Potential Information Visualization Research Projects
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Effectiveness and Efficiency Tests

Description	Date Added	Status
Determine the effects of non-square aspect ratios on the perception of correlation in scatterplots.	01/19/16	No activity
Determine the effectiveness of bar graphs compared to dot plots when the quantitative scale starts at zero.	01/19/16	No activity
Determine the relative speed and effectiveness of interpreting data when presenting in typical dashboard gauges versus bullet graphs.	01/19/16	No activity
Determine the effectiveness of wrapped graphs compared to treemaps when the number of values does not exceed what a wrapped graphs display can handle.	01/19/16	No activity
Determine the effectiveness of bricks as an alternative to bubbles in a geospatial display.	01/19/16	A project is currently being designed at a university in Europe (TBA).
Determine the effectiveness of bandlines as a way of rapidly seeing magnitude differences among a series of sparklines that do not share a common quantitative scale.	01/19/16	No activity
Determine if donut charts are the most effective way to display any data for any purpose.	01/19/16	No activity
Determine if pie charts are ever the most effective way to display any data for any purpose.	01/19/16	No activity
Determine if radar charts are ever the most effective way to display any data for any purpose.	01/19/16	No activity
Determine if packed bubble charts are ever the most effective way to display any data for any purpose.	01/19/16	No activity
Determine if dual-scaled graphs are ever the most effective way to display any data for any purpose.	01/19/16	No activity
Determine if graphs with 3-D effects (e.g., 3-D bars) are ever the most effective way to display any data for any purpose.	01/19/16	No activity
Determine which is more effective: displaying deviations in relation to zero or 100%. For example, if you wish to display the degree to which actual expenses varied in relation to the expense budget, would it work best to represent variances as positive or negative percentages above or below zero or as percentages less than or greater than 100%.	01/19/16	No activity

Determine the effectiveness of various designs for Sankey diagrams in an effort to recommend design guidelines.	01/19/16	No activity
Determine the best uses of various network diagram layouts (centralized burst, arc diagrams, radial convergence, etc.).	01/19/16	No activity
Determine the effectiveness of word clouds versus horizontal bar graphs (or wrapped graphs).	01/19/16	No activity
Determine which shapes are most perceptible and distinguishable for data points in scatterplots.	01/19/16	No activity
Determine the effectiveness of large data visualization walls versus smaller, individual workstations.	01/19/16	No activity
~~Determine if the effectiveness of displaying time horizontally from left to right depends on one's written language or is more fundamentally built into the human brain.~~	01/19/16	As it turns out, this has already been addressed in studies by Fischer M.H., Mills R.A., & Shaki S. (2010) and Shaki S., Fischer M. H., & Petrusic W. M. (2009), which suggest that the left-to-right perception of time is probably language dependent.
Determine if the typical screen scanning pattern beginning at the upper left depends on one's written language or is more fundamentally built into the human brain.	01/19/16	No activity
Determine the relative speed and effectiveness of interpreting particular patterns in data when displayed as numbers in tables or visually in graphs. For example, compare a table that displays 12 monthly values per row versus a line graph that displays the same values (i.e., twelve monthly values per line) to see how quickly and effectively people can interpret various patterns such as trending upwards, trending downwards, particular cyclical patterns, etc. We know that it is extremely difficult to perceive patterns in tables of numbers, but it would be useful to actually quantify this performance.	01/19/16	No activity
Determine the relative speed of finding outliers in tables of numbers versus graphs.	01/19/16	No activity

Determine the relative benefits of using a familiar form of display versus one that requires a few seconds of instruction. The argument is sometimes made that a graph must be instantly intuitive because making people learn how to read an unfamiliar form of display is too costly in time and cognitive effort. For example, population pyramids provide a familiar way for people who routinely compare the age distributions of males versus females in a group, yet a frequency polygon, although unfamiliar, might provide a way to see how the distributions differ much more quickly and easily. In cases when people can be taught to read an unfamiliar forms of display with little effort, does it make sense to do so versus rather than continuing to use a form of display that works less effectively.	01/19/16	No activity
Determine if violin plots are ever the most effective way to display any data for any purpose.	01/22/16	No activity
Determine if and when it works as well to label the values of each bar in a bar graph as an alternative to a quantitative scale along one of the axes.	06/02/16	No activity
Determine if the width of bars in a bar graph causes problems if it exceeds a particular threshold.	06/02/16	No activity
Determine the specific role of bar length in the use of bar graphs as opposed to the 2-D position of the bar's end. Does the fact that bars encode values in two ways—2-D and length—provide benefit beyond 2-D encoding alone?	05/22/17	No activity
Determine the effect of jittering data points in a strip plot in the direction that is perpendicular to the direction of the quantitative scale on the perception of a distribution.	05/22/17	No activity

New Solution Designs

Description	Date Added	Status
Develop an effective way to show part-to-whole relationships in a geospatial display.	01/19/16	No activity
Develop an effective way to show proportional highlighting, as it pertains in brushing and linking, for portions of the following graphical objects: bars, lines, and boxplots. Various ways to show proportional highlighting have been applied to bar graphs, but not to line graphs and box plots.	01/19/16	No activity
Develop a way to automatically attach data labels to the ends of lines in a line graph without overlapping.	01/19/16	No activity

Develop a way to temporarily overlay or replace box plots with frequency polygons. The purpose is to enhance our ability to see the shape of a particular distribution in greater detail than a box can provide without changing the entire graph. For example, imagine hovering over a single box in a box plot and having the box become visually subdued while a line is superimposed on top of it.	01/19/16	No activity
Develop a way to automatically detect the amount of lag between two time series and then align the leading events with the lagging events in a line graph.	01/19/16	No activity
Develop potential uses of blindsight to direct a person's attention to particular sections of a display as needed (e.g., to something on a dashboard that needs attention).	01/19/16	No activity
Develop an effective design for waterfall graphs when multiple transactions occur at the same time and some are positive and some are negative.	01/19/16	No activity
Develop an algorithm for automatically distributing several sets of time series values uniformly across a 100% scale when they have different starting points, ending points, and durations. For example, this would make it easy to compare the person hours associated with various projects across their lifespans, even when they differ in starting dates, ending dates, and durations.	01/19/16	No activity
Develop a full set of interface mechanisms for making formatting changes to charts (turning grid lines on and off, changing the colors of objects, repositioning and orienting objects such as legends, changing the quantitative scale along an axis, etc.) that involves direct access to those objects rather than one that requires the user to wade through lists of formatting commands located elsewhere (e.g., in dialog boxes).	01/19/16	No activity

Taxonomies and Guidelines

Description	Date Added	Status
Develop a useful taxonomy or set of guidelines to help people think about the differences in how data visualizations should be designed to support data sensemaking (i.e., data exploration and analysis) versus data communication (i.e., presentation).	01/19/16	No activity