**Author:** George Robertson, Roland Fernandez, Danyel Fisher, Bongshin Lee, and John Stasko

**Title:** Effectiveness of Animation in Trend Visualization

**Venue:** IEEE Transactions on Visualization and Computer Graphics, Vol. 14, No. 6, November/December 2008

**Year:** 2008

**Aim:** This was an experiment where they test the effectiveness of animation in data visualizations. They tested 1 type of chart presented 3 different ways. The chart they are using is a bubble chart where we have dimensions for the x axis, y axis, size, and time where time is displayed through traces, animations and multiple views. The also tested to see if people did better on smaller datasets versus larger datasets.

**Conclusion:** It was found that the animation visualization was not as good as the other 2 types of visualizations when it comes to analysis. However, Animation was the more popular visualization in general because it was animated versus the static views from the other visualizations. Animation was the better tool for presentations and should be used to tell a clean story.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, it was clear that I should not use animations as a way to analyze the storm paths and patterns. So if I can create a design that uses animation to tell a story and then create multiple views of the storm paths for analysis, it could allow for a better visualization.

**Author:** Ian Ruginski, Alexander Boone, Lace Padilla, Le Liu, Nahal Heydari, Heidi Kramer, Mary Hegarty, William Thompson, Donald House, and Sarah Creem-Regehr

**Title:** Non-expert Interpretations of Hurricane Forecast Uncertainty Visualizations

**Venue:** Spatial Cognition & Computation: An Interdisciplinary Journal

**Year:** 2016

**Aim:** This research paper is about an experiment on hurricane data. Specifically, they are trying to find out the best way to display hurricane uncertainty to help people with a decision on whether to evacuate or not. They used 5 types of uncertainty visualizations shown in the second photo showing cone-centerline, centerline only, ensemble (shows multiple centerline paths from the current position, fuzzy cone and cone only. There would also be a point on the map and participants had to tell how much damage that point would receive from the hurricane on a scale from 1-7.

**Conclusion:** From their results, the ensemble seemed to be the best because people were less confused about the uncertainty cone thinking that the increase in cone size meant more area of effect and higher damage.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I wanted to use ignorance of hurricanes in my story in some way. So if I could find some sort of data on warnings/evacuations, this could help create a story with hurricane data.

**Author:** Edward Segel and Jeffrey Heer

**Title:** Narrative Visualization: Telling Stories with Data

**Venue:** IEEE Transactions on Visualization and Computer Graphics, Vol. 16, No. 6, November/December 2010

**Year:** 2010

**Aim:** This paper is about storytelling in visualizations. Specifically, the authors wanted to review visualizations with a "story" and identify distinct genres and narratives for each visualization. They were able to break down the visualizations into three design differences in terms of the balance between narrative flow and story discovery. In the paper, they go over many case studies and how each are similar but slightly different from each other. After that they provided a chart categorizing all the visualizations they used in order to see which categories seemed more important than others. Finally, they provide what they think is the best practice based on this chart for making a story within a visualization.

**Conclusion:** From their results, it seems that most story visualizations have a lot of interactivity connected to them like hovering, filtering, and buttons. However, they still had very limited interactions.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I should design a way for users to interact with the animation I want to build in order to create a good flowing story visualization

**Author:** David DiBiase, Alan MacEachren, John Krygier and Catherine Reeves

**Title:** Animation and the Role of Map Design in Scientific Visualization

**Venue:** ?

**Year:** 1992

**Aim:** This paper talks about the different kinds of “variables” in animated maps and which ones are best to use in certain situations. The talk about scene duration, rate of change between scenes and scene order as well as basic attribute representations on maps.

**Conclusion:** From their results, they concluded that animated maps should be used along with static maps and graphs/diagrams in order to get the full value out of the animation. Additionally, it seems that a line to represent paths and color to represent their values were both good forms of visualization

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I should design my hurricane paths using a line for each hurricane as well as color to represent their strength. Additionally, using other forms of graphs and maps should be used alongside the animation in order to get a better understanding of each hurricane individually

**Author:** Matthew Ward

**Title:** XmdvTool: Integrating Multiple Methods for Visualizing Multivariate Data

**Venue:** Proceedings of the Conference on Visualization '94

**Year:** 1994

**Aim:** This paper talks about the best way to represent multivariate data on a 2D layout. It talks about some of the criteria used to gauge the effectiveness of the visualization as well as giving some examples and how they apply to their application they made.

**Conclusion:** From their results, it was determined that for scatterplots and such, there should not be too many variables represented in the graph since increasing the number of dimensions would make you lose screen space.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I should design my line charts of each hurricane in such a way that does not use too many variables. Additionally, the variables that I do not use but still want to show should be shown in a different way instead of built into the line graph.

**Author:** Christopher Healey

**Title:** Choosing Effective Colours for Data Visualization

**Venue:** Proceedings of the 7th IEEE Visualization Conference (VIS ‘96)

**Year:** 1996

**Aim:** This paper was focused on describing a technique for choosing colors in data visualizations. They did this by creating multiple experiments to test color through color distance, linear separation and category. The data that the got allowed them to select groups of colors that have good differentiation for data elements. One of the tests had users identify a target color and recorded the response times.

**Conclusion:** It was found that when there are 3-5 colors, the response time was much better than when there were more colors ranging from 7 and above. Additionally, they created a similarity table for colors helping to differentiate between which colors should not be used together when showing data.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I should choose colors such that I do not use more than 5 colors and so that they are not conflicting enough so that they can be distinguished.

**Author:** Nur Yazdani, Tanya Townsend, and Danny Kilcollins

**Title:** Hurricane Wind Shelter Retrofit Room Guidelines for Existing Houses

**Venue:** PRACTICE PERIODICAL ON STRUCTURAL DESIGN AND CONSTRUCTION © ASCE / NOVEMBER 2005

**Year:** 2005

**Aim:** The paper talks about developing a design for constructing in-home hurricane room shelters on existing houses. They presented a bunch of different designs and then made conclusions on which ones would be best to make considering cost.

**Conclusion:** From their analysis, it was found that they could make a retrofit room for about $3100. These rooms would help resist winds up to 225 km/h and would be resistant to large debris.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I should be able to calculate how many houses could be fitted with a potential hurricane proof room to help build upon my story.

**Author:** Elba Urbina and Brian Wolshon

**Title:** National review of hurricane evacuation plans and policies: a comparison and contrast of state practices

**Venue:** Transportation Research Part A 37 (2003)

**Year:** 2003

**Aim:** Based on past hurricane evacuations, it was clear that the evacuation system needed to be improved. This paper performed many surveys on the evacuation system in order to find out good evacuation policies and decision making criteria.

**Conclusion:** It was determined that evacuation plans have improved significantly in past years however it still could improve. Given a 2 day evacuation notice, it is still difficult to evacuate major cities such as Houston and New Orleans due to not enough roads and traffic issues.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, it will help give me a sense of how good the evacuation plans are and possibly why people are still dying in the hurricanes. This may not help me in creating the visualization but will be good background information.

**Author:** Christopher Landsea and James Franklin

**Title:** Atlantic Hurricane Database Uncertainty and Presentation of a New Database Format

**Venue:** MONTHLY WEATHER REVIEW

**Year:** 2012

**Aim:** This paper aimed to explore uncertainty with hurricanes and weather forecasts. After analyzing this data, they try to provide suggestions on how to make hurricane forecasting better in the future since hurricane uncertainty can be very hard to gauge.

**Conclusion:** From their analysis, it was concluded that there is still too much error in uncertainties with best track positions. It has substantially improved over time but is still too high. Additionally, as the number of hours away from land the hurricane is , the more error there is in uncertainty. They suggest to use different monitoring techniques in order to get better data and information about the storms ahead of time.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I can safely say that uncertainty plays a big role in hurricanes. If people do not understand that hurricane paths can change very rapidly, then they may not be able to evacuate in time. This paper is more for background knowledge and supporting evidence that people underestimate hurricanes.

**Author:** Leander Bathon, Oliver Bletz, and Jens Schmidt

**Title:** Hurricane proof buildings – An innovative solution using prefabricated modular wood-concrete-composite elements

**Venue:** ?

**Year:** 2006

**Aim:** The aim of this paper was to produce a new type of composite for hurricane buildings. They looked to produce a wood-concrete-composite building.

**Conclusion:** Wood-concrete-composite buildings are much better than wood/concrete structures and they are cost efficient to build.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, it is clear that there are fairly cost-efficient ways to build homes that are hurricane proof. This paper is more for more evidence of hurricane proof homes and background information.

**Author:** E.E. Koks, B. Jongman, T.G. Husby, W.J.W. Botzen

**Title:** Combining hazard, exposure and social vulnerability to provide lessons for flood risk management

**Venue:** Institute for Environmental Studies (IVM), VU University Amsterdam, Amsterdam, The Netherlands

**Year:** 2015

**Aim:** The aim of this paper is assess flood risk management strategies and to provide input on how to improve the systems. They performed a bunch of studies on social and physical vulnerabilities when it comes to floods.

**Conclusion:** It was found that the findings provide additional information for FRM strategies by looking at societal characteristics like elderly vs non-elderly behaviors. Additionally, looking at insurance coverages and different ways to affordably overcome flooding issues when it happens was suggested.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, it can be seen that preparing and understanding the dangers of floods is important. Since a lot of damages and deaths are caused by floods during hurricanes, this is good background information to know.

**Author:** Eric S. Blake, Ethan J. Gibney, Christopher W. Landsea

**Title:** THE DEADLIEST, COSTLIEST, AND MOST INTENSE UNITED STATES TROPICAL CYCLONES FROM 1851 TO 2010 (AND OTHER FREQUENTLY REQUESTED HURRICANE FACTS)

**Venue:** NOAA Technical Memorandum NWS NHC-6

**Year:** 2011

**Aim:** This book outlines a bunch of hurricane data and statistics including the most deadly and most costly hurricanes. In addition, they created an estimate of monetary losses.

**Conclusion:** Looking at the tables provided, it was clear that Hurricane Katrina is one of the most deadly and most costly out of almost all the hurricanes. No other hurricane comes close in terms of costliness of hurricane Katrina whereas there were a number of hurricanes that surpassed it in the number of deaths.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I can safely conclude that Hurricane Katrina is one of the worst storms the Atlantic has seen and can give me an idea of what other types of hurricanes to look at based on these numbers.

**Author:** Chaoli Wang, Hongfeng Yu, and Kwan-Liu Ma

**Title:** Importance-Driven Time-Varying Data Visualization

**Venue:** IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 14, NO. 6, NOVEMBER/DECEMBER 2008

**Year:** 2008

**Aim:** The aim of this paper was to identify and present important aspects of time-varying data. They use an importance driven approach. They developed importance curves that characterizes temporal behavior and other aspects.

**Conclusion:** One of the things they mentioned in the paper is that animating time varying data with the right amount of time-steps can convey important aspects of the data. This time step can be really important when trying to analyze data for time-varying data sets like hurricanes, earthquakes and much more.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, it was clear that a good time step was needed for my animation. Testing different time-steps for my animation should be done in order to find the best way to help convey the important parts of the hurricane data.

**Author:** THOMAS R. KNUTSON\*, JOSEPH J. SIRUTIS, STEPHEN T. GARNER, GABRIEL A. VECCHI AND ISAAC M. HELD

**Title:** Simulated reduction in Atlantic hurricane frequency under twenty-first-century warming conditions

**Venue:** NOAA/Geophysical Fluid Dynamics Laboratory, Princeton, New Jersey 08542, USA

**Year:** 2008

**Aim:** The goal of this paper was to create a model to simulate hurricane frequency in the Atlantic to see what factors either increase or decrease the frequency of hurricanes. They performed a number of tests in order to come up with their solution.

**Conclusion:** From their models they created, they were able to conclude that the primary cause for an increase in hurricanes in recent years is because of the warming of the tropical Atlantic compared to other Atlantic basins.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I can conclude that hurricanes are becoming more of a problem and we need to find a solution on how to keep people safe and improve the environment to potentially reduce the number of hurricanes that happen in the future.

**Author:** Alark Joshi, Jesus Caban, Penny Rheingans, and Lynn Sparling

**Title:** Case Study on Visualizing Hurricanes Using Illustration-Inspired Techniques

**Venue:** IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 15, NO. 5, SEPTEMBER/OCTOBER 2009

**Year:** 2009

**Aim:** This paper focuses on improving the understanding of the structure of hurricanes with the help of visualization. Specifically, they use illustration inspired techniques to aid in the hurricane information and compared to old tools, these new visualizations were prefered over old tools.

**Conclusion:** Their illustration inspired visualizations have helped visualize internal structures of hurricanes, the physical phenomenon and other factors. Additionally the silhouette computation method helped identify vertical wind shear which was also important for hurricane analysts. One of the illustrations they used was trailing lines in order to show hurricane motion and size throughout a period of time.

**How this informs some of the design interventions/feedback?**

Based on the findings in this paper, I was able to determine a better way to depict hurricanes in the animation. While I would not be able to create the same exact examples, I can take and choose from parts of their visualization and use it for myself like the trailing lines part of their visualizations but altered slightly.