

# Interpreting Visualizations of Uncertainty on Smartphone Displays

**Trevor Barrett**

University of California Santa Barbara

**Mary Hegarty**

University of California Santa Barbara

**Grant McKenzie**

University of California Santa Barbara

**Michael Goodchild**

University of California Santa Barbara

**Abstract:** The blue circle on smartphone displays is an everyday visualization of uncertainty; with the circle size indicating uncertainty of one's location. Like error bars on graphs, it is a discrete visualization of a graded probability function. Two experiments examined the effectiveness of different visualizations of location estimates varying whether and how uncertainty was visualized (uniform blue circle showing confidence interval, faded circle showing graded probability, or both). Given a known location and visualizations of the estimates of two "smartphones" of that location, participants judged which smartphone showed the better location estimation. Participants reported using two primary heuristics (1) choosing the blue circle that was closest to the known location (distance) and (2) choosing the smaller circle (size). Visualizing graded probability with faded circles biased participants towards the distance heuristic. Visualizing confidence intervals with uniform circles biased participants towards the size heuristic (and using uncertainty information) and produced more accurate judgments.