Reading questions week 5

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1. Ware argues that human perception involves 2.5 dimensions. Given this assertion, when might a 3D visualization be useful and why?

Ware states that the brain perceives depth very different from the other two dimensions (up-down and sideways) in the image plane. Depth cue's such as occlusion, shape by shading and linear perception can be manipulated by the designer to serve purpose for a design. However, Ware emphasizes that "the layout of objects and patterns as they appear in the image plane should be the primary design consideration." When designing interactive applications with 3D visualizations one should be aware of the tradeoff between the costs of eye movements and the cost of information access. 3D visualization is most useful for tools intended to achieve visual realism such as virtual reality systems.

2. In Chapter 6, Ware presents some implications of pattern recognition and visual working memory on design. Provide an example that harnesses some of these principles (perhaps an advertisement, visualization, or interface) and discuss how the design takes these principles into account.

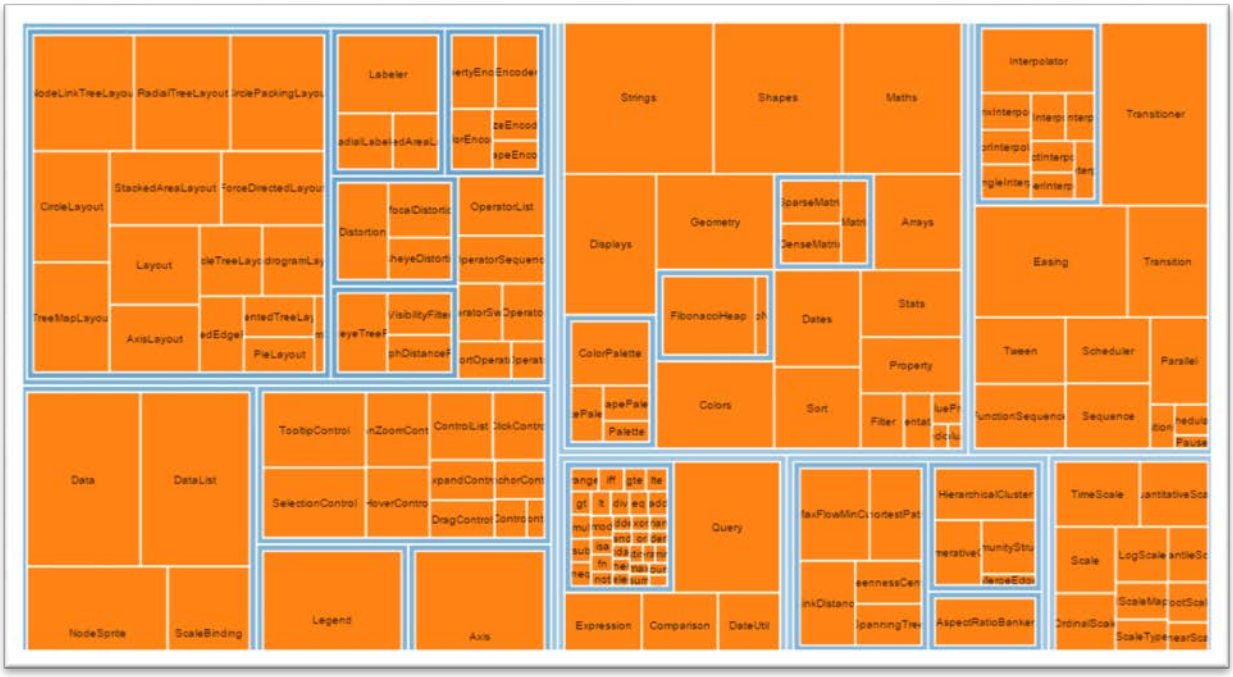
Source: http://www.surfrider.org/programs/plastic-pollution

The advertisement shown above was made by the surf rider foundation and makes use of gist-object conflict. On the first glance, our fast pattern recognition processes the gist of the image and brings up an association with food marketing or resembles another advertisement for a Japanese restaurant. On closer inspection however, one can see that the food contains inedible plastic objects. The mismatch between image gist and objects triggers further exploratory cognitive activity to resolve the conflict. The viewer's attention is directed to the attached text and a powerful message is conveyed.

3. According to Bostock et. al., what are the primary advantages of D3? Based on your reading of the article, please provide an example of a type of visualization that would be easier and better implemented in D3 as opposed to HTML5, JSON, and Javascript. Please list the pros and cons of choosing D3 over pure HTML5, JSON and Javascript.

D3 offers tools that help facilitate the connections between data and graphics and its primary advantages discussed in this article are flexibility, expressiveness and accessibility. D3 is particularly useful for dynamic data visualizations which require mechanisms that add or remove element nodes and connecting them to a dataset. These data transitions are easy to implement in D3 in contrast to HTML5, JSON, and Javascript. D3 pro's: allows for great for interactivity, efficiently binds data to DOM structure and able to generate complex visualizations for large amounts of data, works well together with new browser features and has many open source documentation and examples.
D3 con's: steep learning curve; takes a long time to get familiar with all the tools and when using enormous datasets this will limit the performance of SVG.

4. Of the visualization figures presented in Heer et. al., which do you find the most difficult to comprehend? Does the complexity of the figure interfere with the goal of visualization as described in the article? Include a screenshot of the figure you have chosen in your response and use principles that you have learned so far (i.e., from design, perception, and cognition) to justify your choice.



I picked the squarified tree map diagram for data hierarchy visualization. According to the paper its goal is to leverage hierarchical structure, allowing rapid multiscale inferences: micro-observations of individual elements and macro-observations of large groups. Here the tree is laid out into recursively subdivided rectangles and the area of each rectangle corresponds to the package's size. The benefit

of using this structure as compared to other hierarchy visualizations is that it saves space and has high data density. Additionally, package's sizes can be easily compared to each other. However, these benefits trade-off with seemingly more downsides that come with this type of visualization: it takes a very long time for your eyes to navigate to the element you're looking. The order of hierarchy is not self-evident (padding with blue lines) and the spatial location in this visualization does not have intuitive meaning such as a numerical value. Moreover, the higher-order groups where individual data elements fall into have no names displayed. In summary, the squared enclosure is not as effective in displaying hierarchical structure when compared to other hierarchy diagrams such as the indented tree lay out or node-link diagrams.

5. Play around with the interactive graphs included in the Heer article. You need to open this page in a browser that runs Java. Focus on Figure 1A. To what extent do interactivity and transitions, elements that D3 optimizes, add to the clarity and message of the visualization? With the element of interactivity in mind, redesign and sketch the contents of figure 1A with one of the other visualization types described in the Heer article. Include a picture of a sketch of your idea, and describe how it supports comprehension and data exploration.

The mouse-hovering interactivity in figure 1a adds to the ability to visualize more detailed stock value differences at a particular time, the y-label is rapidly updated to fit max and minimum percentage change and the data is rescaled. My first impression tells me that this data could also be represented in a stacked graph, however since the stock values includes (negative) loss percentages this dataset cannot be stacked. An alternative visualization type that could be used is the small multiples display. For every stock a small line graph could be made, just displaying its own stock's trend. An interactive element would be that users can click the separate line graphs to toggle their display on and off in another larger expanded graph to enable for more clear one to one comparisons.