CHROMETAB

How to give a job talk

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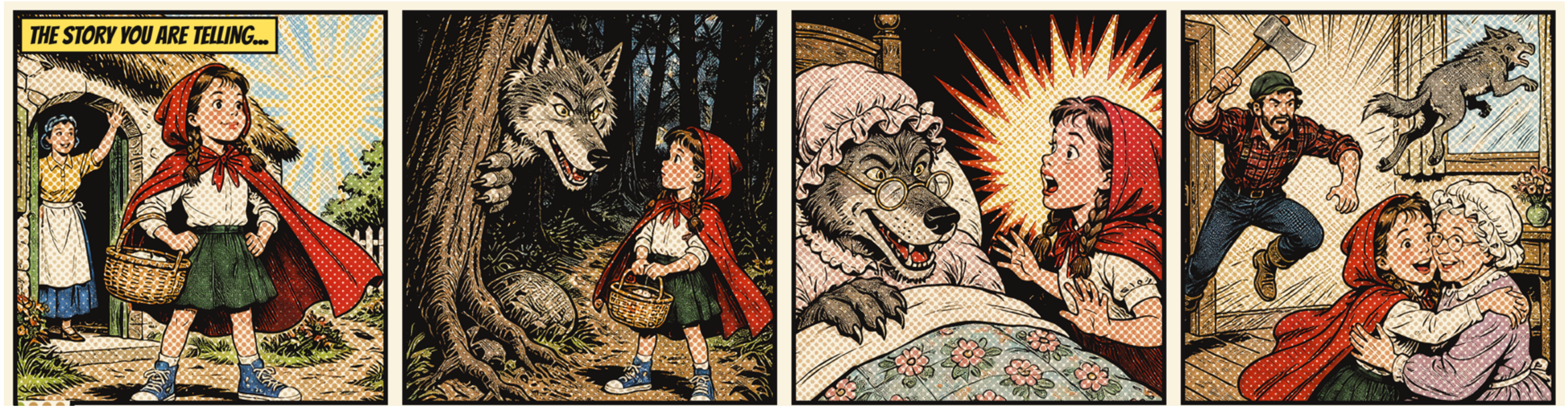


Roy Lichtenstein, Masterpiece, 1962

In 45 minutes, tell the audience why they should hire you

- Your postdoc question was **important**
- You answered it **rigorously**
- You will lead a lab that seeks to answer an even **BIGGER** question
- You can run a small company: raise money, recruit people, get them excited
- You can communicate: **most of the job is communication**
- **(Do you really want a faculty position?)**
  - ↓salary / ↑stress / anti-research climate / mentoring responsibilities…

Tell a story …



… and stick to that story



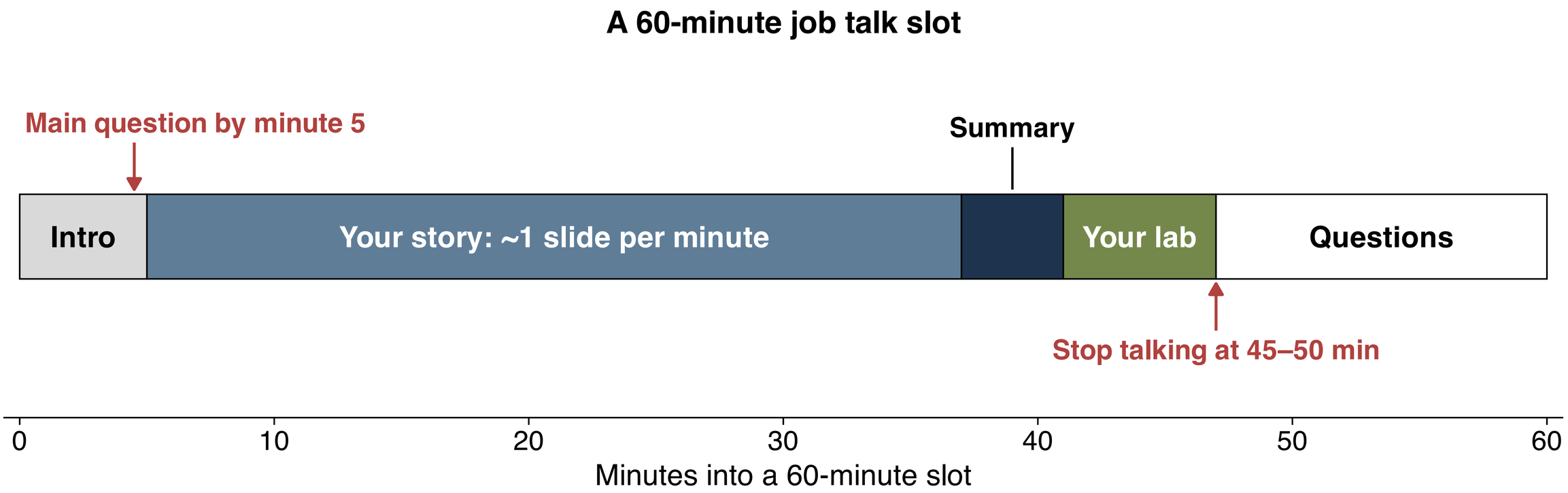
… and stick to that story




B


B

Get to your main question within the first five minutes



Get to your main question within the first five minutes



1 minute/slide ~40-50 slides. **NO MORE!!!**

DO NOT go over allotted time

Your audience knows much less about your work than you do

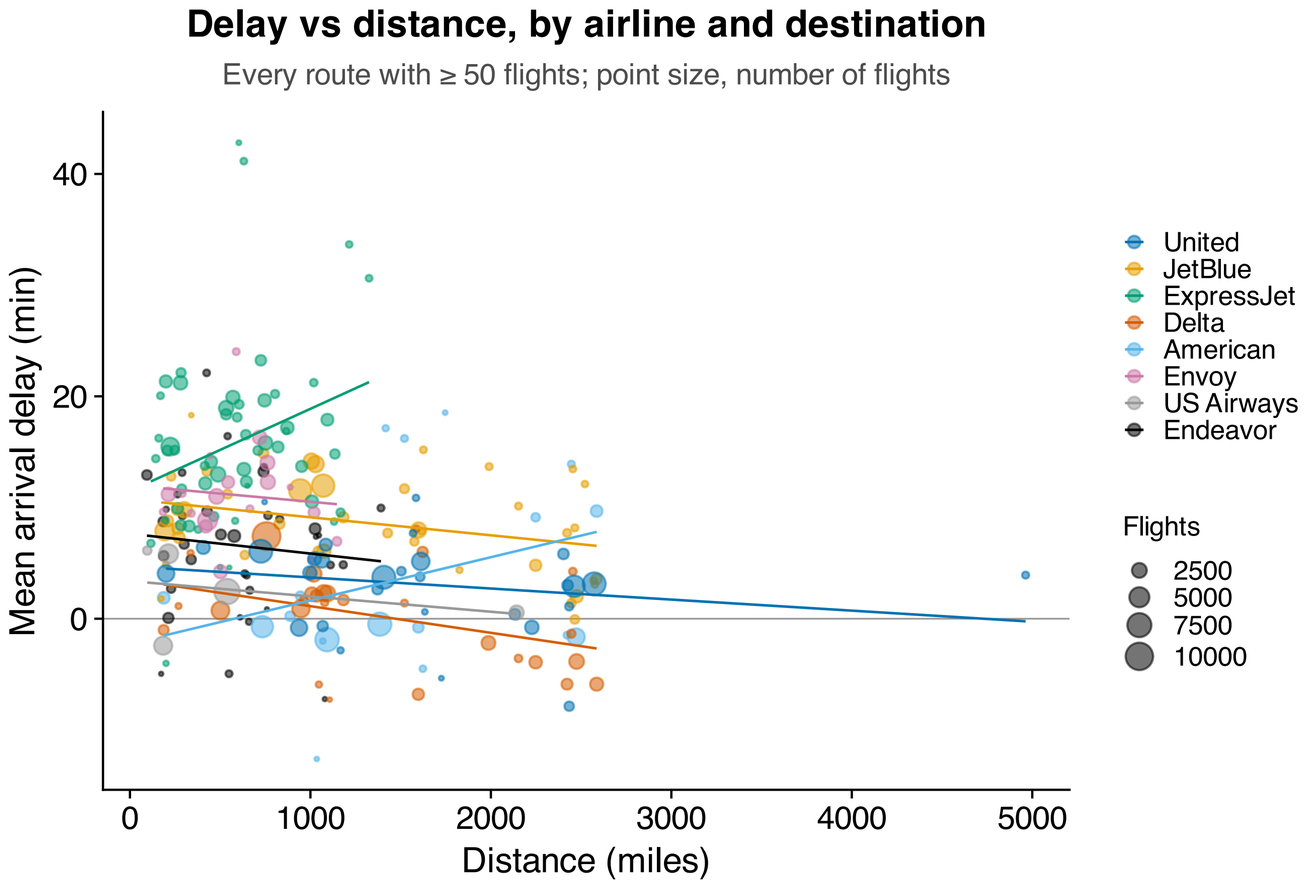
- >Half the room works outside your field
- **Don’t** say ‘you all know this…’ & **NEVER** apologize for something you could have corrected earlier (slides, plots, animations…)
- Define each term **once** and **drop** acronyms
- Walk them through every finding:
    - In order to determine whether X causes Y, we did A
    - We found that xyz
    - This result shows that X causes Y

Your slides are for the audience, not notes for you

- Put your script in the presenter notes, **not** on the slide
- Don’t give the audience any information they don’t **need** to follow the story
- Label **everything** they need, every axis, and nothing more
- If a line does not help them, delete it

Show the one plot that makes your point, not all the data

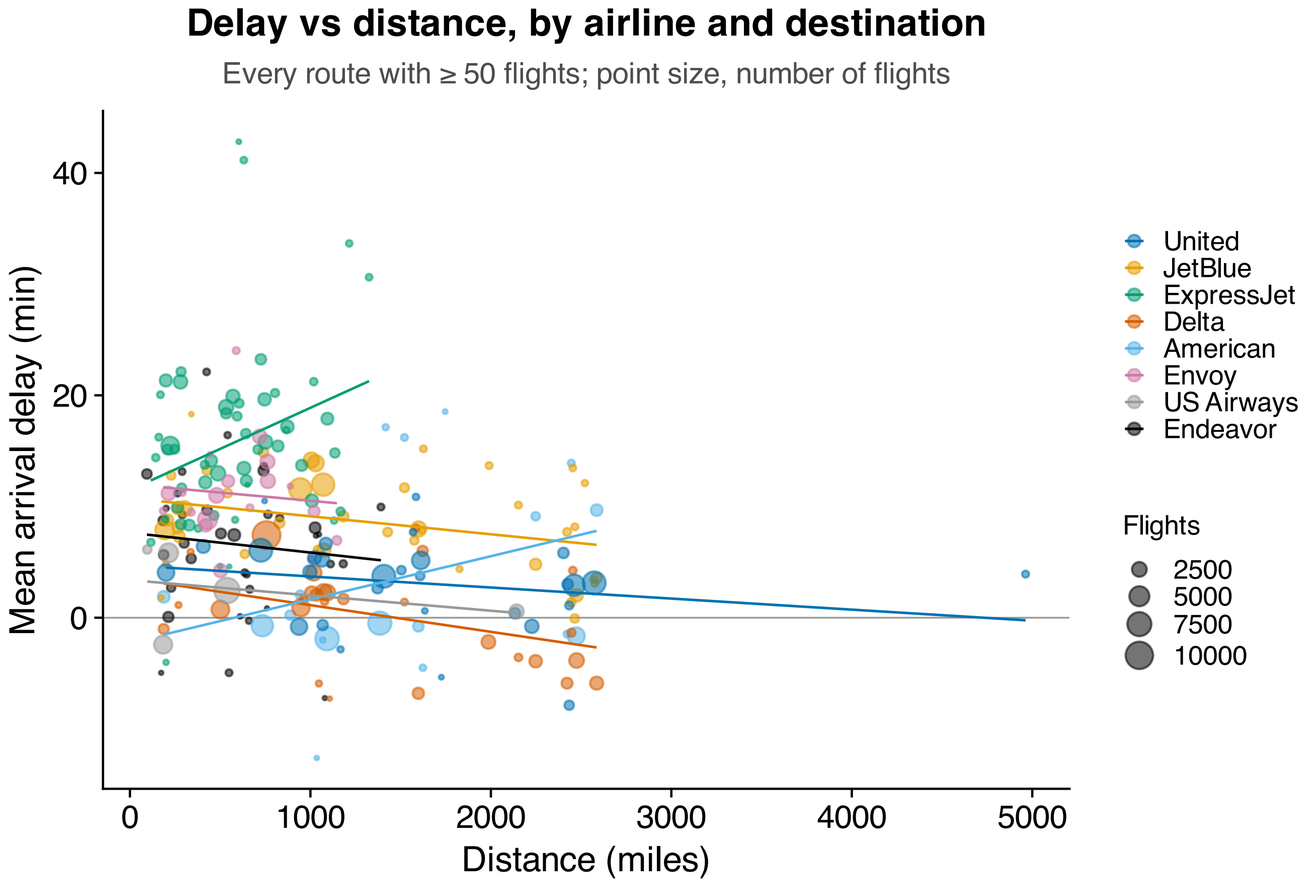
All the data: every airline, every route



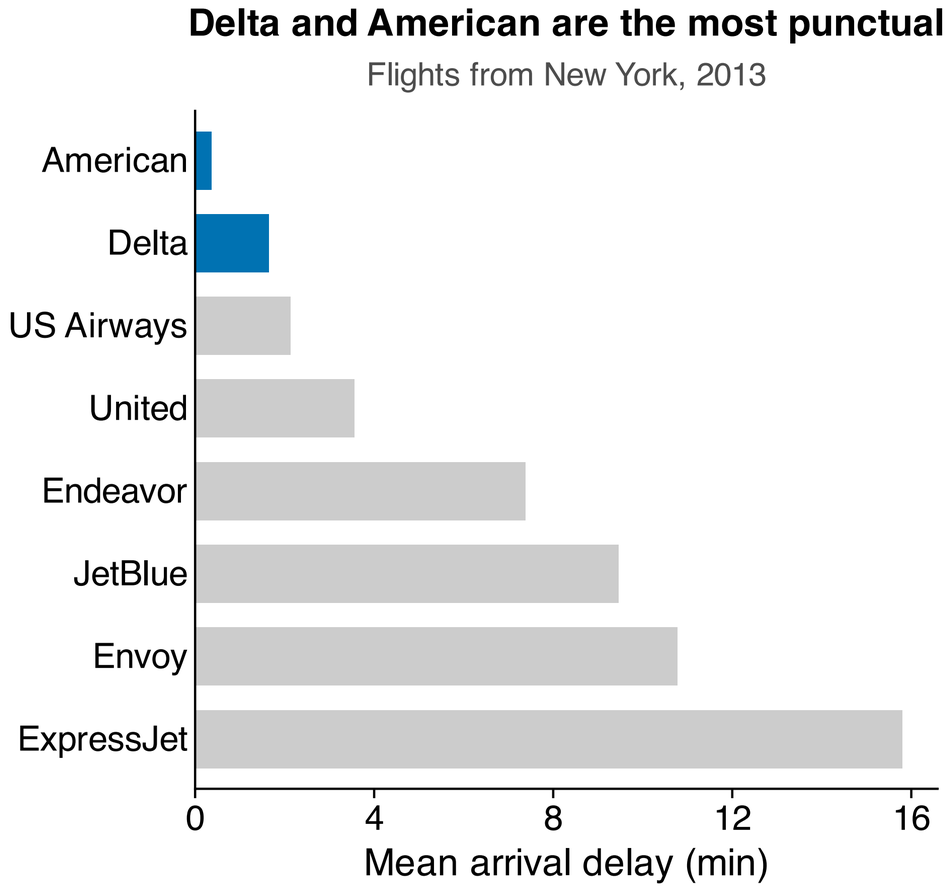
One plot, one point

Show the one plot that makes your point, not all the data

All the data: every airline, every route

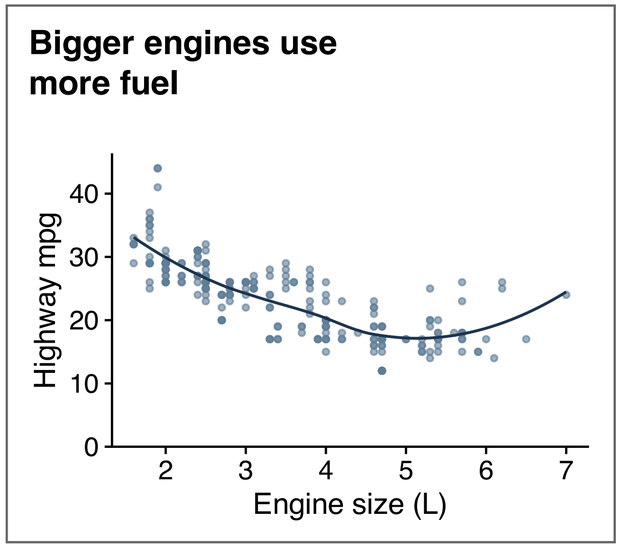


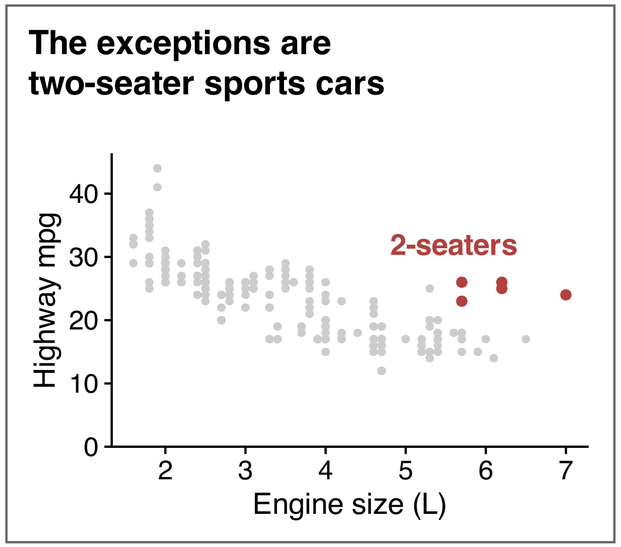
One plot, one point

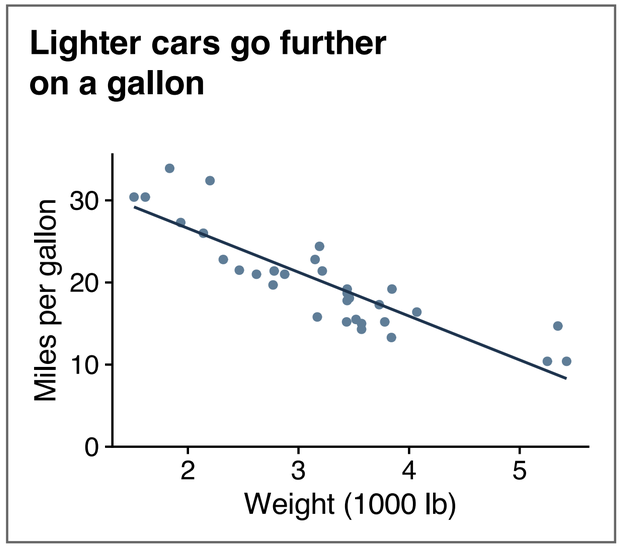


Tell a story in which each result raises the next question

Slide







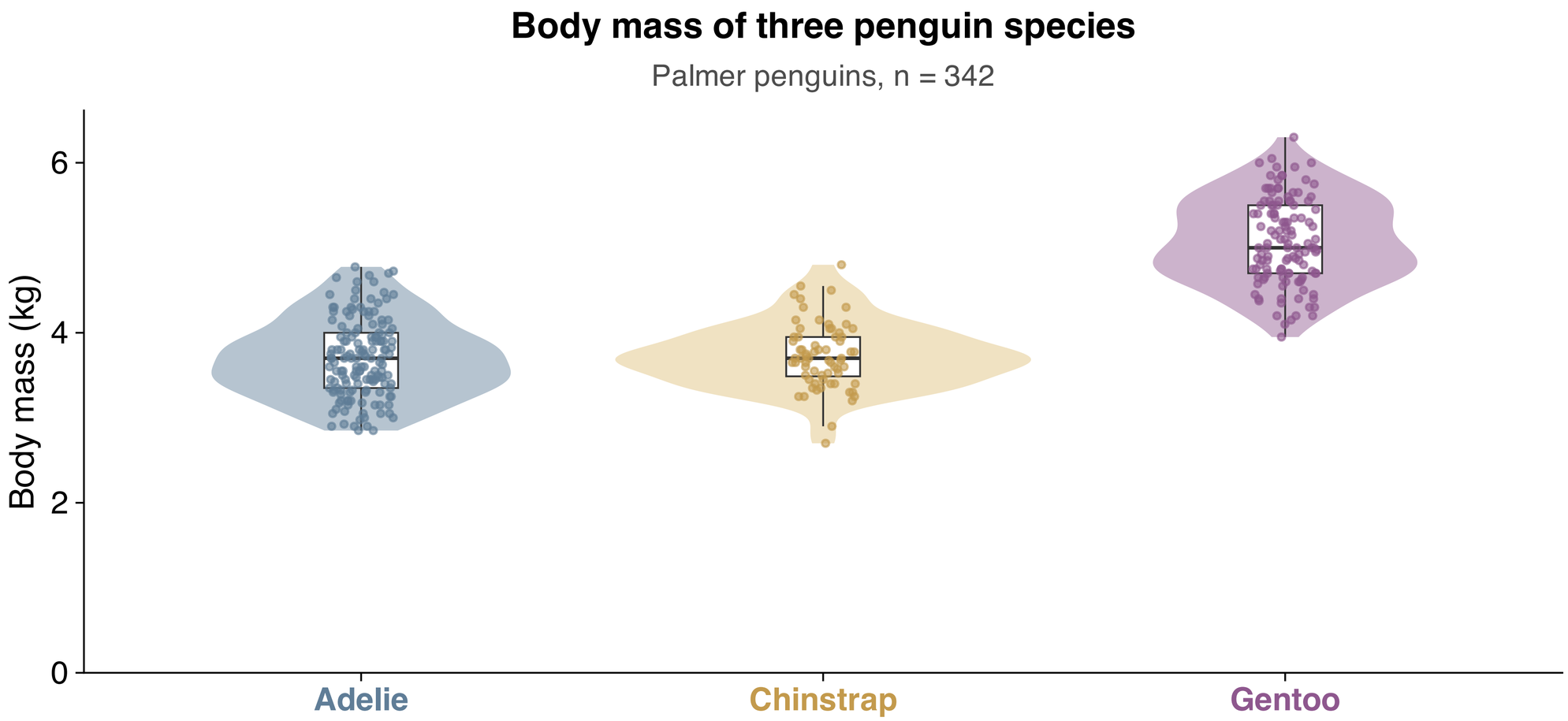
You say

"But a few big engines are efficient. Which cars are they?"

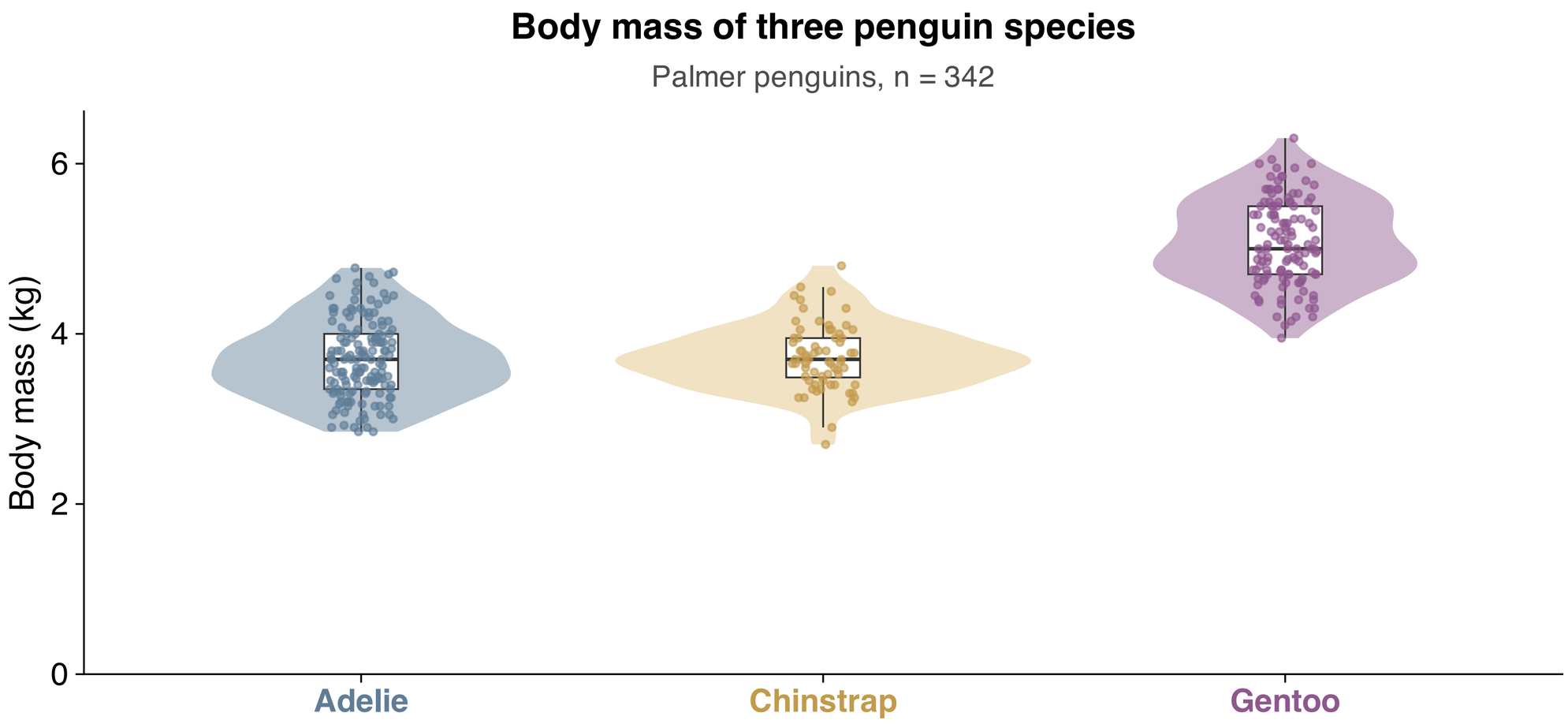
"Why would a sports car be efficient? Is it lighter?"

"So weight, not engine size alone, sets the mileage."

Penguins

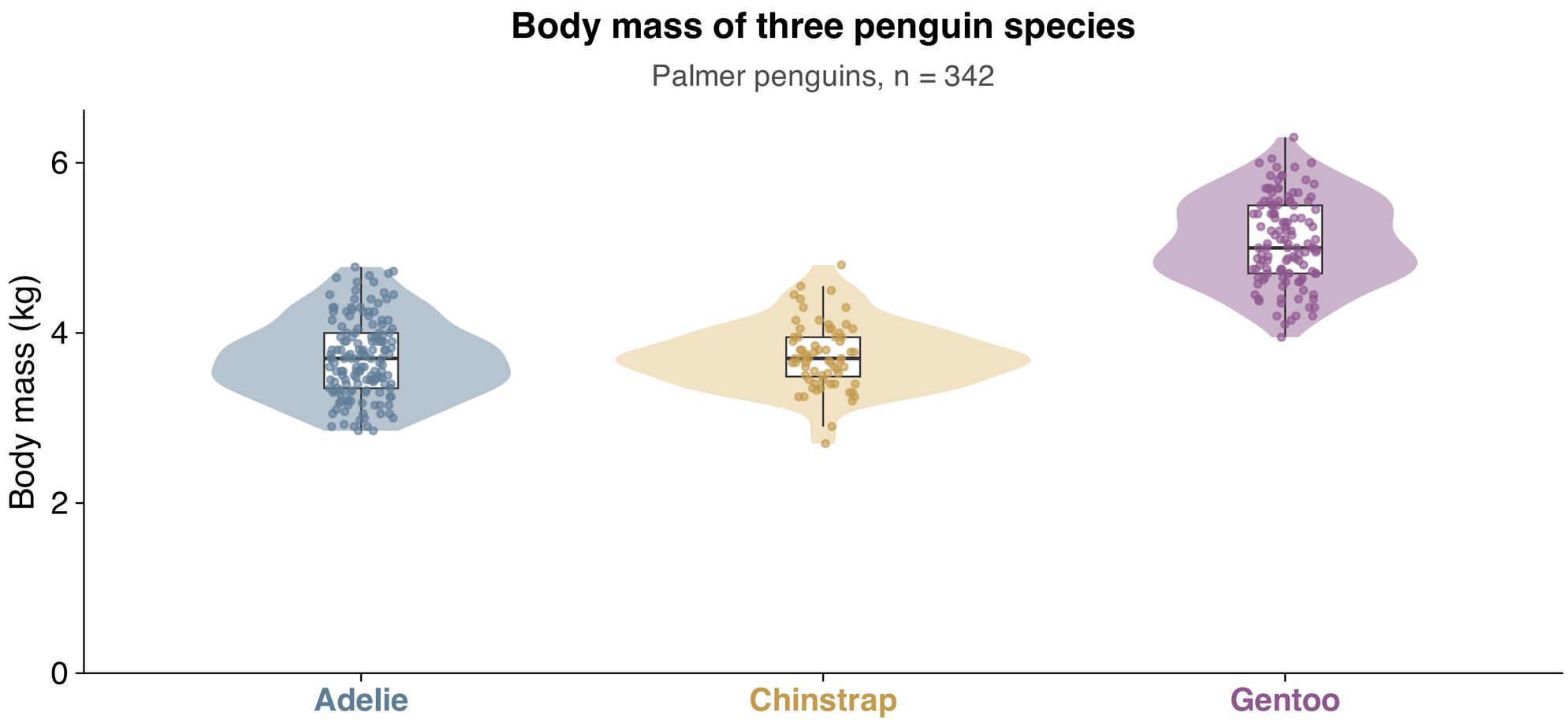

Body mass of three penguin species
Palmer penguins, n = 342
Body mass (kg)
6
4
2
0
Adelie
Chinstrap
Gentoo

Gentoo penguins are the heaviest of the three species

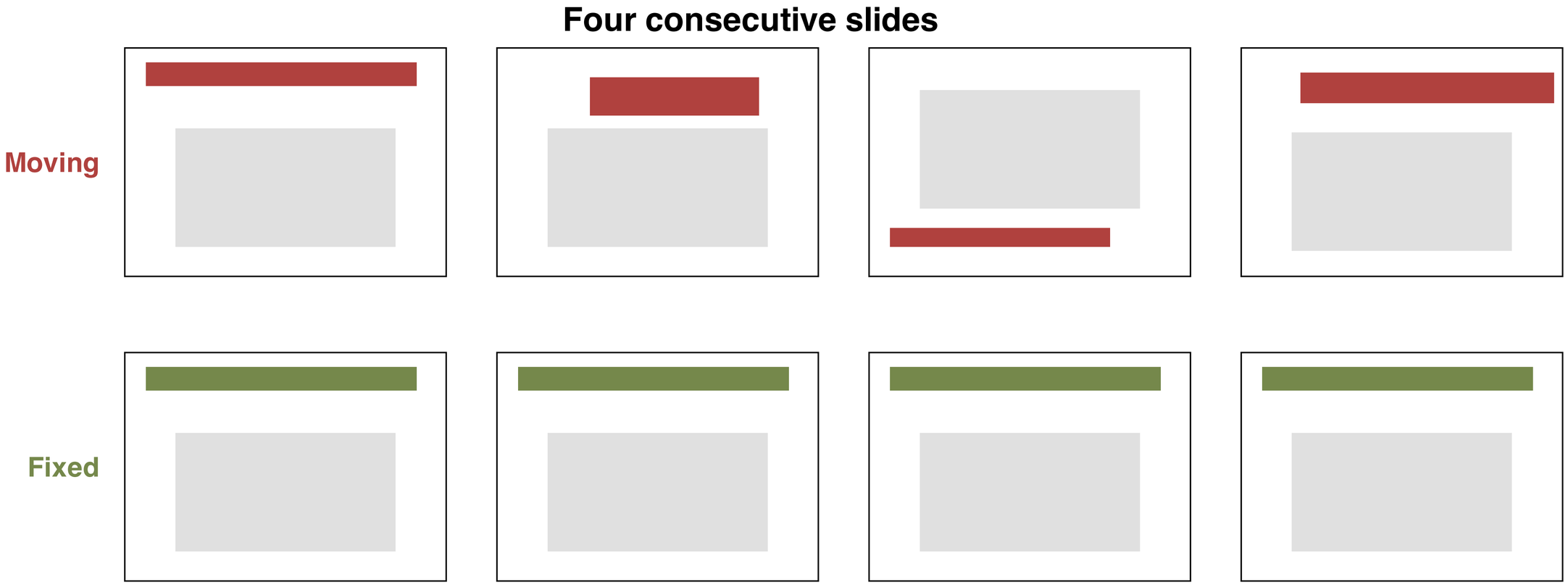


Gentoo penguins are the heaviest of the three species

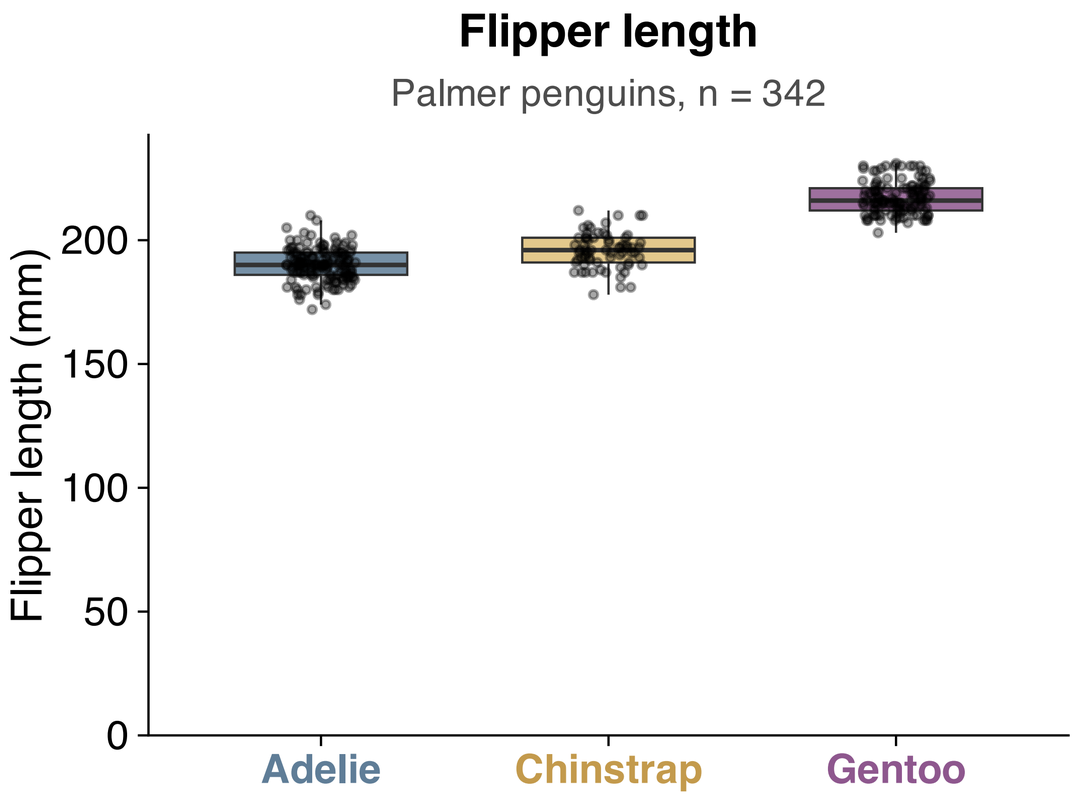
✓ A full sentence with a noun and a verb. The main message as quickly as possible.



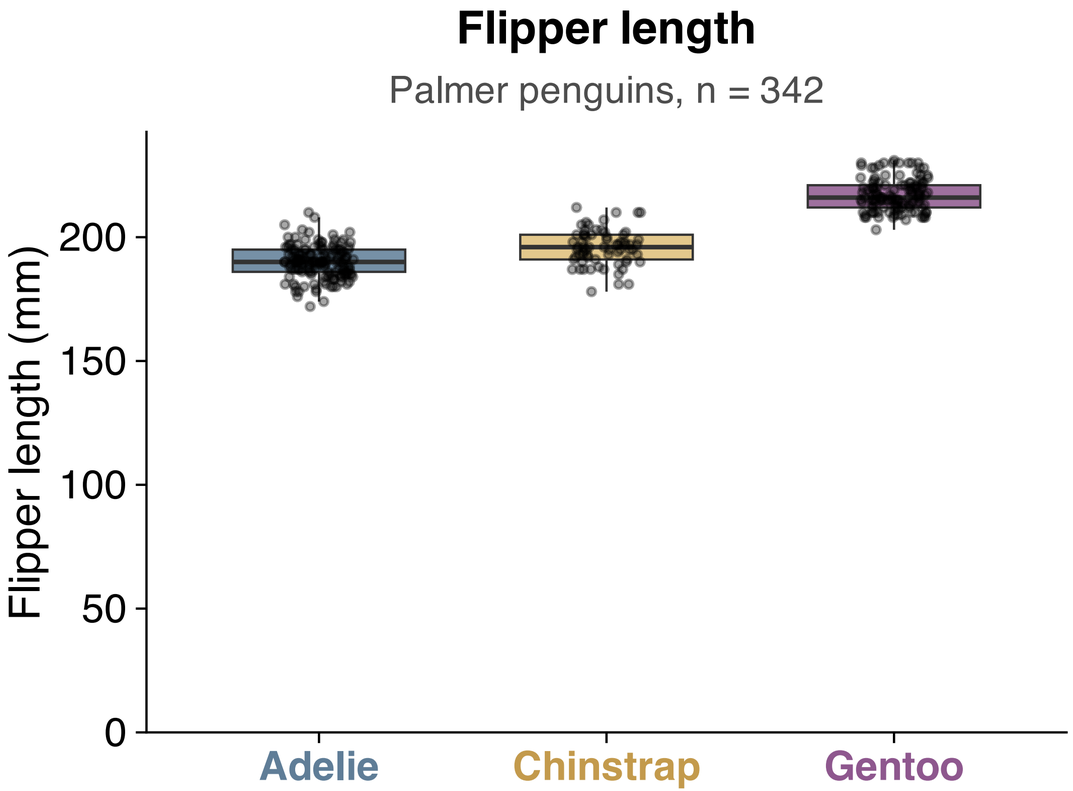
Keep every title in the same place, font and size

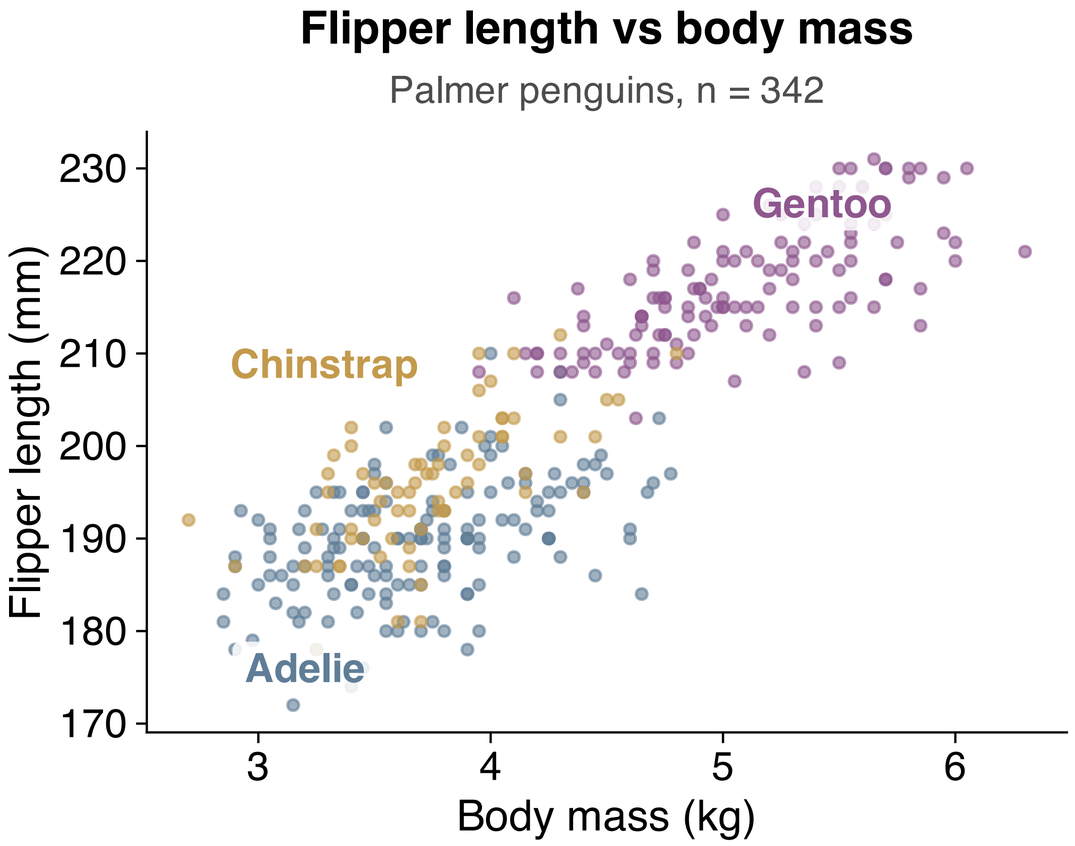


Put one figure on each slide, or two at most



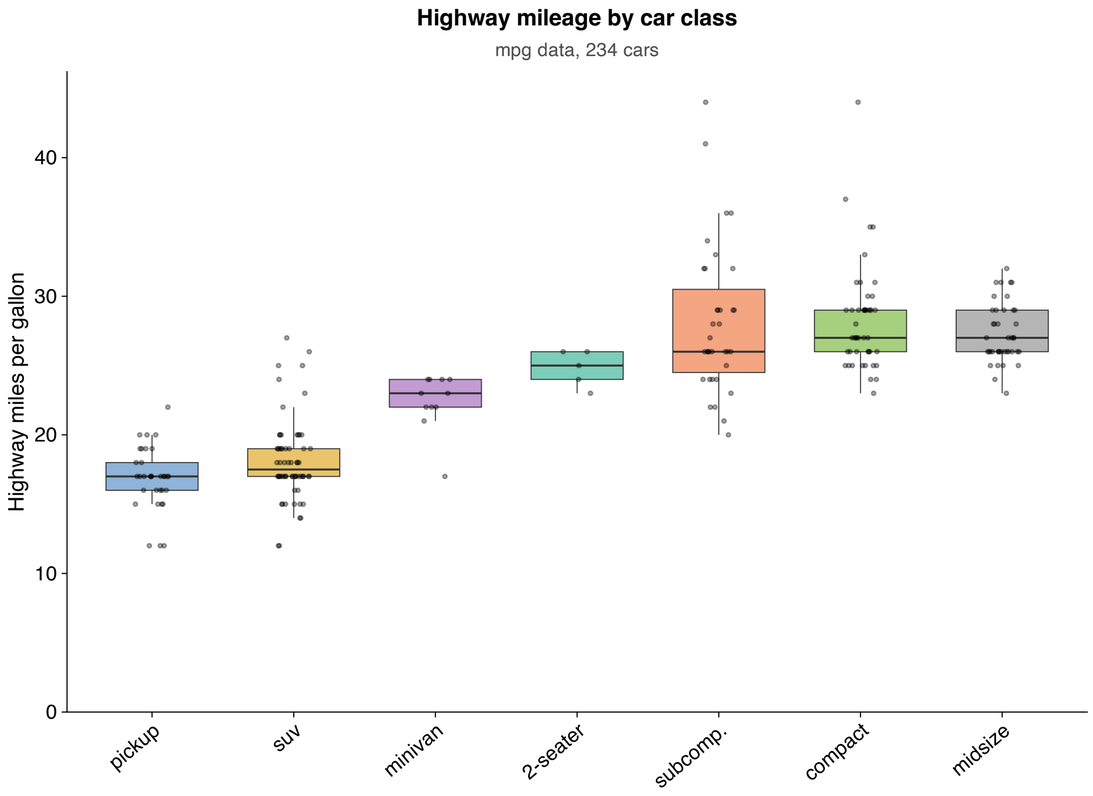
Build the second figure in after you have explained the first



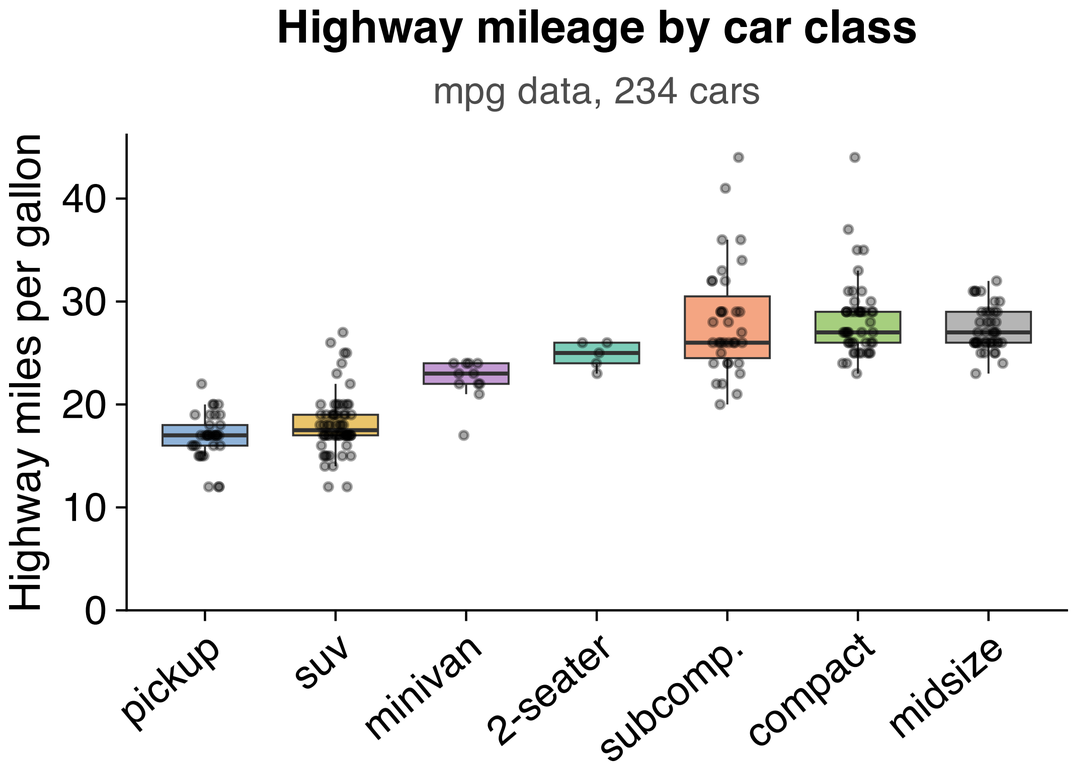


Export each figure at the size it will appear on the slide

Saved at 2× the slot, then shrunk

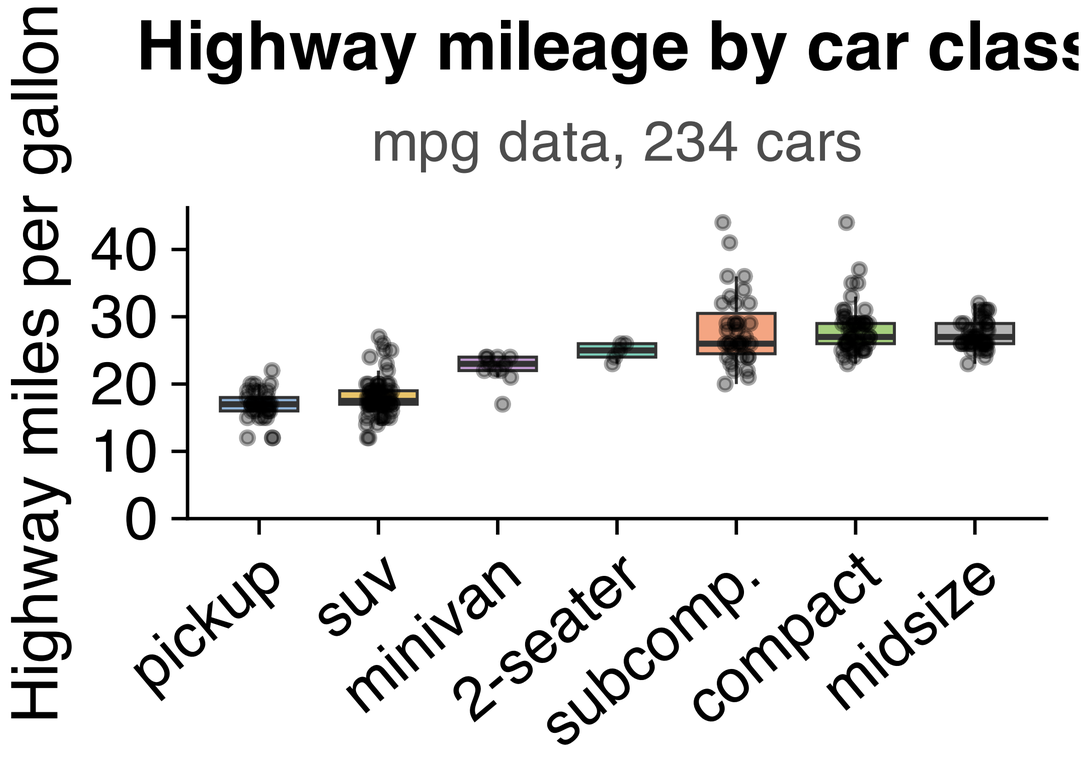


Saved at the slot size

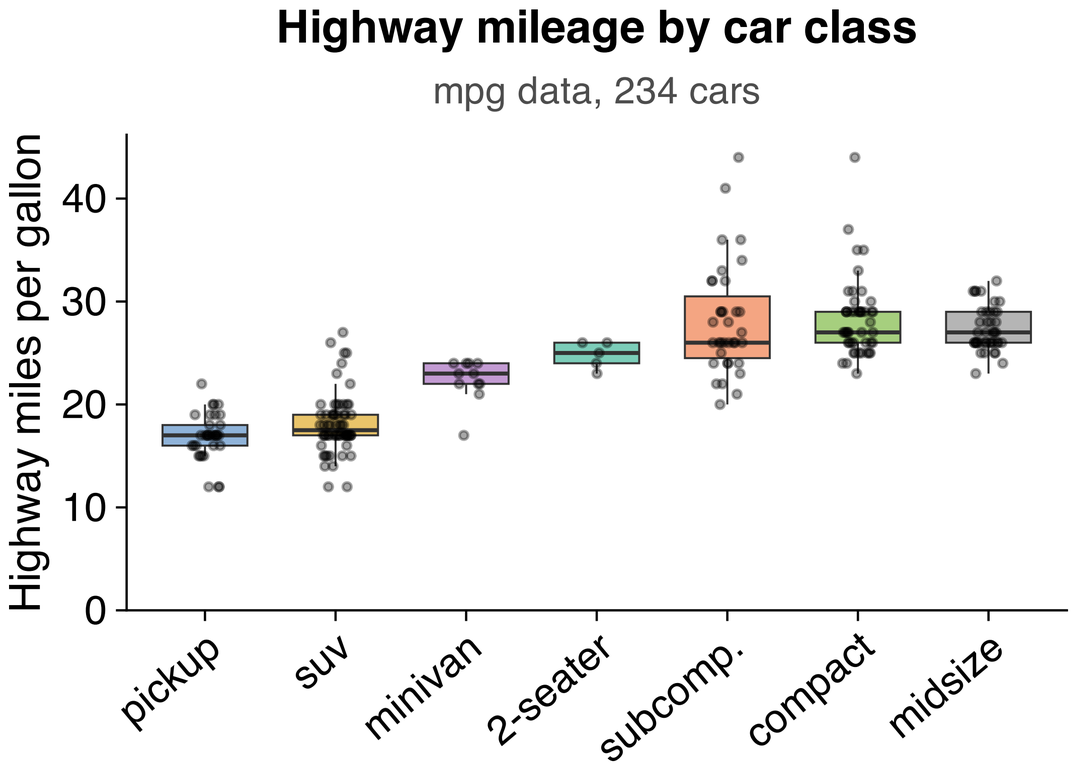


A figure saved too small and then enlarged looks crude and crowded

Saved at ⅔ of the slot, then enlarged

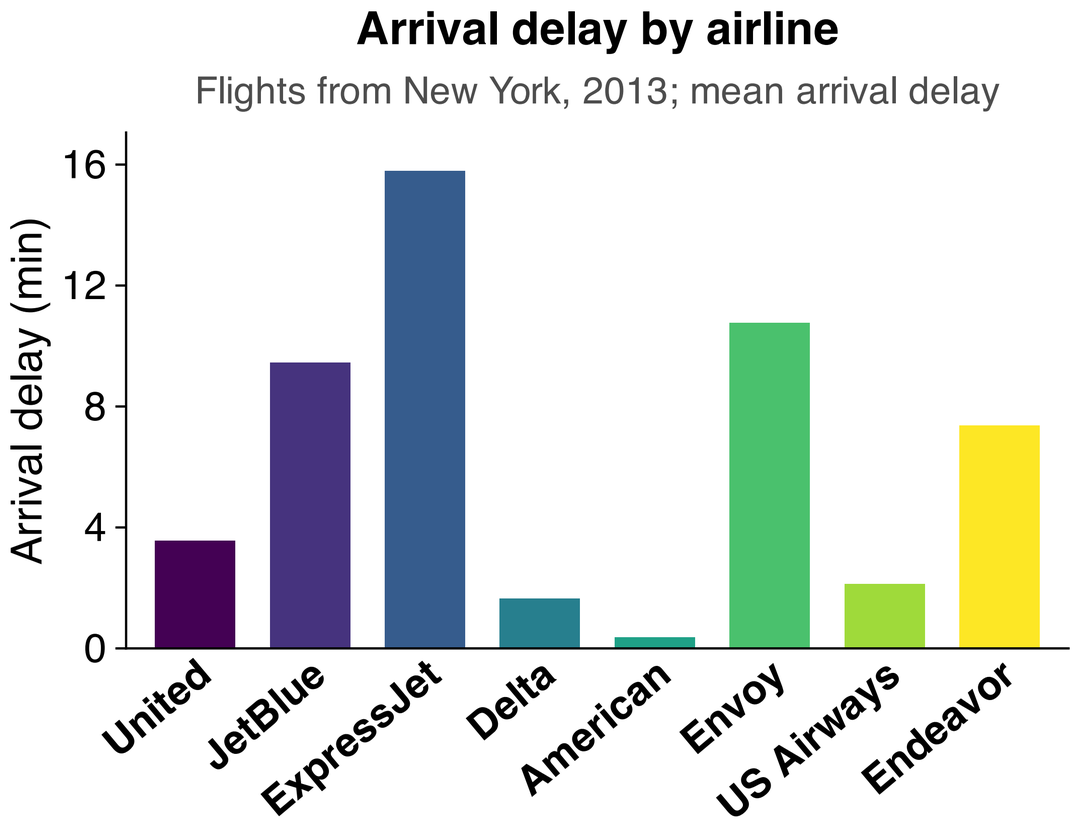


Saved at the slot size

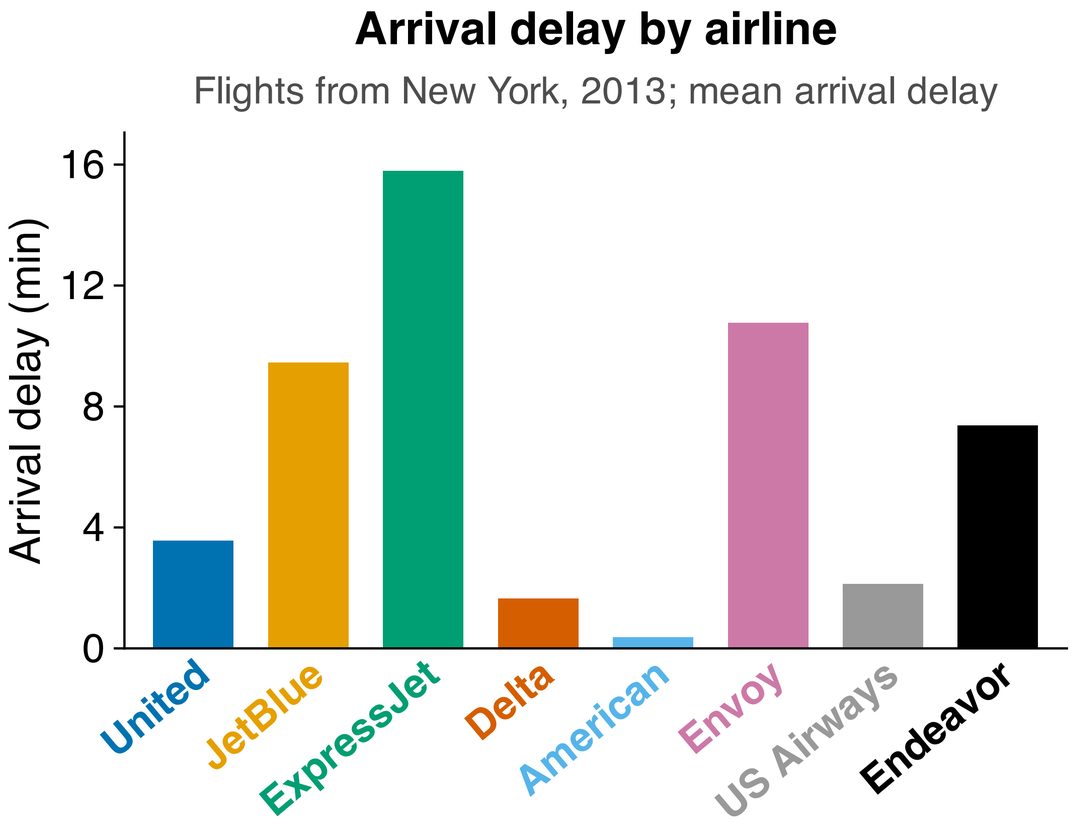


Use a categorical palette when the groups have no order

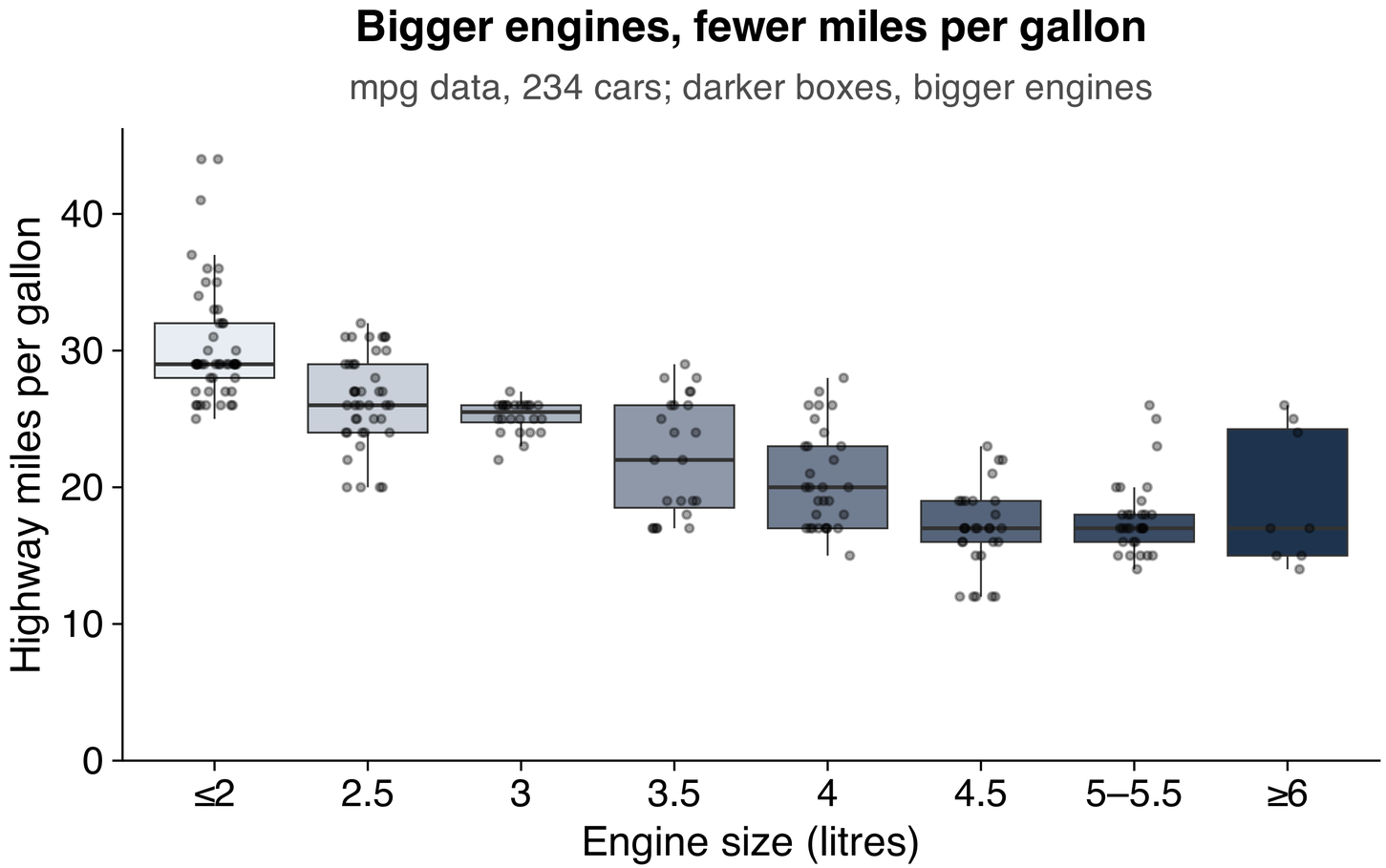
Viridis: neighbors blur together and imply an order



Okabe–Ito: eight distinct, colorblind-safe hues



Use a gradient only when the variable is a quantity

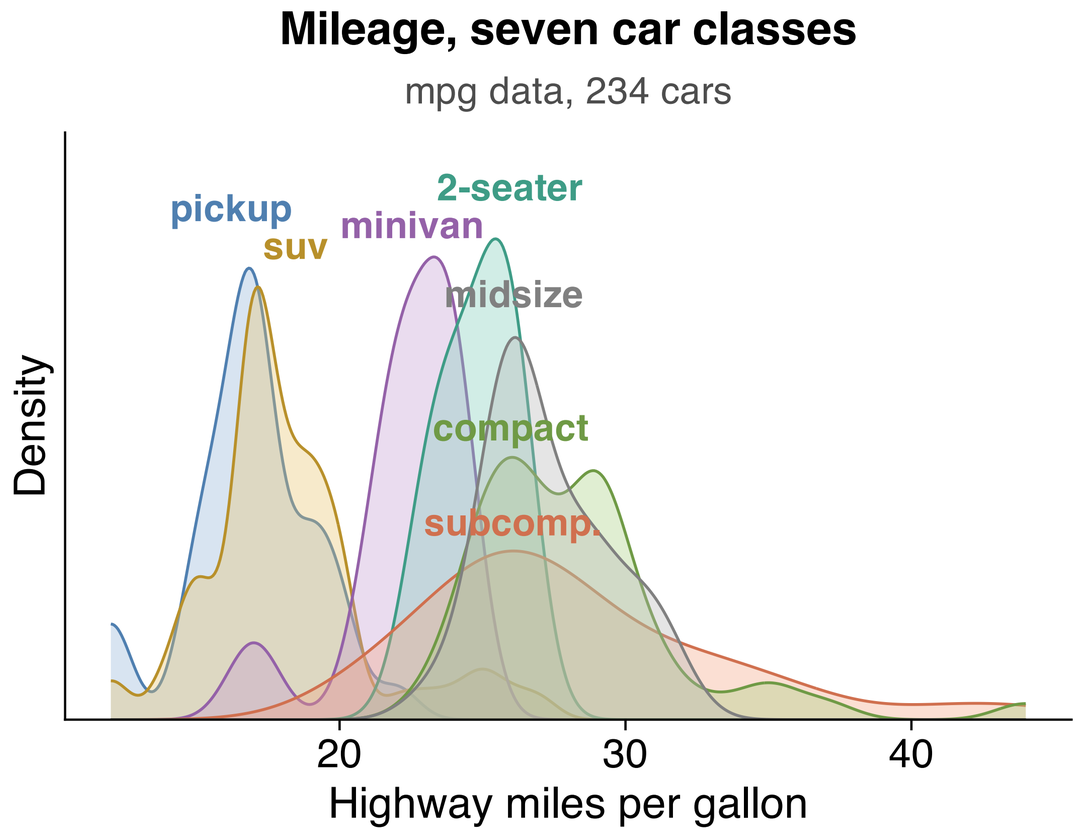


Engine size, dose and time are quantities.

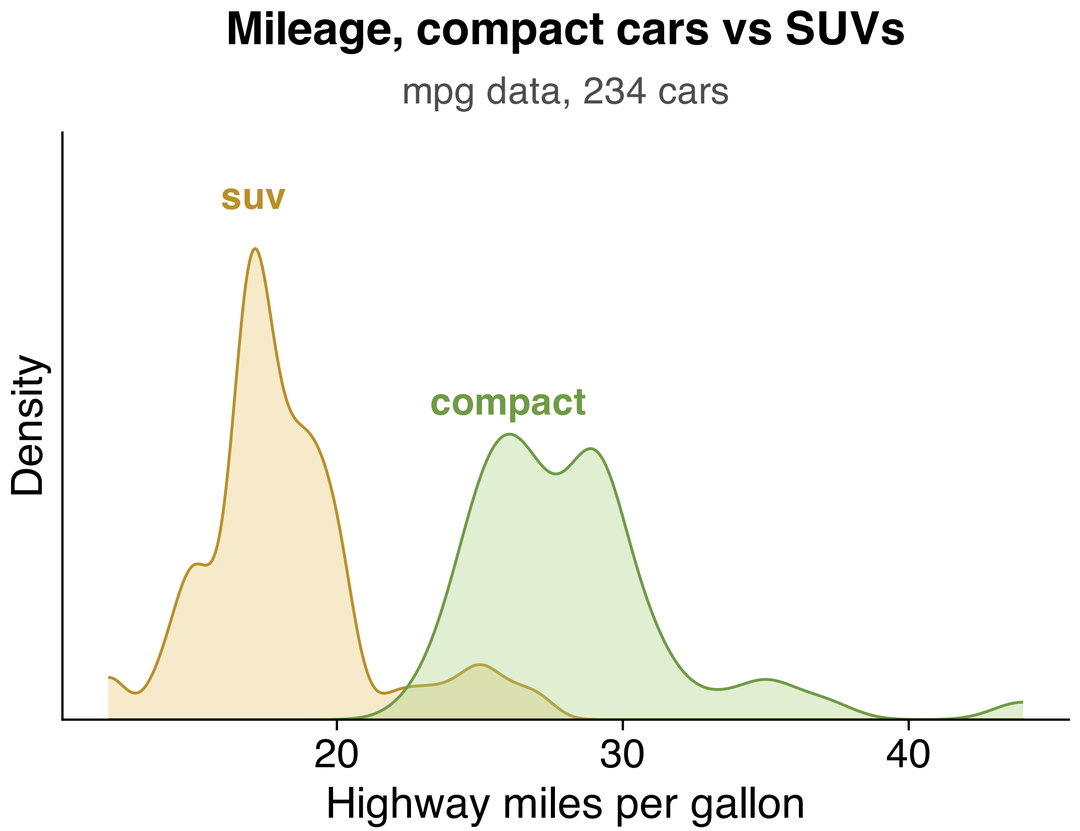
Light to dark reads as low to high.

Show only the conditions that answer the question on that slide

Seven classes

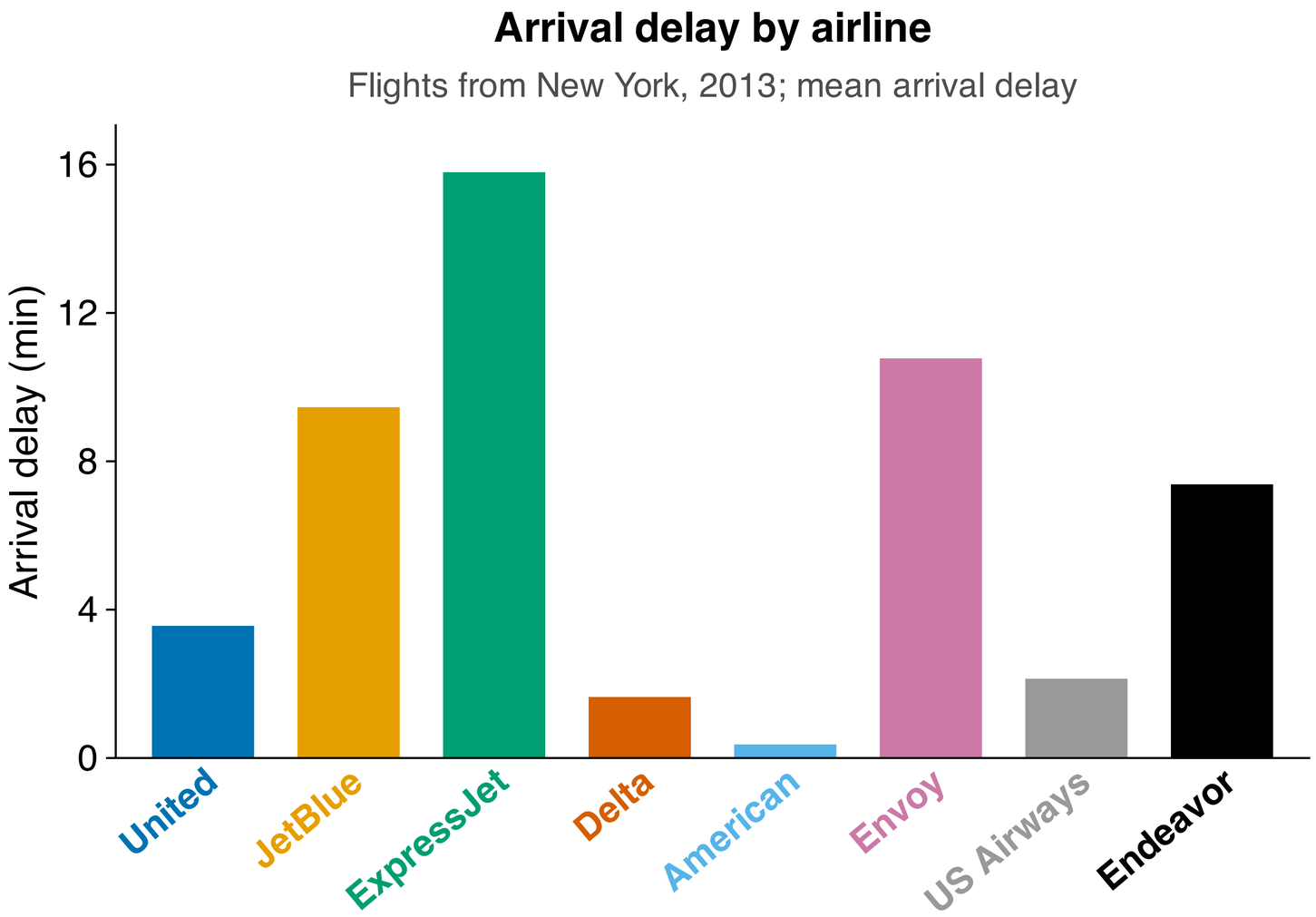


The two that answer the question



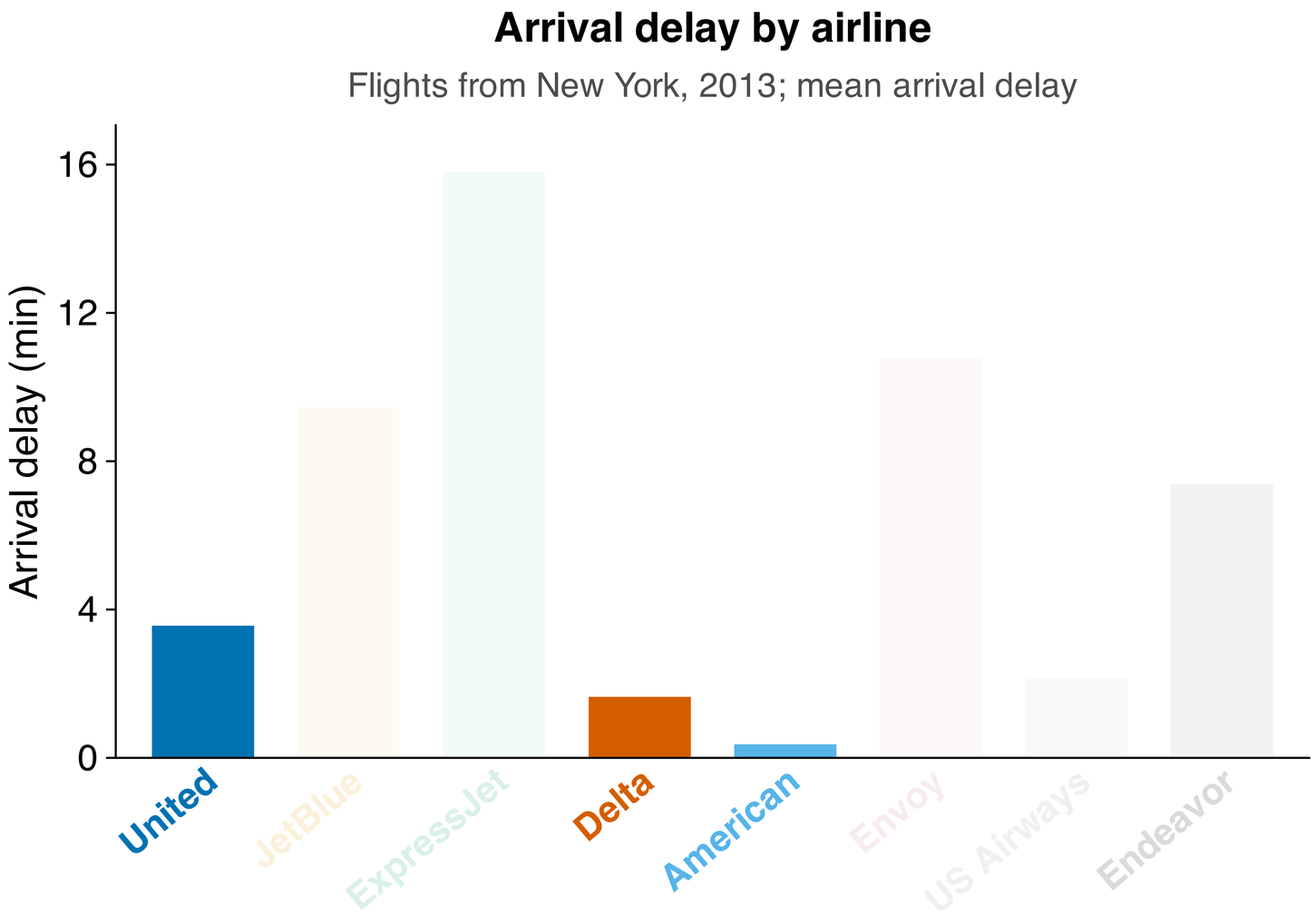
Fade the conditions you are not talking about

Everything at full strength: where should they look?



Fade the conditions you are not talking about

Fade the rest to 5%: the comparison stands out, the context stays

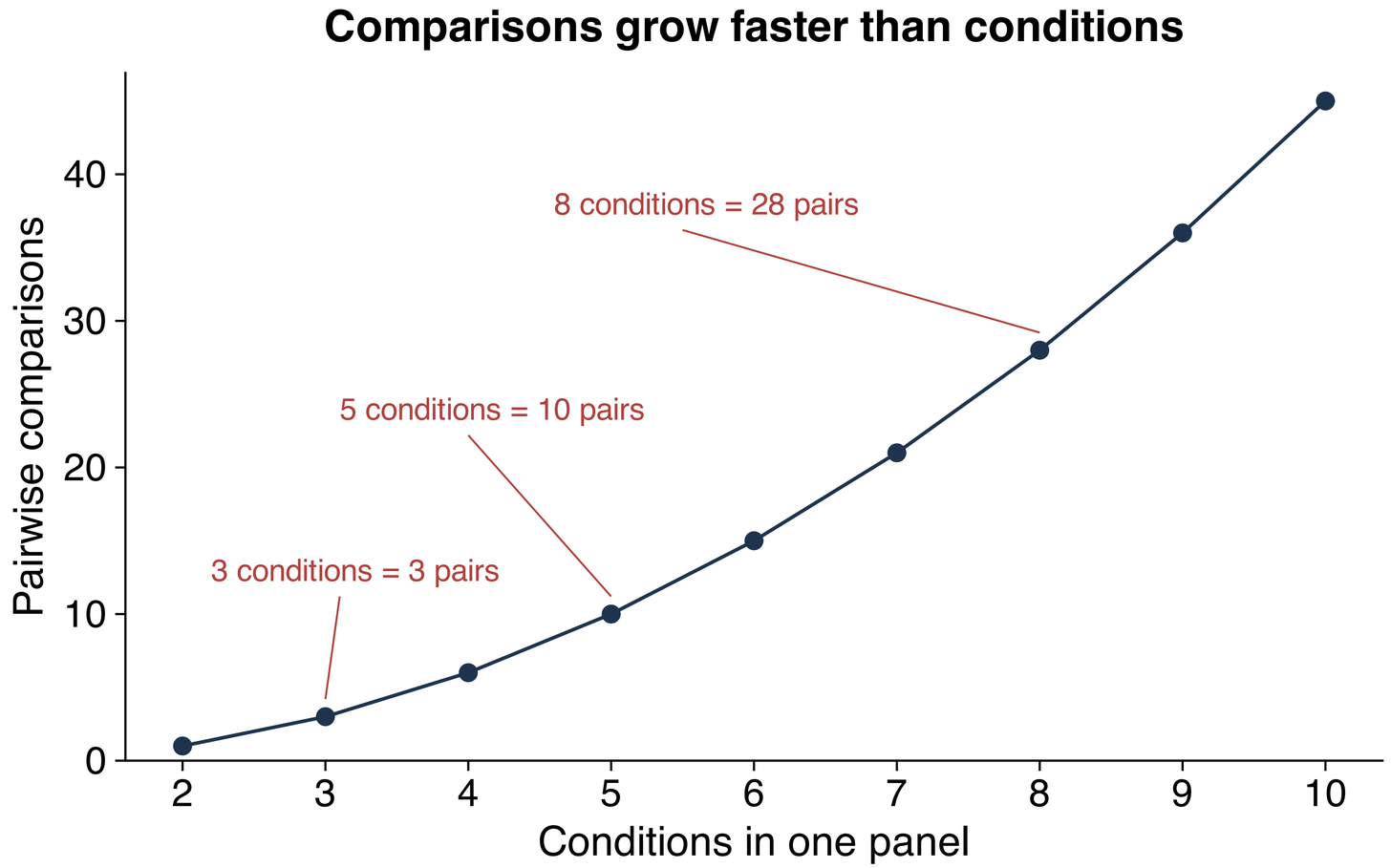


Fade the conditions you are not talking about

Next click: same plot, new focus. Nothing moves.



Every extra condition multiplies the comparisons the audience must make



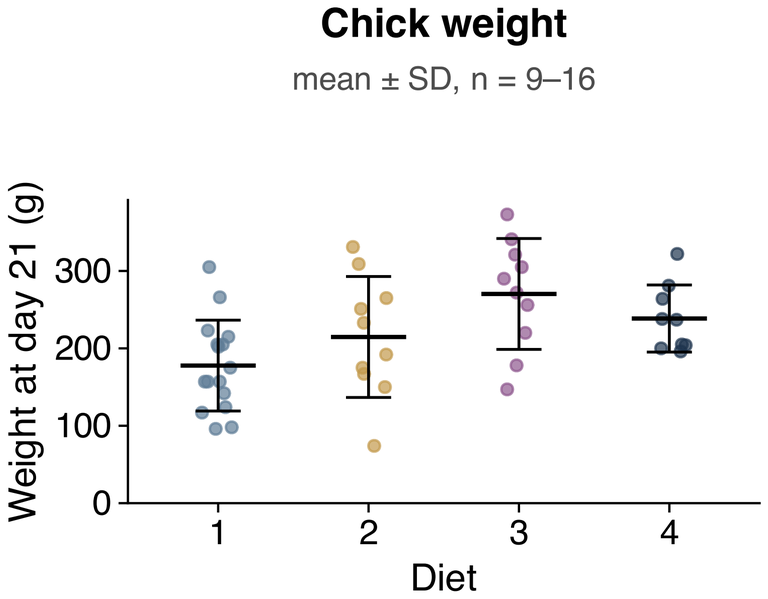
k conditions give

k(k–1)/2 pairs

The eye makes all of them

So do your statistics

The test you choose changes which differences look significant



P value for each pair; dark: p < 0.05

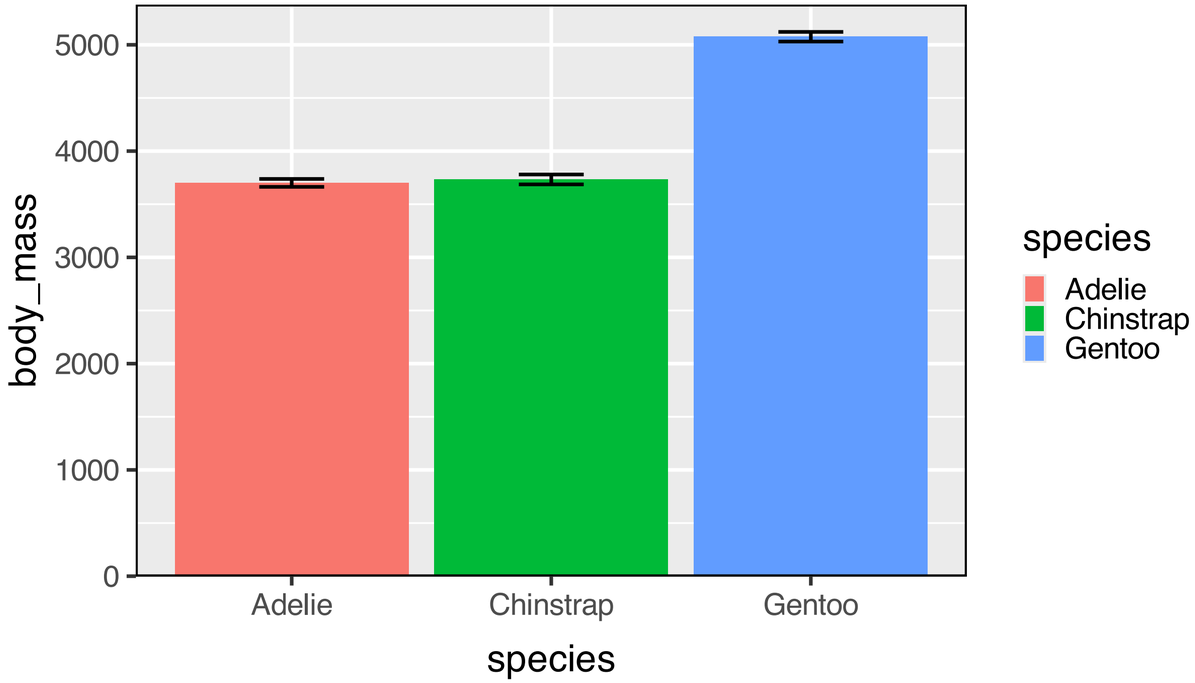
Diets compared	t test, no correction	t test, Bonferroni	Tukey HSD	Wilcoxon, Bonferroni
1 vs 2	0.218	1.000	0.487	1.000
1 vs 3	**0.003**	**0.020**	**0.005**	**0.026**
1 vs 4	**0.008**	**0.046**	0.119	0.151
2 vs 3	0.115	0.688	0.226	0.843
2 vs 4	0.418	1.000	0.849	1.000
3 vs 4	0.256	1.000	0.704	1.000

Same chicks, four tests: Diet 1 vs 4 is significant with two tests and not with the other two.

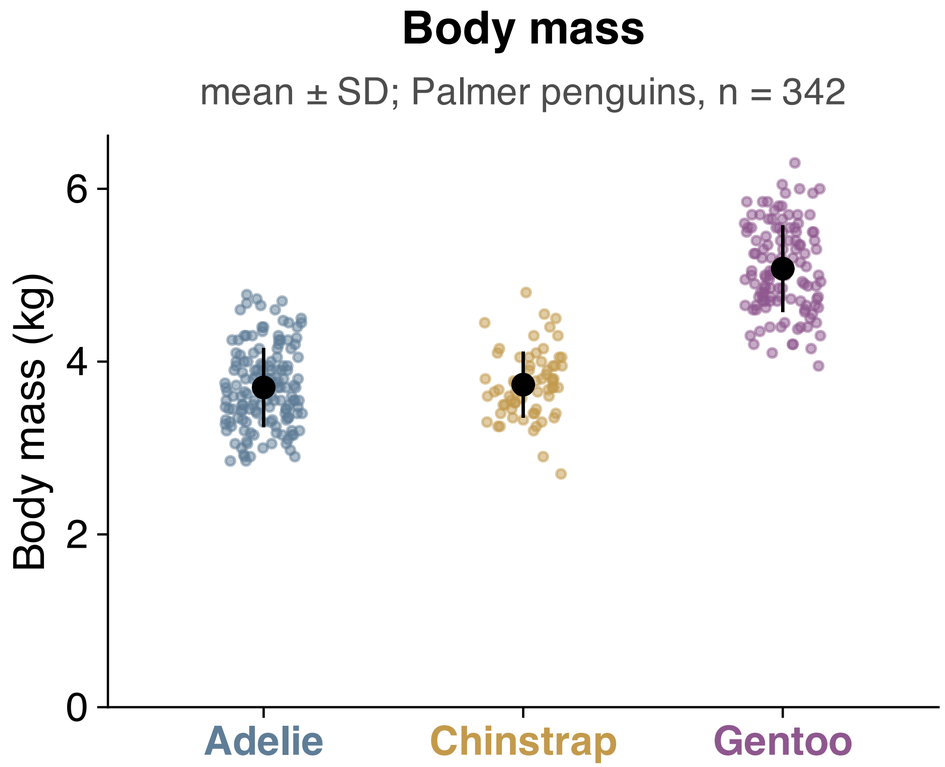
Choose the test before you see the data, and say which one you used.

Erase every element that does not carry data

Grey panel, grid, box, a legend that repeats the axis

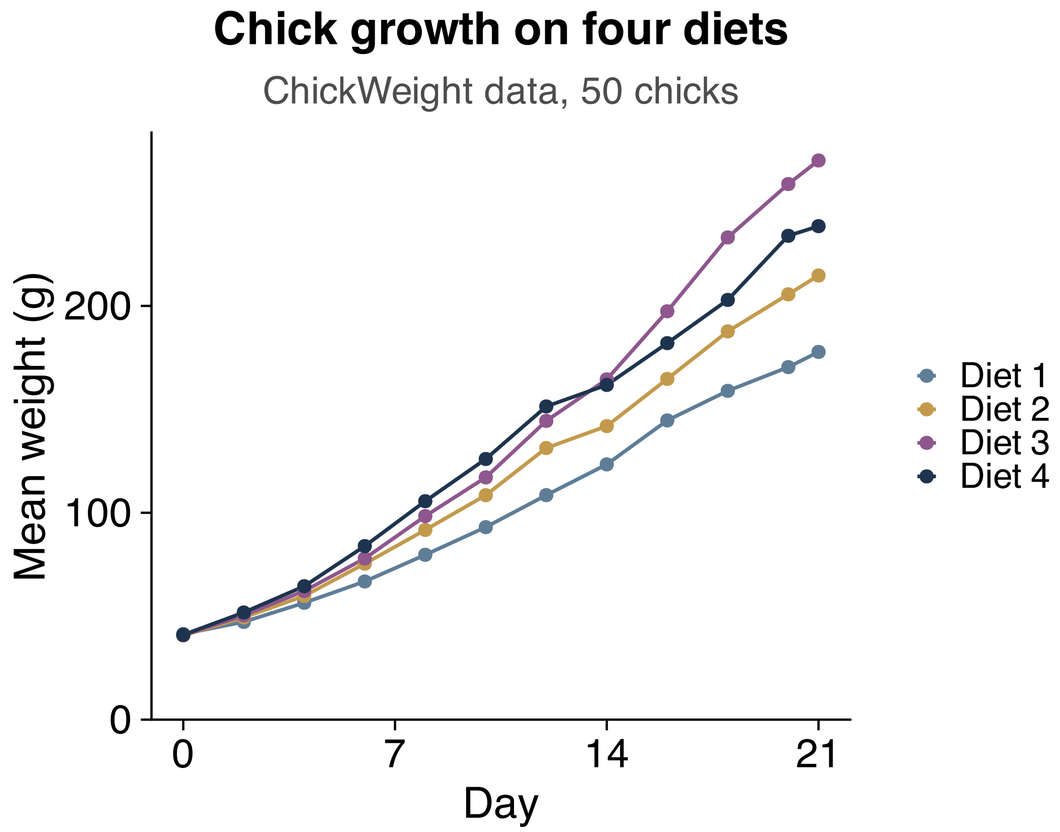


Only data, labels and a title: every drop of ink is data

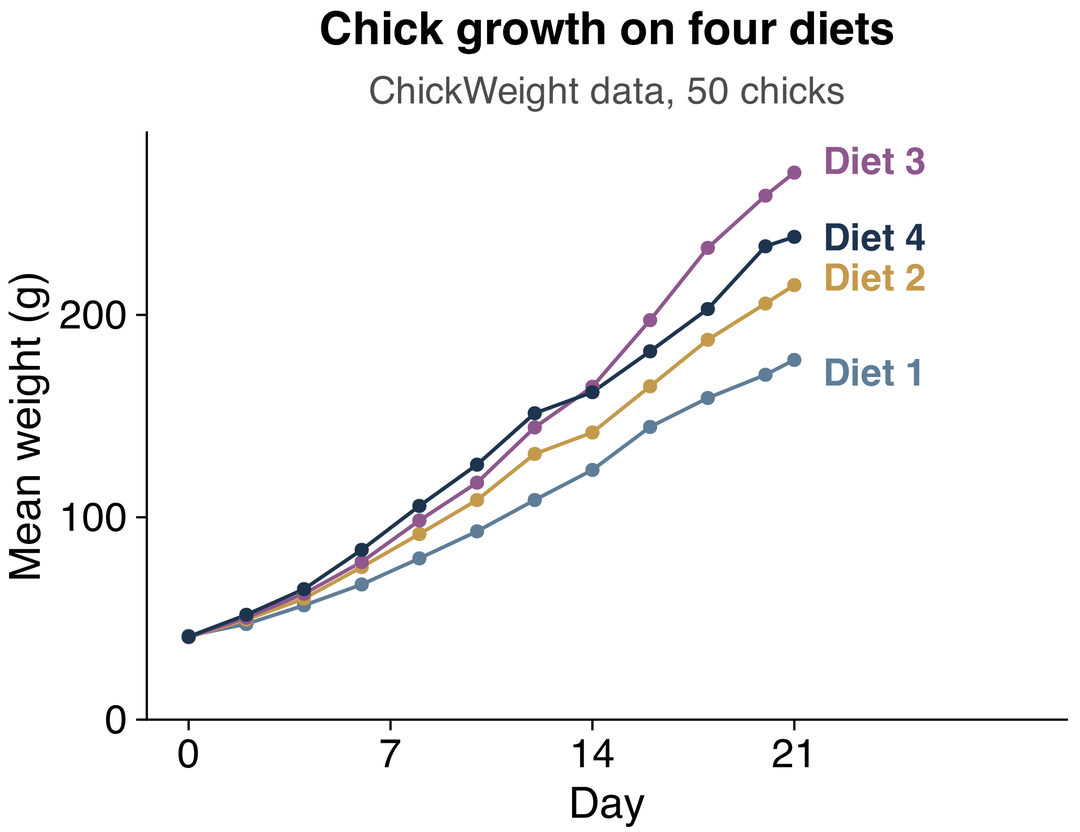


Replace legends with labels placed on the data

A legend sends the eye back and forth

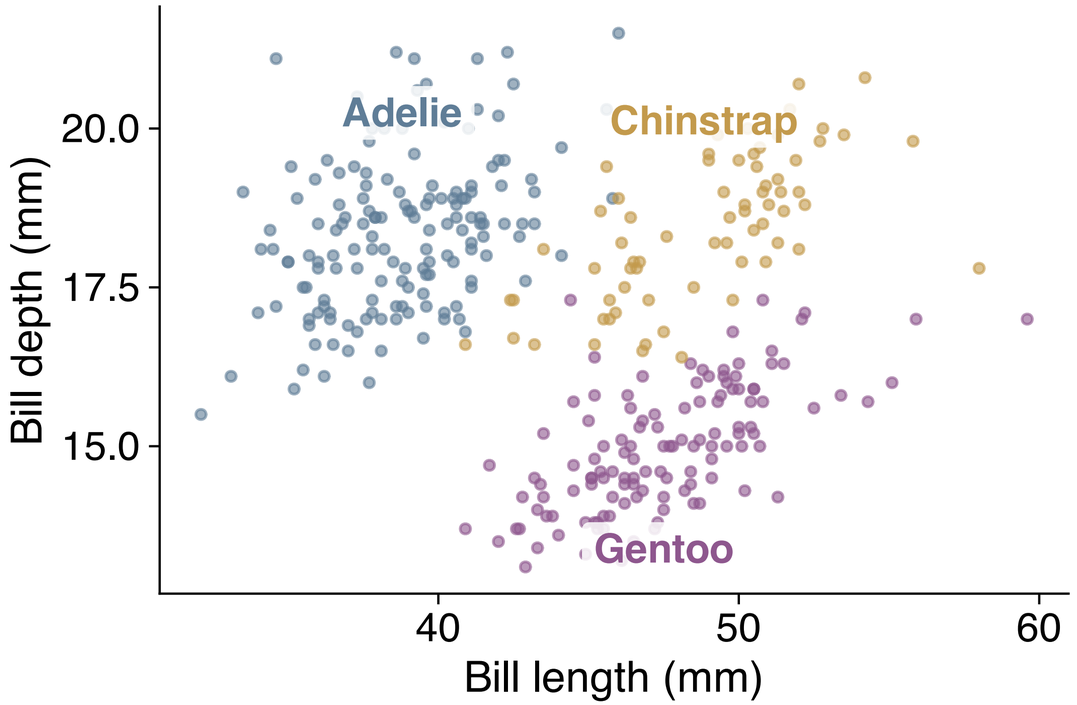


Label the line ends; for bars, color the axis labels

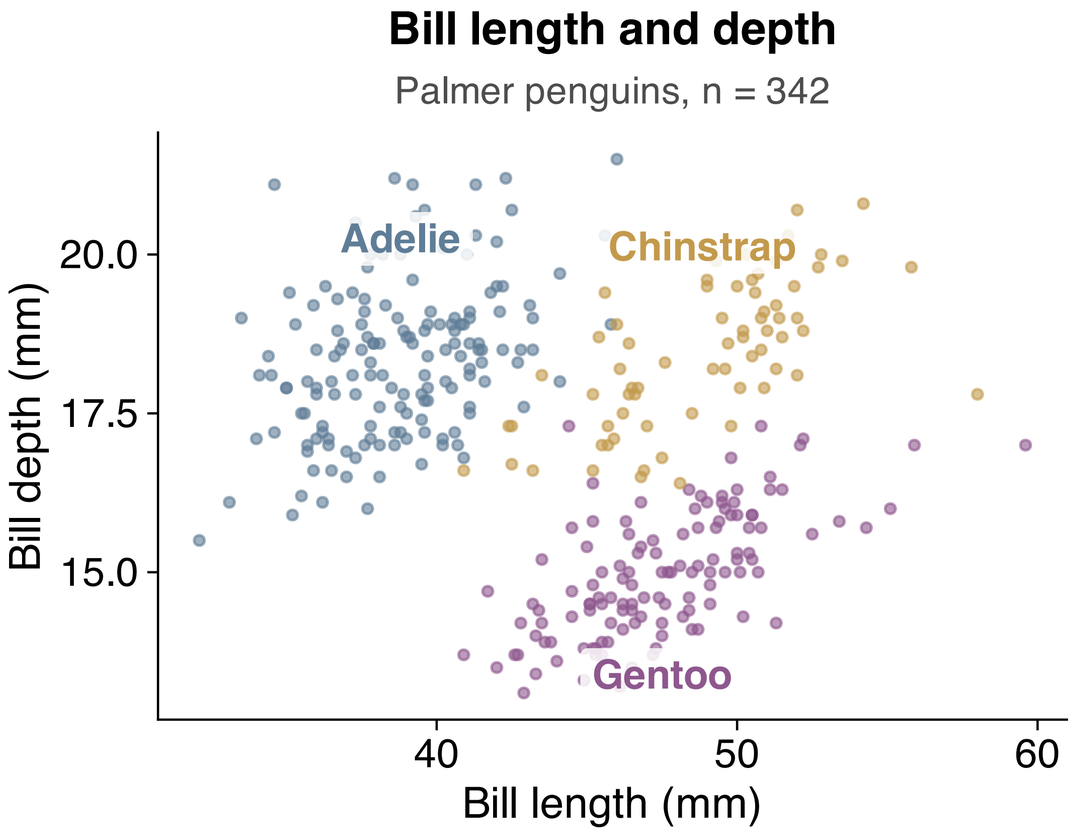


Give every plot a title that says what was measured

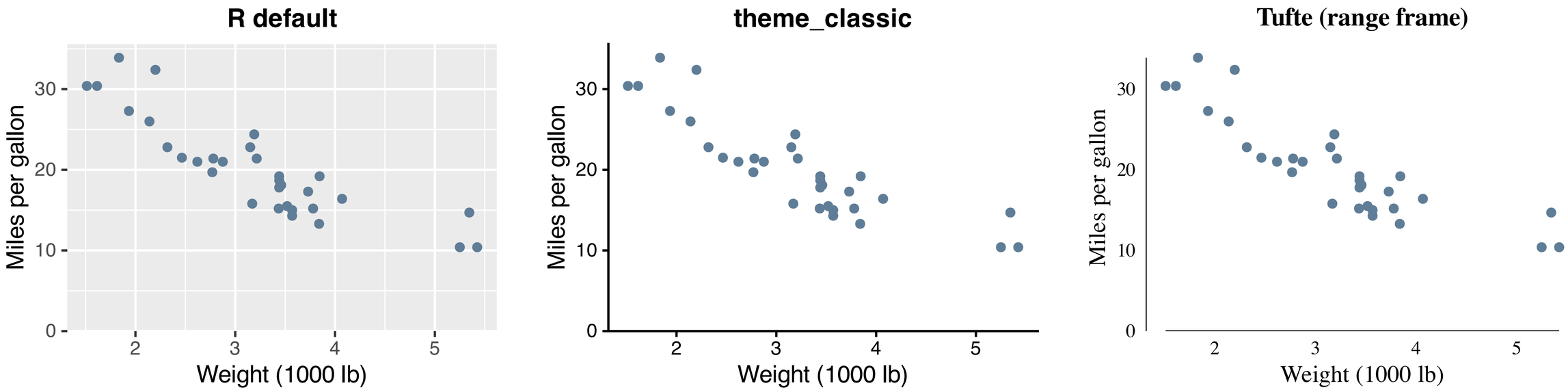
No title



Title: what was measured. Subtitle: how, and n

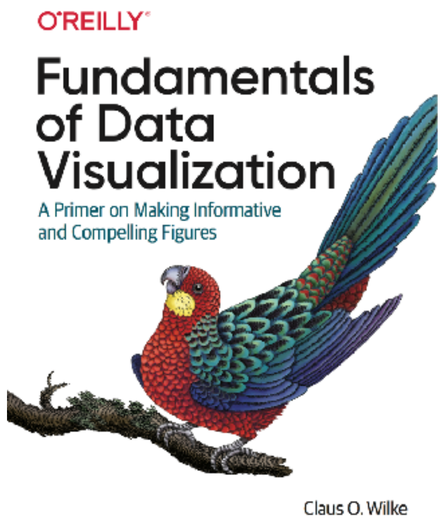


Choose one figure style and keep it for the whole talk



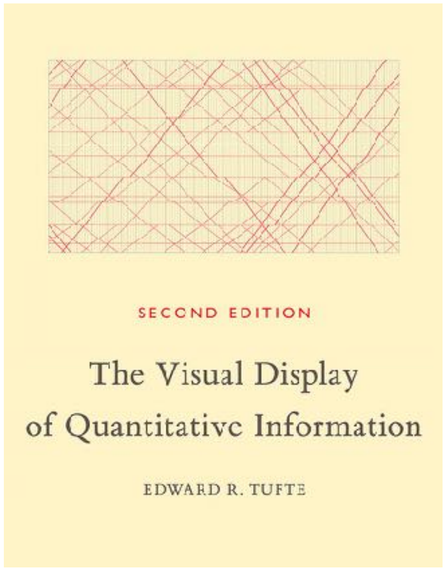
- Pick one and use it in every figure, with the same fonts and sizes
- Each group keeps its color: Adelie is always blue-grey, Gentoo always plum
- Same axis order and labels throughout

Three resources on plot/figure design



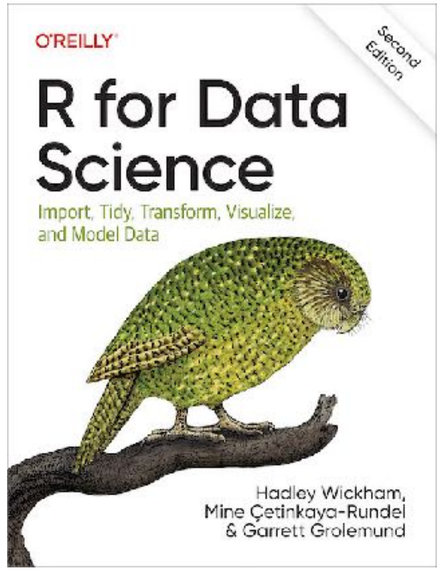
Fundamentals of Data Visualization

Claus Wilke. Which plot for which data. Free at clauswilke.com/dataviz



The Visual Display of Quantitative Information

Edward Tufte. Data-ink, chartjunk, small multiples.



R for Data Science

Wickham, Çetinkaya-Rundel and Grolemund. The ggplot2 code. Free at r4ds.hadley.nz

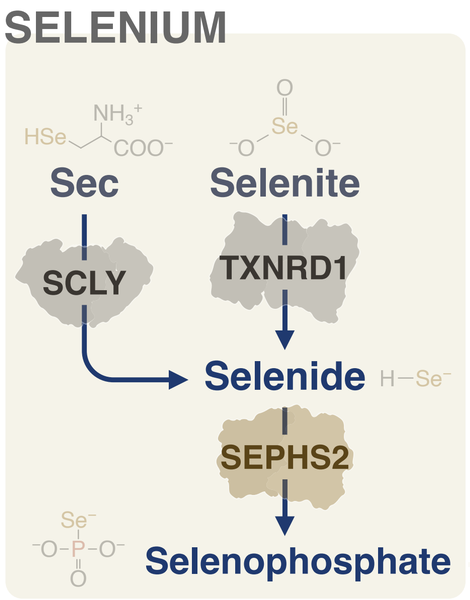
Every plot in this talk uses data built into R: penguins, mpg, mtcars, ChickWeight and nycflights13.

Close with a model figure and one line per finding

People will be thinking about the model. Leave it up during questions.

- First finding: one line
- Second finding: one line
- Third finding: one line
- Why it matters for biology or medicine

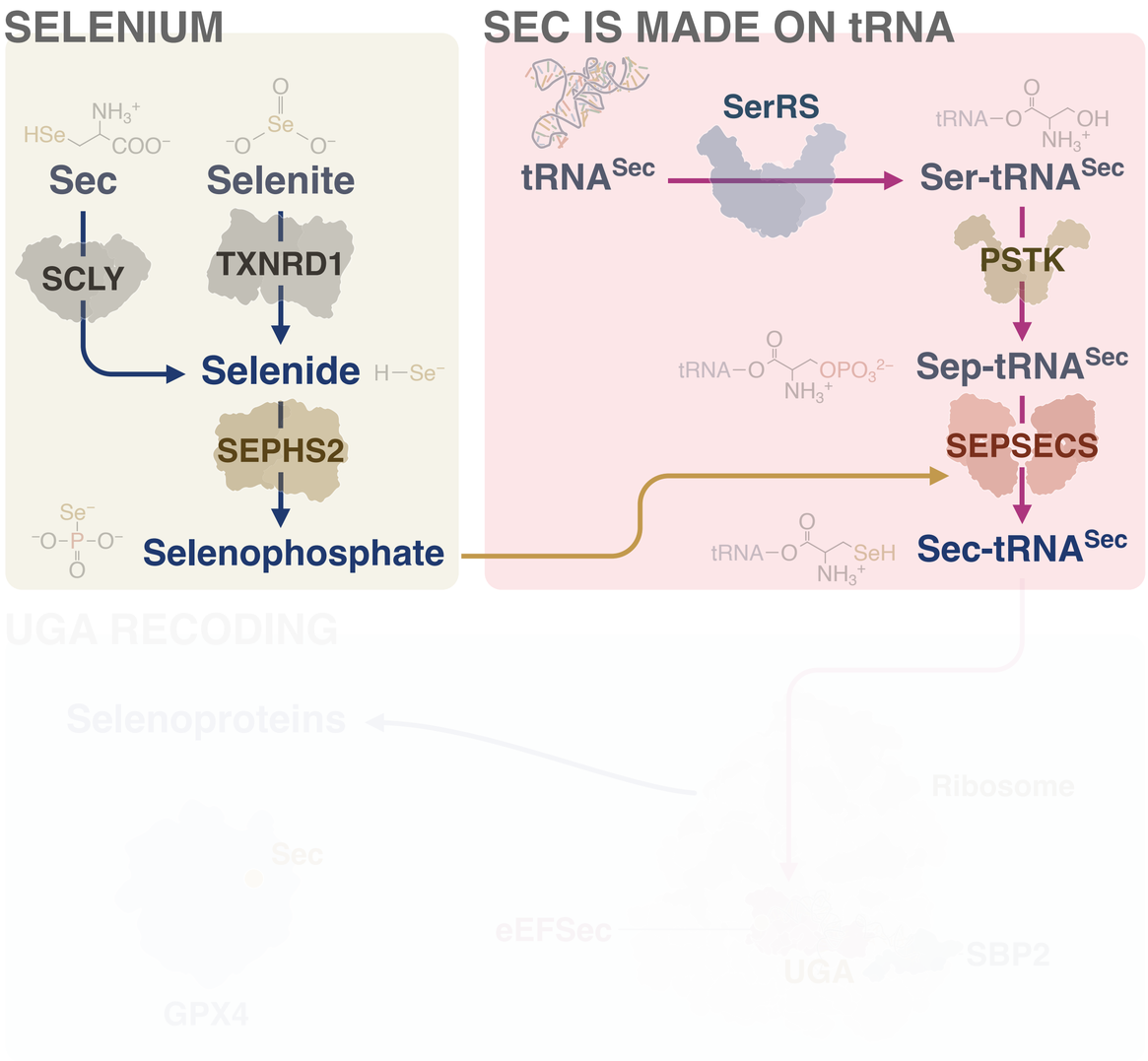
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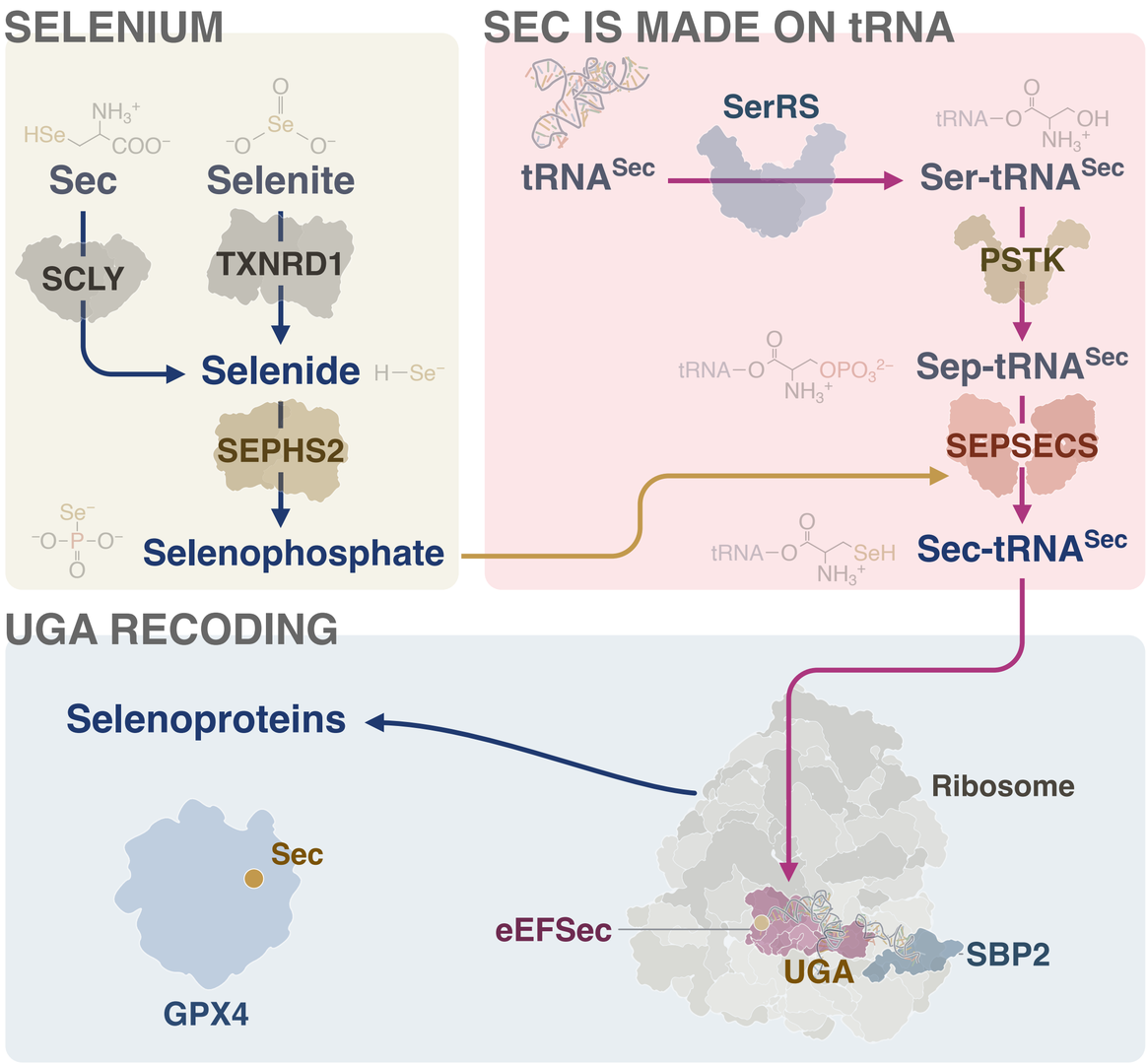
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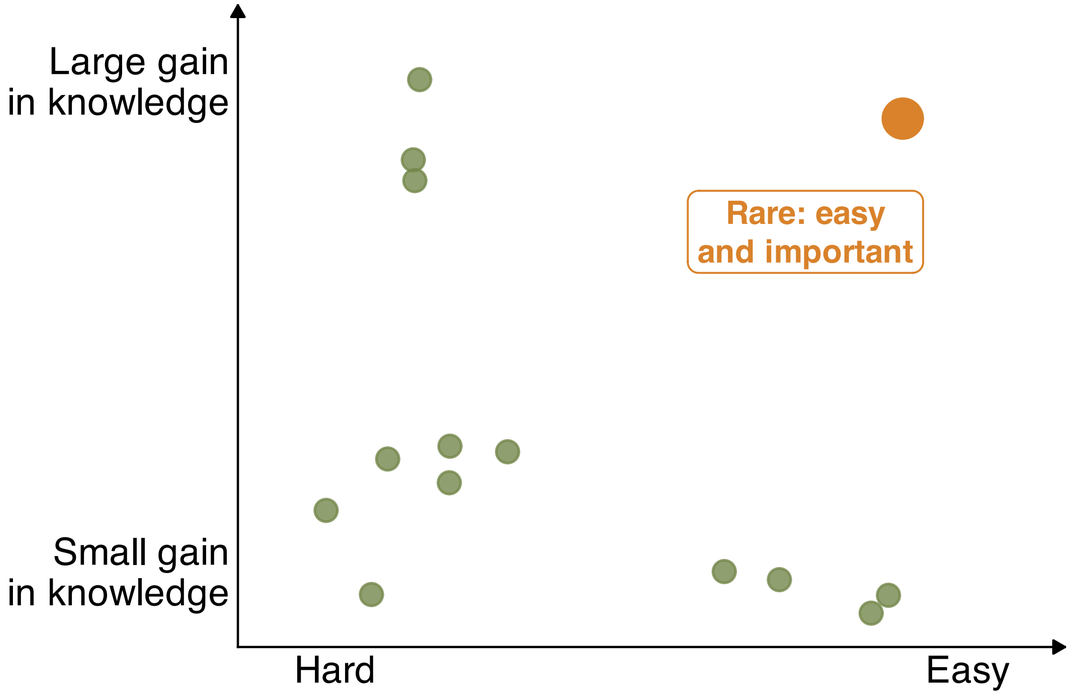


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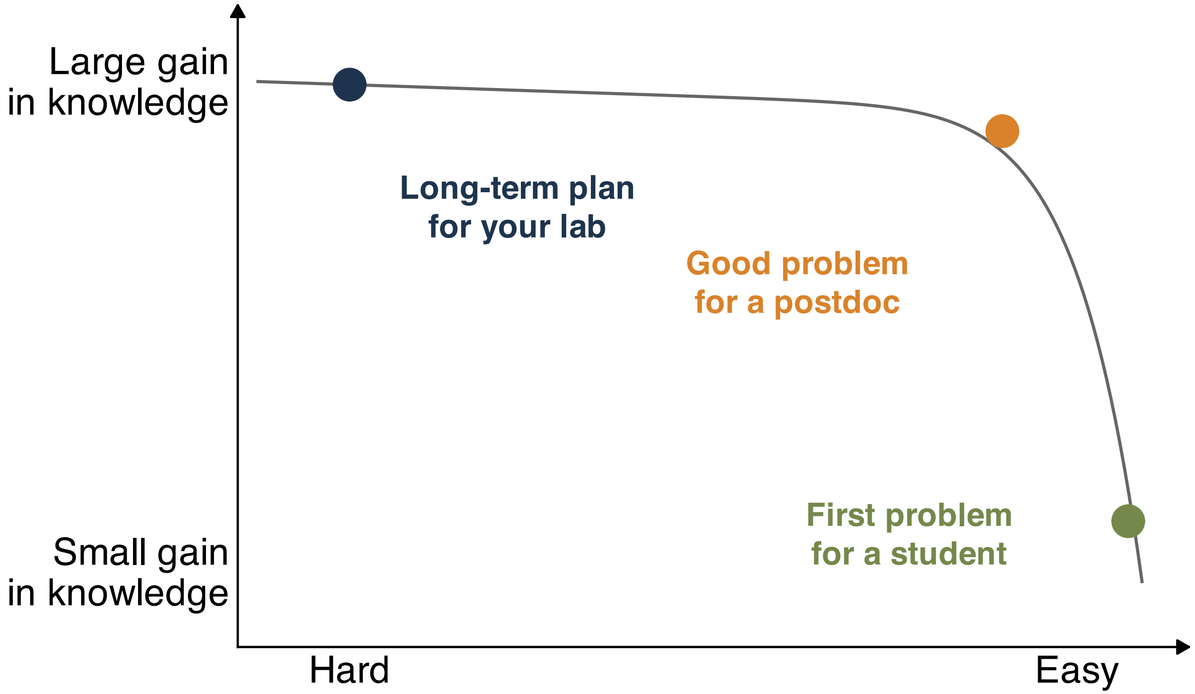
- **First finding: one line**
- **Second finding: one line**
- **Third finding: one line**
- Why it matters for biology or medicine

A good question is important, answerable, and answerable by you

Rank problems by ease and interest



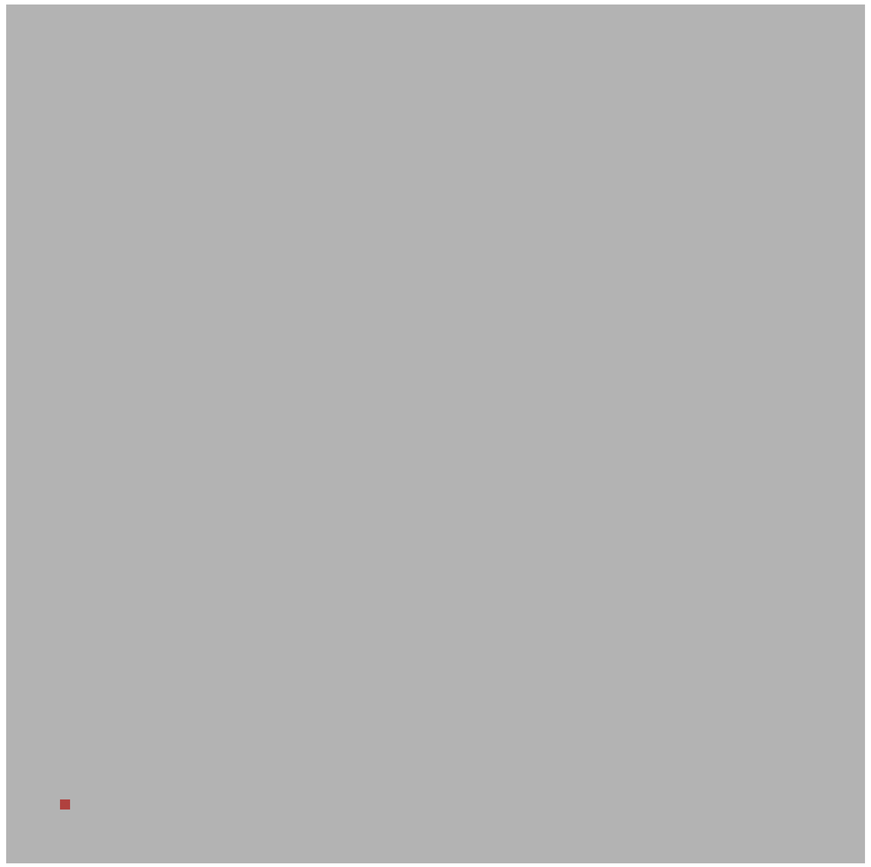
The best choice depends on career stage



Ask why and how, not yes or no. Find the biggest open question you can approach in the next 5–10 years.

Diagram after Uri Alon, How to choose a good scientific problem, Mol Cell 2009

A good question asks how biology works, not how to cure a disease



A good question asks how biology works, not how to cure a disease



Everyone wants to cure cancer. That is a goal, not a question.

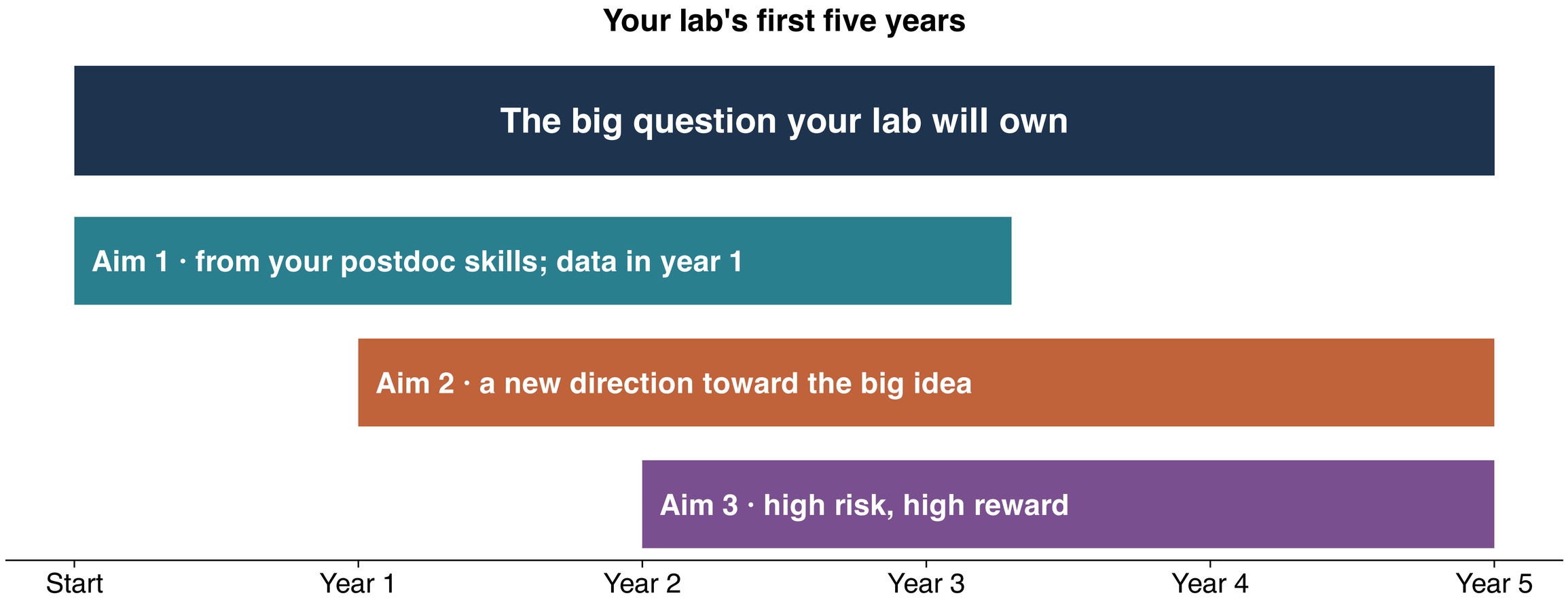
If your lab's goal is a new drug, you are racing companies with thousands of times your budget, and you will lose.

Compete where a small lab wins: a mechanism nobody else is asking about. Cures come from understanding.

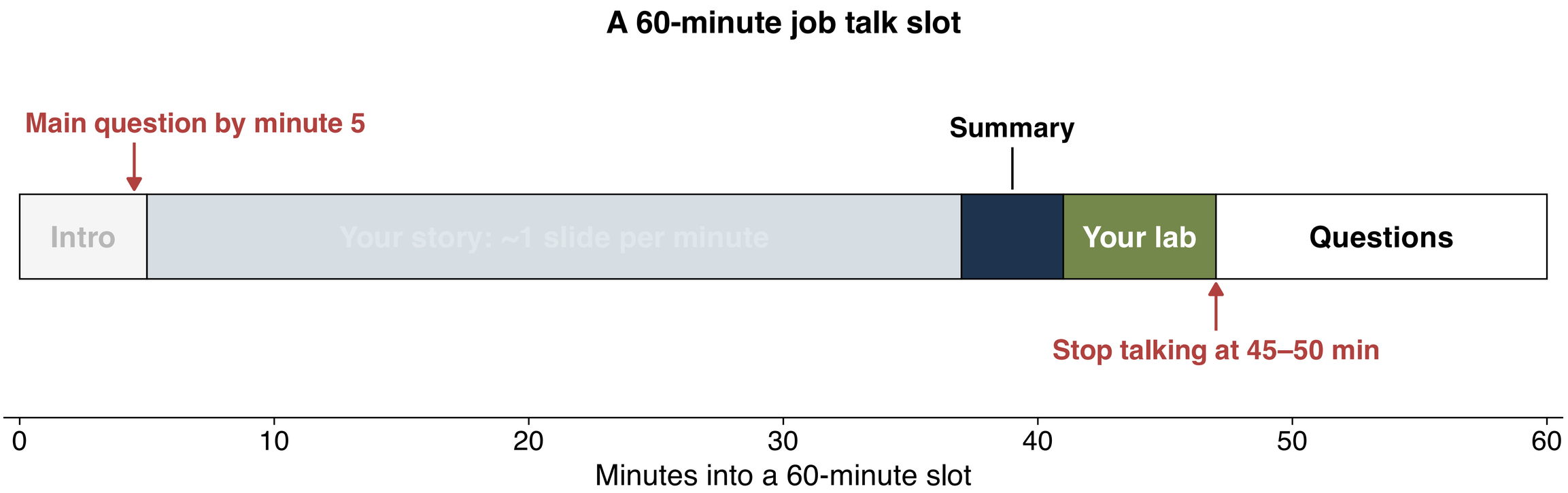
Introduce your lab by answering five questions

- What is your question?
- Why is it important?
- Is it answerable?
- Can you answer it?
- Why are you the ideal person to answer it?

Make your lab's question a big idea, not a follow-up of your postdoc



Finish at 45 to 50 minutes and leave the rest for questions



Running late? Skip a result. Never speed up.

On practice


Seven practice runs before the real talk
Out loud, alone
Record it; watch and listen
Non-scientists
Your lab
Scientists outside your field
Mock talk with faculty
The real room, timed
Run 1
Run 2
Run 3
Run 4
Run 5
Run 6
Run 7

Nerves, nerves, nerves

- Record **audio** only first and listen, then **video** and watch
- Listen for **filler words**, speed and where you lose the thread
- Time every run; cut slides rather than talk faster
- Memorize the first two minutes



Practice with non-scientists



Practice with non-scientists



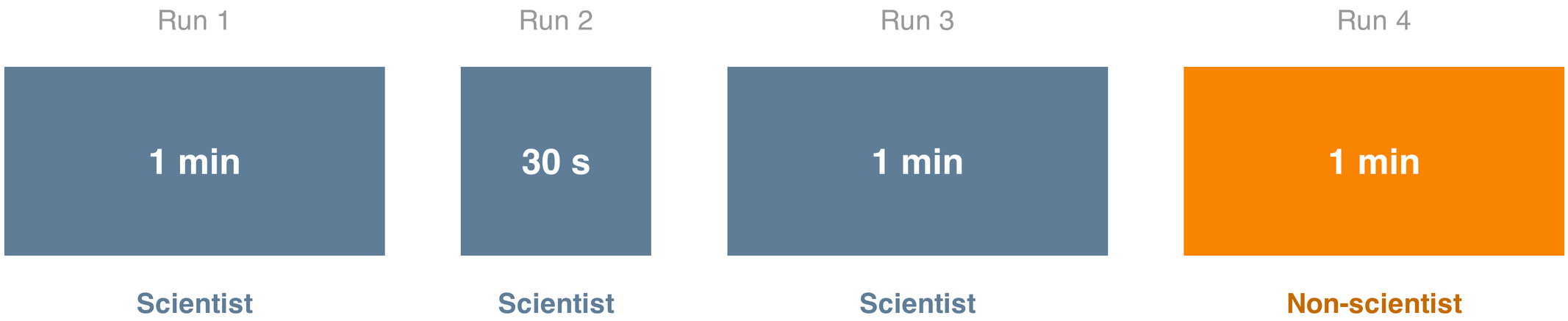
Practice with non-scientists





Practice short versions to find what is essential

Tell the whole story in one minute, then in thirty seconds



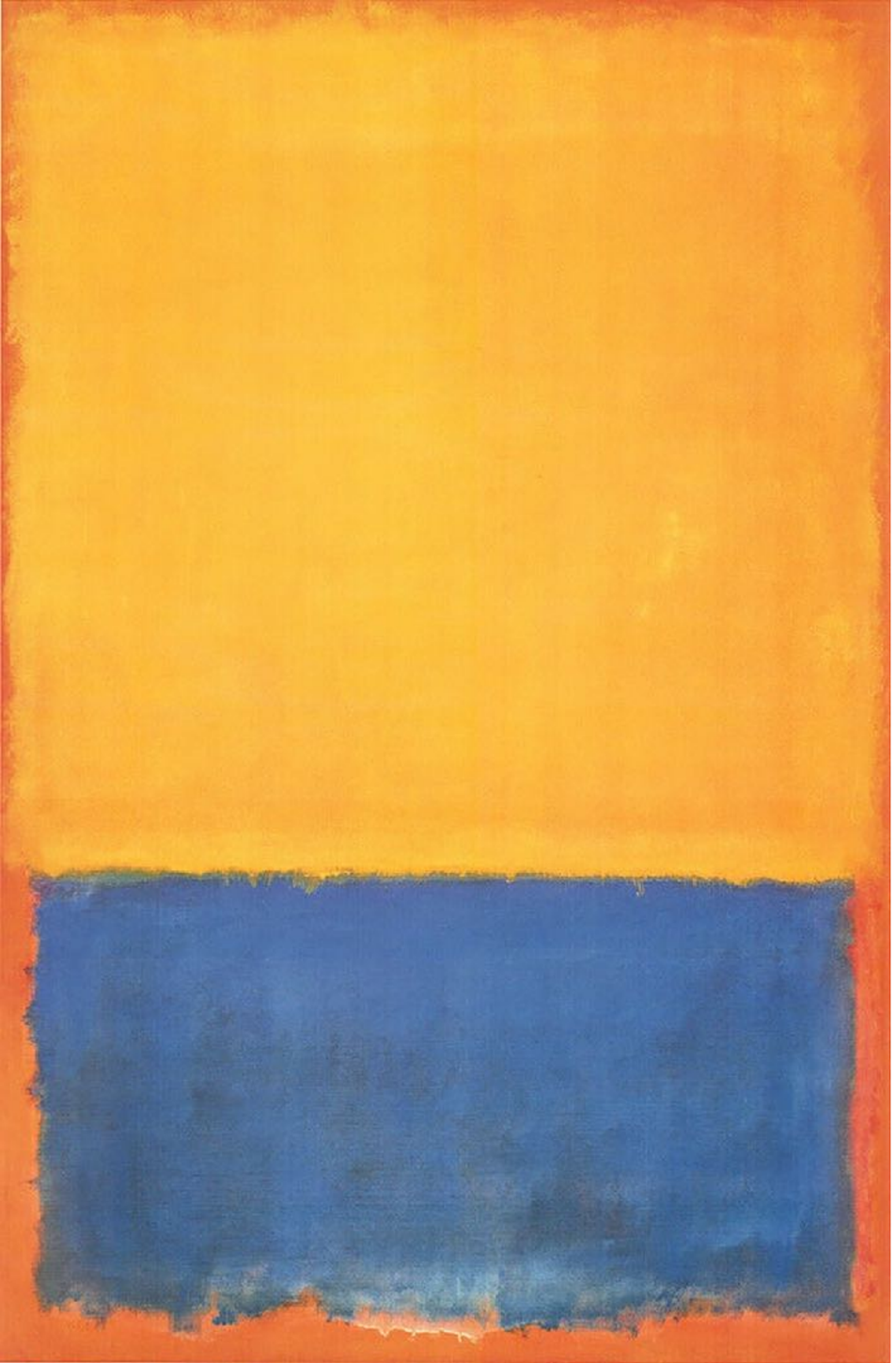
What survives every cut is your message.

Q&A: How to answer questions

- Repeat the question: everyone hears it, and you get time to think
- If you need more time: “that’s a really good question”
- Answer briefly, with facts
- If it helps, add context or what your answer implies
- Move on quickly: answer as many questions as you can

A good job talk asks one big question early, answers it simply and ends on time

- **Start**: why should they hire you? Your question by minute 5
- **Story**: one or two examples, each result raising the next question
- **Slides**: full-sentence titles in a fixed place, one figure per slide
- **Figures**: a title on every plot, saved at slot size, no extra ink, one style
- **Your lab**: a big idea, five questions answered, done by 45–50 minutes
- **Questions**: repeat, answer briefly with facts, move on
- **Practice**: alone, recorded, short versions, non-scientists, then scientists



CHROMETAB

Thank you.
Questions?

Juanma Schvartzman
chroMetab Lab, Columbia University

Mark Rothko, Yellow and Blue (Yellow, Blue on Orange), 1955