Charting Scenarios: A Framework for Uncertainty Visualization in Data Journalism Practice

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1 Communicating Uncertainty

- significant challenge for data journalists
- visual way of simplifying complex ambiguities
- engage with a broad audience with highly variable levels of prior knowledge
- challenge: additional effort in fast-paced news environment
  → framework aims to support data journalists
- research perspective: content-centered focus on existing visualizations instead of data-centered evaluations
  → what do visualizations actually communicate visually to the audience?

→ How is uncertainty currently communicated in data-driven journalism? In which scenarios do journalists already decide to visualize uncertainty?

2 Review of Online Data Stories

- collection of uncertainty visualizations from 17 news sources
- review of over 900 online articles from German and English media outlets published between January 1, 2024, and April 25, 2025
- categorization of 75 visualizations depicting visual elements that communicate uncertainties

→ Assessment of visual representations along the dimensions extrinsic / intrinsic, coincident / adjacent, explicit / implicit (Kinkeldey et al., 2015)

3 Workshop with Data Journalists

- inductive development of scenarios where uncertainty is visualized in journalistic contexts
- discussion with eleven journalists from German-speaking data-teams
- participants showed a rather data-centered focus from a technical point of view
- refinement of scenarios after collaborative assessment

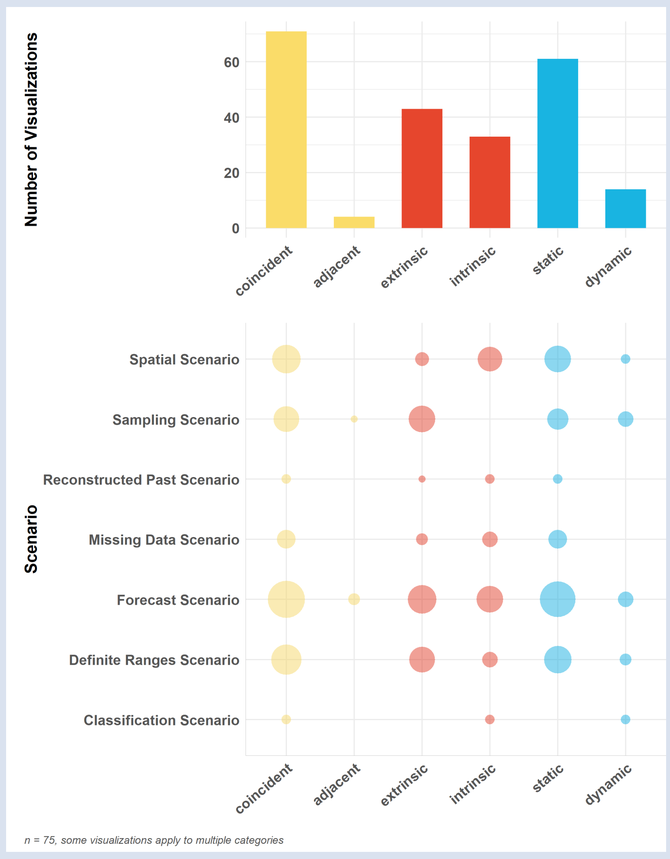
→ Systematic approach essential to foster a broader awareness of uncertainty within data journalism practice

4 Uncertainty Scenarios

- identify thematic and visual patterns
- group visualizations according to
  - type,
  - source,
  - visual strategy

  of the presented uncertainty
- focus on the role of uncertainty within the visualization
- result: 7 non-exclusive scenarios
  → multiple scenarios can apply to one visualization
- Forecast, Definite Ranges, Spatial and Sampling most common scenarios
- mostly static and coincident implementations
  → seamless integration into the main visualization
  → dynamic and adjacent approaches rarely used
- provide a summary of current use cases of uncertainty

→ Set of typical situations in which data journalists communicate uncertainty to the public



n = 75, some visualizations apply to multiple categories

5 Limitations

- only media outlets with an up-to-date data journalism section included
- access limitations through paywalls
- exploratory process of collecting visualizations without formal coding protocol
- no reliable information on how the audience actually perceives uncertainty in certain scenarios

→ Intended to serve as a working foundation for ongoing research and to support data journalism practice through a structured framework

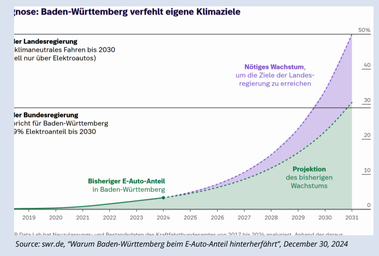
6 Implications

- visualizing uncertainty seems to be more common in certain scenarios (e.g. Sampling - election polls)
- highlights the diversity of approaches and contextual functions of uncertainty visualizations
- only a small amount of visualizations include a visual representation of uncertainty
- what causes the imbalance and why do data journalists tend to use static / coincident approaches?

→ Use and adapt this framework to identify gaps and develop new approaches for visualizing uncertainty

Forecast

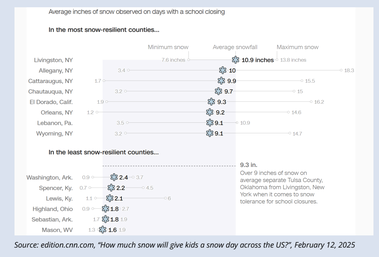
Showing that statements rely on assumptions about an unknown future *(30)*



Source: swr.de, "Warum Baden-Württemberg beim E-Auto-Anteil hinterherfährt", December 30, 2024

Definite Ranges

Estimating the expected reality within a range of possible outcomes (18)



Source: edition.cnn.com, "How much snow will give kids a snow day across the US?", February 12, 2025

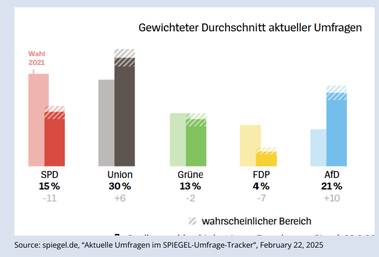
Spatial

Estimating indeterminate locations, conditions in certain areas, etc. *(16)*

Source: nytimes.com, "This Is Where the Palisades Fire Started", January 16, 2025

Sampling

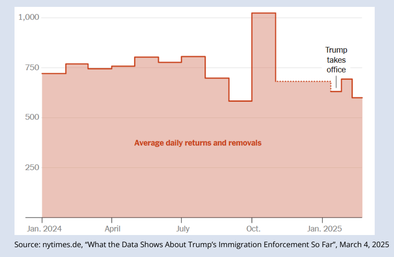
Assessing the results of a sample group and possible differences from reality *(14)*



Source: spiegel.de, "Aktuelle Umfragen im SPIEGEL-Umfrage-Tracker", February 22, 2025

Missing Data

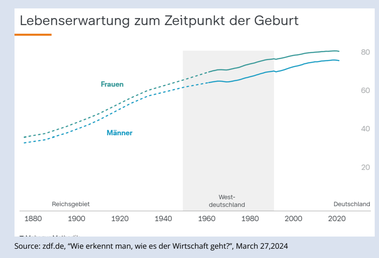
Assessing the limitations of a statement because certain information is not available *(7)*



Source: nytimes.de, "What the Data Shows About Trump's Immigration Enforcement So Far", March 4, 2025

Reconstructed Past

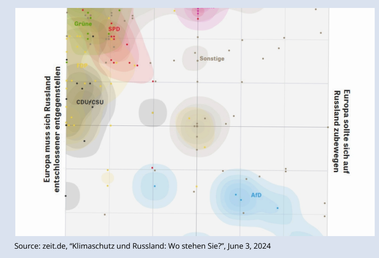
Showing that results cannot be compared because they rely on different historical assumptions *(2)*



Source: zdf.de, "Wie erkennt man, wie es der Wirtschaft geht?", March 27,2024

Classification

Estimating the possible border cases of a chosen group, category or cluster *(2)*



Source: zeit.de, "Klimaschutz und Russland: Wo stehen Sie?", June 3, 2024

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