

## SOLUTIONS

1. Figures 12A, 12B, 12C, 12D, 12E, 12F, and 12G are slides for a presentation about the physical impact of the planes on the Twin Towers in box 13.3 and figure 13.5.

# 12

## SPEAKING ABOUT NUMBERS

### Annotated example of good writing

- Article from front section of New York Times:
  - “First Tower to Fall Was Hit at Higher Speed, Study Finds”
    - E. Lipton and J. Glanz (2/23/02).
- Tailoring to the audience and objectives:
  - An educated lay audience.
  - Two page article.

Figure 12A

### Airplane speed

- “The FBI said the government's analysis put the speeds at 586 m.p.h for the United flight and 494 m.p.h. for the American one.”
  - *Basic principle: report numbers.*
- “In both cases, the planes were flying much faster than they should have been at that altitude. The aviation agency's limit below 10,000 feet is 287 m.p.h.”
  - *Basic principle: compare against a standard to help interpret number.*

Figure 12B

### Energy and impact of planes

- “The energy of motion carried by any object, called the kinetic energy, varies as the square of its velocity, so even modest differences in speed can translate into large variations in what the building had to absorb.”
  - *Basic principle: define concepts using simple wording.*
- “That means that while the United jet was traveling only about a quarter faster than the American jet, it would have released about 50 percent more energy on impact.”
  - *Tool: relative difference and % difference calculations.*

Figure 12C

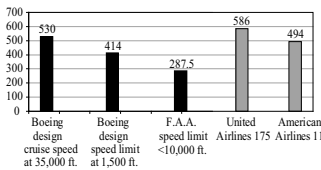
### Just how much energy is that?

- “Even at a speed of only about 500 m.p.h., a partly loaded Boeing 767 weighing 132 tons would have created about three billion joules of energy at impact, the equivalent of three-quarters of a ton of T.N.T.”
  - *Basic principle: interpret numbers and relate them to familiar quantities.*

Figure 12D

### How did speeds compare to design limits?

**Impact speed of 9/11 flights\* and comparison speeds**



- Uses a bar chart to illustrate speed of planes relative to important benchmarks.
  - *Basic principle: choose the right tools.*
- Describe patterns in chart by pointing out that planes’ speeds exceeded design limits.
  - *Basic principle: compare against meaningful cutoffs.*

Figure 12E

### Why do design limits matter?

- Such speeds threatened the structural integrity of the planes even before they struck the buildings, because the lower the plane goes, the thicker the air becomes, so the slower the plane must travel to avoid excessive stress.”
  - *Basic principle: explain complex concepts in simple terms.*
    - In this case, explaining principles of physics.

Figure 12F

### Authors’ use of tools and principles

- Explained complex ideas without (much) jargon.
  - Energy on impact.
  - Effect of altitude on stress.
- Compared against
  - Useful benchmarks
    - FAA speed limit.
    - Design speed limit.
  - Familiar examples
    - TNT.
- Used appropriate tools.
  - Chart to show relative speed.
  - Prose to:
    - Report a few numbers.
    - Explain patterns.
    - Define terms.
  - Types of quantitative comparisons:
    - Absolute difference.
    - Relative difference.
    - Percentage difference.

Figure 12G

3. Figures 12H and 12I are slides about data and methods regarding the CES-D scale for a scientific audience.

### CESD scale

- Center for Epidemiological Studies Depression (CESD) Scale
  - Developed by National Institute of Mental Health (NIMH)
- 20 items on frequency of symptoms in past week
  - Each scaled from 0 (“rarely or none of the time”) to 3 (“almost or all of the time”).
- Very good internal consistency:
  - $\alpha = .85$  for the general population.
  - $\alpha = .90$  for a psychiatric population

Source: Radloff, 1977.

**Figure 12H**

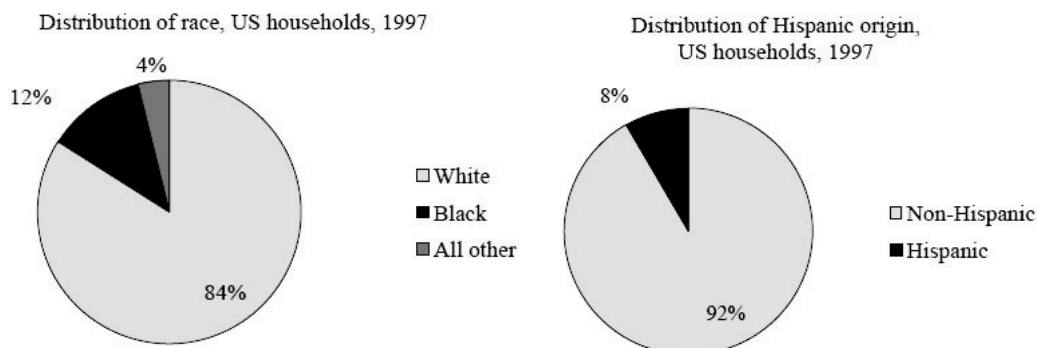
### Factors within the CESD scale

- Four separate factors:
  - Depressive affect.
  - Somatic symptoms.
  - Positive affect.
  - Interpersonal relations.

**Figure 12I**

5. “Vanna White” notes to tables and charts. Bracketed material describes accompanying gestures and is *not* intended to be spoken.
- a. “Table 4.1c presents poverty rates by age group in the United States in 2012. There is one row for each age group, and a row for all age groups combined [point to each row in turn]. Columns report the number of poor persons [point] and population [point], each reported in thousands of persons, and the poverty rate as a percentage of persons in the pertinent age group [point]. In 2012, the poverty rate for children was 21.8% of children, compared to 13.7% of people aged 18 to 64, and 9.1% of those aged 65 or older.”
  - b. “Table 6.1 shows the distribution of households by type of household, race, and ethnic origin in the United States in 1997. All numbers are reported in units of thousands, meaning that there were 102 million when all races and household types were combined [point to bottom row in first column of numbers]. Households are divided into family and nonfamily households, shown in the middle and right-hand sections of the table [point]. The racial distribution of all households is in the leftmost column of numbers [wave vertically down that column]. Distributions of household types are also broken out separately by race and Hispanic origin—shown in the rows [gesture down the column of row labels].” [Then name the modal household type and how it compares to other household types of interest, overall, and by race.]

- c. “The distribution of federal outlays by major function in the United States in 2000 is shown in figure 7.2b. Human resources (the black wedge [point]) comprised by far the largest single category of federal outlays (61% of the \$1.8 trillion spent that year). The second largest category—national defense (dotted fill)—accounted for only about one quarter as much as human resources (16% of the total). Net interest, physical resources, and other functions together amounted for the remaining 23% of total outlays [point to each wedge as you mention its category].”
- d. “Figure 7.5a shows how the relative chances of emergency room use among asthmatic children varied by family income and race in the United States in 1991. Income groups (poor, near poor, and non-poor) are arranged from left to right along the horizontal axis [wave along the axis]. There is a different color bar for each racial group—black for black children and gray for non-black children [point at legend or one cluster of bars]. The heights of the bars show the relative chances of emergency room use for asthma.” [Then describe the patterns by race and by income as in appendix A.]
- e. “The age pattern of death rates in the United States in 1996 is shown in figure 7.17b. Age is grouped into five-year categories across the axis. Death rates are shown on a logarithmic scale on the *y*-axis, measured in number of deaths per 100,000 persons in the pertinent age group. The logarithmic scale is used to allow a wide range of death rates to be shown on a single graph without obscuring differences at the low end of the range. [For a lay audience, add: That means that the distance between successive marks on the *y*-axis corresponds to a 10-fold increase in death rates.] For example, death rates increase by nearly a multiple of 10 between the age category of 20–24 and that of 50–59 (from 101.3 deaths per 100,000 persons to 851.3 per 100,000). Death rates increase by another factor of 10 between the age category of 50–59 and that of 80–84 years.” [Then go on to describe the J-shaped pattern, as in the answer to question 3 from chapter 9.]
7. Create simplified tables or charts for use on slides.
- a. From table 6.1 in *Writing about Numbers*, 2nd Edition.
    - i. Text slide to present distribution by major family type, all races combined. Extracted from cells in bottom row of table 6.1. Text bullet: “Sixty-nine percent of the 102,528 US households in 1997 were family households.”
    - ii. Pie charts (figures 12J and 12K) to present racial distribution and Hispanic origin distribution, based on information in the first numeric column of table 6.1. Titles modified from the title to table 6.1 to reflect the specific variable in each chart.



**Figure 12J**

**Figure 12K**

iii. Two simple tables to present distribution of family types by race (table 12A) and by Hispanic origin (table 12B), created by splitting the table into separate tables for race (top rows of table 6.1) and Hispanic origin (bottom rows of table 6.1). Tables 12A and 12B put household type in the rows and race or Hispanic origin in the columns so the material will fit better on a slide with an adequate (minimum 16 point) type for all labels and numbers. Table titles reflect the specific comparisons in each table.

**Table 12A Family households (thousands) by type and race, United States, 1997**

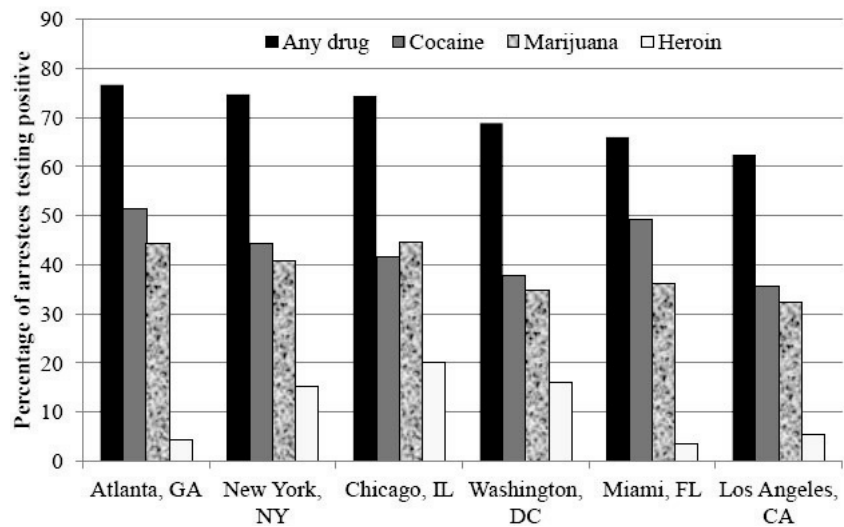
	White	Black	All other	Total
All Households	86,106	12,474	3,948	102,528
Family households	59,511	8,408	2,961	70,880
Married couple	48,066	3,921	2,330	54,317
Other families				
Female householder	8,308	3,926	418	12,652
Male householder	3,137	562	212	3,911
Non-family households	26,596	4,066	986	31,648
Female householder	14,871	2,190	455	17,516
Male householder	11,725	10,901	532	14,133

**Table 12B Family households (thousands) by type and Hispanic origin, United States, 1997**

	Non-Hispanic	Hispanic	Total
All Households	93,938	8,590	102,528
Family households	63,919	6,961	70,880
Married couple	49,513	4,804	54,317
Other families			
Female householder	11,040	1,612	12,652
Male householder	3,366	545	3,911
Non-family households	30,018	1,630	31,648
Female householder	16,762	754	17,516
Male householder	13,258	875	14,133

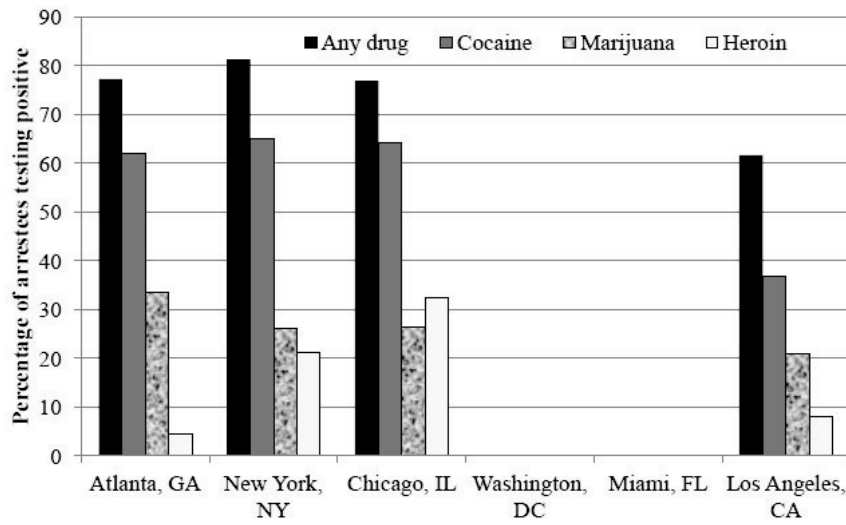
b. Figures 12L (males) and 12M (females) are clustered bar charts, each showing the rates of positive drug tests by city (x-axis, sorted in descending order of use for all drugs) and type of drug (in legend, sorted in descending order of frequency, L to R within each cluster). Data for males is from the lefthand set of columns in table 6.8; females from the righthand set of columns. Titles to figures 12L and 12M are modified from the title to table 6.8 to reflect the gender subgroup in each chart.

Percentage of arrestees testing positive for drugs, by city and type of drug, US males, 1999



**Figure 12L**

Percentage of arrestees testing positive for drugs, by city and type of drug, US females, 1999



Data for female arrestees not available for Washington DC or Miami, FL.

Figure 12M