



Defining Information Visualization

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What is,

Information Visualization?

Information Visualization is ...

Plot
Graph

Design

Information

Interactive

Viz

INFOVIZ

Graphic

Graphic

Visual Analytics

Data Visualization

Info Graph

Artistic Data Visualization

Chart

Information Visualization Is...

Data visualization

Information Visualization Is...

Concerned with the creation of **visual artefacts** aimed at amplifying cognition

Amplifying cognition

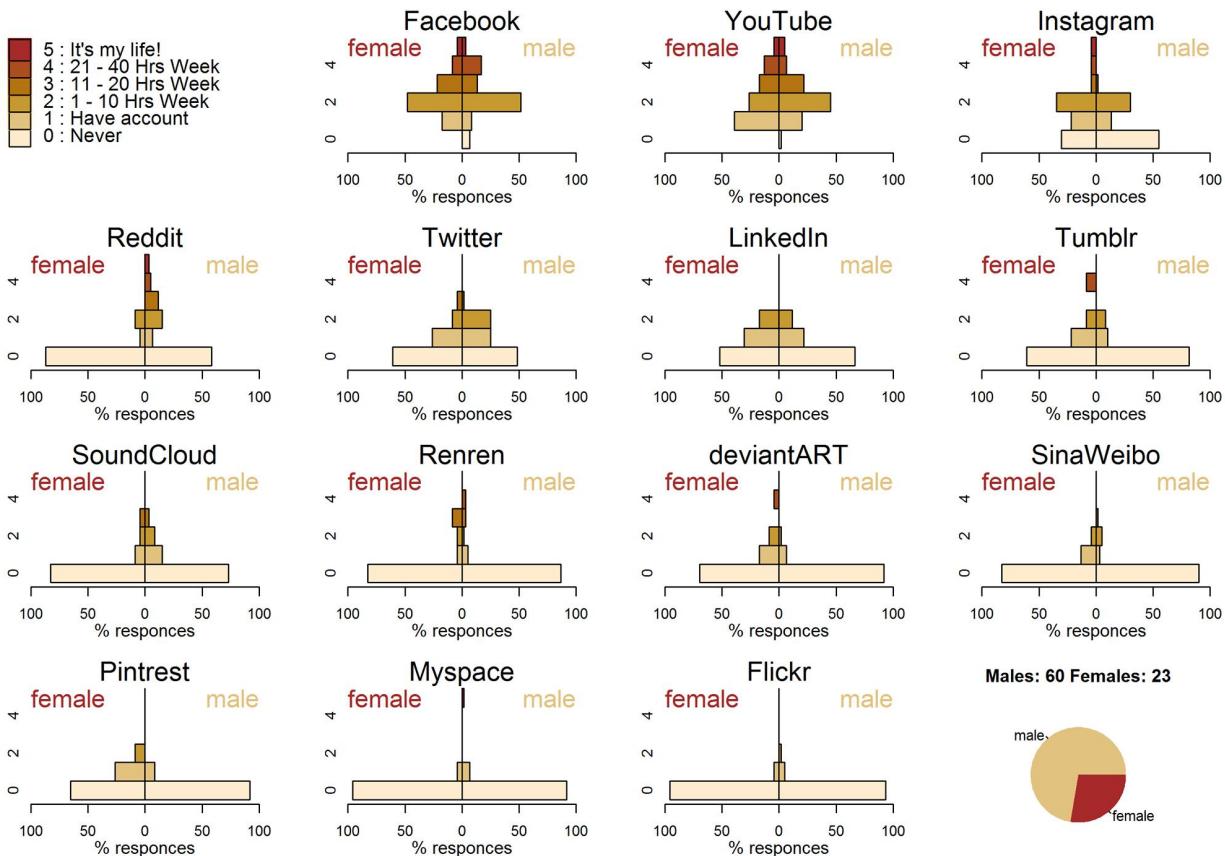
Visual thinking

Memory

How Much Time Do Students Spend on Social Media Sites?

group	year	Facebo	Twitter	LinkedIn	Google	Meetup	Upon	us	Stumble	del.icio.	Flickr	t	e	ail	Slashdot	YouTub	EveryTr	Digg	Pintrest
3	2	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
20	2	4	4	0	1	0	2	0	0	1	0	0	2	0	0	0	0	0	0
8	3	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
1	3	5	0	0	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0
4	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
11	1	4	1	1	5	0	0	0	0	0	0	0	0	2	0	0	0	0	0
6	1	3	1	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	1
12	1	2	1	0	2	0	0	0	0	0	1	0	0	2	0	0	0	0	0
19	2	4	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
14	2	3	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
4	2	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
10	3	2	0	0	2	0	0	1	0	0	0	0	0	2	0	0	0	0	0
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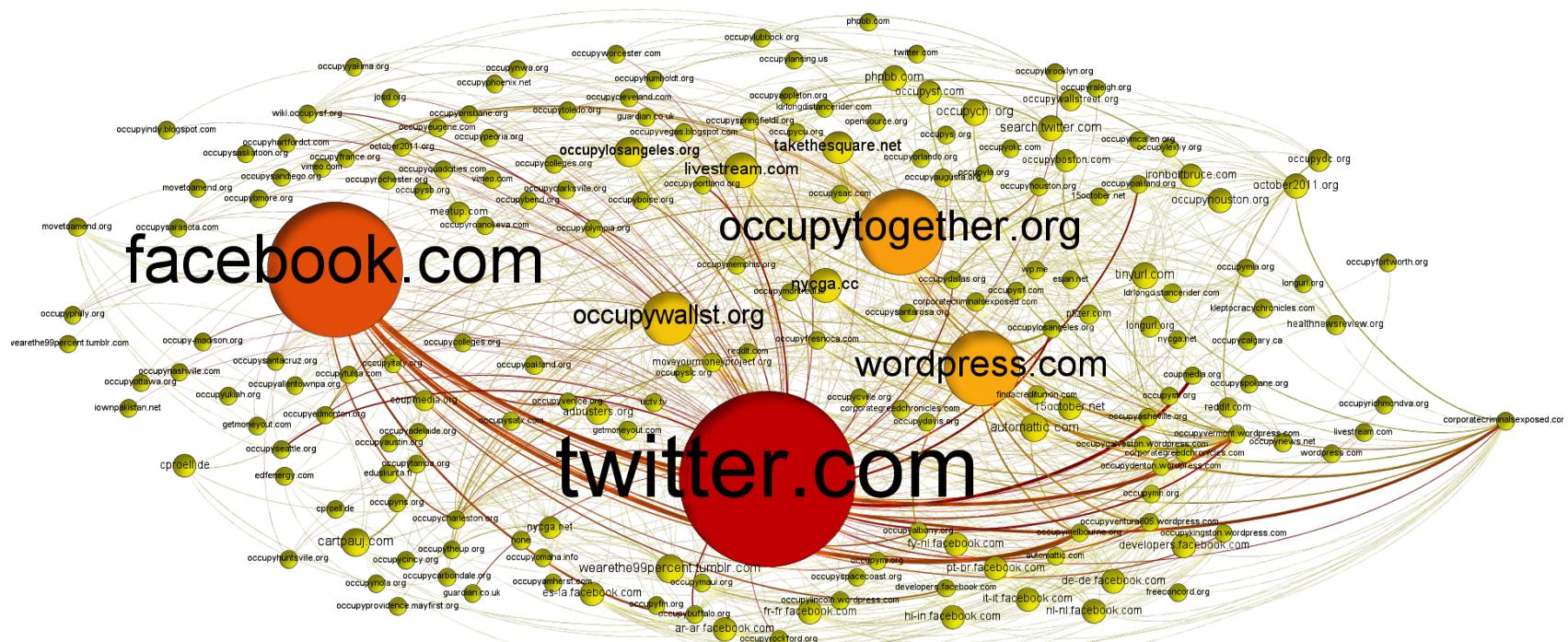
How Much Time Do Students Spend on Social Media Sites?



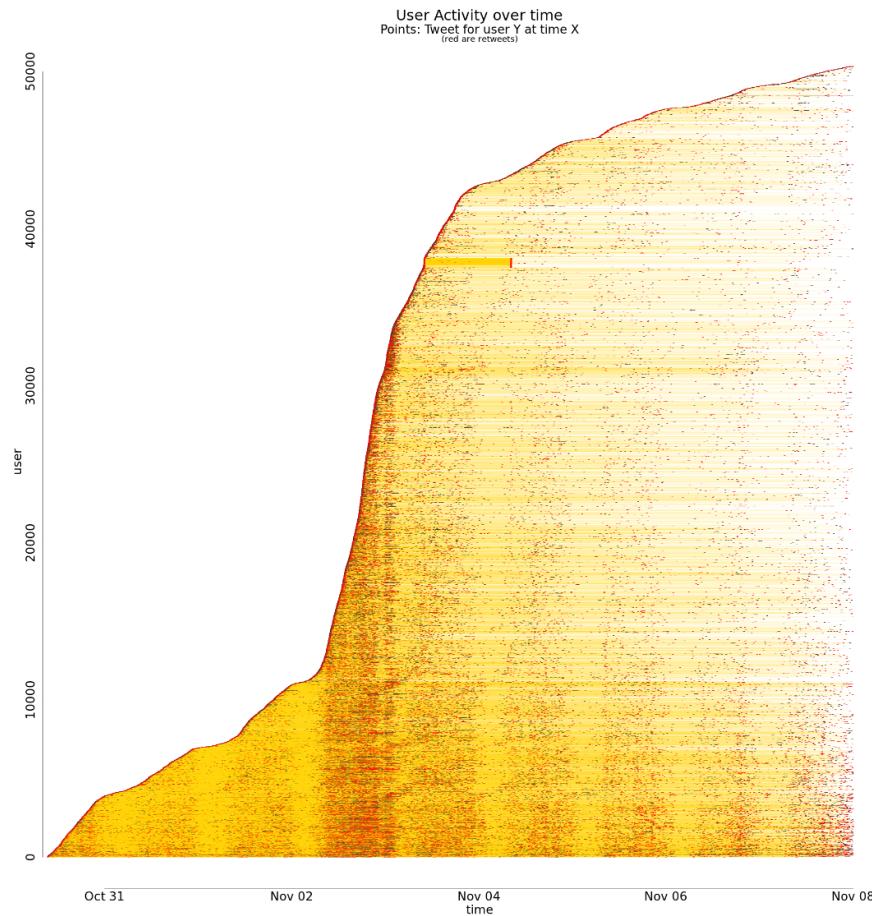
What do you do with
Information
Visualization?

Communication & Exploration

Communication Example



Exploration Example





Visual Thinking, Pre-attentive Attributes and Encoding Data

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Visual Thinking and Pre-attentive Attributes

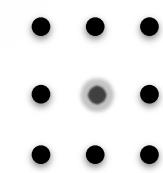
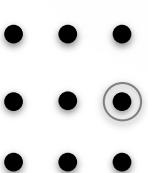
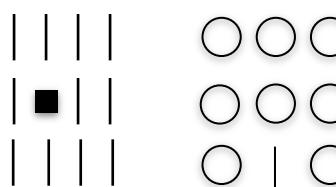
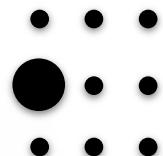
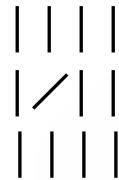
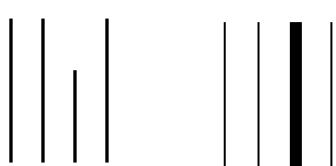
Visual Thinking and Pre-attentive Attributes



Visual Thinking

Amplifying cognition:

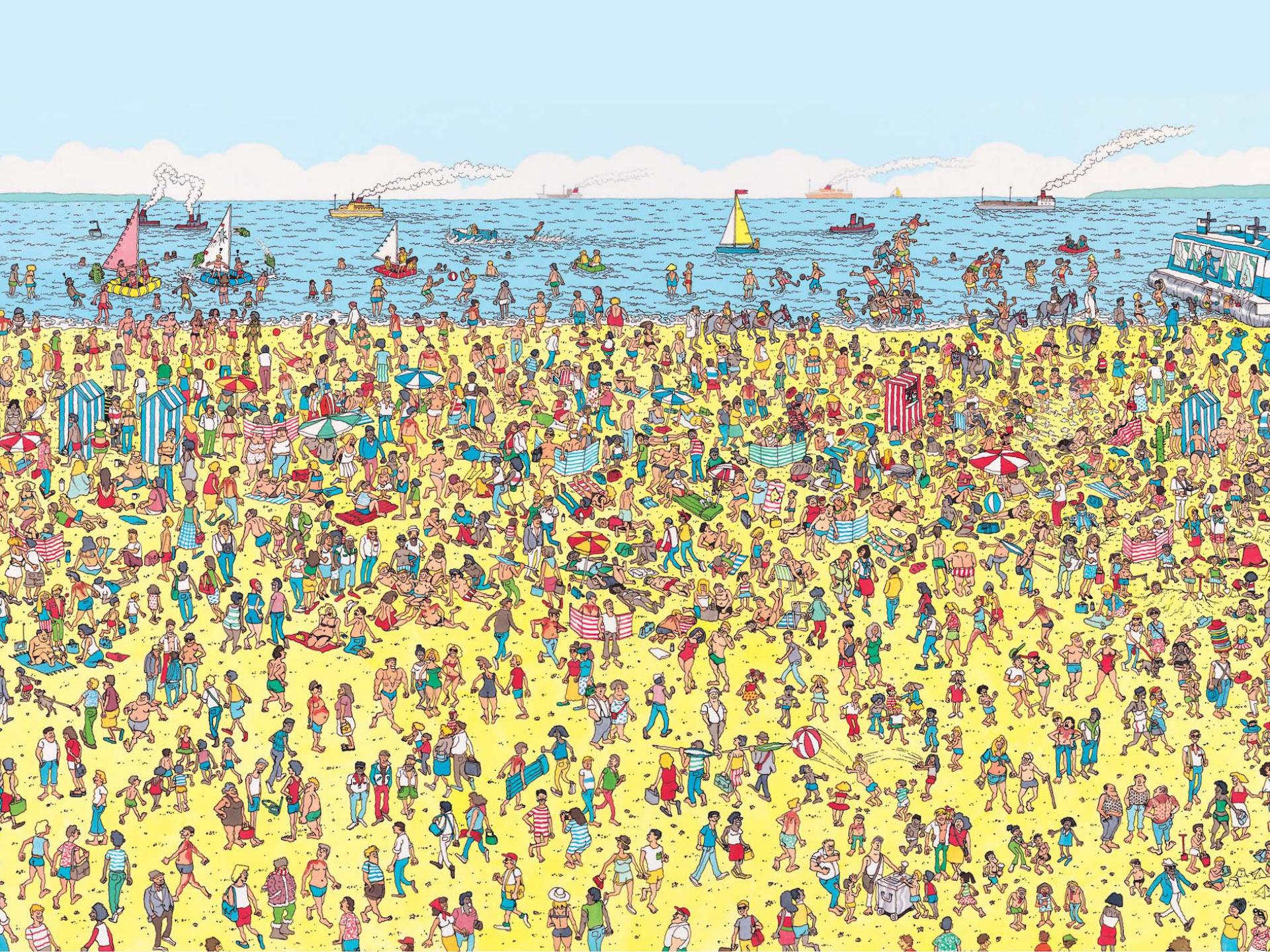
- Pre-attentive attributes and **immediacy**

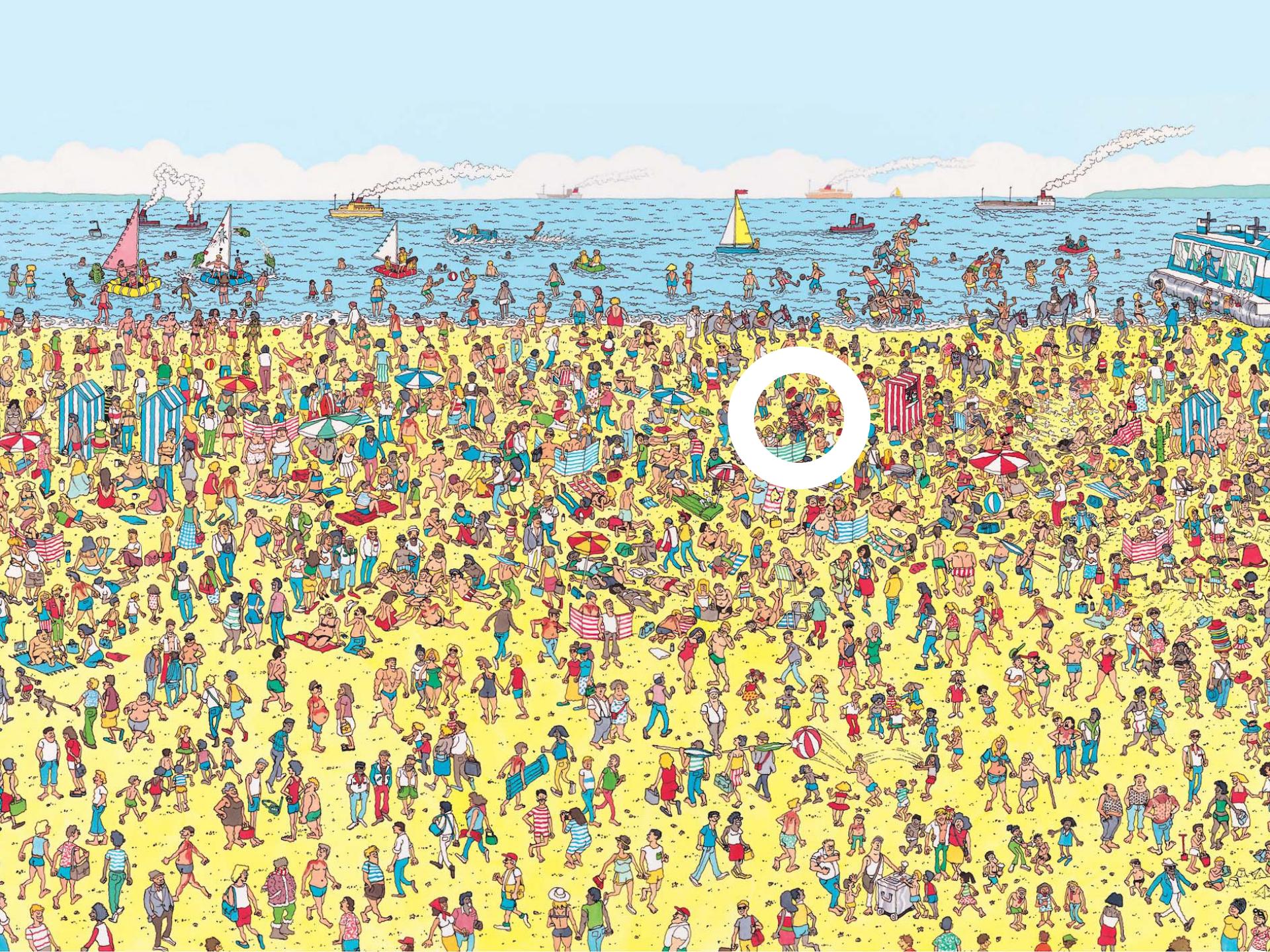


Length
Width
Orientation
Size
Shape
Curvature
Enclosure
Blur

Visual Thinking: Patterns

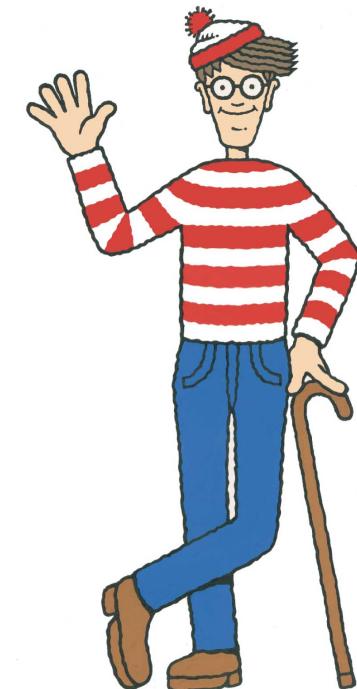
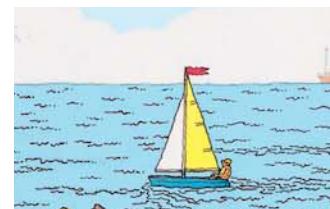






Visual Thinking: Patterns

We do **not**
see everything



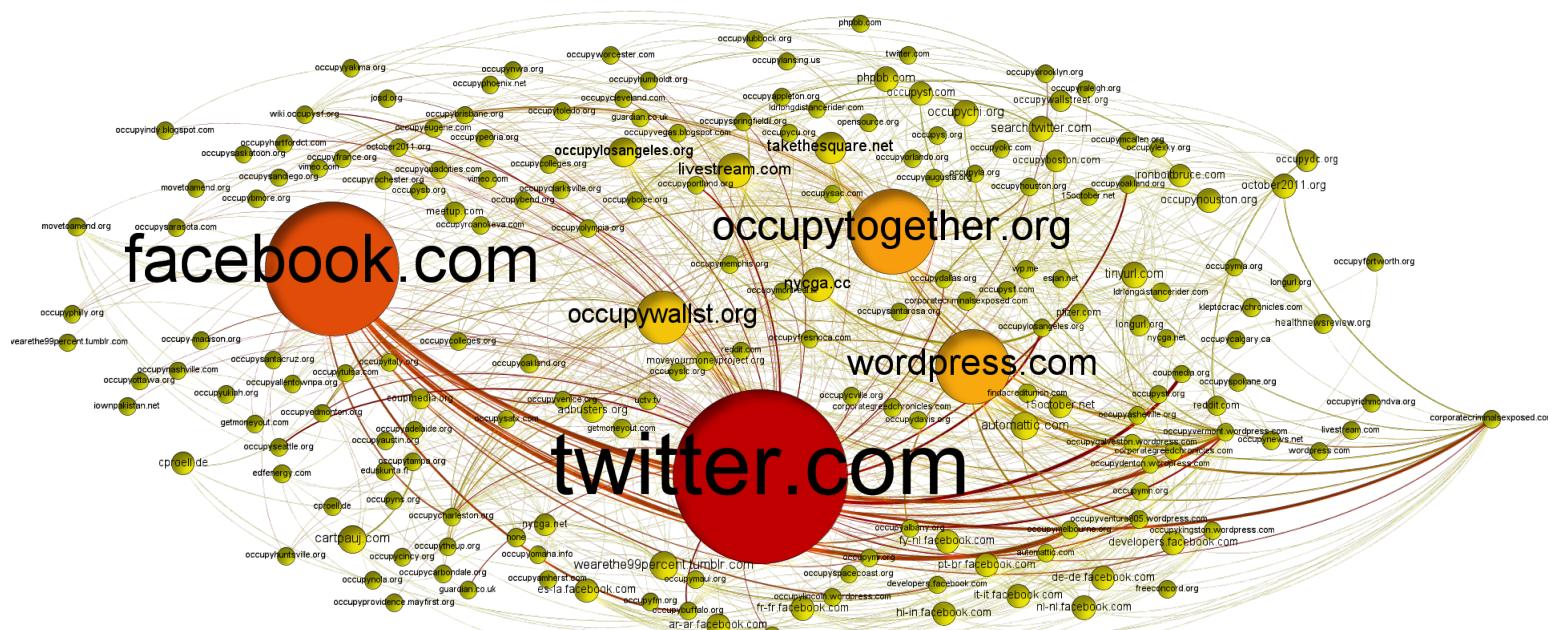
Visual Thinking: Salience

Differences that make a difference

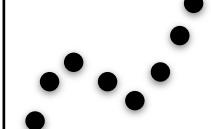
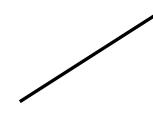
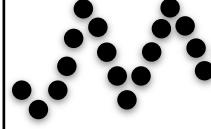
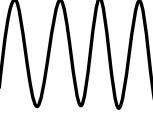
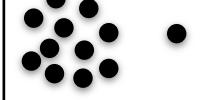
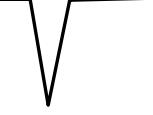
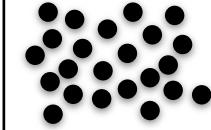


Visual Thinking: Salience

Differences that make a difference

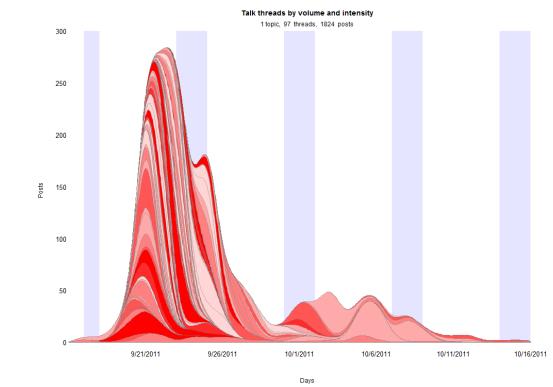
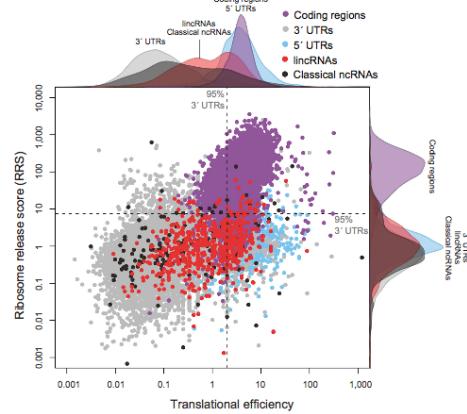
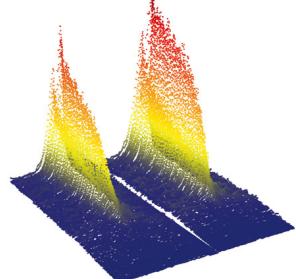
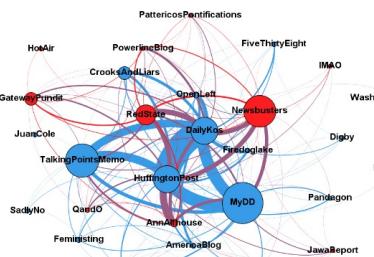
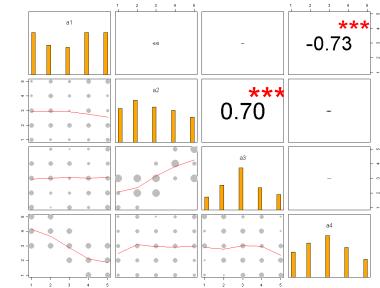
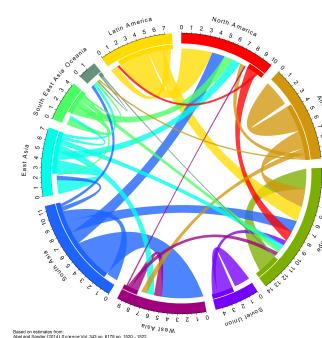
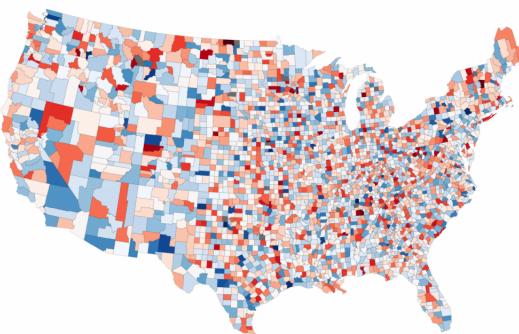
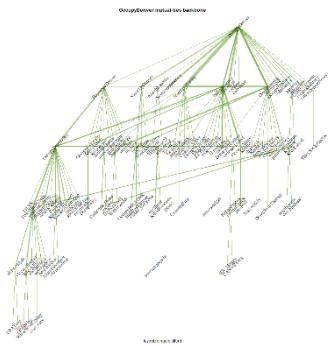


Visual Encoding

	Position	Length	Direction or Orientation	Size	Color
Increase					
Decrease					
Repeated Combinations					
Outliers					
Noise					

From “Data Points”, p144, by Nathan Yau

Visual Encoding





Telling Stories With Data

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Data and Questions

What question can your data answer?

Test out an idea (hypothesis)

Look for exceptional cases (both good and bad)

Reduce uncertainty to maximize the chance of a favorable outcome

Find and Tell the Story in the Data

Find

- Patterns
 - Exploratory: Finding questions
 - Changes over time
 - In aggregate
- Relationships
 - In statistics, correlations, and causation
 - Multiple variables
 - Between visualizations

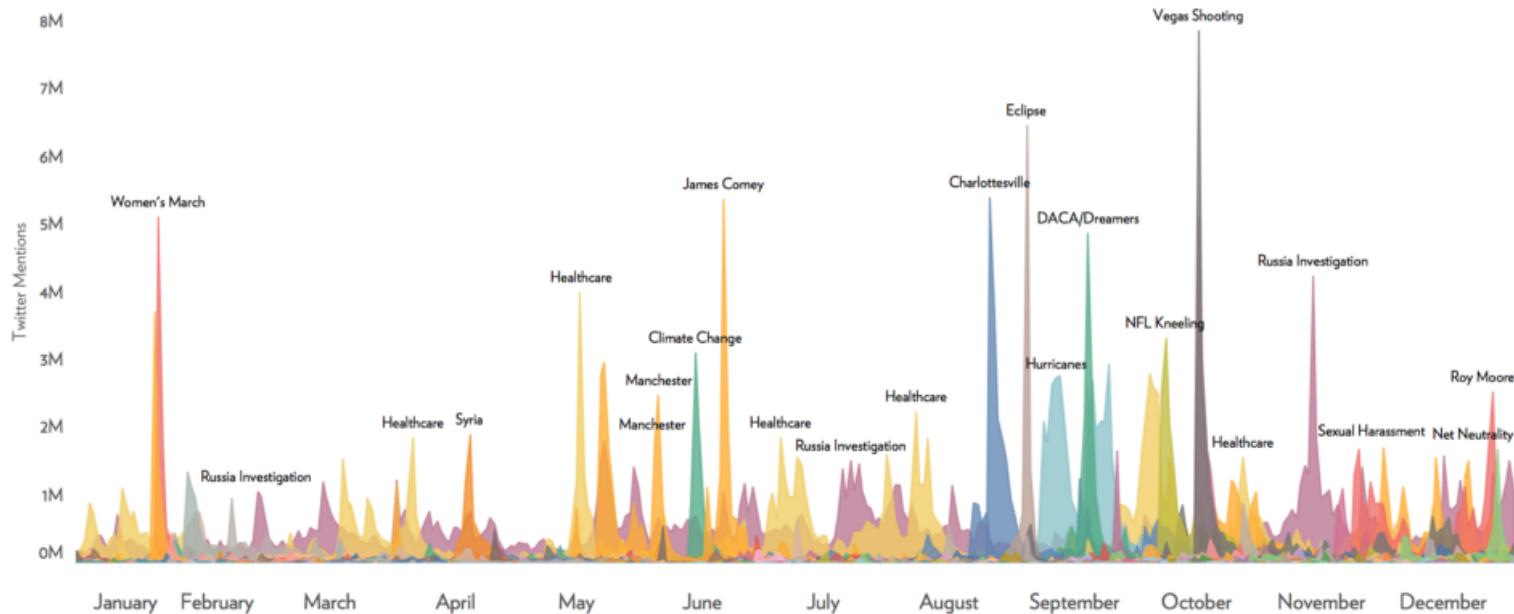
Then encode

- Circle, bars, colors
- Labels, legends, and keys
- Context

What's the Story Here?

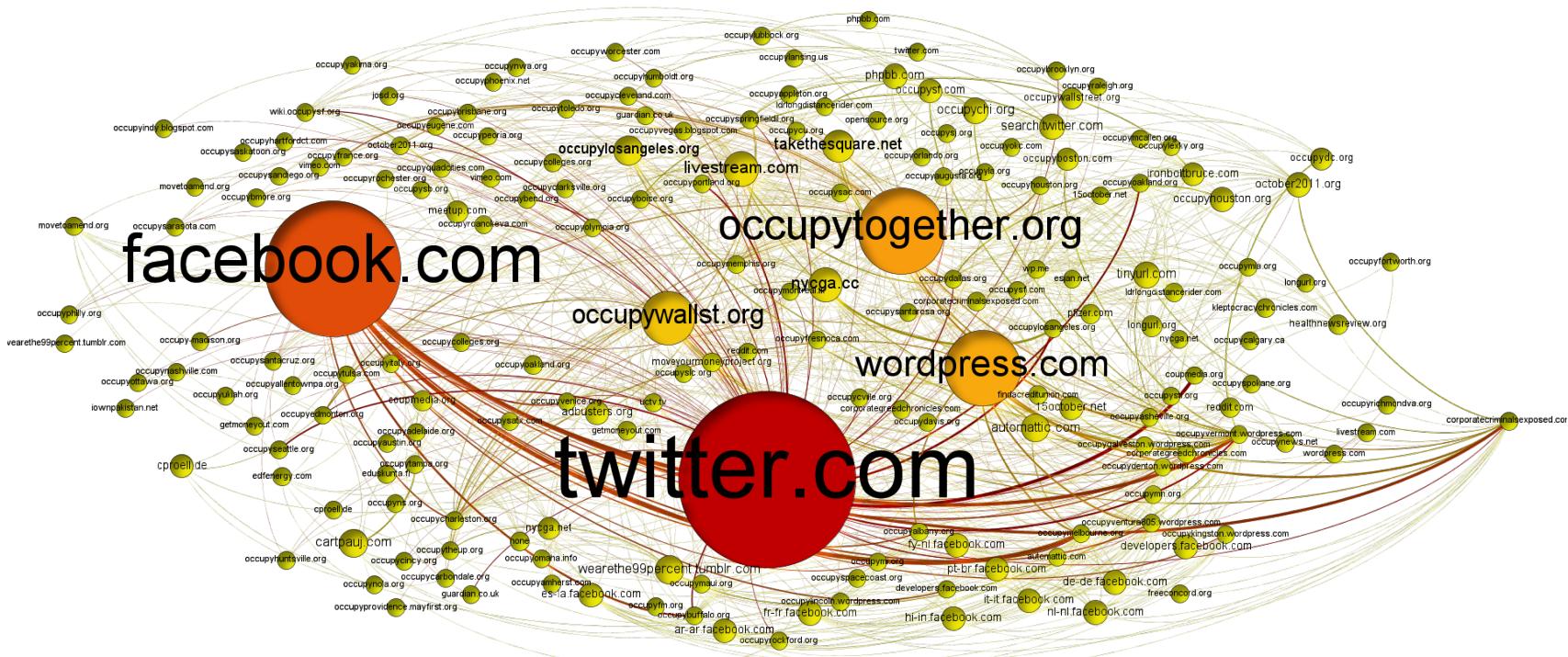
THE YEAR IN NEWS 2017

THE YEAR'S MOST TALKED ABOUT STORIES: DAY BY DAY

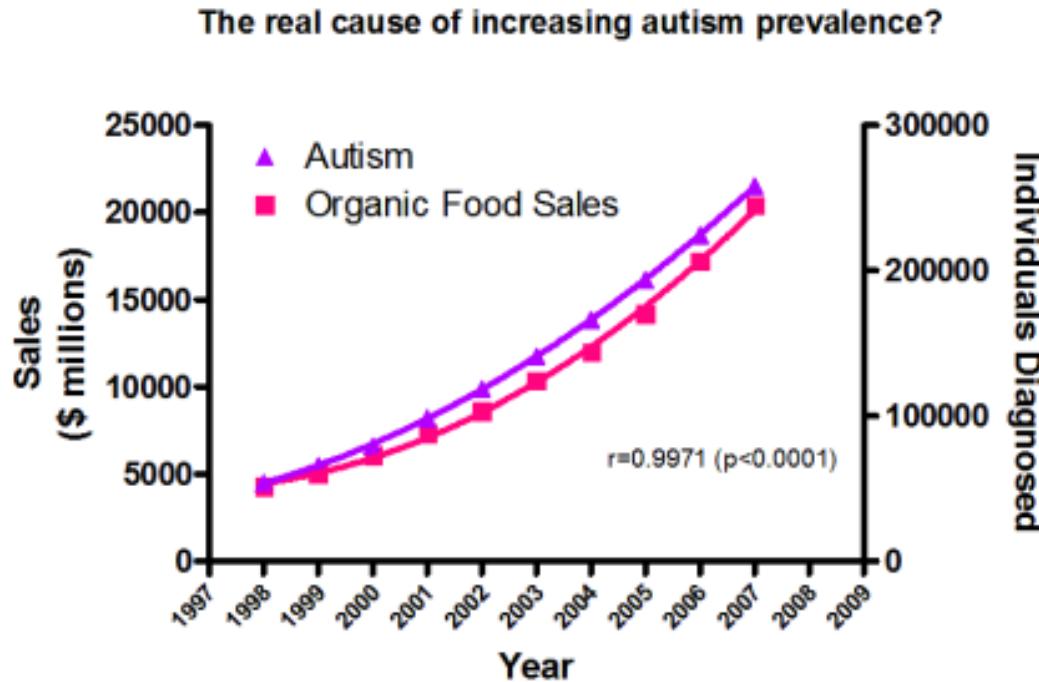


<https://www.visualcapitalist.com/year-in-news-2017/>

What's the Story Here?



What's the Story Here?



Sources: Organic Trade Association, 2011 Organic Industry Survey; U.S. Department of Education, Office of Special Education Programs, Data Analysis System (DANS), OMB# 1820-0043. "Children with Disabilities Receiving Special Education Under Part B of the Individuals with Disabilities Education Act"

<http://grist.org/list/this-graph-will-make-you-think-twice-about-eating-organic/>



What This Class Is and Isn't

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What This Class Is Not:

Biz analytics with easy tools like
Tableau or Watson

Advanced R programming or
deep data mining

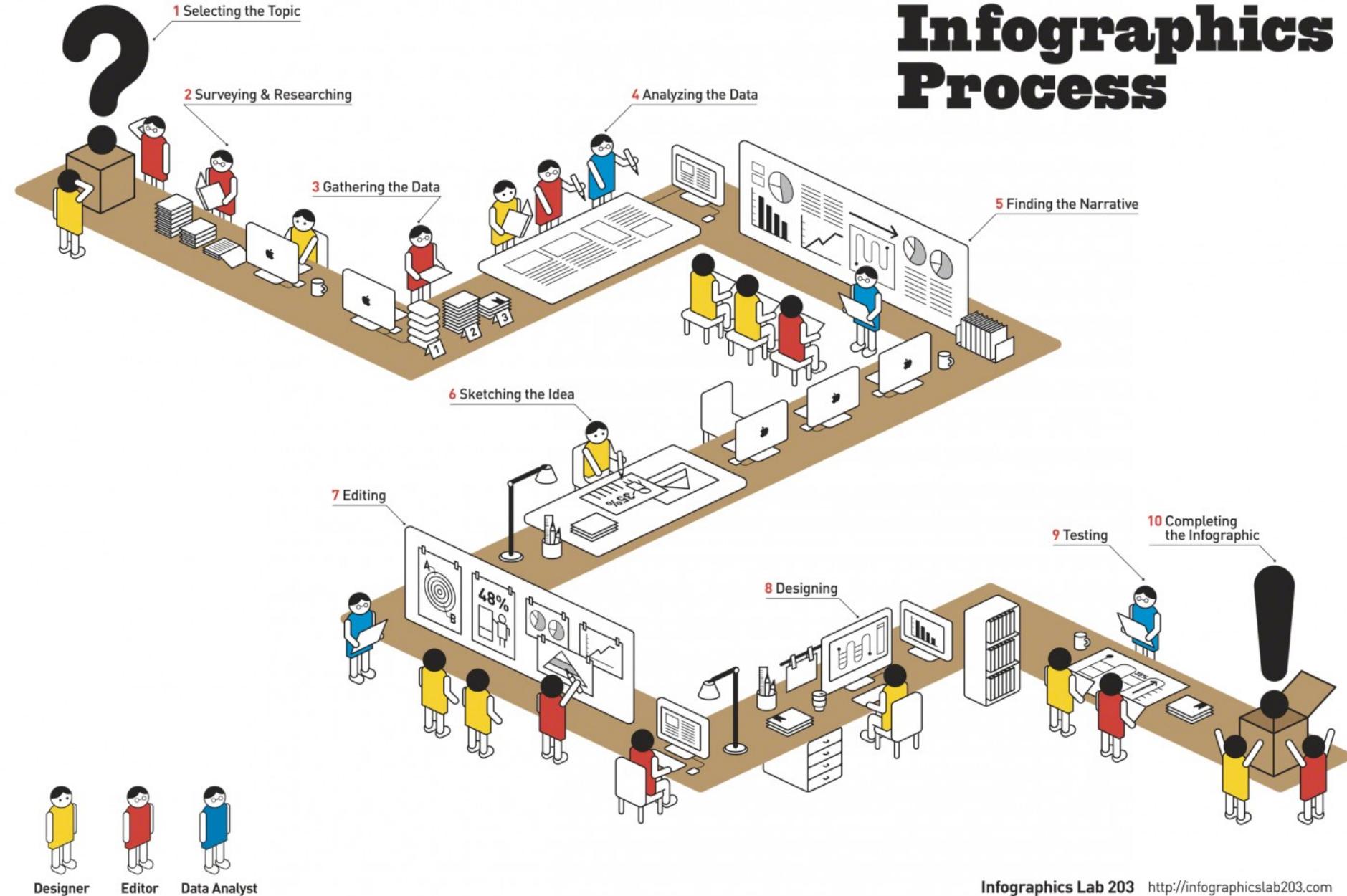
What **is not**

Information Visualization?





Infographics Process



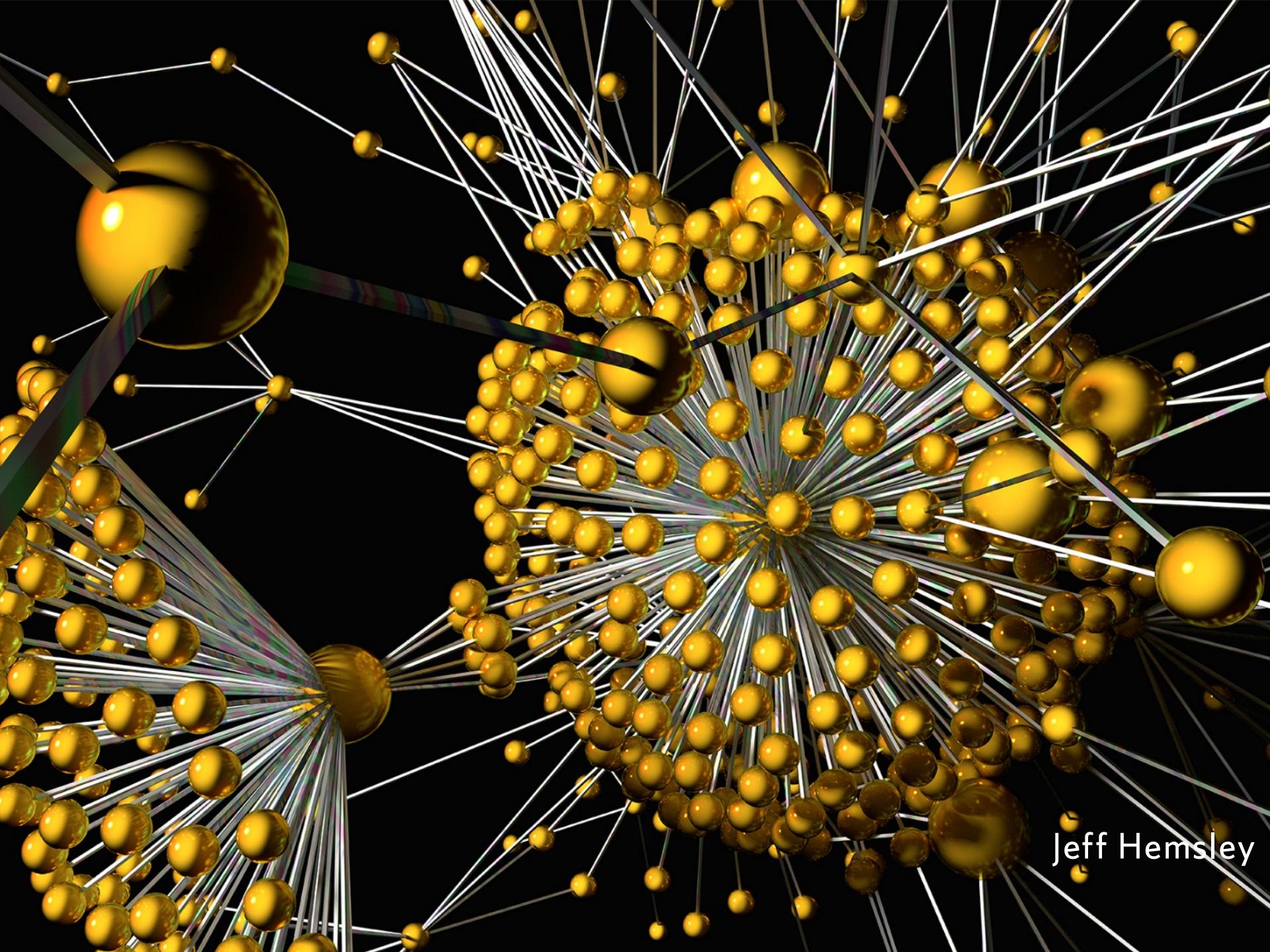
the top 50 most important Rules of Document Design

COLOR	C Contrast	R Repetition	A Arrangement	Y “Why”	O Organization	N Negative Space	T Typography	I Iconography	P Photography
 <p>Entire color. But use it wisely.</p> <p>The Color Wheel Use the color wheel to create matching color schemes that are more harmonious, analogous, complementary, split complementary, triadic, and/or tetradic.</p> <p>Four or Fewer In most cases, create your design using a color scheme of four or fewer colors.</p> <p>Emotion Saturation Use warm, earthy colors to express warmth and professionalism; bright, saturated colors to express friendliness and professional; use fully saturated colors to grab attention or to appeal to children.</p> <p>Color Psychology Understand how people and cultures respond to colors; use color to show caution, danger, happy, joyful, scary, approachable, and other related emotions and experiences.</p> <p>White is Nice Use white as a color; use white to communicate clarity, sophistication, clear lines, professionalism, and even in some cases, expensive.</p>	 <p>It's different, make it VERY different.</p> <p>Color Use contrasting colors for clarity and visual interest. If it's a coherent color, it should be obviously different.</p> <p>Size Make the most important thing on the document the biggest and boldest. Use clearly defined sizes for titles and icons. If they're meant to be different sizes, they should be clearly differentiated.</p> <p>Typefaces Use different typefaces when using more than one font. Contrast serif body text, for example, with a sans serif or script heading. If there are different typefaces, they should be very different.</p> <p>Highlighting Highlight no more than 10 objects on a document. Make headings and important text and objects stand out by using boldfaced, colored, italicized, underlined, reverse type, and so forth. Only use two or three techniques at once and don't use ALL CAPS to highlight.</p> <p>Overlays When overlaying text or graphics on an image, contrast the background with the text significantly to avoid conflicts or visual noise.</p>	 <p>Repeat, repeat, repeat.</p> <p>Repeat Within Repeat visual elements within a single document. Different typefaces, colors, sizes, shapes, layouts and so forth should be used in number and repeated throughout.</p> <p>Repeat Across Repeat visual elements across multiple documents to create continuity, clarity, and branding between documents.</p> <p>Proximity Consider grouping visual cues—shapes, logos, tones—that repeat from page to page or slide to slide to make a document seem uniform and organized.</p>	 <p>As simple, it's all about relationships.</p> <p>Purpose Give purpose and show relationships to every object on a page. Avoid arbitrary placement of “floating” objects that don’t seem visually connected to anything else.</p> <p>Alignment Everything on a page should be aligned to something else. Avoid center-alignment for most layouts and text.</p> <p>Stability Arrange objects to show clear stability or lack thereof. Objects that are flat and horizontal appear stable and calm; vertical arrangement can appear more active. Tilted objects can appear in motion.</p>	 <p>Why we think the way we do.</p> <p>Expectation Match or intentionally disrupt your audience’s expectations. Use branding, document genres, tone, colors, and so forth that align with what your audience expects or hopes to see.</p> <p>Credible Complexity Increase complexity of a design or content to heighten credibility of data. Simplify the document to make it seem more digestible or organized. Make a document easy to make products or services appear impressive.</p> <p>Metaphor Apply everyday figures of speech—such as metaphor, pun, hyperbole, irony, and so forth—to increase comprehension, credibility, and meaning at depth of your communication’s purpose.</p> <p>Propositional Density Simplify visual design elements while increasing communicative propositions (or ideas to be communicated). Divide the number of propositions by the number of visual elements and seal for a number greater than 1.</p> <p>Rhetorical Four Make your document health and audience through ethics (credibility, pathos (emotion), logos (logic), and kairos (timings)).</p>	 <p>We clean. We clean. We organize.</p> <p>Five Hat Racks (LATCH) Know the most effective ways to organize your information. (Hat acronym only) by location, space, by category, by hierarchy.</p> <p>Hierarchy Know the hierarchy of importance of your information. Give visual cues to guide your audience through the most important information to the least important information.</p> <p>Satisfice-ability Organize document so that a person can scan information quickly and in sections. Recognize that people rarely read the document—they scan and satisface.</p> <p>Rule of Thirds To increase visual interest, divide your document into nine equal segments of space (three both horizontally and vertically) and place most important or interesting data on the intersections where invisible lines divide the segments.</p> <p>Blends To increase aesthetic interest and readability, use color, texture, and contrast to avoid visual noise. Move the edges of some objects and images off the edges of the page.</p>	 <p>Because what isn't there, really is.</p> <p>1 + 1 = 3 Pay attention to the spaces you create between two objects. Recognize that every time you design two objects, a third is being designed between the two.</p> <p>Multistability Increase interest in some logo designs by making them multi-stable—where negative space can become the figure or central visual piece. Then, it needs to fit the background like in the face-in-the-moon image above.</p> <p>Empty Noise Observe all empty space and identify if it is purposeful and effective. White space or empty space does not appear designed or intentional; it is considered unintentional visual noise and reduces credibility.</p> <p>Rule-Ground Keep visual design stable by making clear distinctions between figures and backgrounds. Objects in lower regions or that overlap other objects appear in front and are perceived as more important.</p> <p>Margins Be intentional about your margins. Avoid the inward margins between objects and text and the edges of pages that invade them to create shapes and paths.</p>	 <p>Every letter's a shape. An aesthetic delight.</p> <p>Two Fonts Most documents should use two different fonts (rarely one or three or more), typically from different font families. Use one font for headings and titles and the other for body text.</p> <p>Font Families Know your font families and use them appropriately. Most fonts can be labeled as serif, sans-serif, decorative, or graphic.</p> <p>Empty Space Apply the appropriate font to the personality of your document. Recognize that subtle nuances in practices make big differences in the personality of your document. Avoid default and overused fonts.</p> <p>Personality Apply the appropriate font to the personality of your document. Recognize that subtle nuances in practices make big differences in the personality of your document. Avoid default and overused fonts.</p> <p>Legibility Be sure your font is legible for the specific word(s) you are displaying. Some typefaces work well for particular words but not for others. If a word is real common, you can use less legible fonts. For names, use only very legible fonts.</p>	 <p>Instant recognition = good communication.</p> <p>The Four Types For most designs, use as many letters and icons as possible as long as the important information can be made clear and represented. Cliché audiences will remember communication with images up to 50% more than ones without images.</p> <p>Brand Recognition Use icons and shapes to enhance immediate recall of a brand. Logos are used by brands; icons are shapes that are used for most brands. Do not use images that are located and distorted in any way; your audience will lose immediate credibility.</p> <p>Face-is-m Ratio When using pictures of people, decrease the size of the face to make body features stand out more. And this applies to animals, too.</p> <p>Lines and Paths Make sure all lines have the same thickness and style. Lines and paths are used to create pathways, arrows, and other directional directions. Avoid lines and arrows where importance is already obvious.</p> <p>Style Match When using multiple types of data in the same document, make sure that their photographic styles, including lighting, positions, and colors are consistent.</p>	 <p>They really are worth 1,000 words.</p>

Designed by Curtis Newbold | TheVisualCommunicationGuy.com | 2014



Rebecca Ruige Xu



Jeff Hemsley

What you will get

- Visual thinking skills
 - Tools and design: data exploration
 - Design and tools: present data
- Ethical and social issues

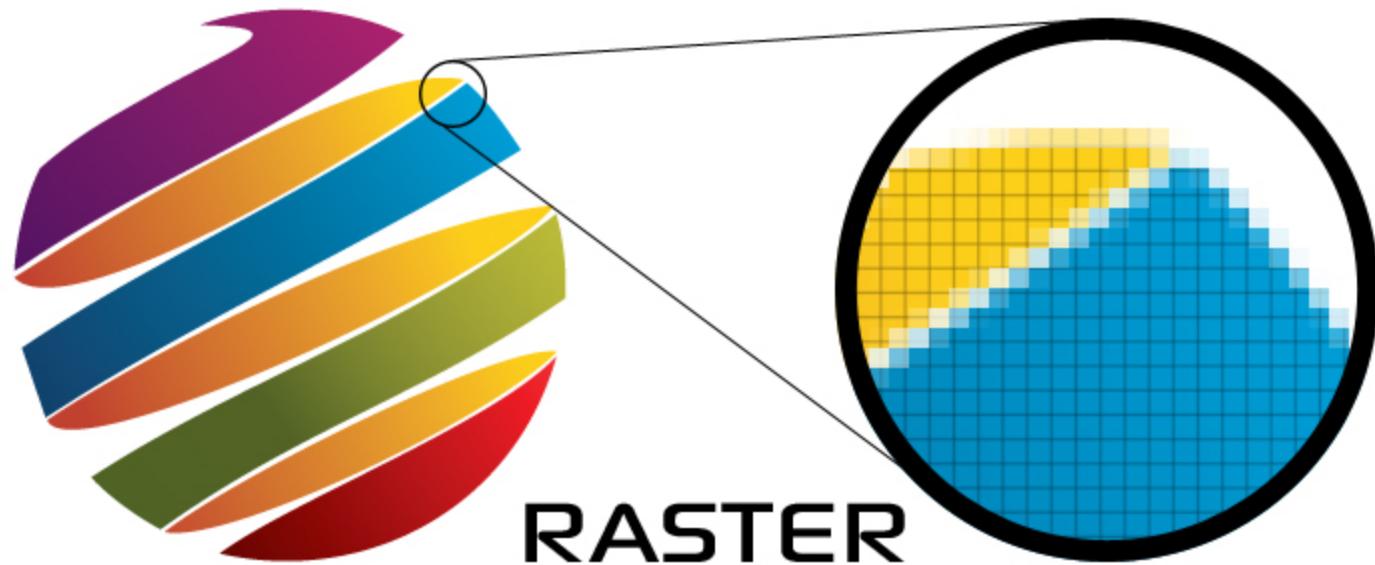


Raster vs. Vector Graphics

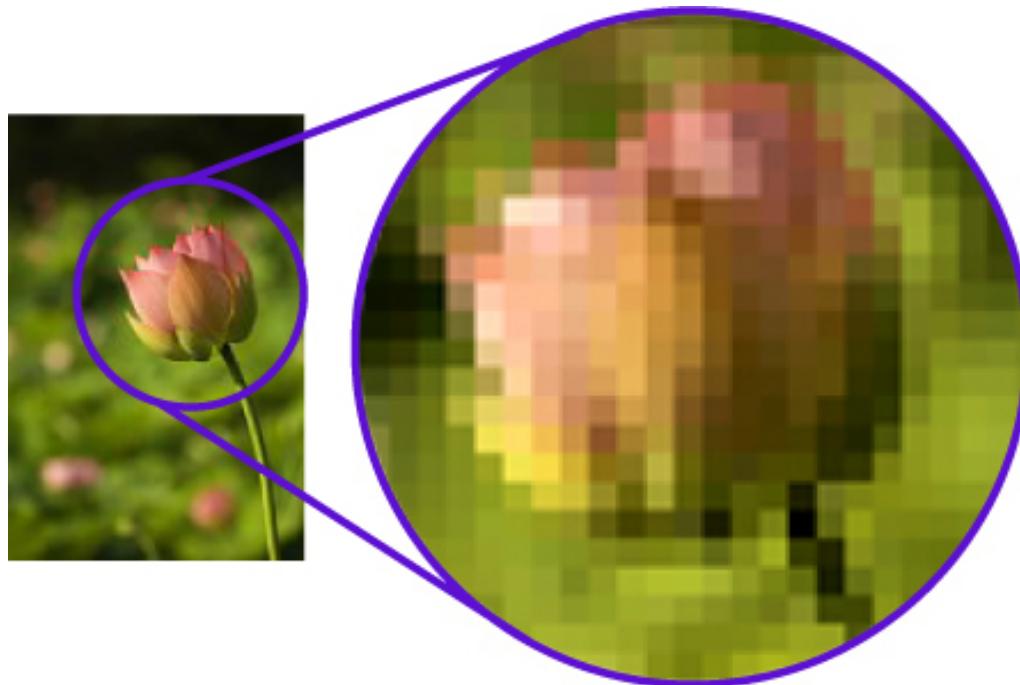
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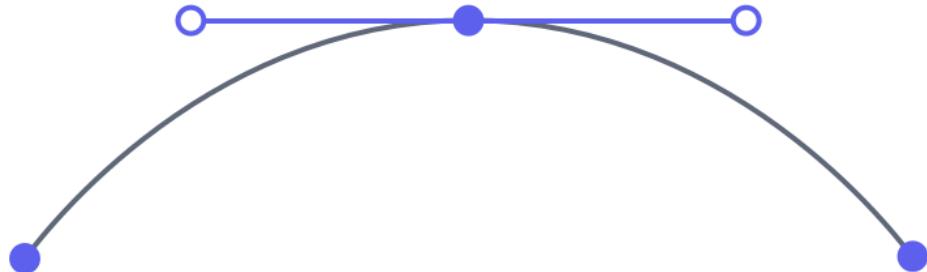
Raster



Raster

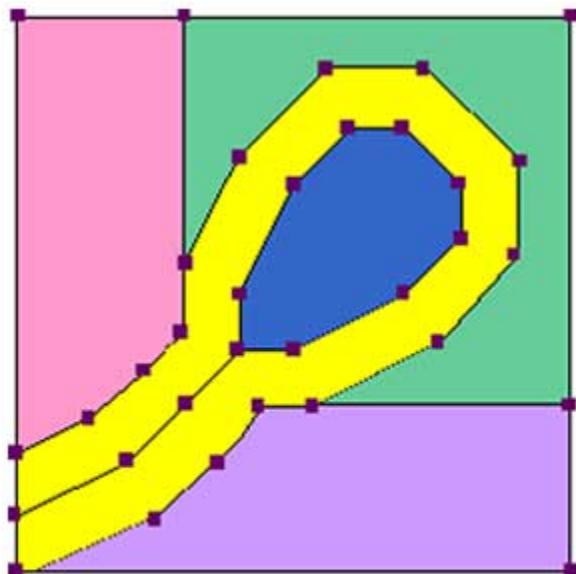


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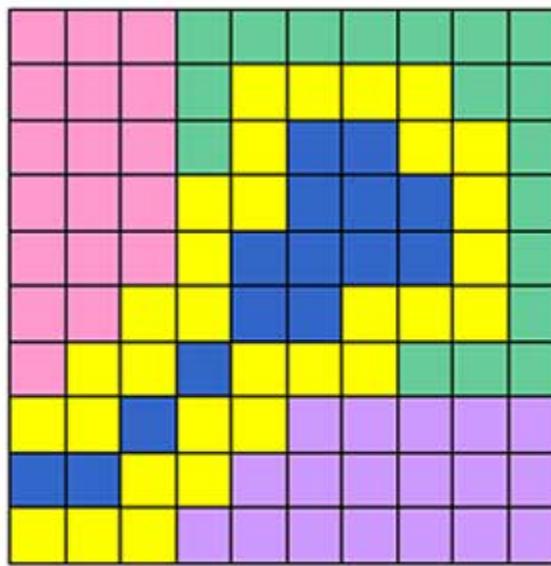


- Vector Point
- Handle Control Point
- Handle (one on each side)
- ~ Path (defines a line or shape)

Vector



Vector



Raster

Raster vs. Vector

