Visualizing Data

Telling a story with information
“There were 5 Exabytes of information created between the dawn of civilization through 2003, but that much information is now created every two days.”

(Kind of. This is a bit exaggerated.)

—Eric Schmidt, Executive Chairman of Google
Visual Hierarchy

Hierarchy is the order in which compositional elements are viewed.

A clear hierarchy makes important things stand out and other things recede.
Ways to control hierarchy

Size

Value

Space

Typographic Weight

thin vs. thick
On the printed page the eye may be directed from one unit to another through the quality of motion which forms a very valuable resource for the designer.
On the printed page the eye may be directed from one unit to another through the quality of motion which forms a very valuable resource for the designer.
Utility

is the first purpose

of the works
of man
Data Connections

Data provides insights revealed by patterns or connections.

Think about telling a story with the information at hand.
Visual Storytelling

Visual narratives make data easier to understand.

Instead of merely presenting information, think about how quickly and directly connect the reader with your content (or story).
Quick, can you name five small businesses in your neighborhood? If you're like most Americans, you can probably think of even more than five. After all, small businesses represent 99.7% of all employer firms in America—that's nearly 6 million companies. Small businesses (defined by the Small Business Administration as companies with less than 500 employees) employ about half of all private-sector workers. But aside from employing millions of Americans, studies show that many of us also think highly of these types of businesses and even have an emotional connection with them. Here's what Americans have to say when it comes to small businesses.

**Boosting the Economy**
AMERICANS SEE SMALL BUSINESSES AS VITAL TO SUPPORTING THE MIDDLE CLASS.
Over the last 50 years, what has been most important to the economic well-being of middle-class Americans?

- Small Businesses: 51%
- Labor Unions: 19%
- Major Companies: 17%
- Government: 11%

**Honesty is the Best Policy**
AMERICANS BELIEVE SELLERS HAVE HIGHER ETHICAL STANDARDS THAN LARGE ORGANIZATIONS.
Over the last 50 years, what will be most important to the economic well-being of middle-class Americans?

- Small Businesses: 49%
- Labor Unions: 19%
- Major Companies: 11%
- Government: 11%

**How Would You Rate the Honesty and Ethics of Small Business Owners?**

<table>
<thead>
<tr>
<th>Year</th>
<th>High</th>
<th>Average</th>
<th>Low</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>47%</td>
<td>44%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>2012</td>
<td>52%</td>
<td>39%</td>
<td>9%</td>
<td>6%</td>
</tr>
</tbody>
</table>

THANK YOU FOR SHOPPING WITH US!
CUSTOMER COPY

**Americans Love Small Business**
Through the eyes of consumers, 77 percent believe small business owners work harder than a typical worker and 61 percent believe they provide more valuable services to a community than big businesses or the government.

**Service-Minded**
66 percent of Americans say they would prefer to do business with a smaller, local company that may charge somewhat higher prices. They also use 33 percent of their discretionary spending at locally owned independent businesses, but why? Here's why they prefer to shop at small businesses:

- 23% Employees are friendly and know customers by name
- 22% Employees make tailored recommendations of products and services
- 10% Like interacting with other regulars
- 8% Shop because of rewards or discounts, for being a regular
- Other 27% for other reasons

Sources: Small Business Administration, Public Affairs Council, American Express OPEN, Reputation Reports

A collaboration between GOOD and Deloitte
d in partnership with UPS
PLASTICS BREAKDOWN

WE USE TONS OF PLASTIC. IT'S EVERYTHING FROM PACKAGING TO TOYS, TO THE DASHBOARD IN YOUR CAR. MASSIVE AMOUNTS OF IT END UP IN THE OCEAN. IT CONTAINS TOXINS, AND ABSORBS MORE TOXINS. IT ENTANGLES AND KILLS SEA LIFE. IT CERTAINLY DOESN'T BIODEGRADABLE. BUT THERE ARE WAYS WE CAN HELP.

BAD FOR THE OCEAN, BAD FOR US •

92.5% OF DEAD SEABIRDS (NORTHERN FULMARS) IN A STUDY HAD INGESTED PLASTIC IN AMOUNTS EQUAL TO 5% OF THEIR BODY WEIGHT.

AMERICANS USE ROUGHLY 100 BILLION PLASTIC BAGS PER YEAR. PLASTIC BAGS CAN TAKE 400 TO 1,000 YEARS TO DECOMPOSE, BUT THEIR CHEMICAL RESIDUES REMAIN FOR YEARS AFTER.

92.5% OF THE 120 MARINE MAMMAL SPECIES ON THE THREATENED LIST HAVE BEEN OBSERVED ENTANGLED IN OR INGESTING PLASTIC.

54% OF THE WORLD'S OCEANS.

HOW BIG IS THE PROBLEM?

OF PLASTIC ARE SPREAD THROUGHOUT THE WORLD'S GYRES.

73.9 MILLION POUNDS

OF PLASTIC IS MADE OF TOXINS

331 MILLION BARRELS OF PETROLEUM & NATURAL GAS LIQUIDS WERE USED TO MAKE U.S. PLASTIC PRODUCTS, EQUAL TO ABOUT 5% OF THE NATIONAL PETROLEUM CONSUMPTION.

PLASTICS CONTAIN TOXIC CHEMICALS LIKE PHthalates AND FLAME RETARDANTS HAVE BEEN FOUND IN FISH, MOLLUSKS, SEA MAMMALS, AND OTHER SEA LIFE.

IT'S EXPENSIVE TOO...

AS OF 2006, SOUTHERN CALIFORNIA CITIES HAD SPENT OVER $7 BILLION TO KEEP WATERWAYS FROM BEING OVER LEGAL TRASH LIMITS.

ON THE NORTHERN PACIFIC GYRE.

IN PLASTIC FROM THE NORTHERN PACIFIC GYRE.

CIRCULAR CURRENTS (gyres) THOUSANDS OF MILES ACROSS COLLECT IMMENSE AMOUNTS OF PLASTIC IN ALL OF THE WORLD'S OCEANS.

MICROPLASTIC CONCENTRATIONS IN THE NORTHERN PACIFIC GYRE INCREASED 100X IN THE PAST 40 YEARS.

CURRENTS CARRY THE PLASTIC EVERYWHERE.

RUBBER DUCKS LOST FROM A SHIPPING CONTAINER IN THE NORTH PACIFIC WERE FOUND NEAR SCOTLAND, IN THE NORTH-ATLANTIC TSUNAMI DEBRIS FROM JAPAN ARRIVED IN NORTH AMERICA, AFTER CROSSING THE LARGEST OCEAN ON EARTH IN JUST 10 MONTHS.

WHAT CAN WE DO TO HELP?

USE LESS PLASTIC

8 OF THE TOP 10 ITEMS FOUND ON BEACHES DURING LAST YEAR'S INTERNATIONAL COASTAL CLEANUP DAY WERE PLASTICS RELATED TO EATING & DRINKING.

PLASTIC BAGS > REUSABLE BAGS. NO BAG

BOTTLED WATER > REUSABLE WATER BOTTLE

ELECTRONICS > REPAIR OR UPGRADE. RECYCLE THE OLD ITEM WHEN YOU NEED SOMETHING NEW

CLOTHING > BUY NATURAL MATERIALS. SYNTHETIC FIBERS END UP IN THE OCEAN
Types of Data and Charts

“When all you have is a hammer, everything looks like a nail.”

Maslow’s Hammer
Honesty in Data Reporting

Scale and visualization can affect perception.

As a consumer, would you rather purchase at a store where prices are consistent or items from a store where the prices fluctuate?
Graphic Representations of Quantity

Quantity can be represented in many ways.

Not all methods give an accurate picture of specific amounts.
Area Comparison

Area can convey magnitude but not exact numerical comparisons.

We can say that:
2 is larger than 1
B is greater than A
Pie Charts

Pie charts are good at providing relative quantities to a whole as long as there are not many partitions.

We can say that:
2 is larger than 1 in area
A is 1/2 of 1
B is 1/2 of 2
Groups of Geometric Units

This format provides measurable comparisons between units and groups. Combine units into meaningful amounts to facilitate counting.

We can say that:
2 is twice as large as 1
A is 3/5 of 1
B is 6/10 of 2
A is 1/2 of B
Scale of Signs

Don’t use icon area to show quantitative data.

Assign a numeric unit and semantic meaning

satisfied customers

✔️ ✔️ ✔️ ✔️ ✔️ ✔️

dissatisfied customers

🚫🚫🚫
Accuracy

Pie Charts should add up to 100%.
Color

Simultaneous color can affect our perception of size.

Remember to consider cultural color associations.
Best Practices

1. Use one color to represent each category.

2. Order data sets using logical hierarchy.

3. Use callouts to highlight important or interesting information.

4. Visualize data in a way that is easy for readers to compare values.

5. Use icons to enhance comprehension and reduce unnecessary labeling.
Avoid these things

6 | Don’t use high contrast color combinations such as red/green or blue/yellow

7 | Don’t use 3D charts. They can skew perception of the visualization.

8 | Don’t add chartjunk, unnecessary illustrations or ornamentations.

9 | Don’t use more than six colors in a single layout.

10 | Don’t use distracting fonts or elements (such as bold, italic, or underlined text).
Visualizing complex data

Correlations and hierarchical systems may require combined charts or new methods of visualizing data.

A hierarchical system is an ordered set where elements and/or subsets are organized in a given relationship to one another, both among themselves and within the whole.

Treemaps are a tool for visualizing hierarchies.
May 3, 2006

All of Inflation’s Little Parts

Each month, the Bureau of Labor Statistics gathers 84,000 prices in about 200 categories — like gasoline, bananas, dresses and garbage collection — to form the Consumer Price Index, one measure of inflation.

An Average Consumer’s Spending

Each shape below represents how much the average American spends in different categories. Larger shapes make up a larger part of spending.

Color shows change in prices from March 2007 to March 2006

-10% -2 0 +2 +4 +6 +8 +10 +20 +40%

Food and beverages 15%
The high price of oil is a factor that has made food prices rise quickly.

Transportation 18%
Gas is 5.2 percent of spending nationwide, but only 3.3 percent in the New York area.

Miscellaneous 3%

Health care 6%
As a group, the elderly spend about twice as much of their budget on medical care.

Recreation 6%

Education/Communication 6%
Cellphones were added to the index in 1997. Because the Consumer Price Index can be slow to add new goods, which are often cheaper, it may overstate parts of inflation.

Apparel 4%
The ratio of spending on women’s clothes to that on men’s clothes is about 2 to 1.

Housing 42%
In the C.P.I., home ownership costs track rent prices more closely than housing prices. This means inflation may have been understated when home prices were rising faster than rents.
Barack Obama and John McCain have raised millions of dollars for their presidential campaigns. In good's second installment of Political NASCAR, we look at the uniforms the two candidates would wear if companies wanted to use their political donations as advertisements, and if running for president ended with the winner doing donuts on the White House lawn.