantly, this theory unifies several previously fragmented constructs in visualization research (e.g., intuitiveness, cognitive fit, and graph comprehension) under a single explanatory model, offering both theoretical clarity and practical guidance for intentional visualization design and evaluation.

Our cognitive affordance framework has already enabled us to identify previously undocumented reasoning errors in how viewers interpret probability density function (PDF) plots, particularly when vertical scaling varies across distributions [23]. In this work, we show that viewers reliably conflate vertical height and pixel area with probability, leading them to incorrectly infer differences in cumulative probability even when distributions are statistically identical. Building on these insights, we used the cognitive affordance framework to motivate and evaluate a redesign of density plots, called Croissant Charts (Figure 4), which preserve the expressive shape of PDFs while adding visual structure that affords counting and part-to-whole reasoning [22]. As shown in Figure 4, Croissant Charts retain the continuous shape of a PDF while subdividing the distribution into visually countable probability units, making the intended probabilistic comparison more cognitively accessible.

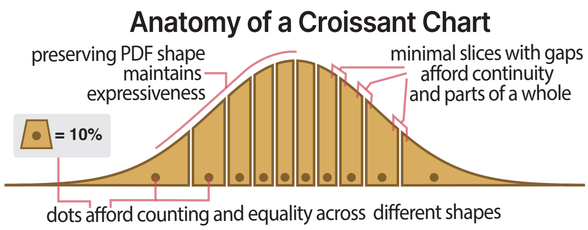


Fig. 4: Croissant Charts preserve the continuous shape of probability density functions while subdividing the distribution into visually countable probability units [22]. This design was motivated by the cognitive affordance framework [21] to support both part-to-whole reasoning and continuous distributional reasoning.

Uncertainty Communication in AI Forecasting

Rapid advancements in AI-supported decision-making have made uncertainty communication in AI forecasting a central direction in my current research program. Supported by an NIH R01 award, my collaborators and I study how domain experts interpret AI-generated recommendations, calibrate trust, and make decisions in high-stakes healthcare contexts, including sepsis diagnosis [17], mental health care [24], and post-surgical recovery [25]. Across these projects, we examine how visual and narrative interfaces can help experts reason with uncertain information while preserving their agency in complex decision-making workflows.

In our work on AI-supported clinical decision-making, we examine how clinicians and AI recommender systems can collaborate effectively [26]. We found that existing AI sepsis prediction tools can fail because they intervene too late in the clinical reasoning process and position AI as a competitor to physician judgment rather than as a collaborator [17]. To address this issue, we proposed a human-AI collaboration paradigm in which AI supports earlier stages of decision-making, including hypothesis generation, data gathering, uncertainty visualization, and identifying additional lab tests that could reduce uncertainty. We extended this agenda to mental health decision support through our CHI 2026 paper, which received a **Best Paper Honorable Mention** (top 5%) [24]. In this work, we developed a large language model-powered narrative dashboard that integrates clinical notes, transcripts, active sensing data, and passive sensing data into clinically relevant multimodal insights. Together, these projects show that effective uncertainty communication in AI systems must go beyond visualizing model confidence alone. High-stakes clinical AI systems also need to support expert reasoning through narrative structure, evidence traceability, uncertainty reduction, and clinician-centered controls that preserve expert agency.

Together, these projects position my current research agenda around the design of AI-supported visual and narrative systems that communicate uncertainty, preserve expert judgment, and support coordinated decision-making across healthcare contexts. This problem is especially challenging because uncertainty communication can sometimes decrease trust, as shown in my prior work on COVID-19 forecast visualizations [14]. A key goal of this research direction is therefore to determine how systems can convey uncertainty accurately while still supporting appropriate reliance in high-stakes settings.

Underserved Populations in Visualization Decision-Making

I pursue a coordinated research agenda examining how cognitive, linguistic, and educational differences shape visualization reasoning and decision-making. The goal of this work is to ensure that populations historically overlooked in visualization research are meaningfully included, advancing inclusion while also yielding insights and design solutions that benefit society more broadly.

One line of this work focuses on individuals with low working memory capacity, a fundamental cognitive constraint that limits the amount of information that can be actively maintained and manipulated during reasoning. In studies of uncertainty visualization, we show that working memory capacity systematically moderates how people reason with different visual encodings of uncertainty [20]. Distributional visualizations, such as density plots and quantile dotplots, support more accurate and uncertainty-aware reasoning than summary representations (e.g., confidence intervals or textual summaries), particularly for individuals with lower working memory capacity. Importantly, by combining behavioral accuracy with validated workload measures (NASA-TLX), we demonstrate that some visualization techniques impose substantially higher cognitive effort, helping explain why certain designs fail for cognitively constrained populations even when aggregate accuracy appears comparable.

Complementing this cognitive perspective, we examine how linguistic background shapes visualization comprehension for bilingual individuals. Supported by NSF Award #2403094, this work is grounded in the premise that uncertainty visualizations should be responsive to viewers' abilities, needs, and decision contexts, rather than relying on one-size-fits-all designs. In collaboration with disaster managers in the Rohingya refugee camps in Bangladesh, home to over 700,000 displaced individuals facing severe flash flood risks, we study the use of visualization in settings characterized by high uncertainty and time pressure [12, 2]. Extending this work to language, we show that bilingual readers are not a homogeneous group. In a large-scale study of individuals fluent in English and either Tamil or Arabic (n=1096), we find that annotation effectiveness depends on language proficiency, immersion, and internal language use [27]. While detailed annotations support deeper reasoning for experienced viewers, simpler and more concise designs better support comprehension for less experienced or time-constrained decision makers. Together, these findings motivate linguistically and cognitively responsive uncertainty visualization strategies that improve accessibility and decision-making across diverse populations. This work was inspired by my time as a disaster risk management and behavioral science consultant for the World Bank's Mind, Behavior, and Development (eMBeD) team, where I worked with the Haitian government to improve hurricane early warning systems, resulting in a World Bank report [28] and accompanying policy recommendations.

Finally, our work on data visualization literacy provides a unifying measurement framework for understanding individual differences in visualization reasoning. Supported by NSF Award #2400471, this research focuses on developing improved measures of visualization literacy to advance research and assessment in STEM education. In a large psychometric study comparing two widely used literacy assessments across university-based and demographically representative U.S. samples, we show that existing measures capture overlapping but distinct components of visualization literacy [29]. Although overall performance is correlated with prior mathematics education, analyses of error patterns reveal that neither graph type nor question type alone accounts for performance variability. Instead, a small number of latent factors better predict how people succeed or fail when interpreting visualizations. These findings demonstrate that visualization literacy is a constellation of component skills, laying the groundwork for more sensitive and equitable assessment tools and educational interventions that better support reasoning among historically underserved populations.

Diversity in Academia and Outreach

As a Latina woman, I am deeply aware of the importance of diverse perspectives in science and have made sustained contributions to advancing diversity, equity, and inclusion across research, service, and outreach. I am an active leader in the data visualization community, serving as one of the **General Chairs of IEEE VIS 2026 in Boston**. As a leader in the field, I have proactively promoted diversity. For example, as **Diversity and Equity Chair for IEEE VIS** (2020–2022), I led initiatives supporting inclusion at the field's flagship conference, including the management of diversity scholarships, childcare grants, and accessibility protocols. My commitment to broadening participation in STEM is further reflected in my NSF Postdoctoral Fellowship focused on diversity and inclusion (NSF Award #1810498).

In addition to conference leadership, I am an organizer of the **Visualization Summer Camp**, a mentoring program for junior faculty in visualization across North America. Each year, we convene small cohorts of early-career researchers for peer mentoring and professional development, with a focus on building sustainable research programs, securing funding, developing pedagogy, and navigating the broader responsibilities of academic careers. This program aims to strengthen the visualization community by empowering the next generation of diverse leaders.

My service has also extended to national and interdisciplinary efforts to improve representation in science. I served on the governing board of the **Spark Society** (2021–2023), an NSF-funded organization dedicated to increasing minority representation in psychological science and recipient of the SIPS Mission Award (2021). Earlier in my career, I founded and served as **President of the Diversity Graduate School Application Advisory** at the University of Utah (2015–2018). In this role, I raised over $5,000 to support application fees and GRE preparation for minoritized students applying to PhD programs. This initiative was recognized with the Chair's Special Recognition Award for contributions to diversity in the Psychology Department. I also served as Vice President of the University of Utah SACNAS Chapter (2017–2018), where I helped organize professional development programming for underrepresented students.

Finally, public communication is central to my efforts to broaden access to scientific knowledge. My outreach includes contributions to *Scientific American*, the APA podcast, and my regular *ACM Interactions Magazine* column, *Unpacking Uncertainty*. I also maintain **Dr. DataVis**, a YouTube channel with more than 20,000 subscribers that provides free, accessible data visualization education to a global audience. I have been featured on the CBS program *Mission Unstoppable* to inspire young girls to pursue STEM careers, and was contracted by **Massolit** to develop and star in educational videos that help K–12 teachers teach students how to interpret and reason with data visualizations. Across these efforts, I bridge research, service, and public engagement to make scientific knowledge more inclusive, interpretable, and actionable for diverse communities.

Future Research Agenda

The long-term goal of my research program is to develop an empirical foundation for the next generation of complex data communication, grounded in the union of decision science and visualization research. My future research agenda continues to focus on improving uncertainty communication in high-stakes decision contexts, including healthcare, flood forecasting in remote and underserved regions, and climate forecasting communication. Across these domains, decision makers must often act under uncertainty, time pressure, and unequal access to technical expertise. My work will develop and evaluate visualization techniques that help people reason more effectively about uncertain information while preserving trust, agency, and appropriate reliance on data-driven systems.

A second major direction focuses on integrating insights from perceptual and cognitive psychology into chart authoring systems. Current visualization grammars and software incorporate some perceptual principles, but they lack systematic mechanisms for prioritizing or recommending designs that go beyond basic encoding choices such as color, size, and position. In ongoing work, we are integrating our cognitive affordances theory into interactive visualization systems, including GoFish, in collaboration with Arvind Satyanarayan at MIT. The overarching goal is to operationalize the theoretical frameworks my group has developed so they can be embedded within practical design tools, enabling visualization systems to more effectively support human reasoning and decision-making.

Summary

I am a leading expert in decision-making with visualizations, authoring the predominant cognitive model of the visualization decision-making process [19]. I select research applications that have the potential for broad societal impact, working with NGOs, government agencies, and domain experts across climate, public health, healthcare, and science communication. My interdisciplinary research program has produced a publication record spanning top-tier venues in both computer science and psychology, including 25 top-tier publications in computer science and 8 top-tier publications in psychology (Tables 1 and 2). This record includes multiple award-winning publications, mentee-first-author papers, and publications in which I served as senior author.

As shown in Table 3, my externally funded research portfolio includes awards from NSF, DOE, NIH, and NASA totaling $4,057,725, with $2,264,976 allocated to me. This portfolio includes an **NSF CAREER Award** and an **NIH R01**. I have also received prestigious recognition, including the **IEEE Visualization and Graphics Technical Community (VGTC) Significant New Researcher Award**, an **IEEE VIS Best Paper Award**, and an Early Career Award from the Society for Experimental Psychology and Cognitive Science (Division 3 of the American Psychological Association). Together, this work establishes a research program that not only reveals how people reason with visualized uncertainty, but also transforms that knowledge into practical systems for improving consequential decisions in science, health, climate, and society.

Table 1: Summary of top-tier conference and journal publications in ***computer science*** at Northeastern University and prior institutions. Publications from 2023 onward are counted as Northeastern publications.

Venue	At Northeastern	Outside Northeastern	Total
IEEE VIS	7	6	13
IEEE TVCG	2	1	3
ACM CHI	5	1	6
EG EuroVis	1	0	1
IEEE PacificVis	2	0	2
Top-tier total in CS	**17**	**8**	**25**
Mentee first-author top-tier	**10**	–	**10**
Padilla first author top-tier	**1**	**3**	**4**
Padilla last author top-tier	**8**	**2**	**10**
Publication award top-tier	**3**	**1**	**4**

Table 2: Summary of top-tier journal publications in ***psychology*** at Northeastern University and prior institutions. Publications from 2023 onward are counted as Northeastern publications. Impact factors reflect 2024 Journal Impact Factor values.

Venue	At Northeastern	Outside Northeastern	Total	Impact Factor
Psychological Science in the Public Interest	-	1	1	17.6
Cognitive Research: Principles and Implications	1	2	3	3.1
Psychonomic Bulletin & Review	-	2	2	3.0
Journal of Experimental Psychology: Applied	-	2	2	2.1
Top-tier total in Psychology	**1**	**7**	**8**	–
Mentee first-author top-tier	**-**	**-**	**0**	–
Padilla first author top-tier	**-**	**5**	**5**	–
Padilla last author top-tier	**-**	**-**	**0**	–
Publication award top-tier	**-**	**1**	**1**	–

Table 3: Summary of externally funded research grants awarded to Padilla, ordered by grant end year from latest to earliest.

Agency	Project Title	Role	Total	Padilla	Period
NIH (R01)	SCH: Improving Early Prediction and Decision-Making for Sepsis with Human–AI Collaboration	Co-PI	$1,194,506	$26,427	2024–2029
NSF	HCC: Medium: Responsive Uncertainty Visualizations for Human-Centered Decision-Making	Co-PI	$600,000	$164,963	2024–2027
NSF	Improved Measures of Data Visualization Literacy to Advance Research and Assessment in STEM Education	Co-PI	$803,673	$26,427	2024–2026
DOE	Visual Cognition in Support of Transmission Reliability	Subcontract	$99,998	$99,998	2025–2026
NSF CAREER	HCC: Resolving Uncertainty Visualization Reasoning Errors with Mental Model Design and Training	PI	$499,952	$499,952	2023–2028
NSF EAGER	Facilitating Restoration of Natural Infrastructure Using Uncertainty Communication	PI	$300,000	$300,000	2021–2023
DOE	Visual Cognition in Support of Transmission Reliability	Subcontract	$225,000	$225,000	2021–2023
NSF RAPID	Visualizing Epidemic Uncertainty for Personal Risk Assessment	Co-PI	$191,696	$81,309	2020–2021
NSF Postdoctoral	Improving Equity in STEM via Visualization Literacy Cognition	PI	$138,000	$138,000	2018–2020
NASA	Gordon Research Conferences Visionary Research Grant, S15-178-05: Improving Trust in Uncertain Science	Co-PI	$3,900	$3,900	2018–2020
Total			**$4,057,725**	**$2,264,976**	

References

[1] S. C. Castro, P. S. Quinan, H. *Hosseinpour, and **Padilla, L.**, "Examining Effort in 1D Uncertainty Communication Using Individual Differences in Working Memory and NASA-TLX," *IEEE Transactions on Visualization and Computer Graphics*, vol. 28, no. 1, pp. 411–421, 2022, iEEE VIS conference paper; published in TVCG.

[2] **Padilla, L.**, S. Dryhurst, H. *Hosseinpour, and A. Kruczkiewicz, "Multiple Hazard Uncertainty Visualization

Challenges and Paths Forward," *Frontiers in Psychology*, p. 1993, 2021.

[3] **Padilla, L.**, G. Hansen, I. T. Ruginski, H. S. Kramer, W. B. Thompson, and S. H. Creem-Regehr, "The influence of different graphical displays on nonexpert decision making under uncertainty." *Journal of Experimental Psychology: Applied*, vol. 21, no. 1, p. 37, 2015.

[4] I. T. Ruginski, A. P. Boone, **Padilla, L.**, L. Liu, N. Heydari, H. S. Kramer, M. Hegarty, W. B. Thompson, D. H. House, and S. H. Creem-Regehr, "Non-expert interpretations of hurricane forecast uncertainty visualizations," *Spatial Cognition & Computation*, vol. 16, no. 2, pp. 154–172, 2016.

[5] **Padilla, L.**, I. T. Ruginski, and S. H. Creem-Regehr, "Effects of Ensemble and Summary Displays on Interpretations of Geospatial Uncertainty Data," *Cognitive Research: Principles and Implications*, vol. 2, no. 1, p. 40, 2017.

[6] S. L. Franconeri, **Padilla, L.**, P. Shah, J. M. Zacks, and J. Hullman, "The Science of Visual Data Communication: What Works," *Psychological Science in the Public Interest*, vol. 22, no. 3, pp. 110–161, 2021.

[7] **Padilla, L.**, R. *Fygenson, C. Wilson, K. Potter, and S. C. Castro, "Examining interpretation strategies for multiple forecast visualizations with two and four forecasts," in *Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, Sep. 2026, ⋆ **ACM CHI Honorable Mention Award, top 5%.**

[8] L. Liu, A. P. Boone, I. T. Ruginski, **Padilla, L.**, M. Hegarty, S. H. Creem-Regehr, W. B. Thompson, C. Yuksel, and D. House, "Uncertainty Visualization by Representative Sampling from Prediction Ensembles," *IEEE Transactions on Visualization and Computer Graphics*, vol. 23, no. 9, pp. 2165–2178, 2017, tVCG-only journal article.

[9] L. Liu, **Padilla, L.**, S. Creem-Regehr, and D. House, "Visualizing Uncertain Tropical Cyclone Predictions using Representative Samples from Ensembles of Forecast Tracks," *IEEE Transactions on Visualization and Computer Graphics*, vol. 25, no. 1, pp. 882 – 891, 2018, iEEE VIS conference paper; published in TVCG.

[10] **Padilla, L.**, S. H. Creem-Regehr, and W. Thompson, "The Powerful Influence of Marks: Visual and Knowledge-Driven Processing in Hurricane Track Displays," *Journal of Experimental Psychology: Applied*, 2020, ⋆ **APA Early Career Award, top 1%.**

[11] M. Simpson, **Padilla, L.**, K. Keller, and A. Klippel, "Immersive storm surge flooding: Scale and risk perception in virtual reality," *Journal of Environmental Psychology*, p. 101764, 2022.

[12] A. Kruczkiewicz, M. Braun, S. McClain, H. Greatrex, **Padilla, L.**, L. Hoffman-Hernandez, K. Siahaan, M. Nielsen, B. Llamanzares, and Z. Flamig, "Flood Risk and Monitoring Data for Preparedness and Response: From Availability to Use," *Global Drought and Flood: Observation, Modeling, and Prediction*, pp. 289–306, 2021.

[13] **Padilla, L.**, M. *Powell, M. Kay, and J. Hullman, "Uncertain about Uncertainty: How Qualitative Expressions of Forecaster Confidence Impact Decision making with Uncertainty Visualizations," *Frontiers in Psychology*, vol. 11, p. 3747, 2020.

[14] **Padilla, L.**, R. *Fygenson, S. Castro, and E. Bertini, "Multiple Forecast Visualizations (MFVs): Trade-offs in Trust and Performance in Multiple COVID-19 Forecast Visualizations," *IEEE Transactions on Visualization and Computer Graphics*, 2022, iEEE VIS conference paper; published in TVCG. ⋆ **IEEE VIS Best Paper Award, top 1%.**

[15] **Padilla, L.**, H. *Hosseinpour, R. *Fygenson, J. Howell, R. Chunara, and E. Bertini, "Impact of COVID-19 Forecast Visualizations on Pandemic Risk Perceptions," *Scientific reports*, vol. 12, no. 1, pp. 1–14, 2022.

[16] Y. Zhang, Y. Sun, **Padilla, L.**, S. Barua, E. Bertini, and A. G. Parker, "Mapping the landscape of covid-19 crisis visualizations," in *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, 2021, pp. 1–23.

[17] S. Zhang, J. Yu, X. Xu, C. Yin, Y. Lu, B. Yao, M. Tory, **Padilla, L.**, J. Caterino, P. Zhang *et al.*, "Rethinking human-ai collaboration in complex medical decision making: A case study in sepsis diagnosis," in *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, 2024, pp. 1–18.

[18] E. J. C. Lobato, M. Powell, **Padilla, L.**, and C. Holbrook, "Factors Predicting Willingness to Share COVID-19 Misinformation," *Frontiers in Psychology*, vol. 11, p. 2413, 2020. [Online]. Available: https://www.frontiersin.org/article/10.3389/fpsyg.2020.566108

[19] **Padilla, L.**, S. H. Creem-Regehr, M. Hegarty, and J. K. Stefanucci, "Decision making with visualizations: A cognitive framework across disciplines," *Cognitive Research: Principles and Implications*, vol. 3, no. 1, p. 29, 2018. [Online]. Available: https://doi.org/10.1186/s41235-018-0120-9

[20] **Padilla, L.**, S. C. Castro, P. S. Quinan, I. T. Ruginski, and S. H. Creem-Regehr, "Toward Objective Evaluation of Working Memory in Visualizations: A Case Study Using Pupillometry and a Dual-Task Paradigm," *IEEE Transactions on Visualization and Computer Graphics*, vol. 26, no. 1, pp. 332–342, 2019, iEEE VIS conference paper; published in TVCG.

[21] R. *Fygenson, **Padilla, L.**, and E. Bertini, "Cognitive affordances in visualization: Related constructs, design factors, and framework," *IEEE Transactions on Visualization and Computer Graphics*, 2025, tVCG-only journal article.

[22] R. *Fygenson, E. Bertini, and **Padilla, L.**, "Croissant charts: Modulating the performance of normal distribution visualizations with affordances," in *EuroVis 2026 - The Eurographics Conference on Visualization*. The Eurographics Association, 2026.

[23] R. *Fygenson and **Padilla, L.**, "Impact of vertical scaling on normal probability density function plots," *IEEE Transactions on Visualization and Computer Graphics*, 2024, iEEE VIS conference paper; published in TVCG.

[24] R. *Zou, S. Xu, M. E. Morris, J. Ryu, T. D. Becker, N. Allen, A. M. Albano, R. Auerbach, D. Adler, V. Mishra, **Padilla, L.**, D. Wang, R. Sultan, and X. Xu, "MIND: Empowering mental health clinicians with multimodal data insights through a narrative dashboard," in *Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, Sep. 2026, ⋆ **ACM CHI Honorable Mention Award, top 5%.**

[25] B. Yao, M. Zhao, Z. Zhang, P. Wang, E. G. Chester, C. Yin, T. Li, V. Mishra, **Padilla, L.**, O. Chatzipanagiotou, T. Pawlik, P. Zhang, W. Cao, and D. Wang, "Exploring collaboration breakdowns between provider teams and patients in post-surgery care," in *Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, Sep. 2026.

[26] S. Zhang, J. Yu, X. Xu, C. Yin, Y. Lu, B. Yao, M. Tory, **Padilla, L.**, J. Caterino, P. Zhang *et al.*, "Rethinking human-ai collaboration in complex medical decision making: A case study in sepsis diagnosis," in *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, 2024, pp. 1–18.

[27] A. *Arunkumar, **Padilla, L.**, and C. Bryan, "Lost in translation: How does bilingualism shape reader preferences for annotated charts?" in *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, 2025, pp. 1–22.

[28] J. Llopis Abella, E. B. Perge, Z. Afif, C. R. Soto Orozco, **Padilla, L.**, and J. Hsu, "Using Behavioral Insights to Improve Disaster Preparedness, Early Warning and Response Mechanisms in Haiti," The World Bank, Tech. Rep., 2020.

[29] E. Brockbank, A. Verma, H. Lloyd, H. Huey, **Padilla, L.**, and J. E. Fan, "Evaluating convergence between two data visualization literacy assessments," *Cognitive Research: Principles and Implications*, vol. 10, no. 1, p. 15, 2025.