

Visual Aids

IMN Presentation Workshop

Overview

- 1** Introduction
- 2** Design basics
- 3** Data visualisation
- 4** Colour
- 5** Tools

Introduction

My background



Molecular Biologist
(Web Designer)



Bioinformatician



Software developer
Community builder

My background



University of
BRISTOL



UNIVERSITY OF
CAMBRIDGE



Babraham
Institute



TRINITY HALL
CAMBRIDGE



SciLifeLab



NATIONAL
GENOMICS
INFRASTRUCTURE



Stockholm
University



Molecular Biologist

Web Designer



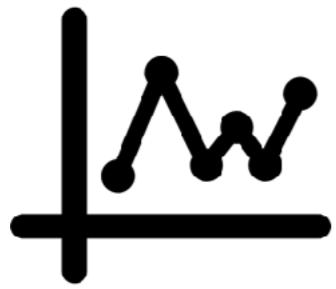
Bioinformatician



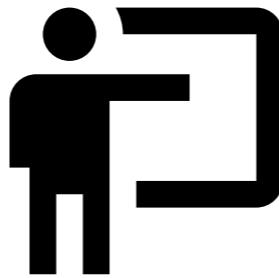
Software developer

Community builder

Visual aids: What



Figures



Talk slides



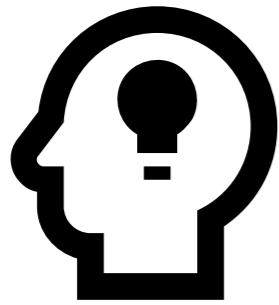
Posters

Visual aids: Why



- Evolution has tuned our brains to interpret images quickly and accurately
- Text comprehension is comparatively slow and difficult
- Visual aids can give context and subtext, implication and association
- If you managed to read this far, you did well

Visual aids: Why



Help to explain



Memorable

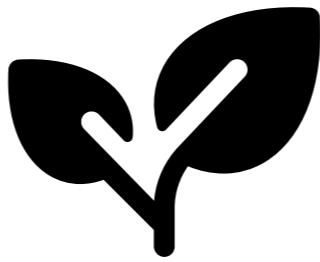


Interesting

Visual aids: How



Know your
audience



Keep it simple



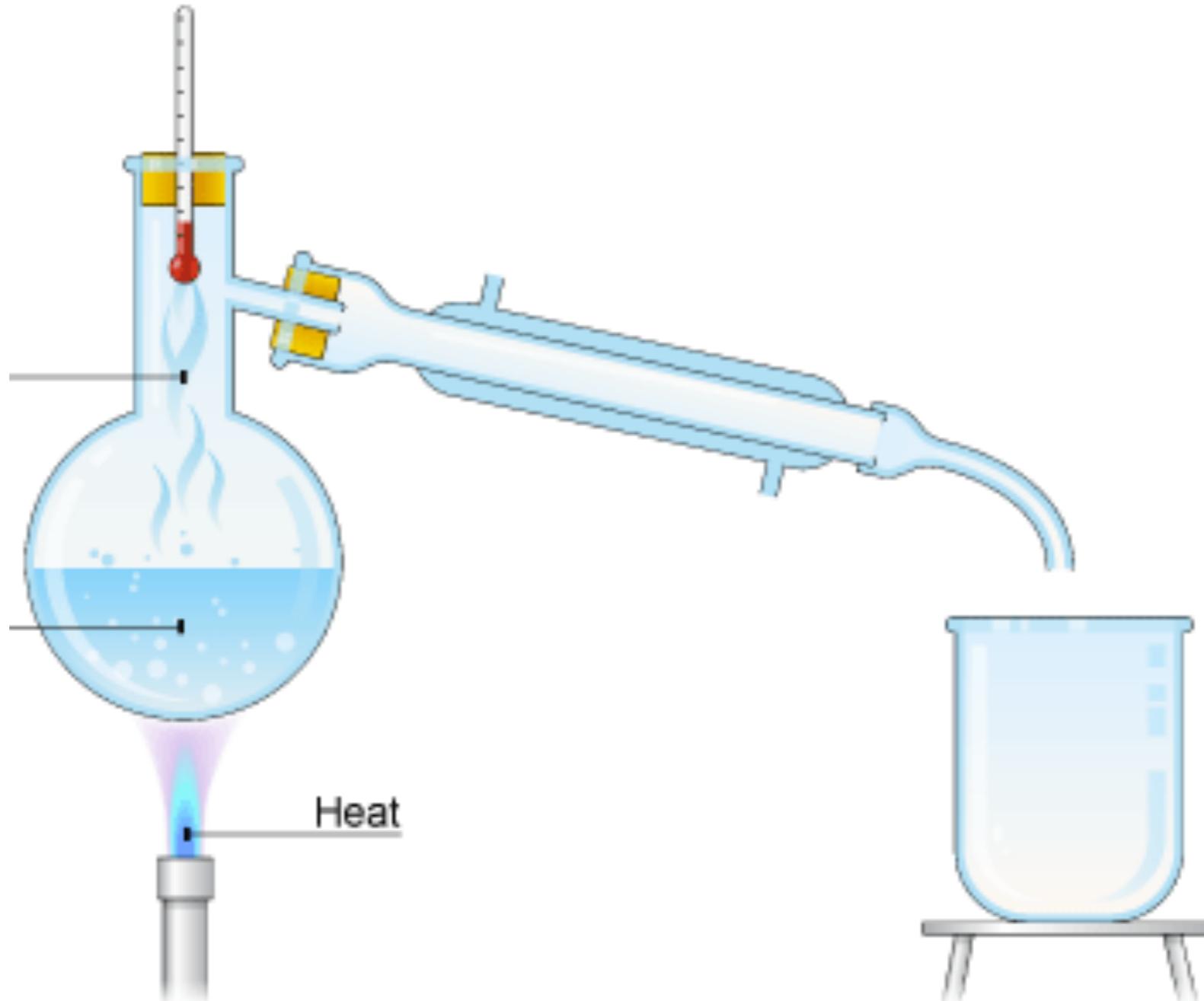
Plan an outline

1

Keep it simple

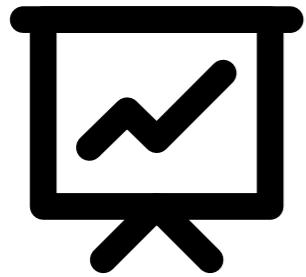
distillation
of idea

all work

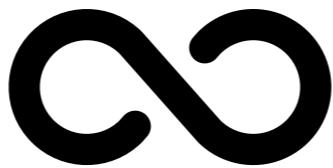


core concept

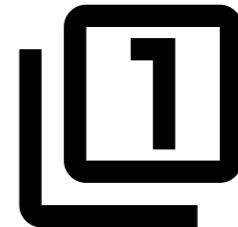
Visual aids: Examples



Talk slides

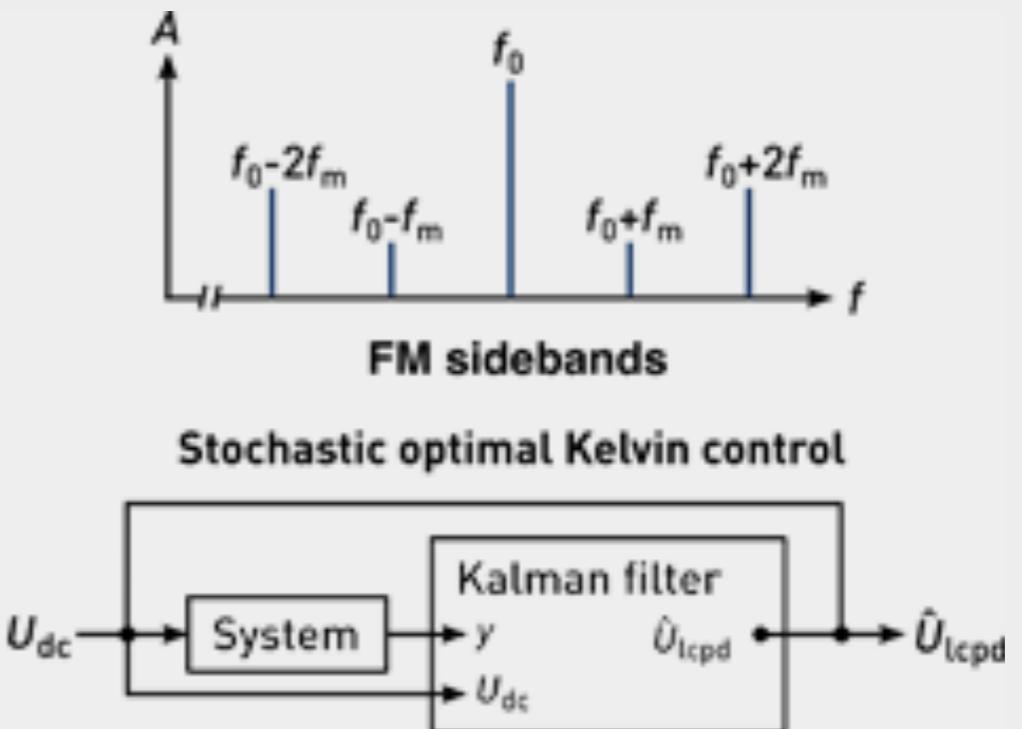
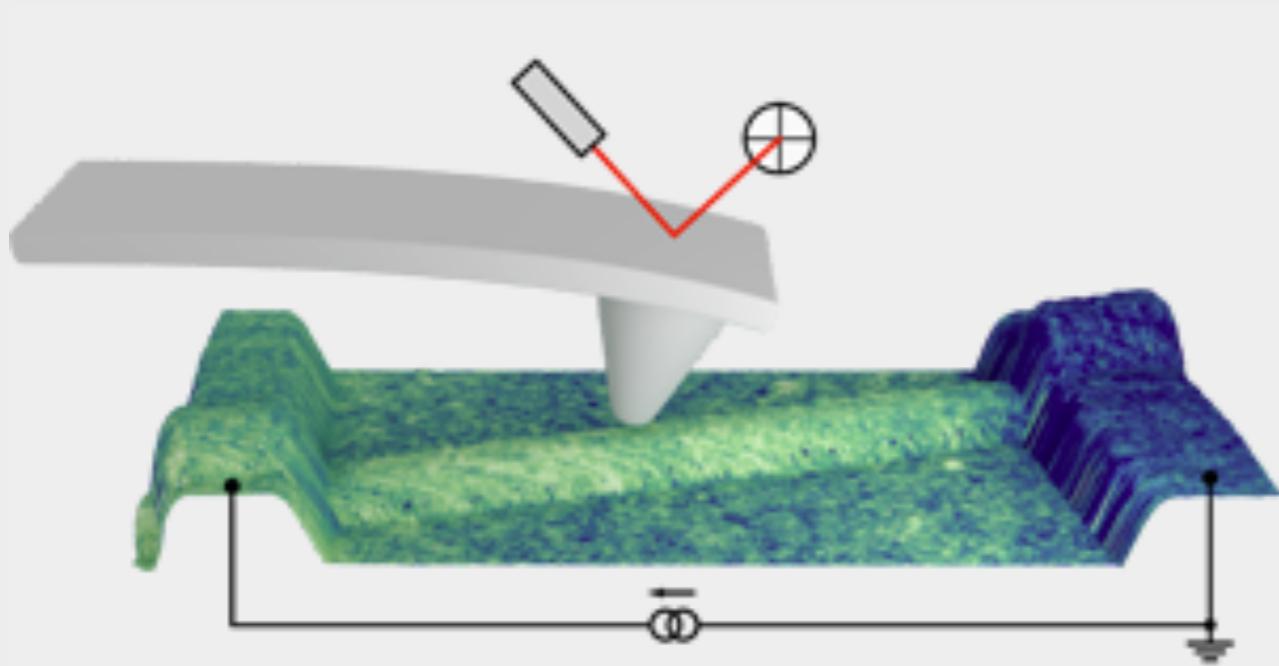


Icons



Header elements

Visual aids: Examples

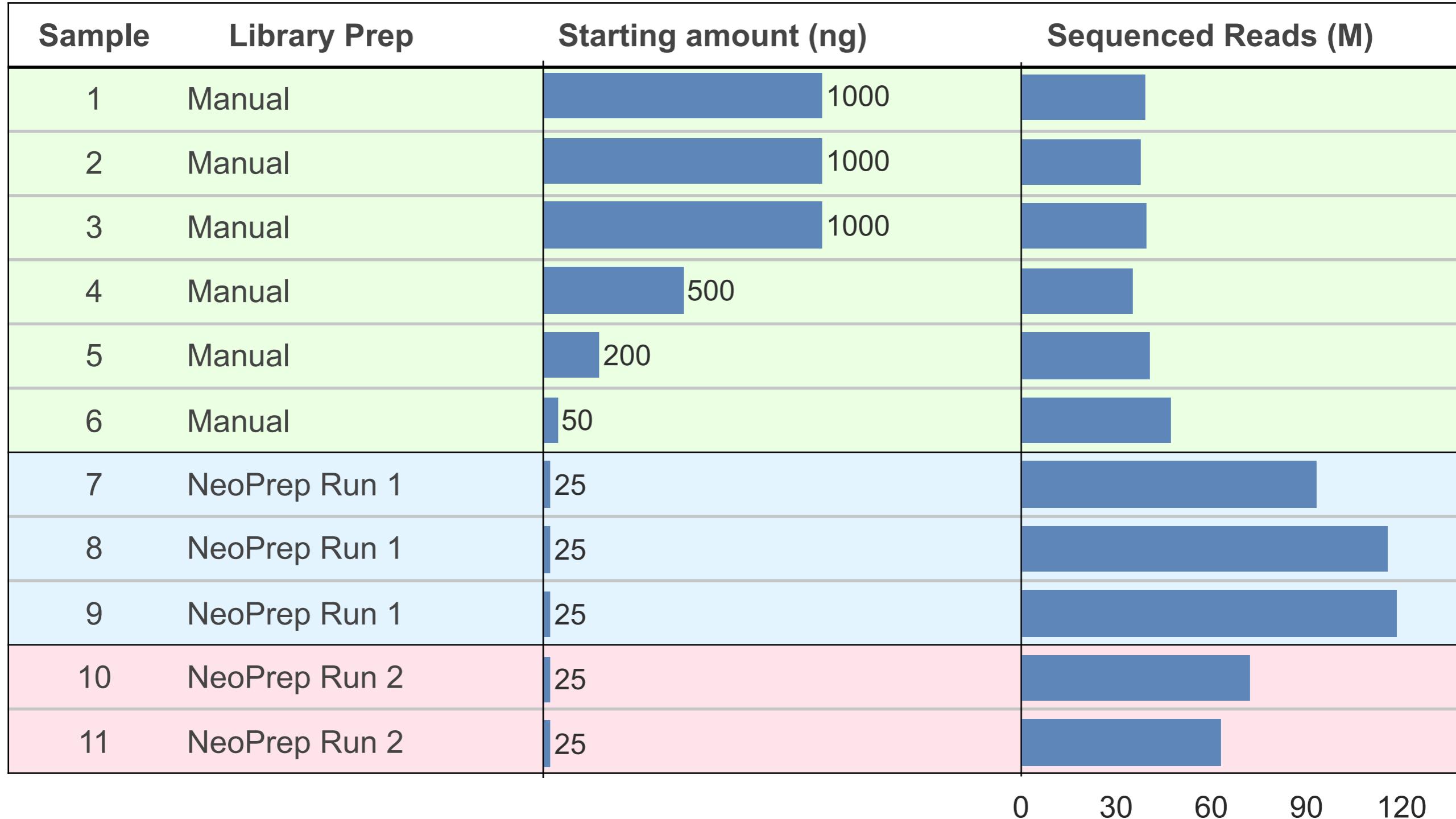


■ Kelvin probe force microscopy for local characterisation of active nanoelectronic devices

Visual aids: Examples

SciLifeLab ID	Library Prep	Starting amount	Sequenced Reads
P1102_101	Manual	1000 ng	38995594
P1102_102	Manual	1000 ng	37663274
P1102_103	Manual	1000 ng	39666722
P1102_104	Manual	500 ng	35332272
P1102_105	Manual	200 ng	40568034
P1102_106	Manual	50 ng	47044650
P2011_1005	NeoPrep Run 1	25 ng	93316971
P2011_1006	NeoPrep Run 1	25 ng	115648988
P2011_1007	NeoPrep Run 1	25 ng	118489187
P2013_1004	NeoPrep Run 2	25 ng	72128476
P2013_1005	NeoPrep Run 2	25 ng	62774142

Visual aids: Examples



Design basics

Introduction

- Don't underestimate the impact of your first few slides
 - Fonts and visual presentation immediately set the tone for your audience
- Anchor your work in the context of your audience's work
- Go slow - everyone will thank you for it
 - This includes not using too much content
 - Try not to read every bullet point from the screen - talk around your slides instead
 - Don't put all of your bullets up at once, the audience will read them instead of listening to you
- Now is the perfect time to use a visual aid

Introduction

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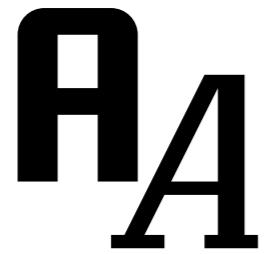
Visual design



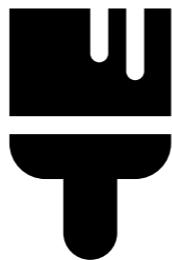
Important



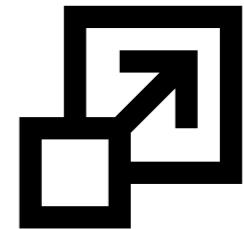
Easy



Fonts



Colours



Layout

Fonts



Avoid (MS Office) defaults

Cambria
Calibri



Use Google Fonts

Bold
Medium
Regular
Light
Thin
Hairline



Make use of font weights

Fonts



Pick a font and stick to it



Consider what the font says
about the content



Fonts

serif

sans-serif

decorative

Block text



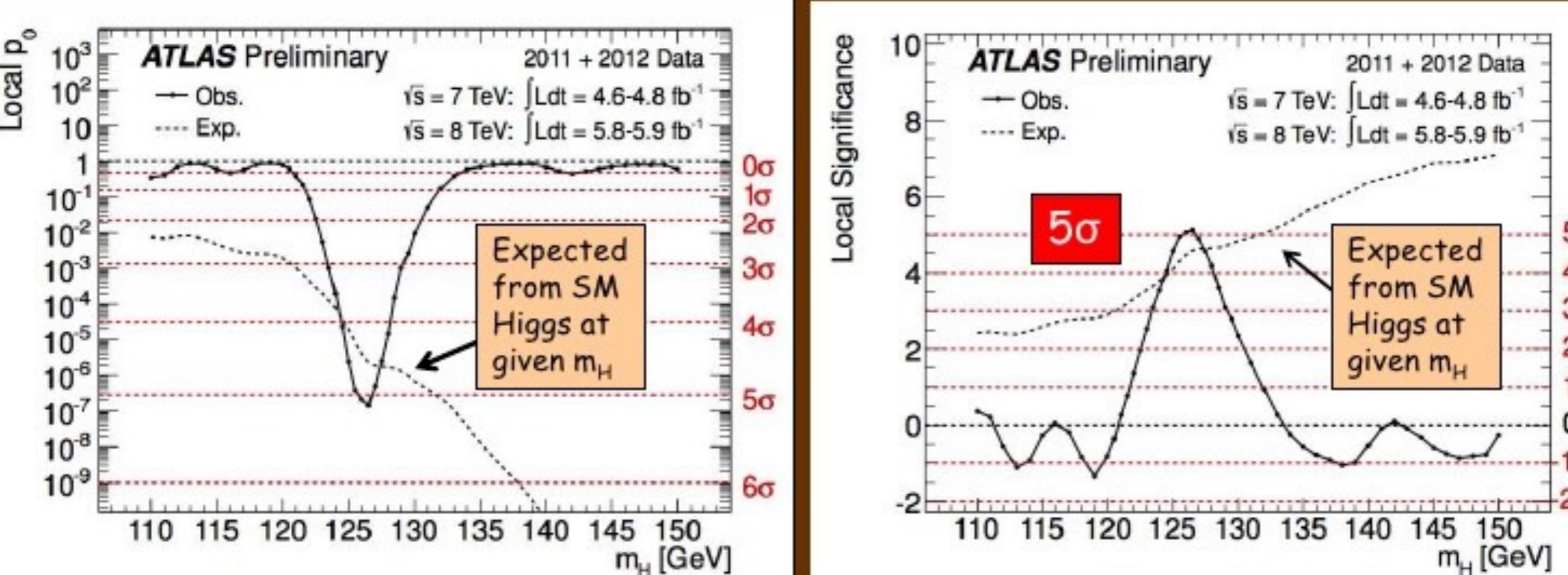
Figures



Presentations



Combined results: the excess



Maximum excess observed at

$m_H = 126.5 \text{ GeV}$

Local significance (including energy-scale systematics)

5.0σ

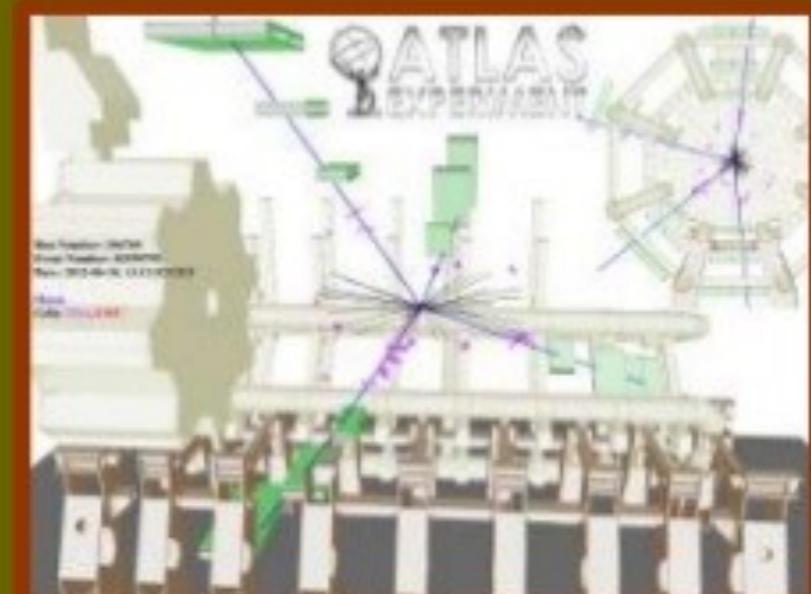
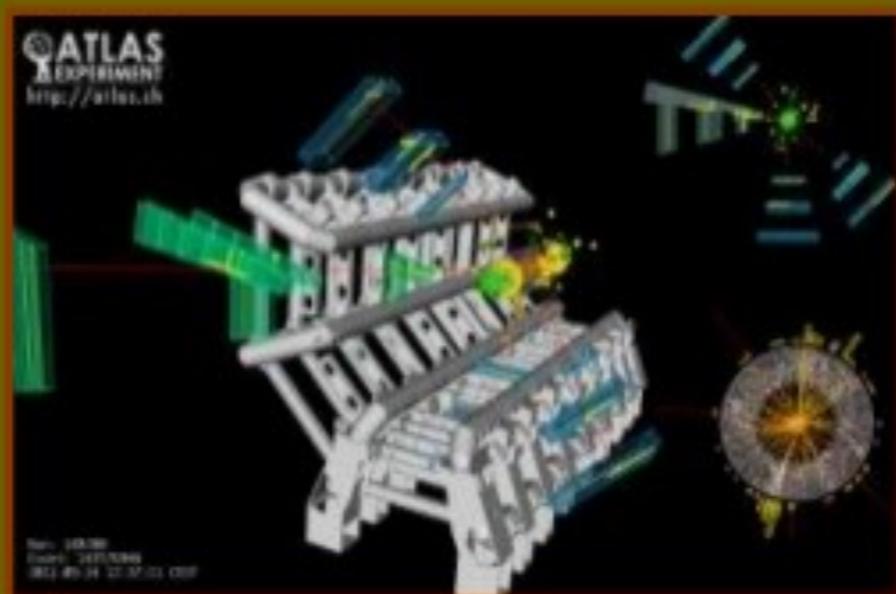
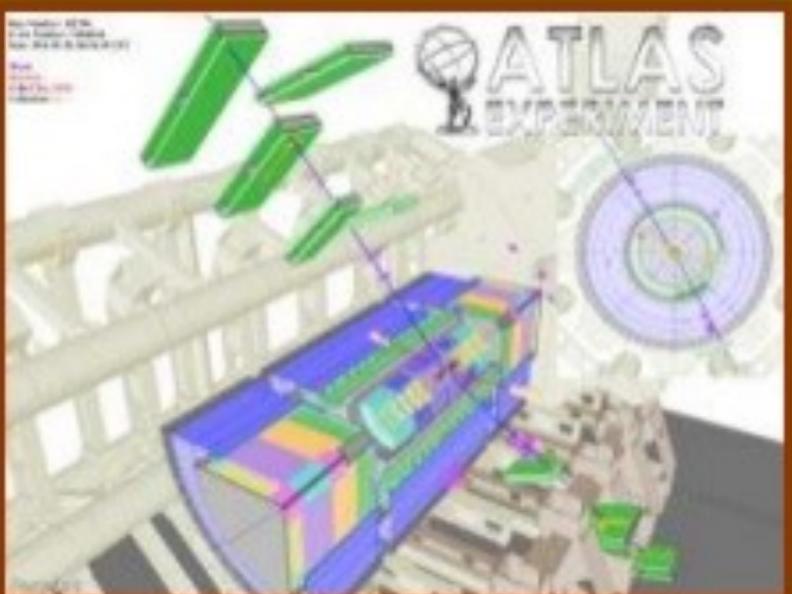
Probability of background up-fluctuation

3×10^{-7}

Expected from SM Higgs $m_H=126.5$

4.6σ

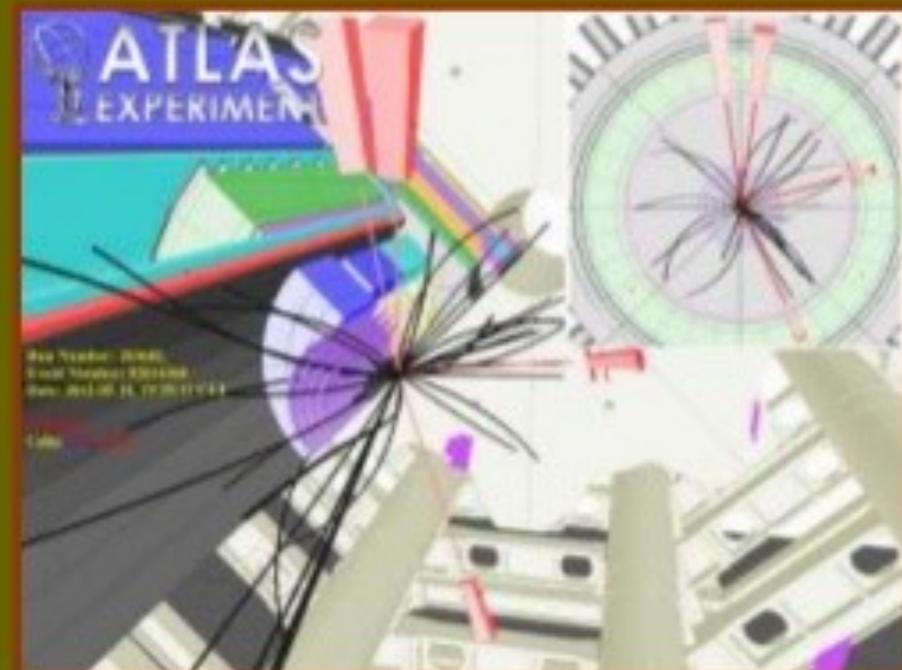
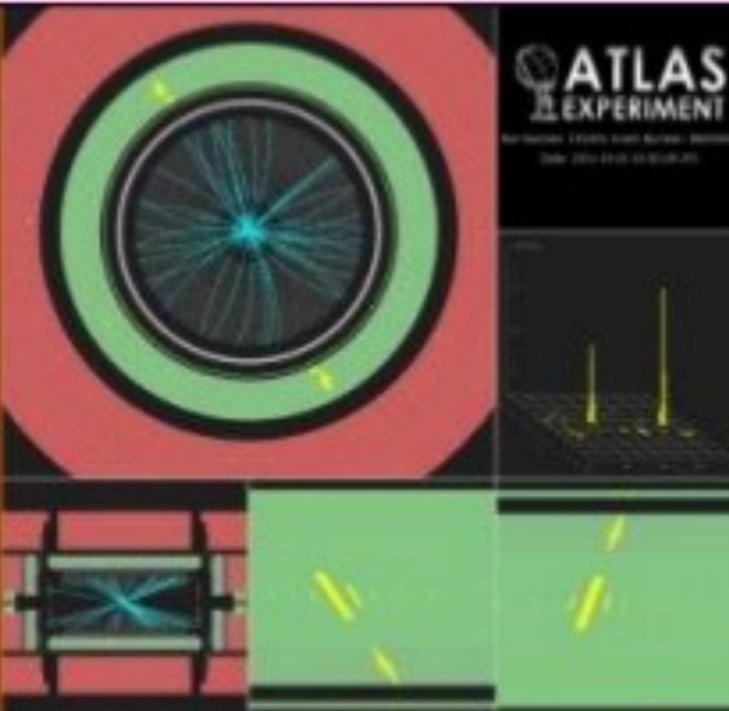
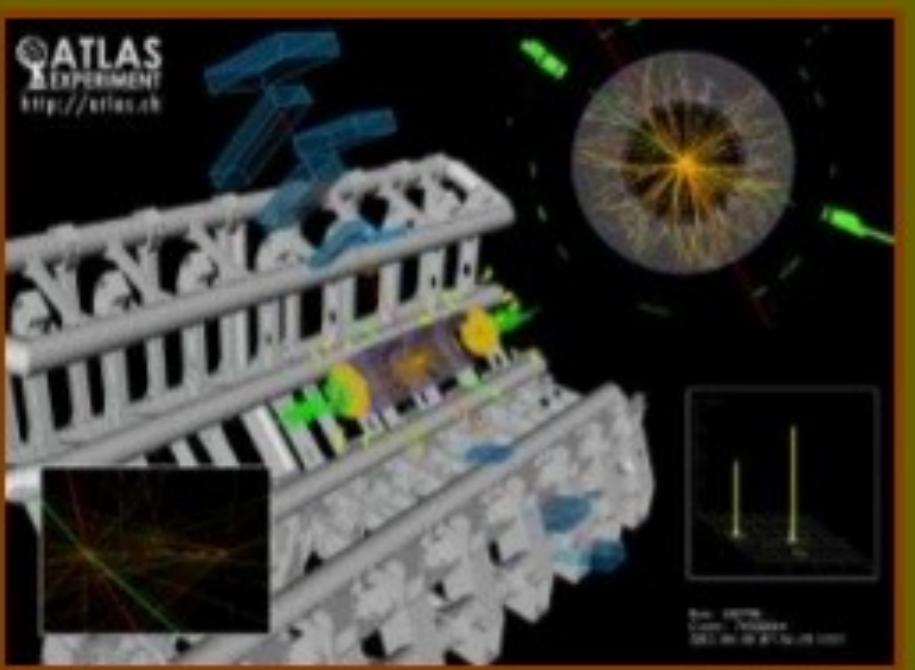
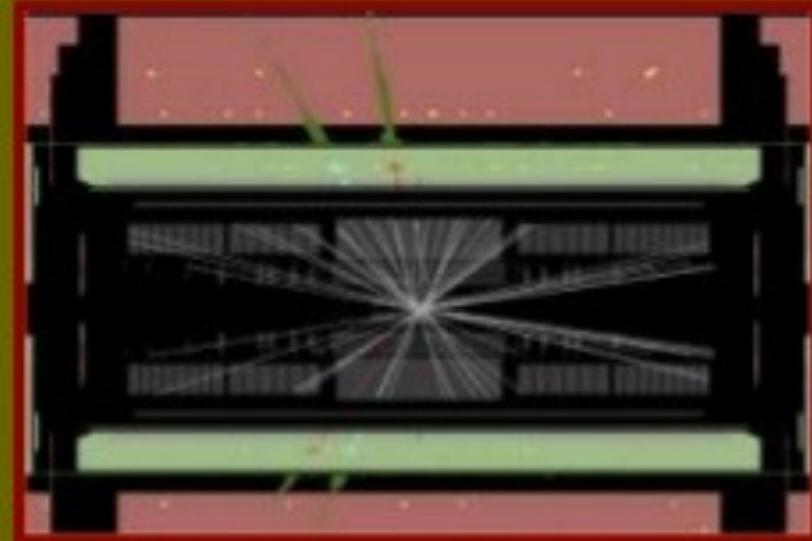
Global significance: $4.1\text{-}4.3 \sigma$ (for LEE over 110-600 or 110-150 GeV)



Status of Standard Model Higgs searches in ATLAS

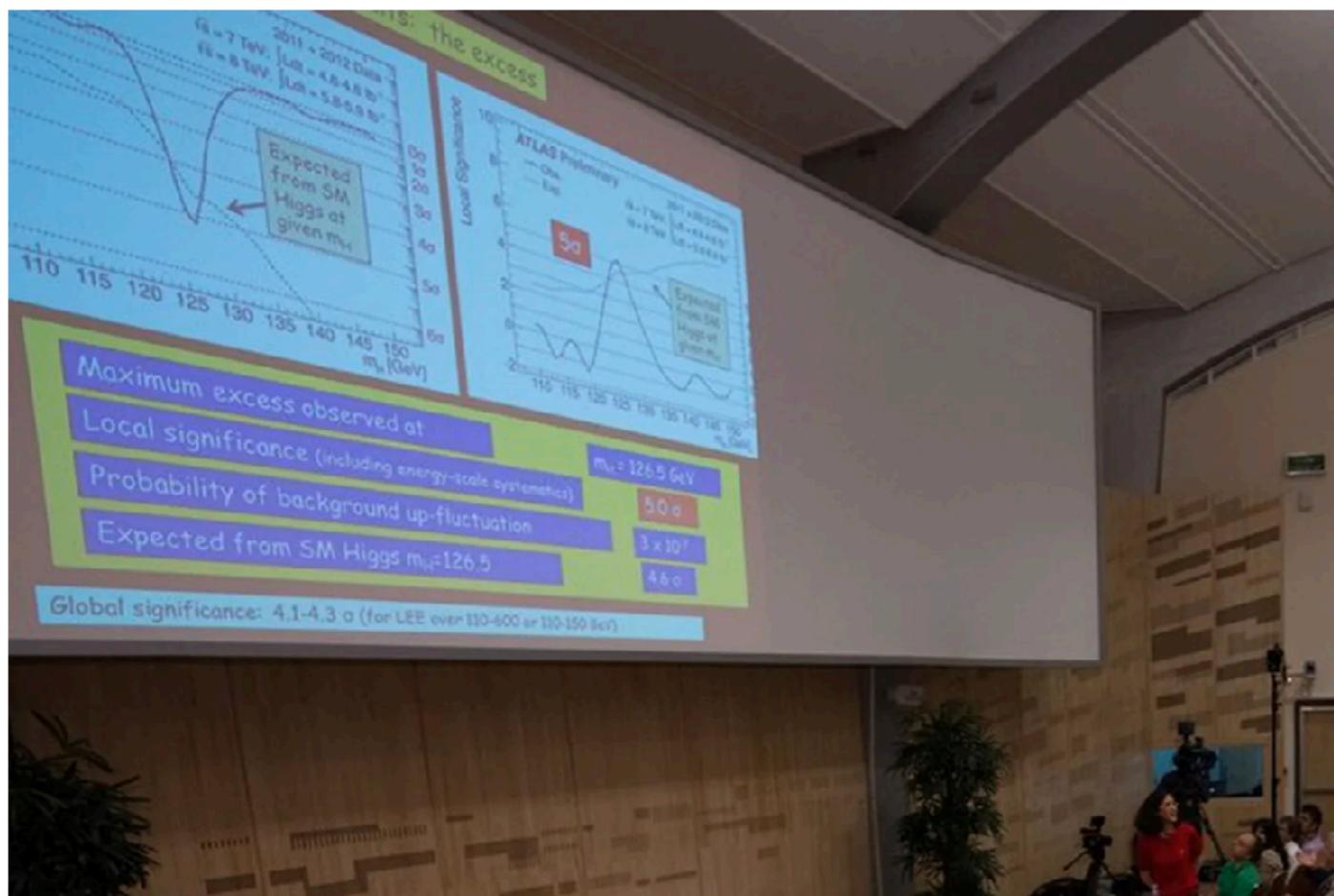
Using the full datasets recorded in 2011 at $\sqrt{s} = 7 \text{ TeV}$ and 2012 at $\sqrt{s} = 8 \text{ TeV}$: up to 10.7 fb^{-1}

Fabiola Gianotti (CERN), representing the ATLAS Collaboration



SCIENCE / DESIGN / ENTERTAINMENT

CERN scientists inexplicably present Higgs boson findings in Comic Sans



CERN Comic Sans

By [Sam Byford](#)

Image [CERN](#)

Jul 4, 2012, 10:56 AM GMT+2 | [0 Comments](#) / [0 New](#)



For many of us, the most shocking revelation to come out of [CERN's Higgs boson announcement today](#) was quite unrelated to the science itself. Rather, we were blown away by the fact that a team made up of some of the most undoubtedly brilliant people in the world believe that

- 1 [Reddit CEO tells employees that subreddit blackout 'will pass'](#)

HELP PREVENT A TRAGEDY

If you see children or adults inside
or attempting to enter this substation
please call 08000 727282
or the local police immediately

SSE Power Distribution



DANGER OF DEATH
KEEP OUT

ADULT PROBATION & PAROLE

Sex Offender Registration Office

Offices are open 8:00 a.m. - 5:00 p.m.
unless otherwise noted.

South Salt Lake P.D.
2835 S. Main St.
South Salt Lake, Utah 84115
Phone: (801) 412-3600

West Jordan P.D.
8000 S. Redwood Rd.
West Jordan, Utah 84088
Phone: (801) 569-5200

Utah County Sheriff
51 S. University Ave. Ste. 105
Provo, Utah 84601
Phone: (801) 851-8360

Salt Lake County Sheriff
3365 S. 900 W. #218
Salt Lake City, Utah 84119
Phone: (801) 743-5900

Taylorsville P.D.
(Taylorsville residents only)
2600 W. Taylorsville Blvd

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EMERGENCY MEDICAL SERVICE



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& Serving
Townships of:

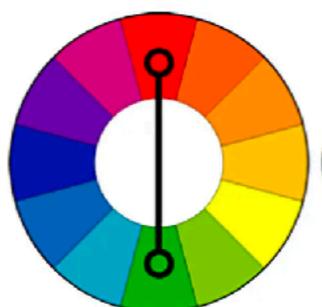
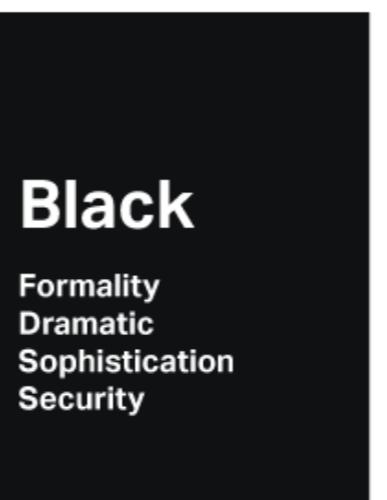
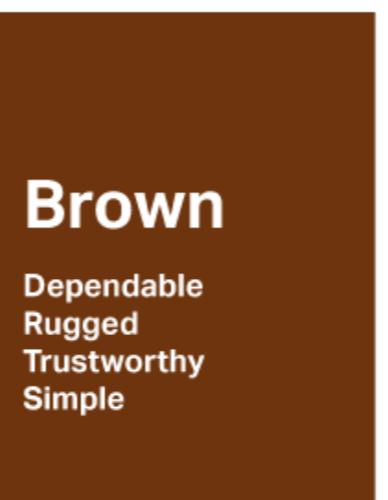
Elkgrove
Ellenboro
Lima
Smelser
Platteville
Belmont
Harrison
& the
City of Platteville

IF YOU
OF A RA
ASSAULT
MAKE A D
YOU CAN DO

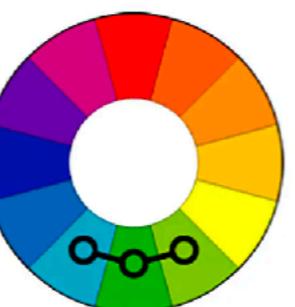


DEF

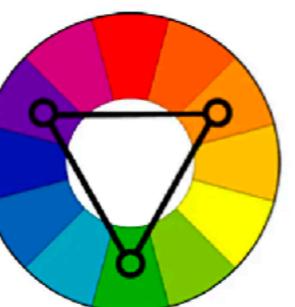
Colour



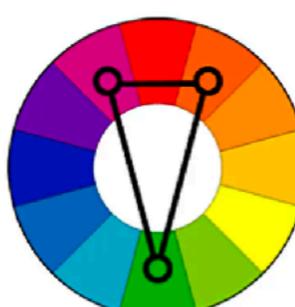
Complementary



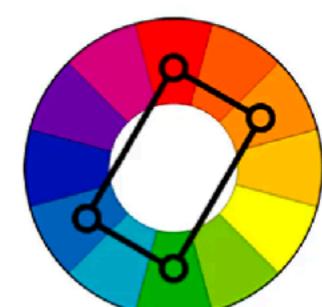
Analogous



Triadic



Split Complementary



Tetradic

Google Material Design Guidelines

Set of guidelines about design

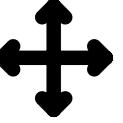
Aimed for app developers

Includes some nice colour palettes

Lots of good stuff about design theory

<https://www.google.com/design/spec/style/color.html>

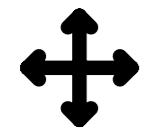
Layout

 Spacing

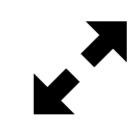
 Alignment

 Sizing

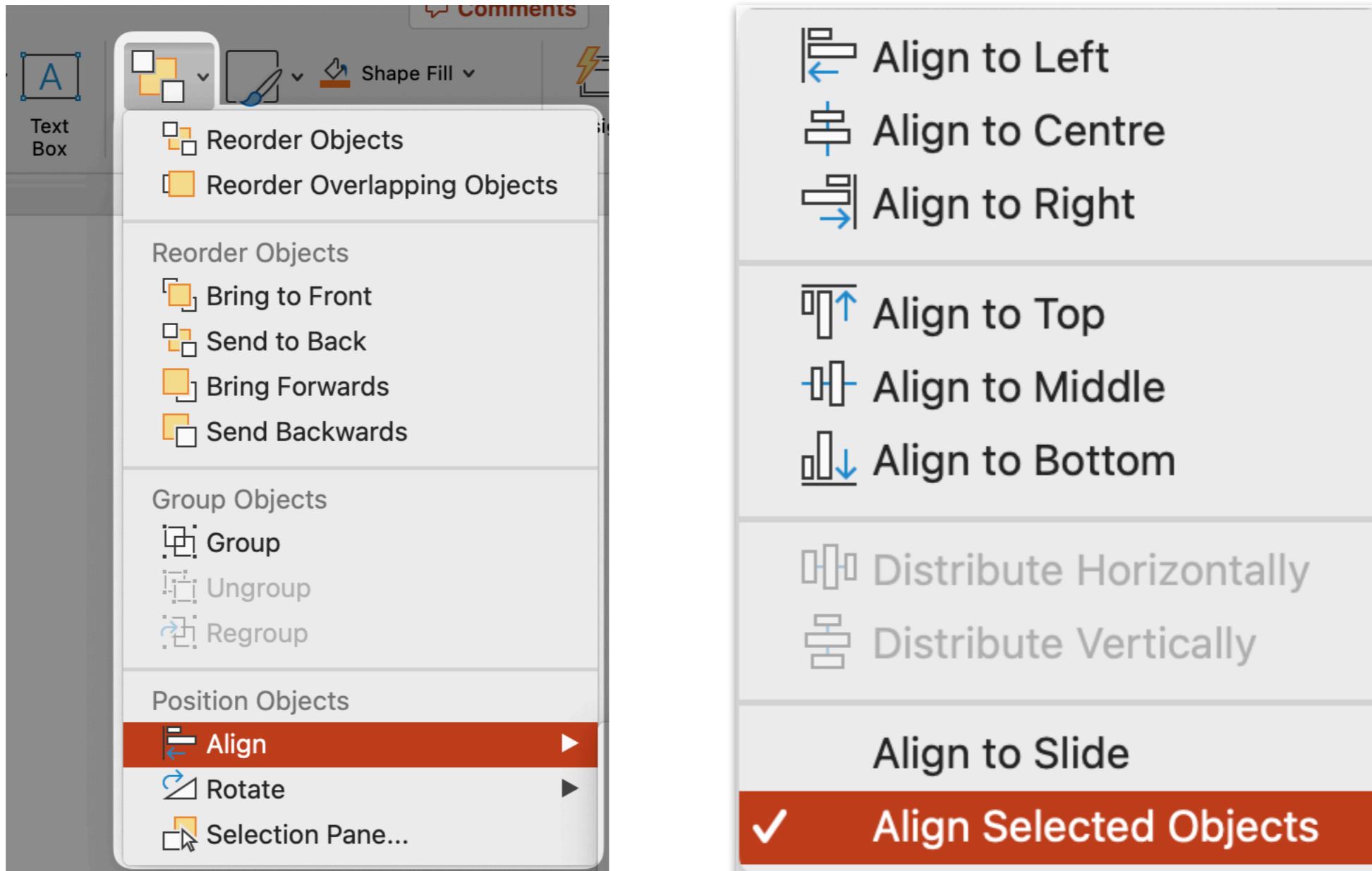
Layout

 Spacing

 Alignment

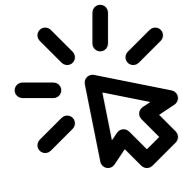
 Sizing

Layout

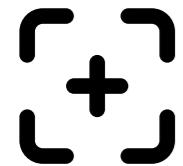


Data Visualisation

Choosing a plot



Which graph helps you to get your point across?



Which data are *really* necessary?



Which type of graph?

Relationship

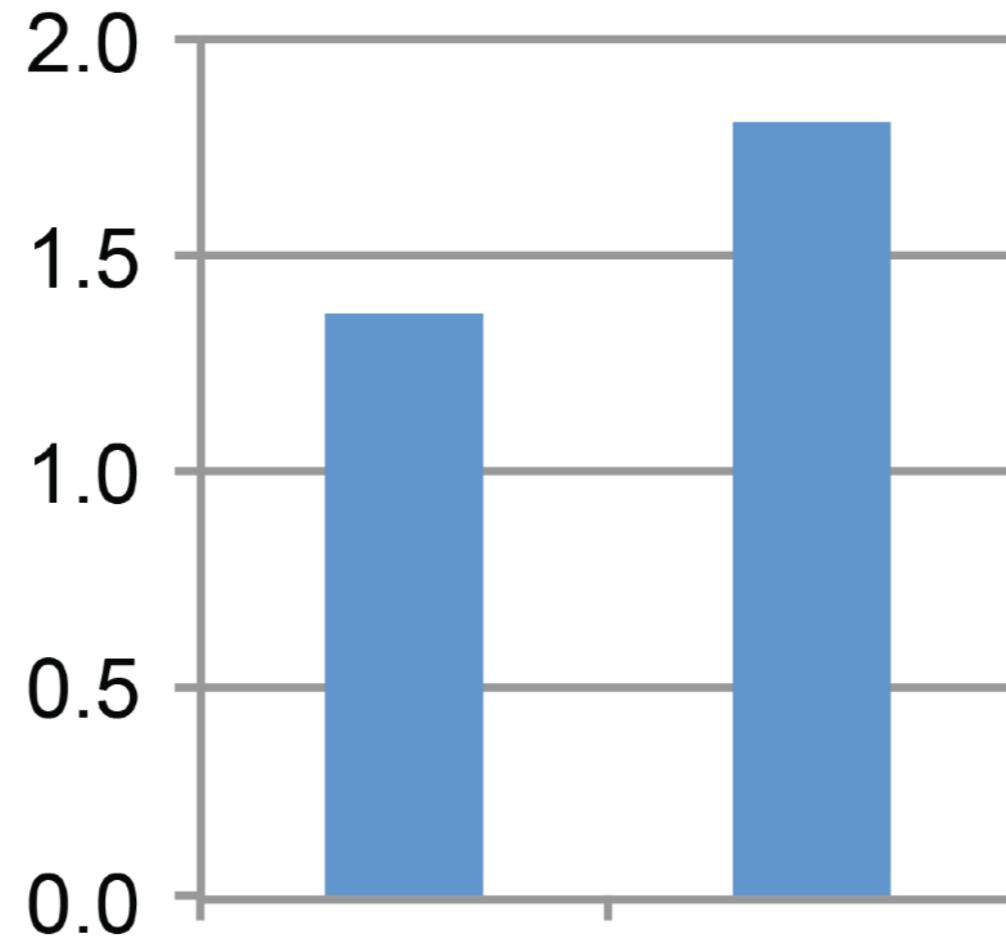
Comparison

Composition

Distribution

3

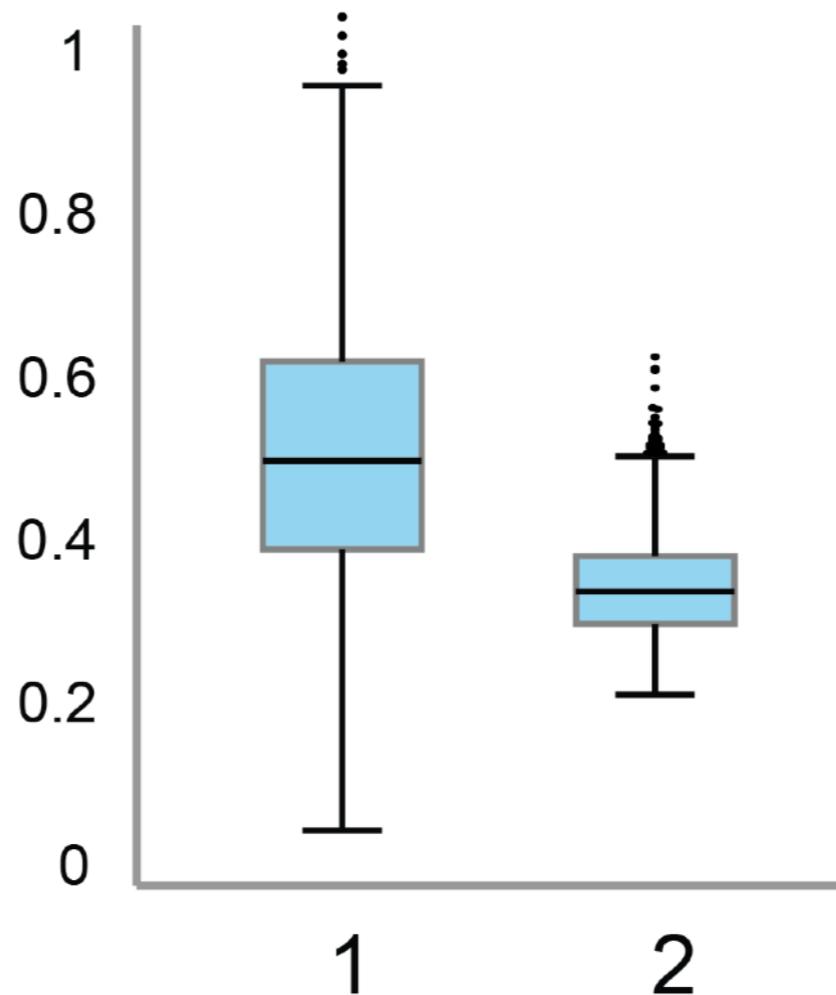
Choosing a plot



Comparison

Relationship / Comparison / Composition / Distribution

Choosing a plot

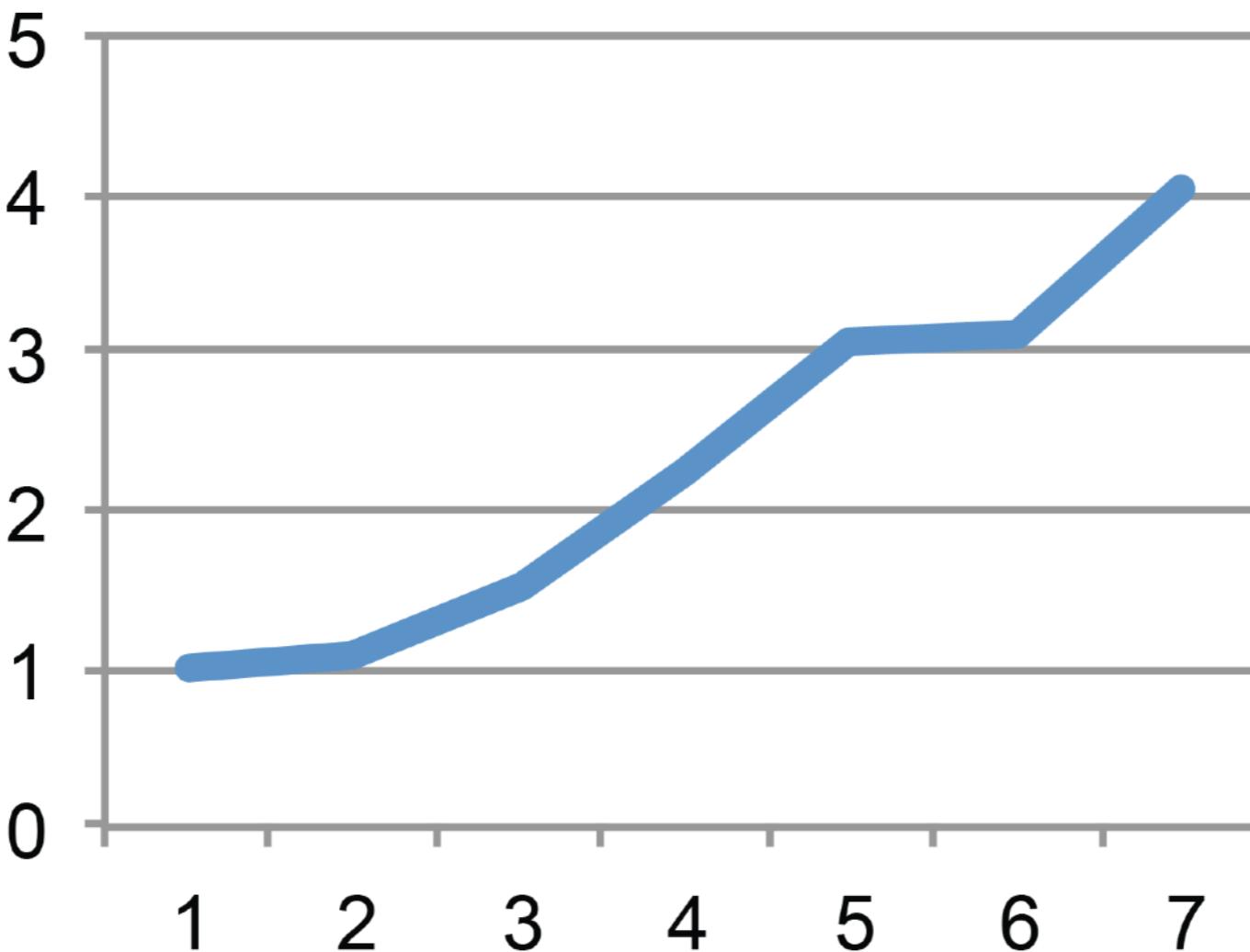


Distribution

Relationship / Comparison / Composition / Distribution

3

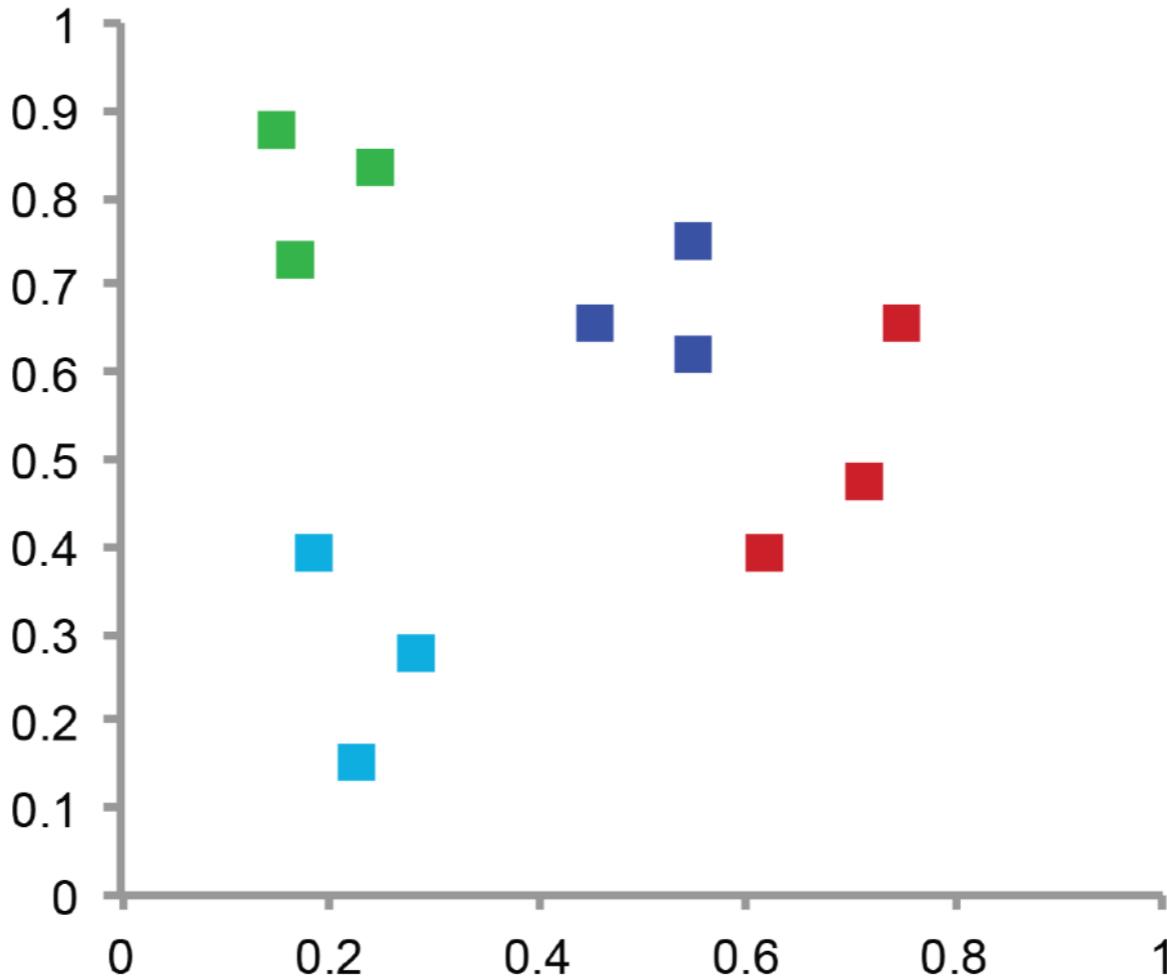
Choosing a plot



Relationship

Relationship / Comparison / Composition / Distribution

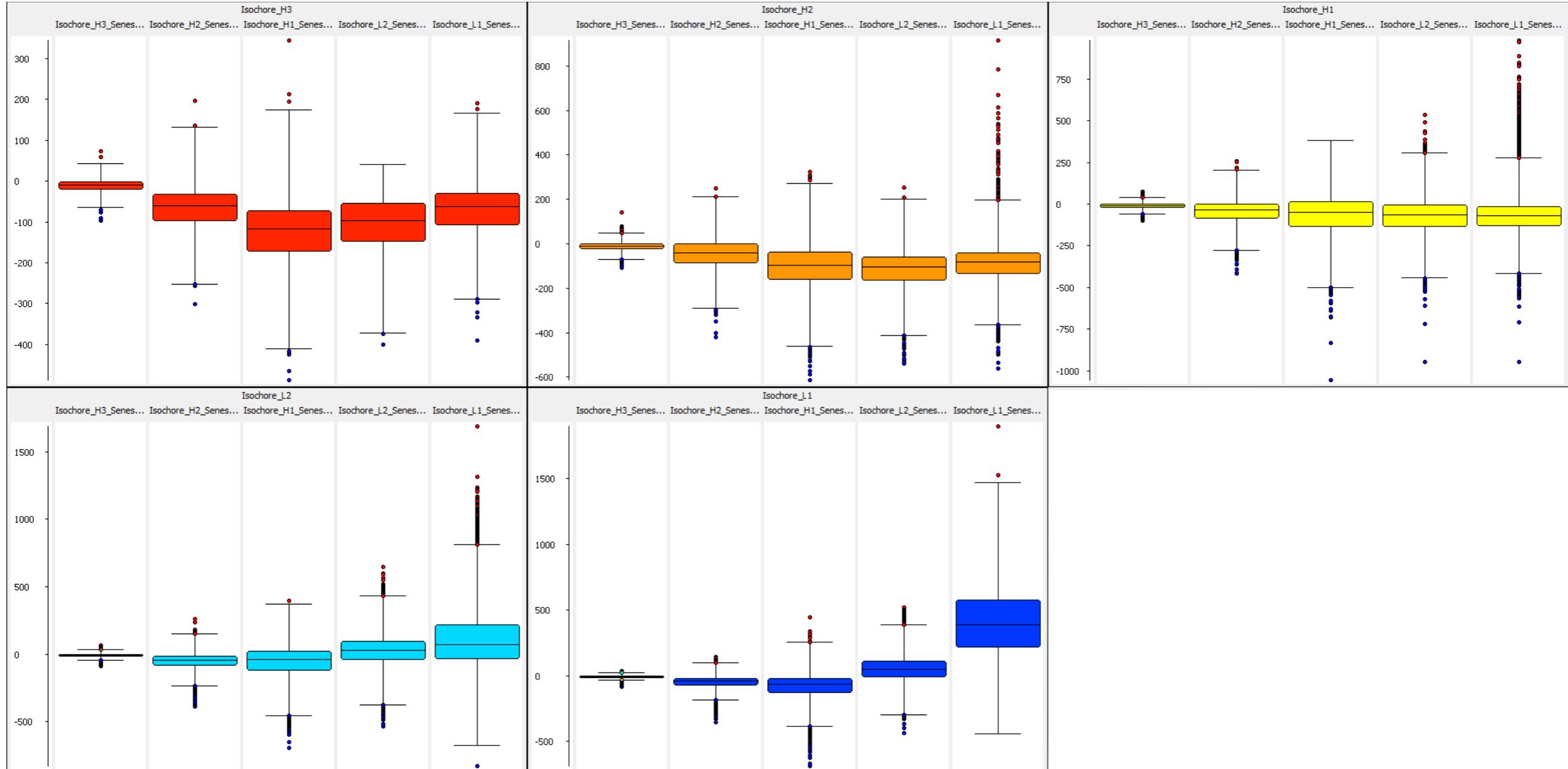
Choosing a plot



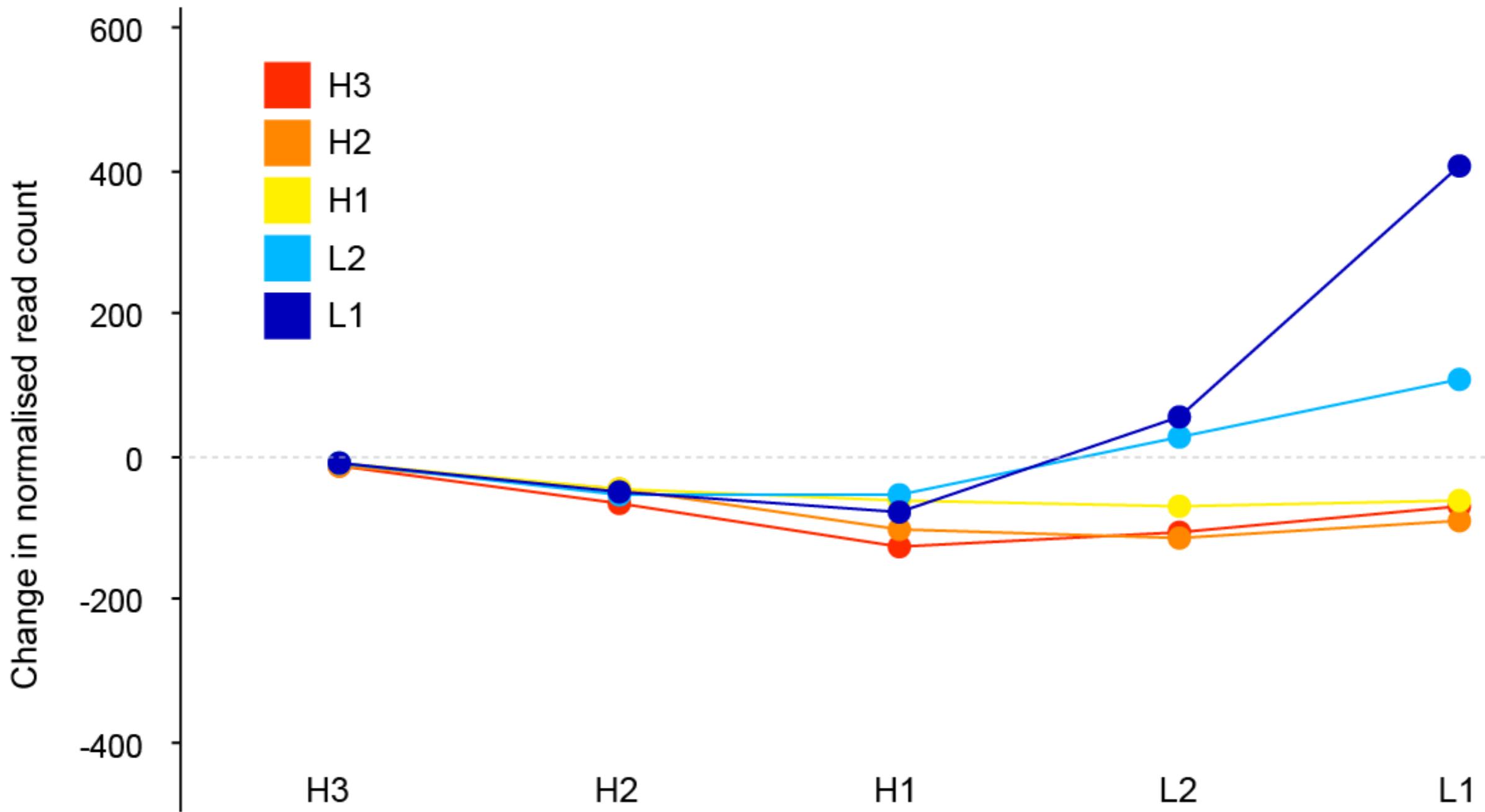
Composition

Relationship / Comparison / Composition / Distribution

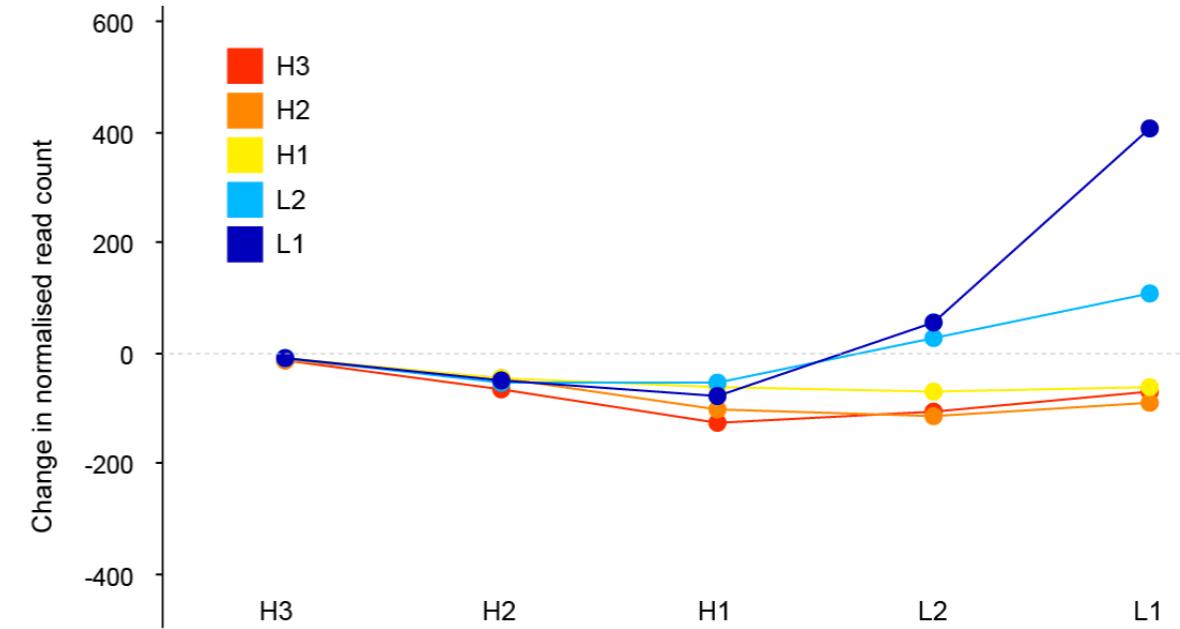
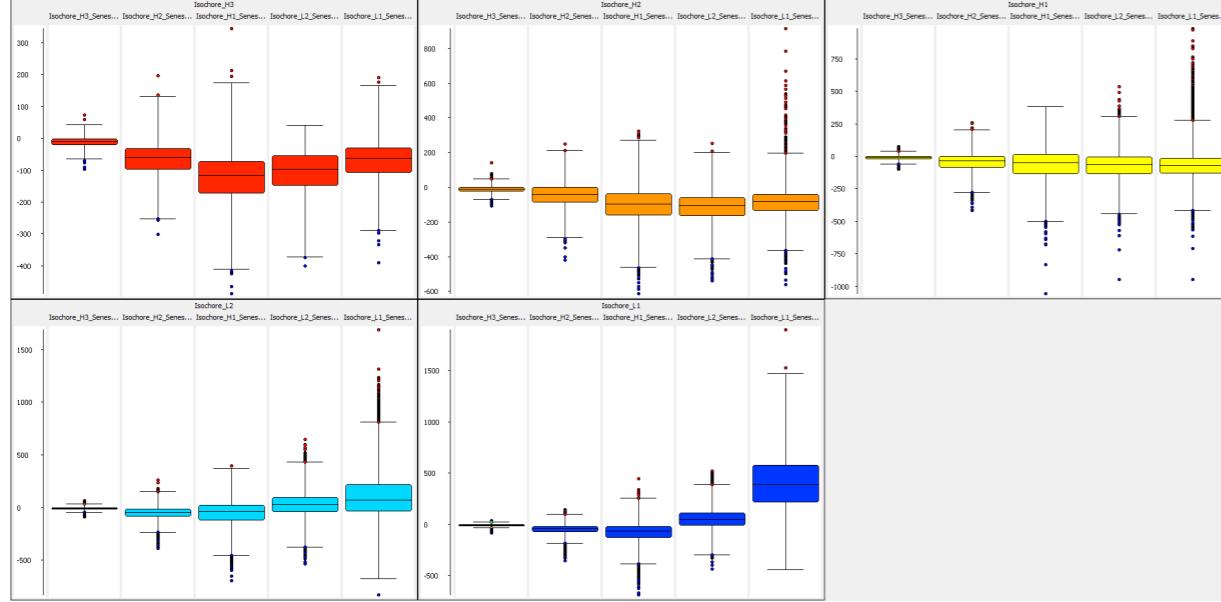
Choosing a plot



Choosing a plot

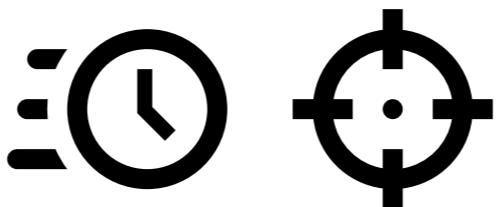


Choosing a plot



- Distributions are not relevant
- Trends difficult to compare
- Only the median value is needed
- Direct comparison

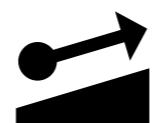
Making Comparisons



Fast, accurate judgement

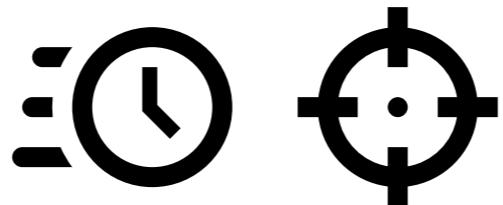


Length



Slope

Making Comparisons



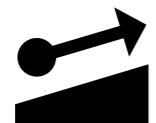
Fast, accurate judgement



Length



Bar graphs



Slope



Line graphs

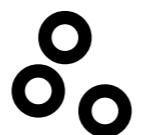
Making Comparisons



Medium judgement



Colour



Patterns

Making Comparisons



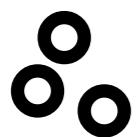
Medium judgement



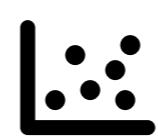
Colour



Heat maps

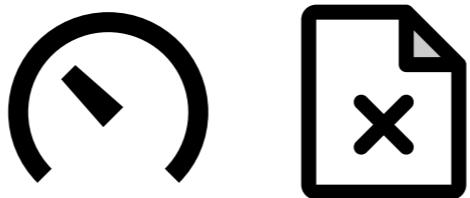


Patterns



Scatter graphs

Making Comparisons



Slow, inaccurate judgement



Angle

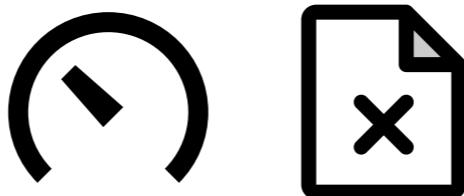


Area



Text

Making Comparisons



Slow, inaccurate judgement



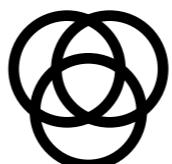
Angle



Pie charts



Area



Venn diagrams

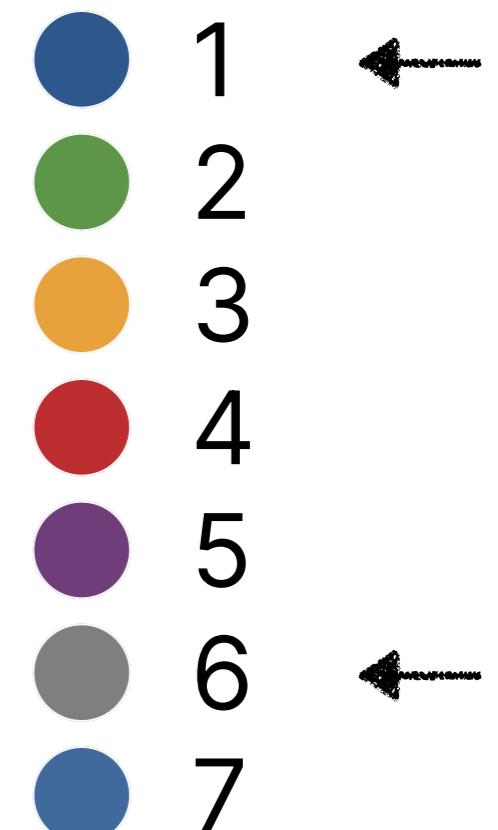
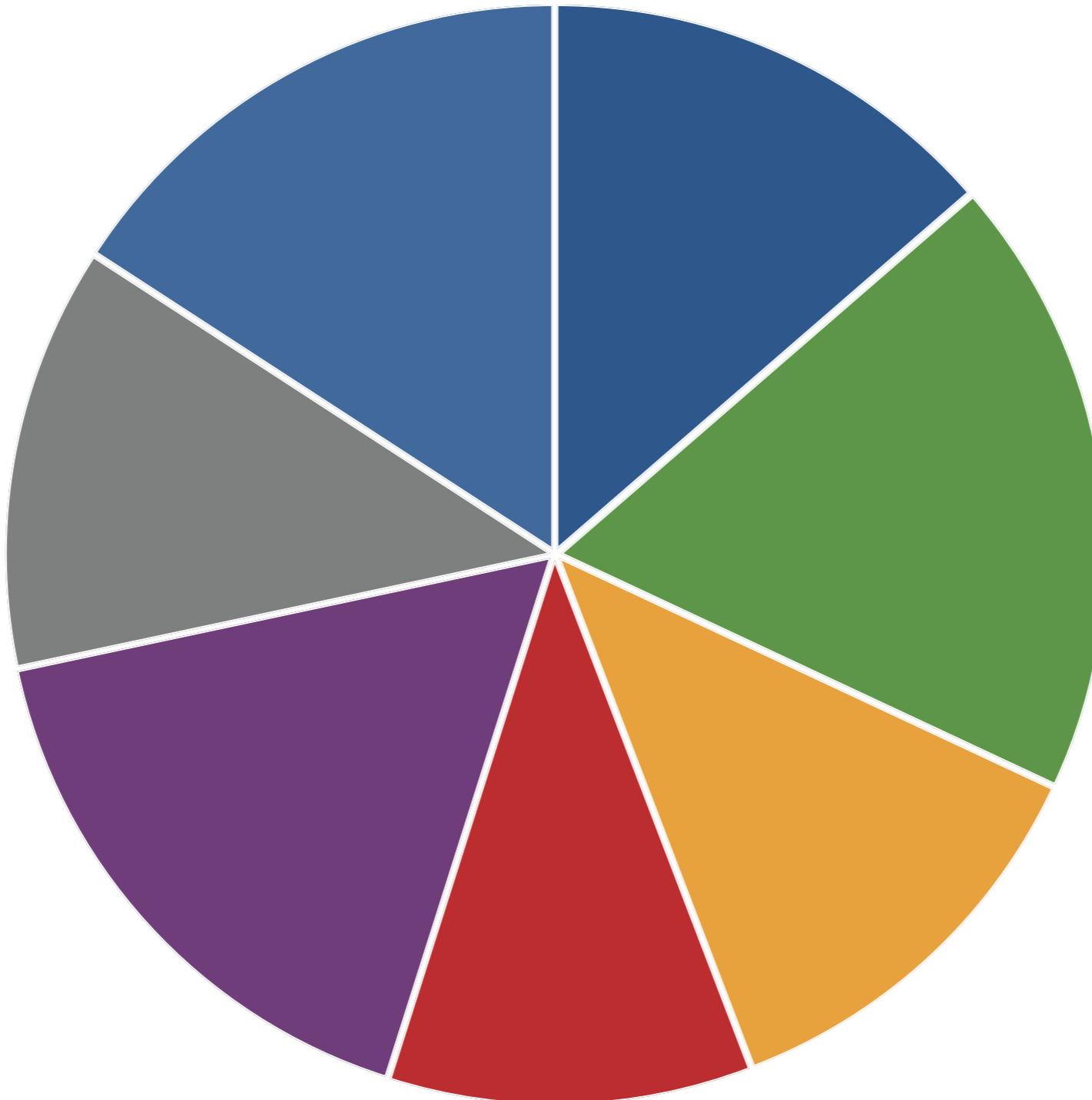


Text

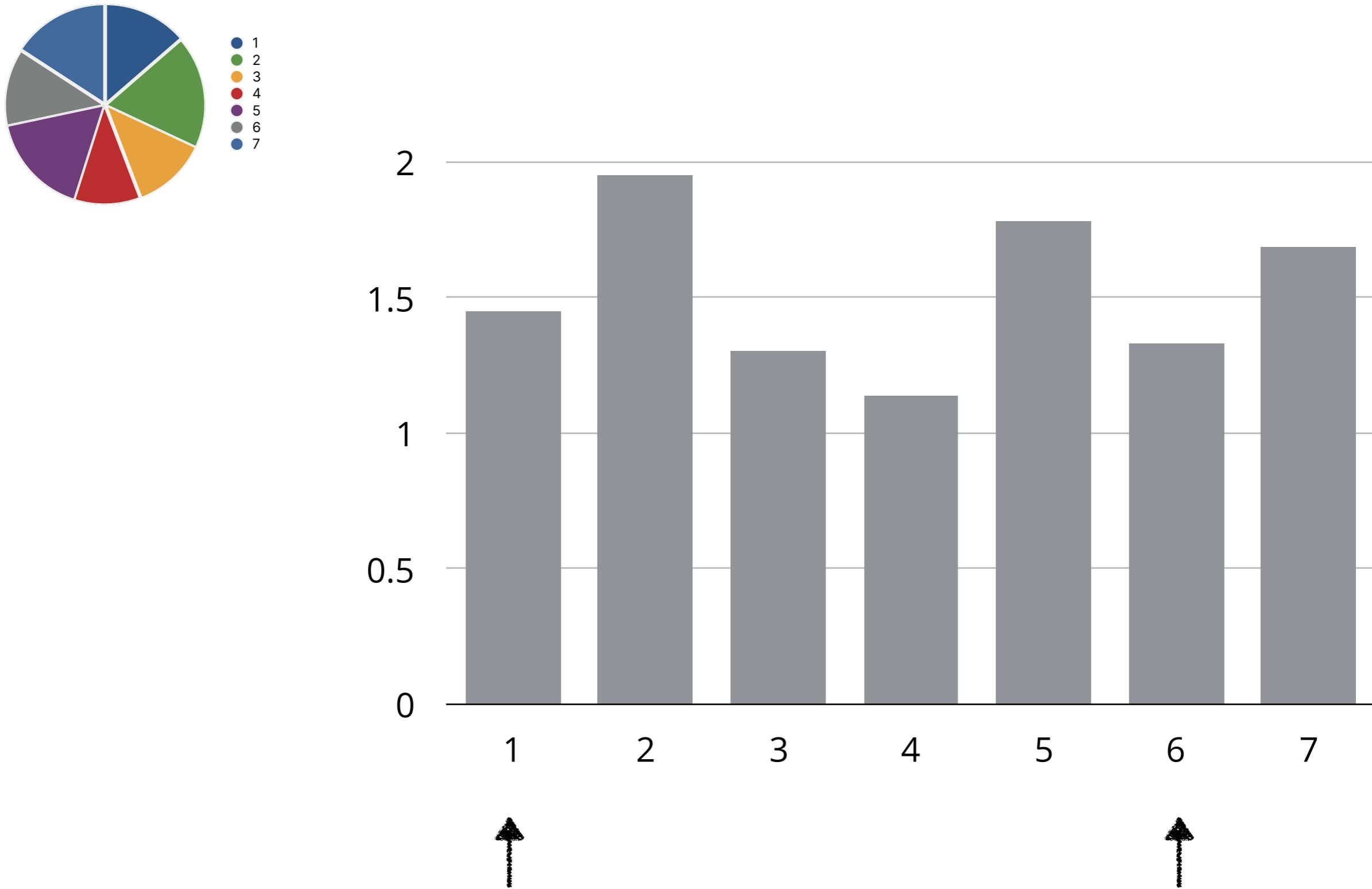


Plot labels

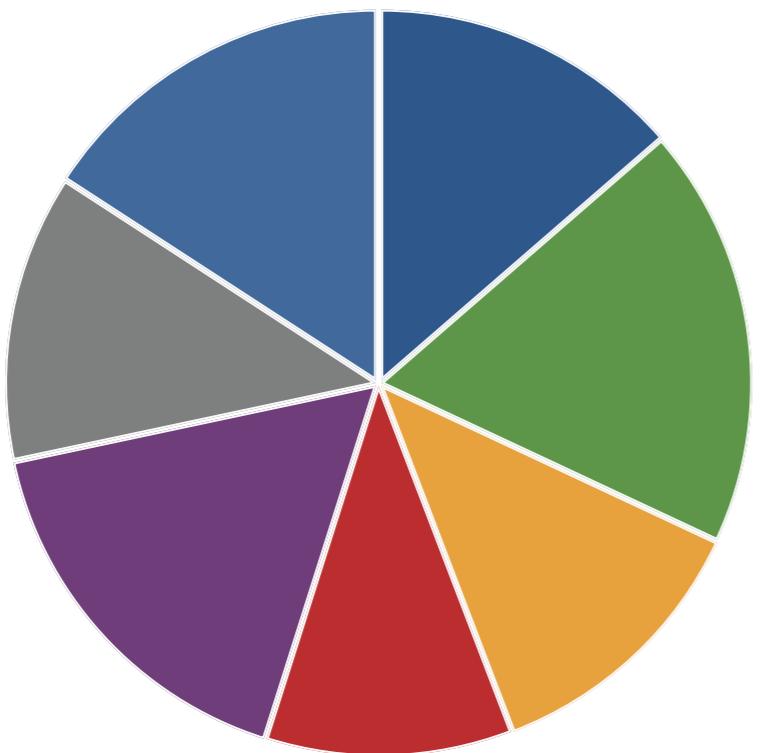
Making Comparisons



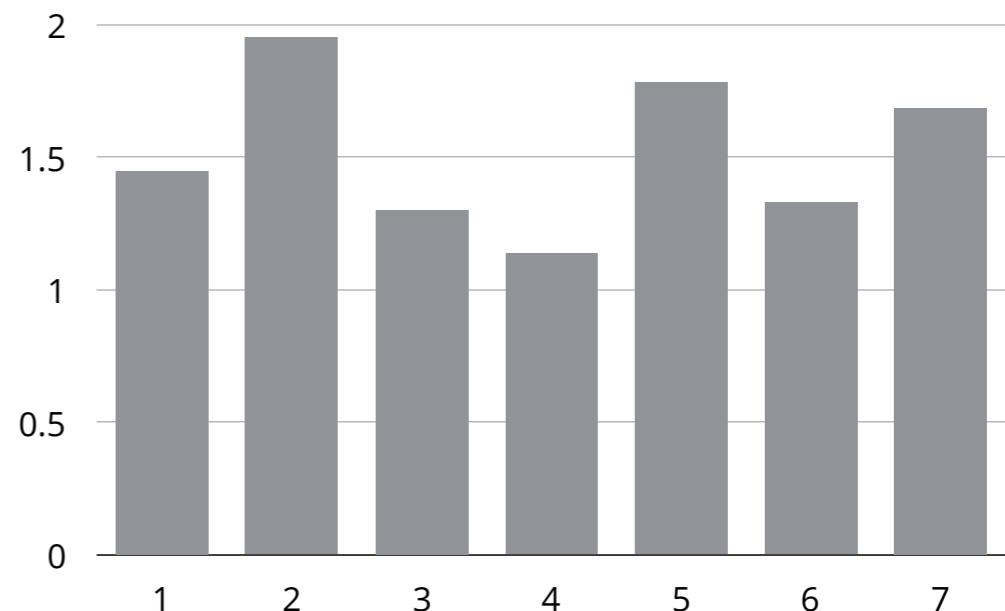
Making Comparisons



Making Comparisons



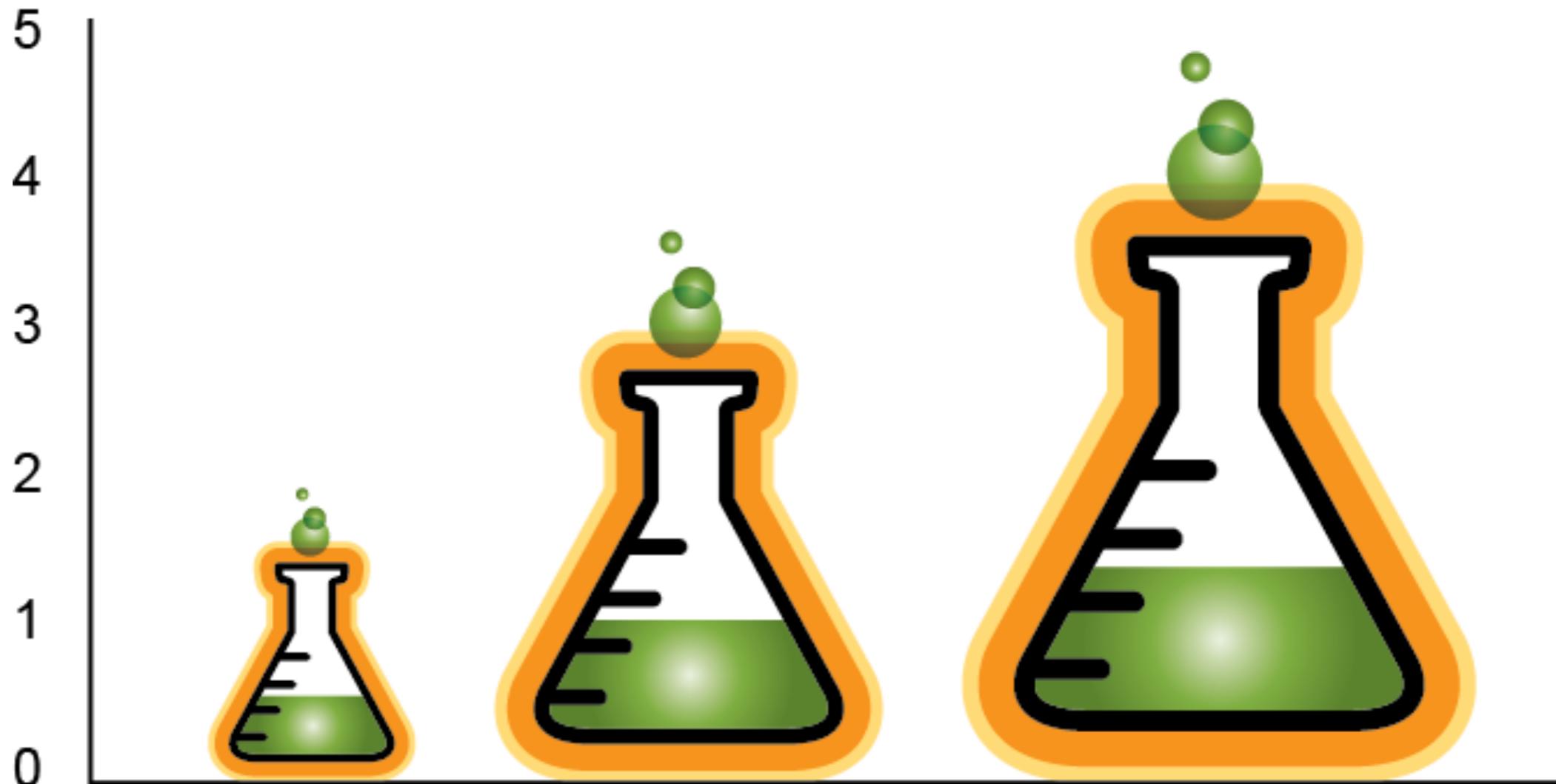
1
2
3
4
5
6
7



- Angles are bad for comparison
- Legend is disassociated from plot
- Requires colour link for series identification

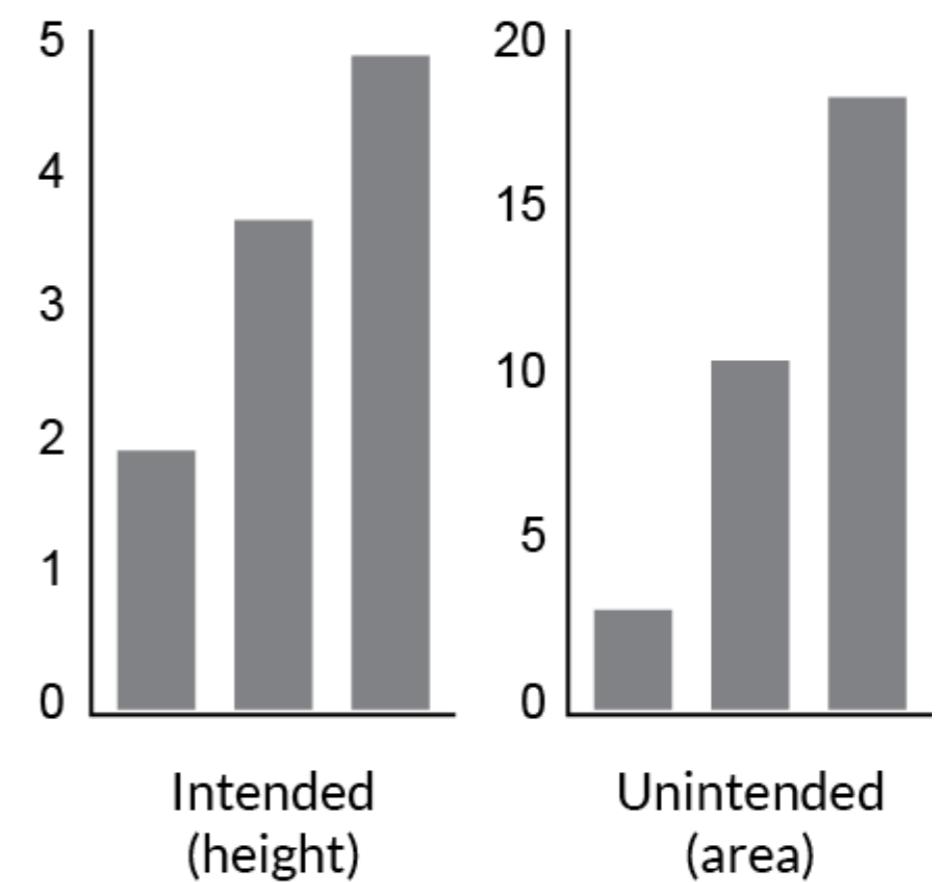
3

Making Comparisons



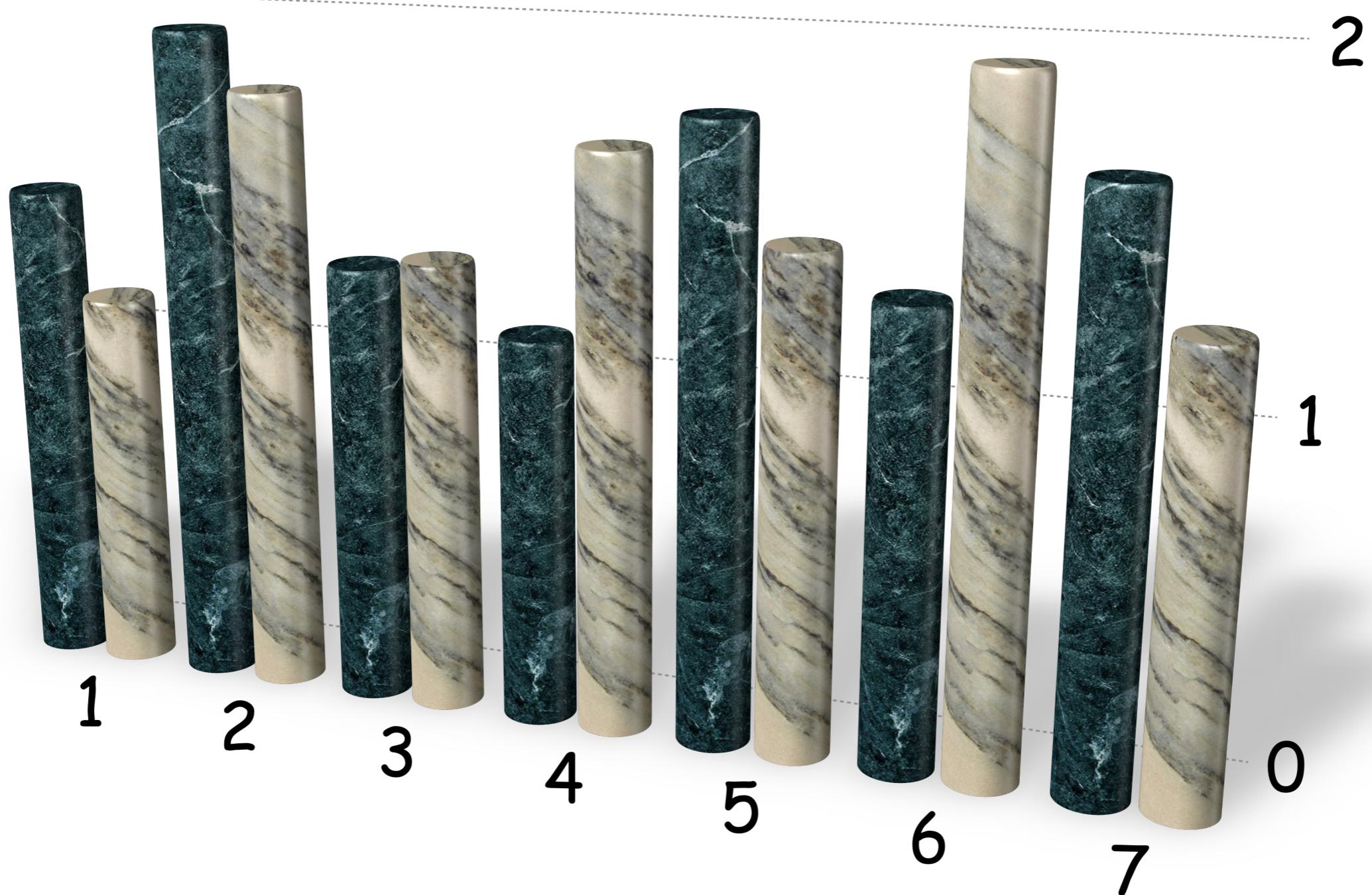
3

Making Comparisons

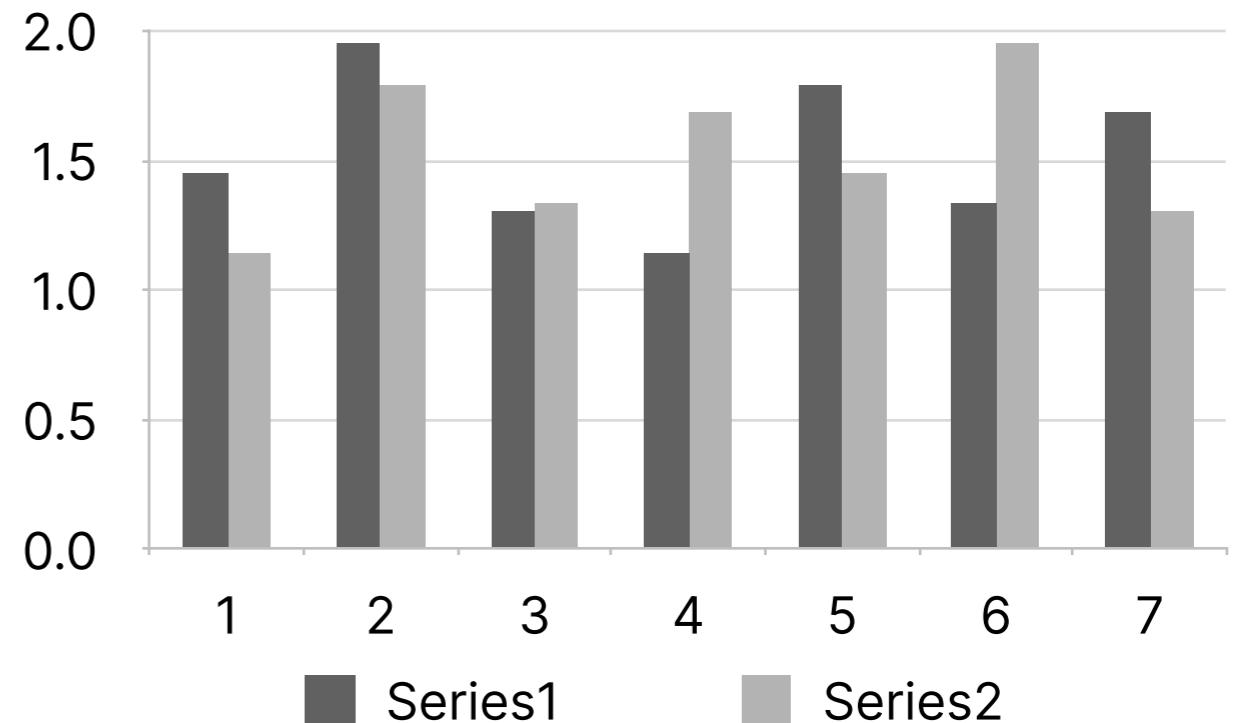
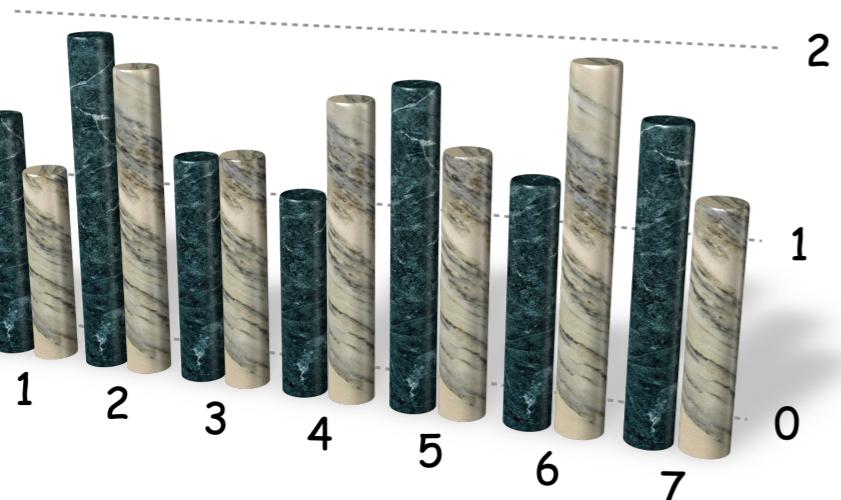


3

Making Comparisons



Making Comparisons



- Use of 3D was arbitrary
- No need for colour and texture

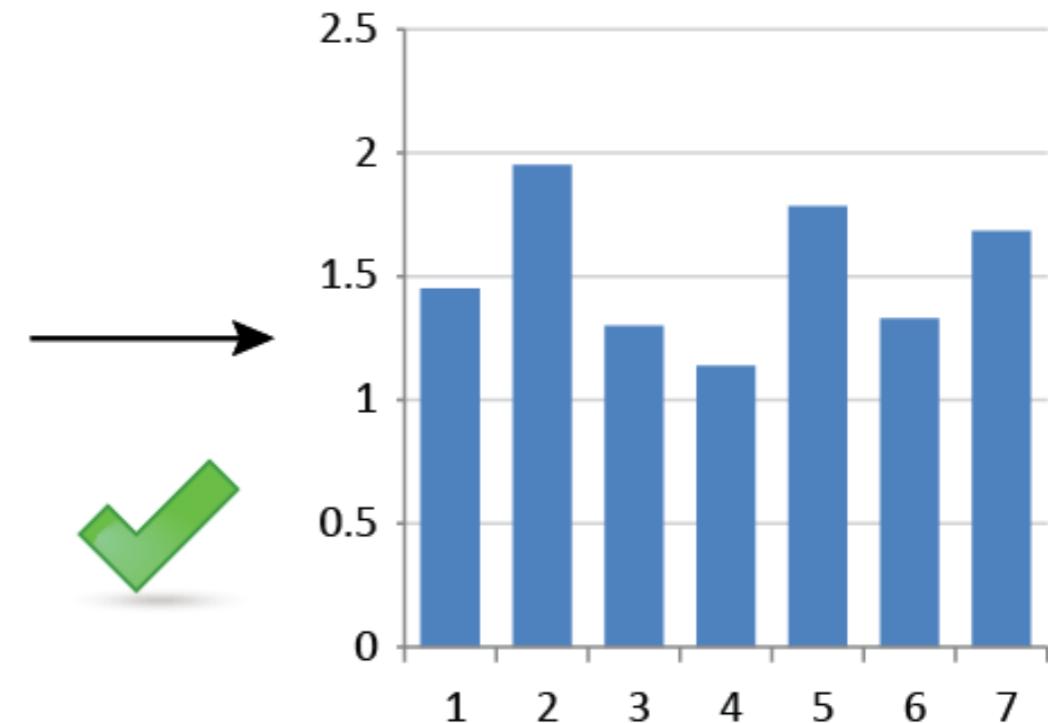
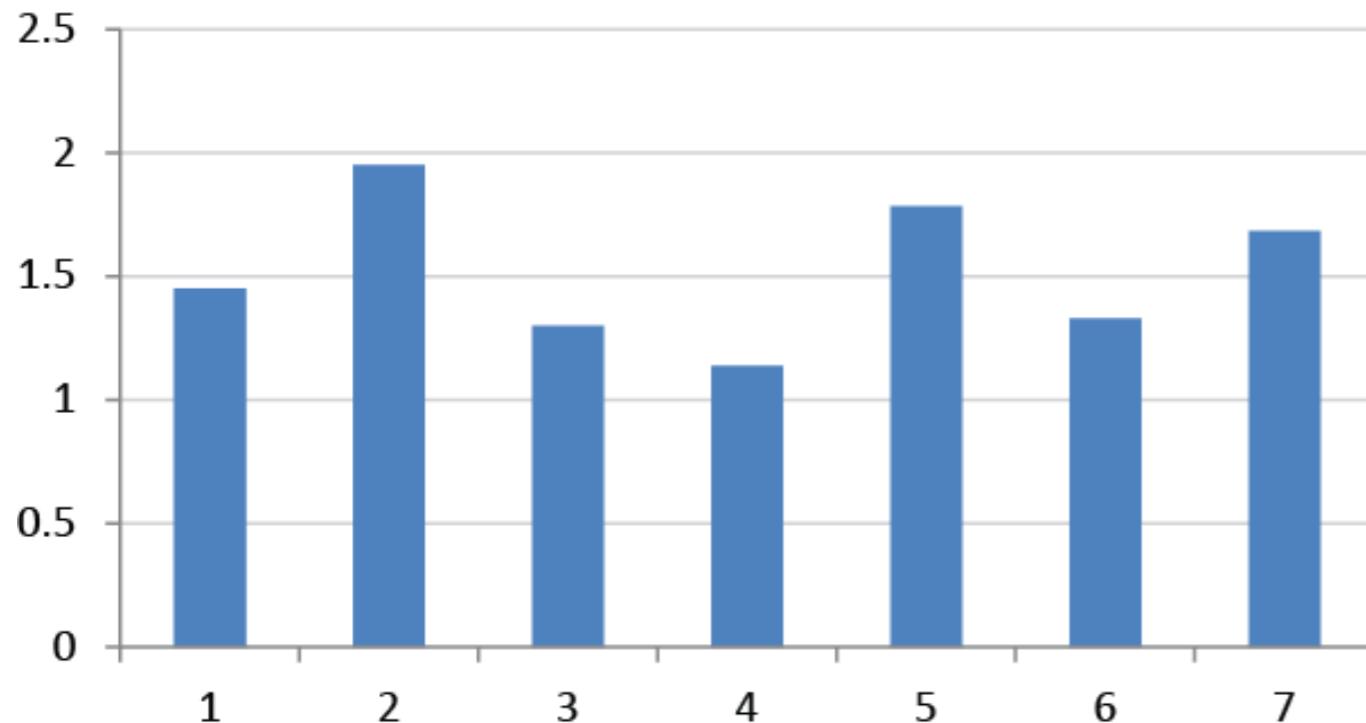
Aspect Ratio

- Elements that need accurate aspect ratios:
 - » Images
 - » Text
 - » Circles
 - » Axes with the same units



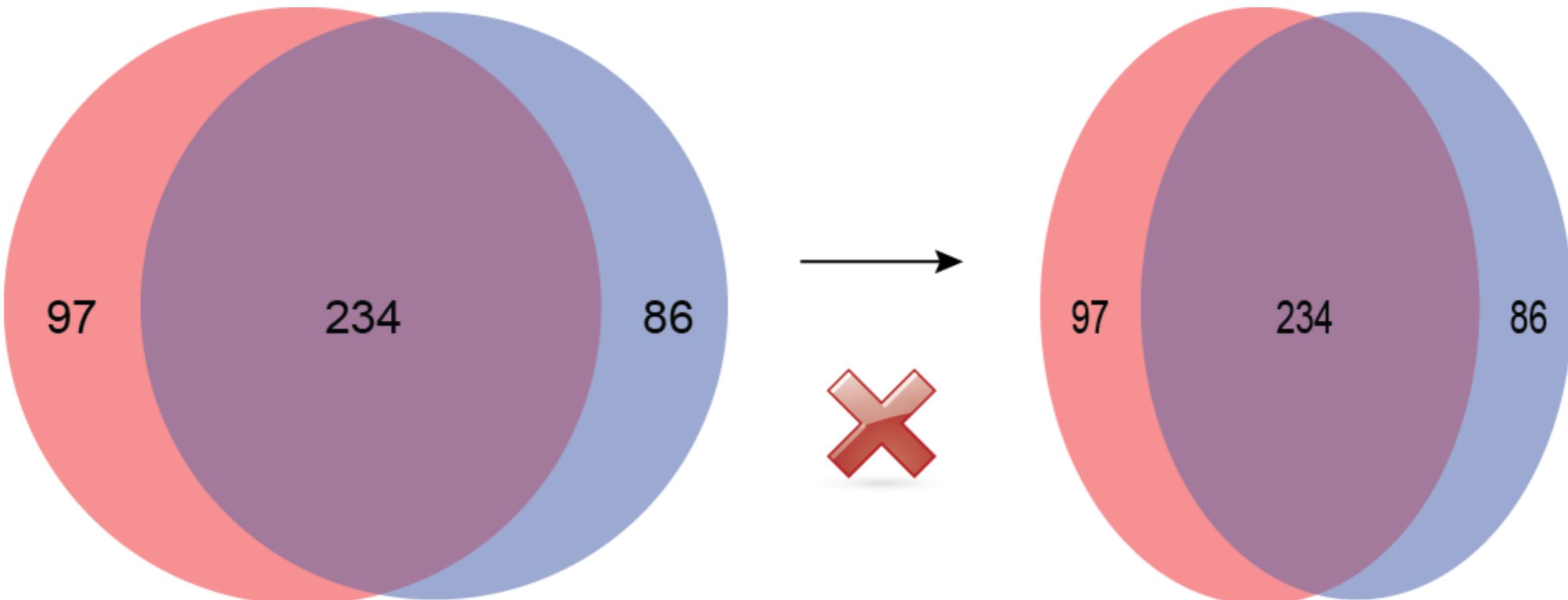
3

Aspect Ratio



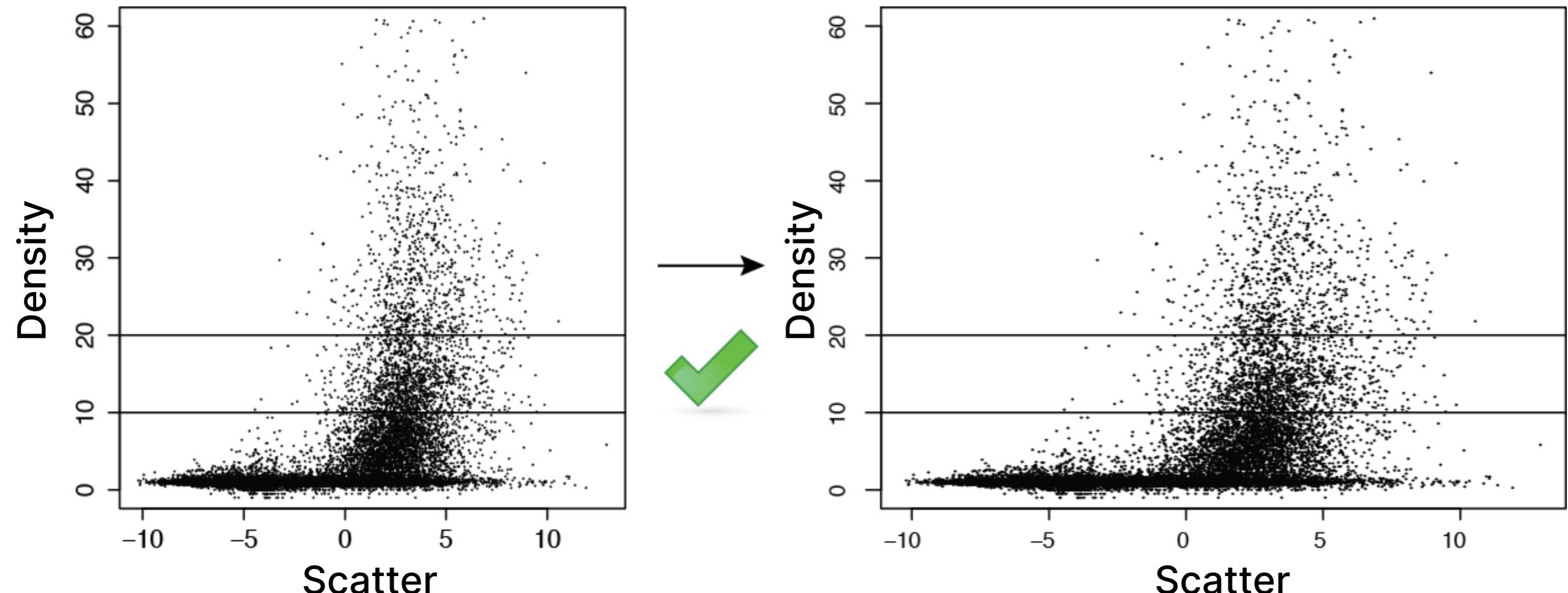
3

Aspect Ratio



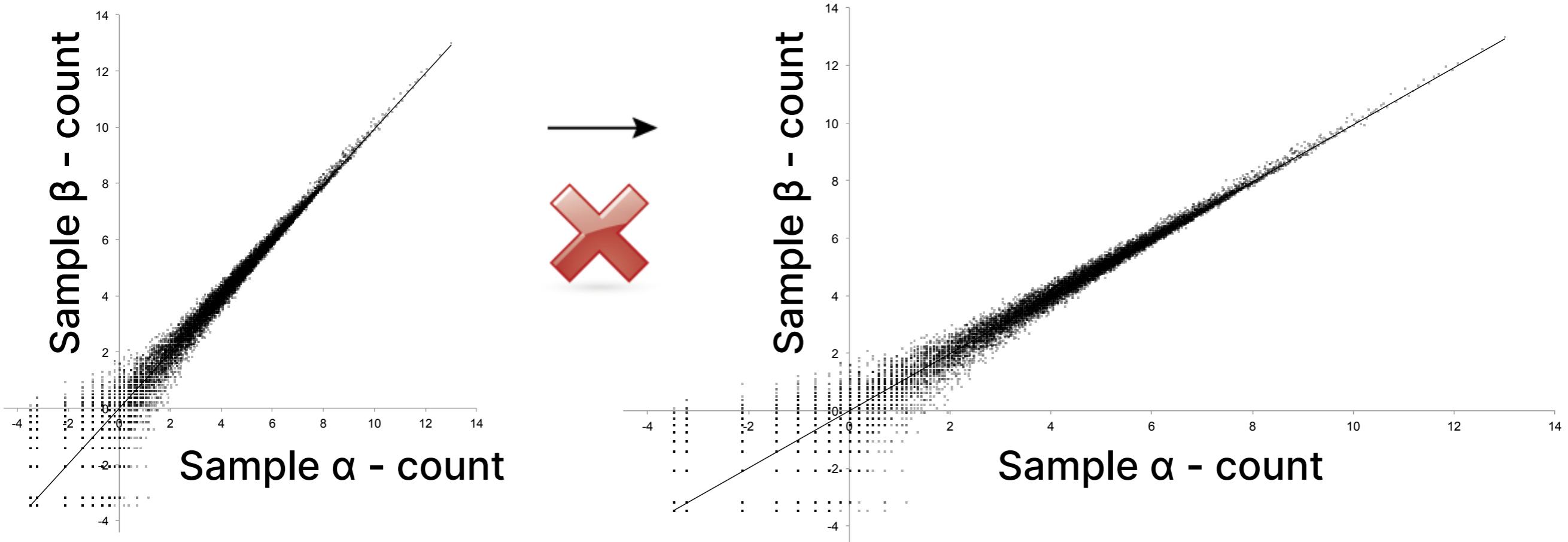
3

Aspect Ratio



3

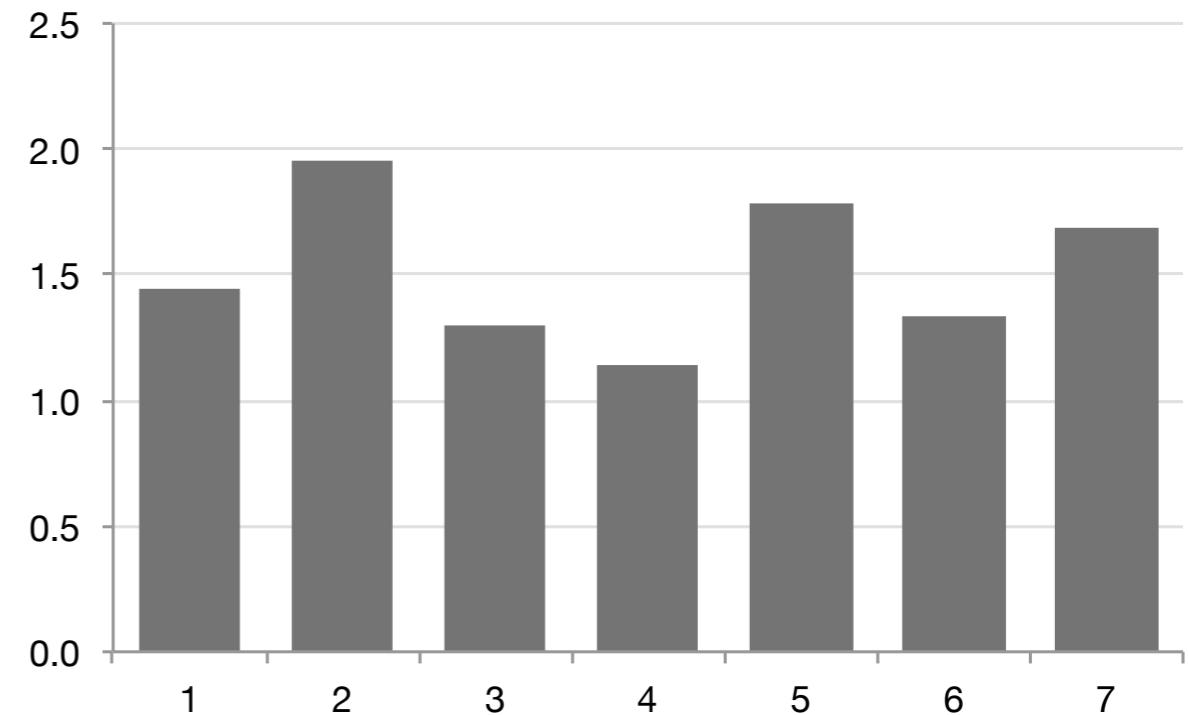
Aspect Ratio



3

Plotting principles

- Minimalistic
- Suitable plot type
- Big and clear
- Attractive (avoid defaults)
- The test - can you draw it from memory?

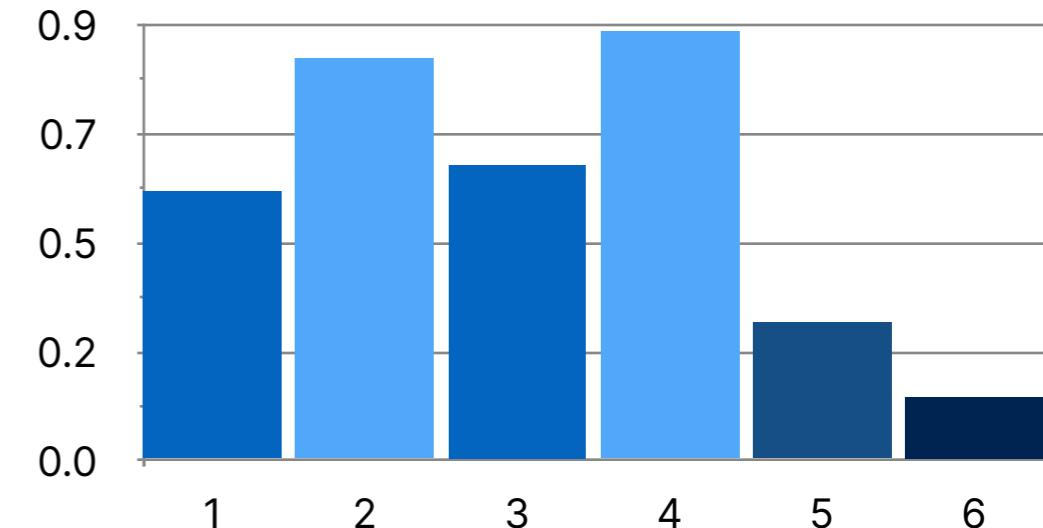
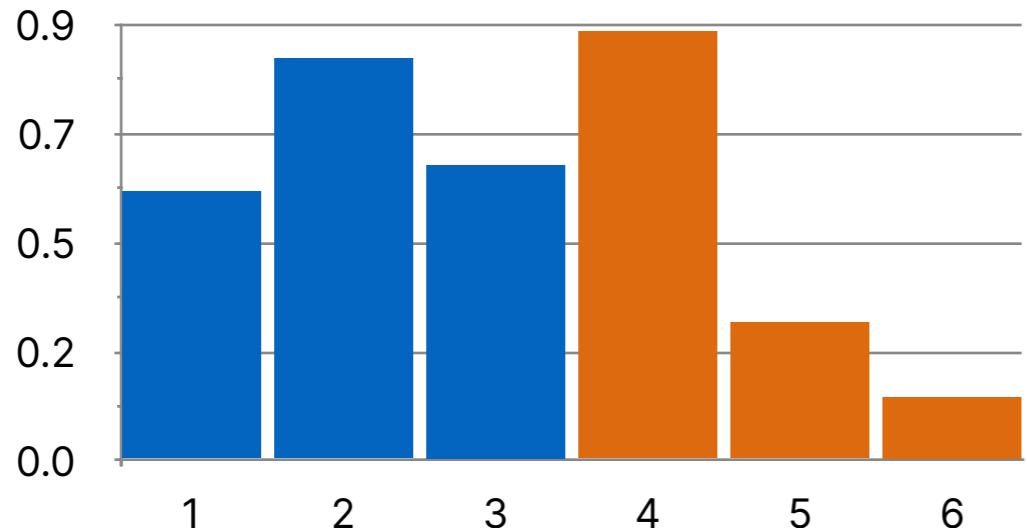
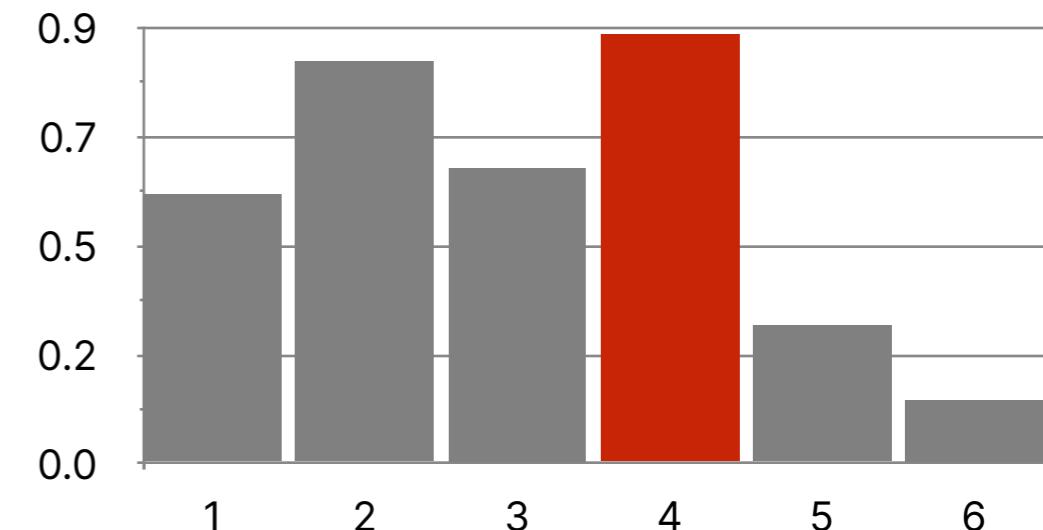


Using plots in talks

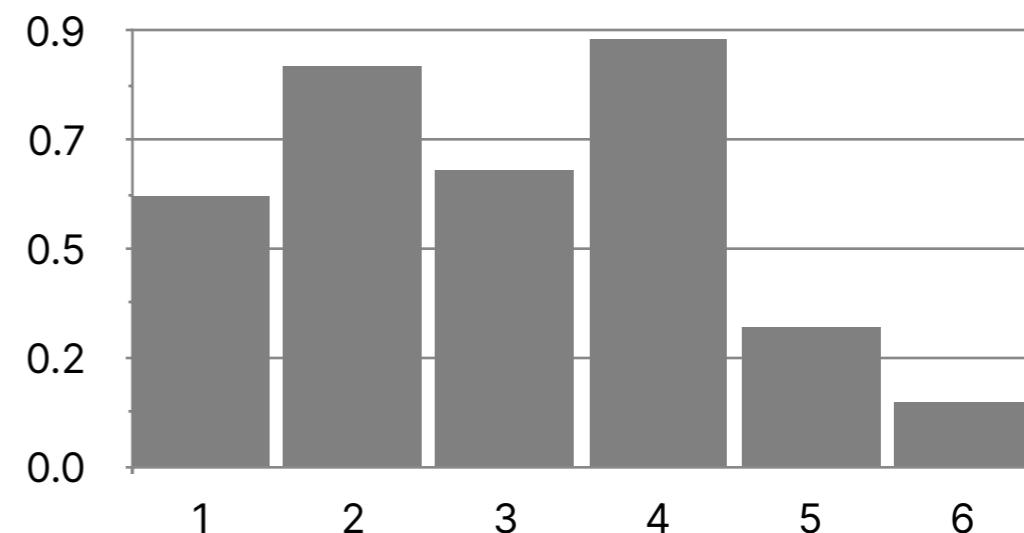
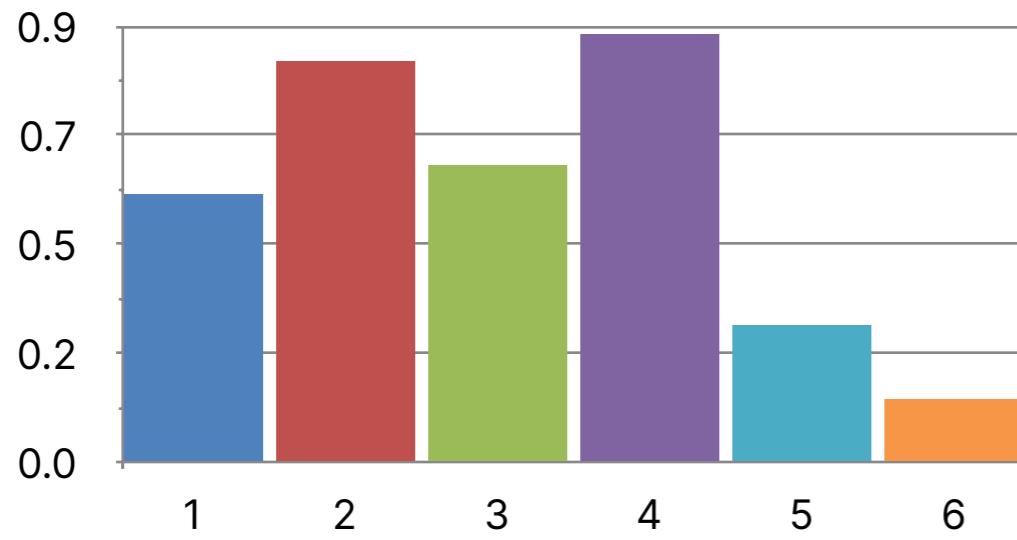
- Hold audience focus
 - » Talk through your data
 - » Don't show everything at once
- Use layering for complex plots
 - » Progressively add data

Colour

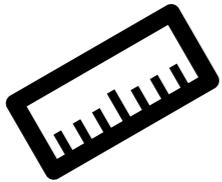
- Colour can be used to:
 - » Highlight specific data
 - » Group categories of data
 - » Encode quantitative values



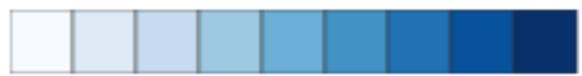
- The more selective you are with colour, the greater its effect



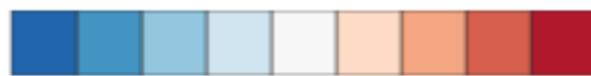
Colour Scales



Represent quantitative data



Sequential



Divergent

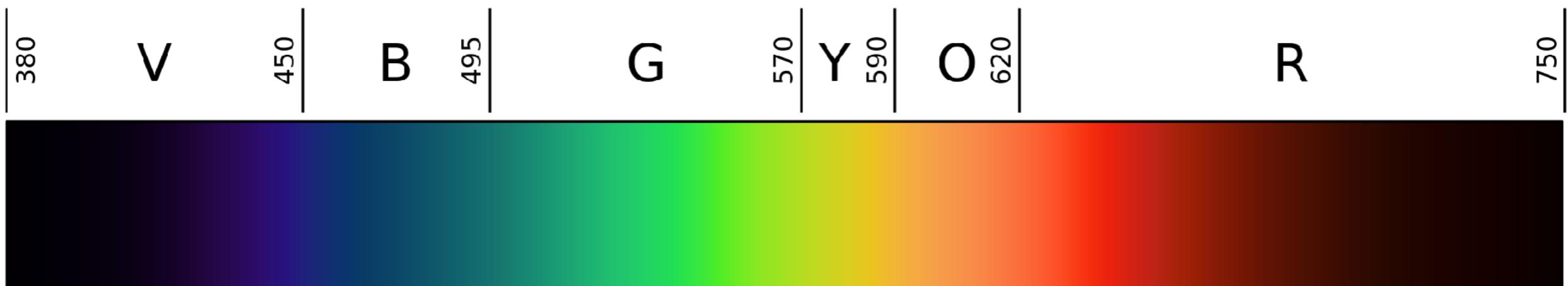


Categorical

Colour Sensitivity

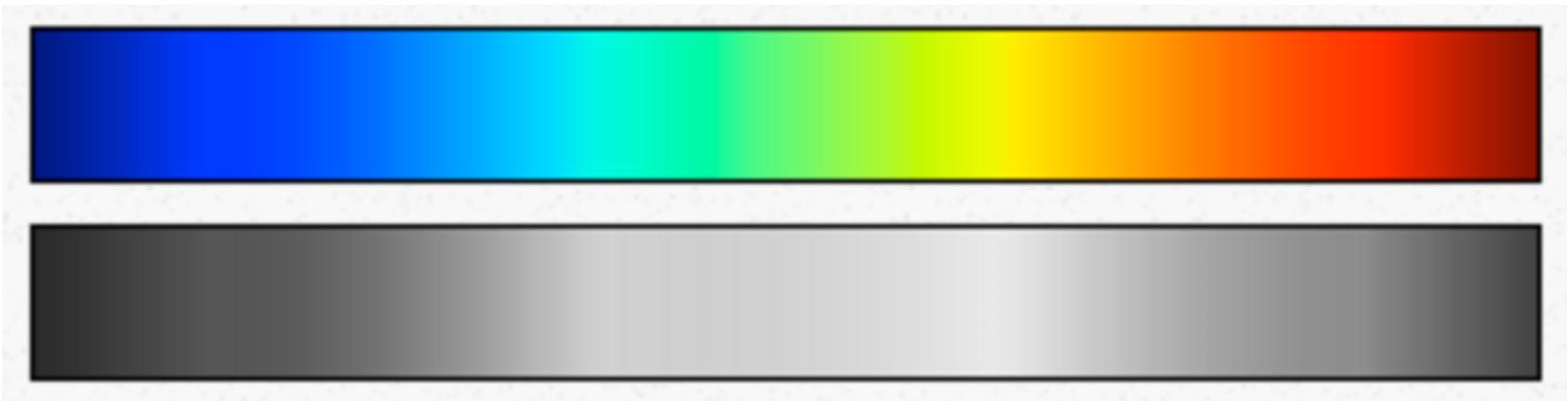


Colour Sensitivity



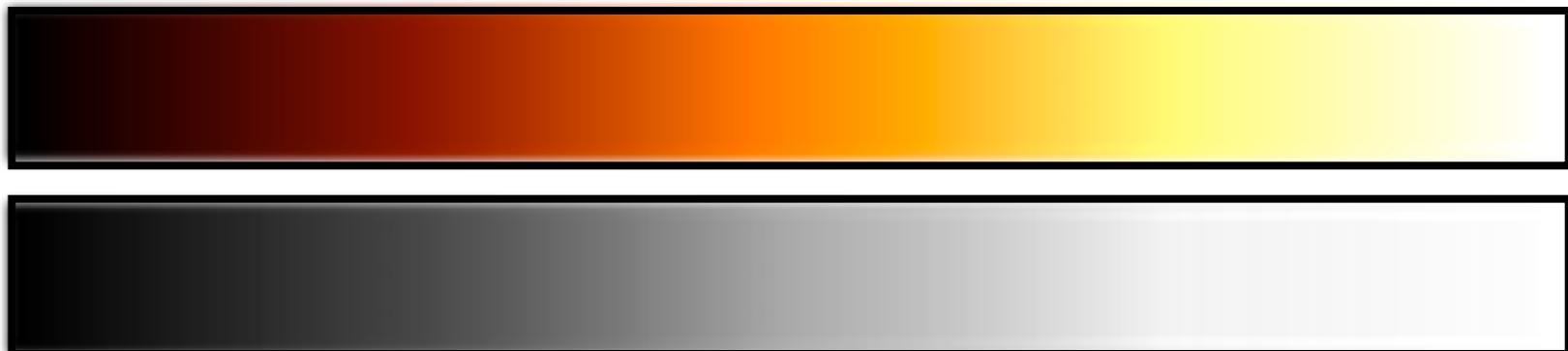
Luminescence

Jet



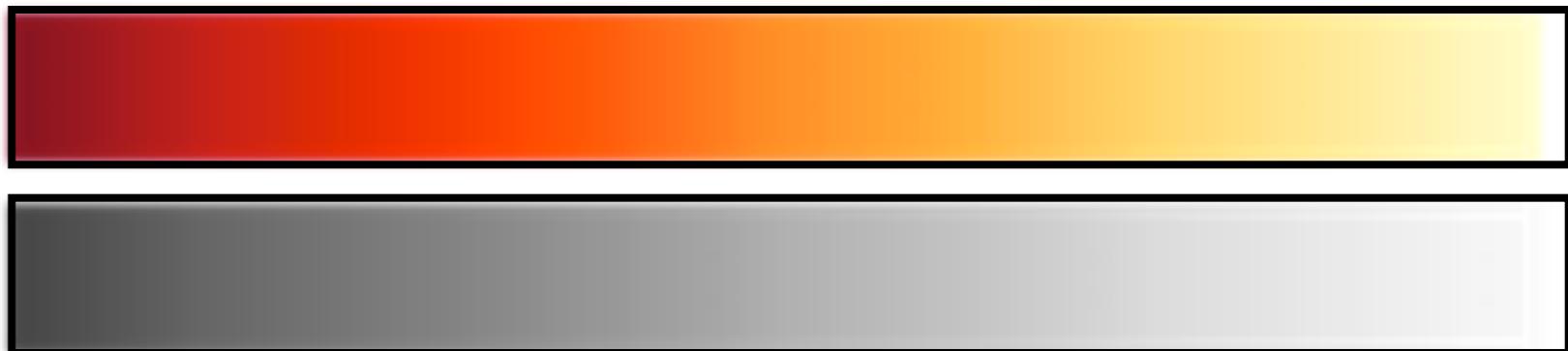
Luminescence

afmhot



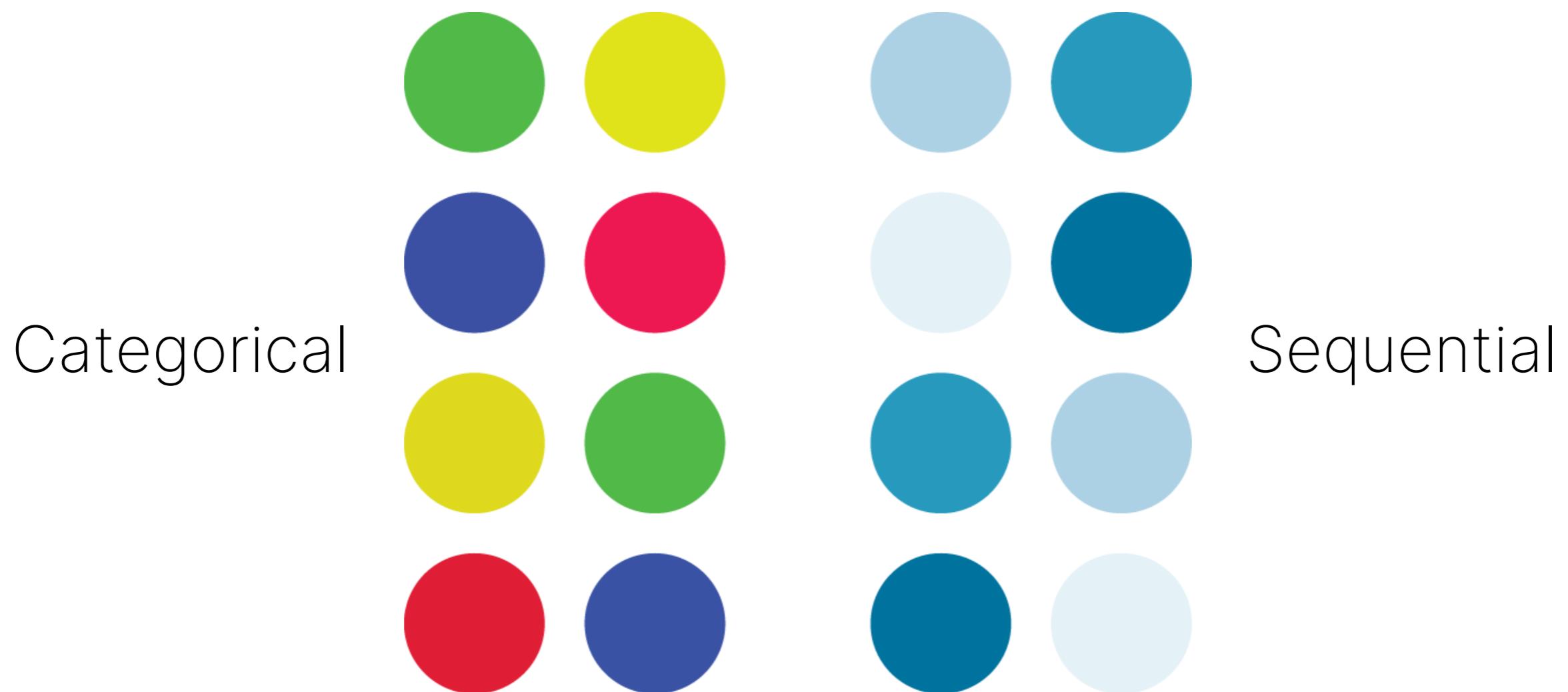
Luminescence

YIOrRd



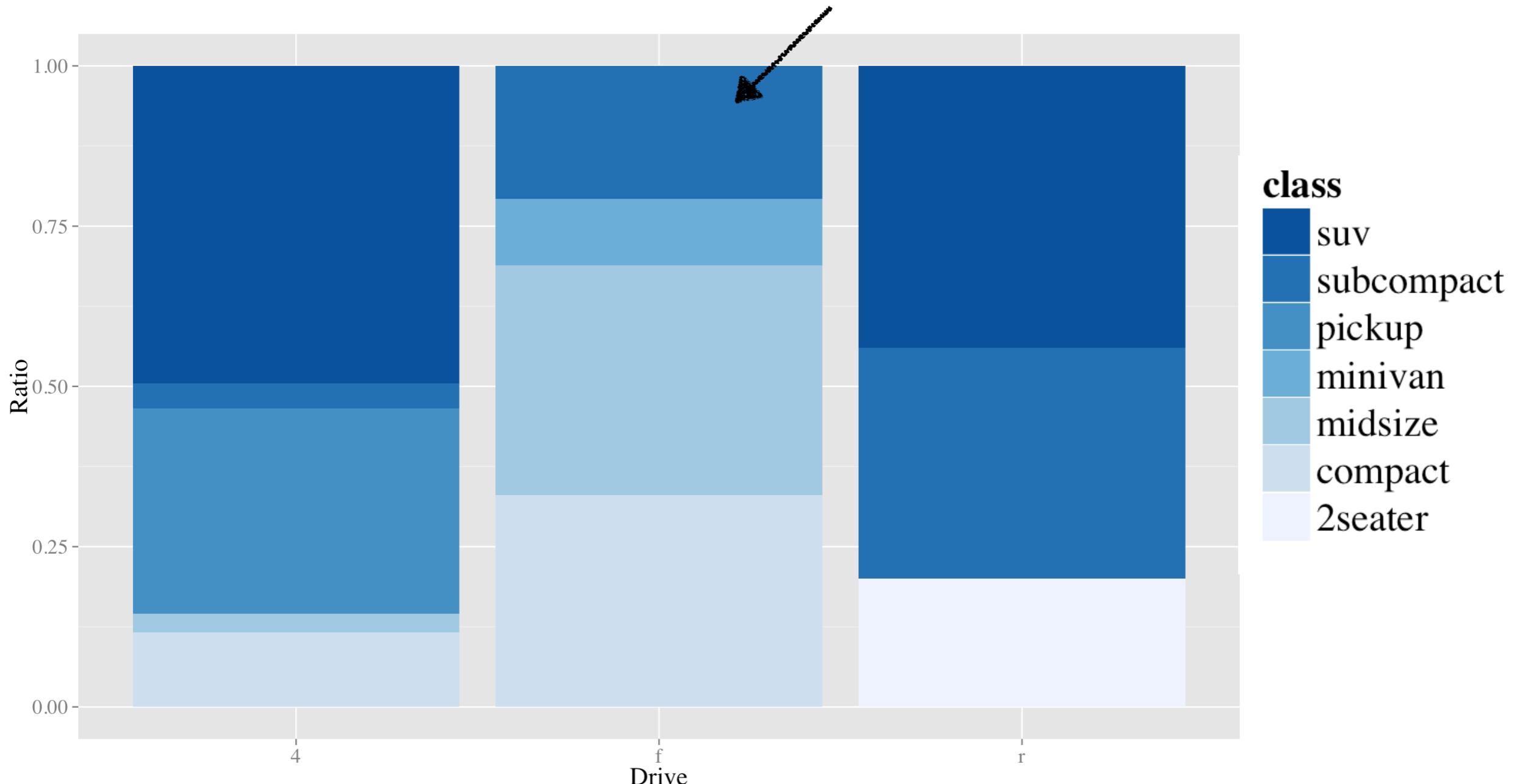
Luminescence

Scale types



Scale types

Which class is this?



Colour Blindness

- Common in Northern European men

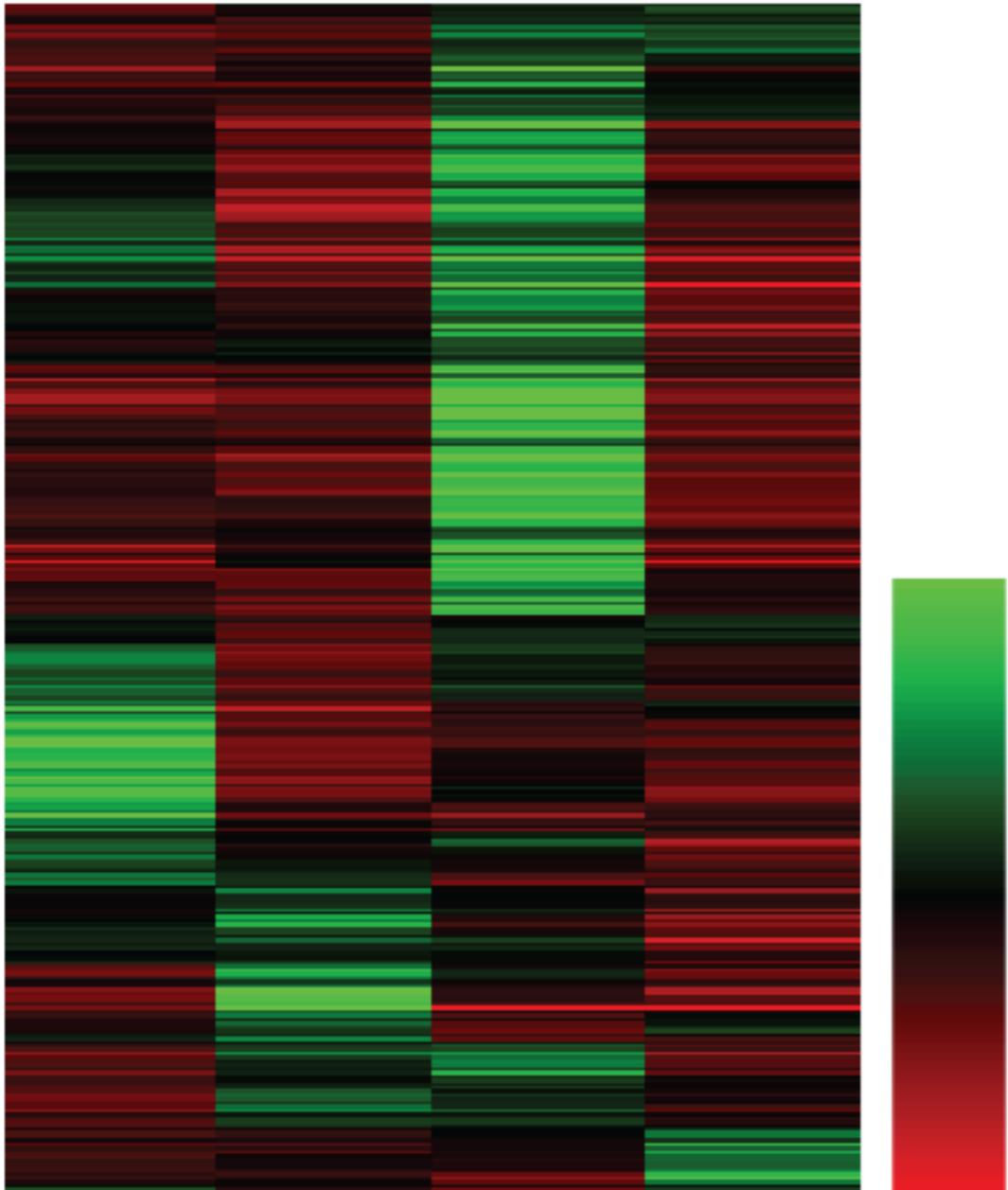
3 NE male
reviewers



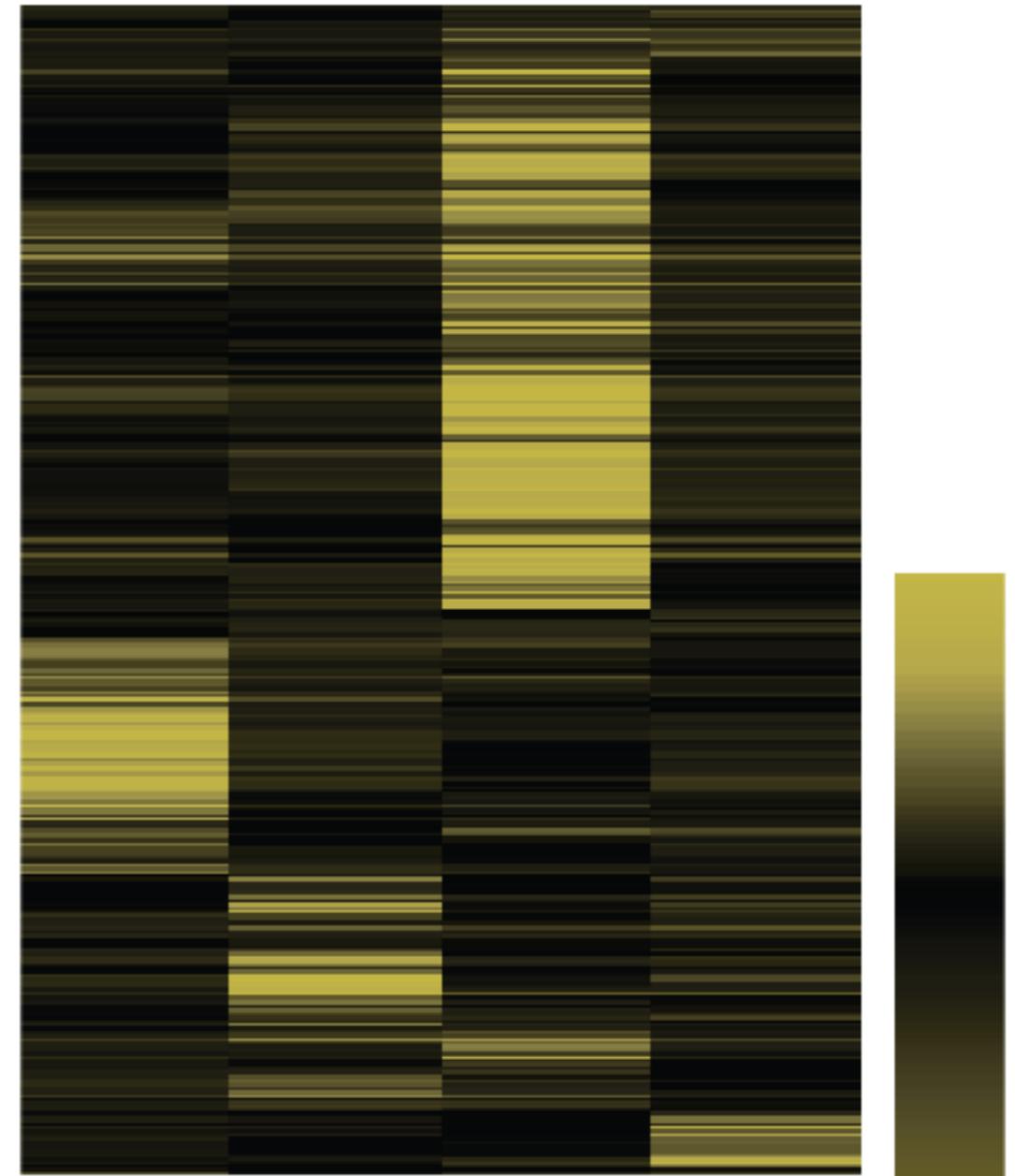
22% chance at least one colour blind

- Colour schemes such as Magenta – Green designed to be colour blind friendly

Colour Blindness

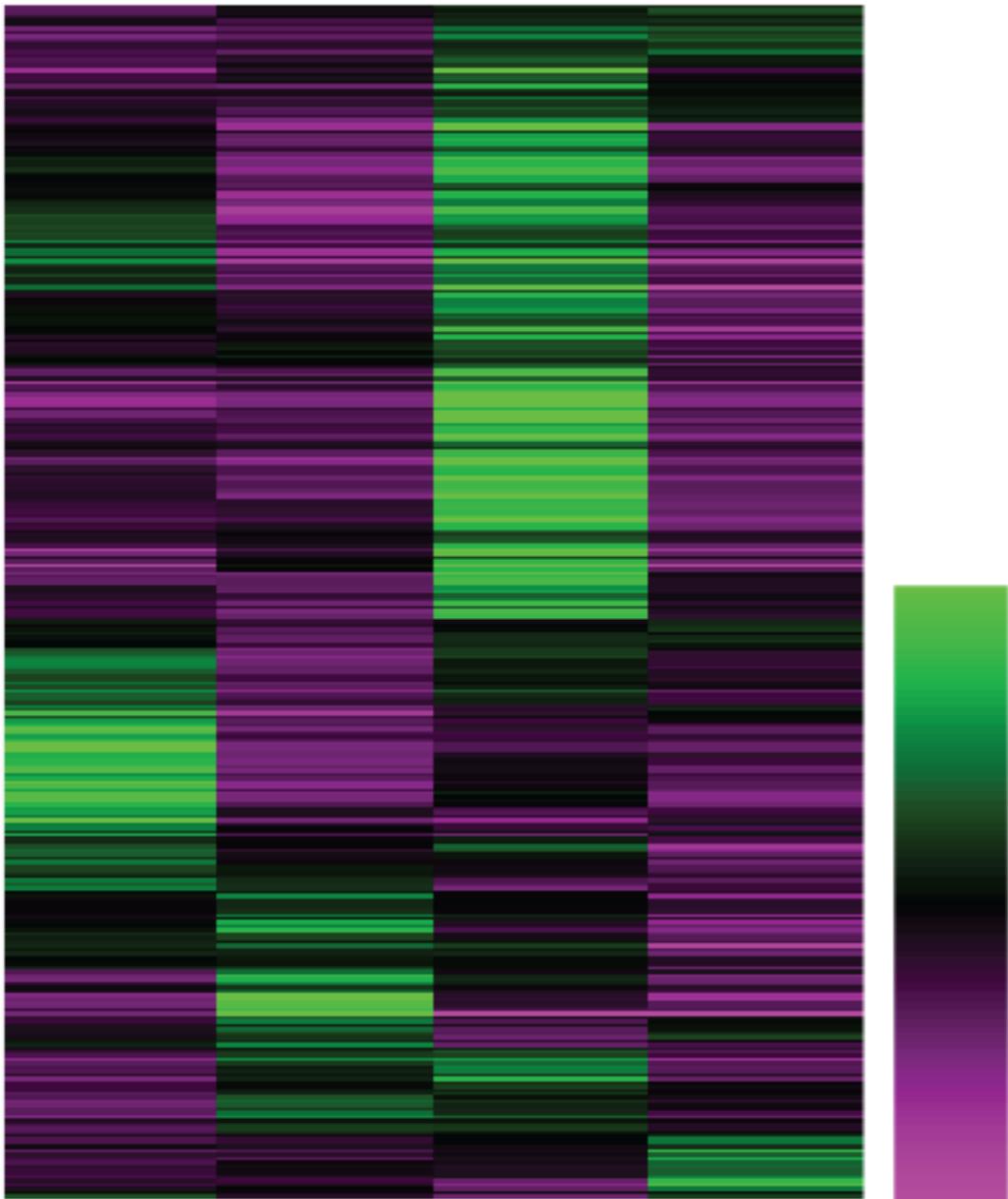


Normal Vision

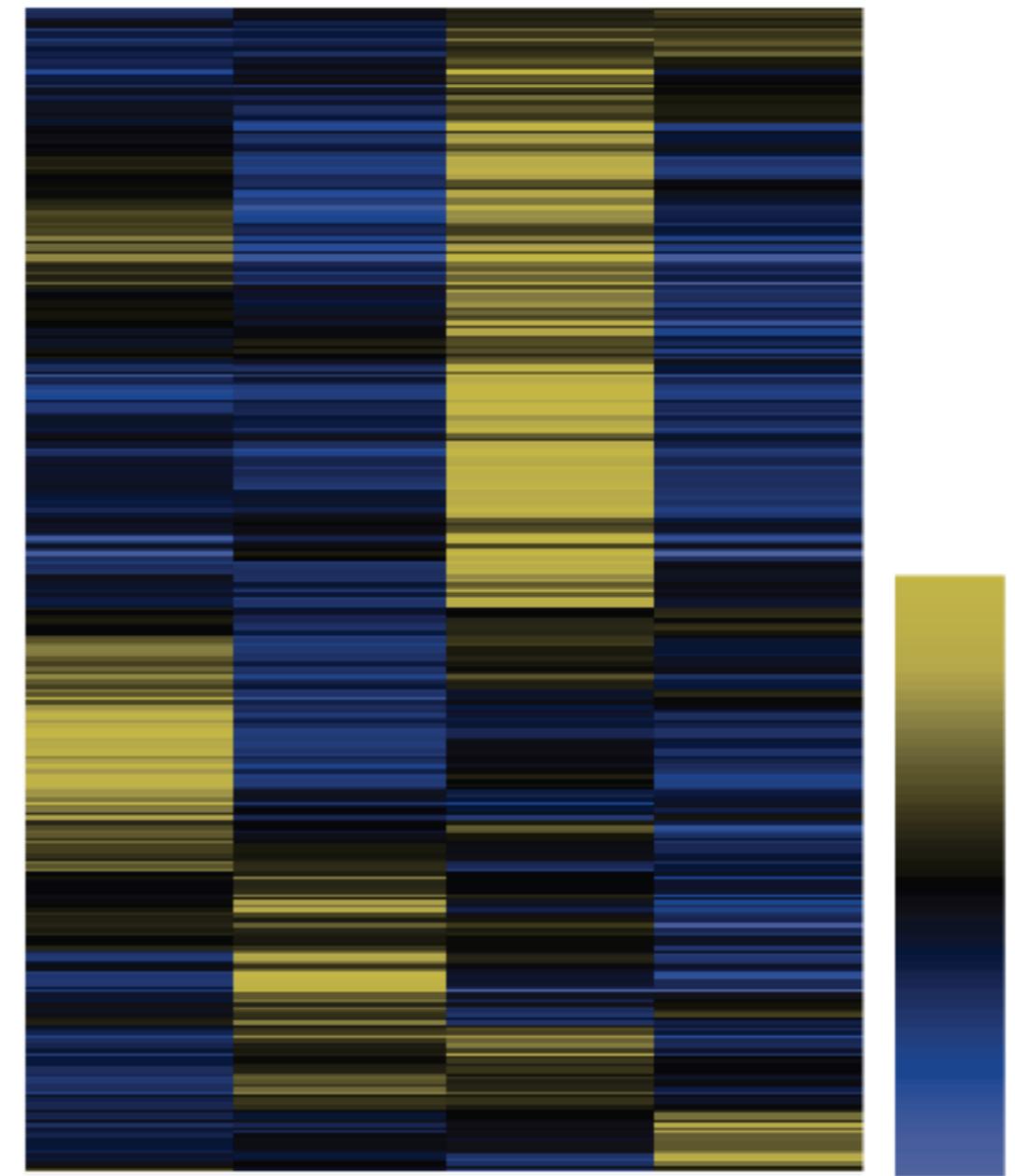


Protanopia

Colour Blindness



Normal Vision



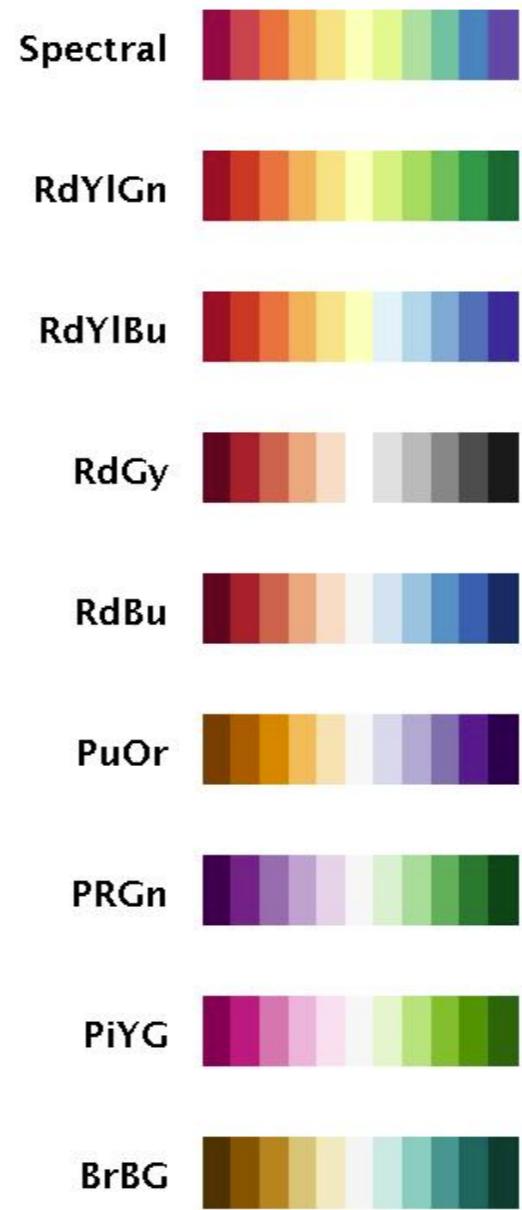
Protanopia

Color Brewer

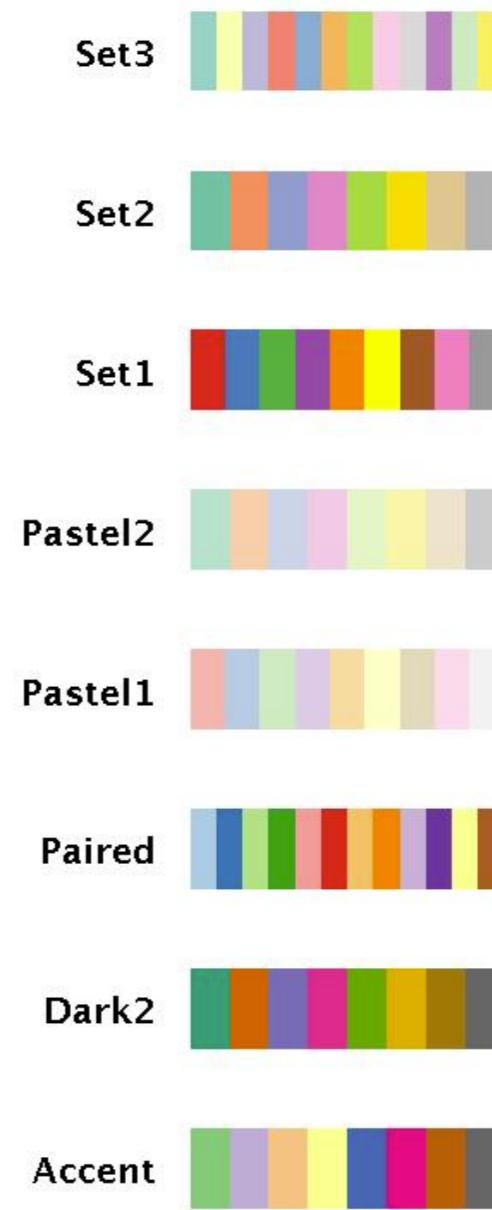
Sequential



Divergent



Categorical



<http://colorbrewer2.org>

Tools

- Fonts - **Google Fonts** (<https://fonts.google.com>)
- Colours - **Coolors** (<https://coolors.co>)
- Icons - **Iconify** (<https://iconify.design>)
- Images - **Unsplash** (<https://unsplash.com>)
- Editor - **Inkscape** (<https://inkscape.org>)

5

Google Fonts

Google Fonts

Fonts Icons Knowledge FAQ :

Search fonts Sentence Type something 40px C

Sans Serif Language Number of styles Show only variable fonts Show only color fonts

571 of 1531 families About these results Sort by: Most popular

Roboto 12 styles Open Sans Variable (2 axes)

fonts.google.com

Noto Sans Japanese Variable (1 axis) Google 人類社会のすべての構成員

Montserrat Variable (1 axis) Julieta Ulanovsky, Sol Matas, Juan Pablo del Peral, Jacques Le Bailly Whereas recognition of

The screenshot shows the Google Fonts homepage. At the top, there's a navigation bar with tabs for 'Fonts' (which is active), 'Icons', 'Knowledge', 'FAQ', and more. Below the navigation is a search bar with a magnifying glass icon and the placeholder 'Search fonts'. To the right of the search bar is a dropdown set to 'Sentence' and a text input field containing 'Type something'. A font size slider is set to '40px'. Further down, there are three dropdown menus: 'Sans Serif' (highlighted with a red box), 'Language', and 'Number of styles'. There are also two checkboxes: 'Show only variable fonts' and 'Show only color fonts'. On the right side, there's a link 'About these results' and a dropdown for 'Sort by' set to 'Most popular' (also highlighted with a red box). Below these controls, there's a large blue banner with the text 'fonts.google.com' in white. Underneath the banner, there are two font families displayed: 'Roboto' (12 styles) and 'Open Sans' (Variable (2 axes)). At the bottom, there are two more font families: 'Noto Sans Japanese' (Variable (1 axis)) and 'Montserrat' (Variable (1 axis)). The 'Noto Sans Japanese' section includes a small note about Google and some Japanese text. The 'Montserrat' section includes the names of its creators: Julieta Ulanovsky, Sol Matas, Juan Pablo del Peral, and Jacques Le Bailly.

5

Coolors



GENERATOR

BROWSER



LOGIN

coolors.co

#119DA4

#0C7489

#13505B

#040404

#D7D9CE

5

Iconify



Thousands of icons, one unified framework.

[Support Iconify](#)

party

X Search Icons

< Show all available icon sets

BoxIcons BoxIcons Solid Game Icons Material Symbols Google Material Icons Arcticons Material Design Icons Lucide OpenMoji

Twitter Emojis Monotone

Emoji One (v1.0) Box OS Emojis

Displaying 1–20 of 20 results

iconify.design

1 2 >

The screenshot shows the Iconify website interface. At the top, there's a search bar with the word "party" typed in, a blue "Search Icons" button, and a link to "Show all available icon sets". Below the search bar is a horizontal navigation bar with several icon sets: BoxIcons, BoxIcons Solid, Game Icons, Material Symbols, Google Material Icons, Arcticons, Material Design Icons, Lucide, and OpenMoji. Some of these buttons are highlighted in different colors (e.g., purple for BoxIcons Solid, green for Game Icons). To the left of the main content area, there are dropdown menus for "Twitter Emojis", "Emoji One (v1.0)", and "Box OS Emojis". The main content area features a large, bold "iconify.design" title. Below it is a grid of icons related to parties, such as balloons, confetti cones, cameras, and faces. The icons are arranged in four rows. At the bottom of the grid, there are navigation arrows for page 1 and 2, and a right arrow for more pages.

5

Unsplash

The screenshot shows the Unsplash homepage with a search bar containing "northern lights". Below the search bar are navigation links for "Explore", "Advertise", "Unsplash+", "Log in", "Submit a photo", and a menu icon. Underneath the header, there are links for "Photos 10k", "Collections 7.2k", and "Users 13". A "Filters" button is also present. The main content area is titled "Northern lights" and features a large blue banner with the text "unsplash.com". Below the banner are several thumbnail images of northern lights, each with a caption: "Iceland", "Aurora Borealis", "Aurora Polaris", "Hd Sky Wallpapers", "Hd Wallpapers", and "Hd Backgrounds".

Northern lights

[Wallpaper](#)[Light](#)[Outdoor](#)[Northern](#)[Nature](#)[Background](#)[Auto](#)

>

[Unsplash+](#)

unsplash.com

[Iceland](#)[Aurora Borealis](#)[Aurora Polaris](#)[Hd Sky Wallpapers](#)[Hd Wallpapers](#)[Hd Backgrounds](#)

Inkscape



INKSCAPE
Draw Freely.

inkscape.org

Summary



Help to explain



Memorable



Interesting



Important



Easy