INFORMATION VISUALIZATION
OUTLINE

About Me

Definitions

History and Milestones

Techniques

Mixed Feelings
WHY HOFI?

+ Lots of technologies fail regardless of how well they are designed ;)
+ There are patterns to the ways technologies are adopted (or not)
+ Going beyond any specific technology and looking at the human part of the equation
DEFINITION(s)

Visual representations of abstract data to amplify cognition
– Card, Mackinlay, Shneiderman, 1999

Visually displayed measured quantities by means of the combined use of points, lines, a coordinate system, numbers, symbols, words, shading and color.
– Tufte, 2001

Complex ideas communicated with clarity, precision, and efficiency.
– Tufte, 2001

The depiction of information using spatial or graphical representations, to facilitate comparison, pattern recognition, change detection, and other cognitive skills that make use of the visual system.
– Hearst, 2003
DEFINITION(s)

Visual
+ Data
+ Understanding
VISUALIZATION?
The linear metaphor is ubiquitous in everyday visual representations ... in almanacs, calendars, charts, and graphs of all sorts. So it comes as something of a surprise to discover that it was only quite recently that scholars first thought to represent chronological relationships among historical events by placing them on a measured timeline.

– Rosenberg, 2010
where are we going?
Joseph Priestley (1733 – 1804)

+ Member of the Royal Society
+ Perhaps better known for discovering oxygen
+ Typical Royal Society polymath
+ Lectures on History and General Policy (1788)
  + Teaching aids to help students see history
+ A Chart of Biography (1765)
+ New Chart of History (1769)
A New Chart of History (1769)
If the reader carry his eye vertically, he will see the contemporary state of all the empires subsisting in the world, at any particular time. He may observe which were then rising, which were flourishing, and which were upon the decline. Casting his eye a little on each side of the vertical line, he will see what empires had lately gone off the stage, and which were about to come on.
Annals of Saint Gall (Mid 9th Century)
710. Hard year and deficient in crops.
711.
712. Flood everywhere.
713.
714. Pippin, Mayor of the Palace, died.
715. 716. 717.
718. Charles devastated the Saxon with great destruction.
719.
720. Charles fought against the Saxons.
721. Theudo drove the Saracens out of Aquitaine.
722. Great crops.
723.
724.
725. Saracens came for the first time.
726.
727.
728.
729.
730.
731. Blessed Bede, the presbyter, died.
732. Charles fought against the Saracens at Poitiers on Saturday.
733.
734.
A LIST OF LIST MAKING

+ Joseph Scaliger – *Thesaurus temporum* (1606)
+ James Ussher – *Annales veteris testamenti, a prima mundi origine deducti* (1648)
+ Christopher Helvig – *Historical and Chronological Theater* (1651)
+ Francis Tallents – *A View of Universal History* (1685)
+ Isaac Newton – *The Chronology of Ancient Kingdoms* (1728)
+ John Blair – *Chronology and History of the World, from the Creation to the Year of Christ 1753* (1753)
Graph of Planetary Movements (10th Century)
Jacques Barbeu-Dubourg
(1709 – 1779)
Jacques Barbeu-Dubourg (1709 – 1779)

+ Physician, botanist, historian
+ Good friend of Benjamin Franklin
  + Translated many of Franklin’s works into French
+ Carte Chronographique (1753)
  + Appears as an entry in Diderot’s Encyclopédie

Imagine a combination of several component charts brought together to form a single large one. The height of this larger chart is hardly a foot; its length is necessarily very considerable. However long, it is divided [along the top edge] into small equal parts, alternately black and white, like those marking out degrees on the great circle around a globe. There are as many of these sections as the years which have elapsed from the creation of the world to our own time. Each of these sections marks one year of the world’s existence. This chronological scale is formed by conjoining three great epochs; the first stretches from the creation of the world to the foundation of Rome; the second, from the foundation of Rome to the birth of Jesus Christ; the third, from the birth of Jesus Christ to our own time.
William Playfair
(1759 – 1823)
William Playfair (1759 – 1823)

+ Scottish engineer and political economist
+ Father of modern information visualization
  + Bar chart, line graph, pie chart
  + Influenced by Priestley and popularity of the timeline
  + Model for clarity and simplicity
+ The Commercial and Political Atlas (1786)
+ Statistical Breviary (1801)
William Playfair (1759 – 1823)

On inspecting anyone of these charts attentively, a sufficiently distinct impression will be made, to remain unimpaired for a considerable time, and the idea which does remain will be simple and complete, at once including the duration and amount. Men of great rank or active business, can only pay attention to general outlines; nor is attention to particulars of use, any further than as they give a general information: And it is hoped, that with the assistance of these charts, such information will be got, without the fatigue and trouble of studying the particulars of which it is composed.
BAR CHART

Exports and Imports of SCOTLAND to and from different parts for one Year from Christmas 1780 to Christmas 1781.

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<th>Name of Places</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
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</tbody>
</table>

The upright divisions are Ten Thousand Pounds each. The Black Lines are Exports, the Stippled Lines Imports.

The Commercial and Political Atlas (1786)
Letter on our agricultural distresses, their causes and remedies (1822)
Nicole Oresme
(132? – 1382)
René Descartes
(1596 – 1650)
GRAPHING EQUATIONS

La Géométrie (1637)
No Humble Pie: The Origins and Usage of a Statistical Chart
On the Mode of Communication of Cholera (1854)
Diagram of the causes of mortality in the army in the East (1858)
Carte figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813 (1869)
OUTLINE

- About Me
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- History and Milestones
- Techniques
- Mixed Feelings
GOOD VISUALIZATION

2012 PRESIDENTIAL RUN
GOP CANDIDATES

BACK PALIN 70%
BACK HUCKABEE 63%
BACK ROMNEY 60%

SOURCE: OPINIONS
DYNAMIC

FOX 47°
GOOD VISUALIZATION

Record
Analyze
Communicate
GOOD VISUALIZATION

Data MAPPING Image
VISUAL VARIABLES

+ Position (x, y)
+ Size
+ Color (Hue)
+ Intensity (Saturation)
+ Value (Brightness)
+ Texture
+ Orientation
+ Shape
+ Others?

Sémiologie Graphique, Bertin (1967)
PRE ATTENTIVE

1281768756138976546985604982826762
9839858458224509856458940980943585
9091030209905959595775050678904567
8845789809821677654876360912949686

How Many 3’s?
PRE ATTENTIVE

How Many 3’s?
PRE ATTENTIVE

+ Line (blob) orientation
+ Length
+ Width
+ Size
+ Curvature
+ Number
+ Terminators
+ Intersection
+ Closure
+ Color (Hue)
+ Intensity
+ Flicker
+ Direction of movement
+ Binocular luster
+ Stereoscopic depth
+ 3-D depth cues
+ Lighting Direction
GRAPHICAL EXCELLENCE

+ Show the data
+ Focus on substance not methodology, graphic design, technology, production method, etc
+ Avoid distorting data
+ Present many numbers in a small space
+ Make large data sets coherent
+ Encourage the eye to compare values
+ Reveal data at different levels from broad overview to fine detail
+ Have a point

Visual Display of Quantitative Information, Tufte (2001)
The interior decoration of graphics generates a lot of ink that does not tell the viewer anything new. The purpose of decoration varies — to make the graphic appear more scientific and precise, to enliven the display, to give the designer an opportunity to exercise artistic skills. Regardless of its cause, it is all non-data-ink or redundant data-ink, and it is often chartjunk.
Data-ink is the non-erasable core of a graphic, the non-redundant ink arranged in response to variation in the numbers represented.

\[
\text{data-ink ration} = \frac{\text{data-ink}}{\text{total ink used to print the graphic}}
\]

*Visual Display of Quantitative Information, Tufte (2001)*
GRAPHICAL EXCELLENCE

Visual Display of Quantitative Information, Tufte (2001)
VISUALIZING AMBIVALENCE
WHAT MIXED FEELINGS LOOK LIKE

www.mixedfeelings.us
AMBIVALENCE

The coexistence in one person of contradictory emotions or attitudes (as love and hatred) towards a person or thing.
– OED

Ambivalence != Indifference
MIXED FEELINGS

"The Problem of the Overstuffed Middle"  
(Converse, 1995)
MIXED FEELINGS
MIXED FEELINGS

Our visualization demonstrates a way to “unstuff” the middle by measuring respondents positive and negative feelings separately.
MIXED FEELINGS
MIXED FEELINGS

How do we make mixed feelings fun to explore?
MIXED FEELINGS

Let’s take a look...
MIXED FEELINGS
MIXED FEELINGS

Ambivalence
Overall, how do you feel about Facebook?
In her recent book *Captive Audience*, the legal scholar Susan Crawford argues that broadband access in America has been hampered by the oligopoly/monopoly of the cable companies. As a result, she says, Americans pay more for slower access than people in other parts of the world, and many people still have no access at all. She concludes that broadband access should be regulated on the model of a public utility such as electric power.

Some have argued that Crawford is wrong: broadband access is not like a public utility, government regulation would be highly costly and strangle service and innovation, and things aren't as bad as Crawford says they are.

Read some material on both sides, and then decide whether, on the whole, you think more government regulation of broadband access is a good or bad idea. Is it appropriate to compare broadband to a public utility? Would deregulation be a better solution? Summarize your view in 3 points, in a total of no more than 350 words.

Once the assignments are in, we're going to ask the class to participate in an in-class debate, calling on a few people to present each side, then voting Oxford debate style. At the top of your assignment, indicate whether you want to opt out from presenting). No extra points, but the presiding spirit of class participation will be hovering close by.