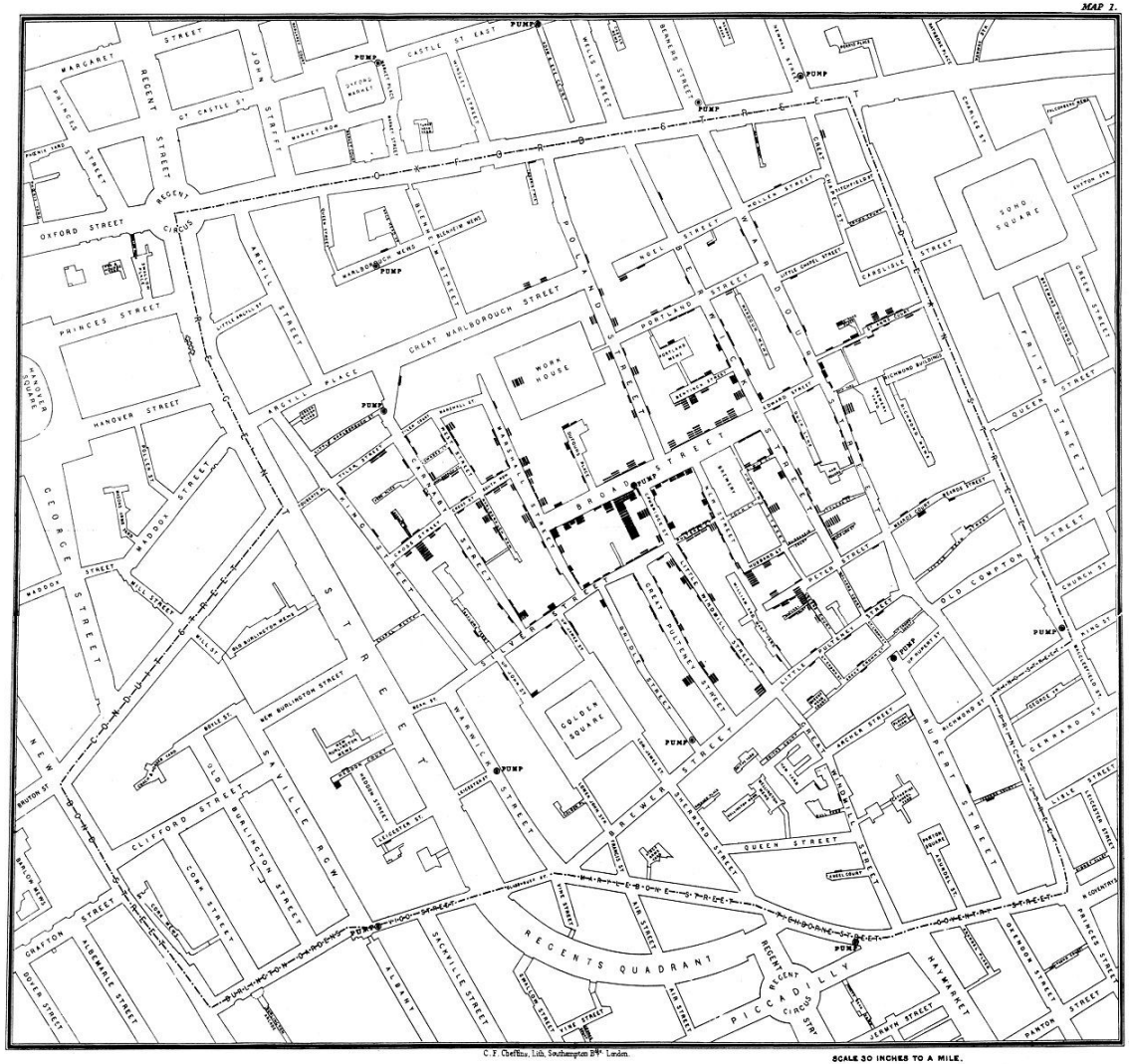
Week 2

Elements of Data Visualization (CS 329E)

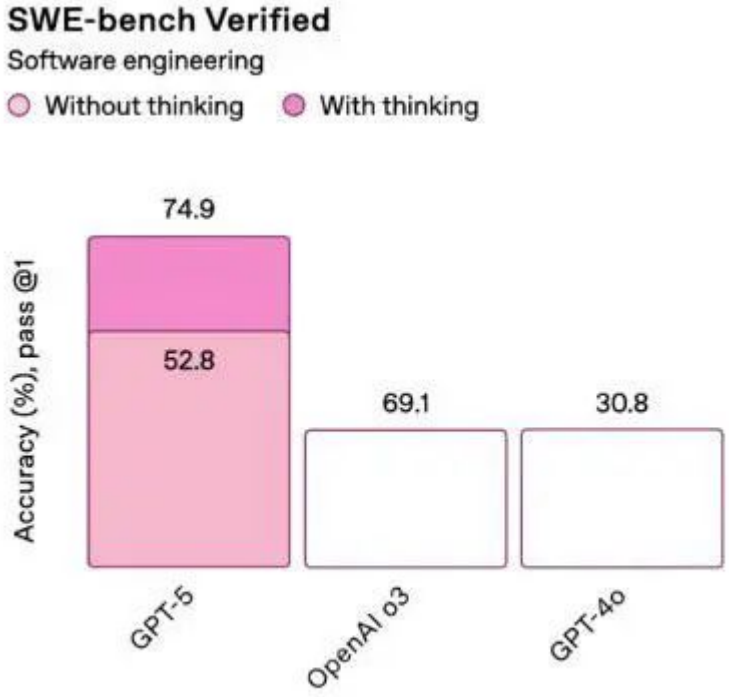
Jan 20, 2026



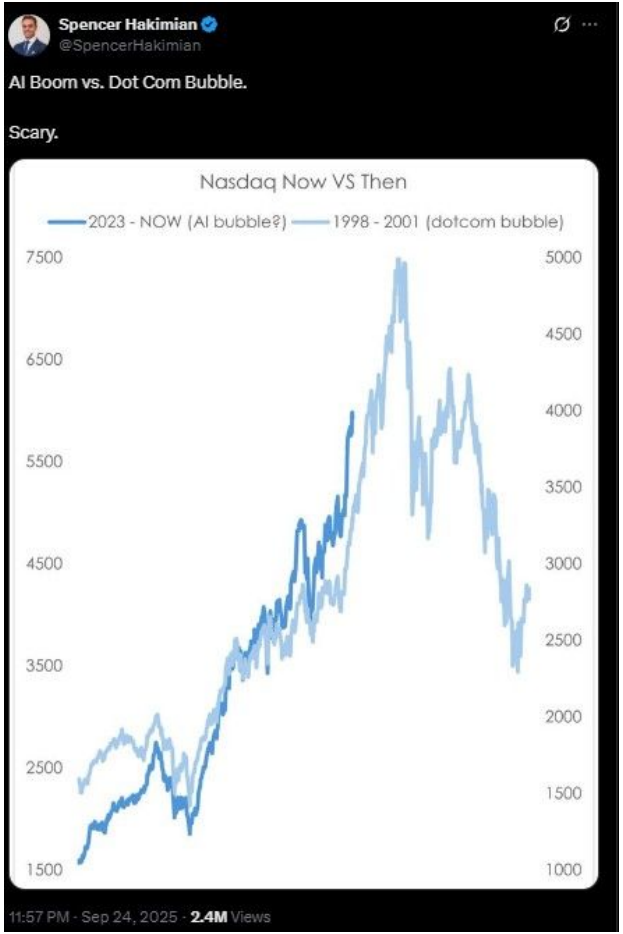
Source: Wikimedia

Source: Hulton Archive/Getty Images

Source: Wikimedia



Source: OpenAI



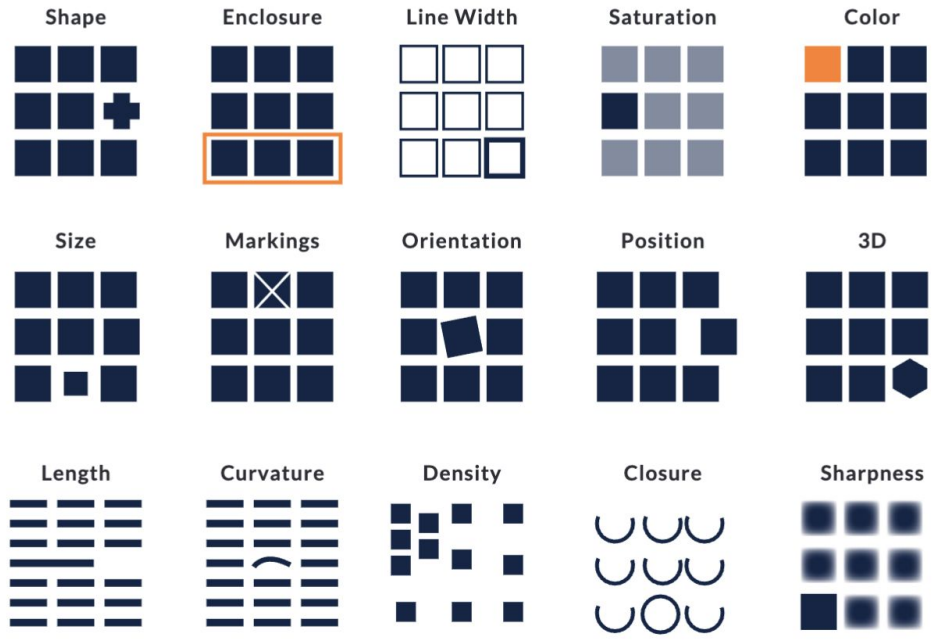
Source: The Kobeissi Letter

Five Guidelines for Better Data Visualizations

1. Show the data
2. Reduce the clutter
3. Integrate the graphics and text
4. Avoid the spaghetti chart
5. Start with gray

Source: Jonathan Schwabish. Better Data Visualizations. Chapter 2.

Our brain is amazing at detecting pattern violations



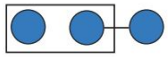
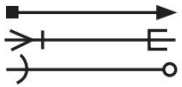
Source: Jonathan Schwabish. Better Data Visualizations. Chapter 1.

How our brain perceives different types of encodings

Example	Encoding	Ordered	Useful Values	Quantitative	Ordinal	Categorical	Relational
	Position, Placement	Yes	Infinite	Good	Good	Good	Good
1, 2, 3; A, B, C	Text Labels	Optional (alphabetic/ numbered)	Infinite	Good	Good	Good	Good
	Length	Yes	Many	Good	Good		
	Size, Area	Yes	Many	Good	Good		
	Angle	Yes	Medium/ Few	Good	Good		
	Pattern Density	Yes	Few	Good	Good		
	Weight, Boldness	Yes	Few		Good		

Source: [Noah Iliinsky]

How our brain perceives different types of encodings

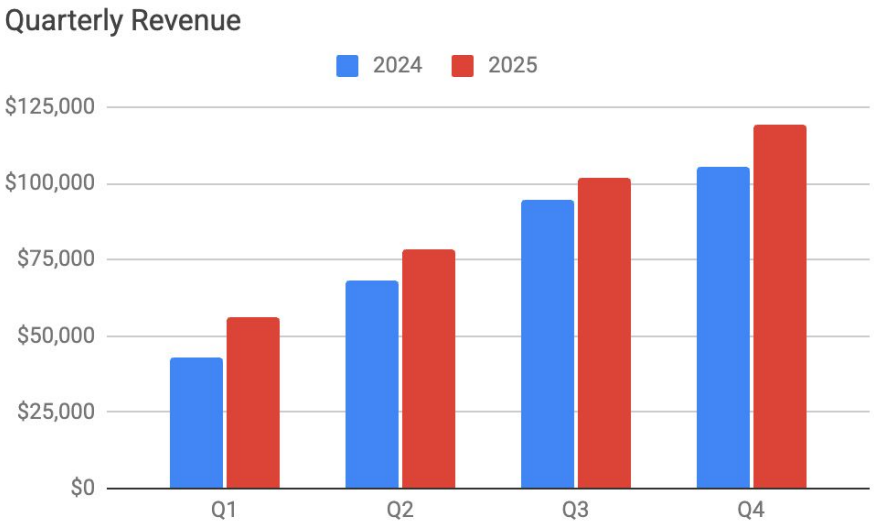
Example	Encoding	Ordered	Useful Values	Quantitative	Ordinal	Categorical	Relational
	Saturation, Brightness	Yes	Few		Good		
	Color	No	Few (<20)			Good	
	Shape, Icon	No	Medium			Good	
	Pattern, Texture	No	Medium			Good	
	Enclosure, Connection	No	Infinite			Good	Good
	Line Pattern	No	Few				Good
	Line Endings	No	Few				Good
	Line Weight	Yes	Few		Good		

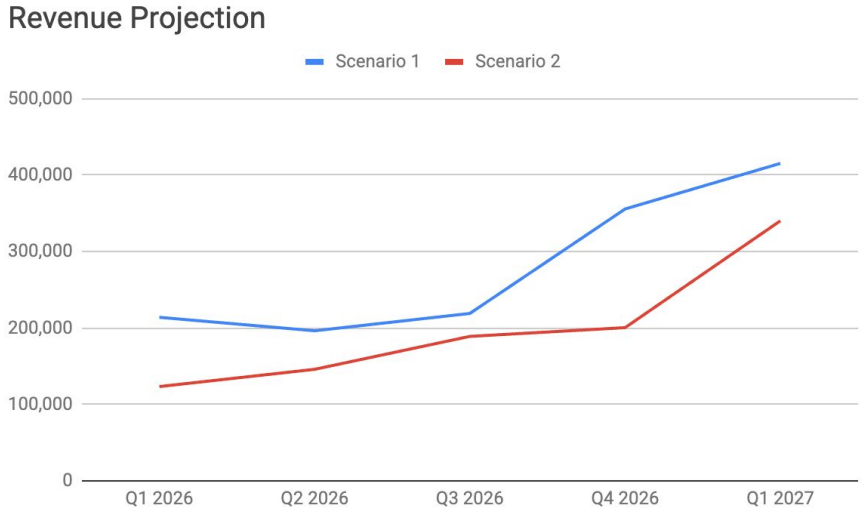
Source: [Noah Iliinsky]

Five Questions for Better Data Visualizations

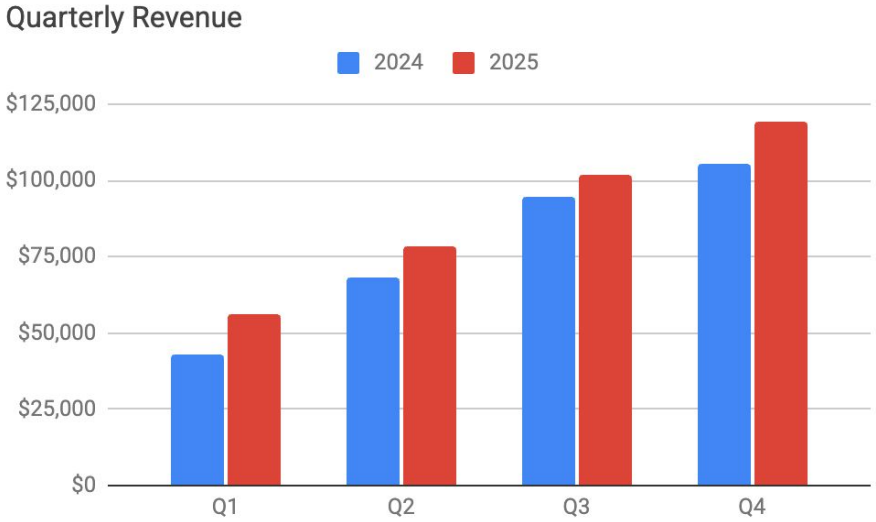
1. Who will see this chart?
2. What do they want?
3. What do they need?
4. What idea do I want to convey?
5. What should I show?

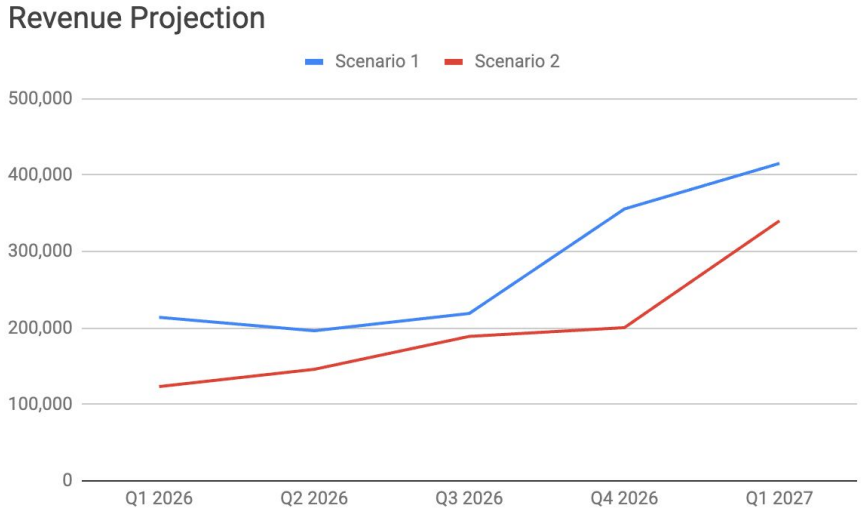
Which one is a good chart for a new manager?





Which one is a good chart for the board of directors?





"You should always want your audience to know or do something. If you can’t concisely articulate that, you should revisit whether you need to communicate in the first place."

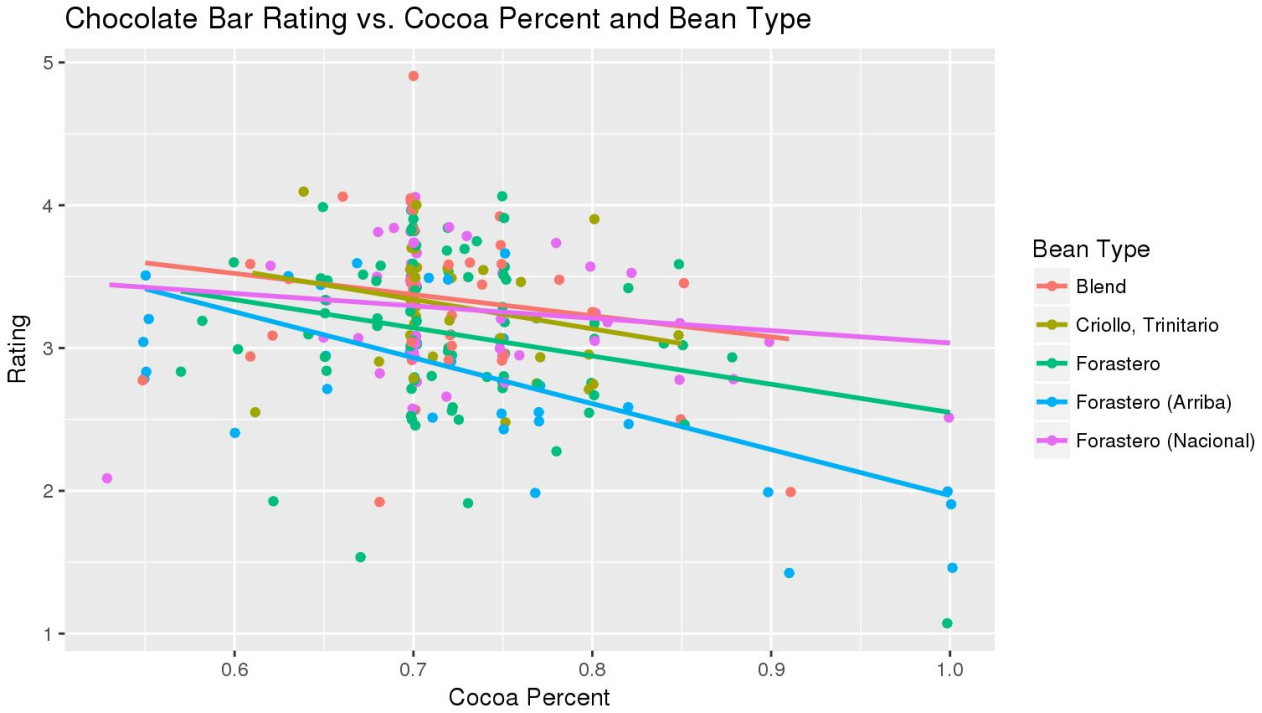
Cole Nussbaumer Knaflic’s Storytelling with Data

Revised Project Timeline

Week-by-week Schedule
This schedule is tentative and is subject-to-change based on the needs of the class.

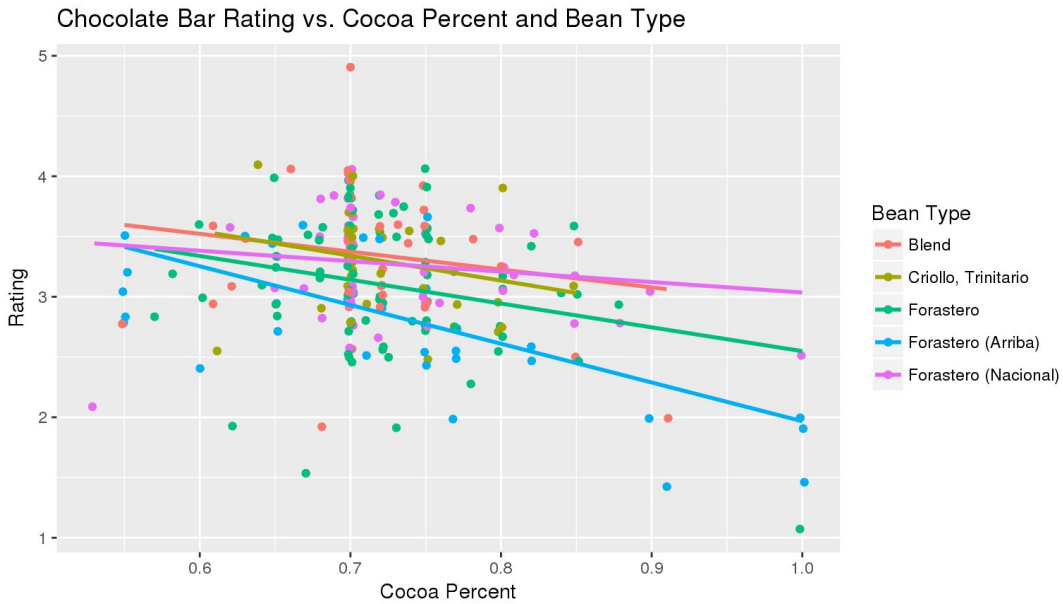
Week	Date	Topic	Project Milestone	Reading & Quizzes	Slides
1	Jan 12	Course overview and setup	P1 M0	Ch 1	Week 1
2	Jan 19	Data vis elements	P1 M1	Ch 2, Q1	
3	Jan 26	Time-series & trends data	P1 M1	Ch 3, Q2	
4	Feb 2	Time-series & trends data	P1 M2	Ch 4, Q3	
5	Feb 9	Network & graph data	P1 M3	Ch 5, Q4	
6	Feb 16	Network & graph data	P1 M4	Ch 6, Q5	
7	Feb 23	Geospatial data	P1 M4	Ch 7, Q6	
8	Mar 2	Geospatial data	P1 M5	Ch 8, Q7	
9	Mar 9	Textual data & NLP	P2 M1	Ch 9, Q8	
10	Mar 16	Spring Break!	Spring Break!	Spring Break!	Spring Break!
11	Mar 23	Textual data & NLP	P2 M2	Ch 10, Q9	
12	Mar 30	Image data	P2 M2	Ch 11, Q10	
13	Apr 6	Image data	P2 M3	Ch 12, Q11	
14	Apr 13	Video data	P2 M3	Ch 13, Q12	
15	Apr 20	Video data	P2 M4	Streamlit tutorial, Q13	
16	Apr 27	Wrap-up	P2 M5	Streamlit tutorial, Q14	

How many visualization elements can you name?



Five Main Components of a Data Visualization

1. Data representation
2. Annotations
3. Color
4. Interactivity
5. Composition



Let’s get hands-on:

Altair tutorial