

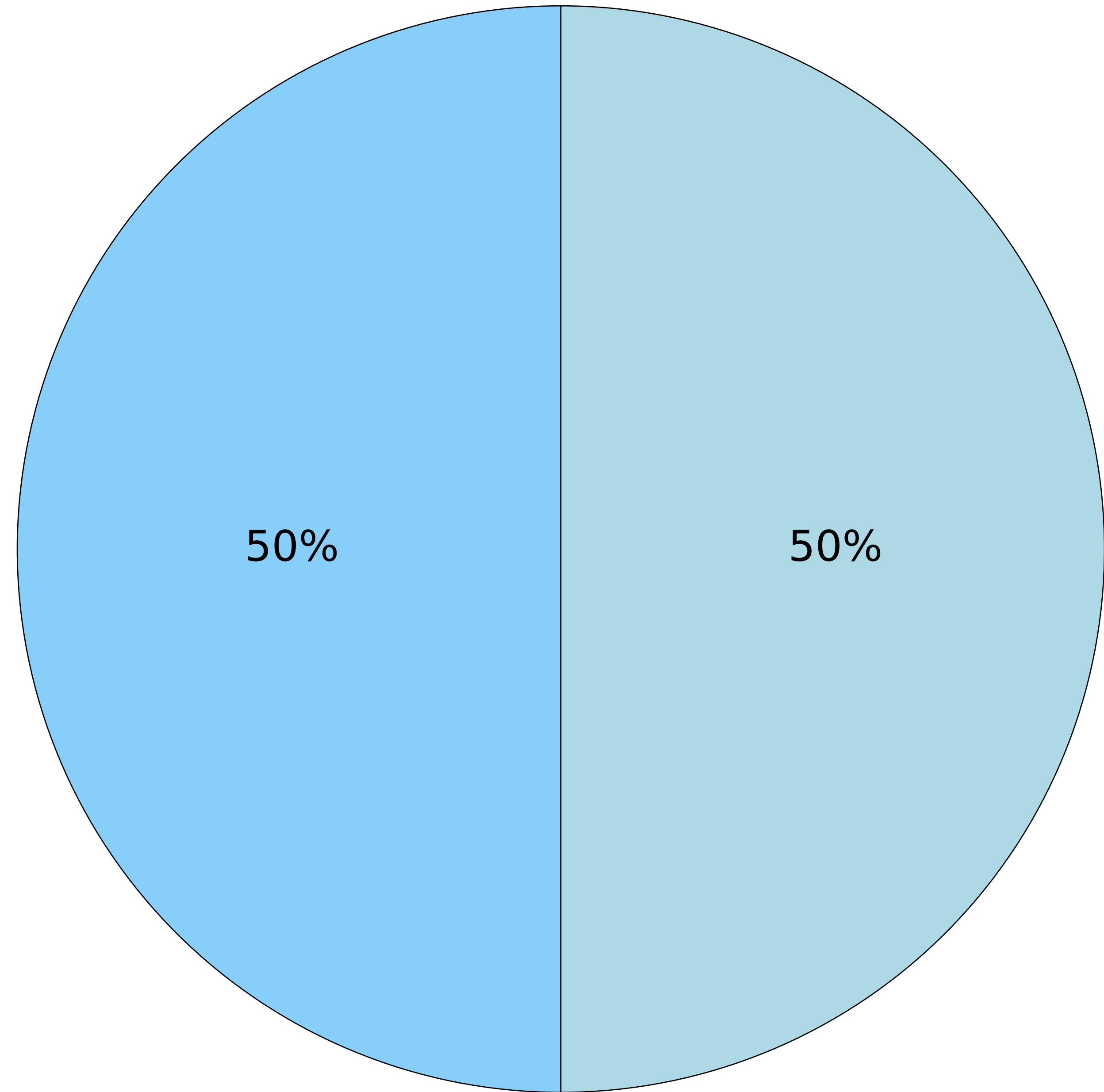
Plotting with Python for fun and profit: Matplotlib

Andrew Lonsdale (@LonsBio)

COMBINE Python workshop: taking Python to the next level

Thursday 27th November, 2014

Fun and ...Profit



It can be hard jumping
in to do all your
plots in something
you are not
familiar with.

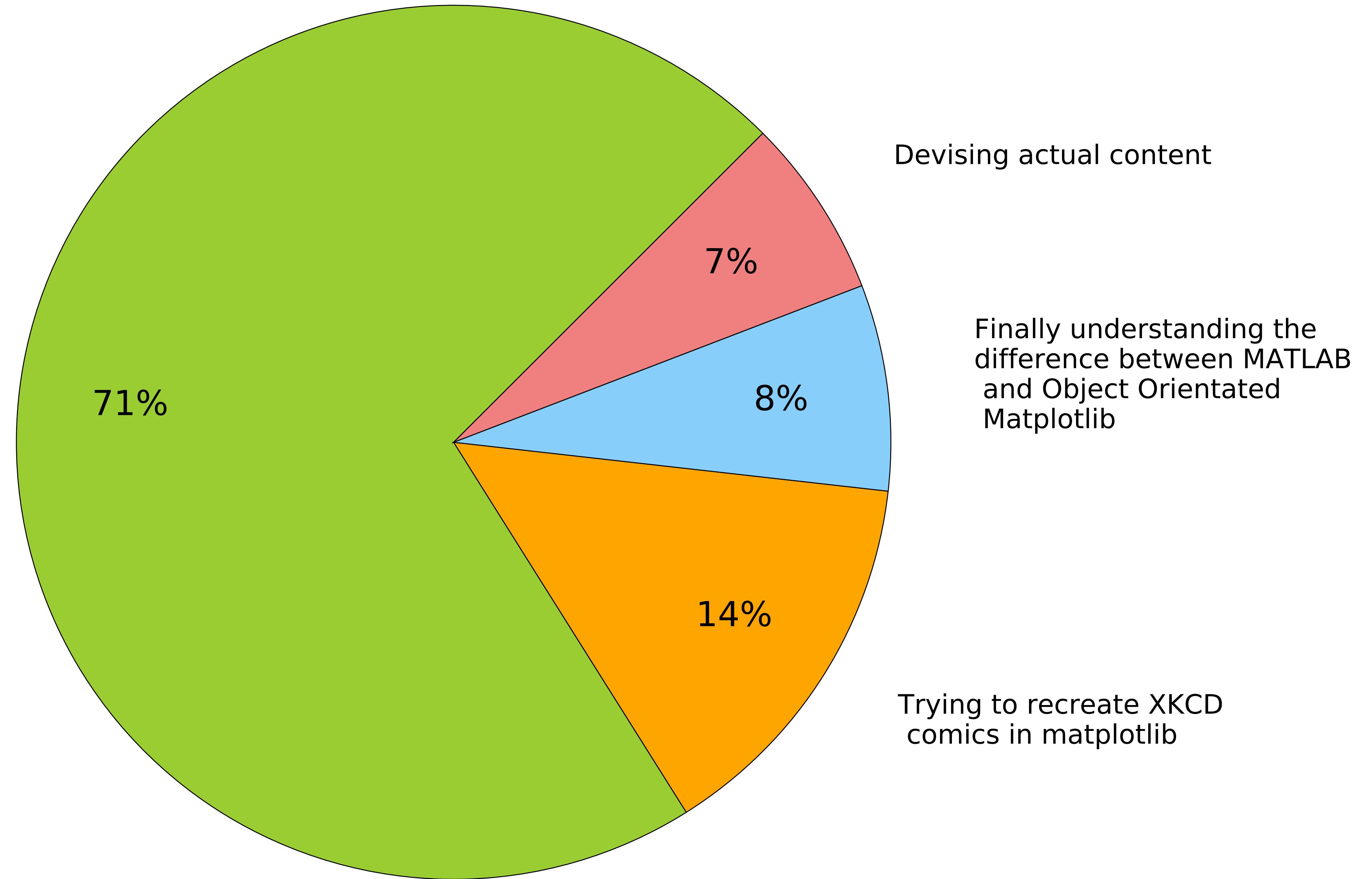
Blog posts,
presentations etc
are a great way to
get comfortable
and practice.

...Profit

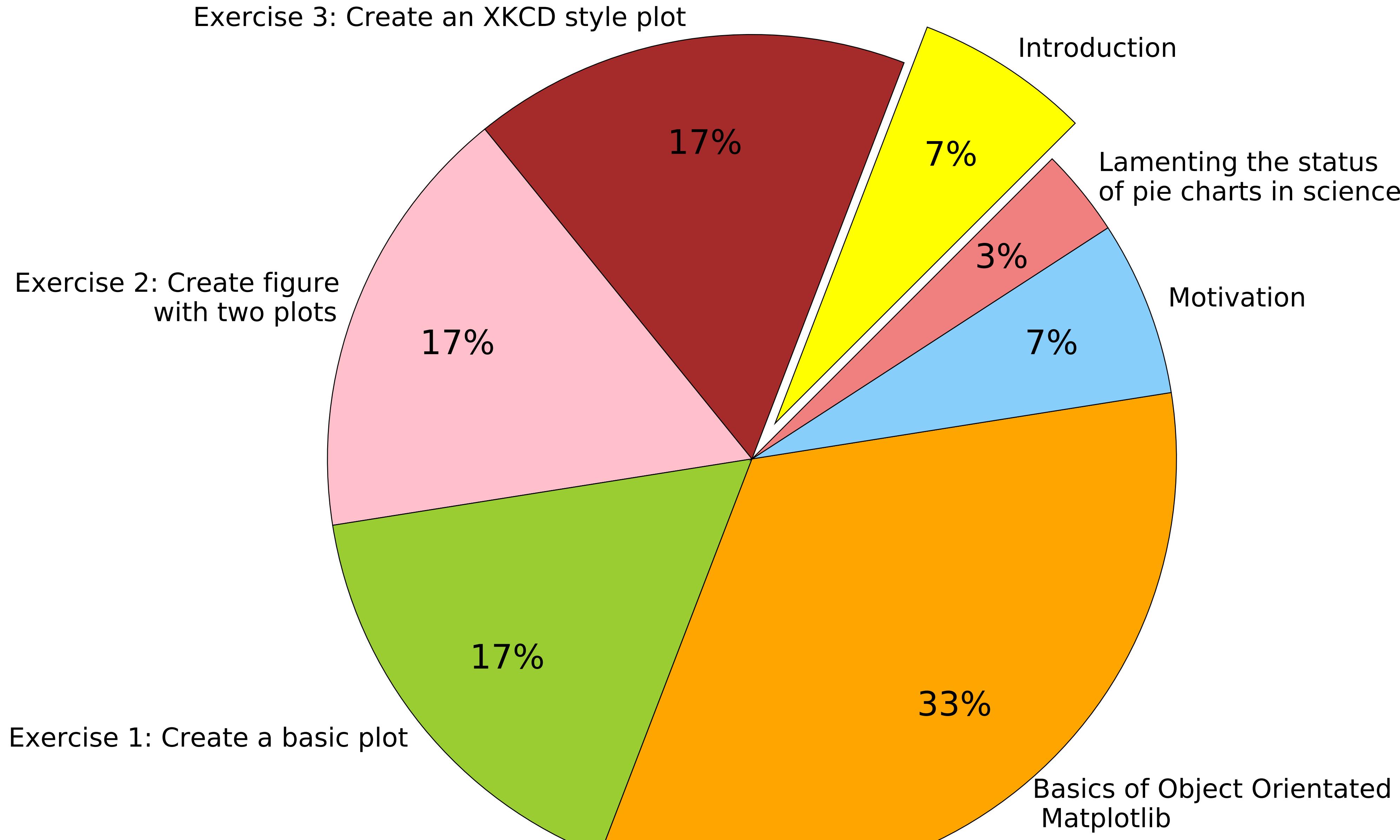
Your research is unique
- there will be a time
when off-the-shelf,
standard visualisation
simply will not do.

When that time comes,
knowledge of a way to
precisely create the
exact plot you need
might come in handy.

Time spent preparing for this talk

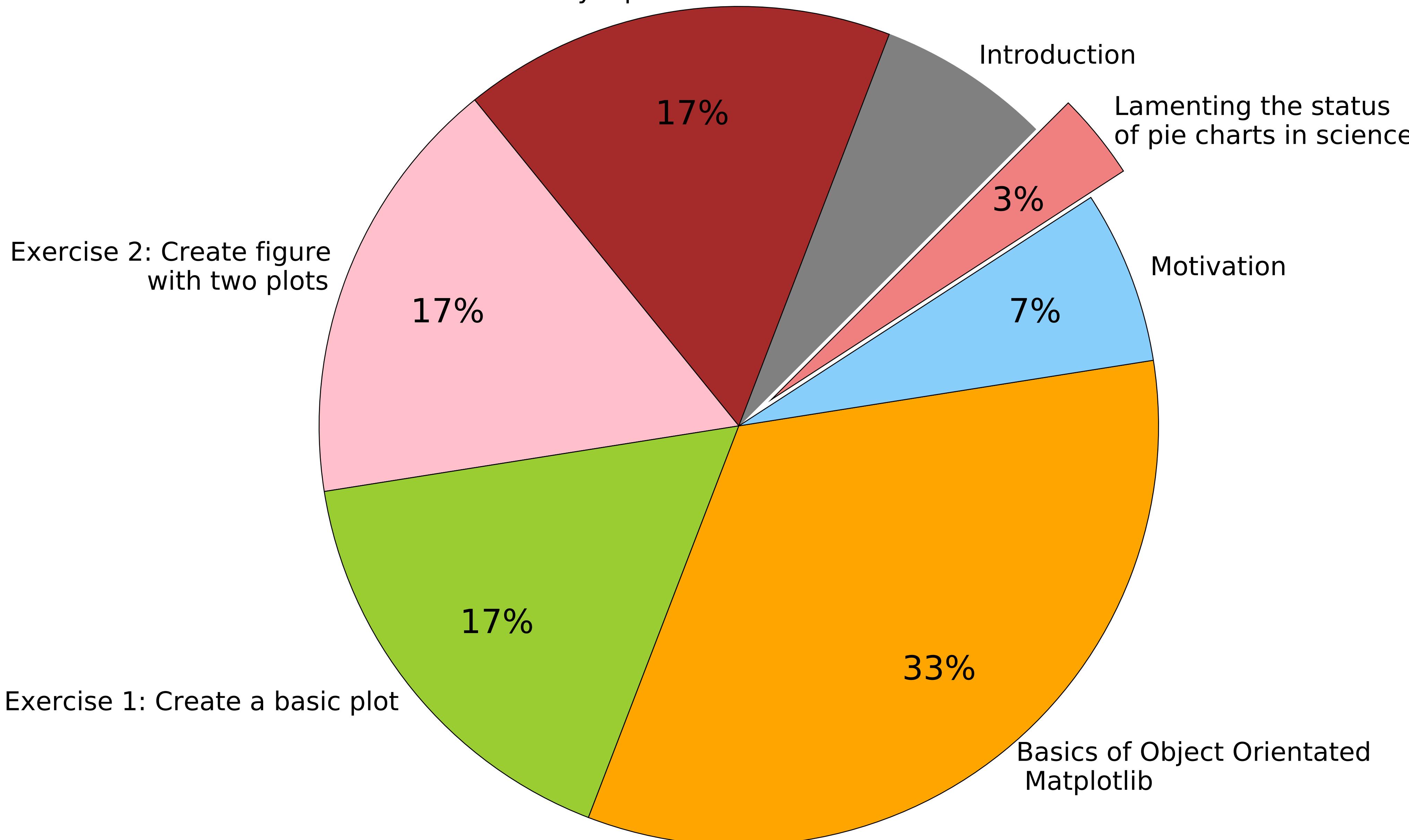


Time spent during this talk



Time spent during this talk

Exercise 3: Create an XKCD style plot



Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en tracés des zones. Le rouge désigne les hommes qui entrent en Russie; le noir ceux qui en sortent. Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Chiers, de Ségur, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davout qui avaient été détachés sur Minsk et Mohilow et qui rejoignirent Oroscha et Wilebsk, avaient toujours marché avec l'armée.

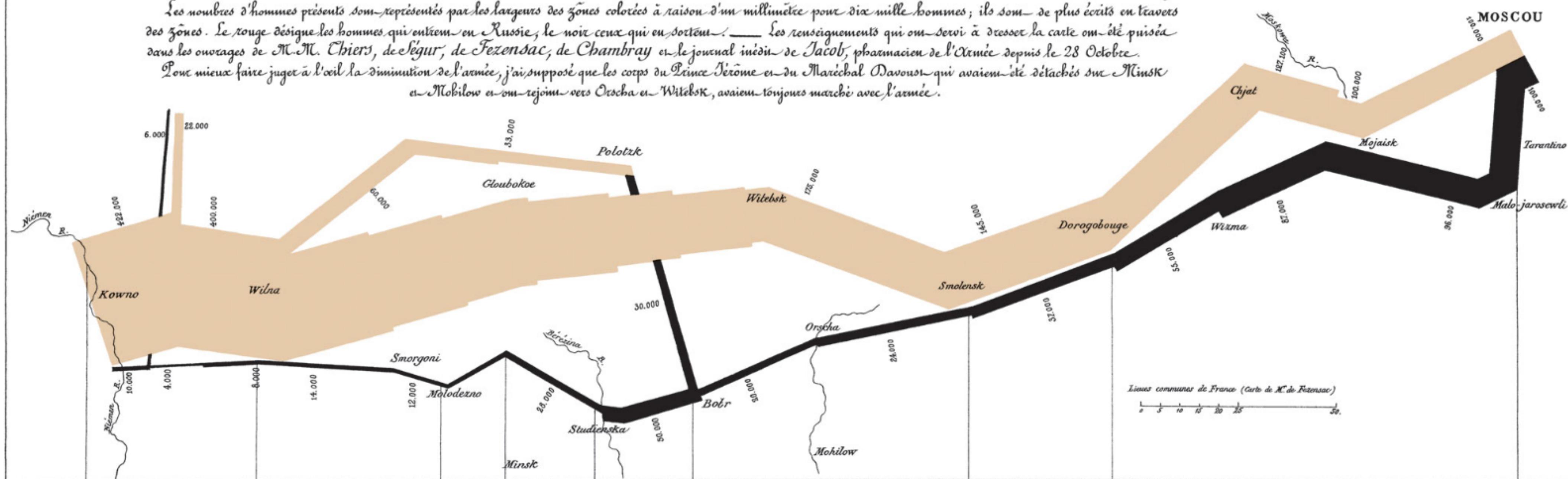


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les Cosaques passent au galop
le Niemen gelé.

-26° le 7 X^{bre}
-30° le 6 X^{bre}

-24° le 1^{er} X^{bre}

-20° le 28 9^{bre}

-11°

-21° le 14 9^{bre}

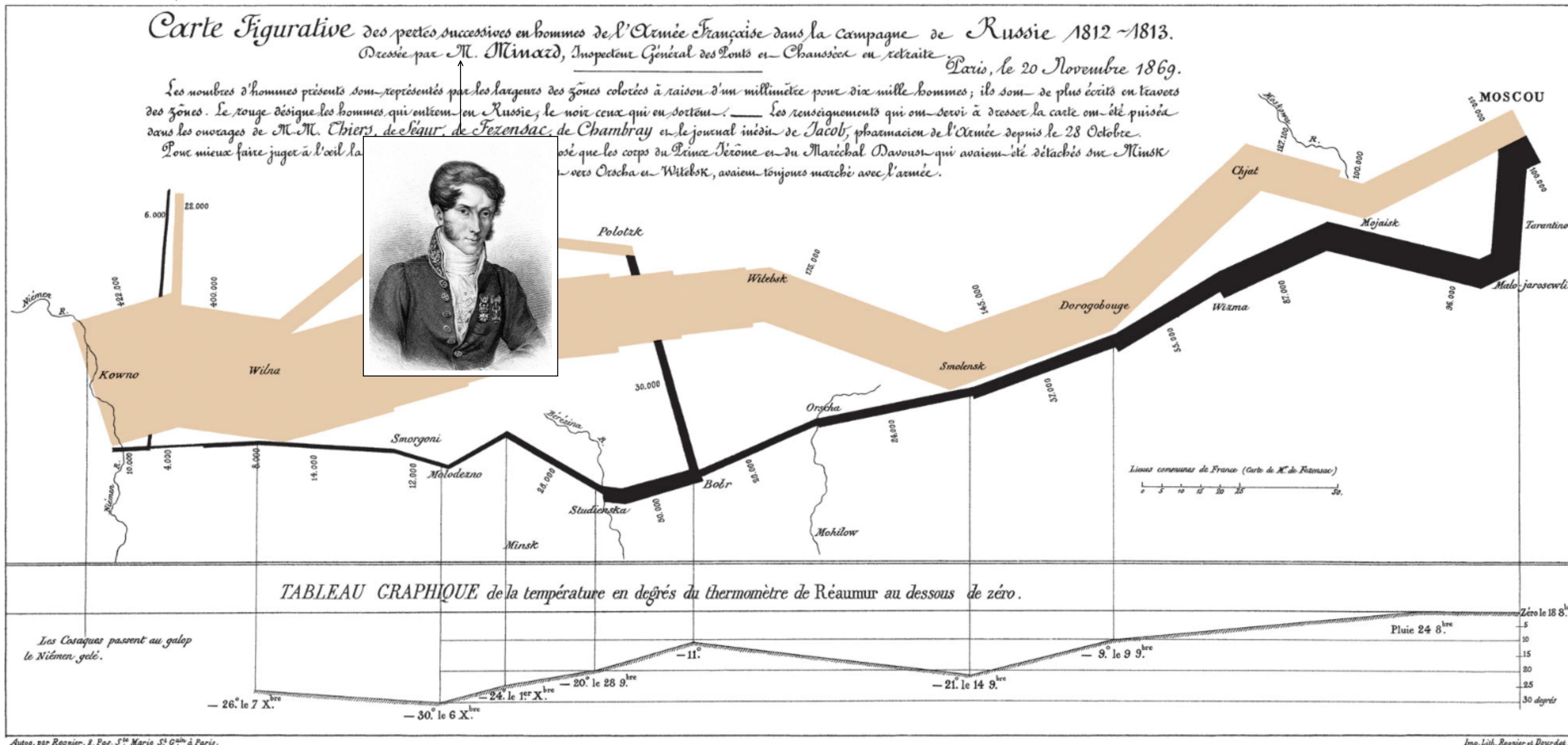
-9° le 9 9^{bre}

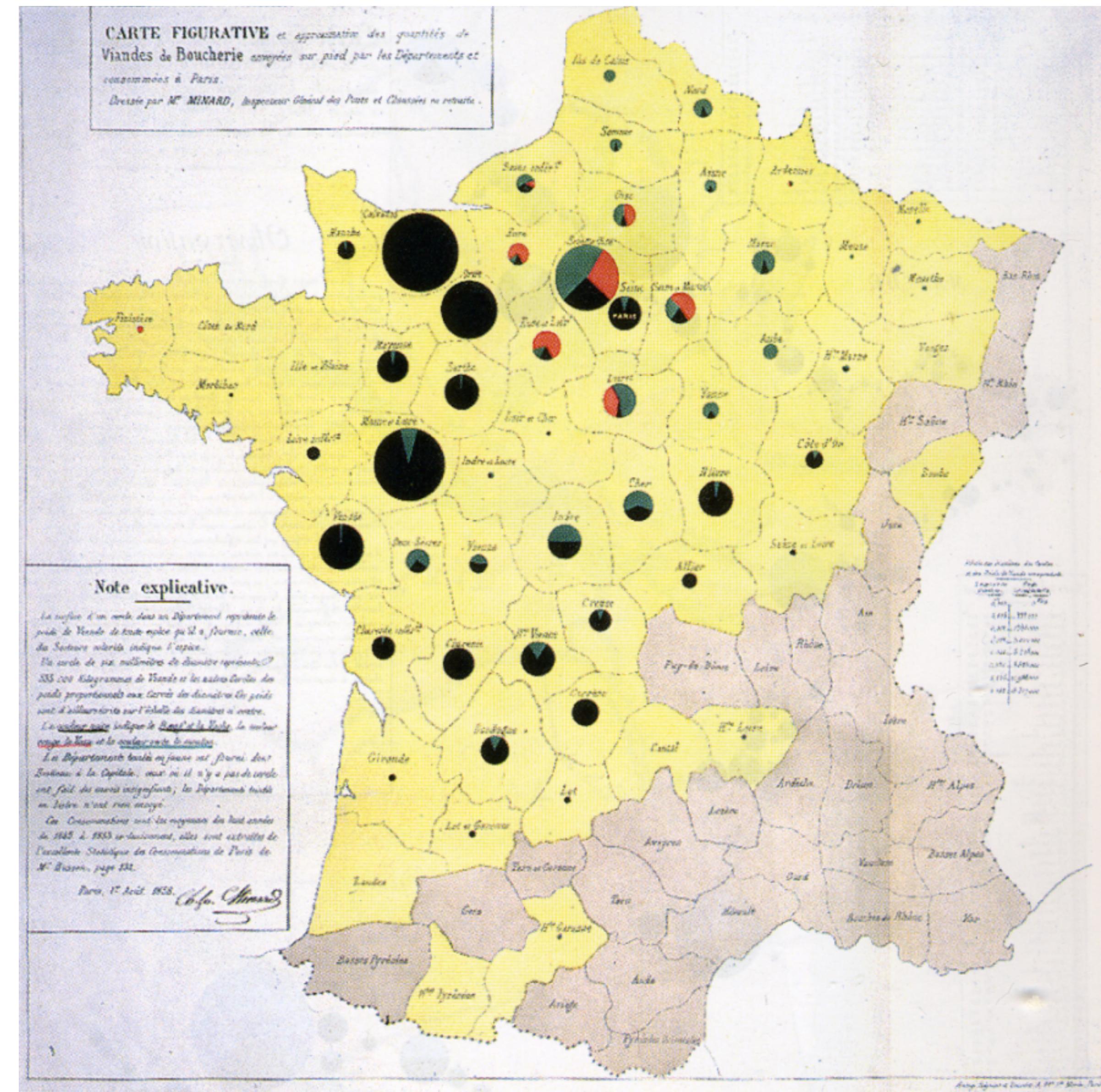
Pluie 24 8^{bre}

Zero le 18 8^{bre}
5
10
15
20
25
30 degrés

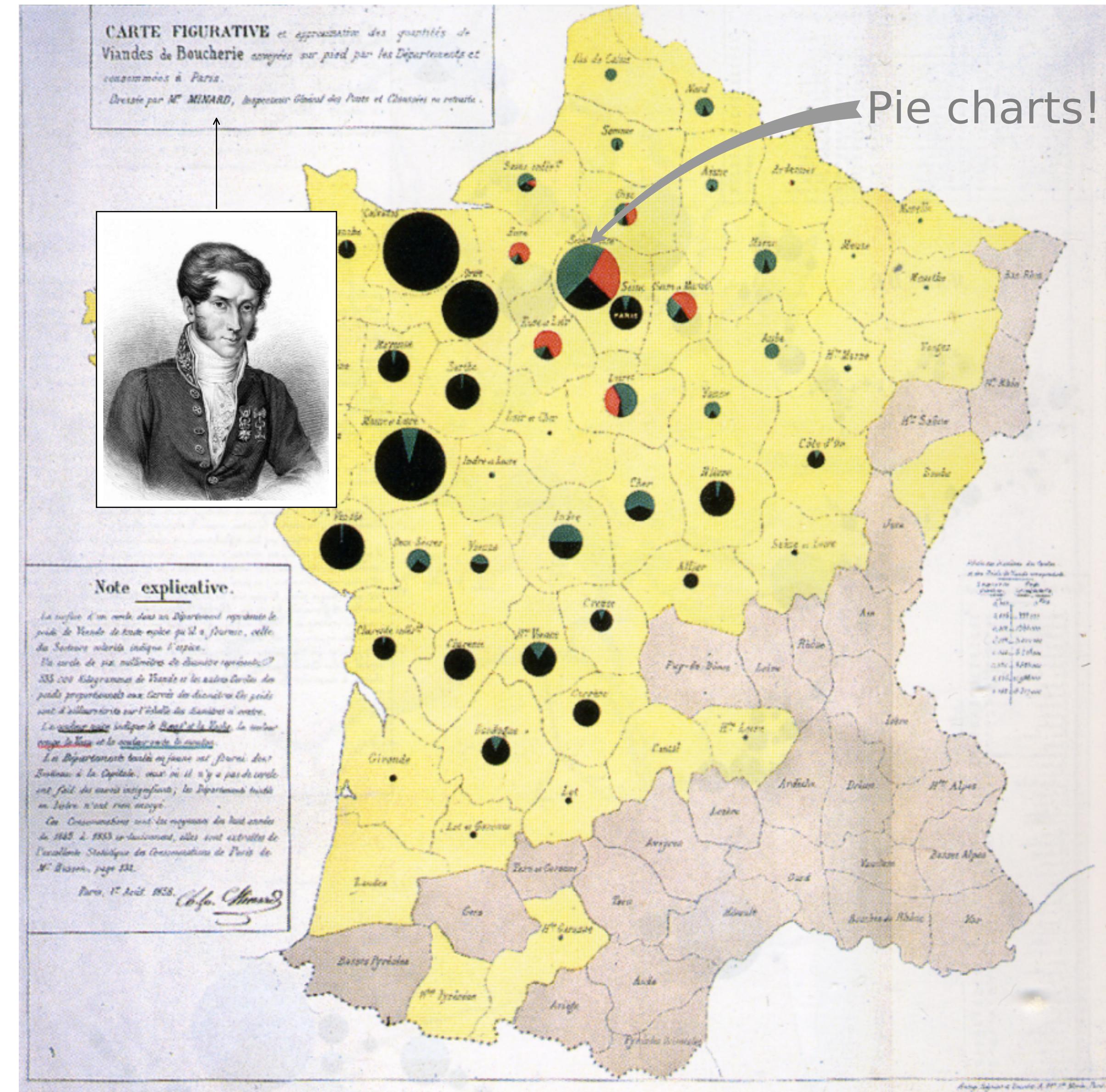
'may well be
the best statistical
graphic ever drawn'

Charles Joseph Minard (1869)





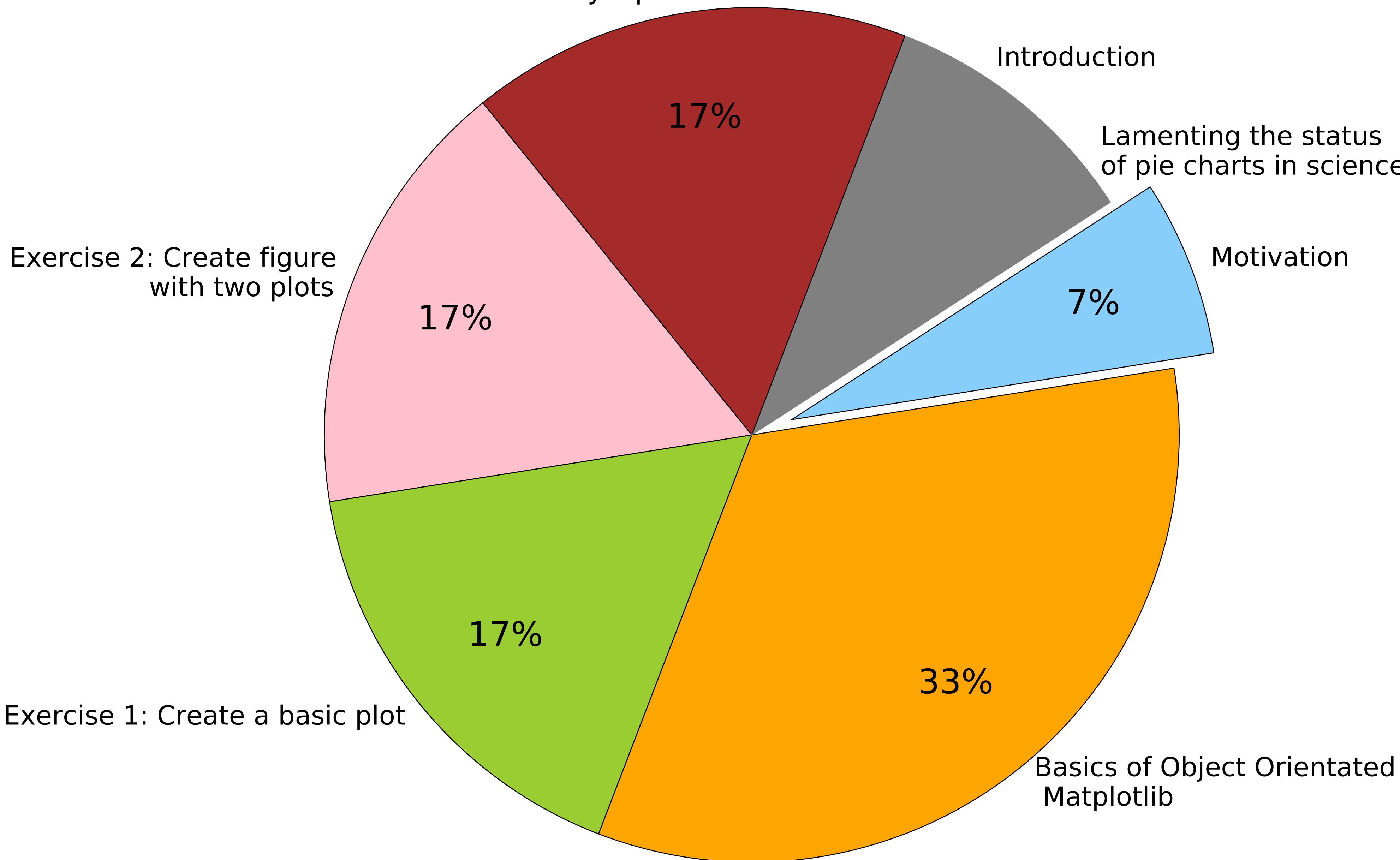
Charles Joseph Minard (1858)



Pie charts!

Time spent during this talk

Exercise 3: Create an XKCD style plot





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Harriet Dashnow Andrew Lonsdale, Philip E. Bourne

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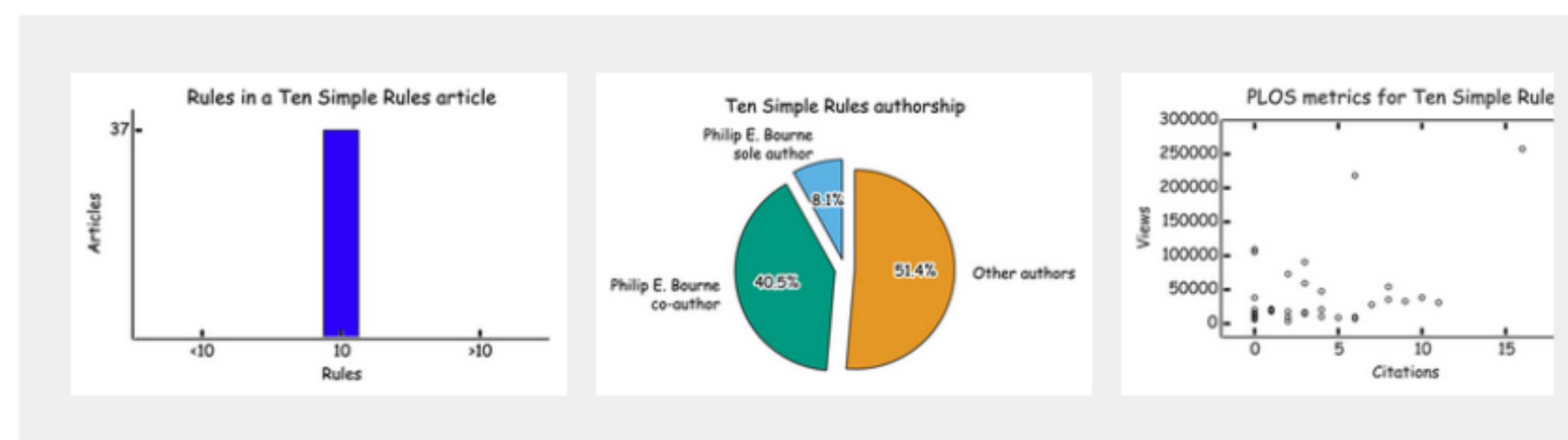
▶ Introduction

Rule 1: Have Ten Rules

Rule 2: Choose Your
Topic WiselyRule 3: Include an
IntroductionRule 4: Be Philip E.
Bourne

Rule 5: Collaborate

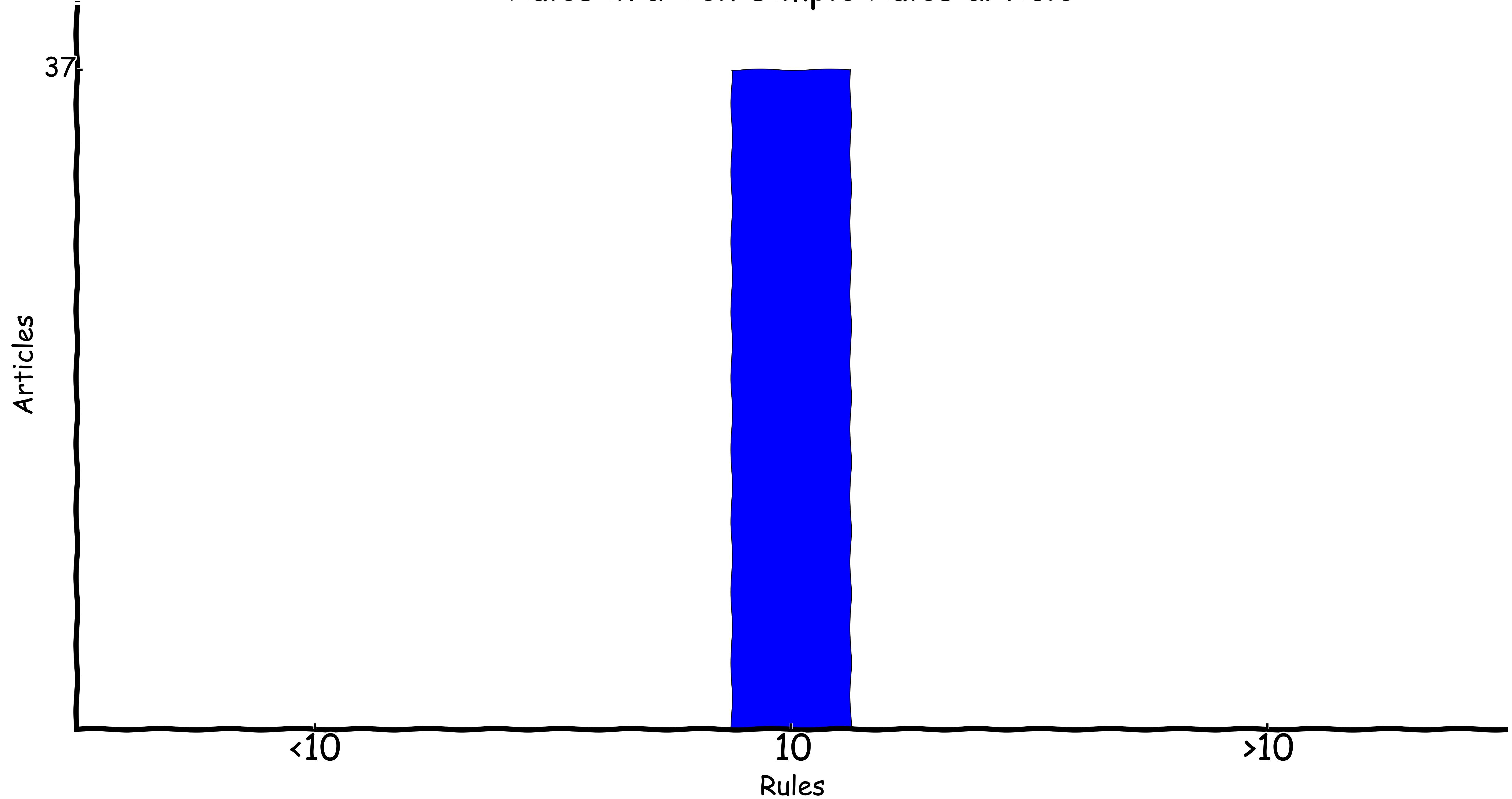
Figures



Subject Areas

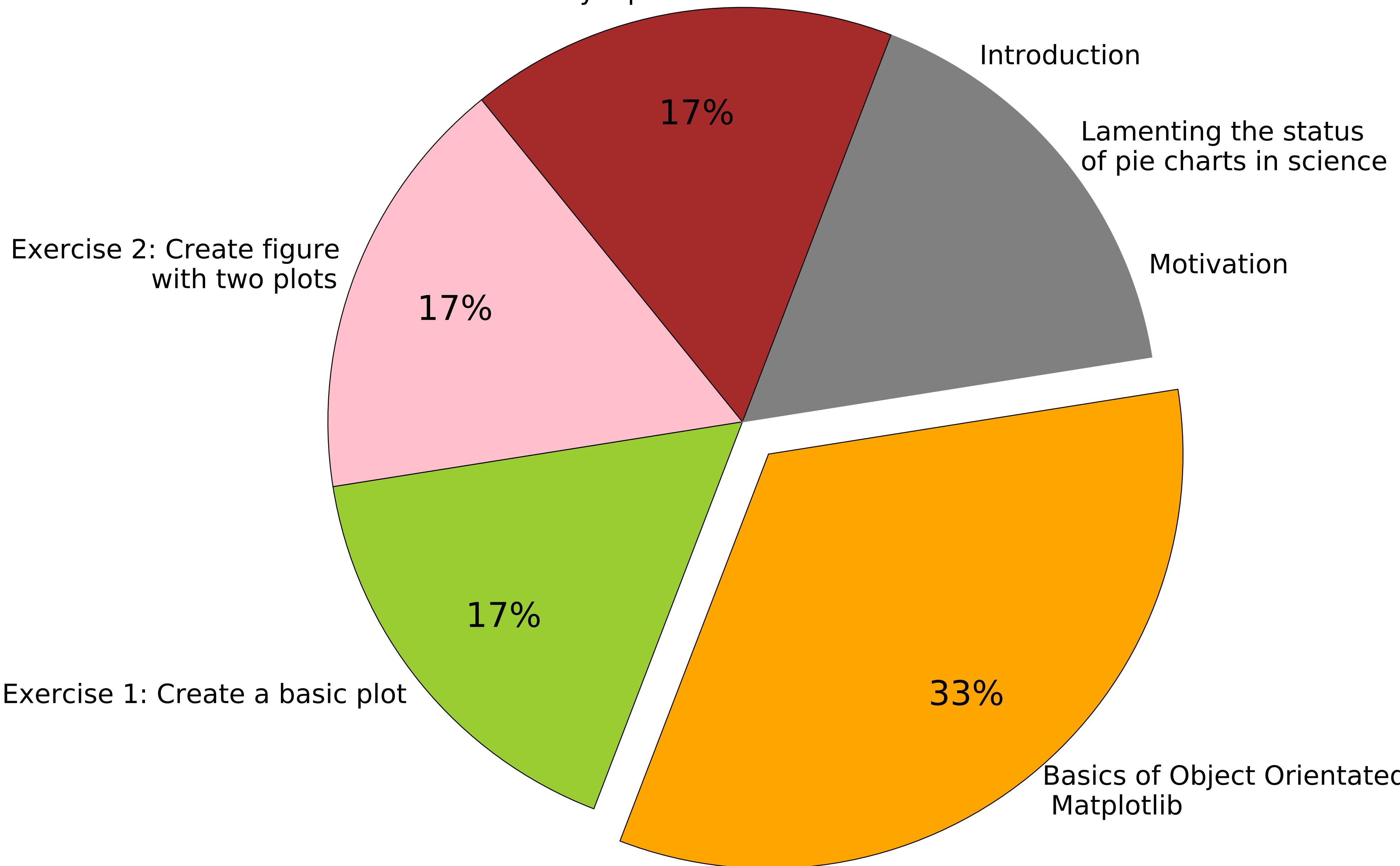


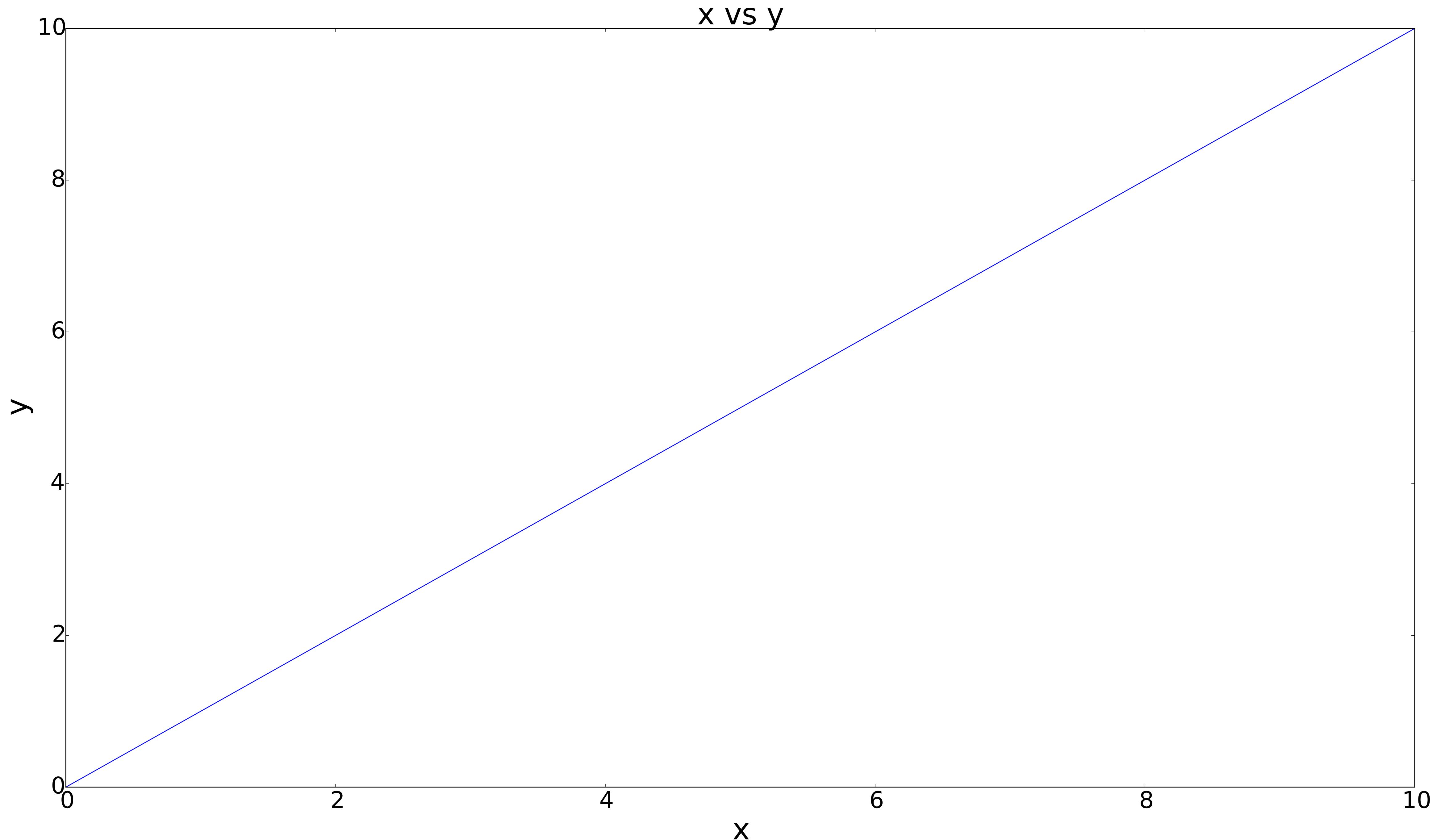
Rules in a Ten Simple Rules article



Time spent during this talk

Exercise 3: Create an XKCD style plot

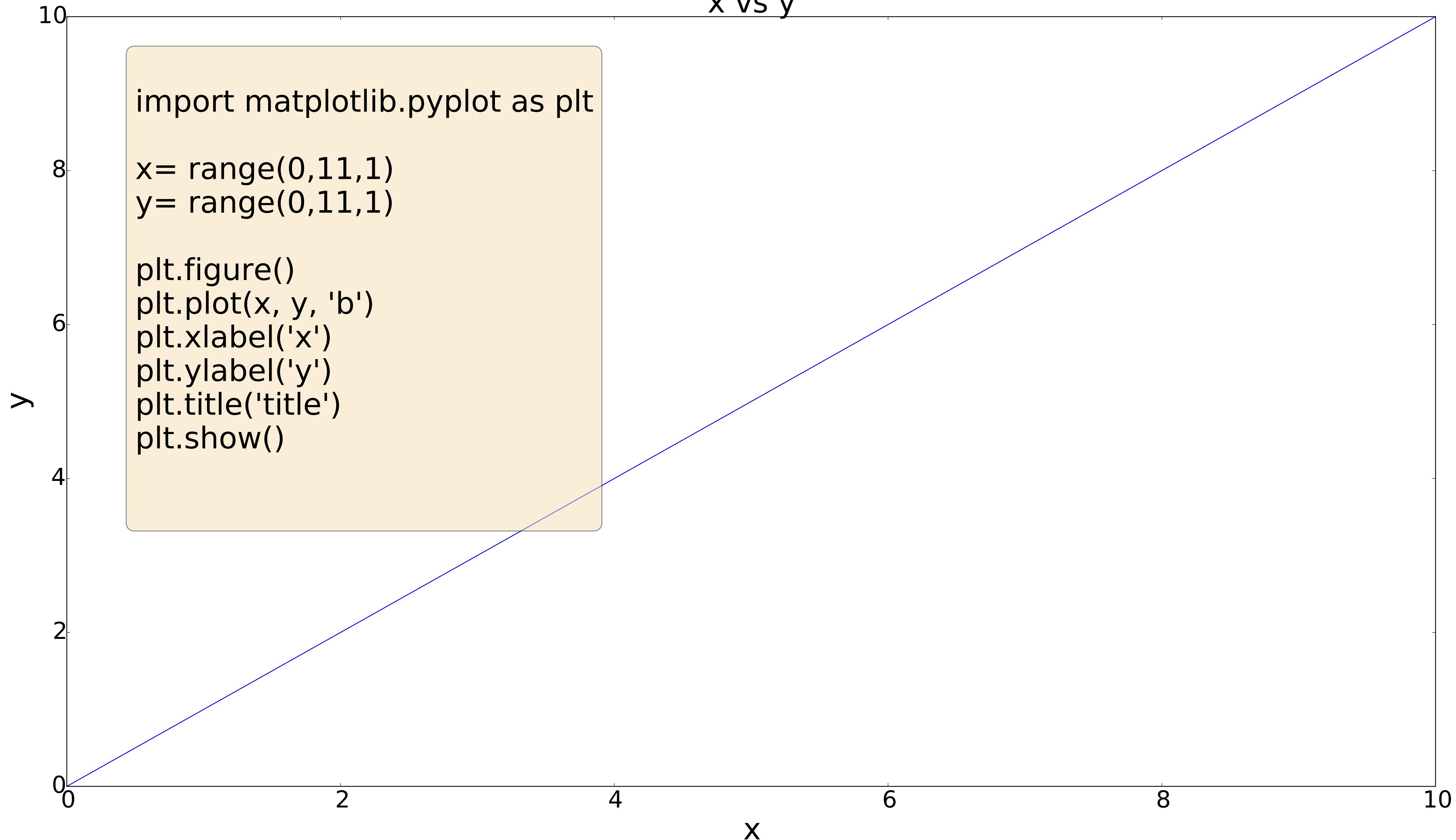




Matplotlib MATLAB concepts:

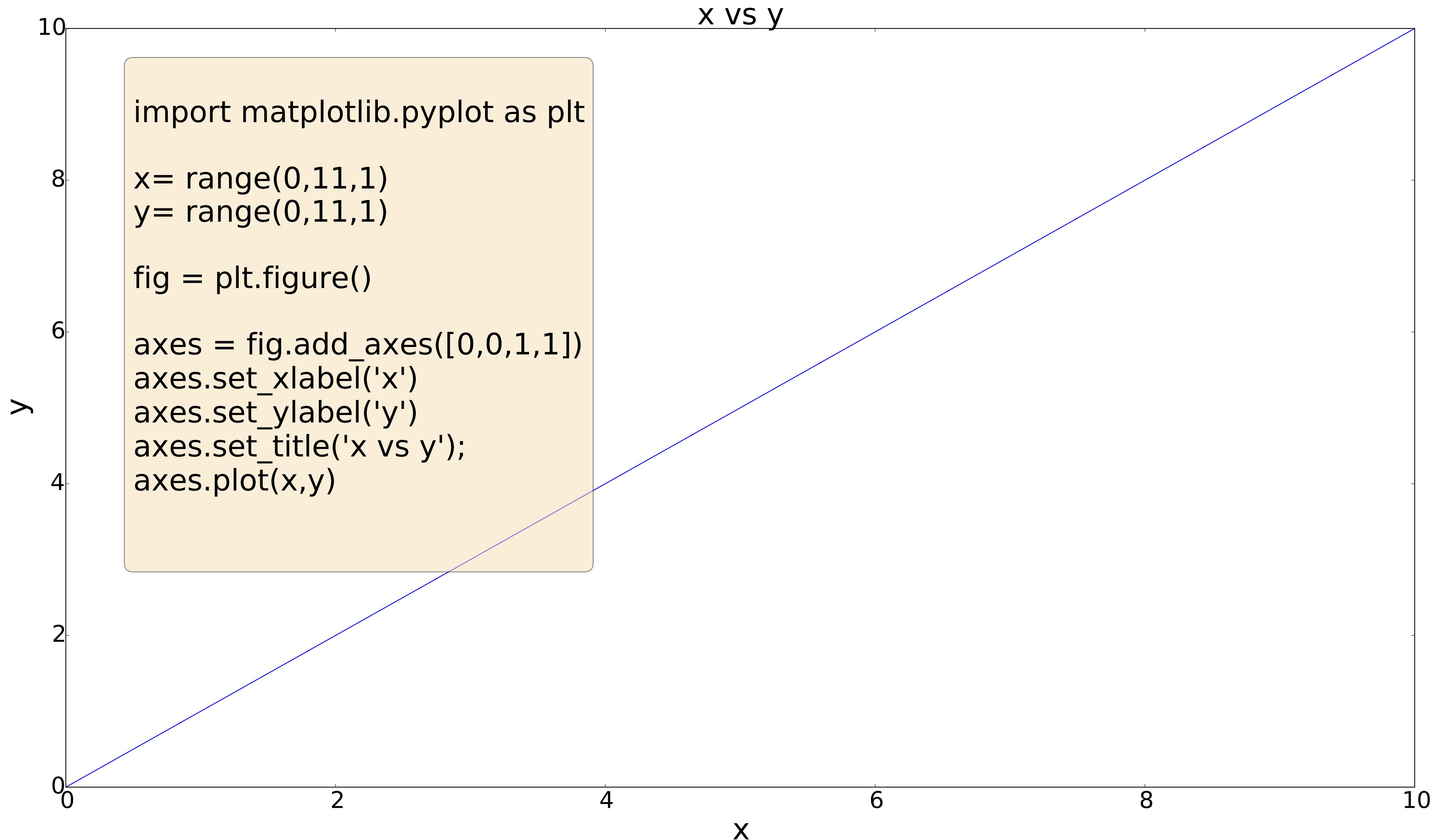
- MATLAB plot compatibility
- Concepts of states (current figure)
- Easy!
- Not as intuitive from a programming/Python point of view (in my opinion)
- If you've never plotted in MATLAB, recommend jumping into the OO deep end

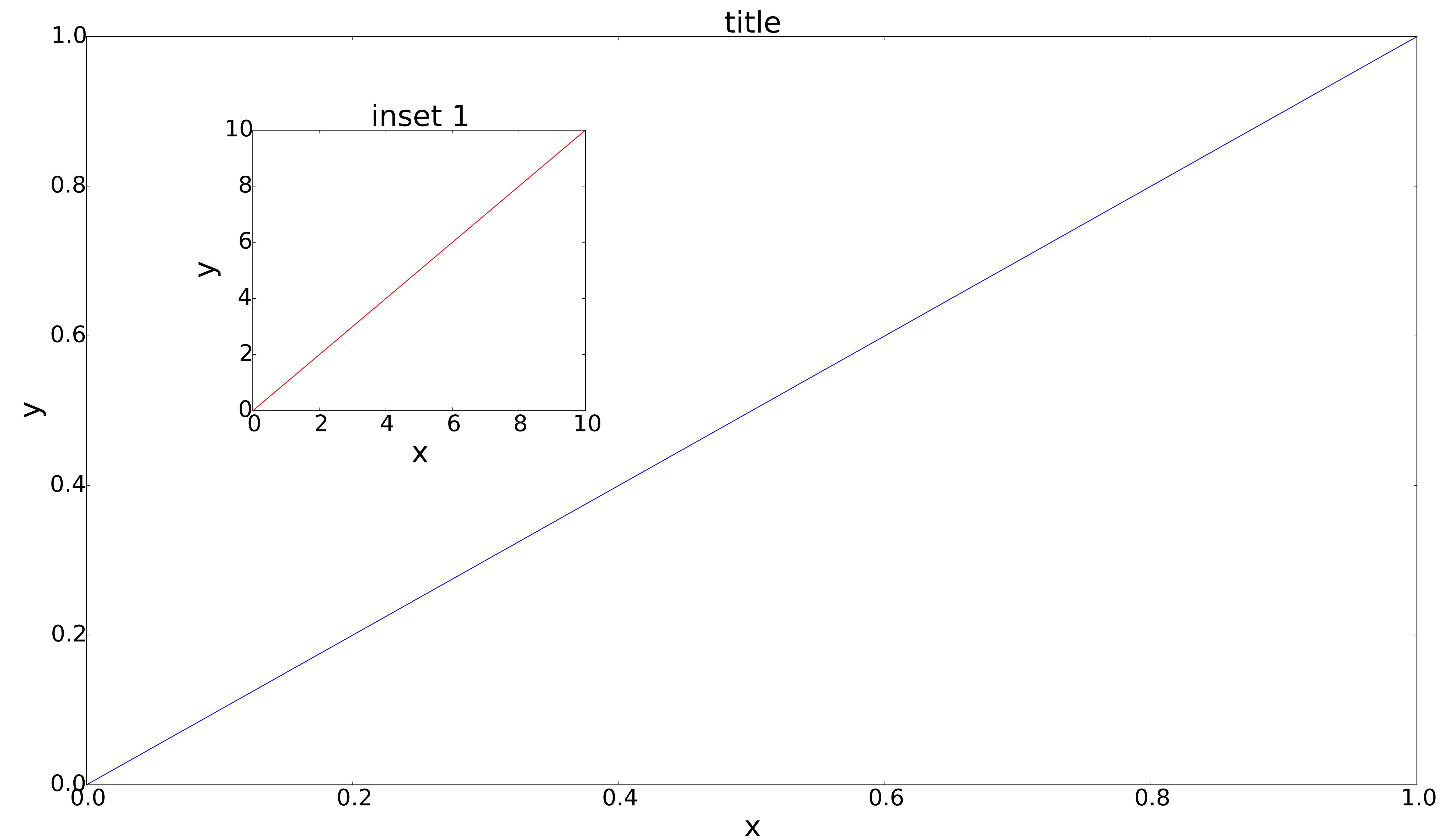
x vs y



Matplotlib API concepts:

- Objects orientated
- Instead of 'current figure', figures like any other object
- Figure is a container object for Axes
- Axes hold the plots
- Figures can have more than one Axes!



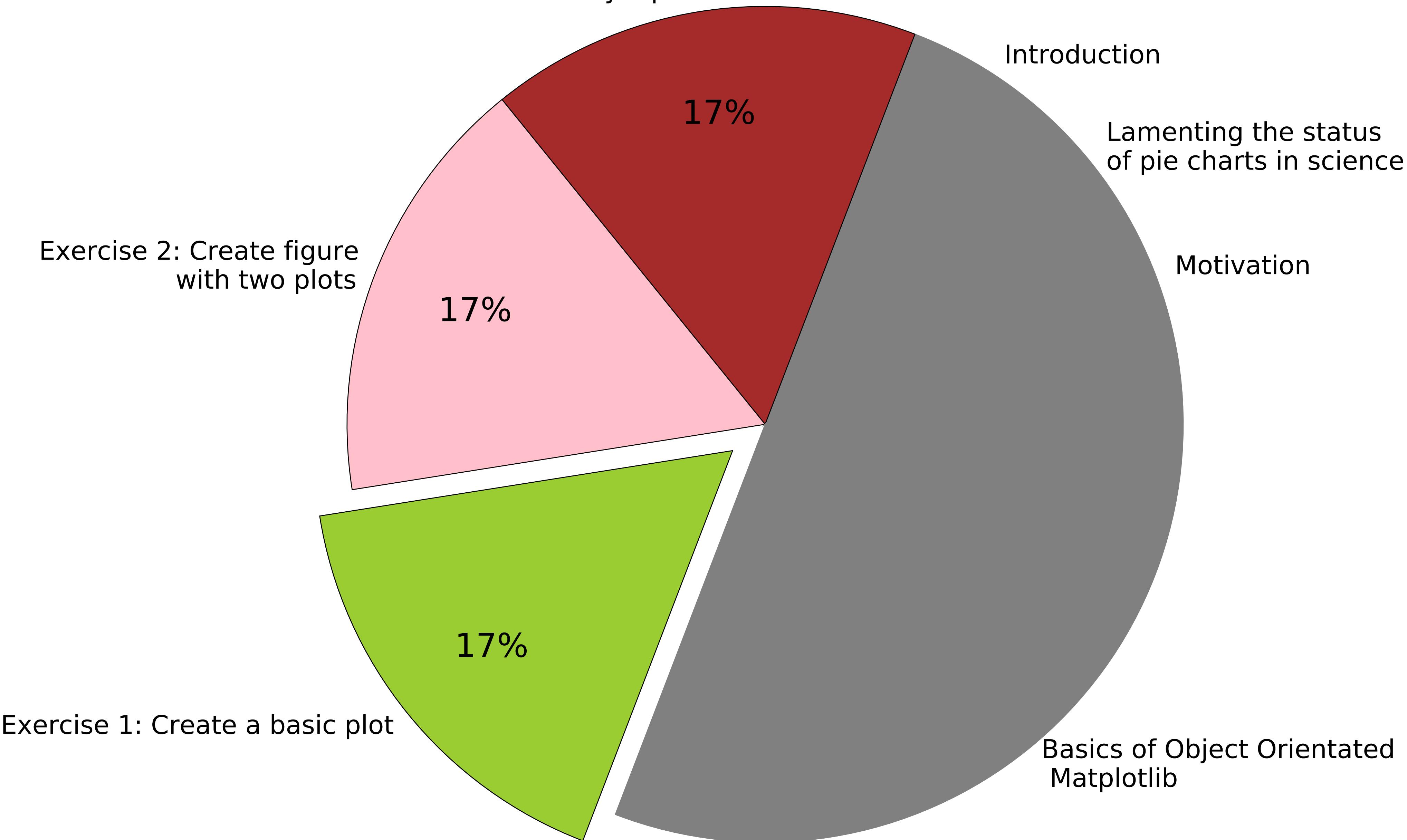


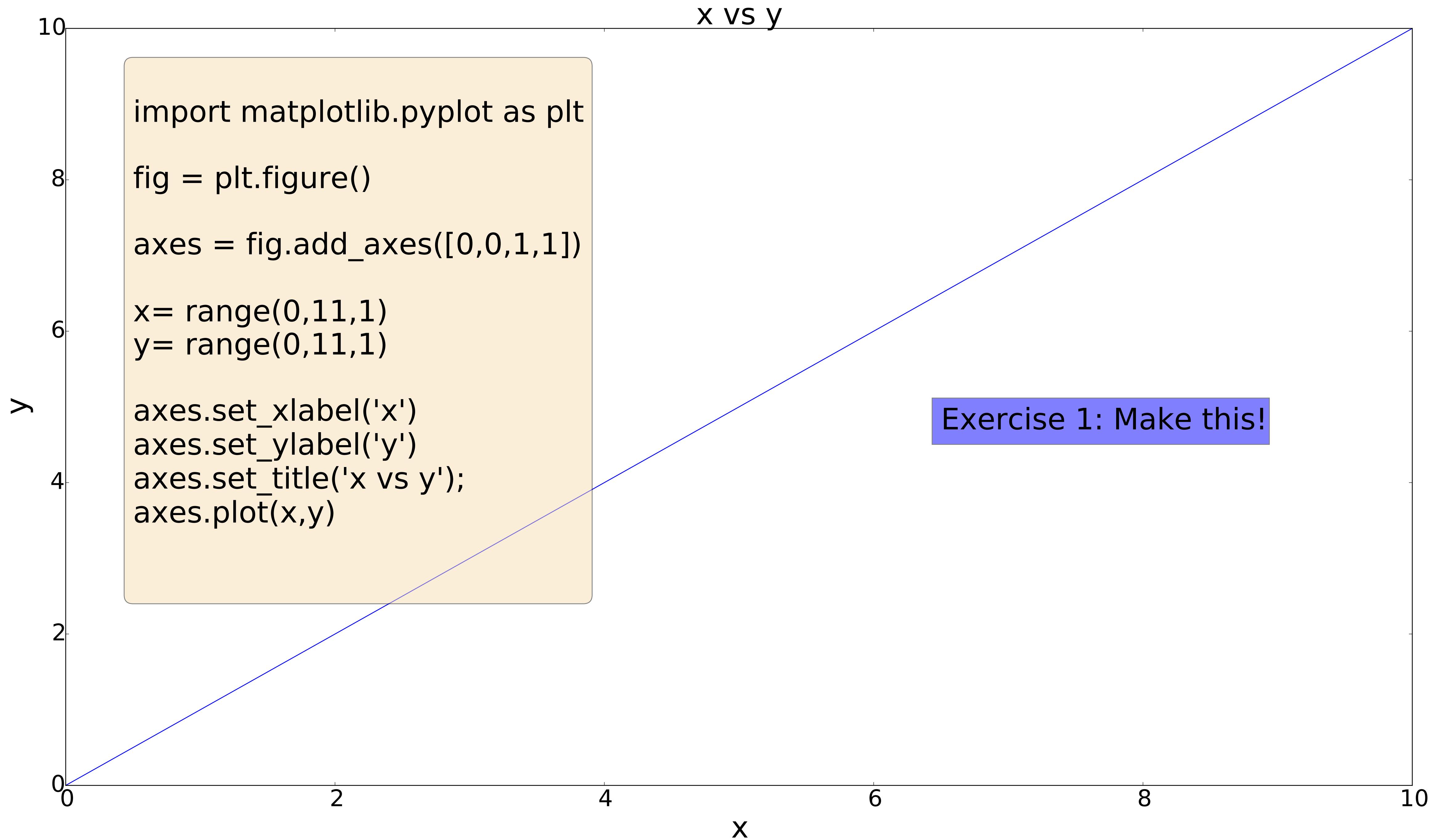
Best way to learn matplotlib is through examples

- Gallery: <http://matplotlib.org/gallery.html>
- Some examples will use OO, some MATLAB
- Anything you can do with the MATLAB approach, you can do with OO

Time spent during this talk

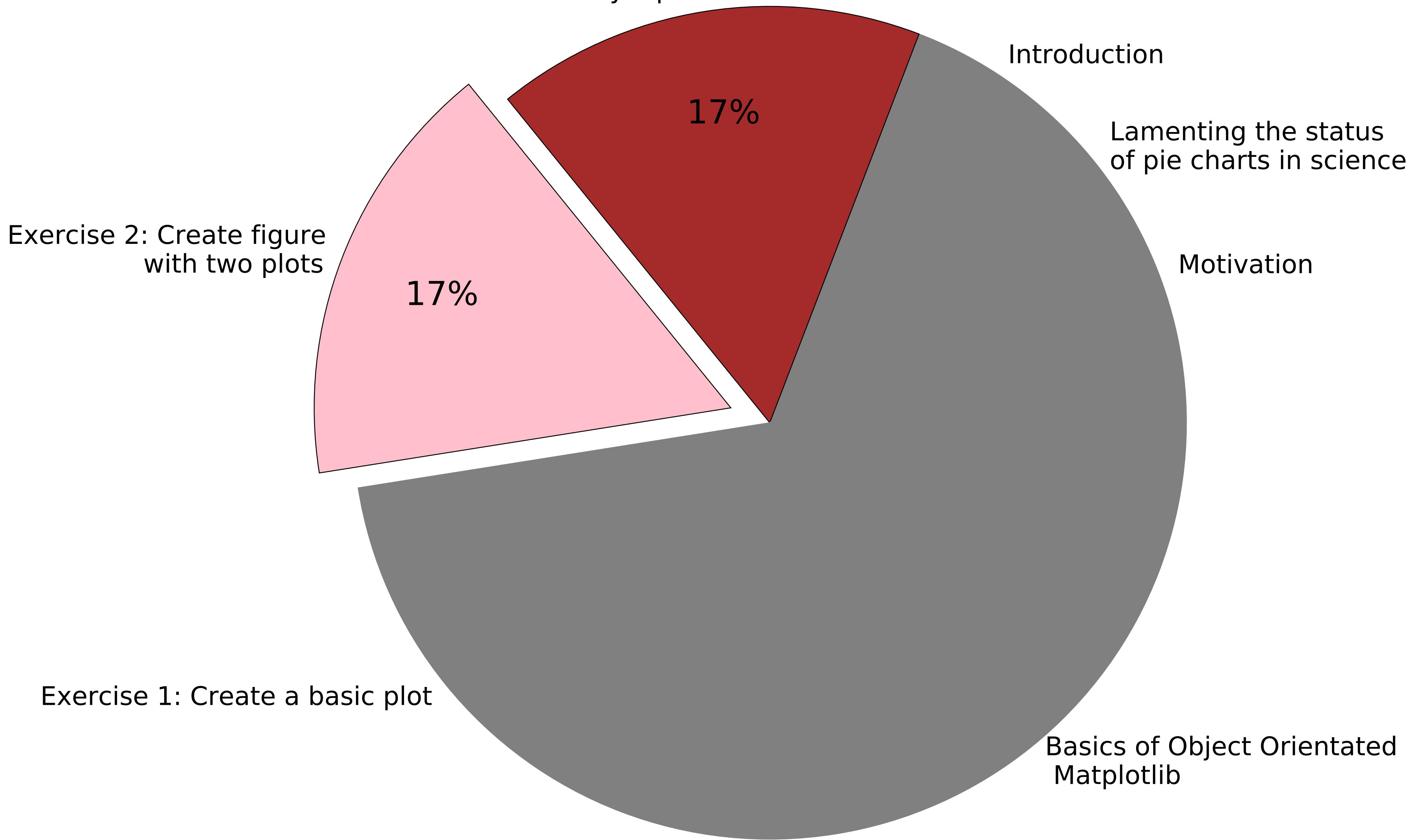
Exercise 3: Create an XKCD style plot

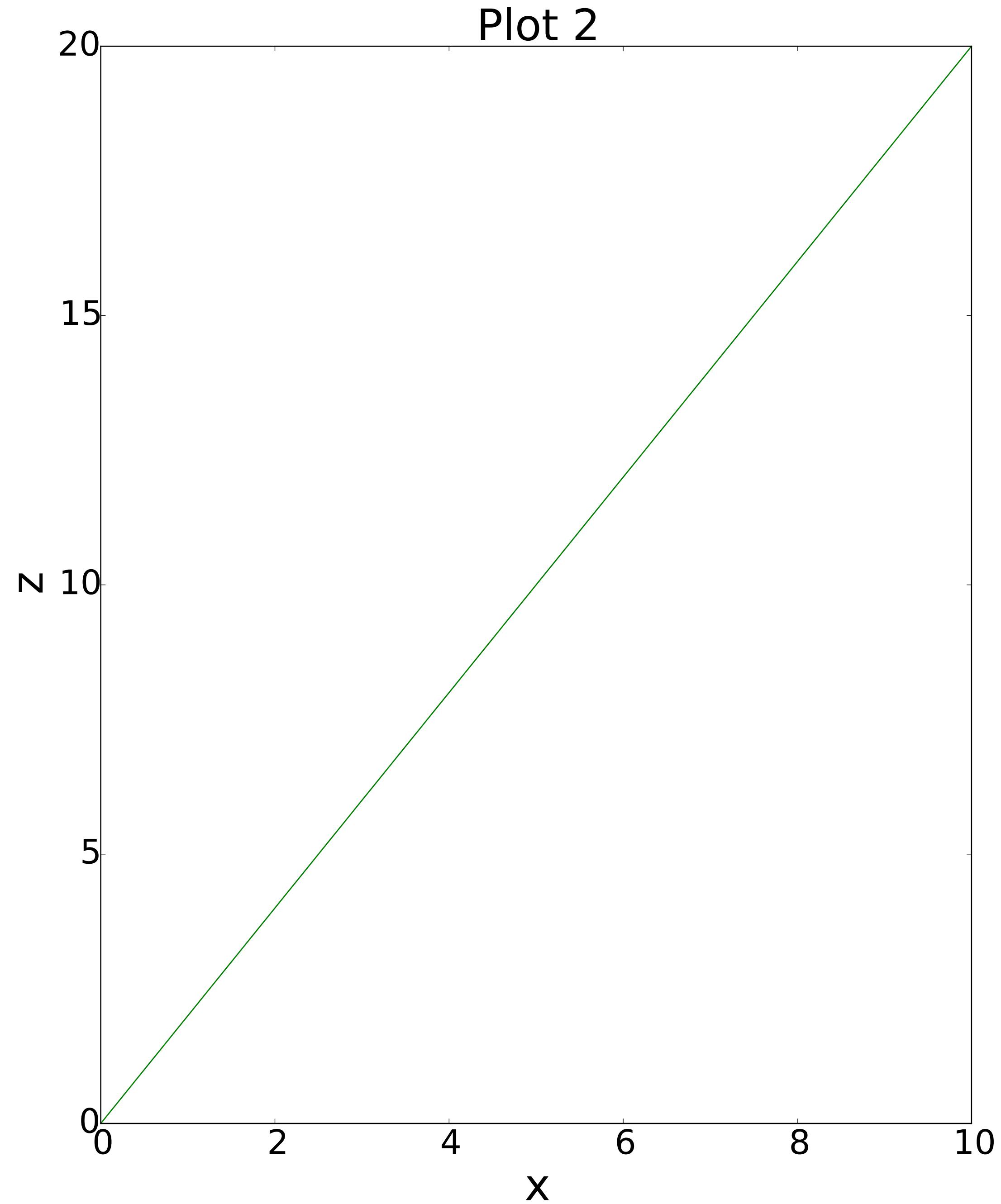
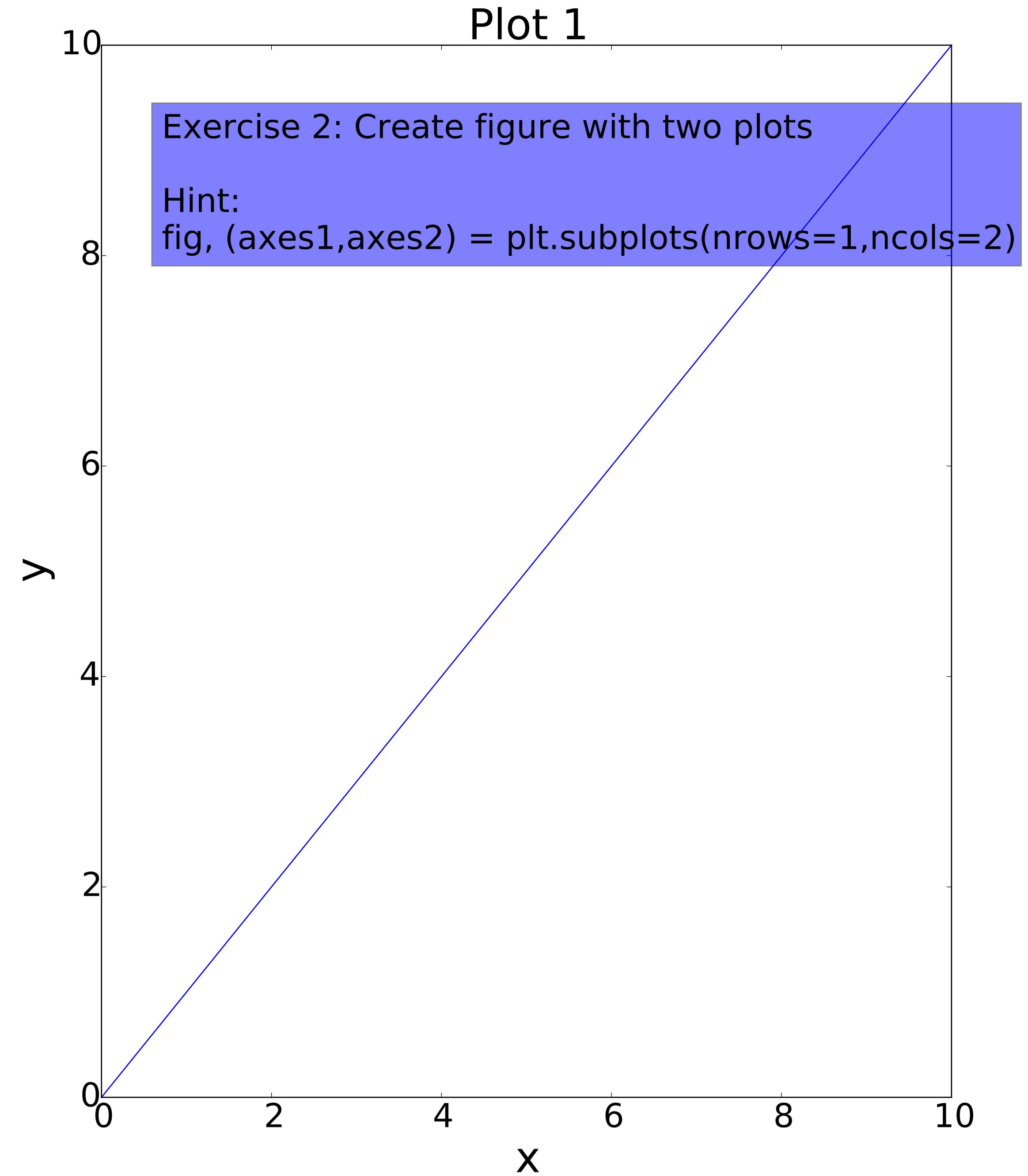




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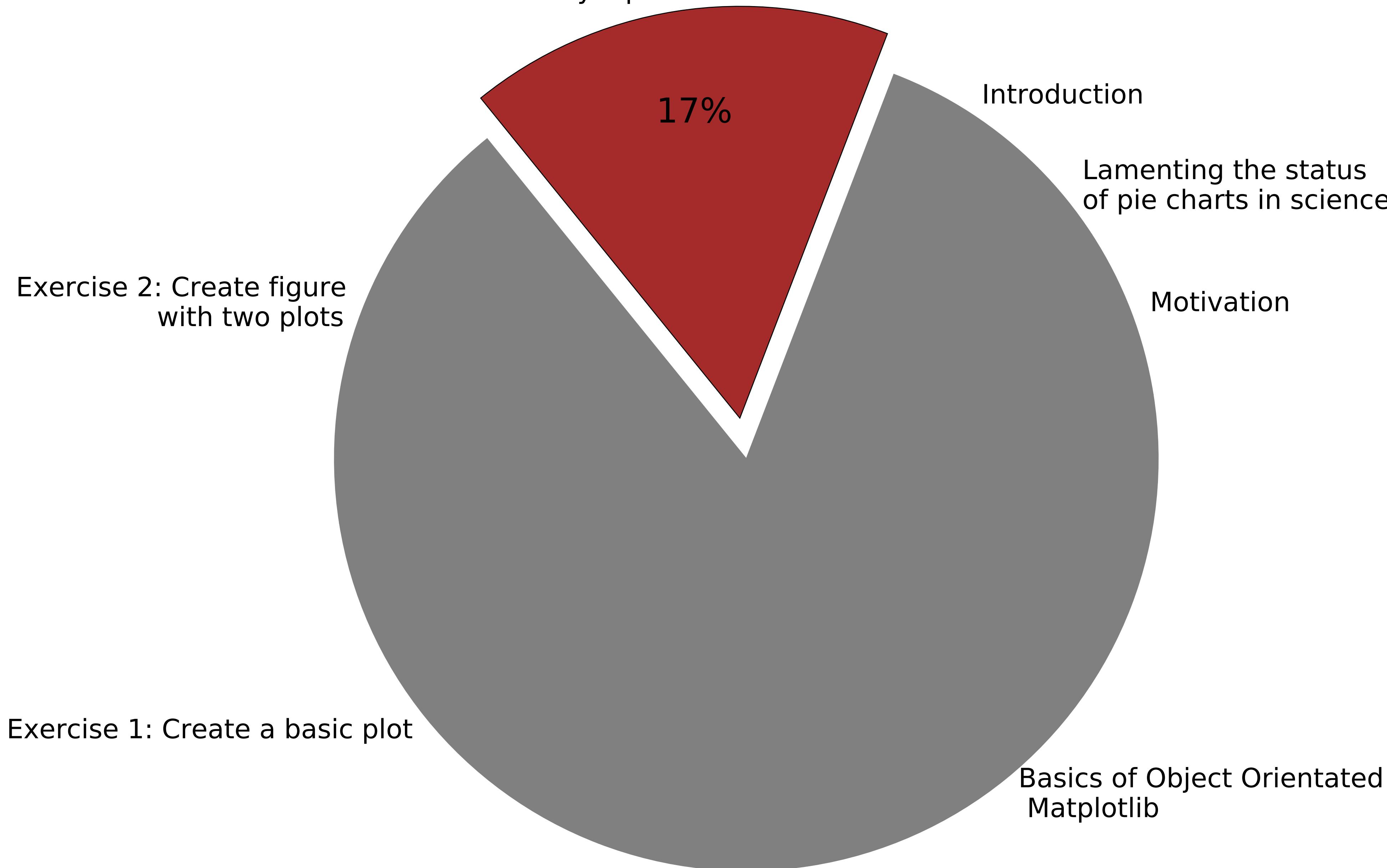
Exercise 3: Create an XKCD style plot





Time spent during this talk

Exercise 3: Create an XKCD style plot



Exercise 3: Create an XKCD style plot.

Be creative!

Any type of chart, and use things like:

- text
- images
- extra plots
- colours
- annotations

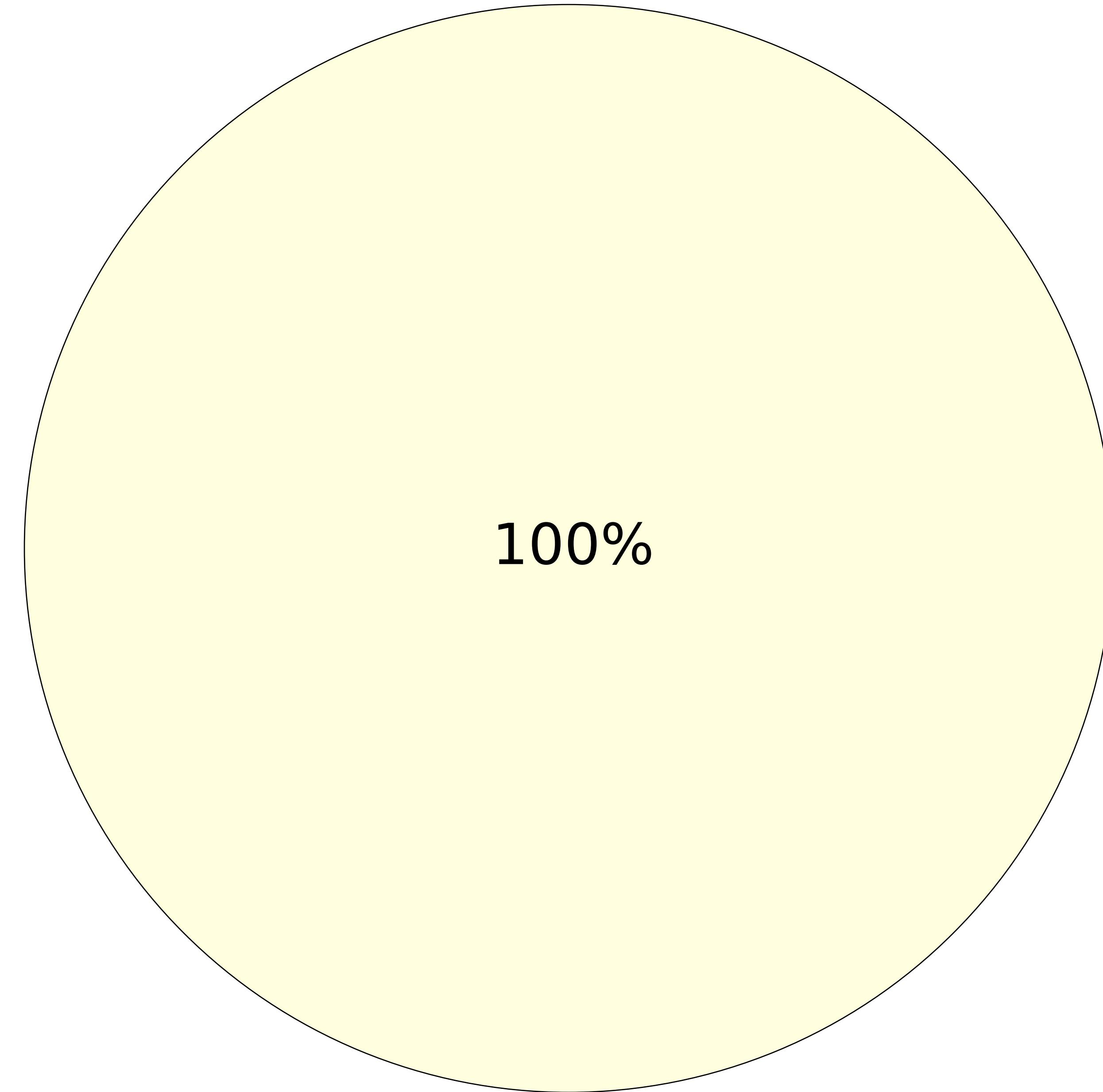
Who thinks they can do exercise 1,2 and 3?

No.

You haven't actually taught us anything.

You talked too much about pie charts.

Slides in this talk that are plots



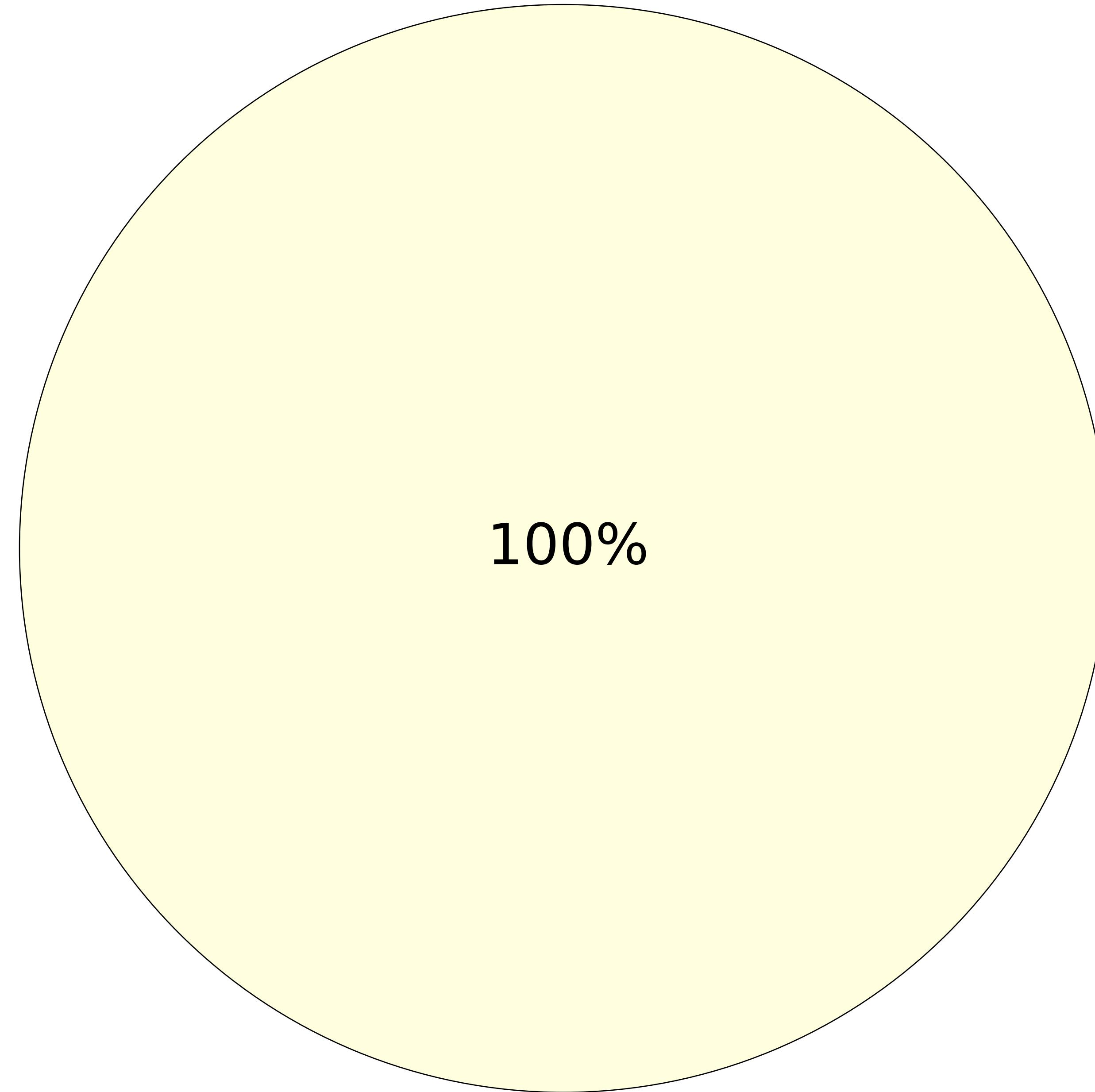
Slides in this talk that are plots

That means every slide was made using matplotlib - including the title page!

Practical? No.

Efficient? No.

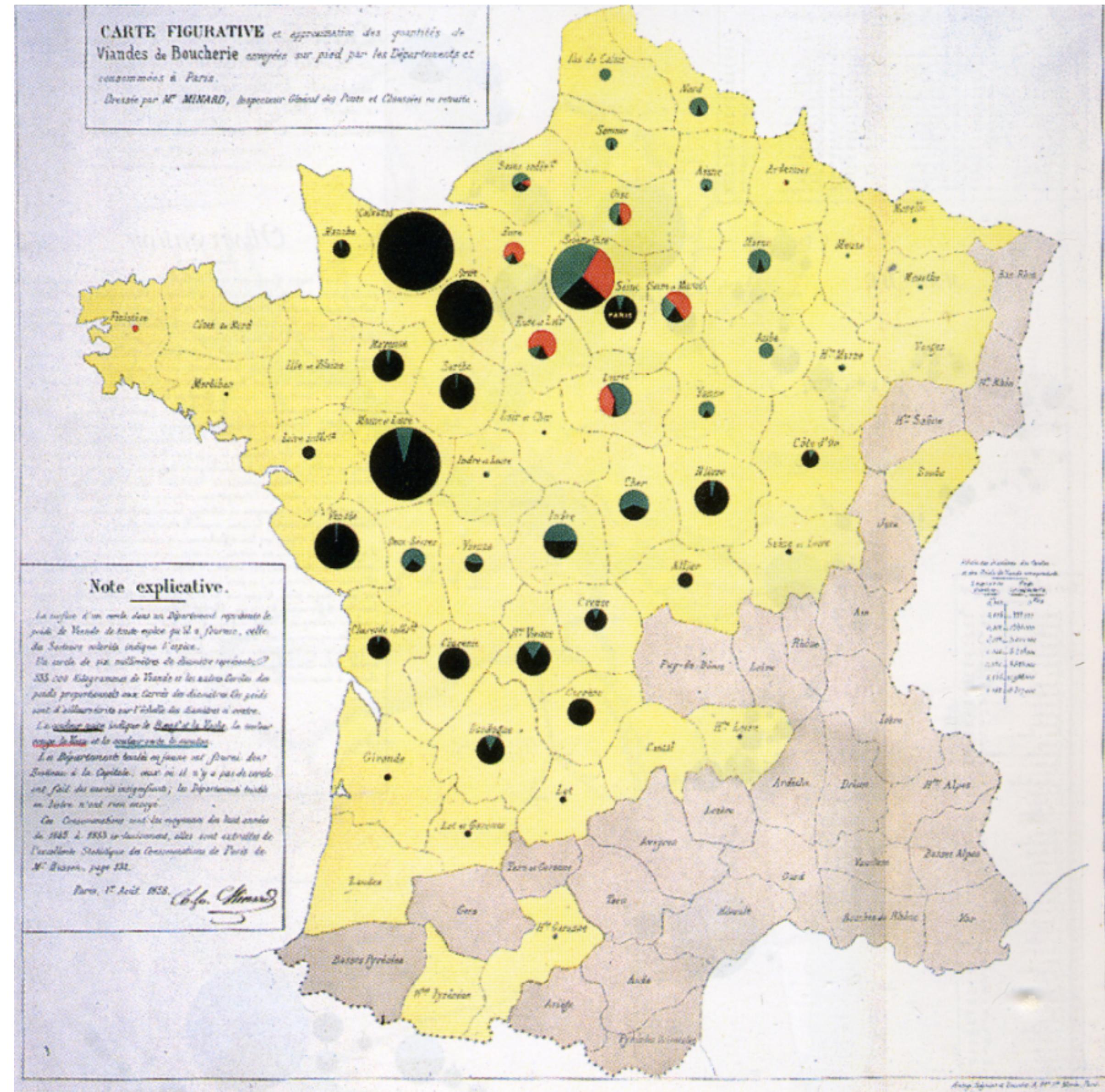
Example of best practice? No.



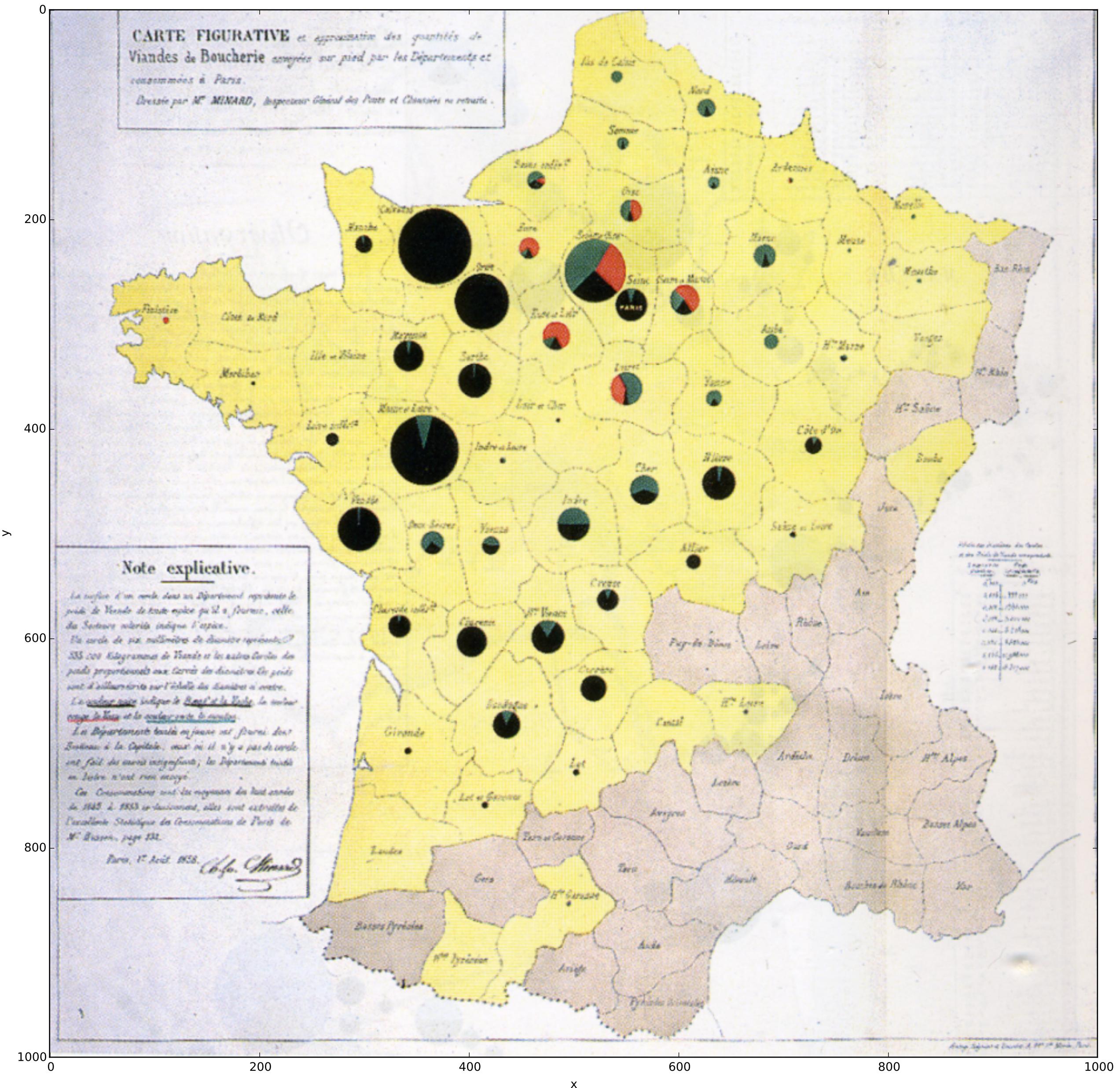
An effective demonstration of the full programmable control over a plot that Matplotlib gives?

Yes.

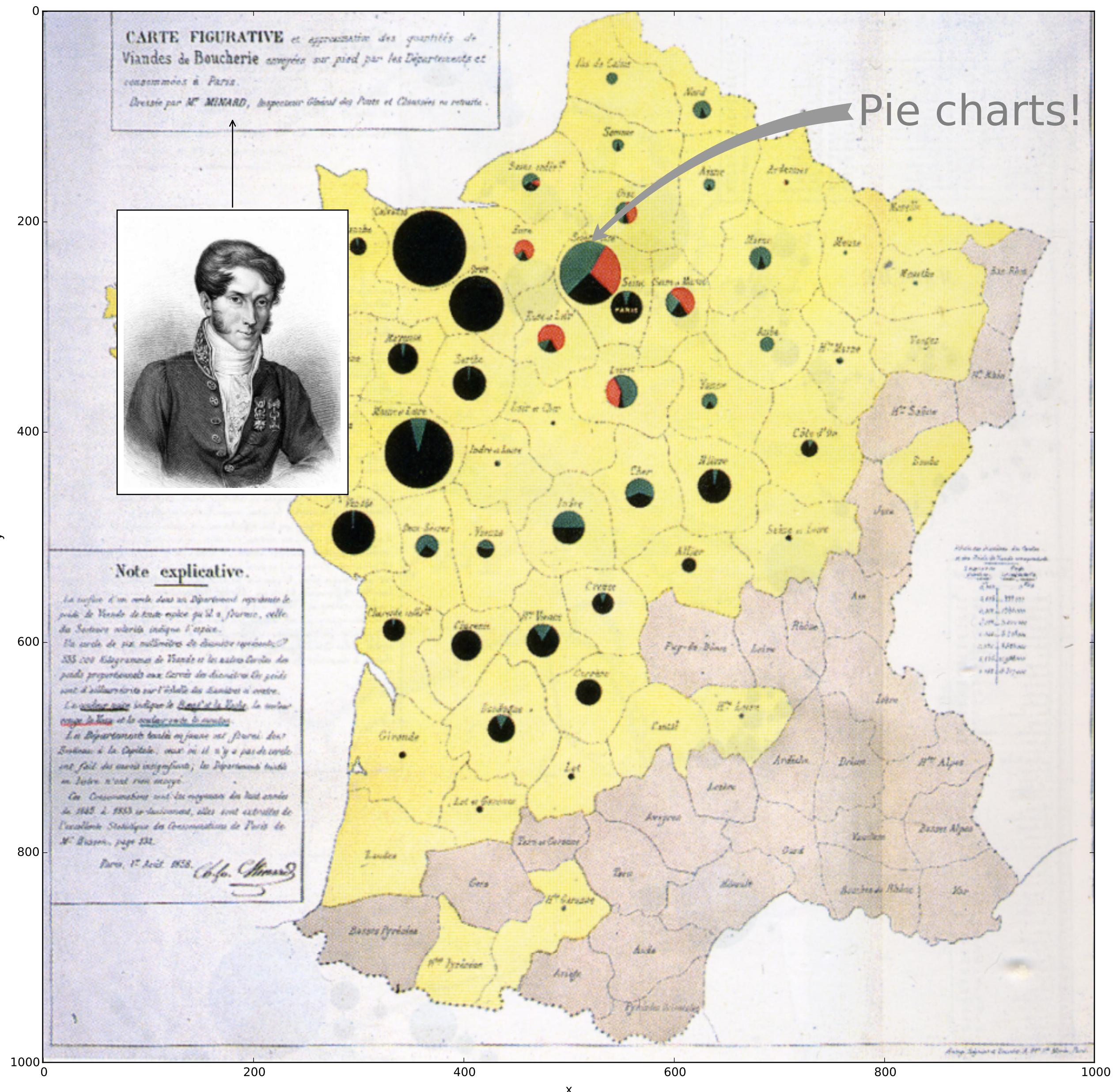
This isn't an image



It's an image in a plot



with annotations!



Let's review how each slide was made:

https://github.com/lonsbio/combine_matplotlib

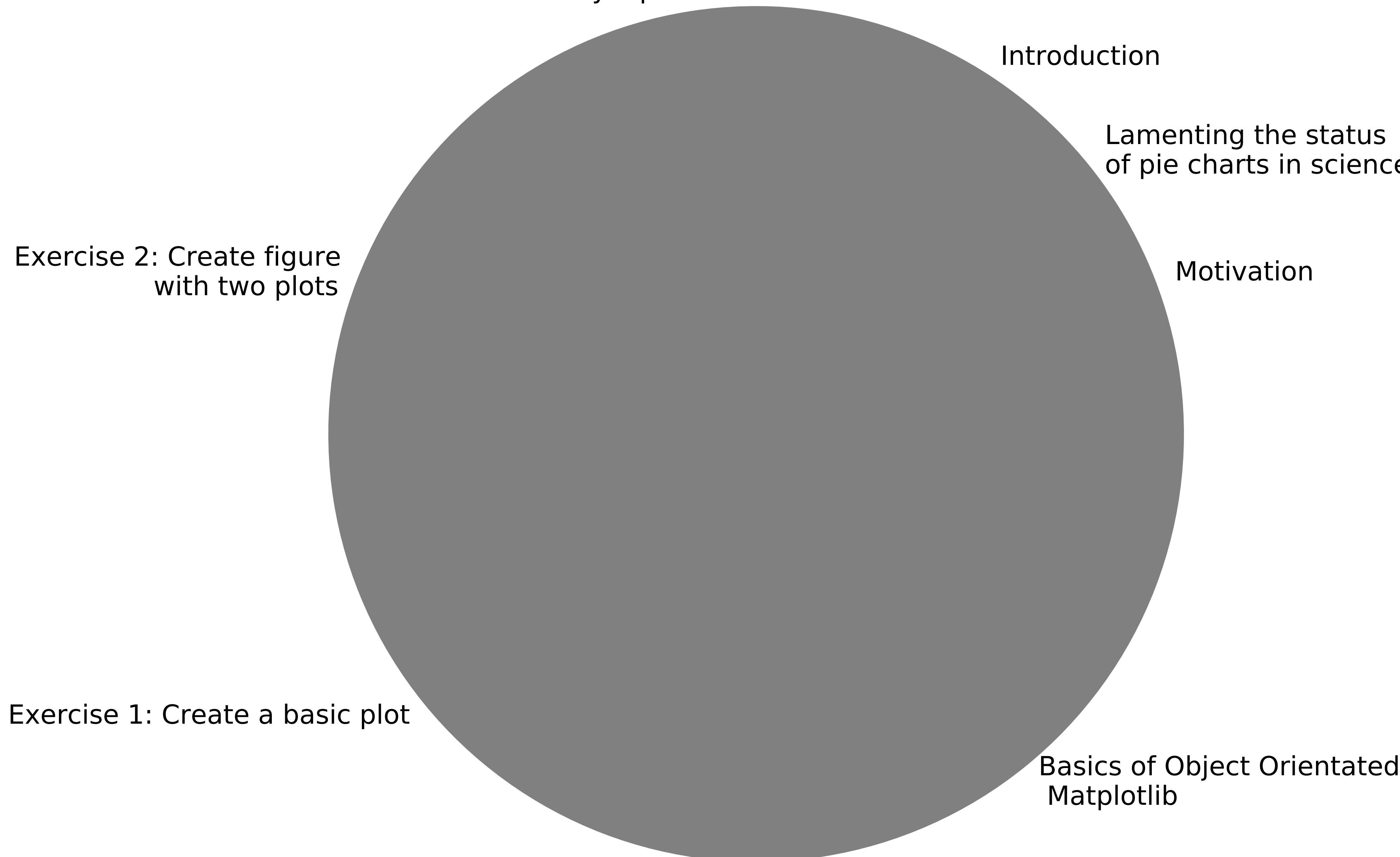
This hasn't been a proper lesson on matplotlib.

**A really good one is Lesson 4
in the set by J Robert Johansson:**

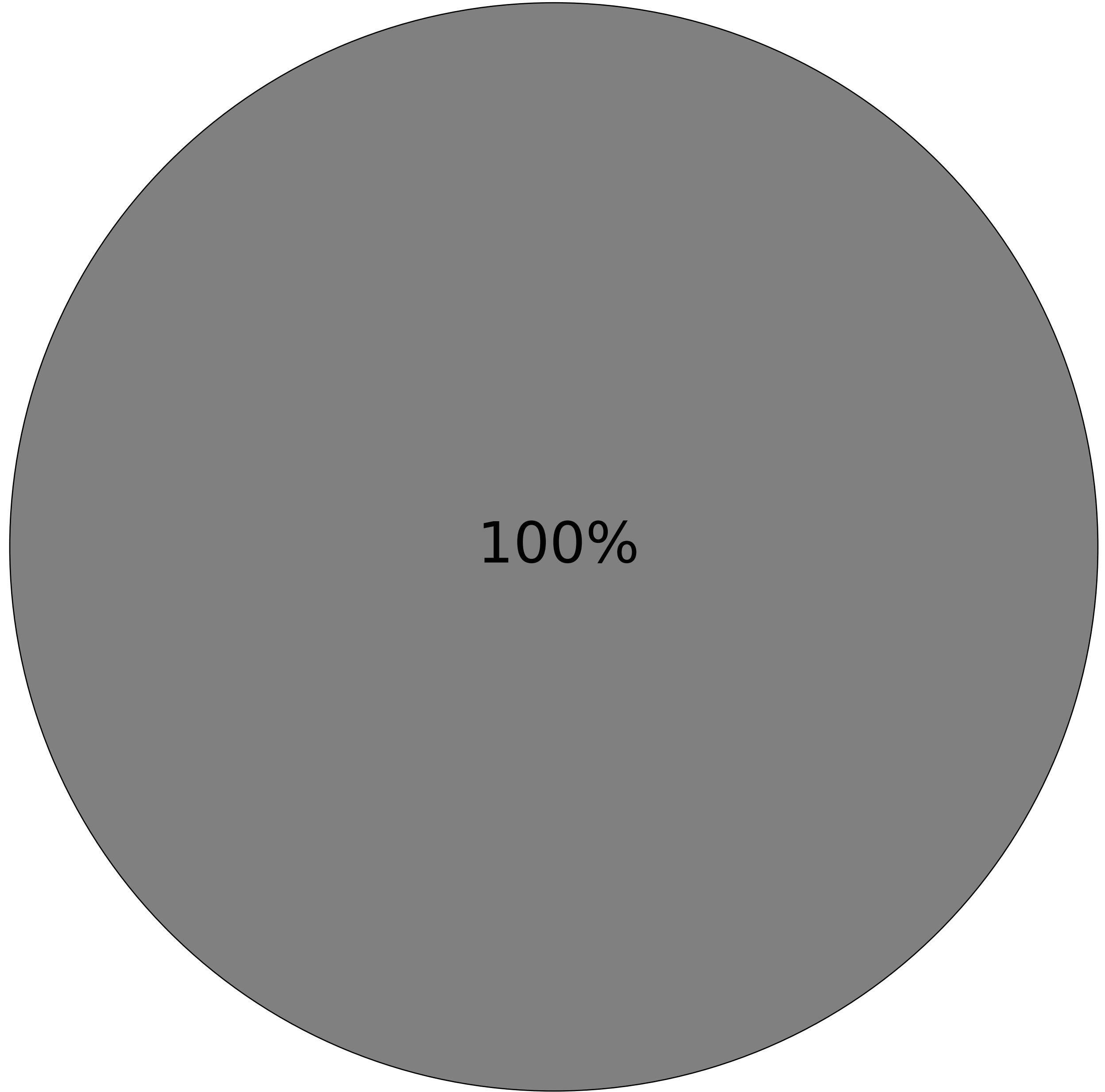
<https://jrjohansson.github.com/>

Time spent during this talk

Exercise 3: Create an XKCD style plot



Thank you!



100%