Visualization-Aware Color Design

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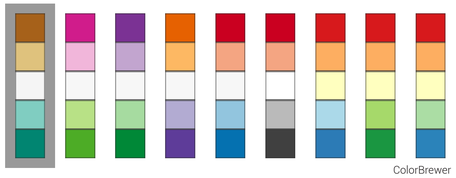
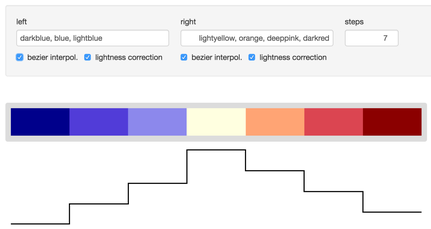
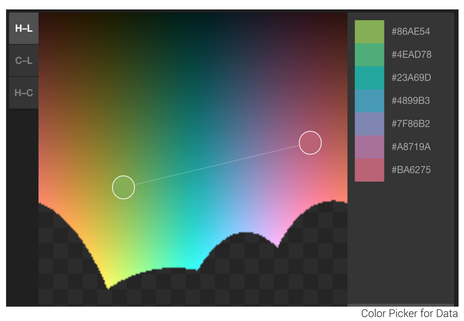
Colors in Isolation:
The Traditional Approach


ColorBrewer

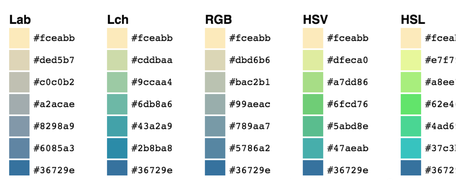
Adobe Kuler



Chroma.js Color Scale Helper

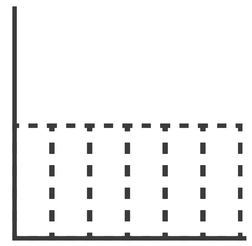


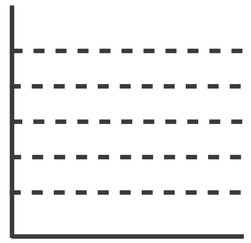
Color Picker for Data

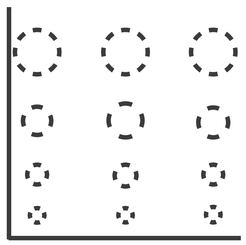


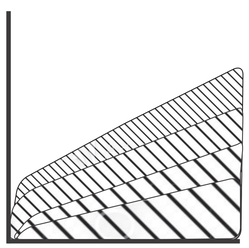
David Johnstone Color and Gradient Picker

Colors for Visualization:
A Constraint-Based Framework to Automate Color Design Based on Known Visualization Attributes





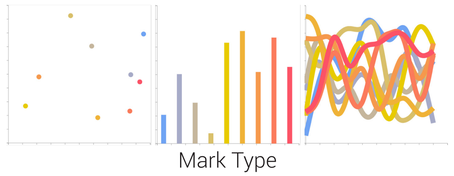


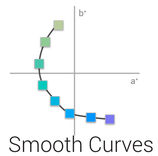


Inputs

Aesthetic Constraints:
Generalize from successful examples

- Smooth shifts between colors
- Color harmony and complementarity
- Appropriate for target mark type
- Avoid harsh colors
- Avoid colors that are too light or dark


Mark Type

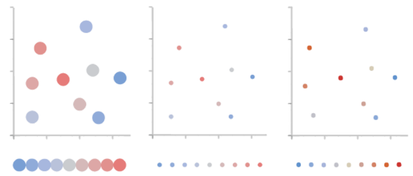


Smooth Curves


Artistic Principles

Perceptual Constraints:
Derive from perceptual models

- Uniform perceived differences between colors
- Equidistant perceived lightness steps
- Colors discriminable at minimum sizes
- Avoid abrupt color name shifts
- Appropriate for color-blind users

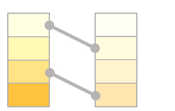

Mark Size

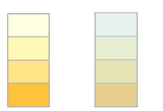

Uniform Lightness


Uniform Difference

Functional Constraints:
Generate algorithmically

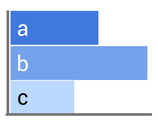
- Related colors for outlier binning
- Unambiguous colors for lowlighting
- Salient colors for highlighting
- Visible colors for labels
- Interpolations for data shapes


Alpha Blending


Hue Blending

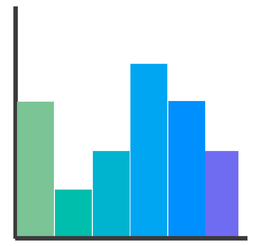
Lowlighting

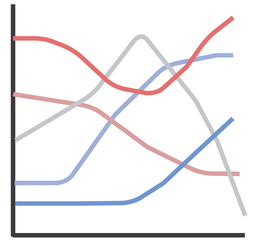

Highlighting

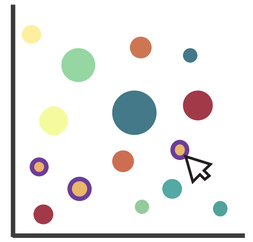


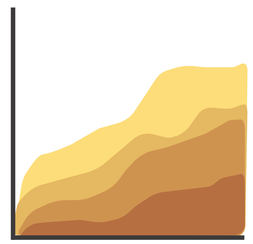
Labeling

Constraints (+ Interactive Tuning)









Outputs

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