

# Interactive Visualization

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# Designing the ‘Lower-Level’ Features of a Chart

Source [1, page 61]

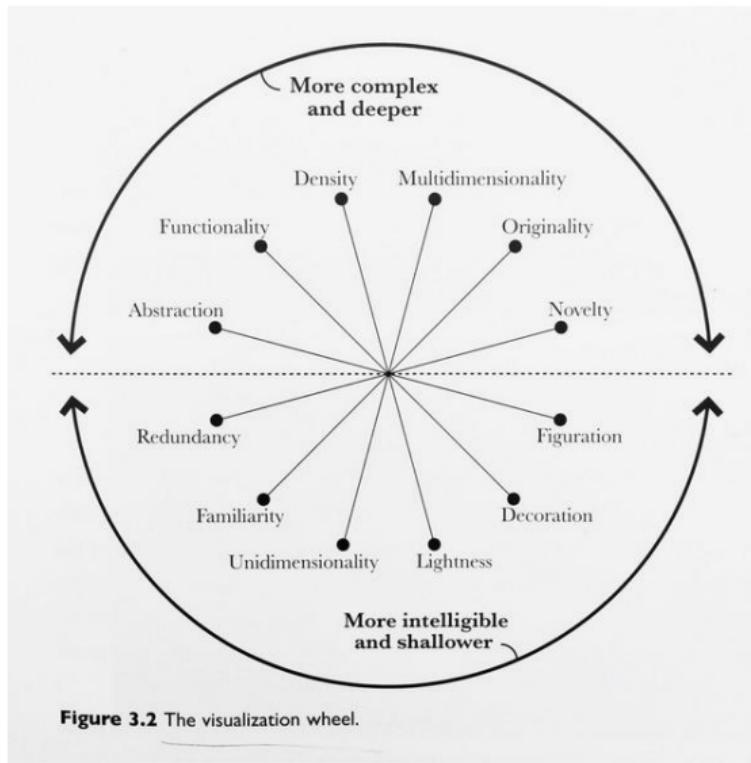
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# Designing the 'Lower-Level' Features of a Chart

Source [1, page 63]

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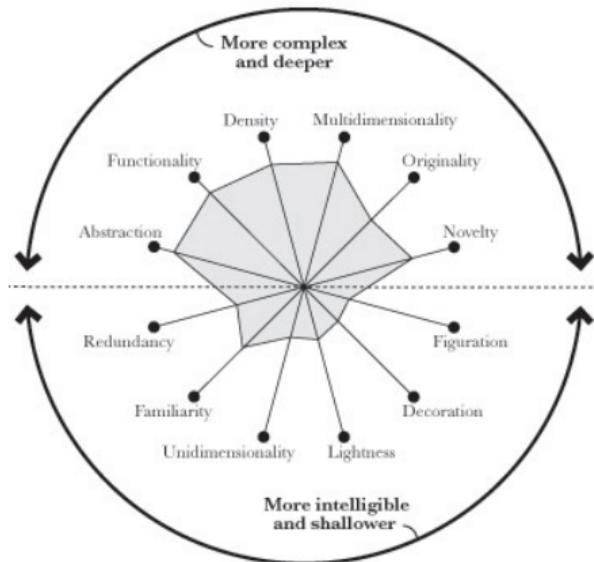
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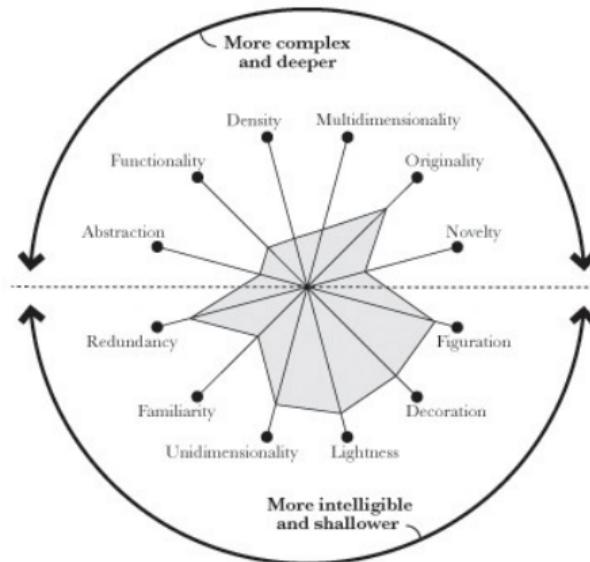
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The wheel preferred by scientists and engineers



The wheel favored by artists, graphic designers, and journalists



# Chartjunk?

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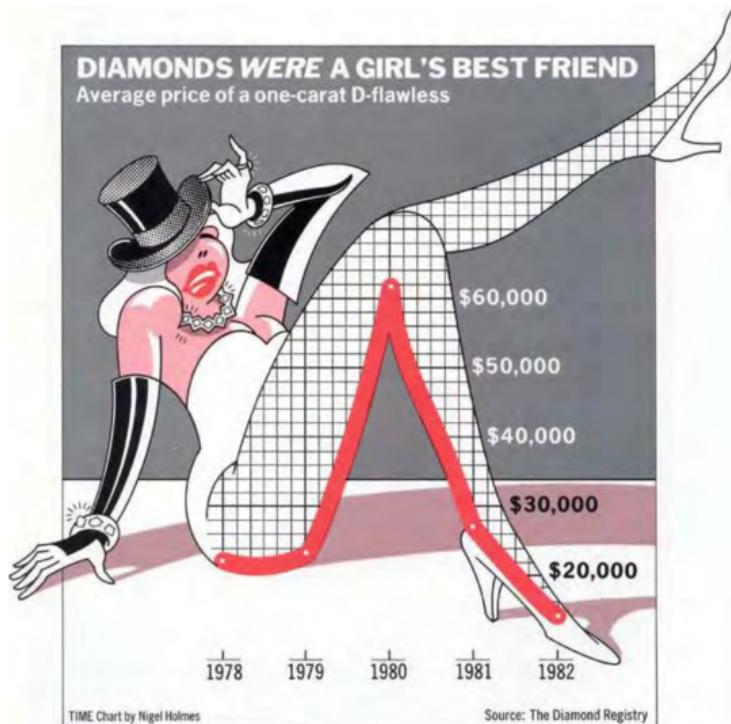


Figure 3.12. Chart by Nigel Holmes for Time magazine. (Reproduced with permission.)

# Chartjunk or Memorable?

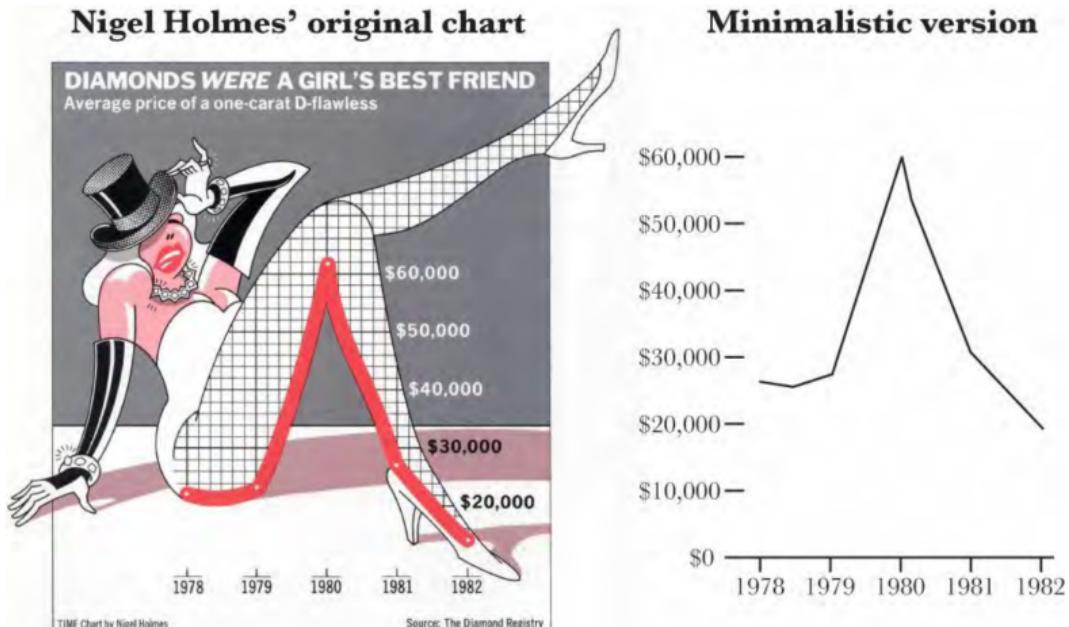
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**Figure 3.15. The original graphic is not very appealing, but the stripped-down version was not easily remembered.**

## What Makes a Visualization Memorable?

Michelle A. Borkin, *Student Member, IEEE*, Azalea A. Vo, Zoya Bylinskii, Phillip Isola, *Student Member, IEEE*, Shashank Sunkavalli, Aude Oliva, and Hanspeter Pfister, *Senior Member, IEEE*

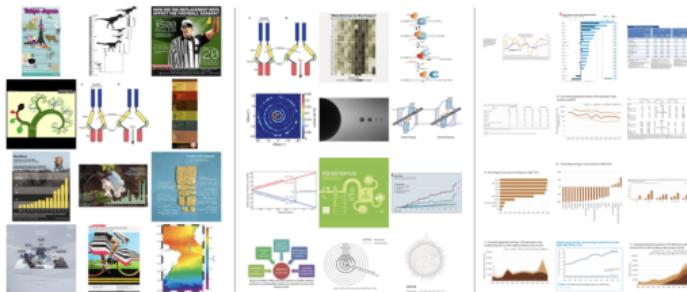


Fig. 1. **Left:** The top twelve overall most memorable visualizations from our experiment (most to least memorable from top left to bottom right). **Middle:** The top twelve most memorable visualizations from our experiment when visualizations containing human recognizable cartoons or images are removed (most to least memorable from top left to bottom right). **Right:** The twelve least memorable visualizations from our experiment (most to least memorable from top left to bottom right).

**Abstract**—An ongoing debate in the Visualization community concerns the role that visualization types play in data understanding. In human cognition, understanding and memorability are intertwined. As a first step towards being able to ask questions about impact and effectiveness, here we ask: “What makes a visualization memorable?” We ran the largest scale visualization study to date using 2,070 single-panel visualizations, categorized with visualization type (e.g., bar chart, line graph, etc.), collected from news media sites, government reports, scientific journals, and infographic sources. Each visualization was annotated with additional attributes, including ratings for data:ink ratios and visual densities. Using Amazon’s Mechanical Turk, we collected memorability scores for hundreds of these visualizations, and discovered that observers are consistent in which visualizations they find memorable and forgettable. We find intuitive results (e.g., attributes like color and the inclusion of a human recognizable object enhance memorability) and less intuitive results (e.g., common graphs are less memorable than unique visualization types). Altogether our findings suggest that quantifying memorability is a general metric of the utility of information, an essential step towards determining how to design effective visualizations.

**Index Terms**—Visualization taxonomy, information visualization, memorability

# Empirical Evidence on Visualization Memorability

## The role of pictograms

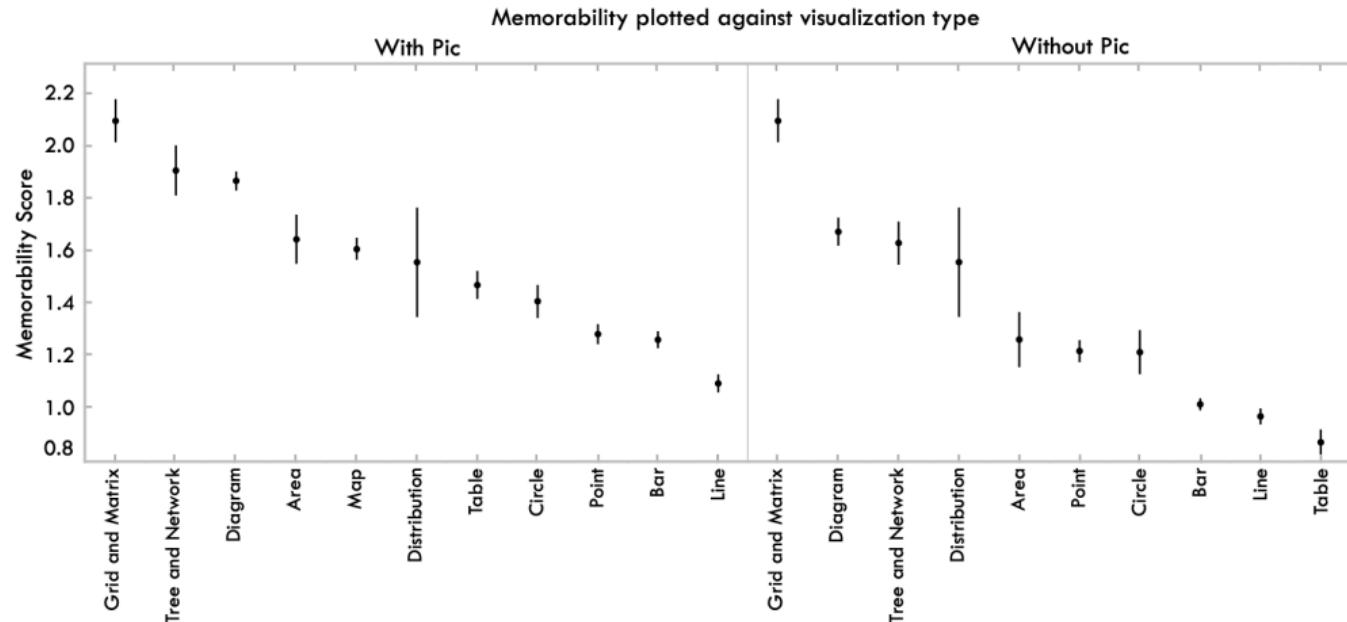
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# Empirical Evidence on Visualization Memorability

The role of pictograms and color rating

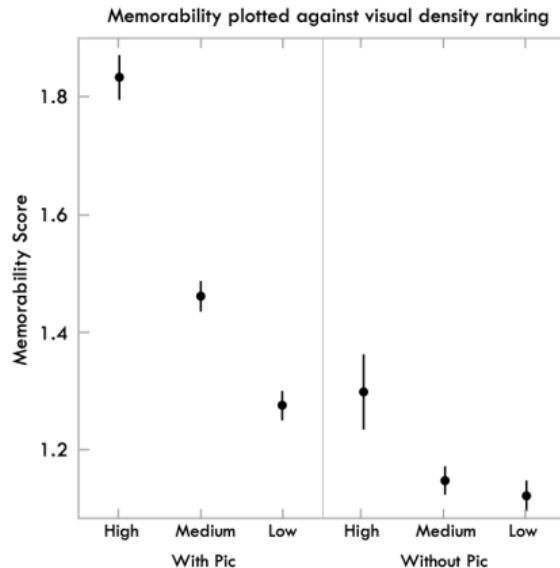
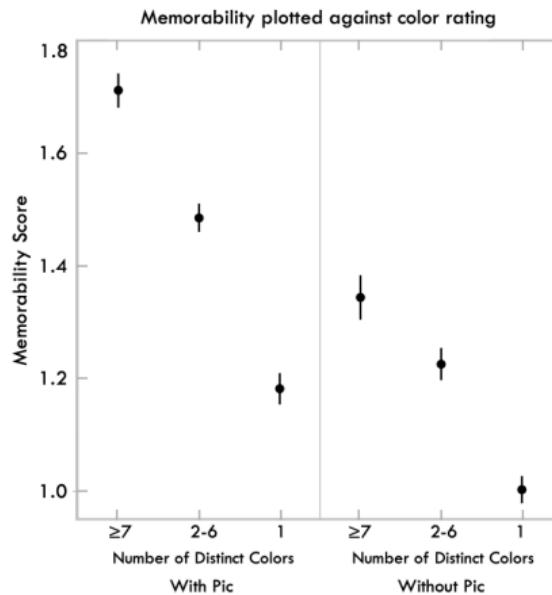
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# Empirical Evidence on Visualization Memorability

The role of data-ink ratio and pictograms

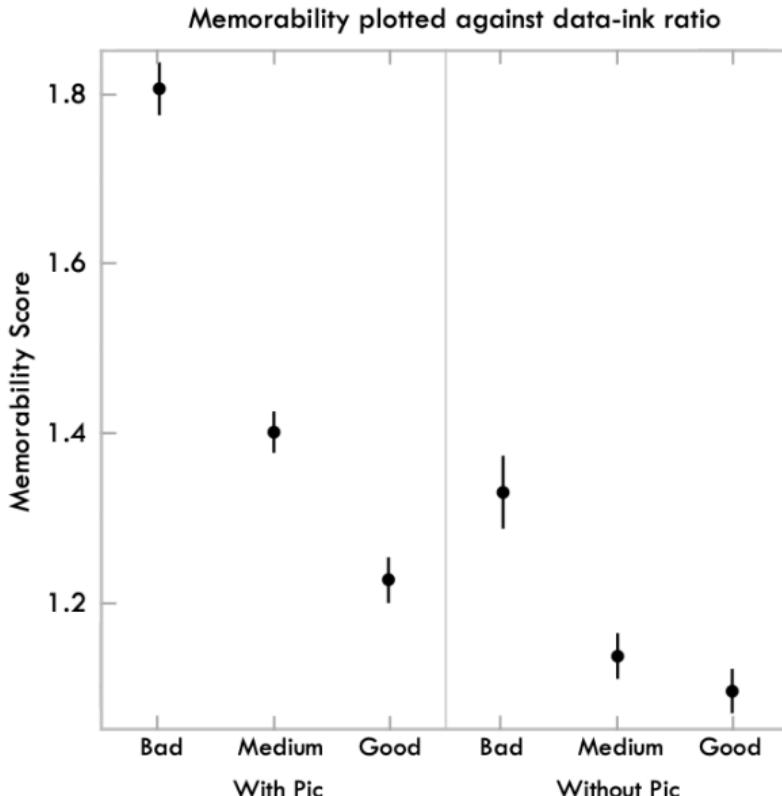
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# Empirical Evidence on Visualization Memorability

The role of pictograms and source

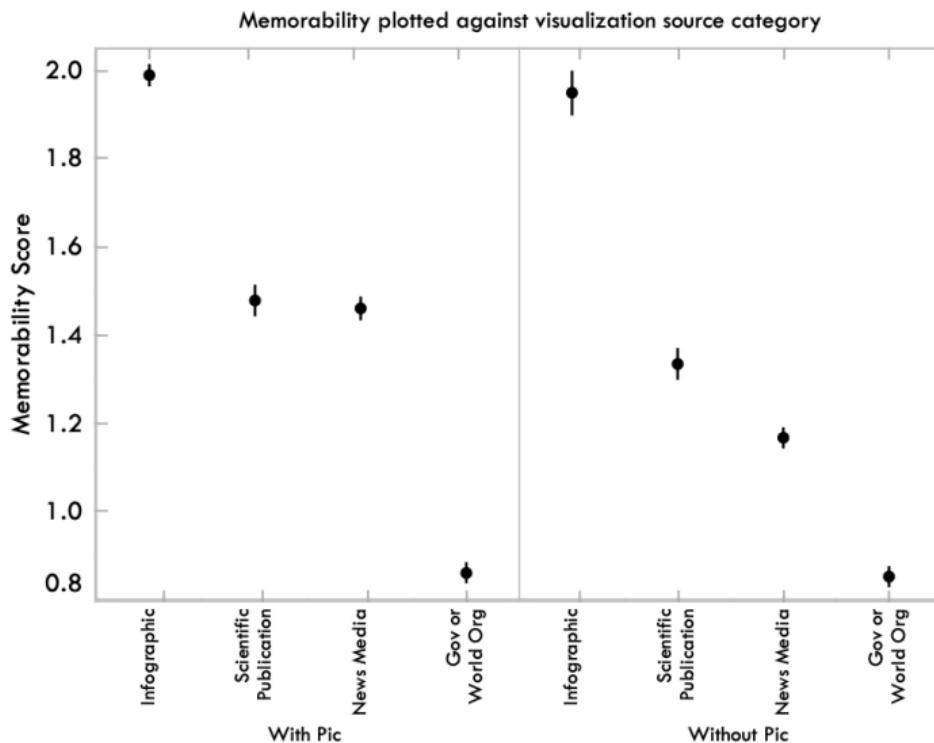
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# From Static to Dynamic Visualization

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## How to escape flatland?

A single image typically provides answers to, at best, a handful of questions

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## How to escape flatland?

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## Dynamic viz is my solution!

Meaningful analysis consists of repeated explorations as users develop insights about significant relationships, domain-specific contextual influences, and causal patterns

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## How to escape flatland?

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### Dynamic viz is my solution!

Meaningful analysis consists of repeated explorations as users develop insights about significant relationships, domain-specific contextual influences, and causal patterns

### Hold on...maybe not...

Confusing widgets, complex dialog boxes, hidden operations, incomprehensible displays, or slow response times can limit the range and depth of topics considered and may curtail thorough deliberation and introduce errors

# A Taxonomy of Interactive Dynamics for Visual Analysis

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Data & View Specification	<ul style="list-style-type: none"><li>• Filter out data to focus on relevant items</li><li>• Sort items to expose patterns</li><li>• Derive values or models from source data</li></ul>
View Manipulation	<ul style="list-style-type: none"><li>• Select items to highlight, filter, or manipulate them</li><li>• Navigate to examine high-level patterns and low-level detail</li><li>• Coordinate views for linked, multi-dimensional exploration</li><li>• Organize multiple windows and workspaces</li></ul>
Process & Provenance	<ul style="list-style-type: none"><li>• Record analysis histories for revisit, review and sharing</li><li>• Annotate patterns to document findings</li><li>• Share views and annotations to enable collaboration</li><li>• Guide users through analysis tasks or stories</li></ul>

# Let Us Get Things Done!

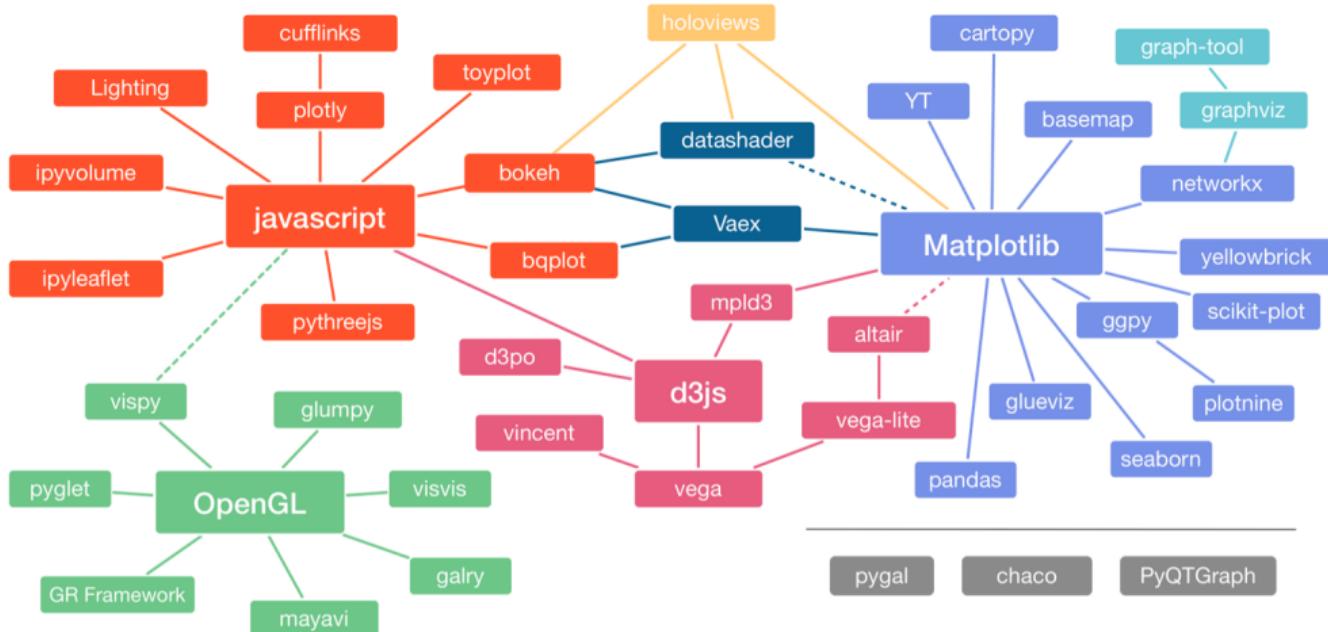
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- [1] Alberto Cairo. *The Functional Art: An Introduction to Information Graphics and Visualization*. New Riders, 2012.