Infographics in the Classroom: Using Data Visualization to Engage in Scientific Practices

Activity 2: Same Data, Different Graphics

This activity utilizes the "Pick a Side" method of oral debates. In this method, the instructor makes a statement and students move to one side of the room if they agree and the other side if they disagree. Students then justify why they moved to that side. We also used a similar method, but had four corners be 4 different answers to a question.

1. Pass out Contrasting Graphics and worksheet 2. Have them work through Part 1.A. on their own to interpret Body vs. Brain Mass.
2. Pause to ask for any questions about the graphic. What do the numbers mean? What type of graph is it? You may need to explain the logarithmic scale that it is graphed with.
3. In pairs, have them work through part 1.B.   They should be prepared to share their ideas at the end. Gather student ideas for part 1.B.
4. In pairs, work through Part 1.C and 1.D, comparing the last 2 body vs. brain mass graphs.
5. Use "Pick a Side" for the following statements:
    - Agree-disagree? The different graphics convey the exact same story.
    - Graphic A, B, C, or D is the most accurate way to represent the numbers.
    - Graphic A,B, C, or D is the most effective at telling the story.
6. Working in pairs, have students work on Part 2 of the worksheet – comparing carbon emissions.
7. Use "Pick a Side" for the following statements:
    - A, B, or C is the most accurate way to represent the numbers
    - A, B, or C is the most visually interesting way to look at the numbers.
    - A,B, or C is the most effective at telling a story.

Infographics used:

- Edward Tufte, Brain vs Body Mass, from Beautiful Evidence
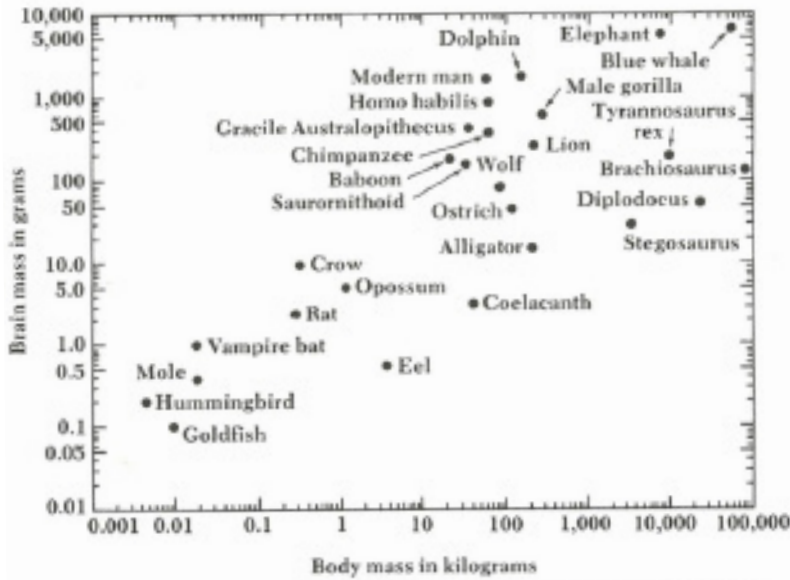- David MacCandless, Tons of Carbon, from Visual Miscellenium

Activity 2
Same Data, Different Graphic

Name _____

Date _____

Part I. Big Brains

Ⓐ

Brain mass in grams vs. Body mass in kilograms

based on Harry L Jerison, Evolution of the Brain and Intelligence (New York, 1973), 42-45

1. What ideas or pieces of information does the author present?

2. Identify the central idea(s) told in the graphic.

3. Pick one point on the image that represents a number. What is that number (you can approximate, if necessary) and what are the units?

4. Describe how the author represents data in the graphic? (Ex. Using color to differentiate two things.)

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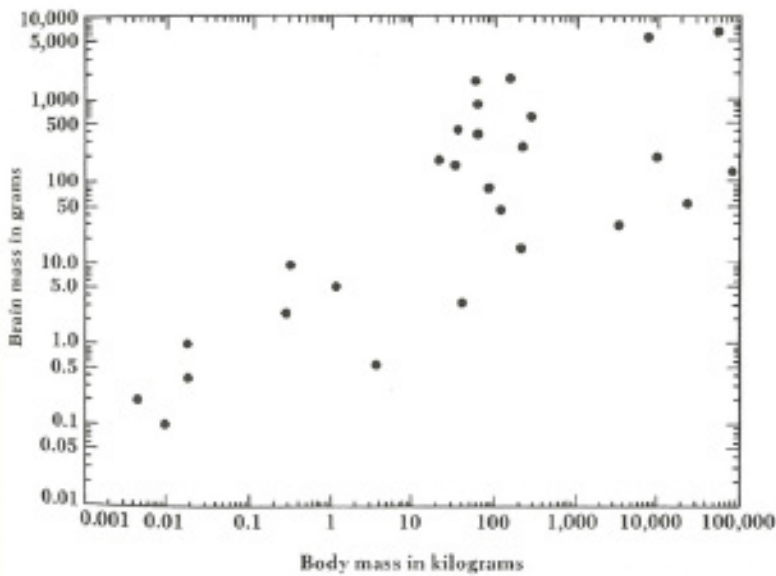| 5. What questions do you have about the graphic? What confuses you?	6. What do you like/dislike about the graphic?

Brain mass in grams (y-axis): 10,000 / 5,000 / 1,000 / 500 / 100 / 50 / 10.0 / 5.0 / 1.0 / 0.5 / 0.1 / 0.05 / 0.01

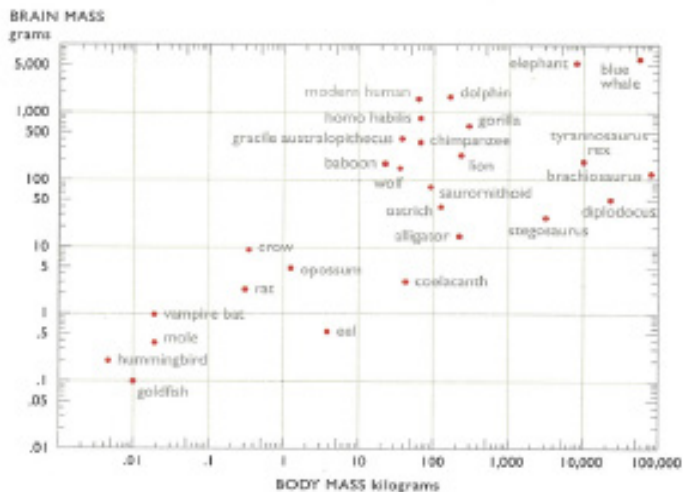Body mass in kilograms (x-axis): 0.001 / 0.01 / 0.1 / 1 / 10 / 100 / 1,000 / 10,000 / 100,000

based on Harry J. Jerison, Evolution of the Brain and Intelligence (New York, 1973), 42-45

7. Does this graphic show a similar set of numbers?

8. Are there any differences in the main ideas?

9. Does the author use any different approaches to representing numbers in this graphic?

BRAIN MASS grams (y-axis): 5,000 / 1,000 / 500 / 100 / 50 / 10 / 5 / 1 / .5 / .1 / .05 / .01

Labels: elephant, blue whale, modern human, dolphin, homo habilis, gorilla, gracile australopithecus, chimpanzee, tyrannosaurus rex, baboon, lion, brachiosaurus, wolf, sauromithoid, ostrich, diplodocus, alligator, stegosaurus, crow, opossum, rat, coelacanth, vampire bat, eel, mole, hummingbird, goldfish

BODY MASS kilograms (x-axis): .01 / .1 / 1 / 10 / 100 / 1,000 / 10,000 / 100,000

based on Harry J. Jerison, Evolution of the Brain and Intelligence (New York, 1973), 42-45

10. How does this graphic visually compare to the previous two? What are the similarities and differences?

11. What do you like/dislike about this graphic? How does it compare with the other two in terms of understanding the main idea?

(D) BRAIN MASS
grams

BODY MASS kilograms

based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973, 42-49)
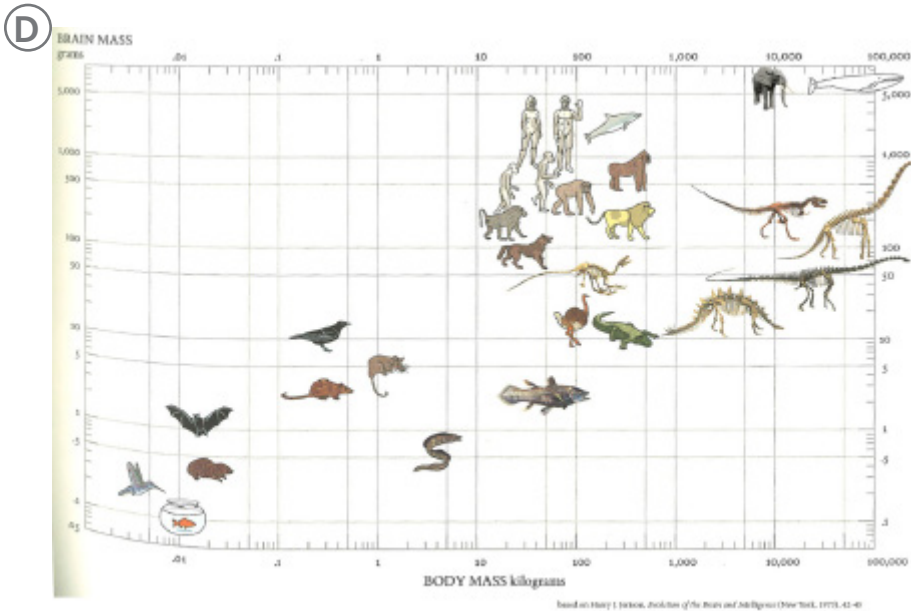
12. Describe how the author represents data in the graphic? How does it compare to the previous graphics?

13. Which of these four graphics would you consider the most accurate? Which is most effective at telling a story? Why?

Part II. Carbon Emissions

(A)

Tons Of Carbon
Per year unless otherwise stated
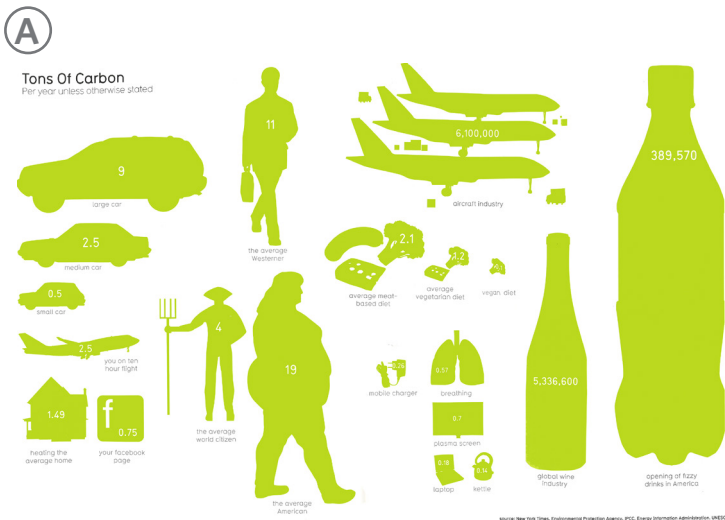
1. Identify the central idea(s) told in the graphic. What story does it tell?

2. Does the graphic accurately represent numbers? Are all the images proportional?

(B)
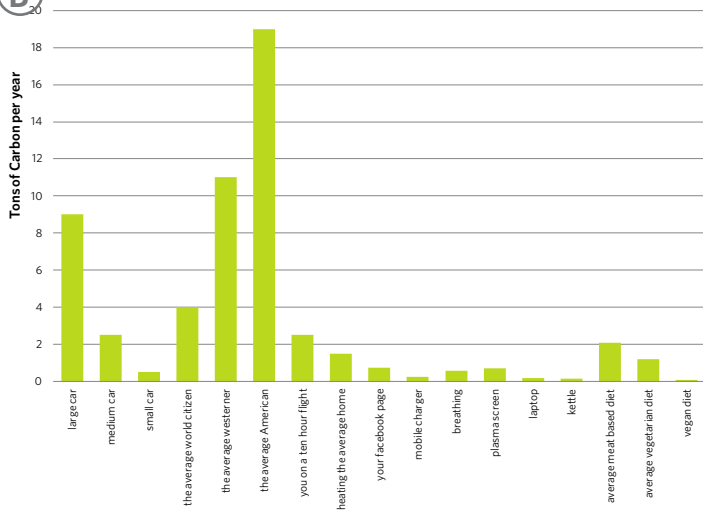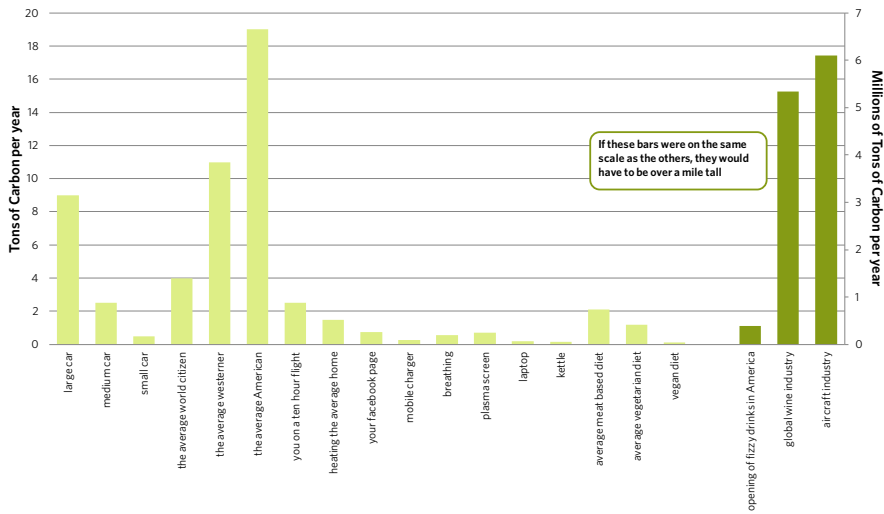
Sources of Carbon in the Atmosphere

Tons of Carbon per year

large car, medium car, small car, the average world citizen, the average westerner, the average American, you on a ten hour flight, heating the average home, your facebook page, mobile charger, breathing, plasma screen, laptop, kettle, average meat based diet, average vegetarian diet, vegan diet

3. Is the information shown in this graphic similar to the previous one?

4. How does it compare visually to the previous graphic?

(C)

Sources of Carbon in the Atmosphere

Tons of Carbon per year

Millions of Tons of Carbon per year

If these bars were on the same scale as the others, they would have to be over a mile tall

large car, medium car, small car, the average world citizen, the average westerner, the average American, you on a ten hour flight, heating the average home, your facebook page, mobile charger, breathing, plasma screen, laptop, kettle, average meat based diet, average vegetarian diet, vegan diet, opening of fizzy drinks in America, global wine industry, aircraft industry
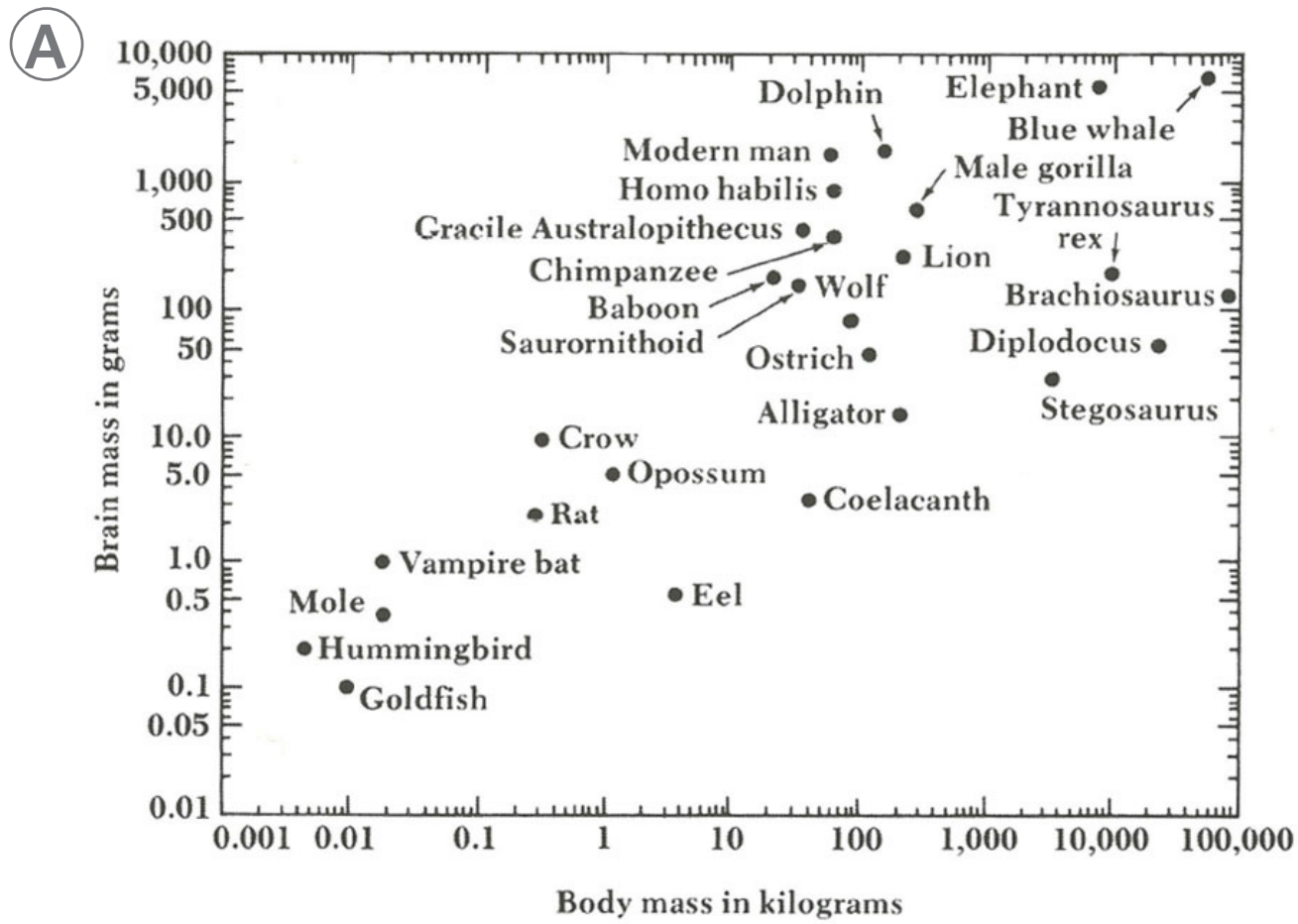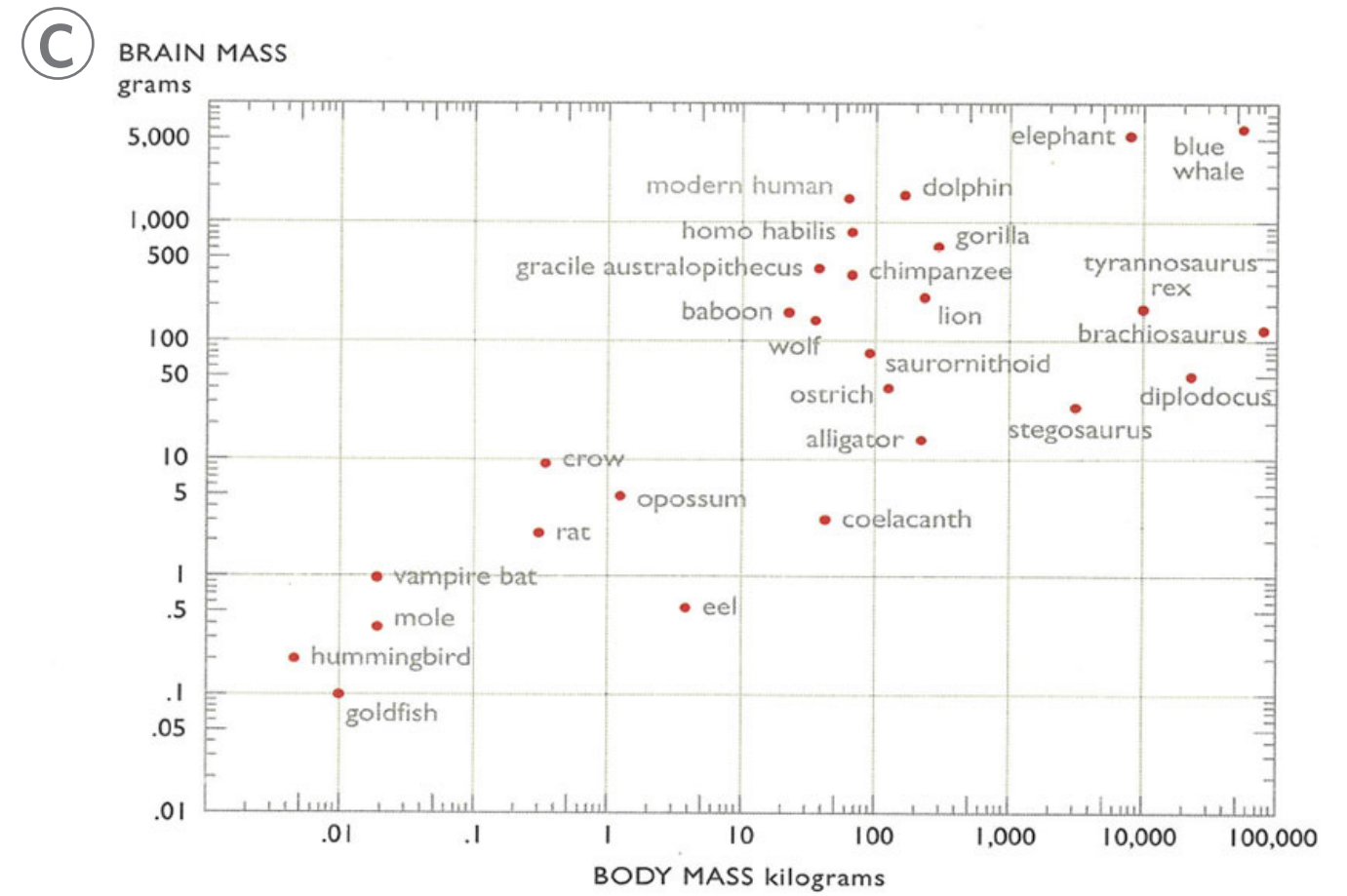
5. How does this graphic differ from the previous one? Does it show the same numbers?

6. Which of these three graphics would you consider the most effective at displaying the data accurately? Why?
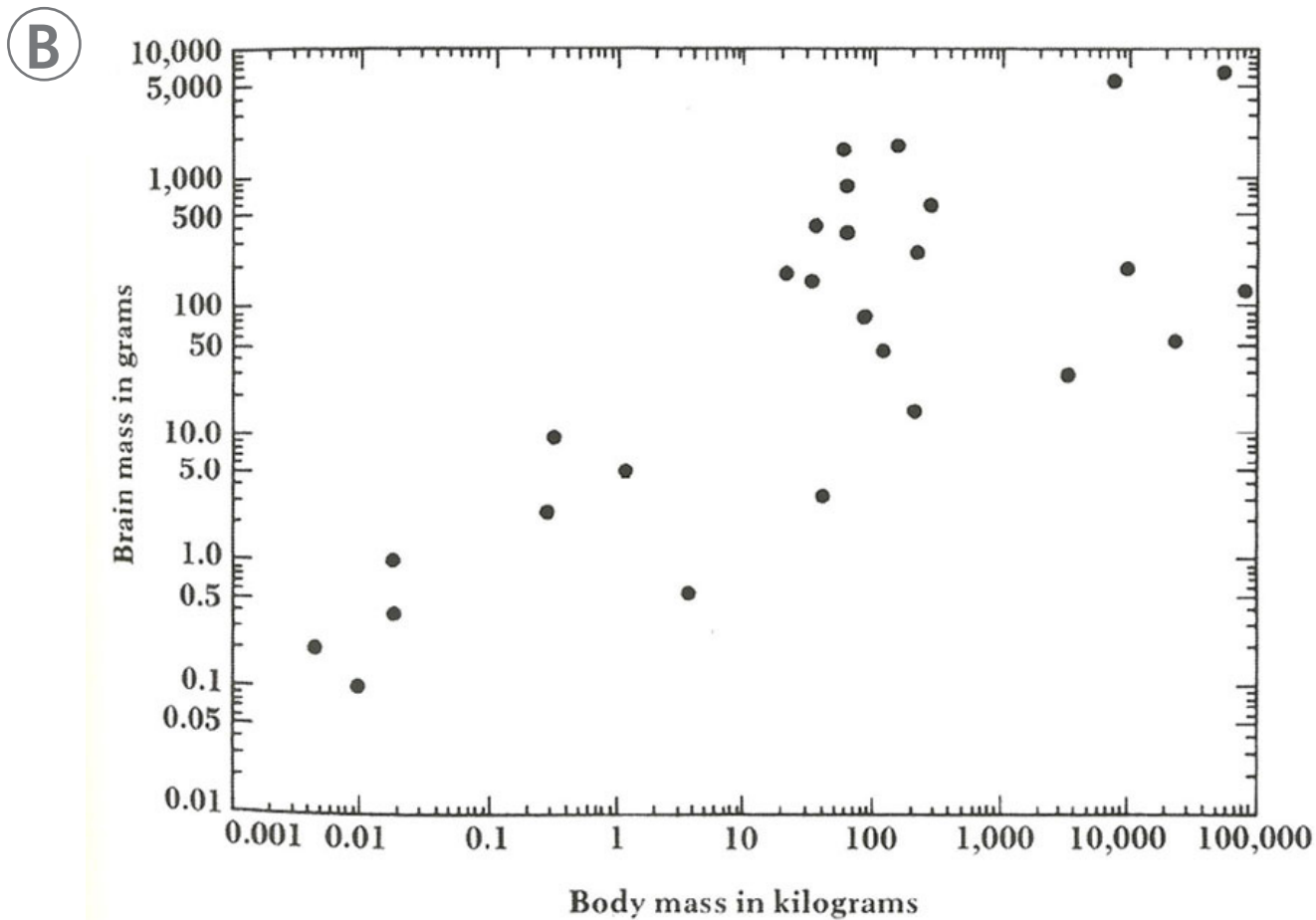
7. Which of the three graphics most convincingly conveys the author's main message? Why?
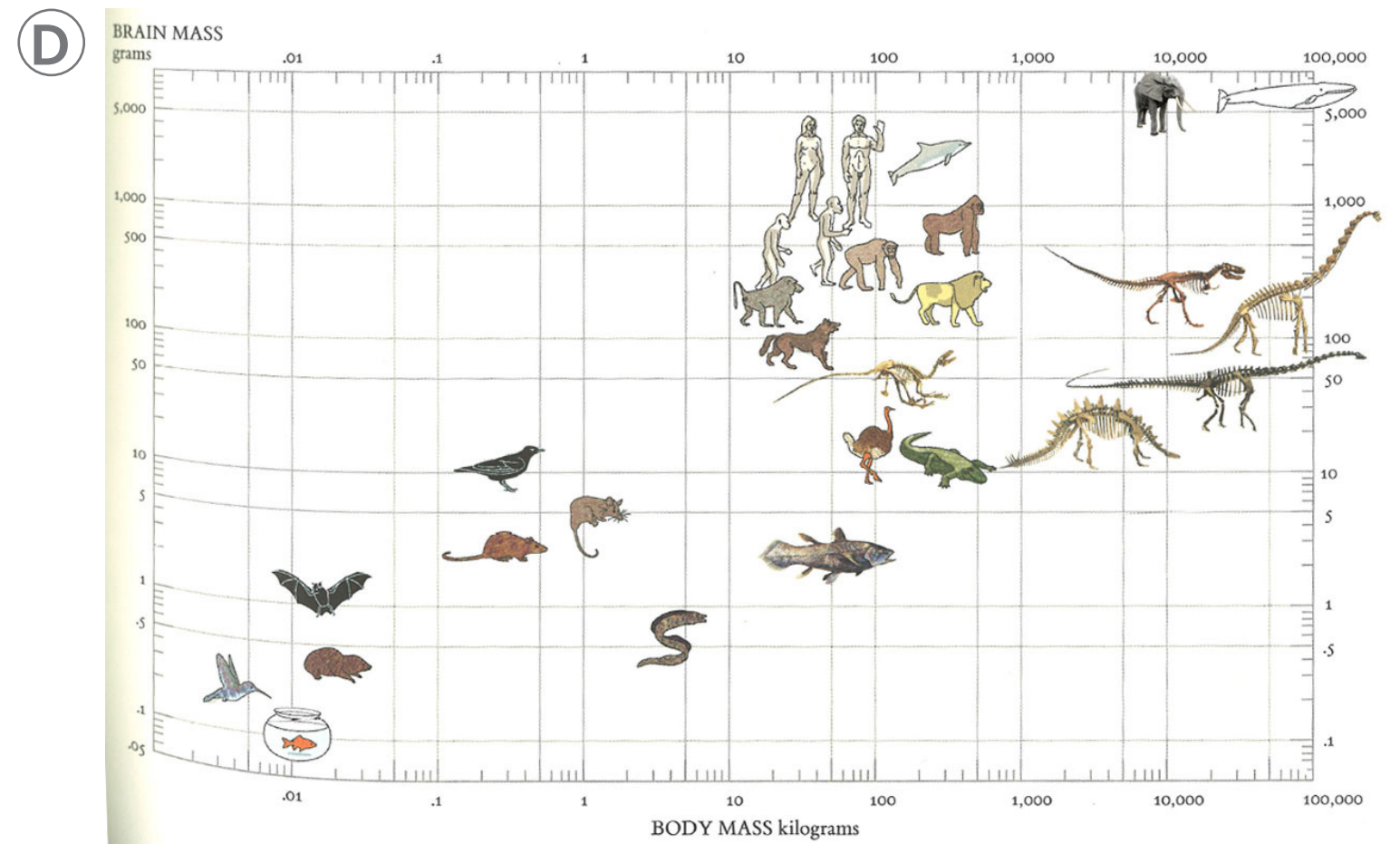
A

Brain mass in grams

10,000
5,000

1,000
500

100
50

10.0
5.0

1.0
0.5

0.1
0.05

0.01

0.001 0.01 0.1 1 10 100 1,000 10,000 100,000

Body mass in kilograms

Dolphin Elephant
Blue whale
Modern man Male gorilla
Homo habilis Tyrannosaurus rex
Gracile Australopithecus
Chimpanzee Lion
Baboon Wolf
Saurornithoid Brachiosaurus
Ostrich Diplodocus
Alligator Stegosaurus
Crow
Opossum
Rat Coelacanth
Vampire bat Eel
Mole
Hummingbird
Goldfish

based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45

B

Brain mass in grams

10,000
5,000

1,000
500

100
50

10.0
5.0

1.0
0.5

0.1
0.05

0.01

0.001 0.01 0.1 1 10 100 1,000 10,000 100,000

Body mass in kilograms

based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45

C

BRAIN MASS grams

5,000

1,000
500

100
50

10
5

1
.5

.1
.05

.01

.01 .1 1 10 100 1,000 10,000 100,000

BODY MASS kilograms

elephant blue whale
modern human dolphin
homo habilis gorilla
gracile australopithecus chimpanzee tyrannosaurus rex
baboon lion
wolf brachiosaurus
saurornithoid
ostrich diplodocus
alligator stegosaurus
crow
opossum
rat coelacanth
vampire bat
mole eel
hummingbird
goldfish

based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45

D

BRAIN MASS grams

.01 .1 1 10 100 1,000 10,000 100,000

5,000

1,000
500

100
50

10
5

1
.5

.1
.05

.01 .1 1 10 100 1,000 10,000 100,000
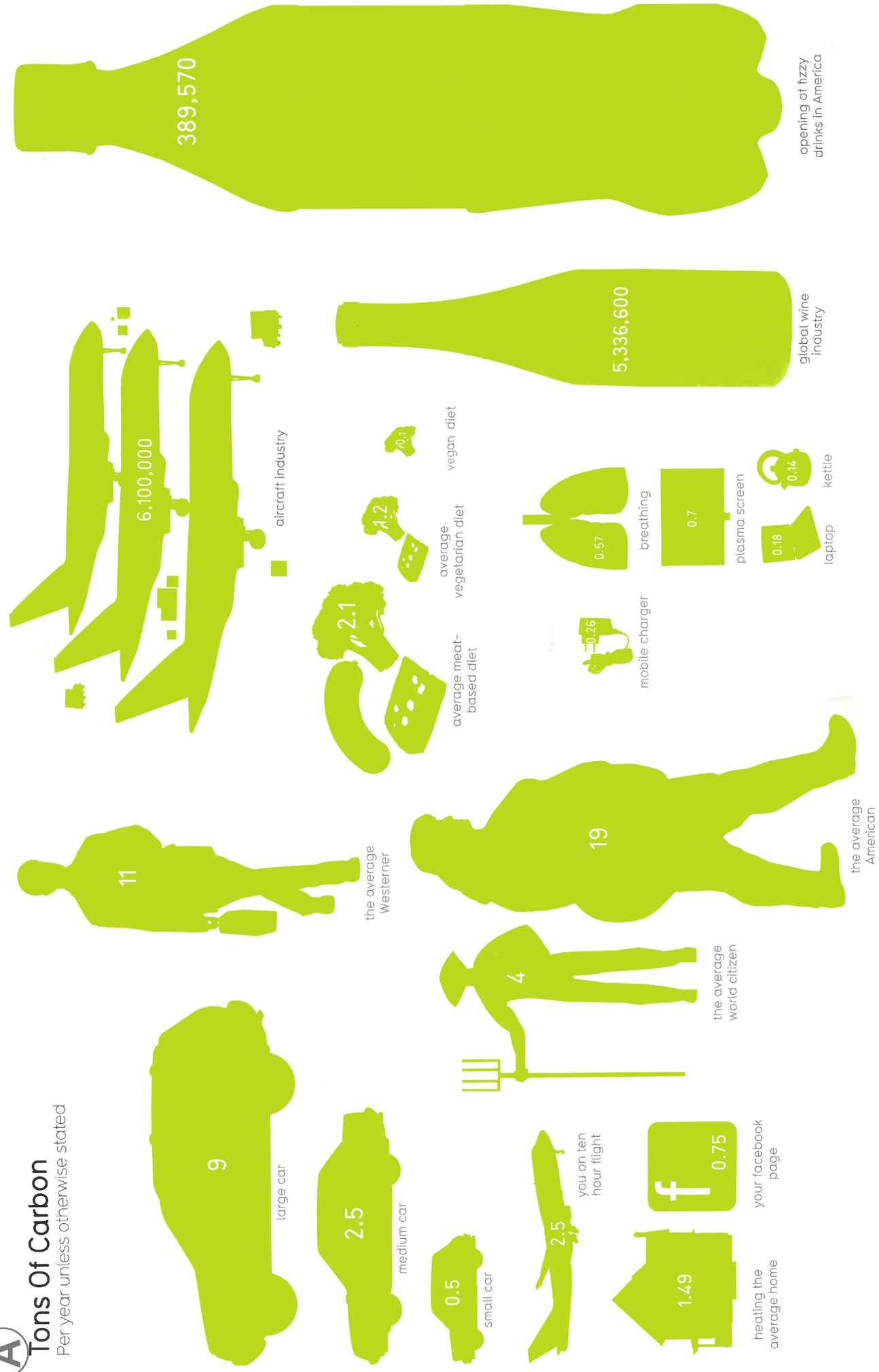
BODY MASS kilograms

based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45

A — Tons Of Carbon
Per year unless otherwise stated

- opening of fizzy drinks in America — 389,570
- global wine industry — 5,336,600
- aircraft industry — 6,100,000
- the average American — 19
- the average Westerner — 11
- the average world citizen — 4
- large car — 9
- medium car — 2.5
- small car — 0.5
- you on ten hour flight — 2.5
- your facebook page — 0.75
- heating the average home — 1.49
- average meat-based diet — 2.1
- average vegetarian diet — 1.2
- vegan diet — 0.1
- breathing — 0.57
- plasma screen — 0.7
- laptop — 0.18
- kettle — 0.14
- mobile charger — 0.26

B — Sources of Carbon in the Atmosphere

Tons of Carbon per year (0–20)

Categories:
- large car
- medium car
- small car
- the average world citizen
- the average westerner
- the average American
- you on a ten hour flight
- heating the average home
- your facebook page
- mobile charger
- breathing
- plasma screen
- laptop
- kettle
- average meat based diet
- average vegetarian diet
- vegan diet

Sources of Carbon in the Atmosphere