



What Makes a Visualization Complex?

Exploring Design Features Related to Visual Complexity

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Overly complex visualizations overwhelm their audiences. However, the extent to which design choices impact people's perceptions of visual complexity (the “**amount of detail or intricacy**” in an image²) has not been systematically examined. We ask:

What design features contribute to perceptions of visual complexity?

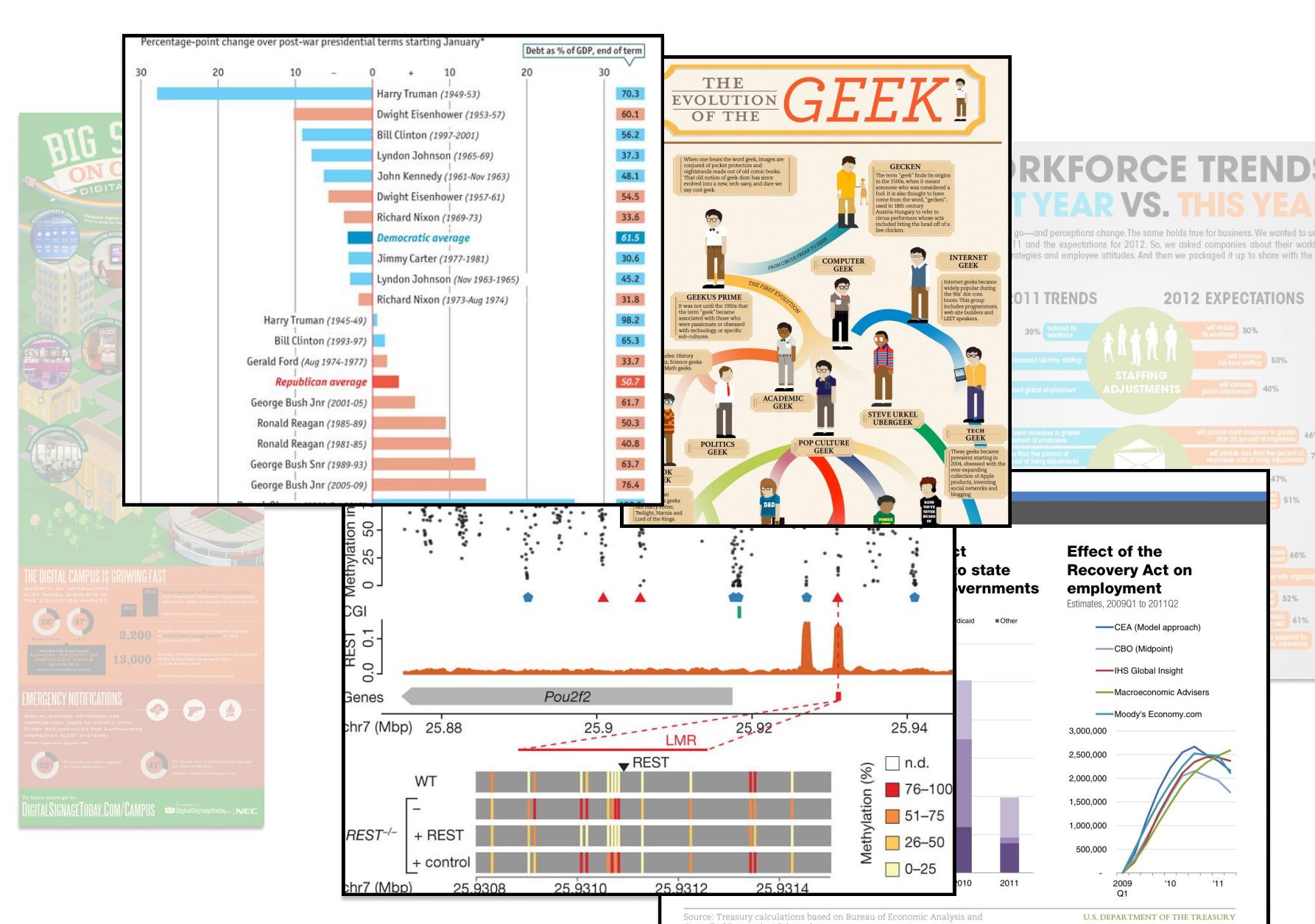
1

RELABEL THE MASSVIS DATASET

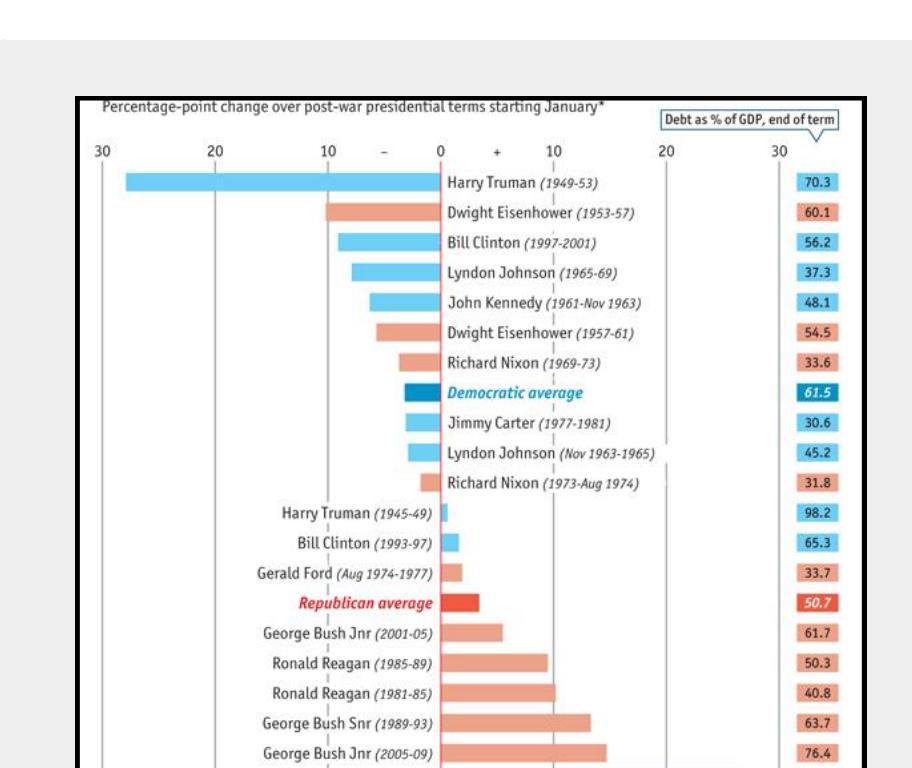
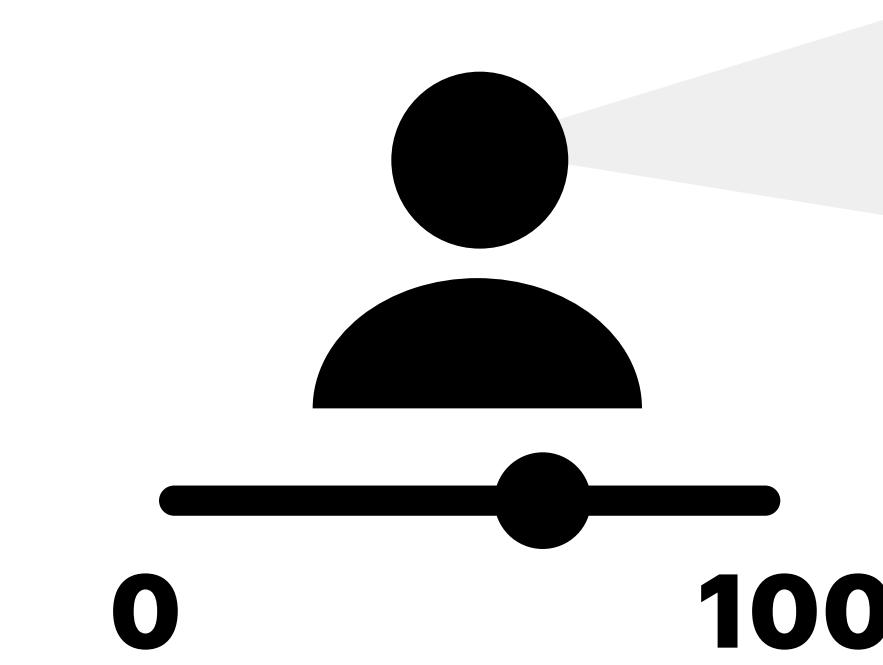
MASSVIS Dataset¹
(5800+ Visualizations)

Design Features
(Text, Color, Data, Design)

Visual Complexity Ratings
(1-100 Slider Response)



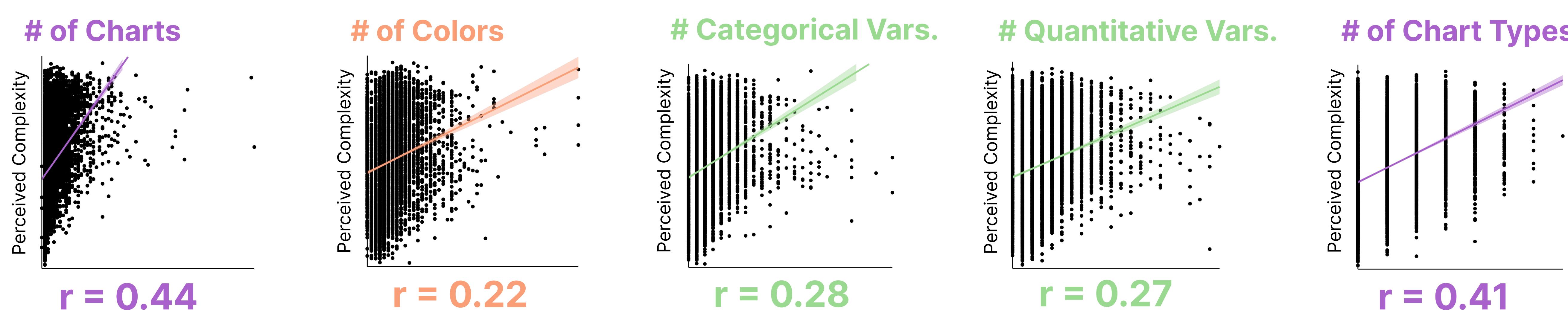
TEXT		Design	
Titles	Legend Titles	# of Charts	Area
Captions	Legend Text	# of Chart Types	Map
Annotations	Text Only	Bar	Distribution
Axes Labels	No Text	Circle	Line
Axes Text		Diagram	Text
Data		Trees & Networks	
		Table	Point
		Grid & Matrix	Grid & Matrix
		Annotation	Annotation
		Tree & Network	Tree & Network
		Multiplicity	Multiplicity
		Axes Label	Axes Label
		Table	Table
		Point	Point
# of Quantitative Variables		Color	
		Black & White	
		# of Colors	
		Background Color	



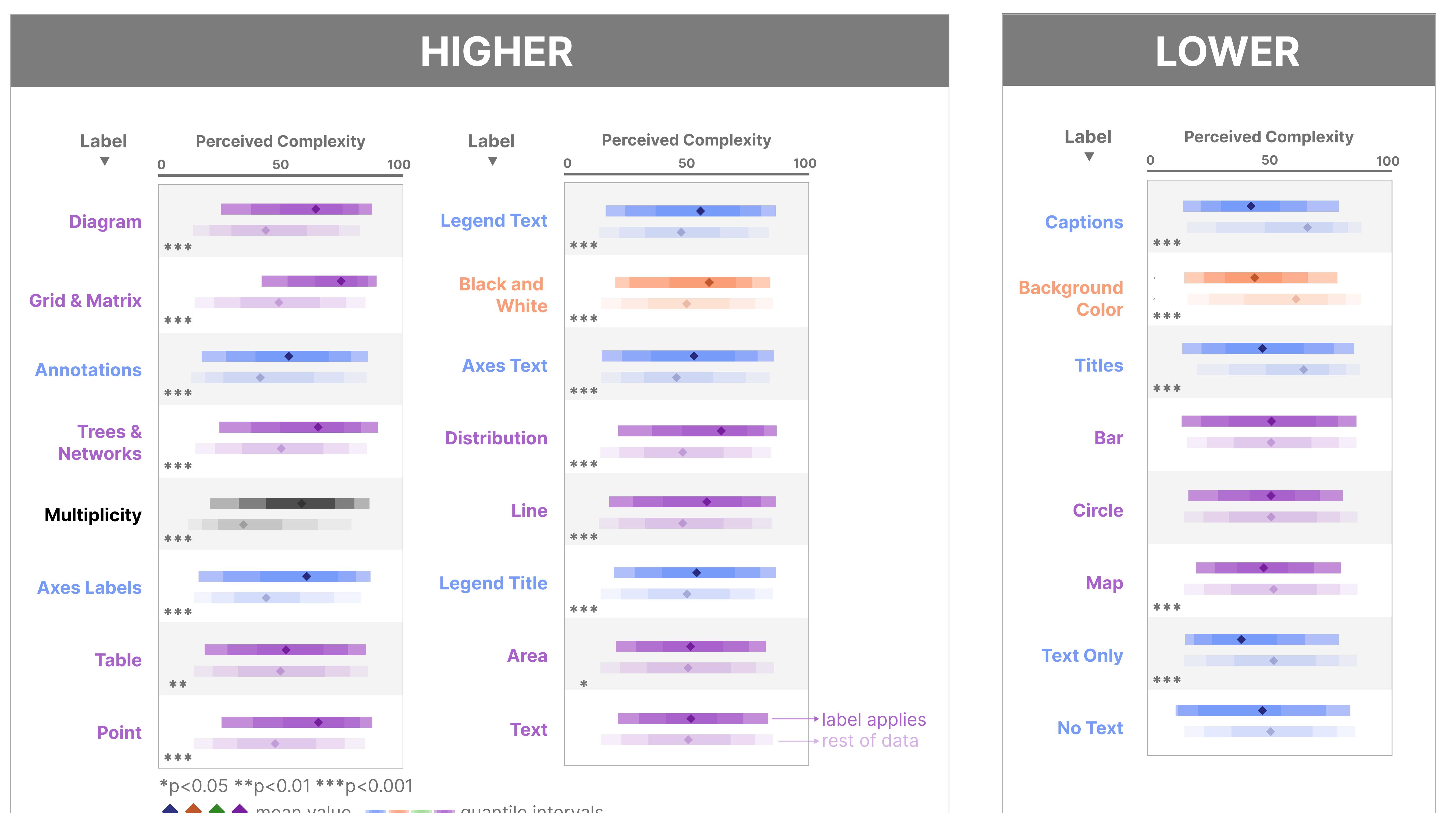
2

ASSOCIATIONS WITH COMPLEXITY

For all continuous labels, higher values correlate with higher complexity:



Mean perceived complexity was higher/lower when certain labels applied to a visualization:



FINDINGS

The **more visual elements** a visualization contains, the greater its perceived complexity.

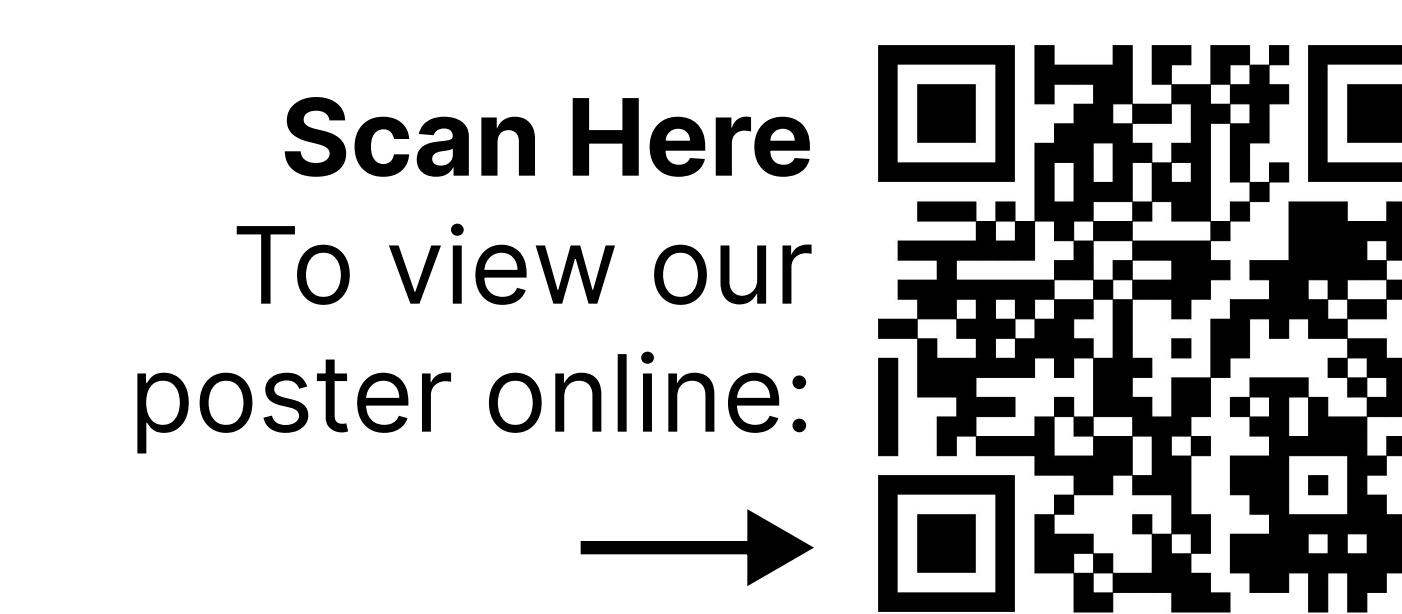
Other findings are a **mix** of intuitive/less intuitive. For example:

- Intuitive: Visualizations with **annotations** are rated as more complex.
- Less intuitive: **Black and white** visualizations are rated as more complex on average, but the **number of colors** is positively correlated with complexity.

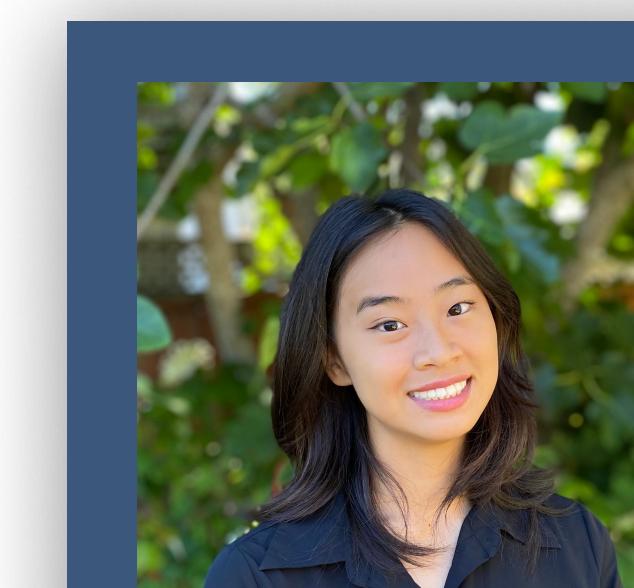
References

- [1] M. A. Borkin, A. A. Vo, Z. Bylinskii, P. Isola, S. Sunkavalli, A. Oliva, and H. Pfister. What makes a visualization memorable? IEEE transactions on visualization and computer graphics, 19(12):2306–2315, 2013. 1 [2] J. G. Snodgrass and M. Vanderwart. A standardized set of 260 pictures: norms for name agreement, image agreement, familiarity, and visual complexity. Journal of experimental psychology: Human learning and memory, 6(2):174, 1980. 1

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