



Tools and Software for Graphics Visualization

Why Tools Matter (But Don't Replace Thinking)

Categories of Visualization Tools



Graphic Design

Focus on manual visual control. Used for posters and reports where aesthetics are paramount.



Analytics

Designed for data-driven graphics with automatic mapping from data to visual elements.



Programming

Visualization created using code. Explicit mapping (data → aesthetics → geometry).



Interactive

Enable user exploration such as zooming, filtering, and highlighting web-based data.

A selection of 10 Data Visualization types

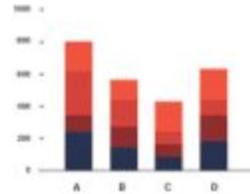
KPIs



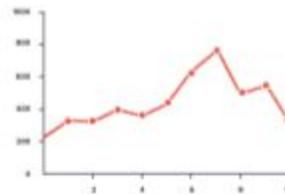
Tables

	A	B	C
X	\$40	240	48
Y	\$50	200	59
Z	\$60	310	79

Bar charts



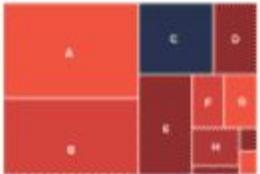
Line charts



Donut charts



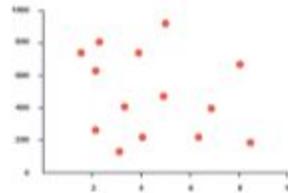
Tree Maps



Bullet Charts



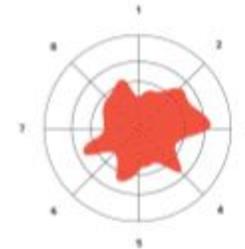
Scatter plots



Geo Maps



Radial charts



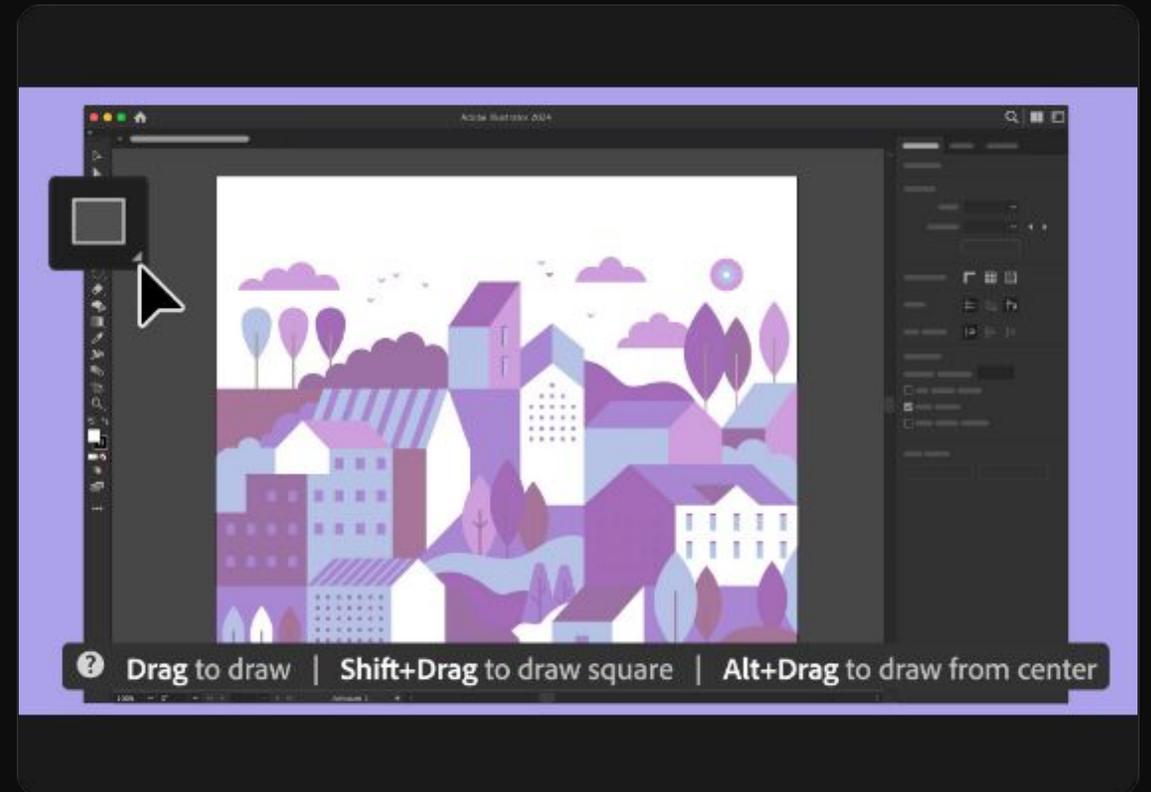
Graphic Design Software

Manual Control: The designer controls every aspect of layout, color, typography, and hierarchy.

Common Uses: Posters, infographics, marketing materials, and static reports.

Key Examples: Adobe Illustrator, Adobe Photoshop, Affinity Designer, Canva.

Philosophy: Tools are enablers for creative expression, not rigid data mappers.



- 01 INFOGRAPHIC**
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- 02 INFOGRAPHIC**
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- 05 INFOGRAPHIC**
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INFOGRAPHIC

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- <https://www.adobe.com/products/illustrator/examples.html>
- <https://www.canva.com/templates/infographics/>

5 Reasons you should use an INFOGRAPHIC

<p>1</p> <p>To increase engagement: Infographics can be more engaging than text-based content, as they use visual elements such as images, charts, and graphics to grab the viewer's attention.</p>	
	<p>2</p> <p>To simplify complex information: Infographics can help to present complex data and information in a clear, concise, and easy-to-understand format.</p>
<p>3</p> <p>To increase brand awareness: Infographics can be used as a marketing tool to increase brand awareness and showcase a company's expertise in a specific field.</p>	
	<p>4</p> <p>To explain a process: Infographics can be used to explain a process or procedure in a clear and simple manner.</p>

5

To make data more accessible:

Graphic Design Tools: Pros & Cons

Strengths

High Aesthetic Quality: Unmatched control over visual polish.

Creative Freedom: No constraints imposed by data structures.

Communication: tailored perfectly for specific presentation contexts.

Limitations

Not Scalable: Difficult to handle large or changing datasets.

Manual Updates: Every data change requires manual redesign.

Misinterpretation Risk: Easy to create misleading visuals if data principles are ignored.

Data Visualization & Analytics Tools

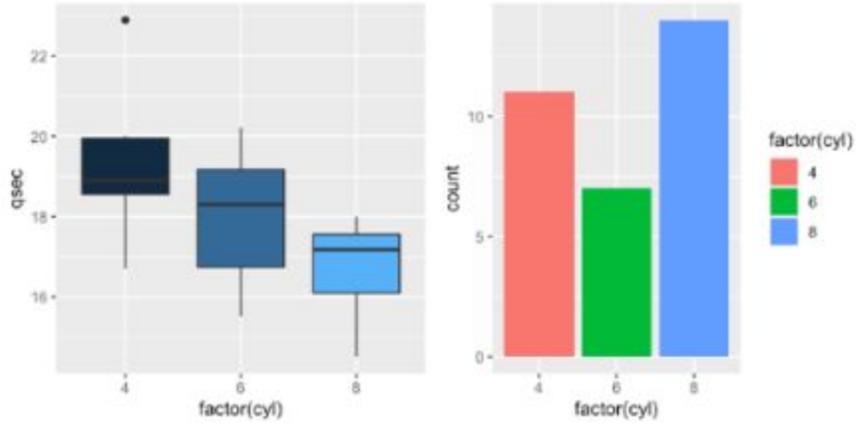
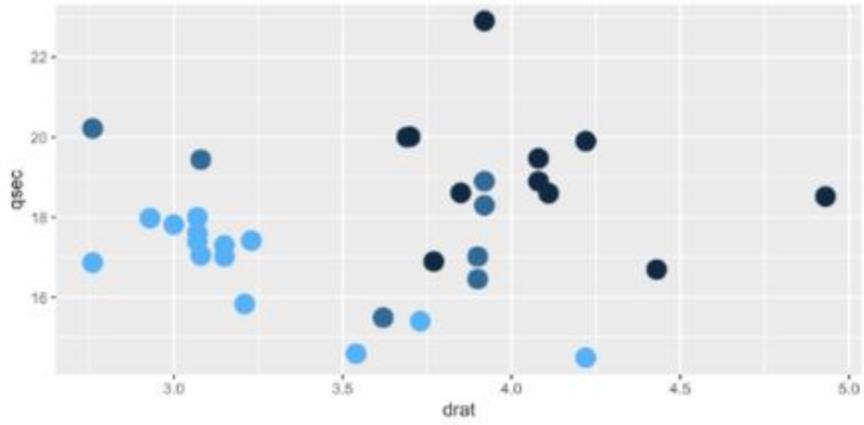
Data-Driven: Automatic mapping from raw data to visual geometries.

Consistency: Supports reproducibility; changing data automatically updates the visual.

Examples: Tableau, Power BI, Qlik.

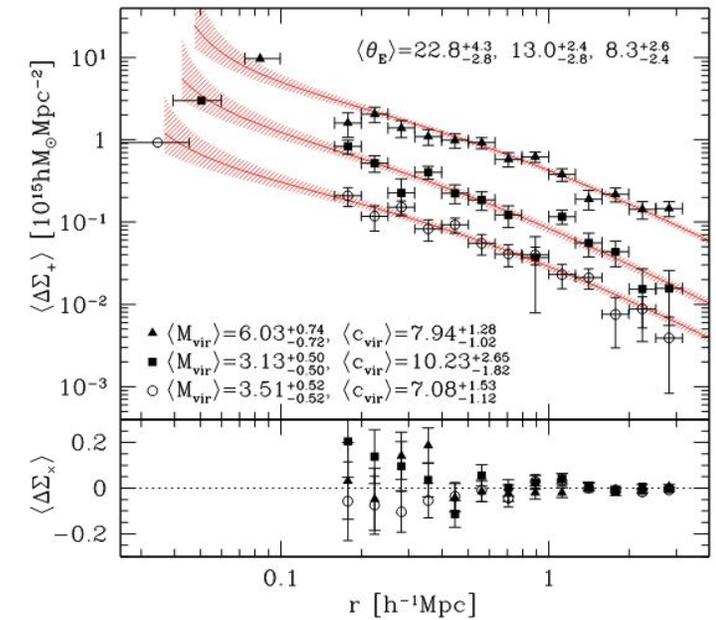
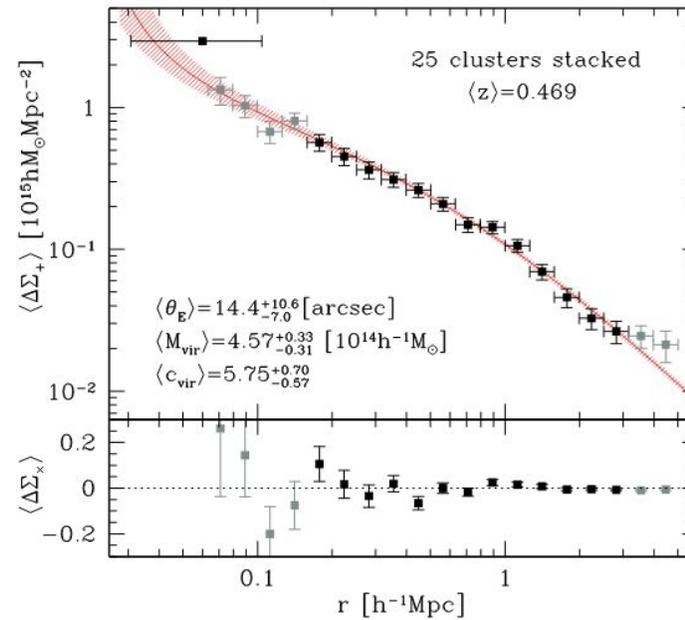
Focus: Emphasizes accuracy, speed, and reliability over pixel-perfect custom design.





- <https://ggplot2.tidyverse.org/reference/>
- <https://matplotlib.org/stable/gallery/index.html>

3224 *M. Oguri et al.*





Package index



Plot basics

All ggplot2 plots begin with a call to `ggplot()`, supplying default data and aesthetic mappings, specified by `aes()`. You then add layers, scales, coords and facets with `+`. To save a plot to disk, use `ggsave()`.

`ggplot()`

Create a new ggplot

`aes()`

Construct aesthetic mappings

`add_gg()` ``%+%``

Add components to a plot

`ggsave()`

Save a ggplot (or other grid object) with sensible defaults

`qplot()` `quickplot()`

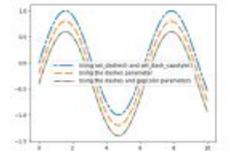
Quick plot

ON THIS PAGE

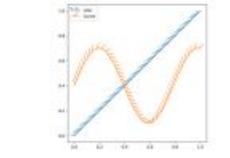
[Plot basics](#)[Layers](#)[Aesthetics](#)[Scales](#)[Guides: axes and legends](#)[Facetting](#)[Coordinate systems](#)[Themes](#)[Programming with ggplot2](#)[Extending ggplot2](#)[Vector helpers](#)[Data](#)[Autoplot and fortify](#)

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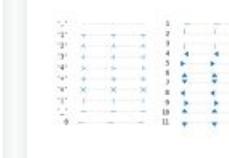
Dashed line style configuration



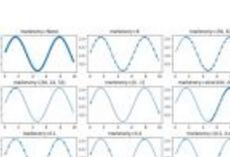
Lines with a ticked path effect



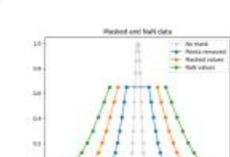
Linestyles



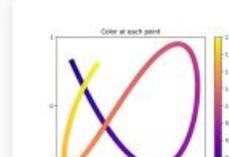
Marker reference



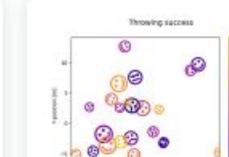
Markevery Demo



Plotting masked and NaN values



Multicolored lines



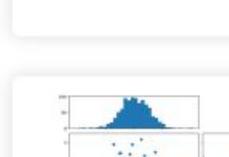
Mapping marker properties to multivariate data



Power spectral density (PSD)



Scatter Demo2



Scatter plot with histograms



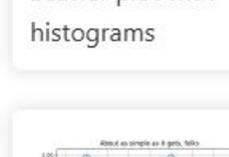
Scatter plot with masked values



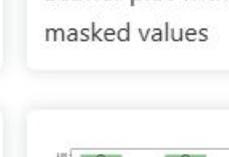
Marker styles



Scatter plot with color and size



Sine wave plot



Bar chart with error bars

On this page

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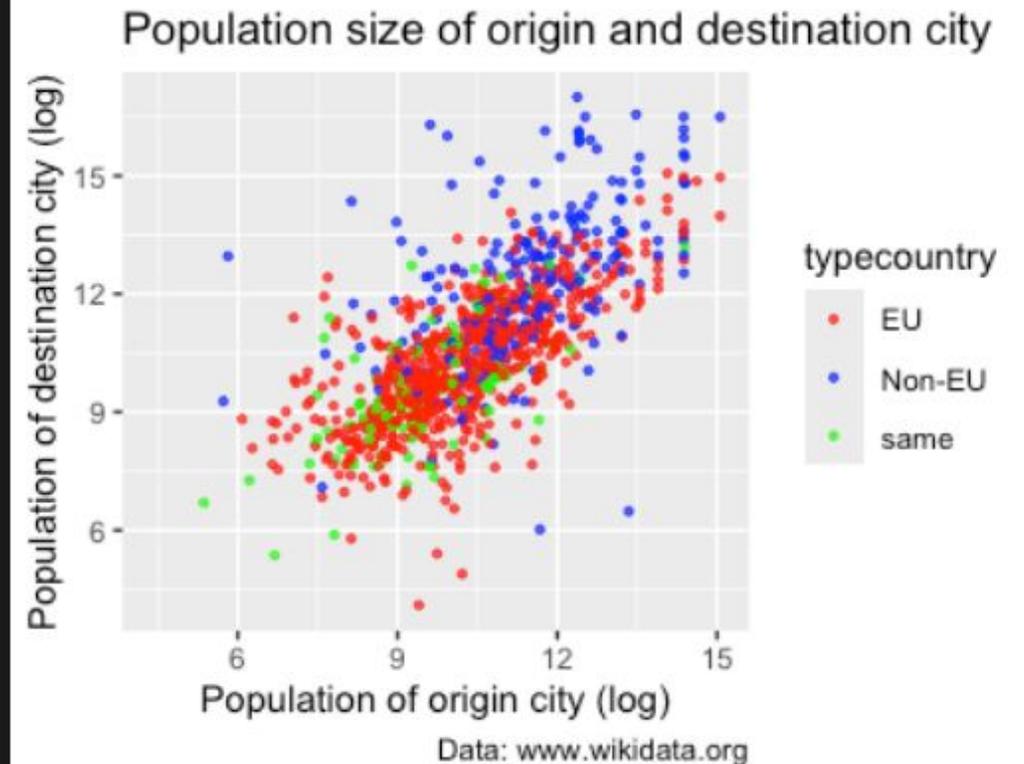
Programming-Based Tools

Grammar of Graphics: Explicitly defines how data maps to aesthetics (x, y, color, size).

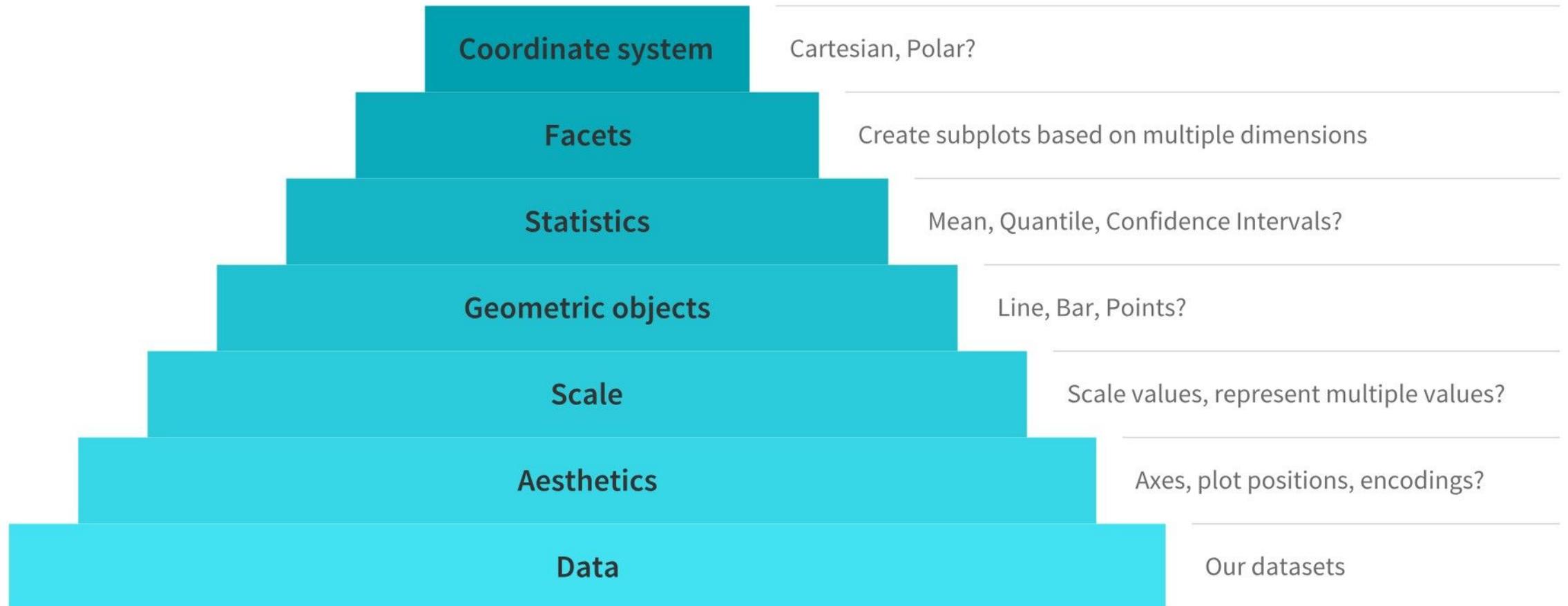
Transparency: Logic is visible in code, reducing accidental design errors.

Examples: R (ggplot2), Python (Matplotlib, Seaborn), Vega-Lite.

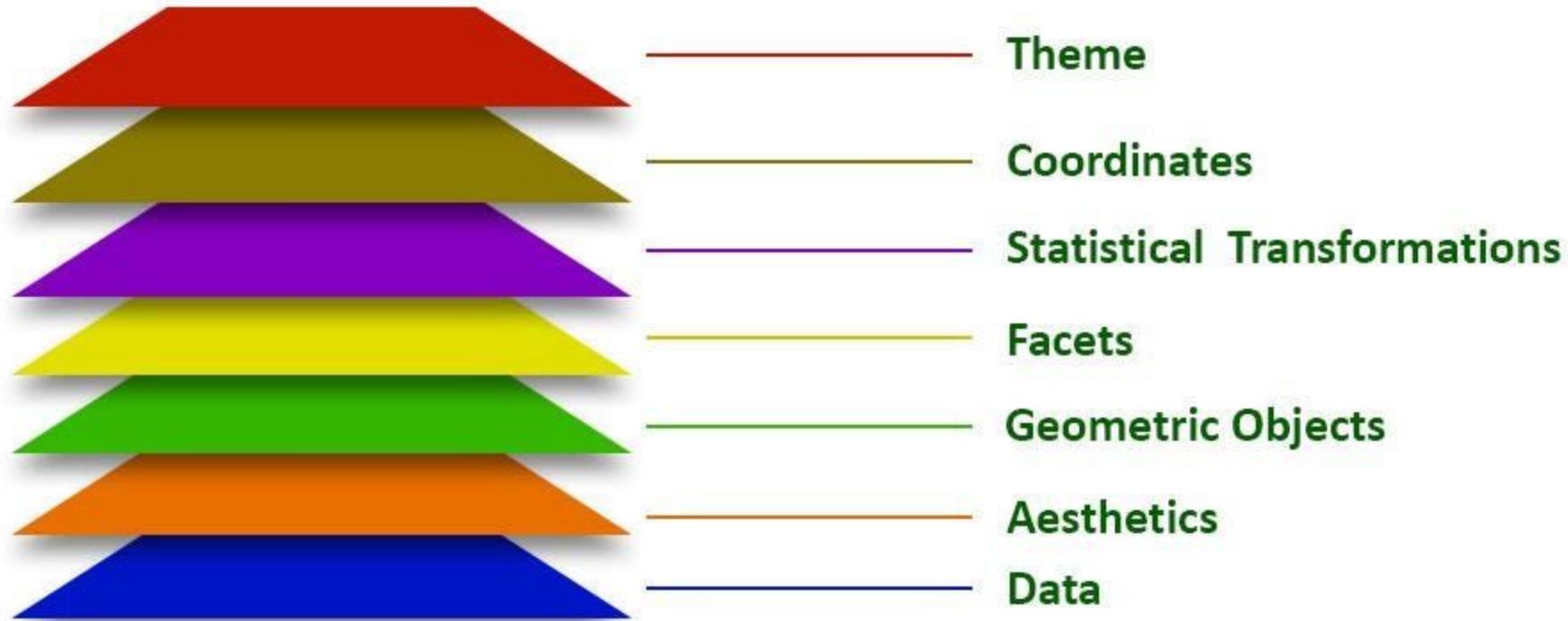
Power: Infinite customization potential for complex, novel visualization types.



Major Components of the Grammar of Graphics



Main Components of the Grammar of Graphics



AI assistance is coming to RStudio!
Join the beta testing waitlist.

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RStudio Desktop

Used by millions of people weekly, the RStudio integrated development environment (IDE) is a set of tools built to help you be more productive with R and Python.

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Want to learn about core or advanced workflows in RStudio? Explore the [RStudio User Guide](#) or the [Getting Started](#) section.

[Try Positron](#), the new code editor for data science from the creators of RStudio, built for the next generation of data science workflows with R and Python.

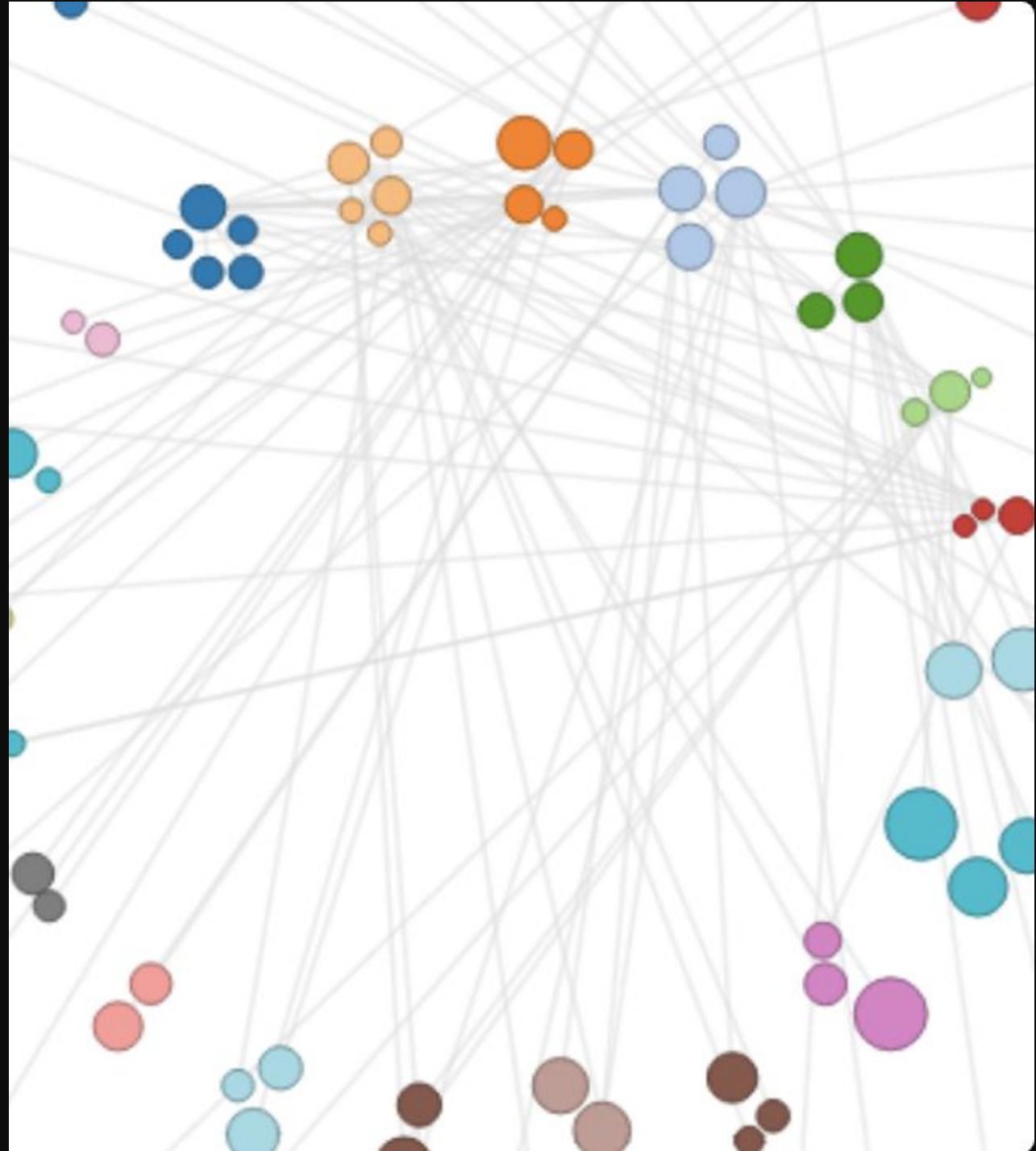
Interactive & Web-Based Tools

Explore the Data

These tools enable interaction such as zooming, filtering, and hovering to reveal details. They support exploratory analysis where the user drives the discovery.

Examples: D3.js, Plotly, R Shiny, Observable.

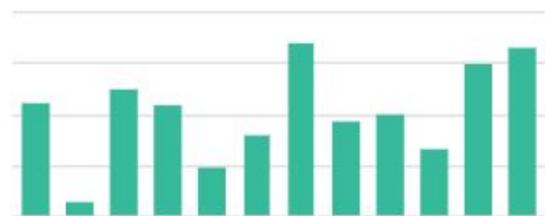
Goal: Interaction should support understanding, not distract from it.



TRAFFIC OVERVIEW

TOTAL SESSIONS

3,344



Previous period
11%

Previous year
410%

BOUNCE RATE

82.94%

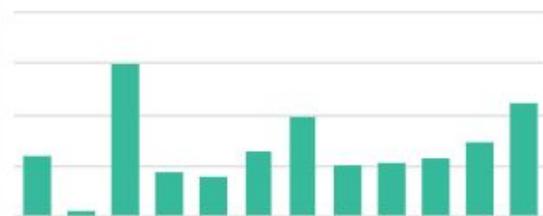


Previous period
18%

Previous year
28%

GOAL COMPLETIONS

5,601



Previous period
49%

Previous year
135%

GOAL COMPLETION RATE

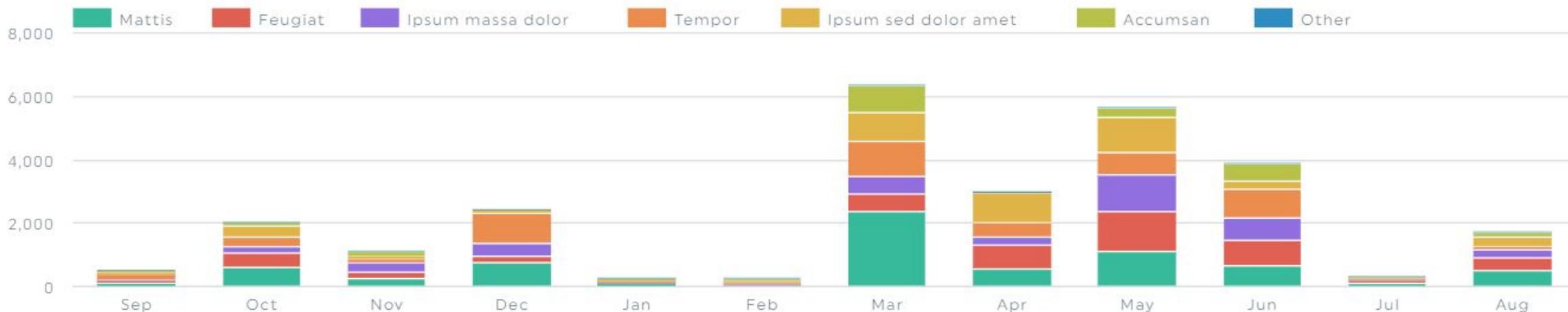
51.91%



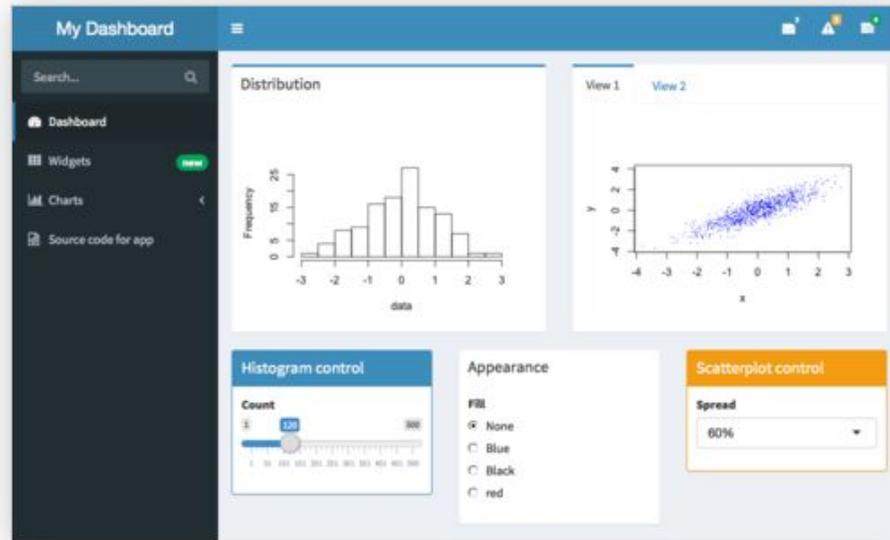
Previous period
2%

Previous year
-22%

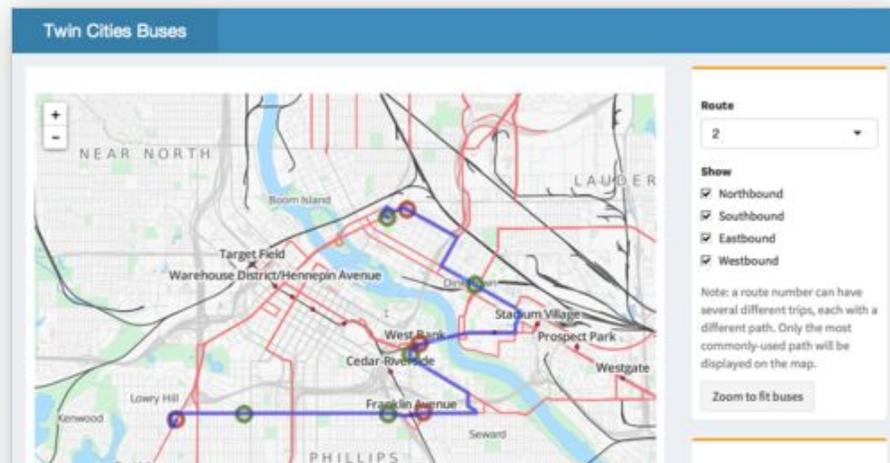
TOP CHANNELS OVER TIME



shinydashboard makes it easy to use [Shiny](#) to create dashboards like these:



Dashboard



Choosing Tools Based on Purpose

Purpose	Suitable Tools	Best For
Infographics & Posters	Adobe Illustrator, Canva	Storytelling, static presentation
Scientific Plots	ggplot2 (R), Matplotlib (Python)	Publication quality, reproducibility
Business Dashboards	Tableau, Power BI	Live monitoring, KPI tracking
Interactive Web Viz	D3.js, Plotly, React	Custom web experiences, exploration
Rapid Exploration	RStudio, Python Notebooks	Analyst understanding data quickly

Common Tool Misuse



3D Effects

Overuse of 3D distorts data and adds unnecessary cognitive load without adding information.



Meaningless Color

Using decorative colors that do not map to data values can confuse the reader.



Chartjunk

Cluttering the visual with unnecessary grids, borders, and decorations.



Defaults

Blind reliance on software defaults often leads to suboptimal design choices.

Key Takeaways



Tools Do Not Think For You

Mastering one tool deeply is better than using many superficially. However, remember that design principles apply across all software.

Learn the **why** before the **how**.

Tools are enablers, not decision-makers.

Visualization quality starts with reasoning.

Image Sources



[https://helpx-prod.scene7.com/is/image/HelpxProd/nfs-help-bar-ai?\\$pjpeg\\$&jpegSize=300&wid=1920](https://helpx-prod.scene7.com/is/image/HelpxProd/nfs-help-bar-ai?$pjpeg$&jpegSize=300&wid=1920)

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Source: www.numerro.io



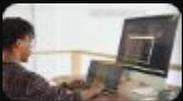
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