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Beyond Winner-Takes-All: Evaluating Grid Cartograms for a More Differentiated Representation of German Election Results

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Figure 1. Grid Cartogram of the Baden-Württemberg state election (8th March 2026). The cells show each party's share of the vote (Zweitstimme) in each electoral district, rather than only the winning party.

Abstract:

Election maps are a form of data visualization that play a central role in communicating election results (Field & Darling, 2016). Traditional election maps—most commonly choropleth maps (McNeill & Hale, 2017)—typically display only the winning party per electoral district. However, in times of narrow majorities and diverse coalition options, this form of representation is insufficient and conveys a one-sided view of the election outcome.

Conventional choropleth maps introduce a perceptual bias, as each district is colored according to the winning party. What is often overlooked is that electoral districts in Germany contain roughly equal numbers of eligible voters, while differing significantly in geographic area. For example, Biberach in Baden-Württemberg appears far more prominent due to its large spatial extent than Stuttgart II (Stuttgart is divided into four districts), despite both districts having a similar number of eligible voters. This phenomenon results in a so-called *area size bias*, where larger regions are perceived as more dominant and influential (Schiewe, 2023; Slocum et al., 2009).

To address this issue, we propose a visualization approach based on grid cartograms, in which each cell represents one electoral district (McNeill & Hale, 2017). The cells can be filled proportionally, for example according to the vote shares

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of different parties. The goal of this work is to investigate to what extent this representation enables users to avoid misinterpretations and to interpret election results in a more differentiated way compared to traditional choropleth maps.

This contribution explores both the design space of the grid layout and the individual cell design, as visual design plays a crucial role in effective communication (Lam et al., 2022). Key challenges include preserving the geographical orientation of electoral districts and ensuring users' understanding of the spatial arrangement. Due to the varying sizes of federal states, neighborhood relationships may shift and locations may be distorted. Additionally, different cell shapes (e.g., squares vs. hexagons) and more complex cell-filling designs are examined.

From this, the following research questions are derived: (1) Do users correctly understand the geographical structure and the represented election results? (2) Does the visualization enable a more accurate assessment of multi-party vote distributions? (3) Is the representation perceived as useful and effective?

To address the research questions, a two-step evaluation is planned. First, an exploratory think-aloud pilot study combined with a quantitative questionnaire will be conducted to inform iterative design improvements. The traditional representation using party-based choropleth maps will be compared with a grid cartogram. Participants will complete tasks related to interpreting election results (e.g., identifying majorities and comparing party shares), while metrics such as clarity, comprehensibility, accuracy, and user preferences are collected.

Subsequently, a more extensive qualitative online study will be conducted with an intended sample size of $n > 10$. In combination with a questionnaire, this will enable a quantitative evaluation of the practical usability of the visualizations in terms of perception, comprehension, and preference. Initial expectations suggest that grid cartograms reduce area size bias (Schiewe, 2023) and enable a more differentiated perception of election results. Furthermore, they offer the potential to reveal trends and patterns more effectively (Nusrat & Kobourov, 2016). However, these advantages may come at the cost of reduced geographical orientation.

This work contributes to the evaluation of alternative election visualizations and provides empirical insights as well as design recommendations for a more balanced and informative representation of election results. In particular, this contribution reports on the results of the two-step evaluation.

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