Visualization Goals

- Provide means to view and explore risk histories
  - Non-geographic spatial juxtaposition via sorting
  - Non-calendar temporal juxtaposition via timeshifting
- Multiple linked views
  - Provide context, links back to real-world space and time
  - Observed similarities in risk history view can be mapped back to real-world

West Nile Virus: brief review

- WNV is dangerous to humans, but primarily transmitted between birds and mosquitoes
- Dead bird surveillance programs are used to track areas of human WNV risk
- Lag time exists between bird deaths and human infections
- Lag is poorly characterized and may vary from region to region

West Nile Virus Risk Analysis

- Dead bird tracking produces daily raster map of WNV activity
  - Binary risk/no risk classification ("Yes" / "No")
- Great data and location of human cases in previous years:
  - What is the relationship between risk patterns and human cases?
  - Does the relationship vary spatially?
  - What patterns of risk are the best predictors of human infections?

Visualization of space-time patterns of West Nile virus

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Demo...
**Strengths and Weaknesses**

- **Software**
  - Improvise is powerful, but may limit future flexibility
  - Live Properties impose limits on interaction between views
  - Impossible for one view to modify certain attributes of another view, such as range of viewport.
- **Theory**
  - What if risk in adjacent cells matters?
  - Difficult to extend this technique
  - Perhaps only useful for large-scale analysis
  - Too many contributing factors
  - Even if a similar risk pattern is found in several human histories, currently no way to see how many times that pattern appeared and did not result in a human case.

**User comments**

- Public health biologist working with West Nile virus
- Really liked multiple views
- Risk histories took some getting used to
- Found the profile view the most informative
  - View was provided for context; cannot provide information about specific relationship between risk and human onset
  - However, it is a useful overall view, made interactive here for first time
- My conclusion: the study of WNV lacks application of current infovis tools. Perhaps that needs to be remedied first before inventing new techniques.

**Possible Future Improvements**

- Clustering based on string similarity
- More flexible sorts, query-based selection
  - Example: sort by number of risk days in a 5 day window, 10 days before onset
- Fit curve to the sorted results
  - Obtain quantitative value for comparison between datasets
- Integrate more geographical data
  - Select based on climate regions, population density
  - Selection based on county for public health officials