Understanding the “Blue Dot” in Smartphone Displays

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Background

- Location-based services often visualize uncertainty of location readings with the “Blue Dot of Uncertainty”.
- Previous research on visualization of uncertainty in geovisualization has focused on user intuitions not on objective measures of performance.
- Here we examined the effect of an alternative visualization to the ‘blue dot’ representation of uncertainty.
- We speculated that people might use different heuristics, and therefore make different judgments, depending on the format of the visualization provided.
Task

You know you are at the location indicated by X. A and B show two different smartphone displays of where you are. Which smartphone produced the most accurate reading for your location?
Method

Design

• 4 visualization formats: 2 (uniform opacity vs. Gaussian fade) x 2 (centroid visible or not visible)
• Between subjects, design, N = 72
• 128 trials per participant (4 scenarios x 8 ‘known locations’ x 4 replications)
• Know location selected to differentiate between heuristics based on responses.
Visualization Variations

Uniform Opacity with border at 95% CI

Gaussian Fade without Visible Centroid

Uniform Opacity with border at 95% CI and Visible Centroid

Gaussian Fade with Visible Centroid
Consistency when distance and probability predict the same response (proportion of participants who choose that response).

![Bar chart showing consistency across different conditions]
When distance and probability predict different responses

![Bar graph showing the response consistent with distance and probability for different conditions: Boundary Only, Boundary + Centroid, Fade Only, and Fade + Centroid. The graph indicates that the response is more consistent with distance than probability for each condition.](image)
Discussion

• Participants receiving the Gaussian fade glyph with the centroid marked tended to respond more consistently with the ‘distance to centroid’ heuristic.

• Both Gaussian fade and centroid increased the saliency of the center of the glyph in relation to the boundary; combined fade + centroid had strongest effect.

• Participants receiving the blue circle only were more likely to take uncertainty into account. In this visualization, the centroid is less salient.

• While we expected the Gaussian fade to promote use of uncertainty, the increased saliency of the centroid in this glyph encouraged judgments based on distance alone that ignored uncertainty.