



EFFECTIVE DATA COMMUNICATION THROUGH VISUALIZATION

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No Disclosures.

Scenario 1

SPEED
LIMIT
45





SPEED

LIMIT

75

MINIMUM

50











Scenario 2



What was the minimum speed limit?

Scenario 1? 50mph

Scenario 2? 50mph

Why was it easier to remember the information
from Scenario 1?



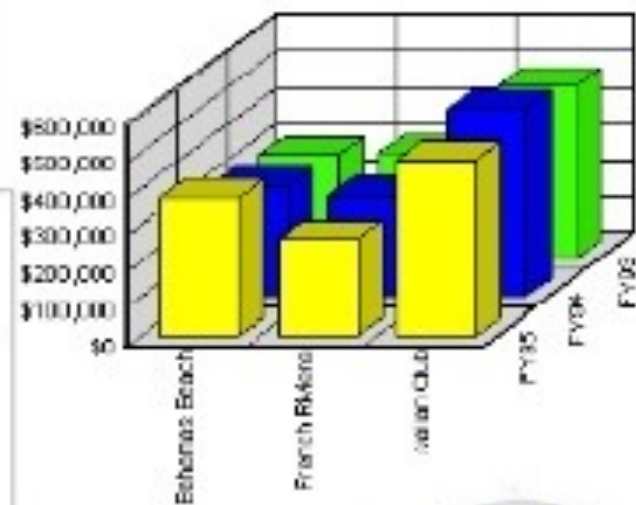
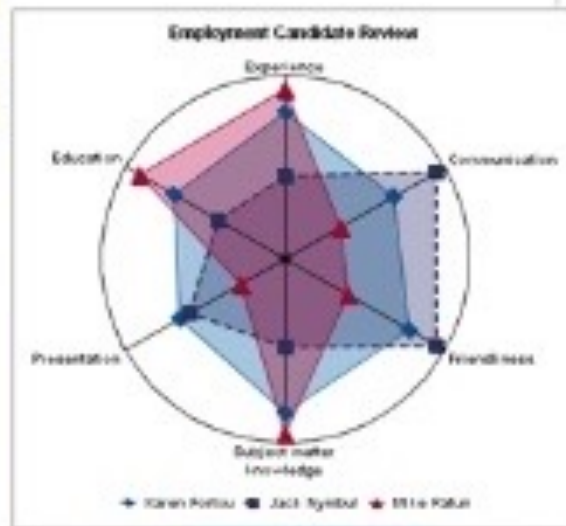
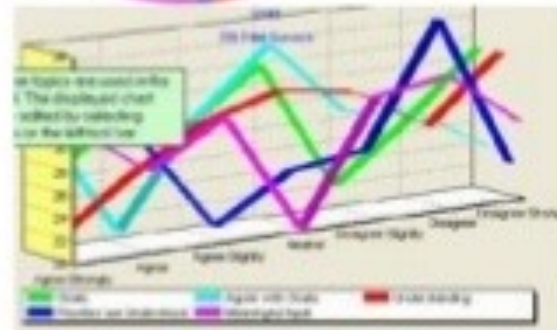
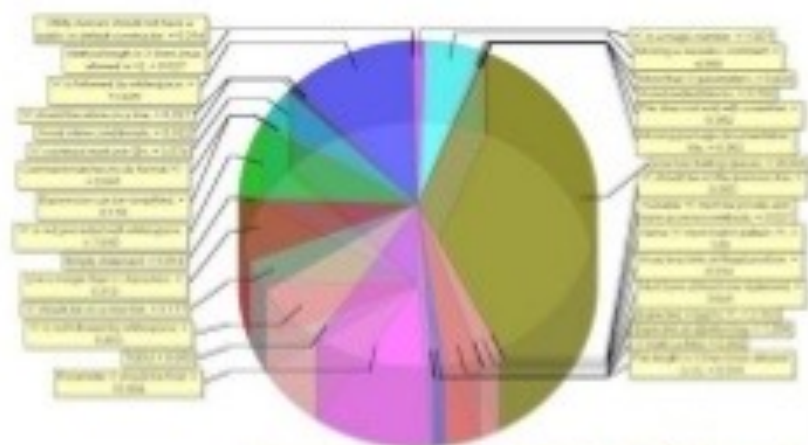
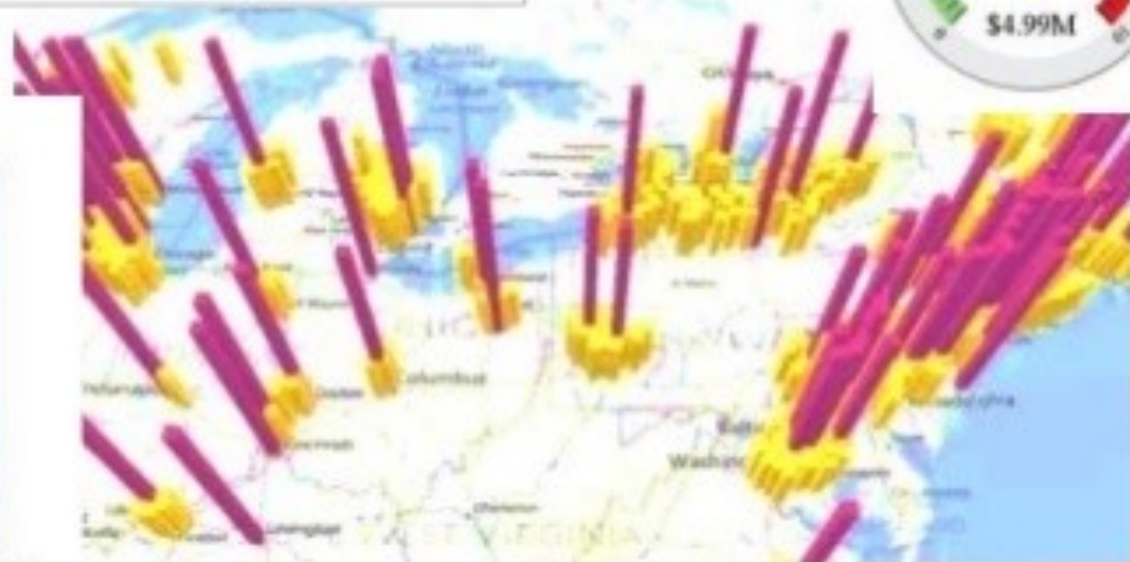
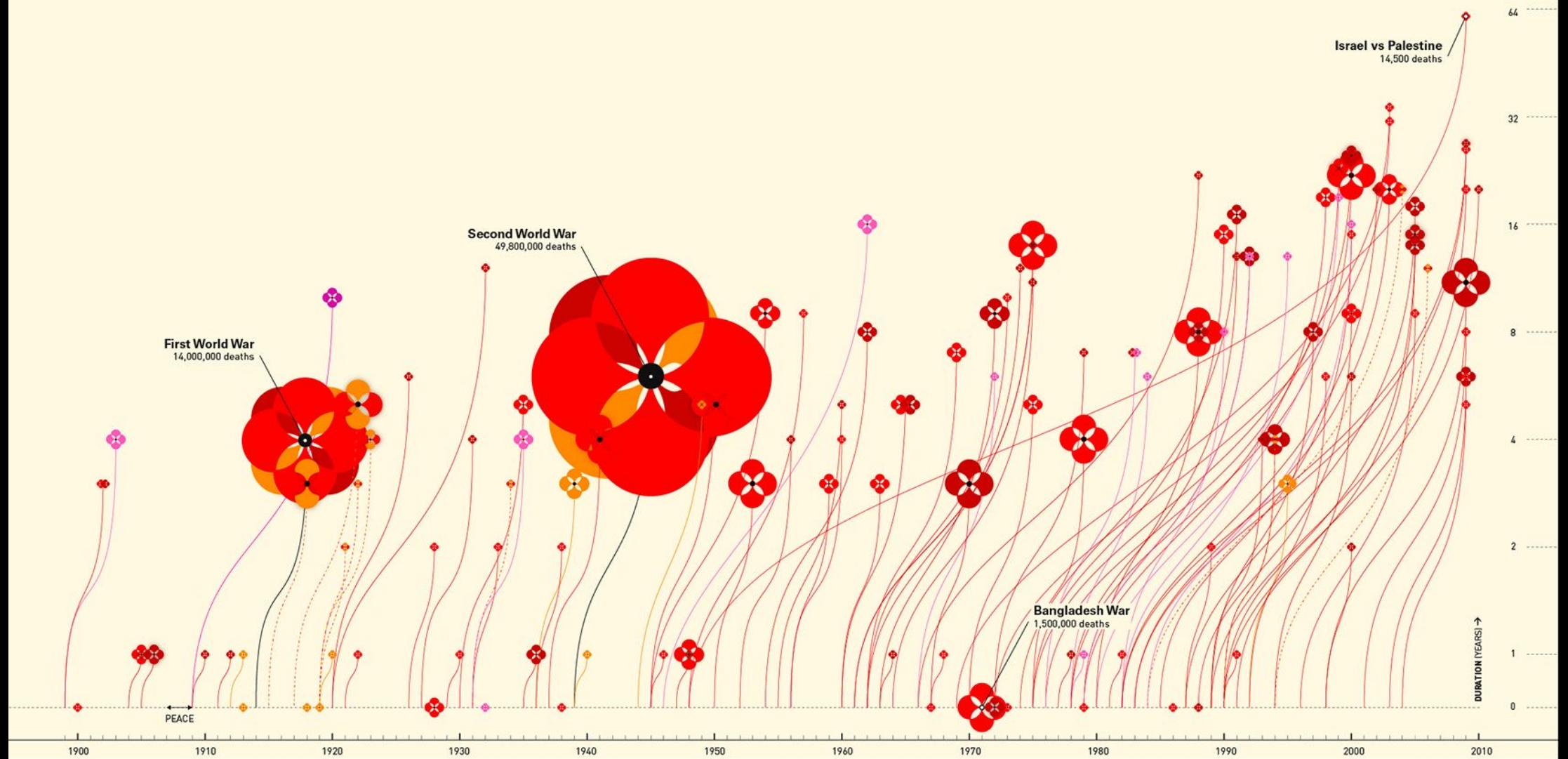


Image Source: <http://www.brickonomist.net>

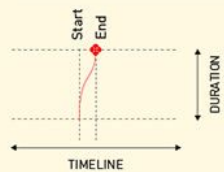


What Data
Visualization is
NOT





POPPY DIAGRAM



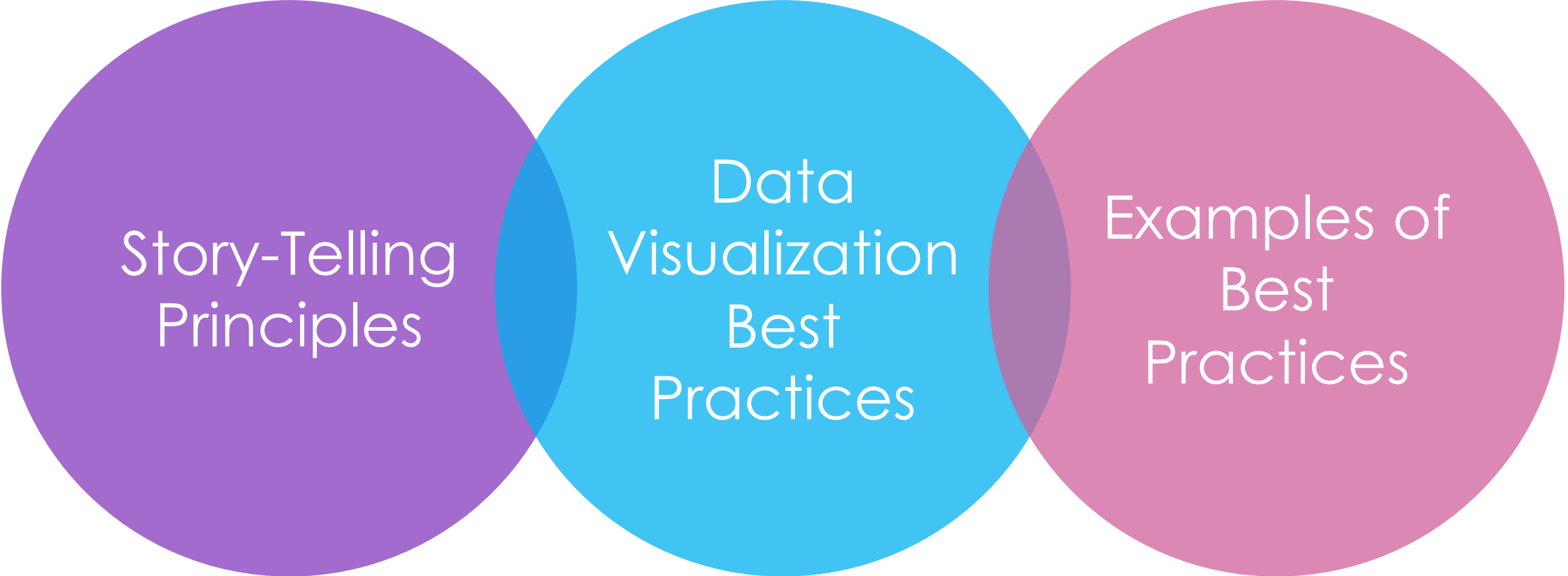
The remembrance poppy commemorates soldiers who have died in war. Each poppy in the diagram depicts a war of the last century (with more than 10,000 deaths). The stem grows from the year when the war started. The poppy flowers in the year the war ended. Its size shows the number of deaths.

NUMBER OF DEATHS IN THOUSANDS (POPPY'S SIZE)



REGIONS INVOLVED IN WARS (POPPY'S COLOUR)





Story-Telling
Principles

Data
Visualization
Best
Practices

Examples of
Best
Practices

**Data's
^
What's Your Story?**



Powerful
Memorable
Captivating
Personal
Emotional



Dry
Cognitive
Factual
Impersonal
Boring
Important

DATA

	A	B	C	D	E	F	G
1	Date	Open	High	Low	Close	Volume	Adj Close
2	02/01/2003	50.65	51.61	50.52	51.6	7545500	44.99
3	03/01/2003	51.61	51.61	49.85	50	8389300	43.59
4	06/01/2003	50.2	50.55	49.67	50.19	7438400	43.76
5	07/01/2003	50.32	50.76	50.1	50.46	6669000	43.99
6	08/01/2003	50.4	51.36	49.86	49.99	7796900	43.58
7	09/01/2003	50.75	52	50.75	51.92	9884800	45.27
8	10/01/2003	51.92	52	51.21	51.62	7426600	45
9	13/01/2003	51.62	52.18	51	51.28	6920800	44.71
10	14/01/2003	51	51.54	50.7	51.41	6759600	44.82
11	15/01/2003	51.45	51.68	50.53	50.59	6503500	44.11
12	16/01/2003	51.1	51.23	49.98	50.3	8086900	43.85
13	17/01/2003	50.3	50.43	49.7	49.97	8661200	43.57
14	21/01/2003	50.07	50.29	48.98	49.01	7827400	42.73
15	22/01/2003	49.02	49.59	47.75	48.07	11097600	41.91
16	23/01/2003	48.07	48.76	47.34	48.57	10896500	42.34
17	24/01/2003	48.4	48.69	47.19	47.3	8425500	41.24

PROBLEM:

Data:

Factual

Impersonal

Dry

Cognitive

Boring

Important

Stories:

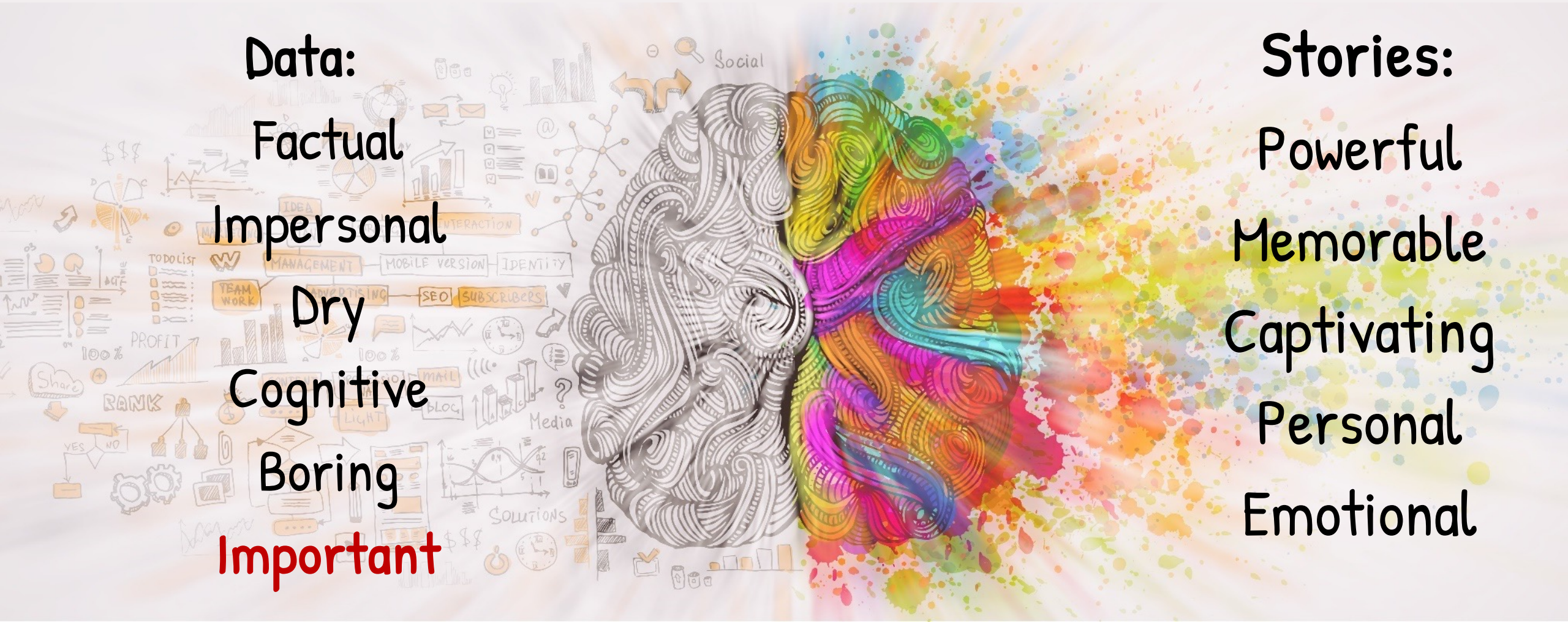
Powerful

Memorable

Captivating

Personal

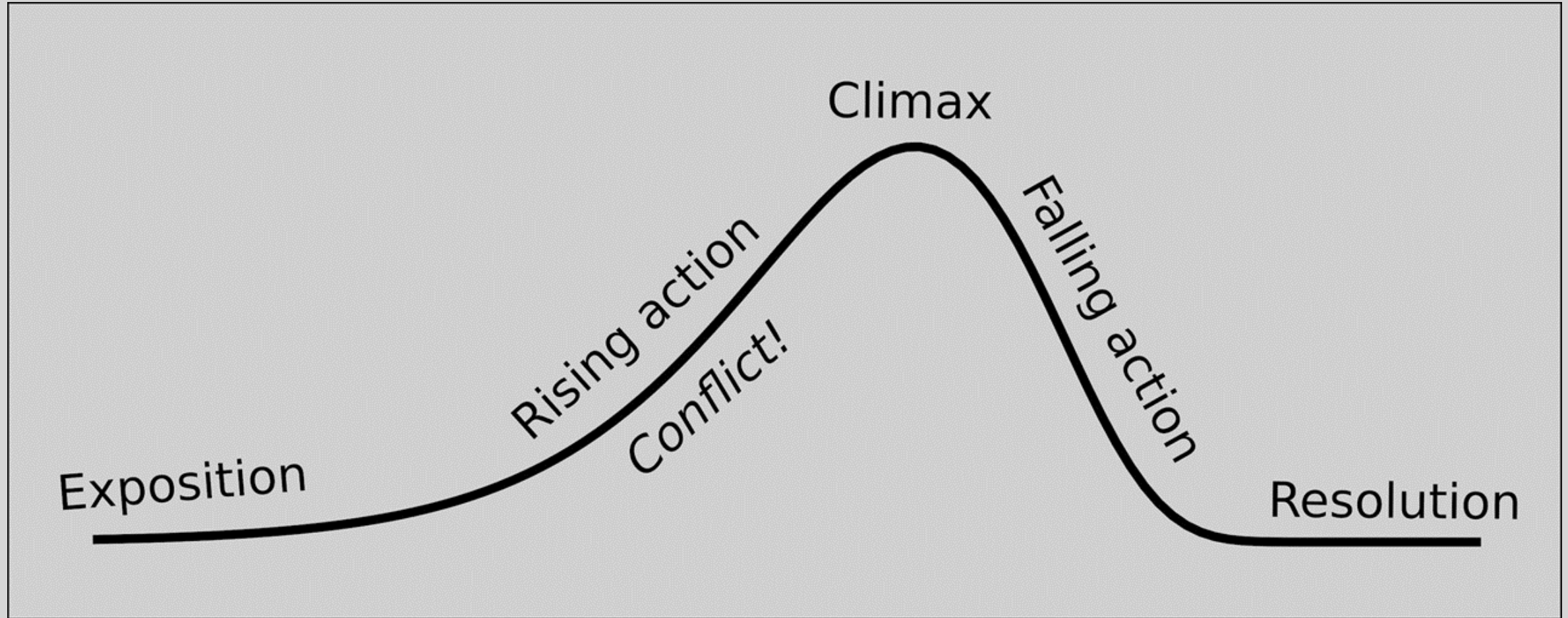
Emotional



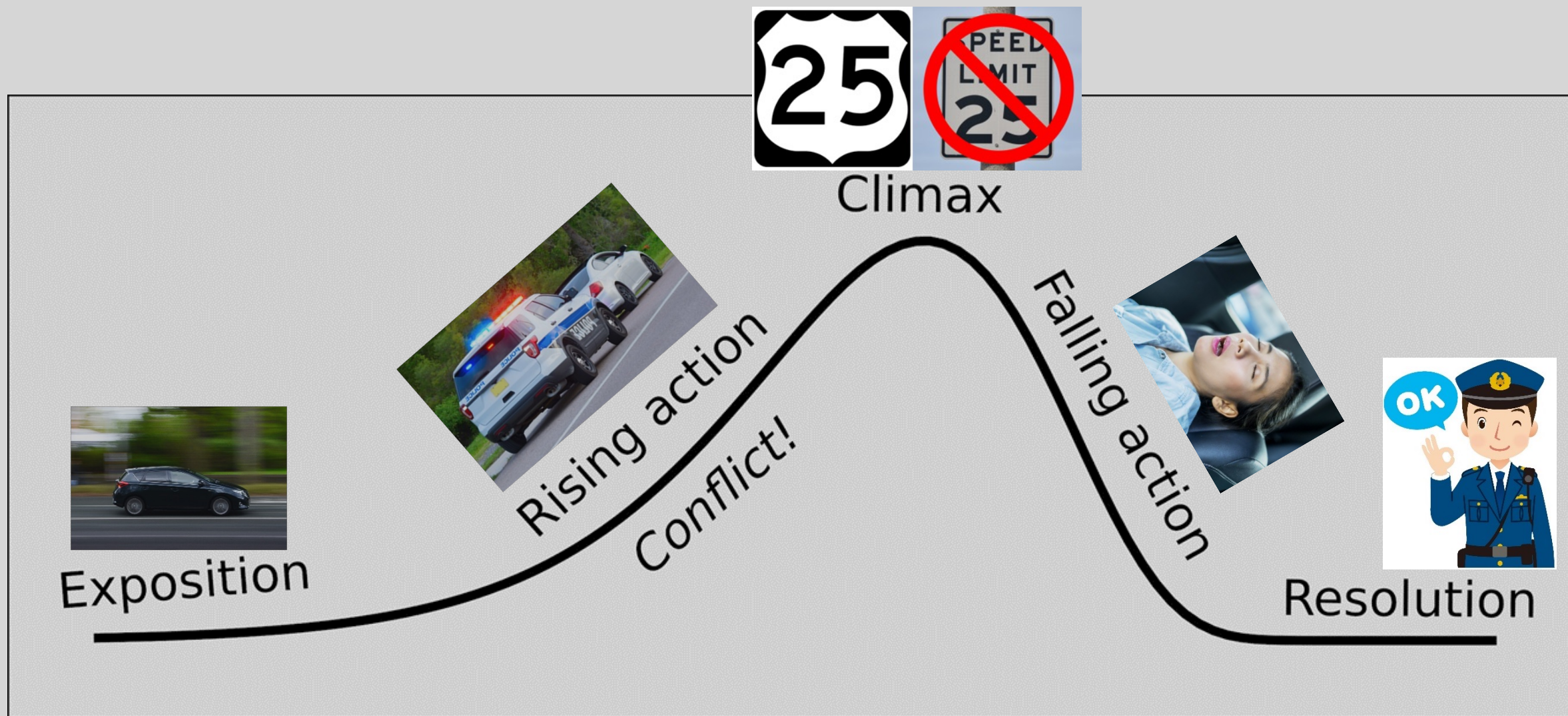
A high-angle, wide shot of a crowded conference hall. Numerous people are seen from behind, walking through aisles lined with large whiteboards displaying various charts, graphs, and text. The scene is busy and filled with activity. A large, red, distressed-style stamp with the word "SOLVED" in white, bold, sans-serif capital letters is superimposed diagonally across the center of the image.

SOLVED

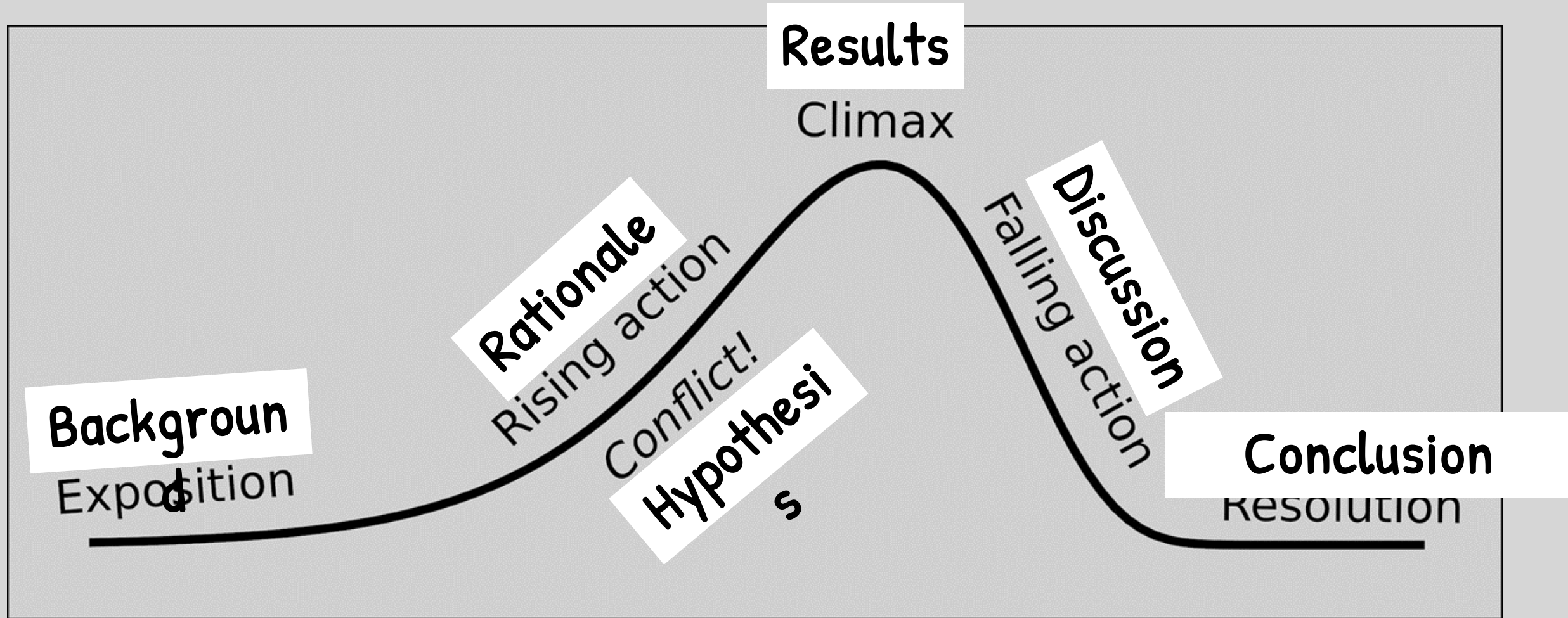
THE "5-STAGE" STRUCTURE OF STORYTELLING:



THE "5-STAGE" STRUCTURE OF STORYTELLING:



THE "5-STAGE" STRUCTURE OF STORYTELLING:



FUNDAMENTALS

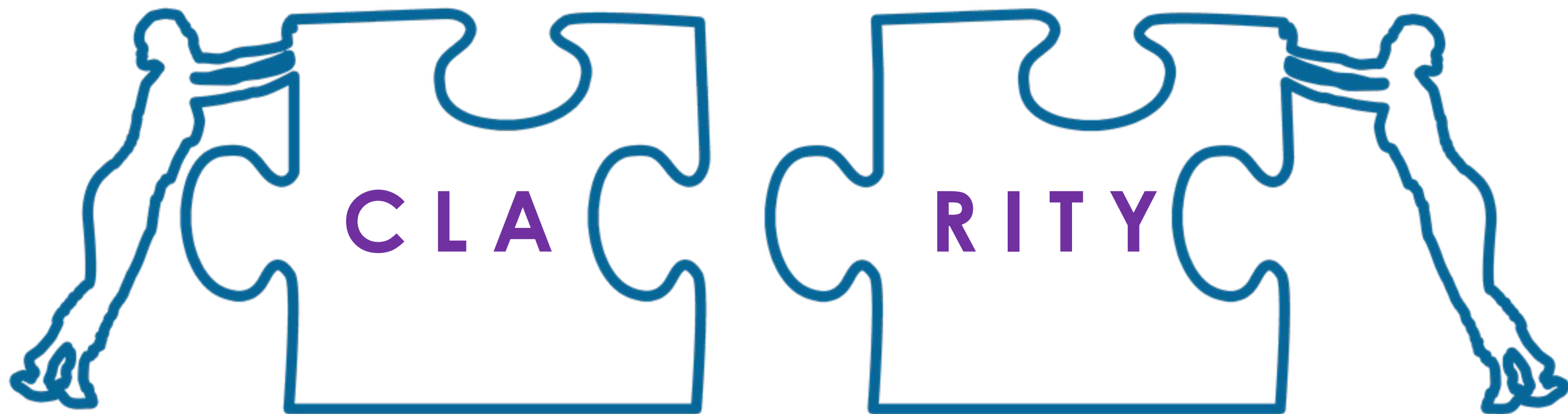
of Data Visualization

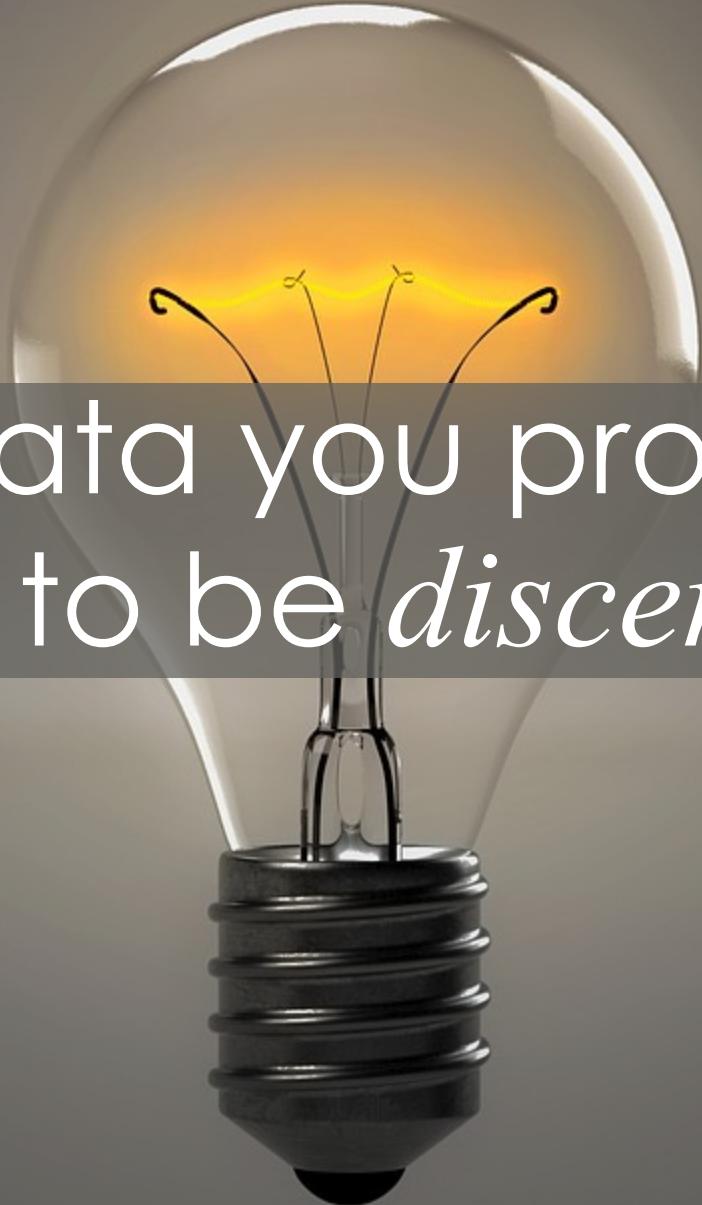
cognitive load

the amount of mental effort that we use
to process the information we need

**Content volume should *not* overload
audience cognitive capabilities**







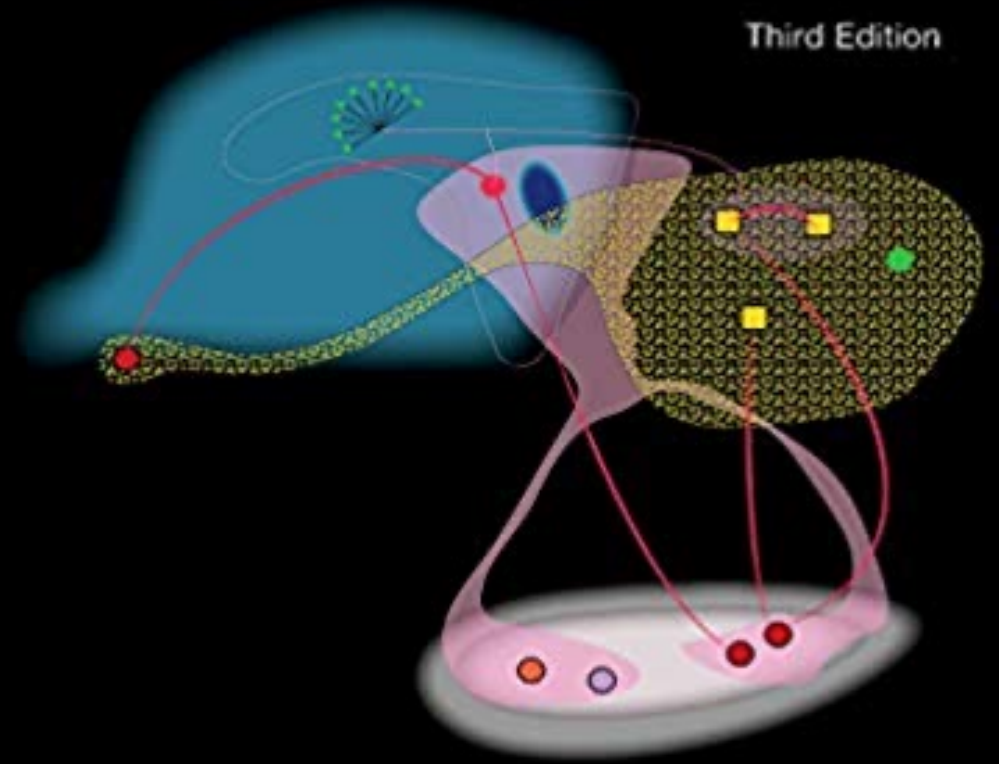
The data you provide
needs to be *discernible*

Pre-attentive attributes of visualizations

Information Visualization

PERCEPTION FOR DESIGN

Third Edition



MK
MORGAN KAUFMANN

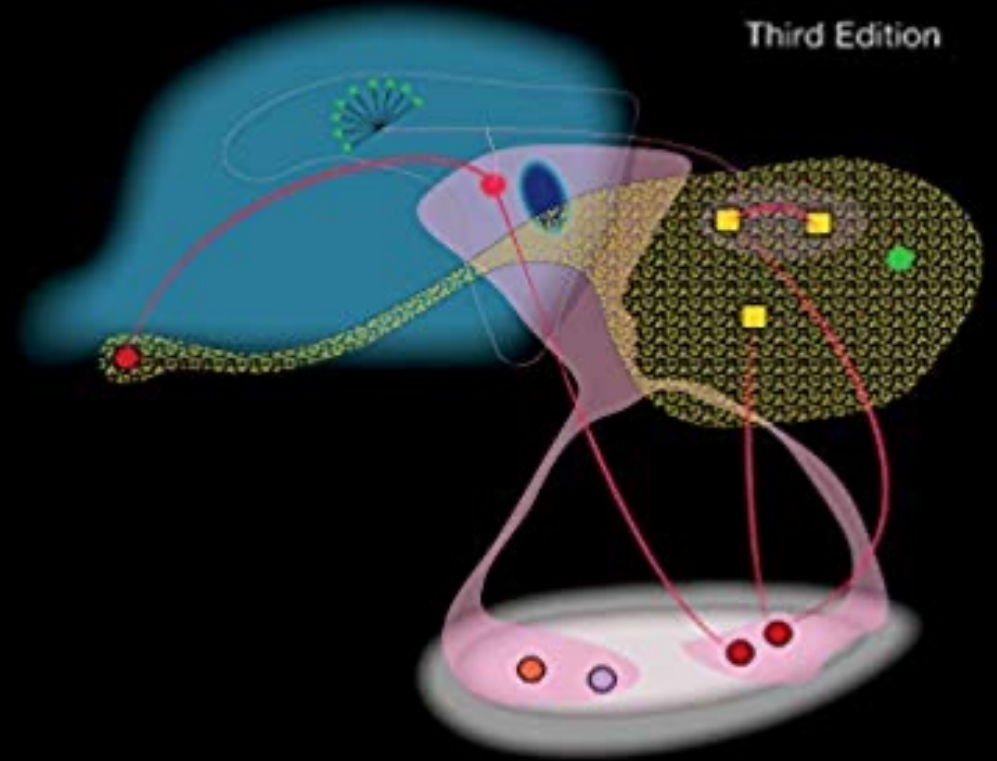
Colin Ware

Color
Form
Movement/Motion
Spatial Positioning

Information Visualization

PERCEPTION FOR DESIGN

Third Edition



MK
MURKIN KUTTING

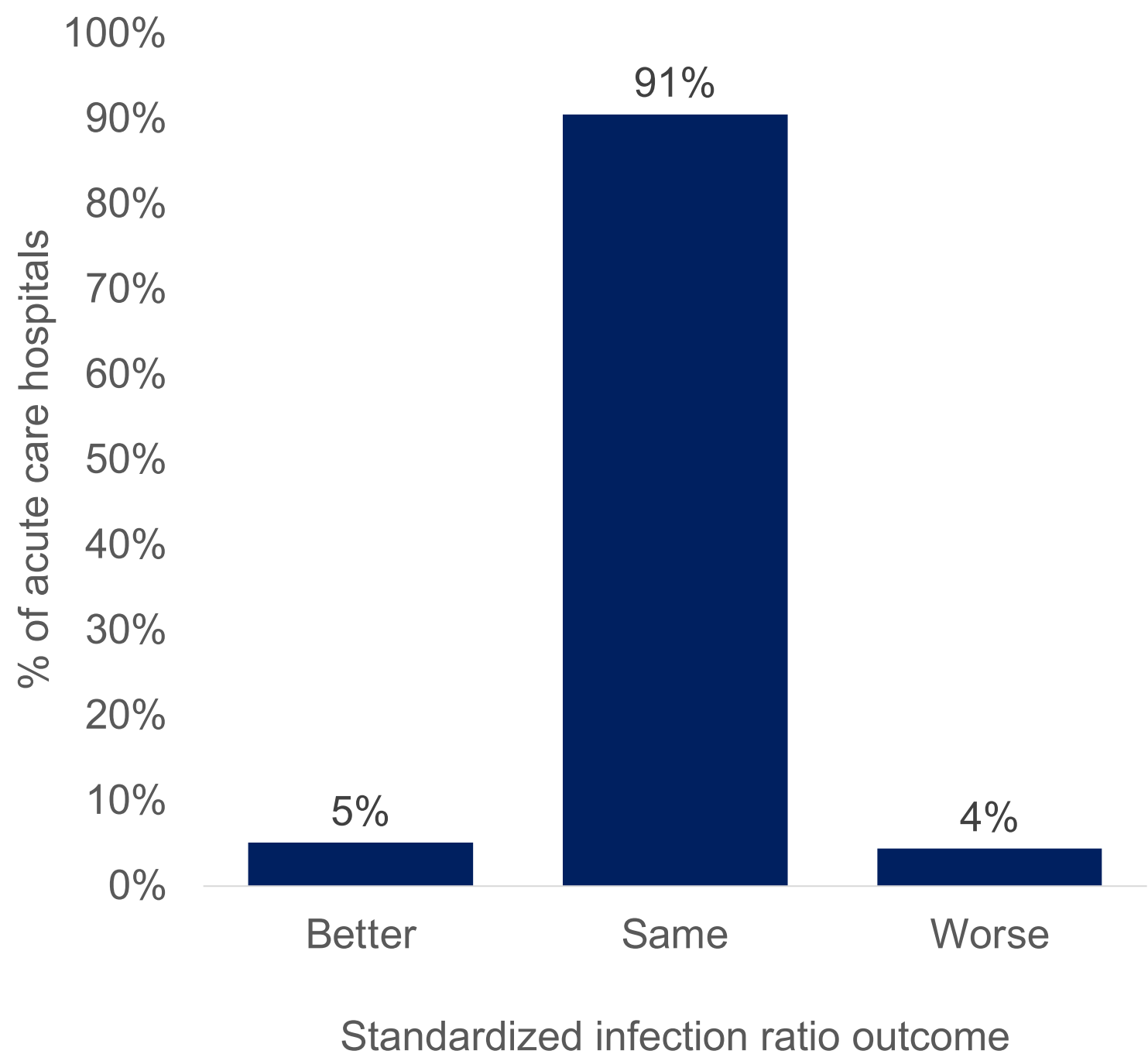
Colin Ware



Color

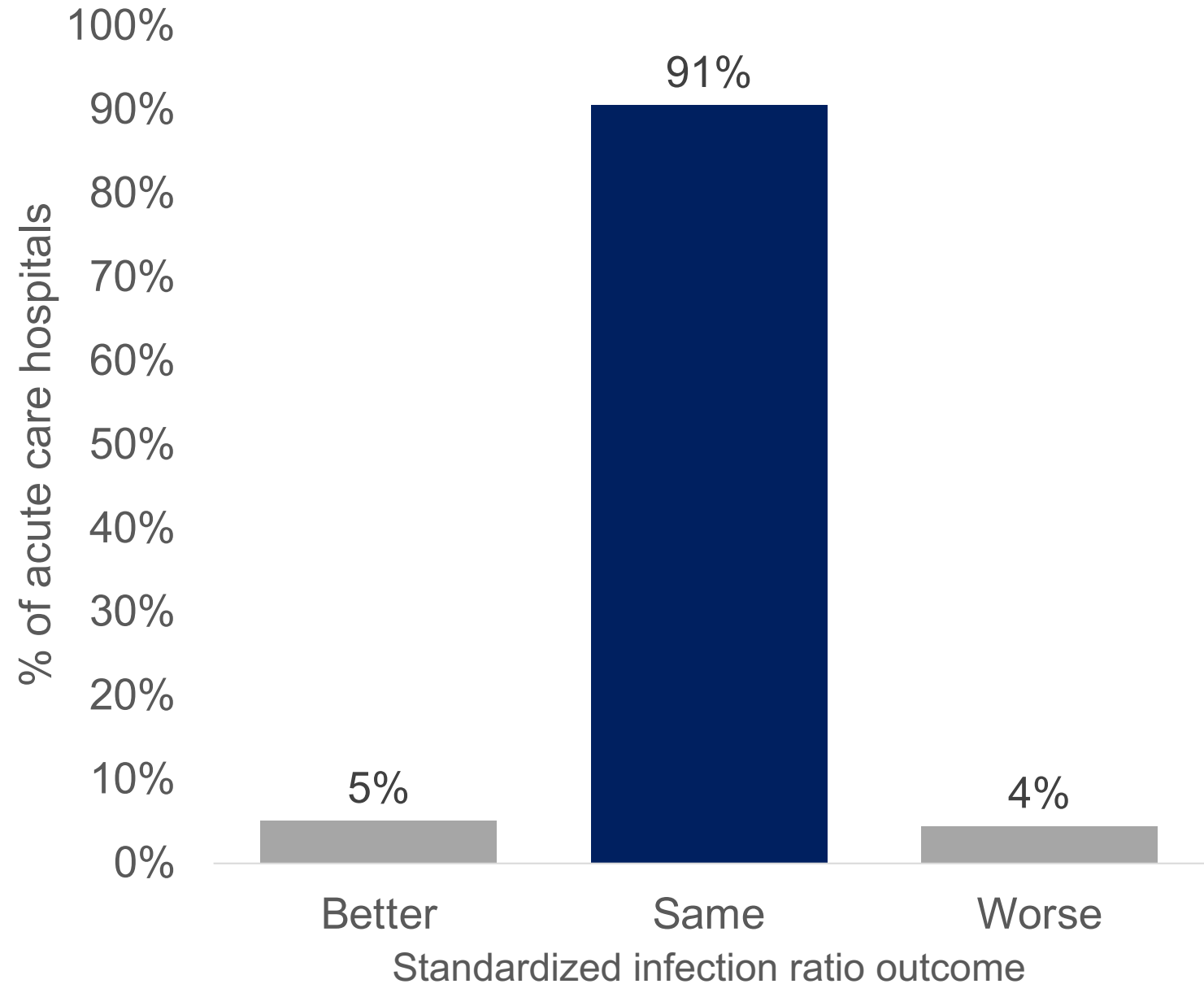


emphasize
important
data

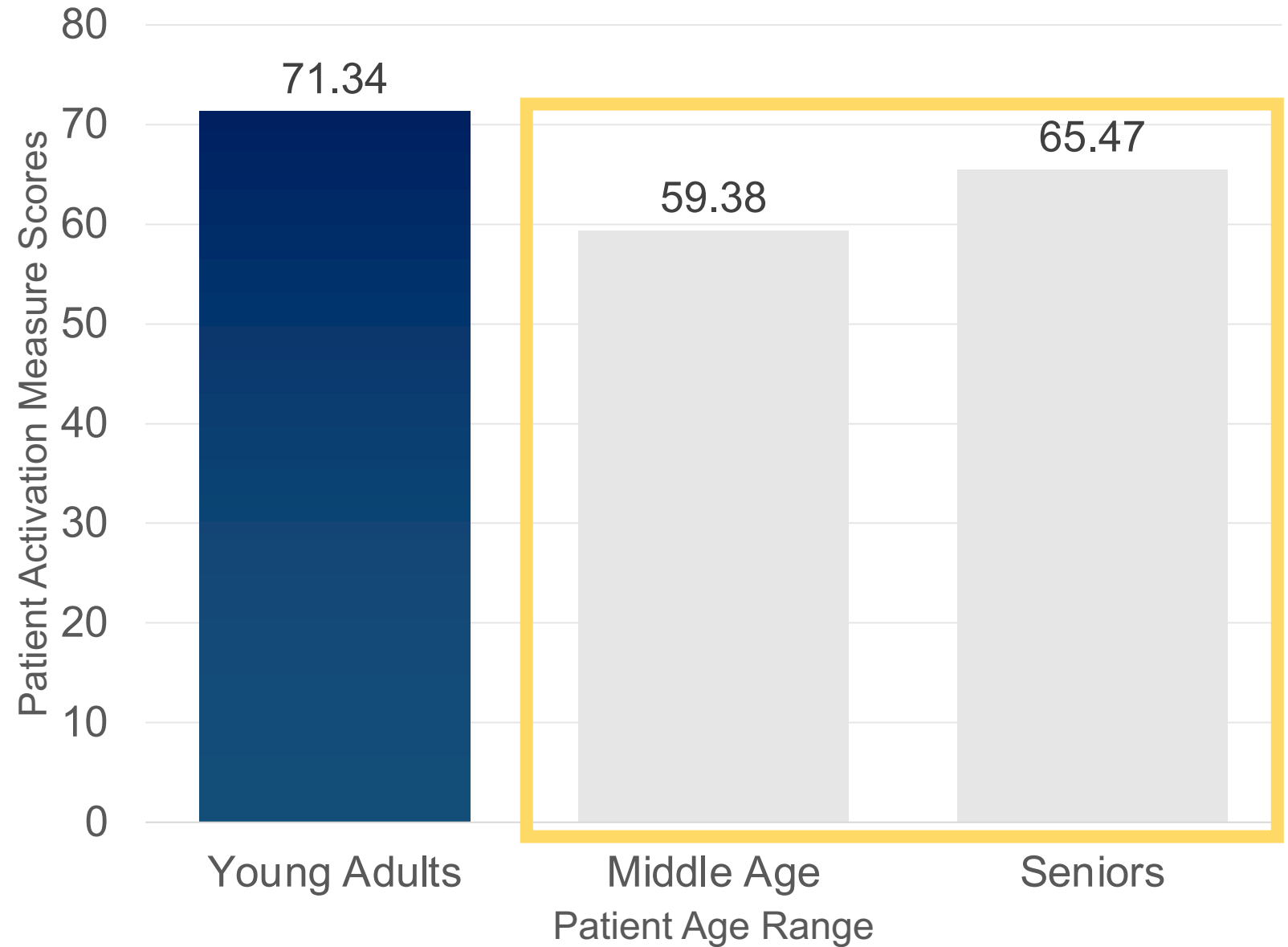


91% of MRSA bloodstream infections in California Hospitals remained the same

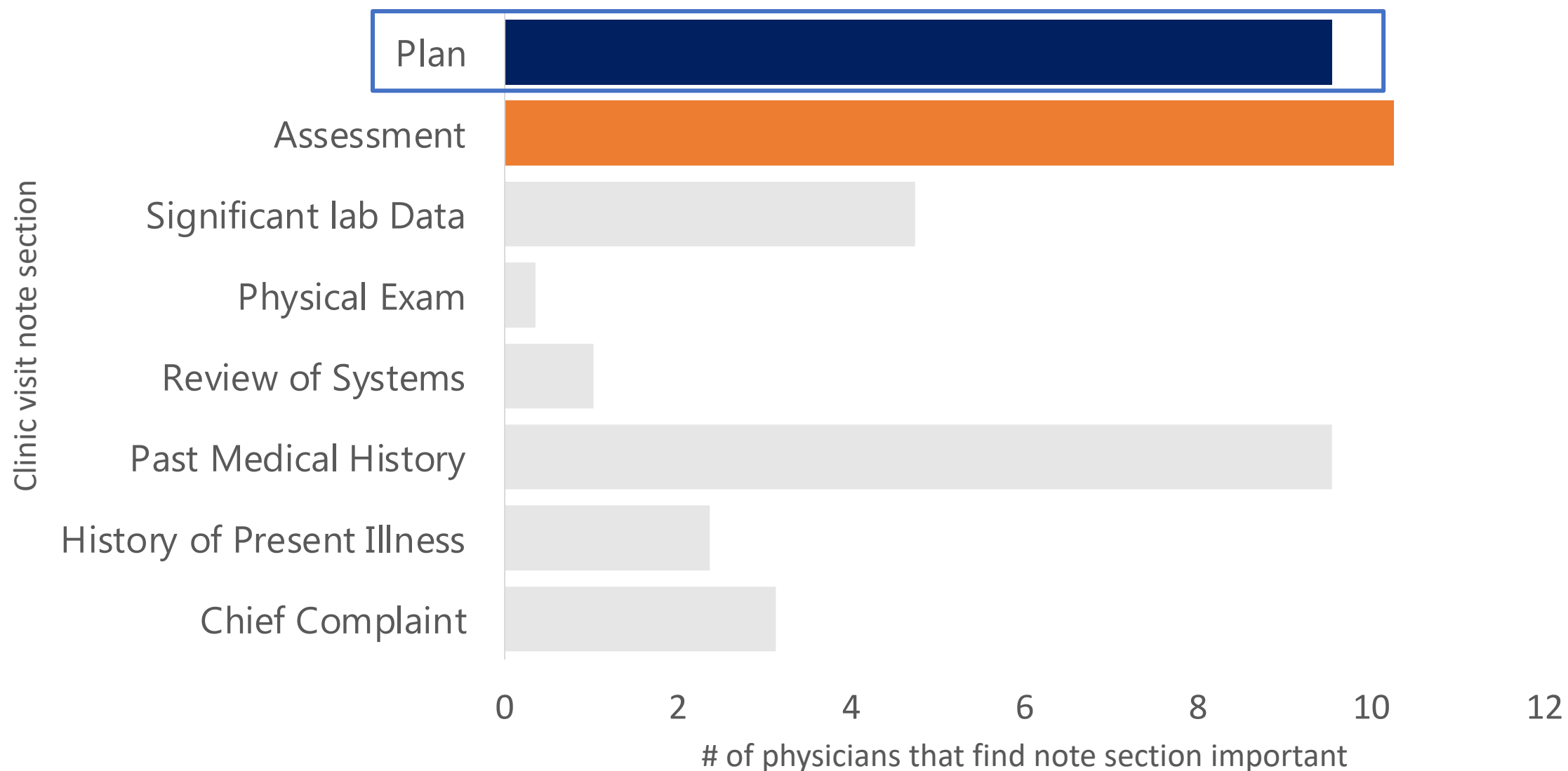
emphasize
important
data



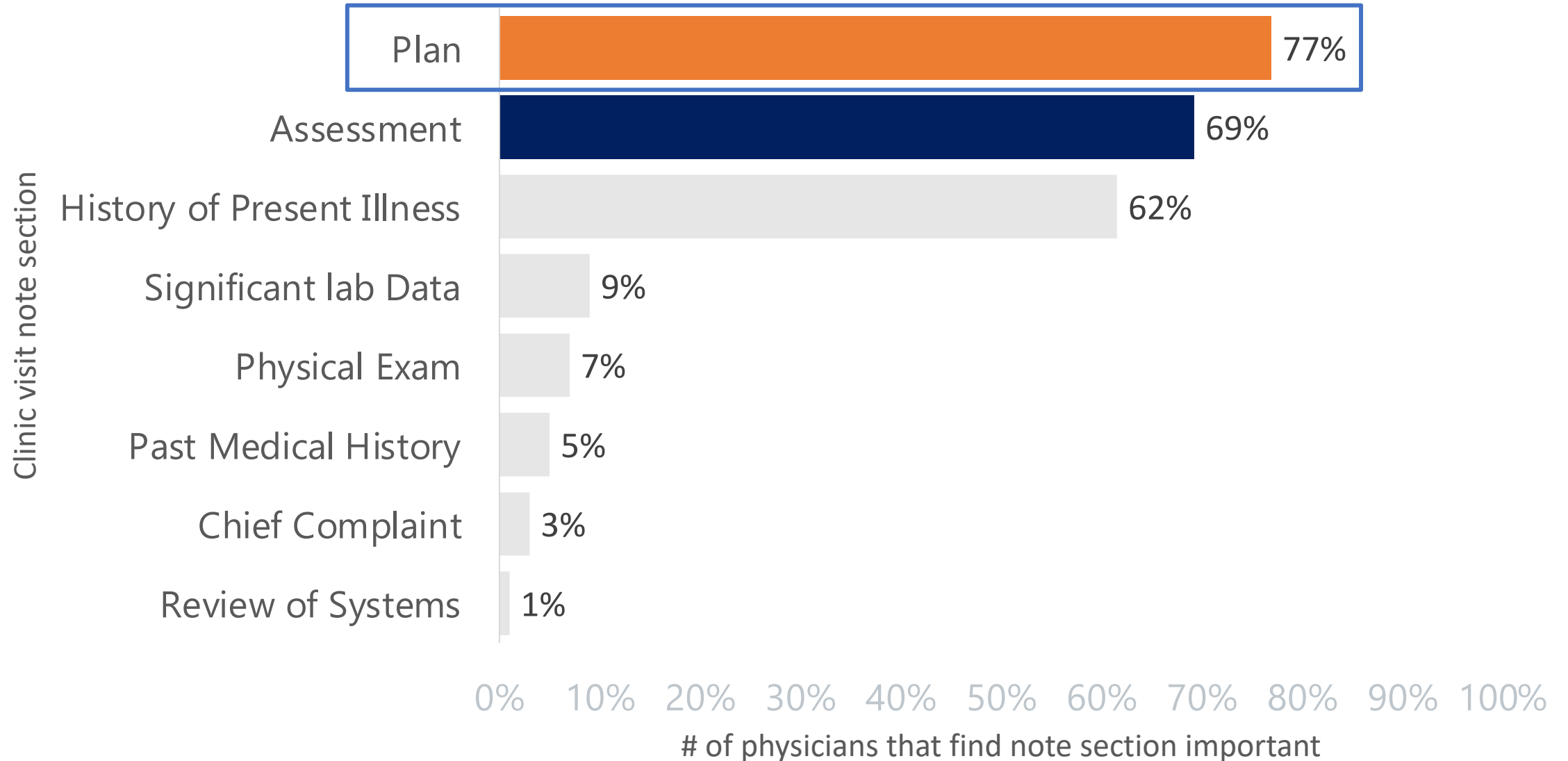
emphasize
important
data



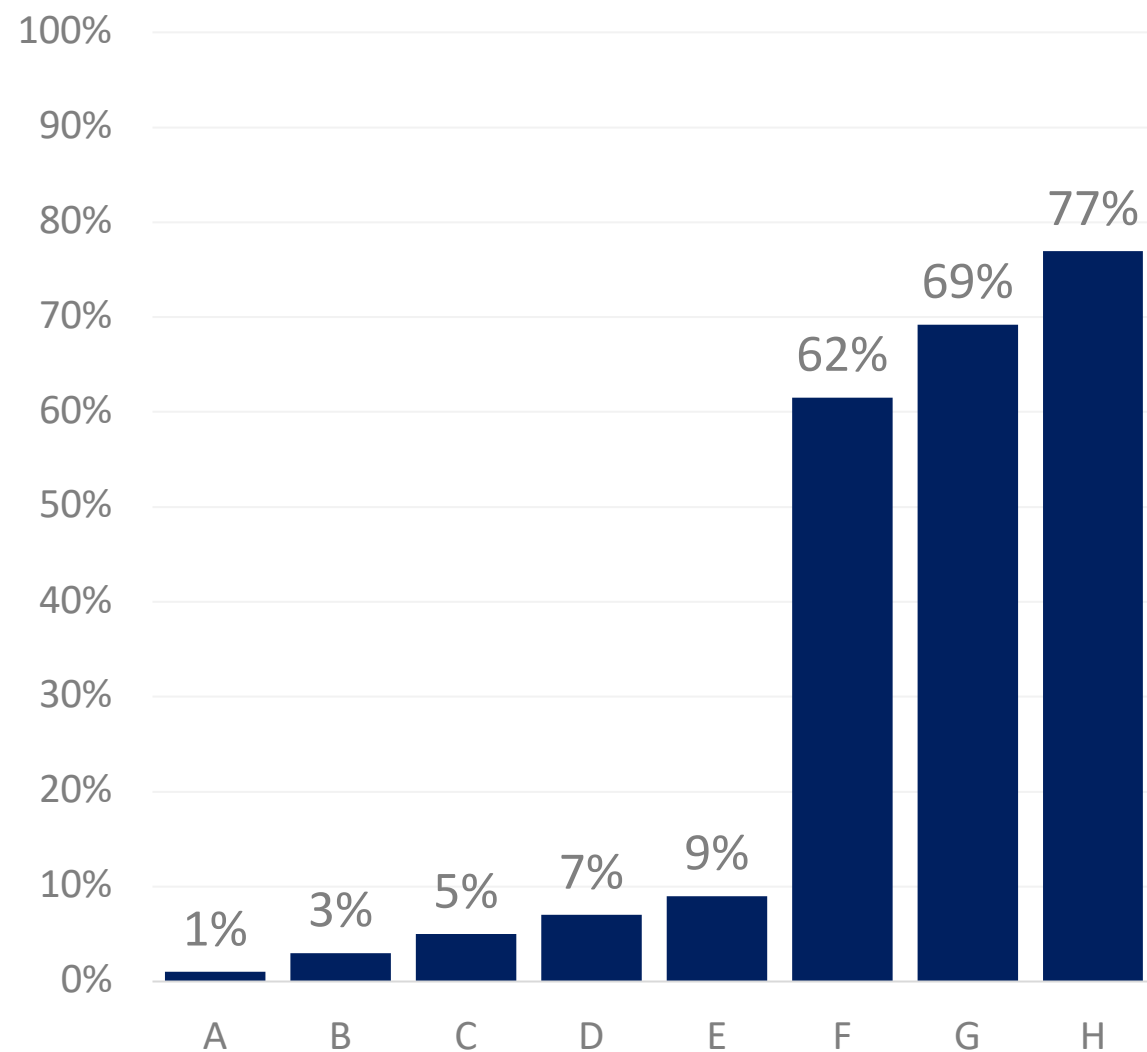
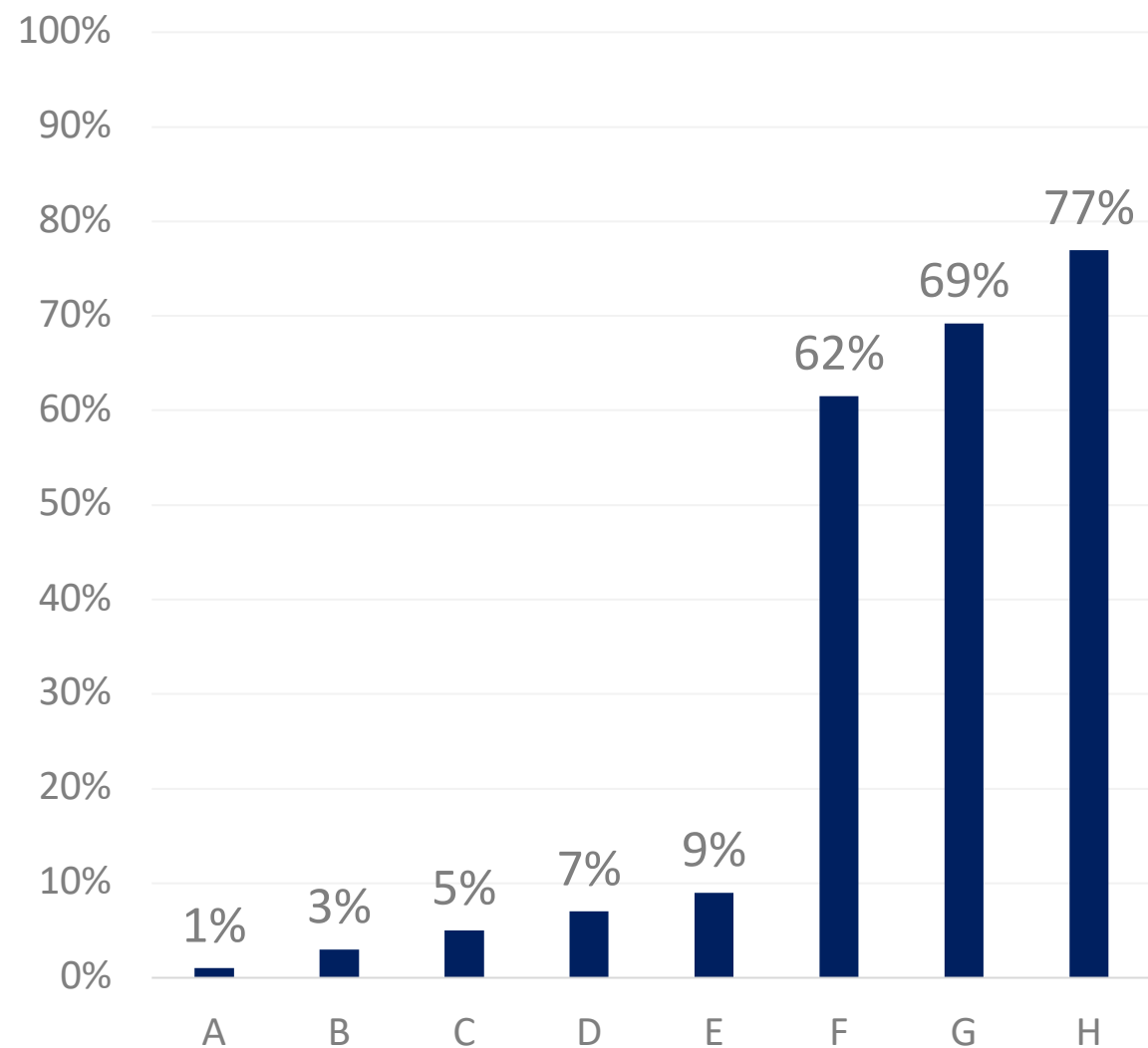
Inconsistency between visualizations



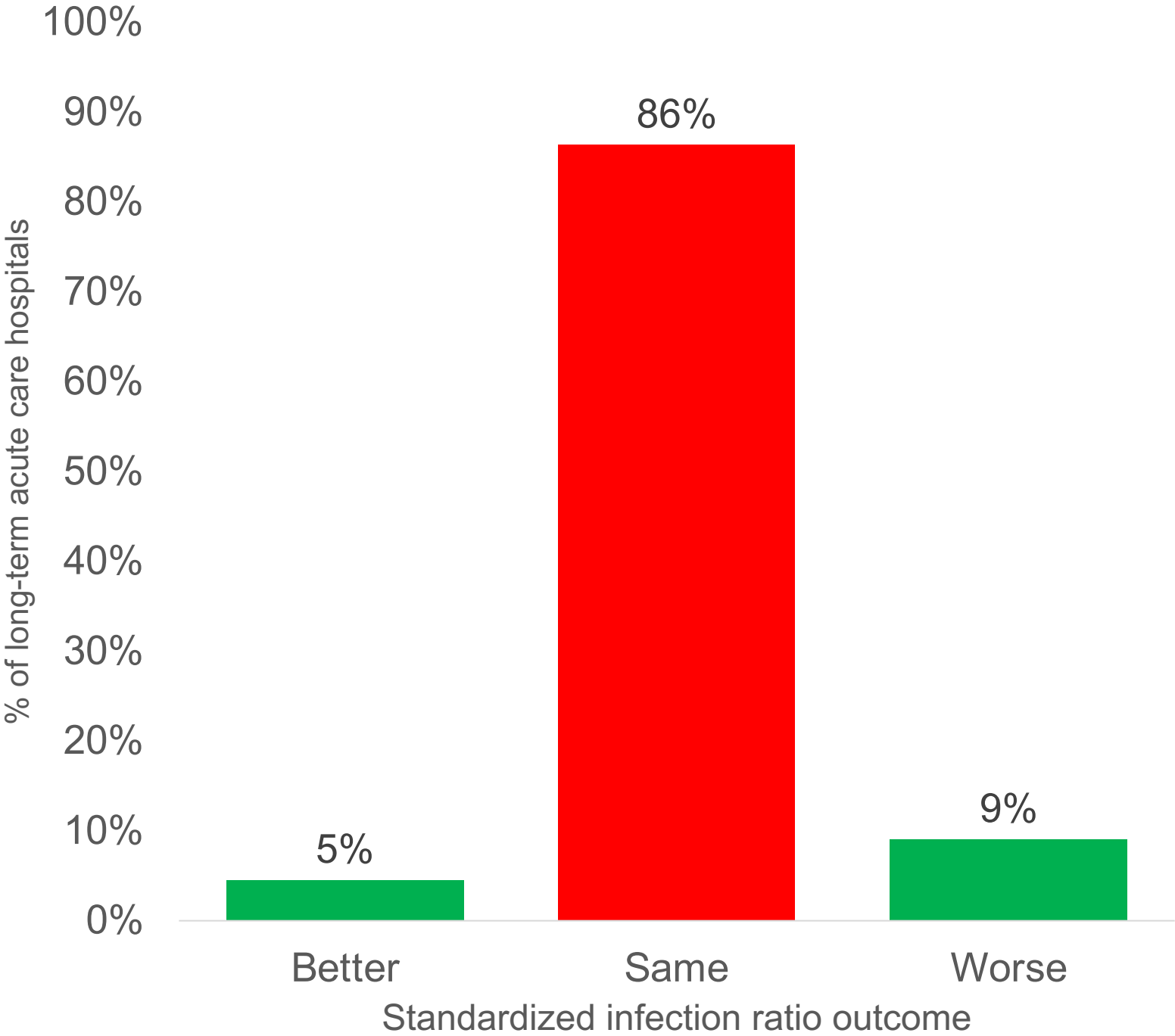
Inconsistency between visualizations



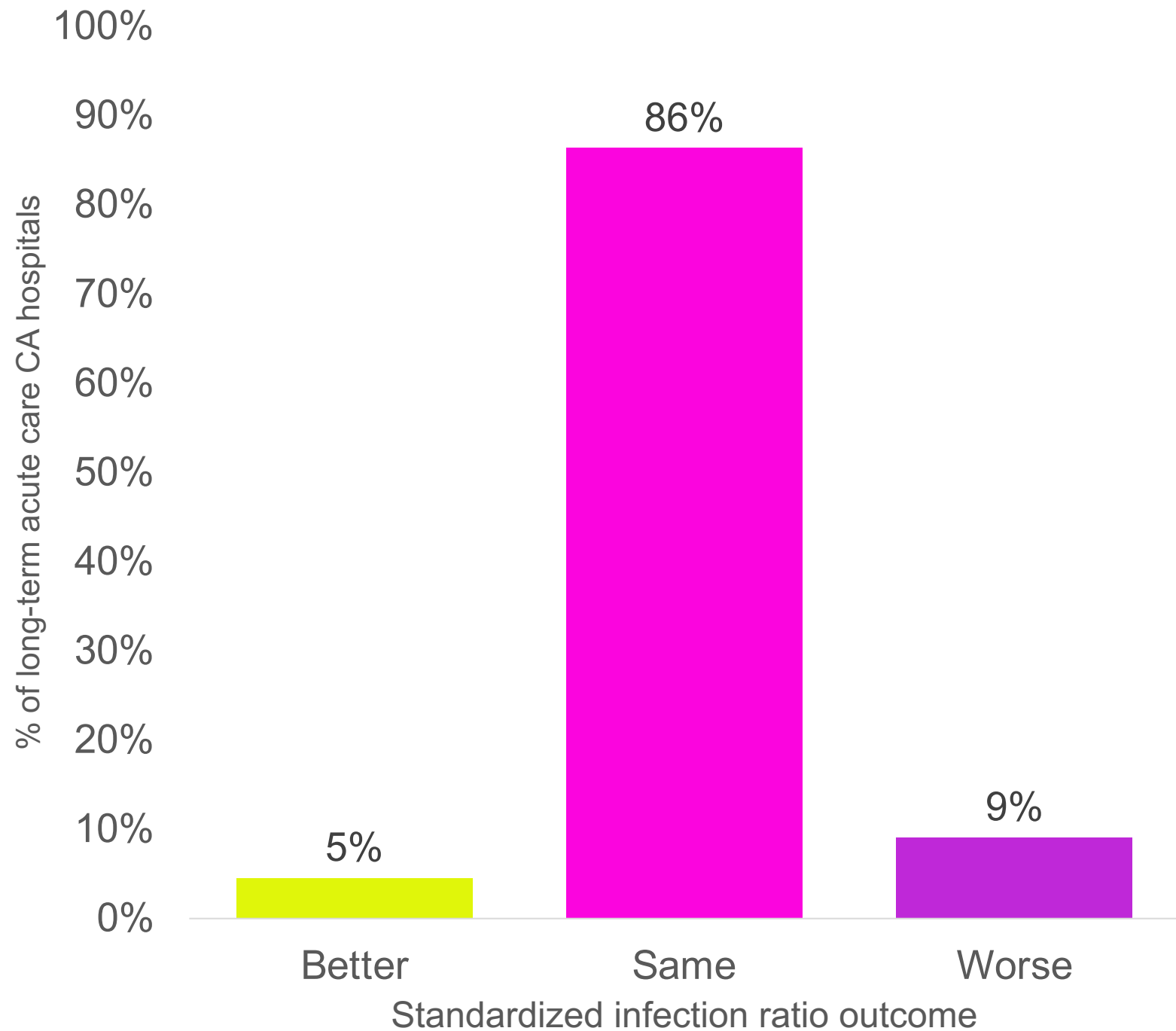
Bars must be thicker than the white space



Using a color
scheme not
everyone can see



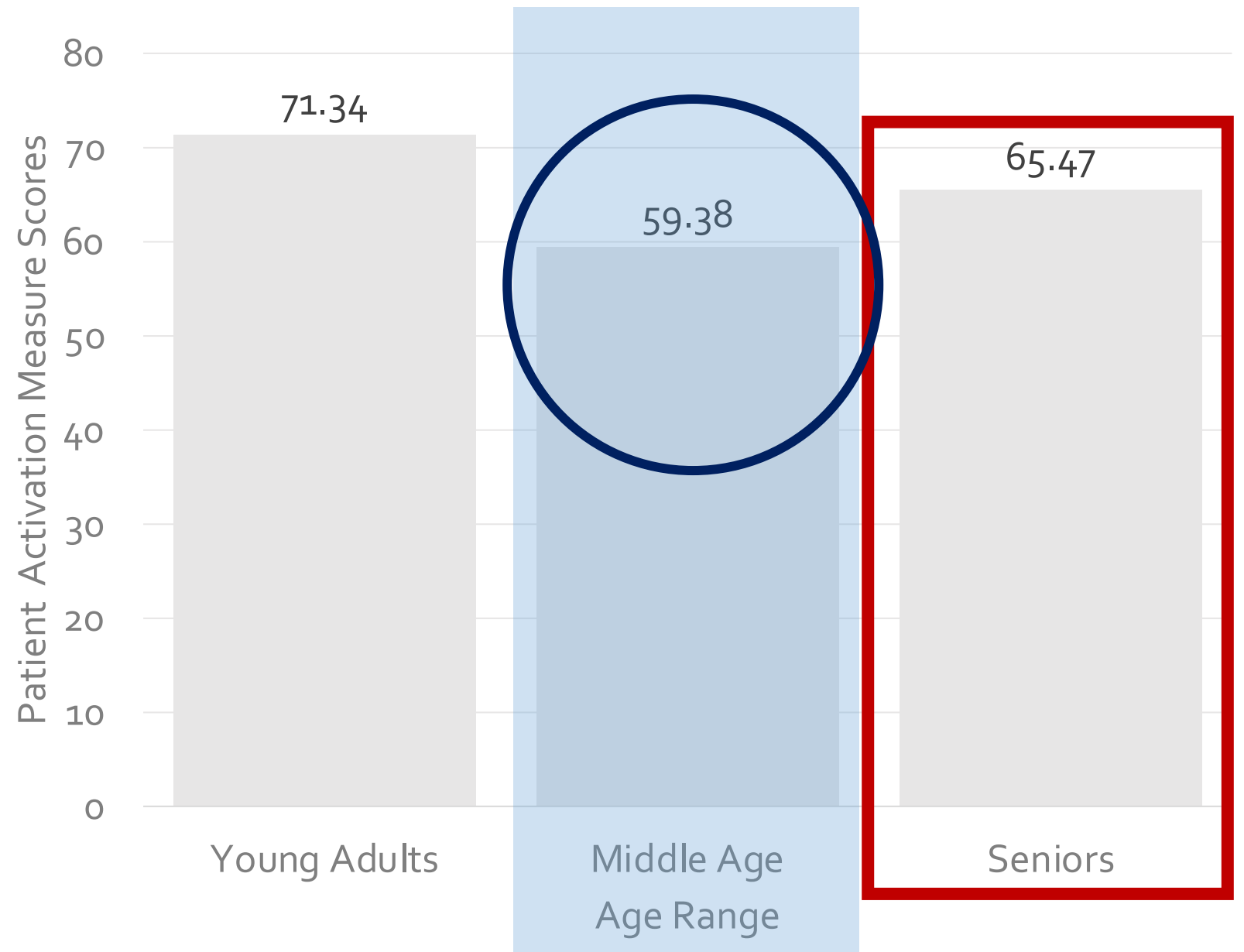
overuse of
bright & bold
colors



emphasize
important
data

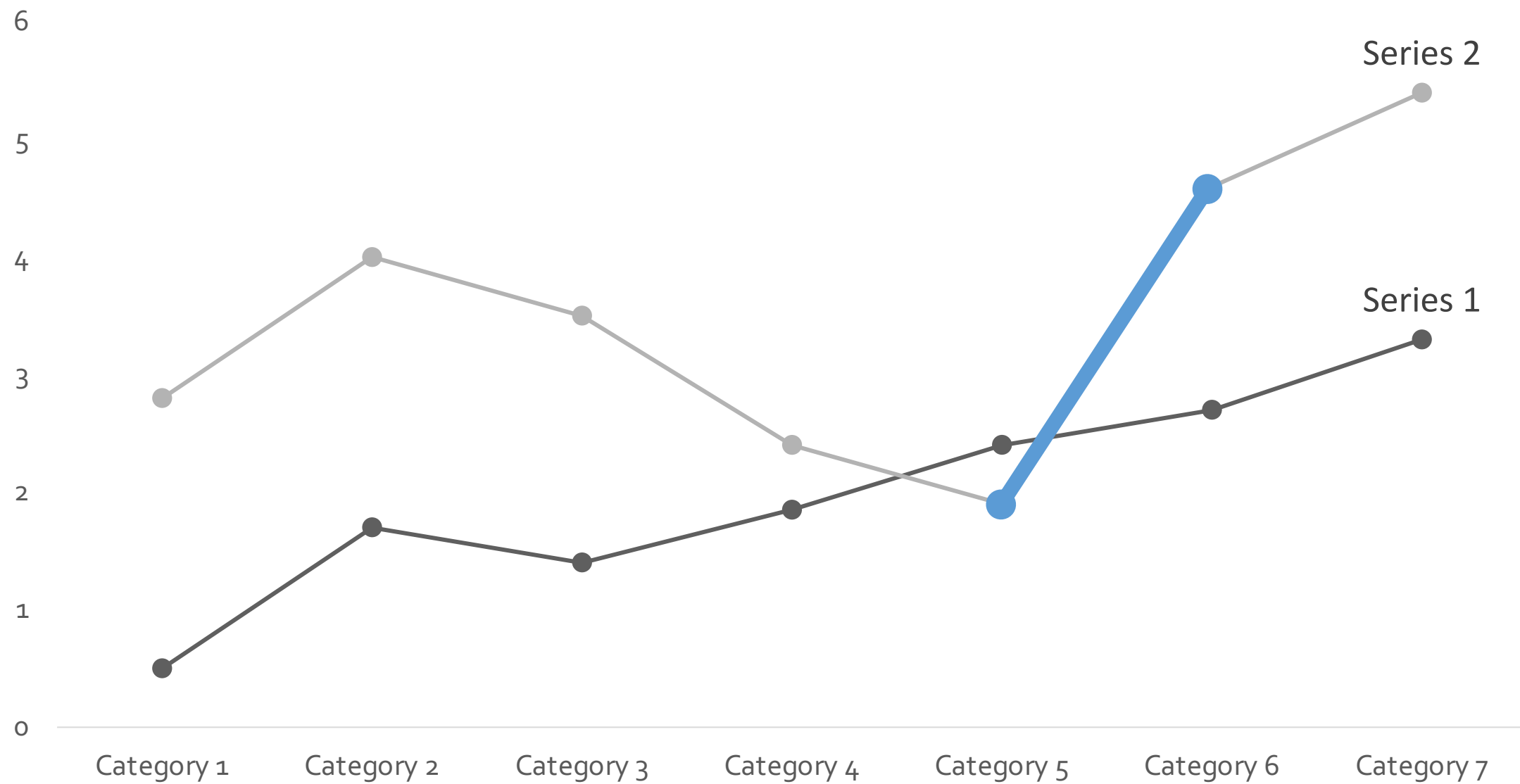


nothing



Form

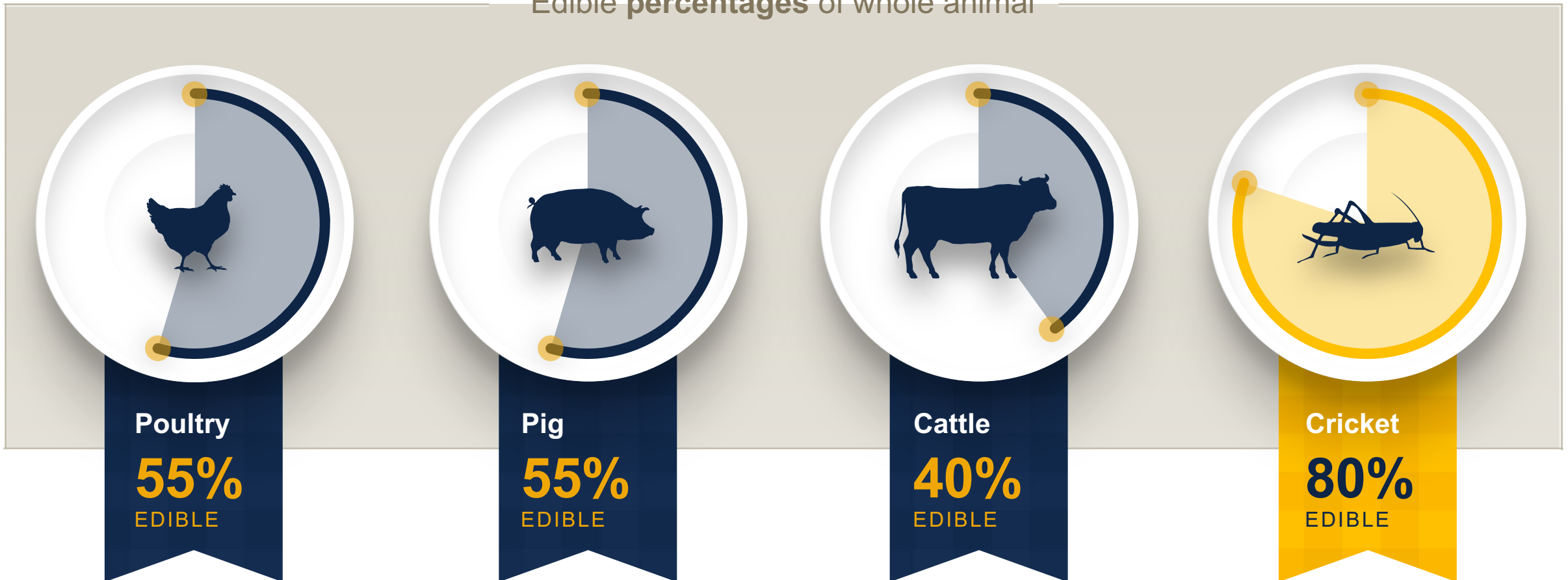




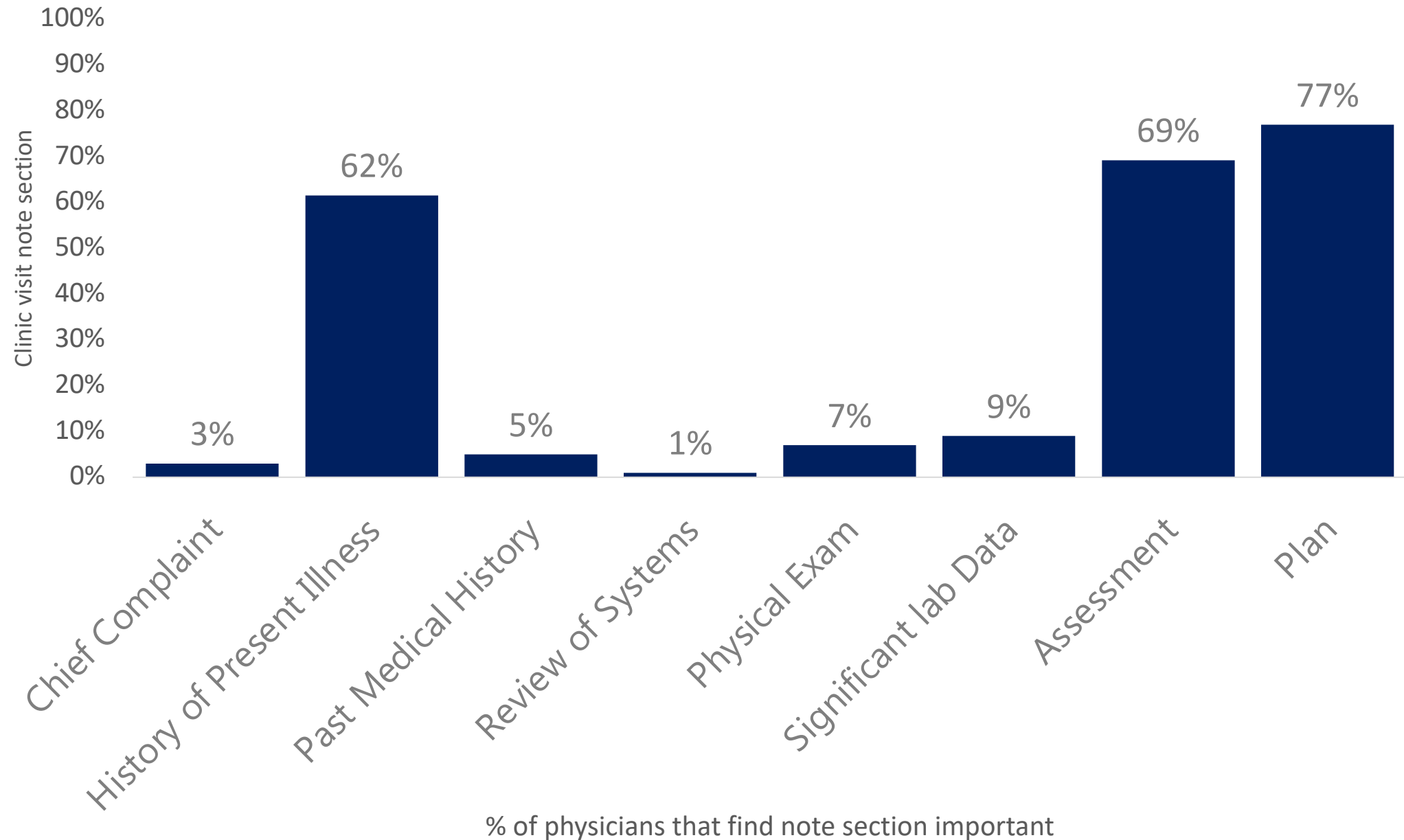
Protein Alternatives

Cricket Efficiency

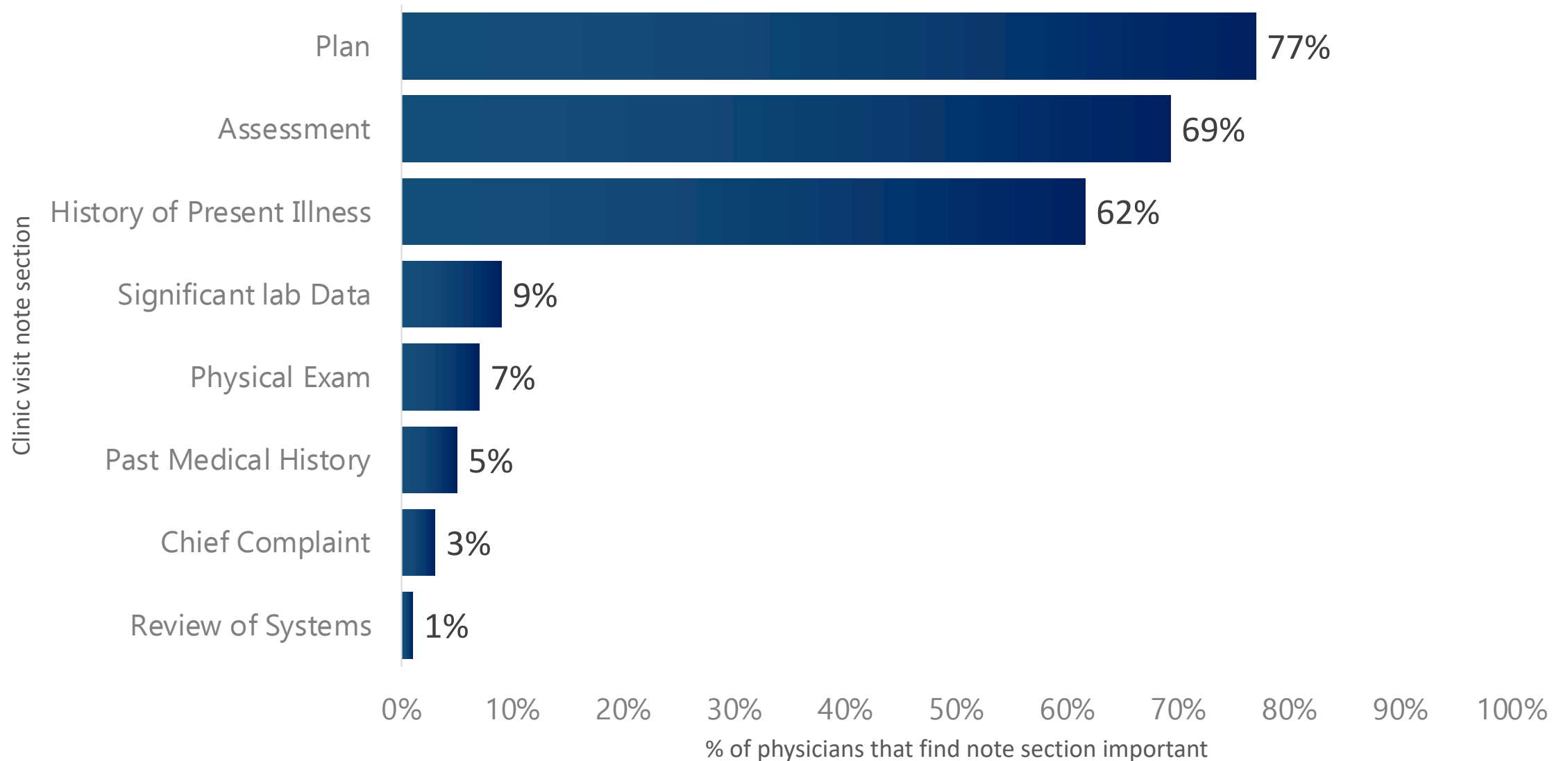
Edible **percentages** of whole animal



Orient your views for legibility.

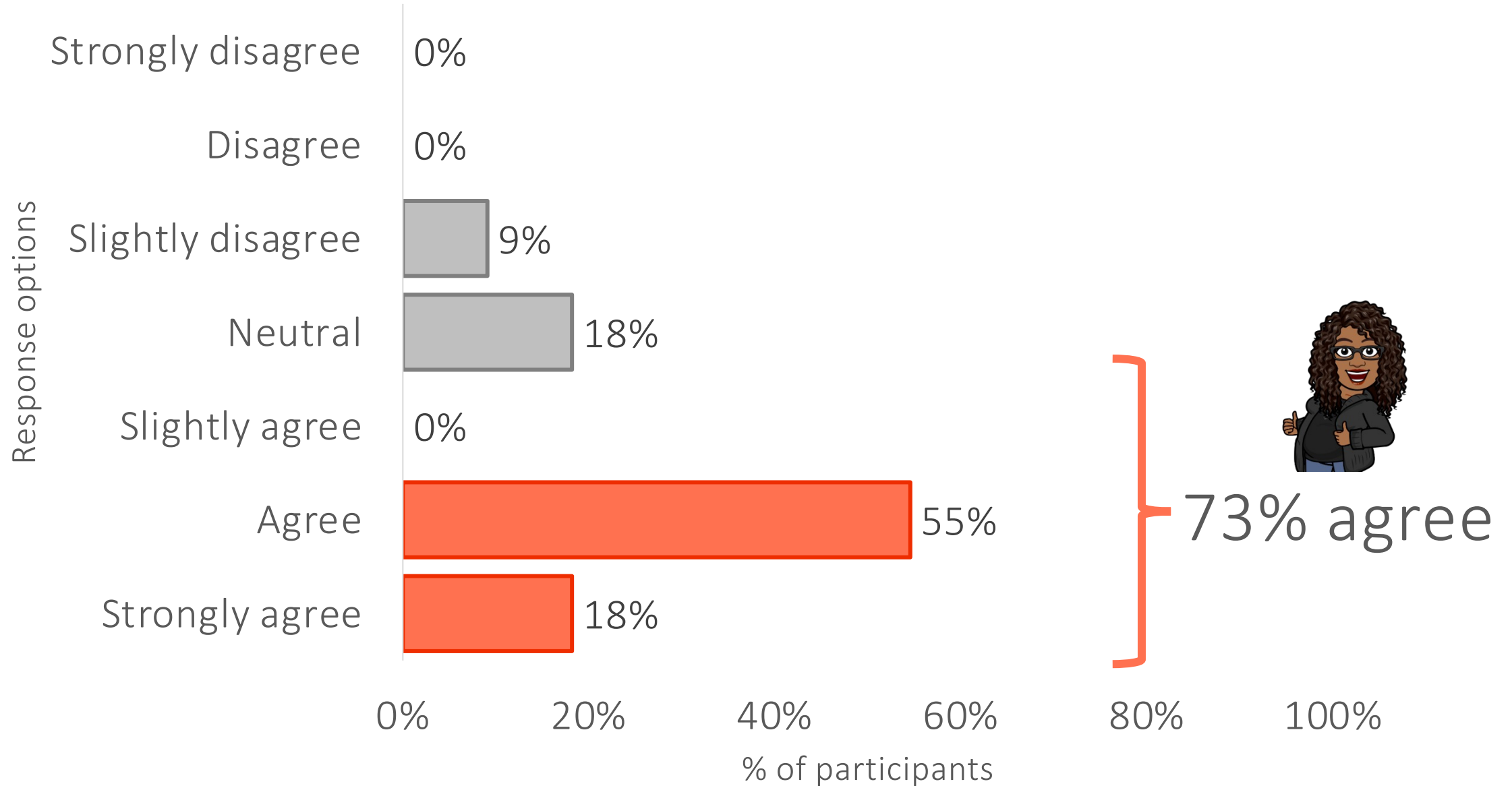


Orient your views for legibility.



TRUST

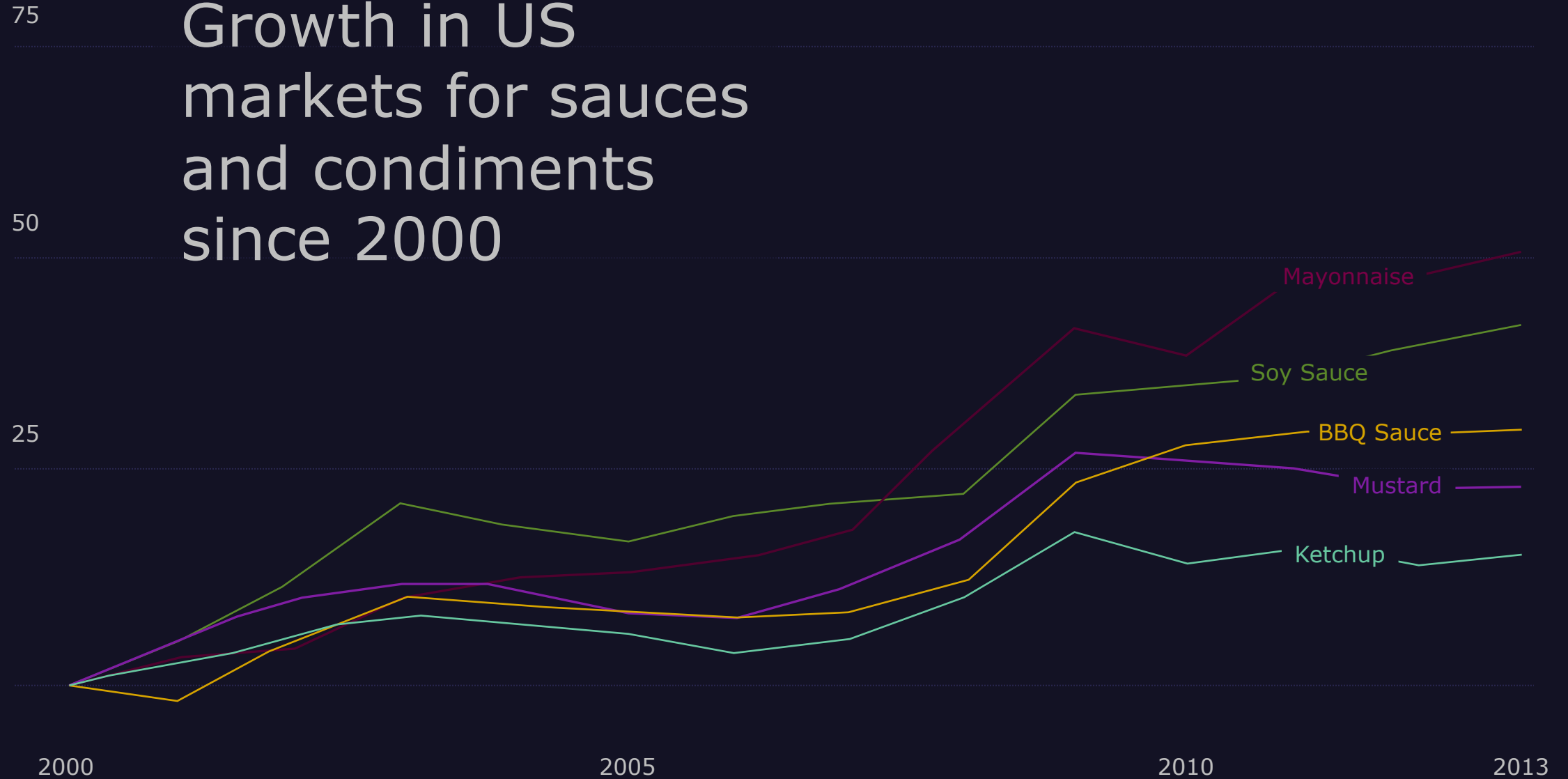
73% agree that the app is a reliable health information source



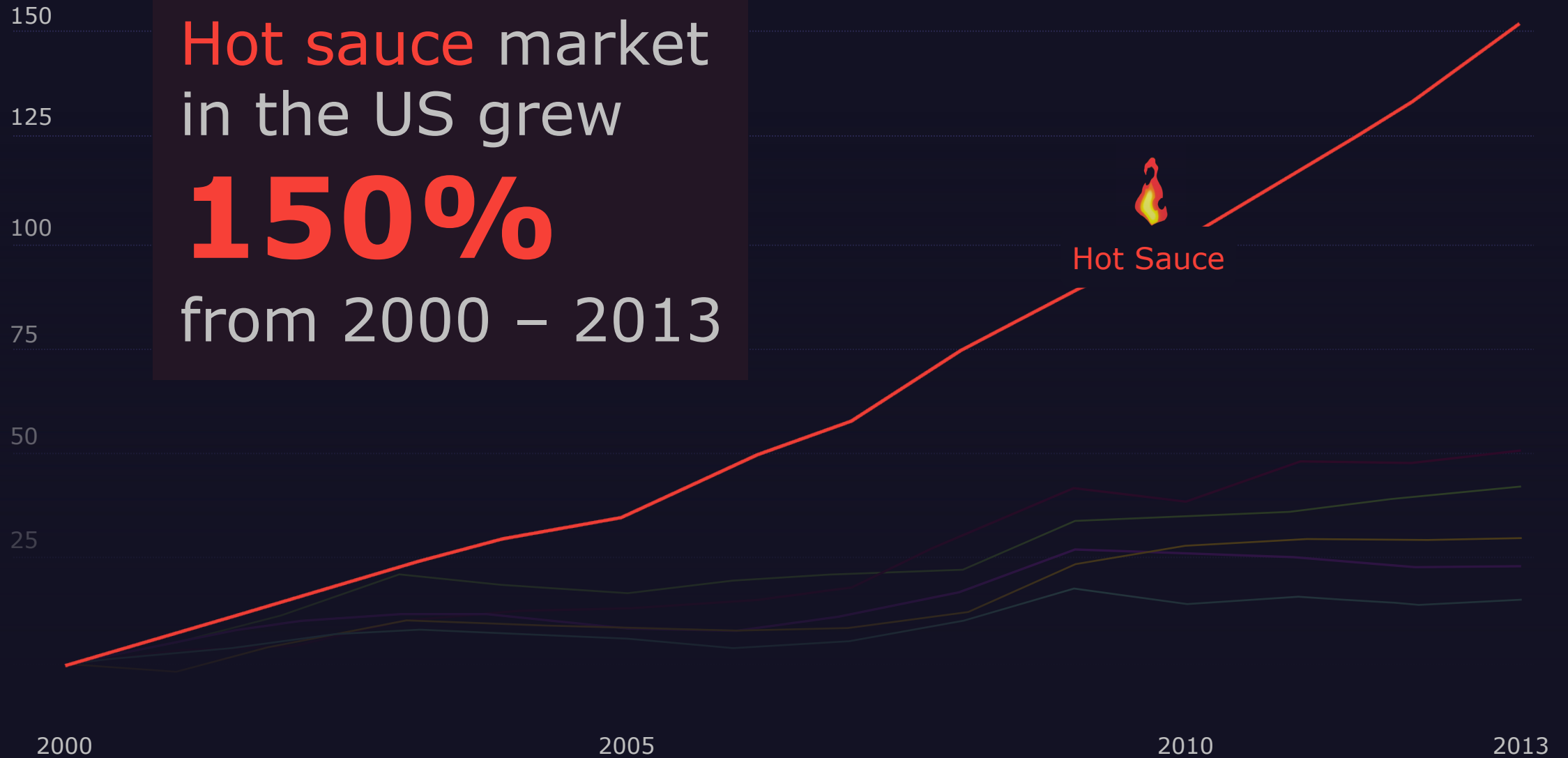
A black and white photograph capturing two horses in motion. The horses are running from left to right across a field, kicking up a large cloud of dust or dirt. The horse in the foreground is dark-colored with a white blaze on its face, while the horse behind it is lighter. The background is filled with silhouettes of trees and a bright, hazy sky. A black rectangular box with the word "Motion" in white text is overlaid on the left side of the image.

Motion

Growth in US markets for sauces and condiments since 2000



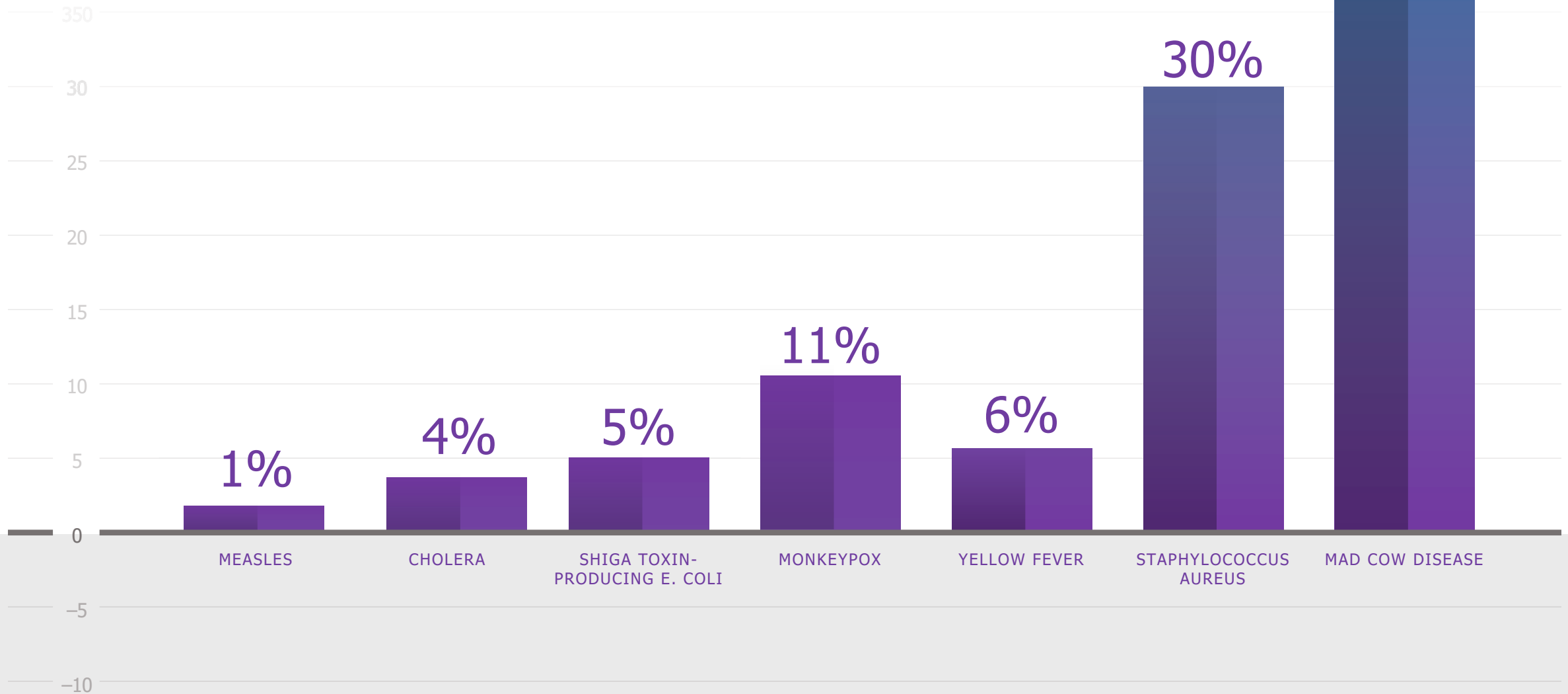
Hot sauce market
in the US grew
150%
from 2000 – 2013



Use motion to show the scale of data

2020 Deadly infectious diseases

Mortality rate



Deadly infectious diseases

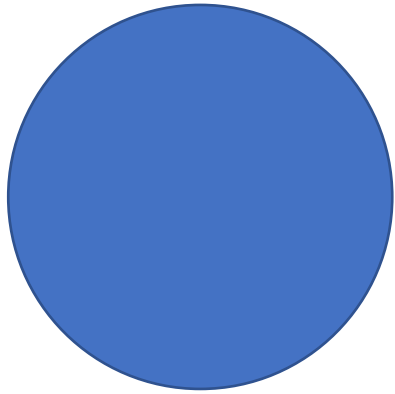
Mortality rate



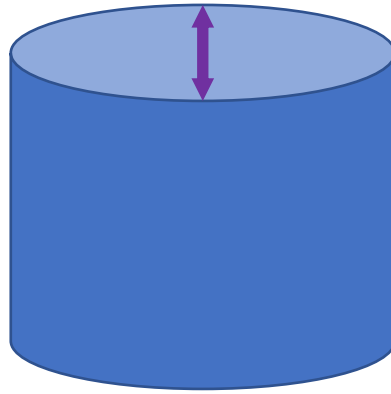
SPATIAL POSITIONING



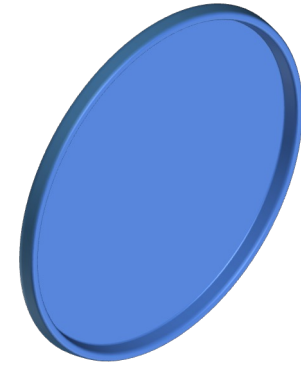
SPATIAL POSITIONING



2D

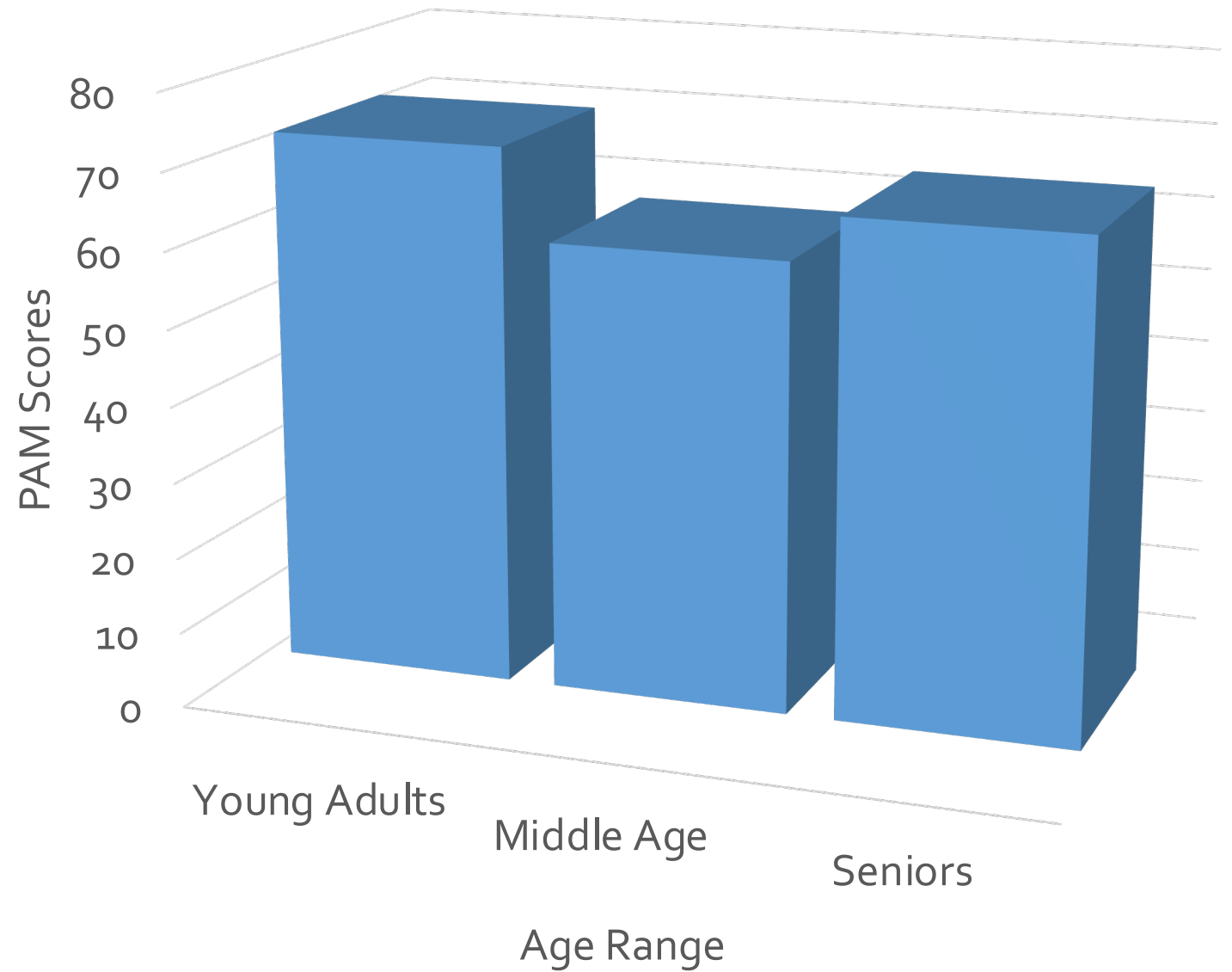


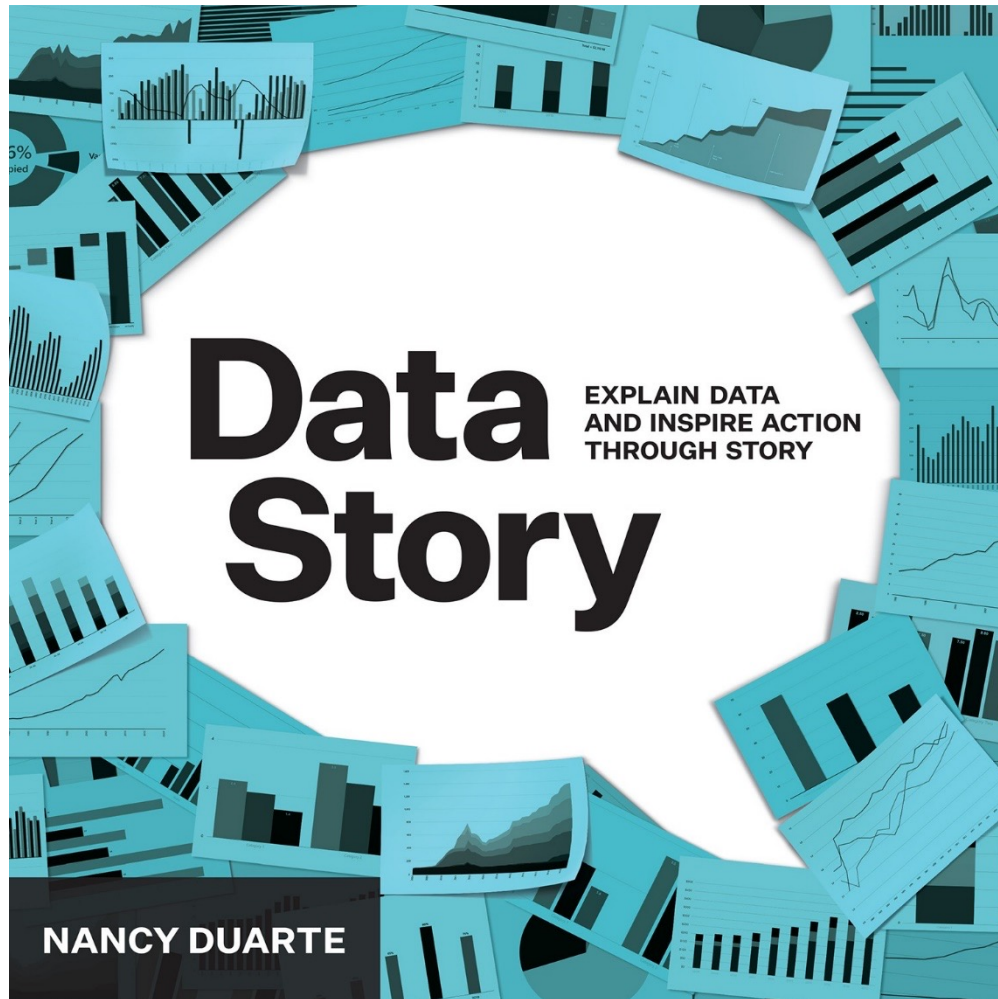
Depth



Concave &
convex

no 3D effects





Bar charts

Line graphs

Pie chart

Protein Alternatives

Cricket Efficiency

Edible **percentages** of whole animal



Poultry

55%

EDIBLE



Pig

55%

EDIBLE



Cattle

40%

EDIBLE



Cricket

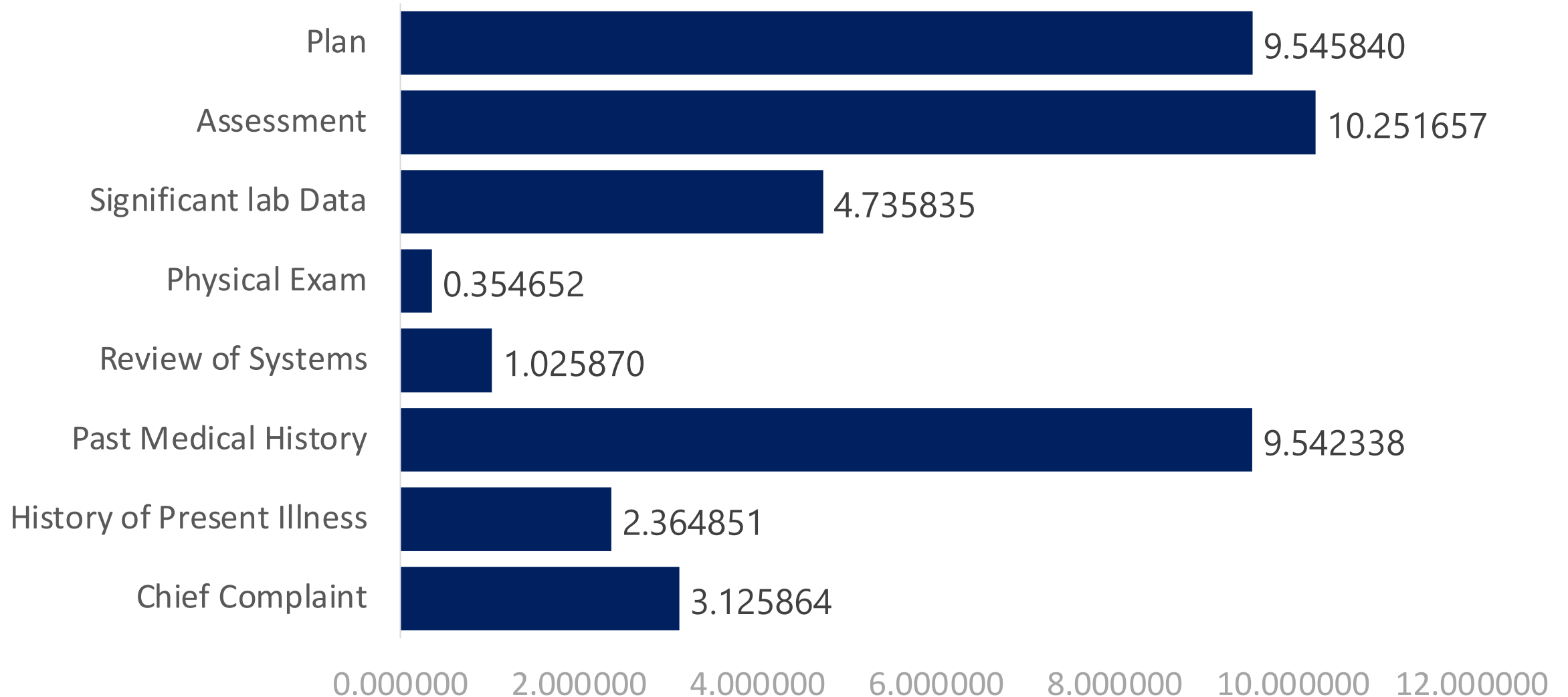
80%

EDIBLE

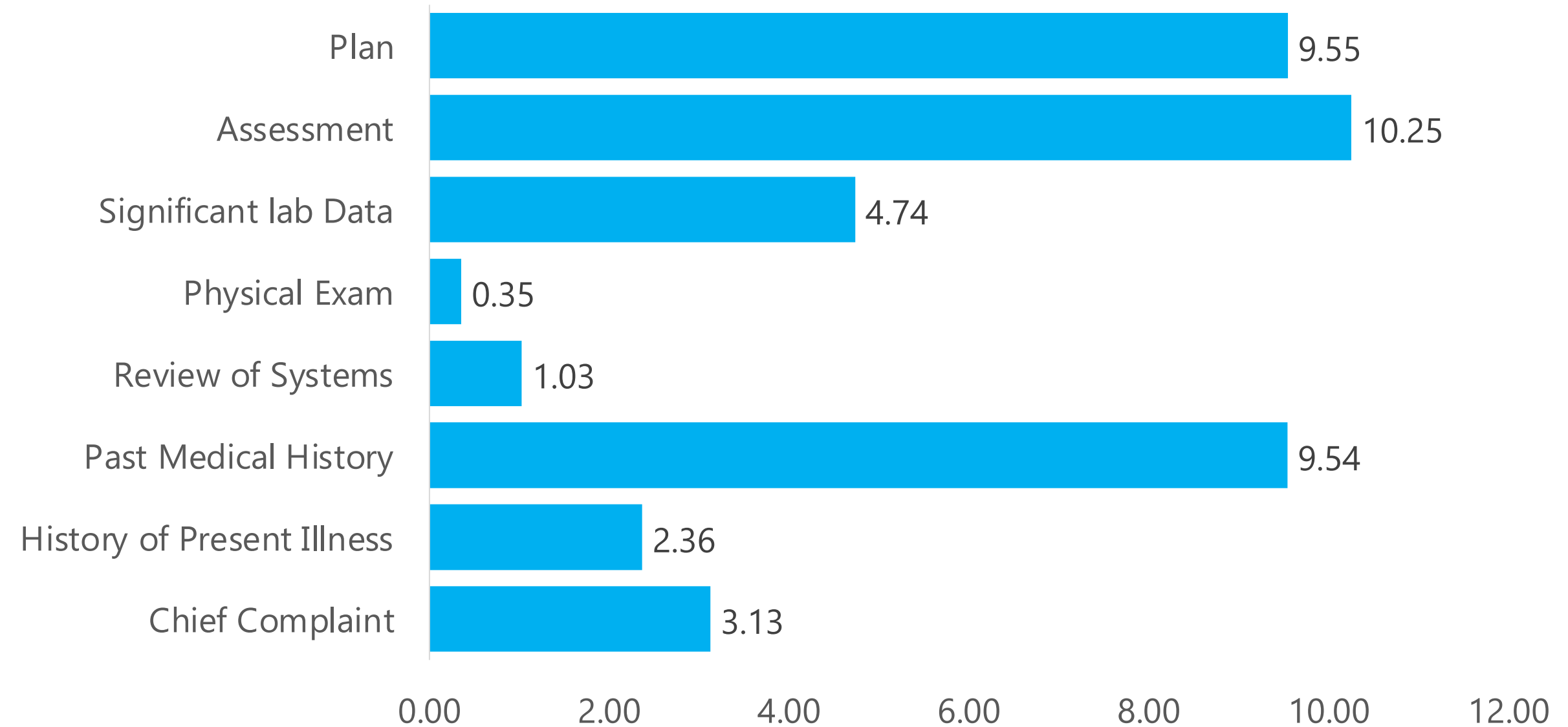
Mistakes to avoid



Displaying numbers in a hard to digest format



Displaying numbers in a hard to digest format



pay attention to axis labels

40%

35%

30%

25%

20%

15%

10%

5%

0%

Strongly agree

Agree

Slightly agree

Neutral

Slightly
disagree

Disagree

Strongly
disagree

■ New Invoice Management

■ Old AoW

8%

10%

33%

38%

25%

23%

20%

11%

2%

7%

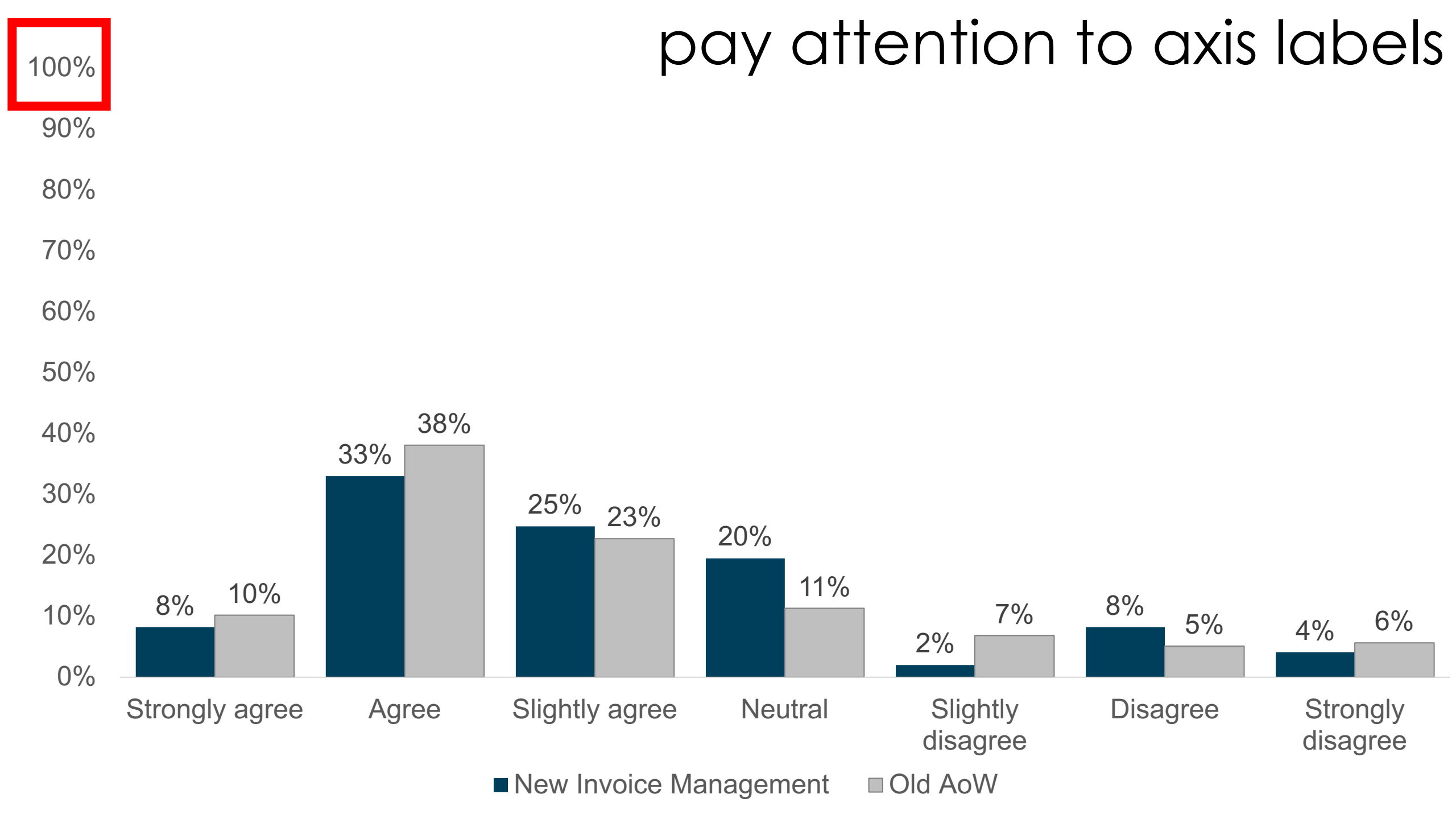
8%

5%

4%

6%

pay attention to axis labels

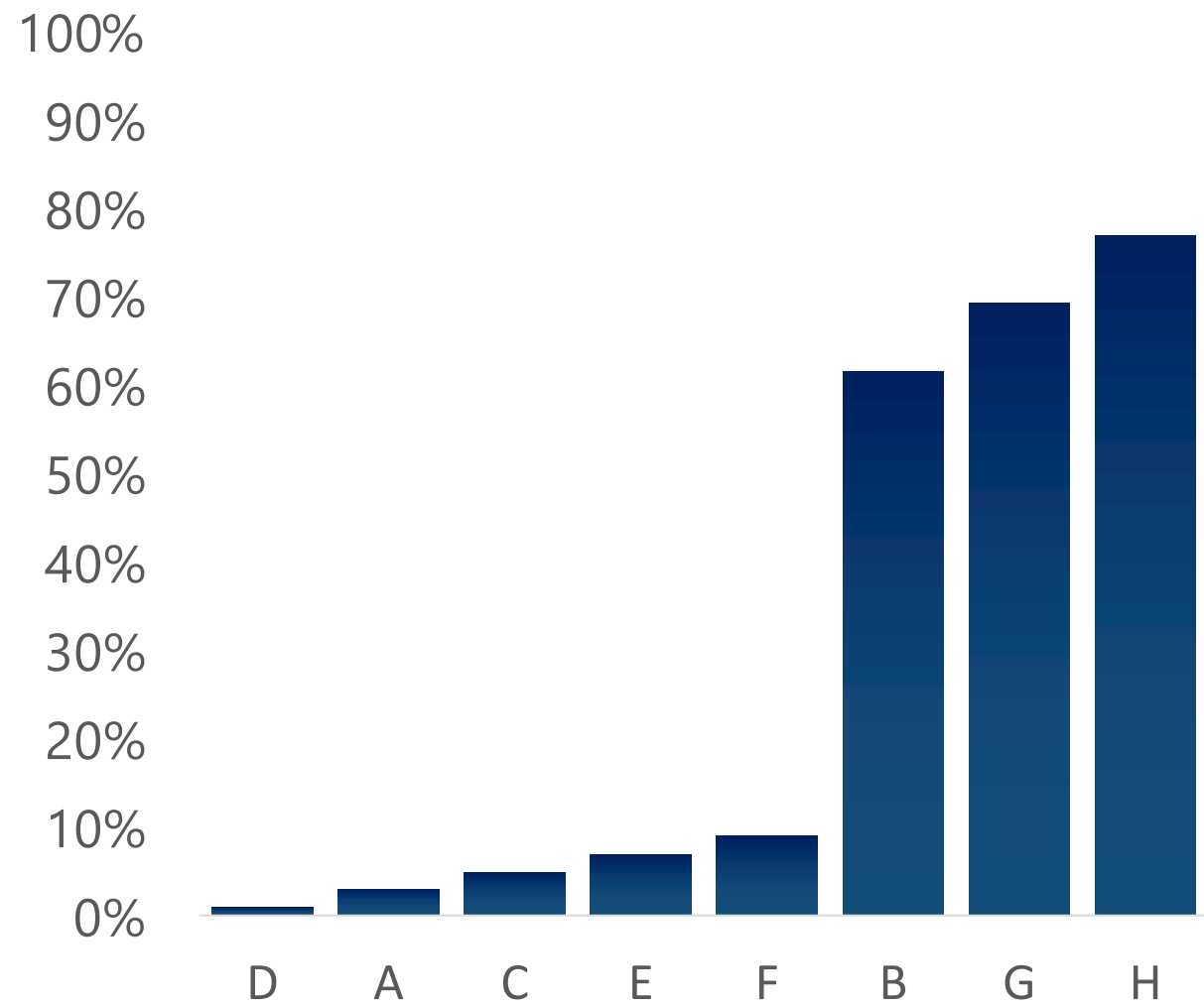
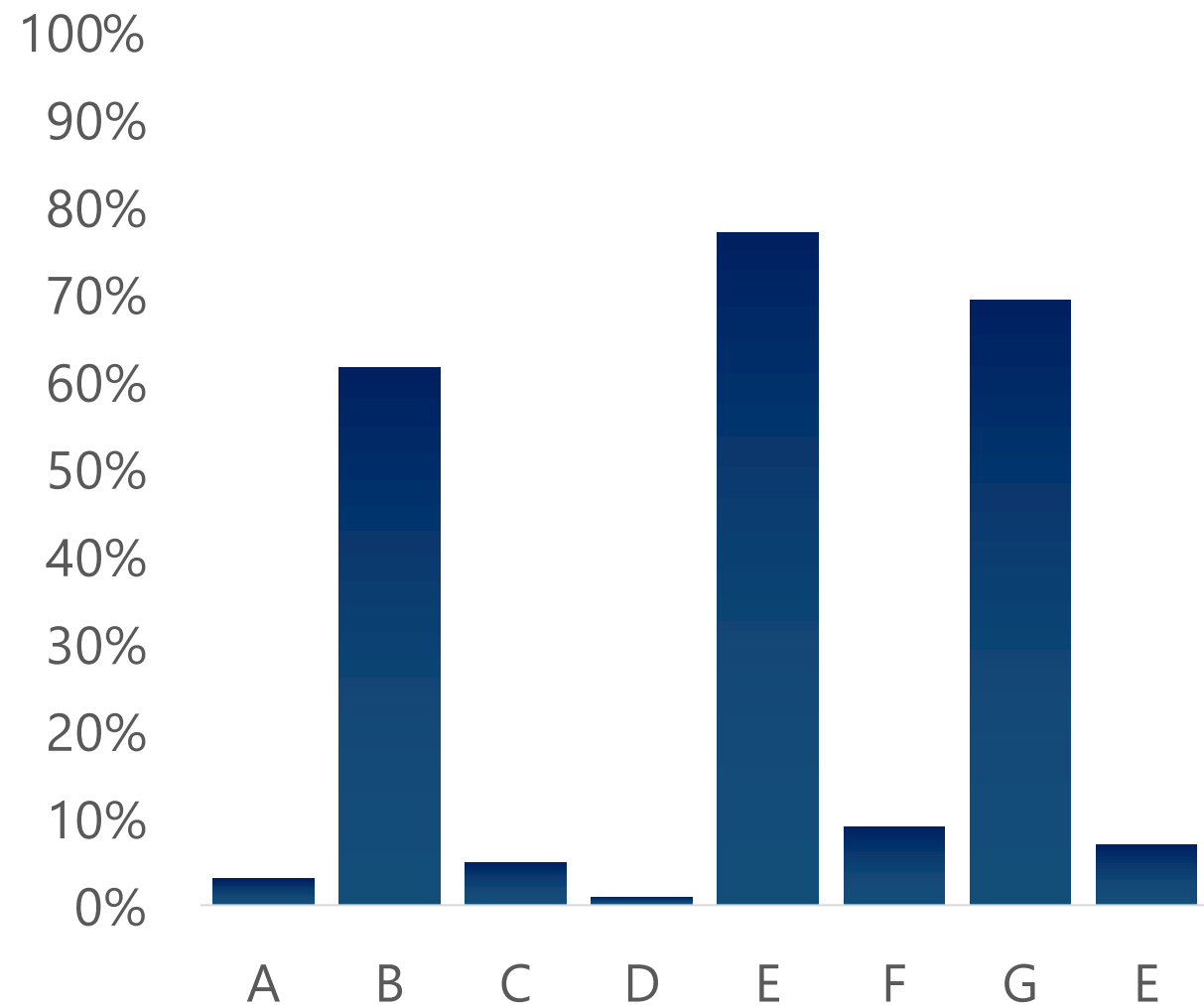


6.2 million

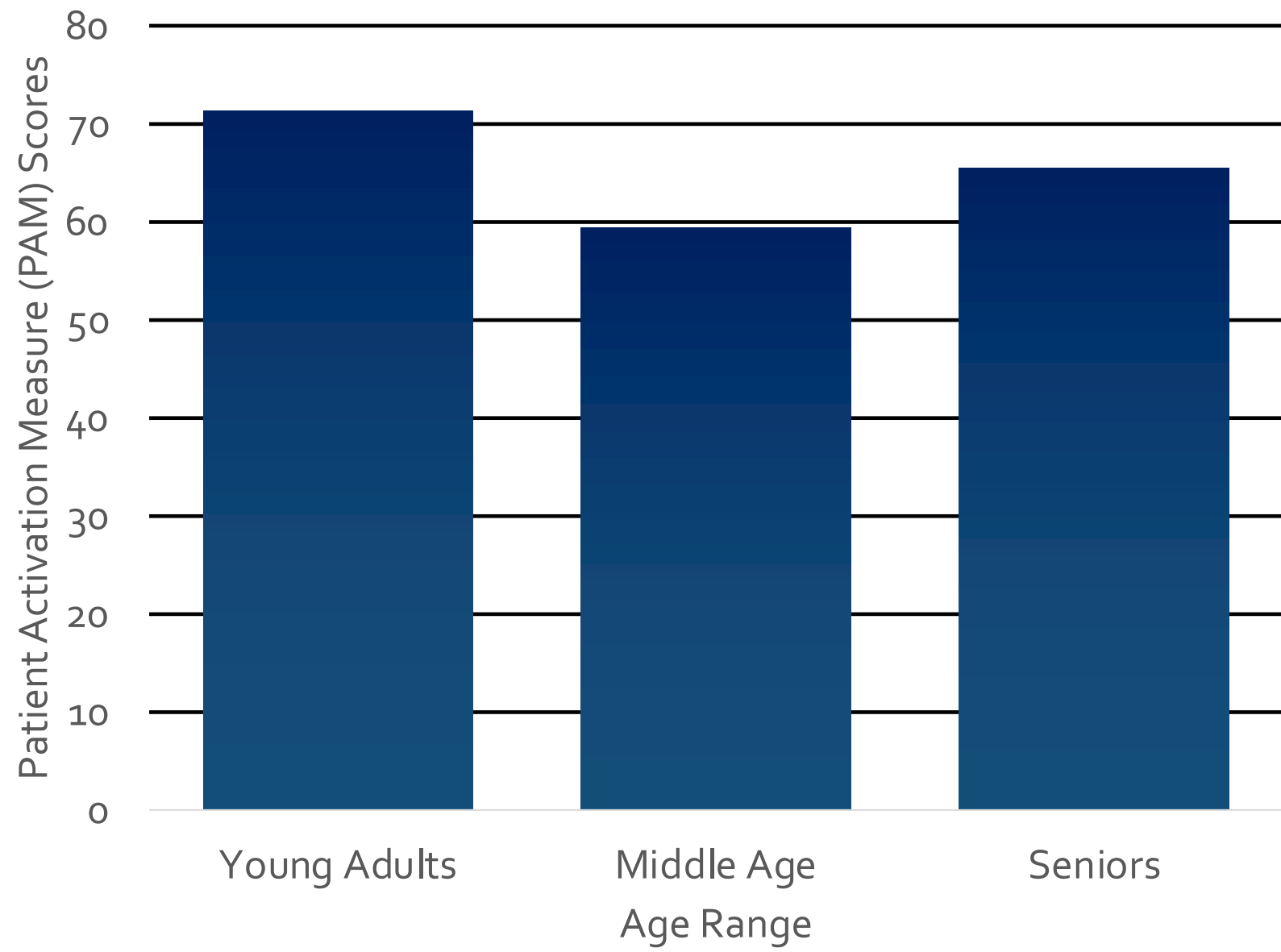
vs.

6,200,000

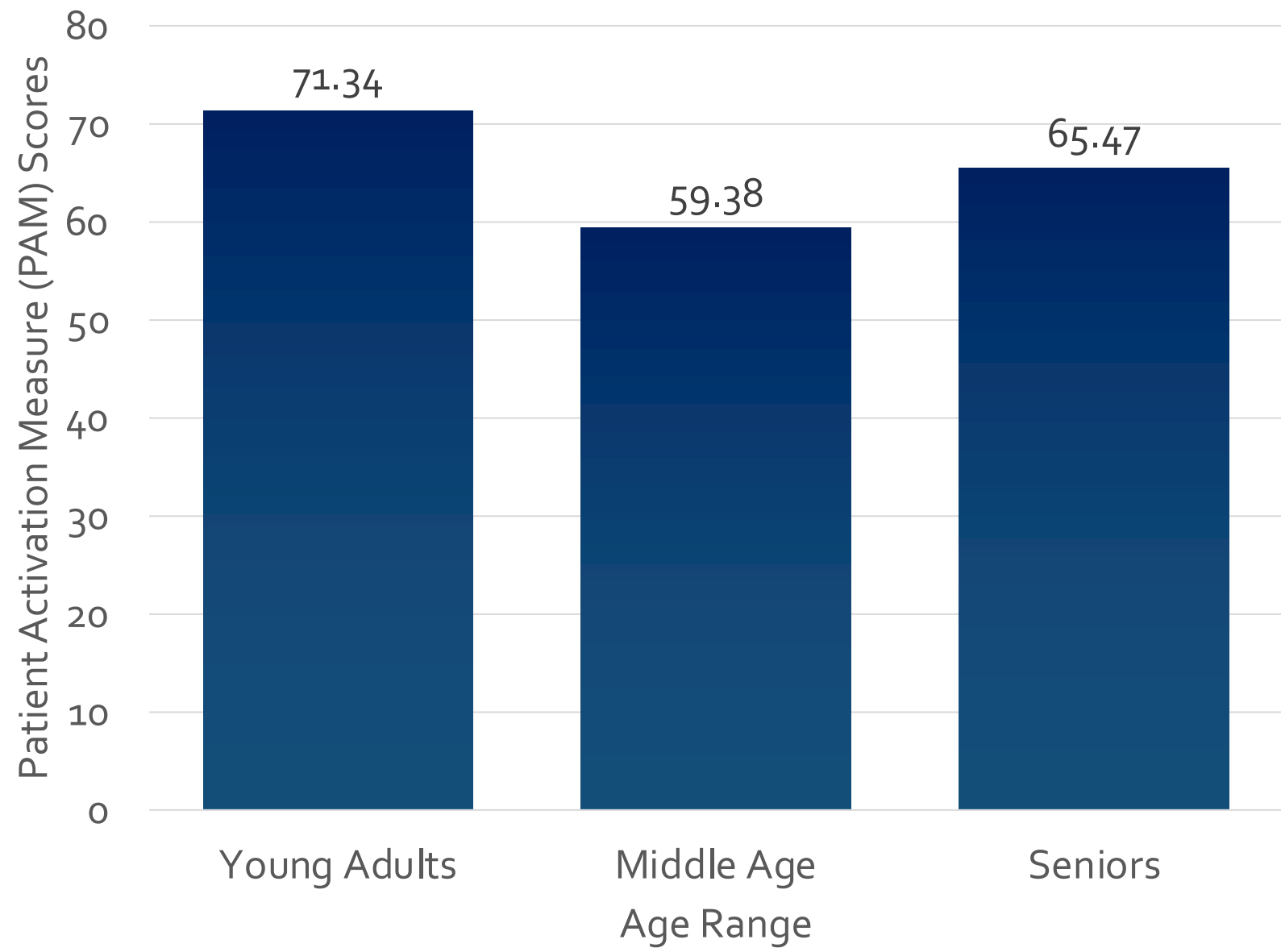
Ignoring how data is sorted



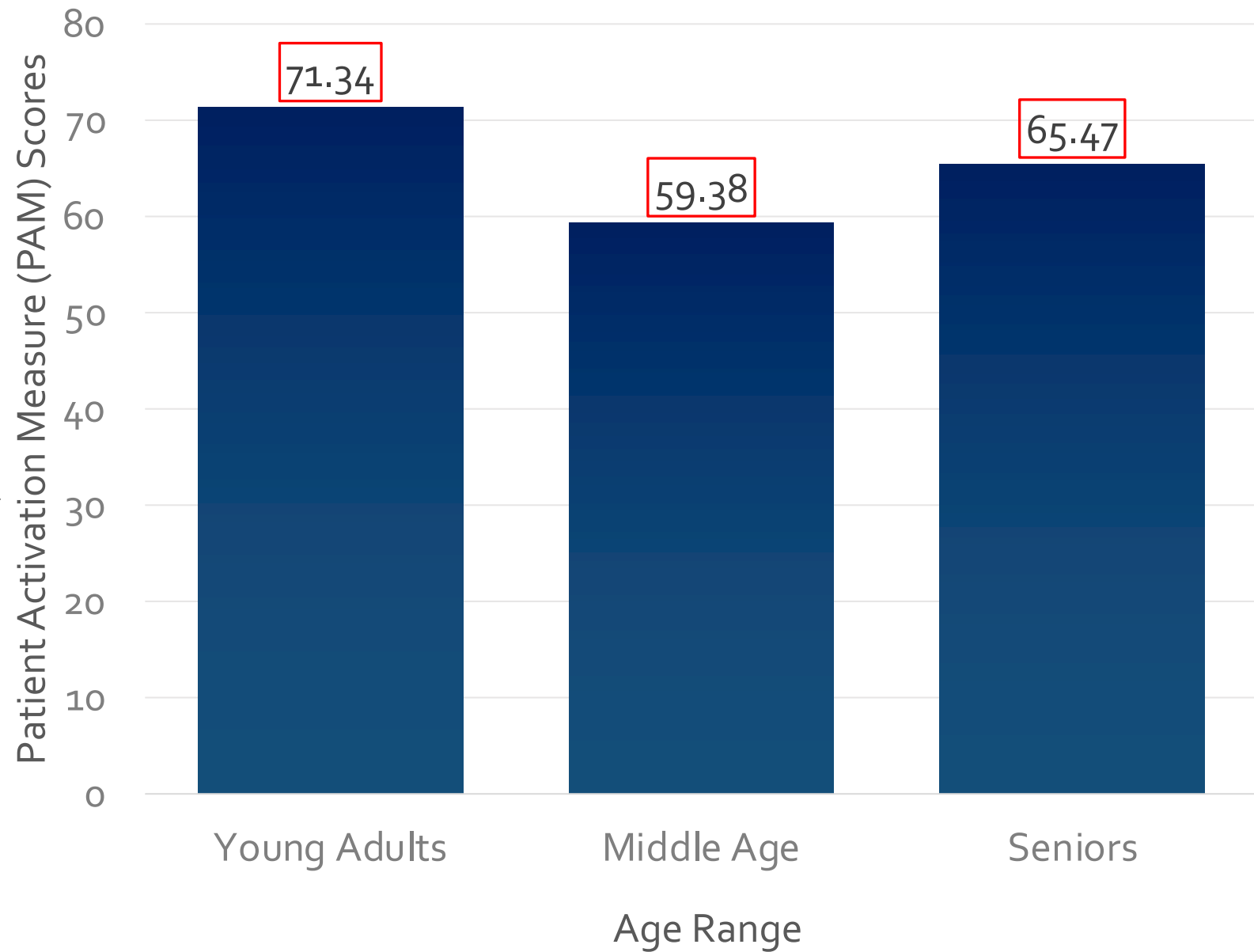
dark grid lines



dark grid lines

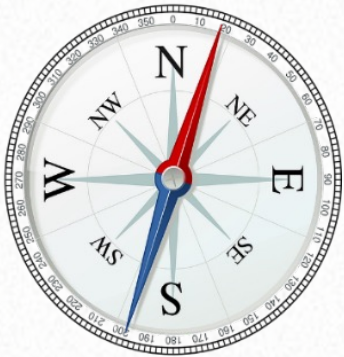


some redundancy
is necessary clutter



Resources

Exploration tools



- Tableau <https://www.tableau.com/>
- Article: Overview of the Best Data Visualization Tools <https://www.toptal.com/designers/data-visualization/data-visualization-tools>

Small dataset tools



- Interactive Dotplot <http://statistika.mfub.bg.ac.rs/interactive-dotplot/>
- Interactive Repeated Experiments Dotplot <http://statistika.mfub.bg.ac.rs/interactive-repeated-experiments-dotplot/>

Vector-based graphics



- Adobe Illustrator
- Inkscape <https://inkscape.org/>
- Diagrammer™ <https://diagrammer.duarte.com/>
- Duarte DataStory tools <https://www.duarte.com/datastory/>

Royalty free images



- Pexels: <https://www.pexels.com/>
- Pixabay: <https://pixabay.com/>
- Unsplash: <https://unsplash.com/>
- Canva: <https://www.canva.com/>

T.S.M.U.V.T.P.C.U.A.B.C.L.

Thou shan't make ugly visuals that people can't understand and because...cognitive load.

Remember:

Color

Form

Movement/Motion

Spatial Positioning

**S
E
L
F**



**F
I
V
E**



That's all Folks!



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