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### Objectives

- To Investigate visualizations of uncertainty in the context of an everyday mobile mapping scenario.
- To investigate the effectiveness of different visualizations of uncertainty in this context
- To Examine potential heuristics employed by participants.

### 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 accuracy of judgements with alternative visualizations to the ‘blue dot’ representation of uncertainty.
- We also expected that participants would utilize different heuristics depending on the format of the visualization provided.

### 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)
- Known location selected to differentiate between heuristics based on errors.

### Task

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

Map A

Map B

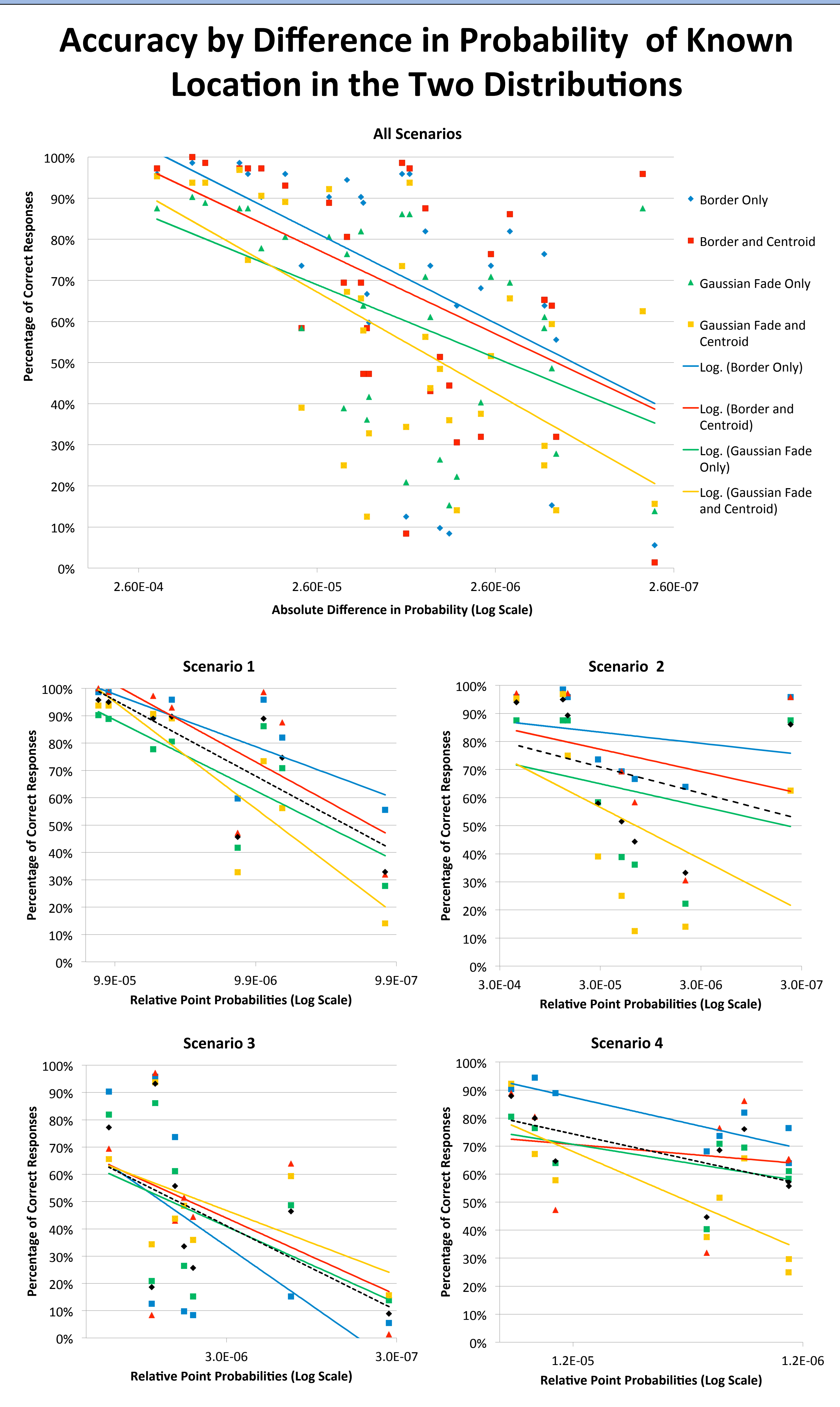
### Variations in Visualizations

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



### Most Common Heuristics Reported in Post -Task Questionnaire

- Chose the circle for which the known point was closest to the center (40% of Participants)
- Chose the smaller circle (24%)
- Chose the circle that the known point was inside (14%)

### Proportion of responses in accordance with ‘distance to centroid’ heuristic.

Scenario	No Centroid Marked	Centroid Marked
1	.79	.84
2	.73	.75
3	.60	.65
4	.43	.45

### Preliminary Conclusions

- Accuracy decreased as difference between relative probability between distributions decreased.
- Uniform Opacity visualization lead to greater accuracy.
- Presence of visible centroid marker lead to decreased accuracy.
- Distance to center was a strong heuristic, but not influenced by visibility of centroid in display