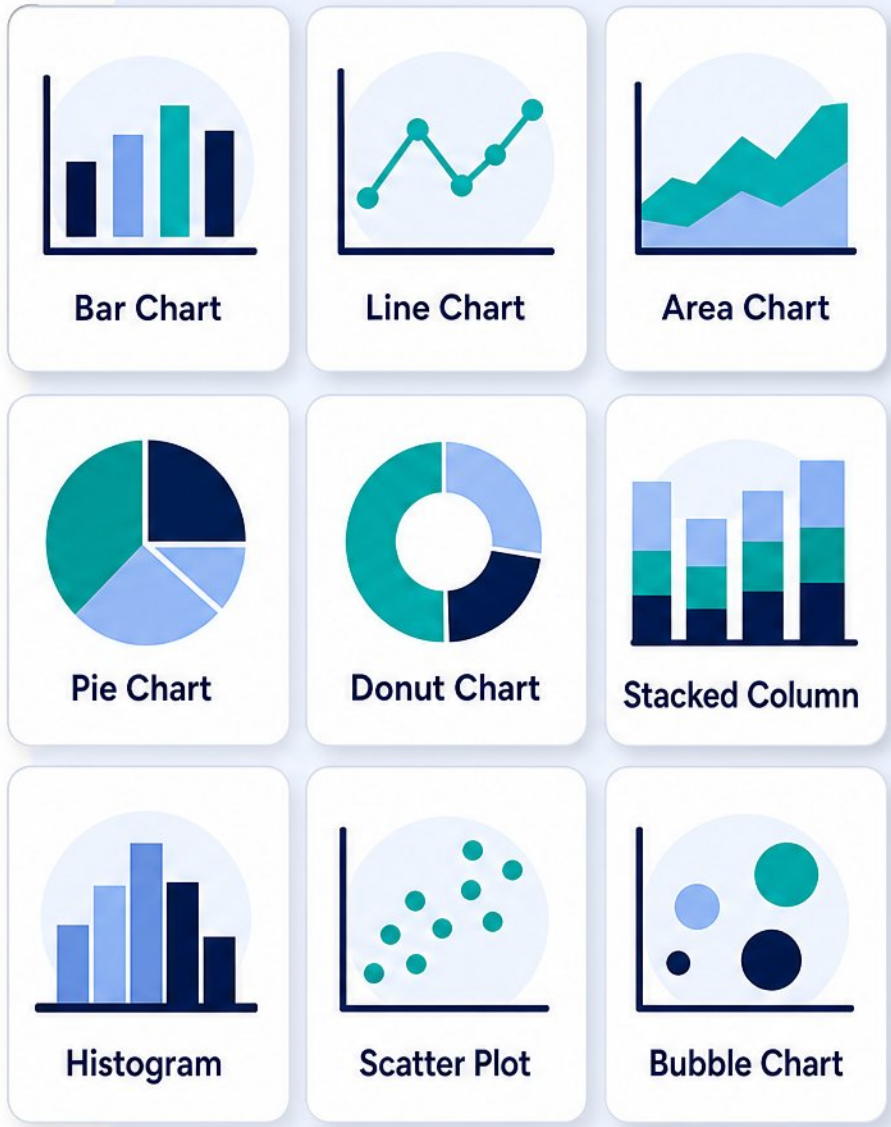
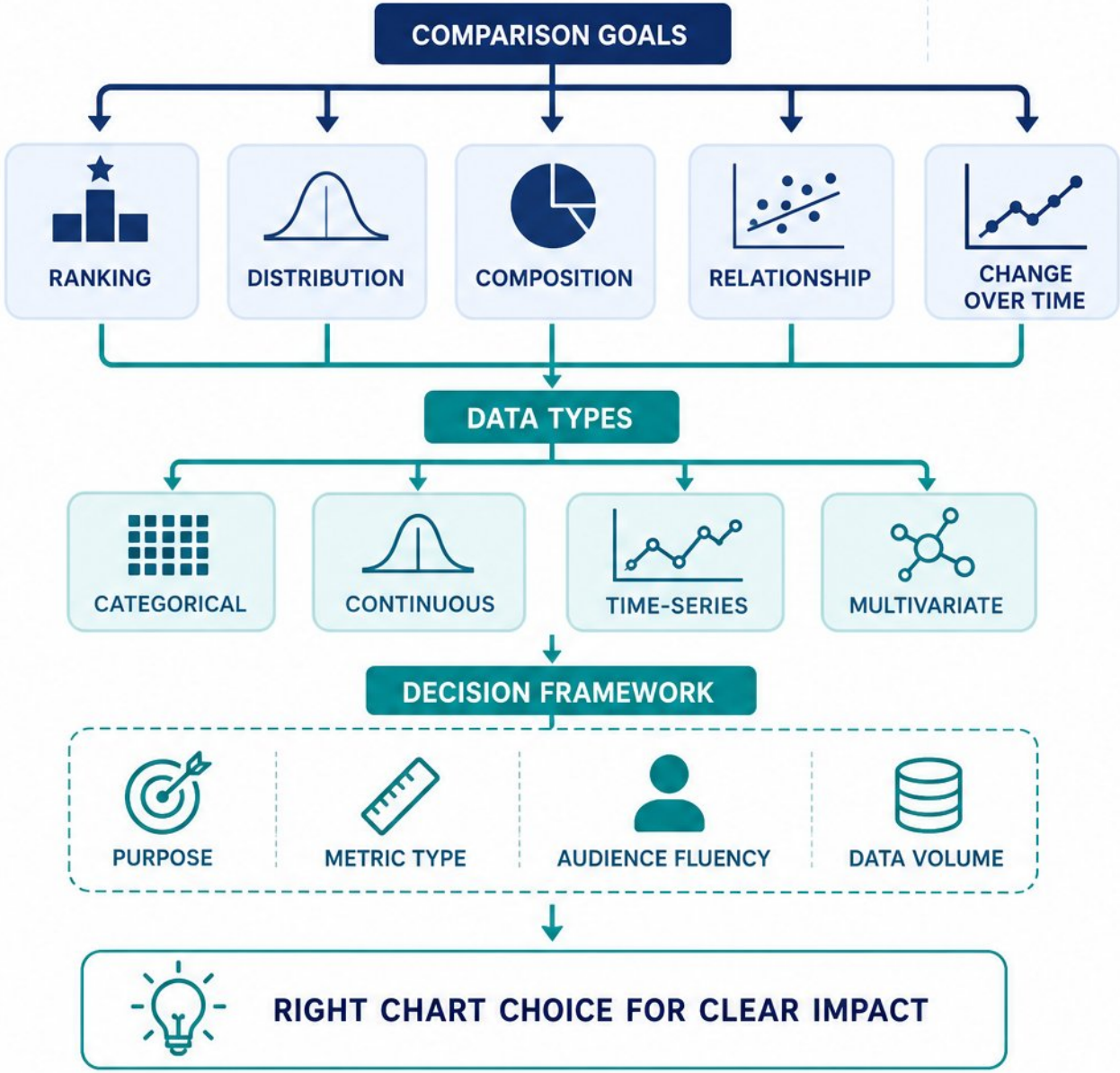
Types of Data Visualization Charts

- Match chart types to comparison goals and data patterns
- Chart choice shapes clarity, insight, and decisions
- Covers comparison, distribution, composition, relationship, and trends
- Wrong charts mislead; right charts accelerate understanding



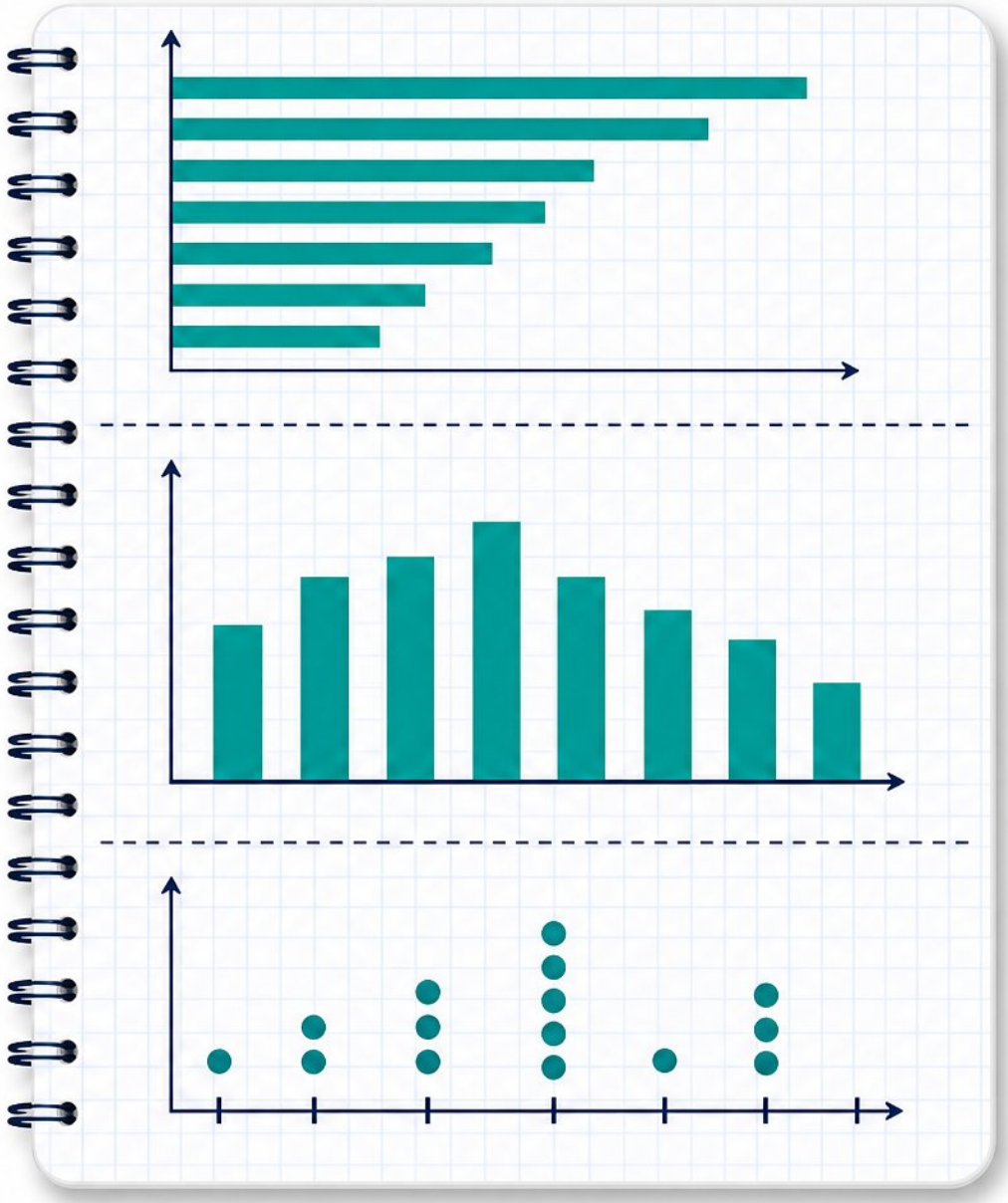
Core Framework for Chart Selection

- **Define five comparison goals:** ranking, distribution, composition, relationship, change over time
- **Identify data types:** categorical, continuous, time-series, and multivariate
- **Use a decision framework:** purpose, metric type, audience fluency, data volume
- **Why encoding matters:** position and length beat angle and area for accuracy
- **Match charts to data patterns** and audience needs for clear impact



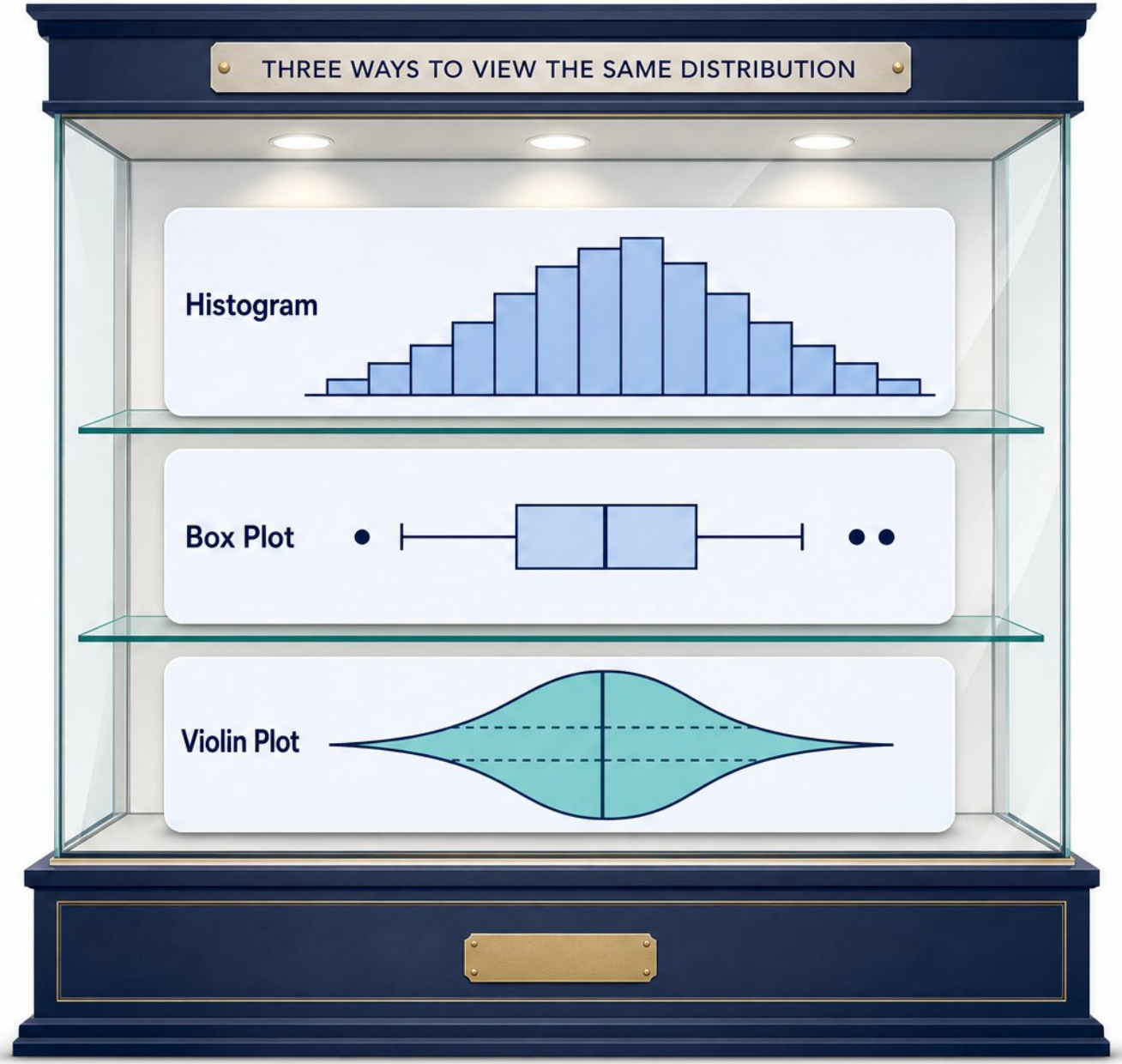
Charts for Comparing Values

- Use bar charts for long labels, many categories, or ranking data
- Use column charts for time-based data or fewer than 10 categories
- Choose dot plots as a clutter-free alternative for dense comparisons
- Sort by value, start bars at zero, and limit the number of series



Charts for Showing Distribution

- Histograms reveal the shape of continuous data distribution
- Box plots summarize median, quartiles, spread, and outliers
- Violin plots compare distribution shape across groups
- Use ridge plots for many groups; density curves need large samples
- Avoid KDE and violin plots with fewer than 30 points per group

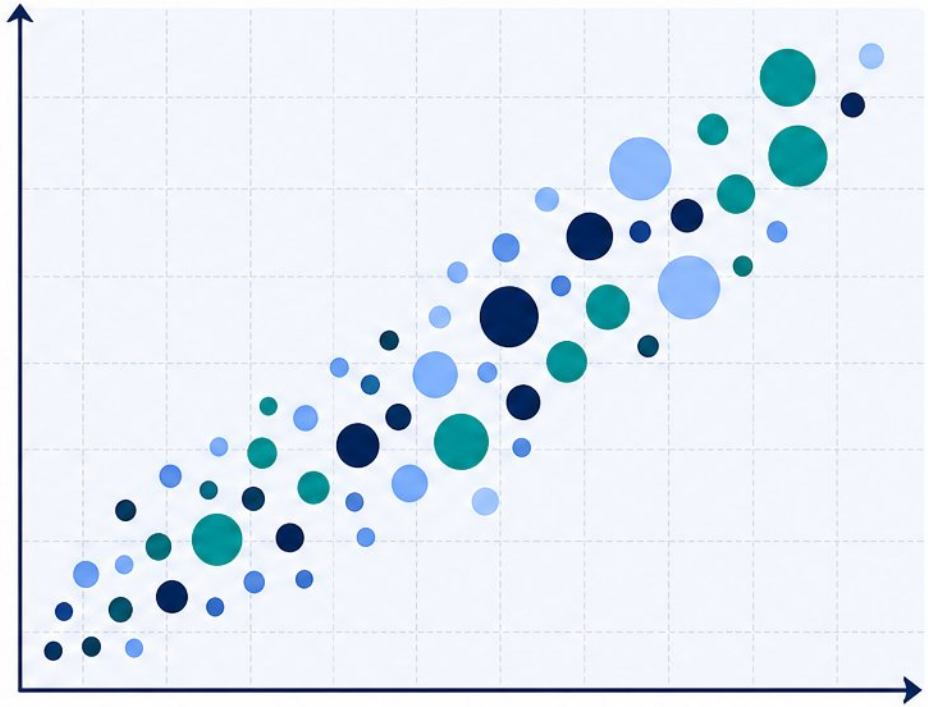


Charts for Showing Composition

- **Pie/donut charts:** simple part-to-whole, 5 or fewer categories
- **Stacked bars:** compare composition across multiple groups
- **100% stacked bars:** compare proportions across groups
- **Treemaps:** hierarchical or dense composition data

Charts for Showing Relationships

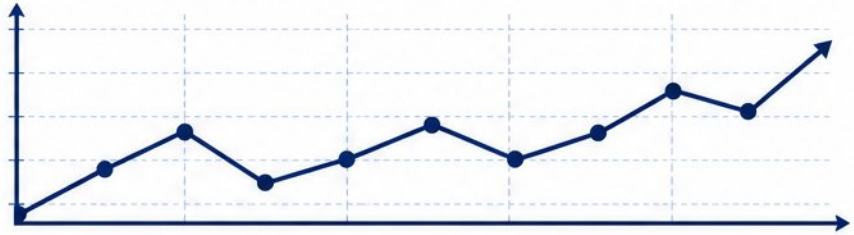
- Scatter plots reveal correlations between two continuous variables
- Bubble charts add a third variable via dot size; color can group categories
- Correlation heatmaps summarize relationships across multiple variables
- Connected scatter plots show time-based relationships; avoid overplotting



Charts for Showing Change Over Time

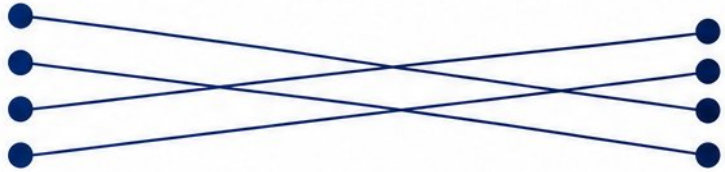
- Use line charts for continuous time trends and precise comparisons
- Use area charts to emphasize volume or cumulative totals
- Use slope graphs for before-after comparisons and ranking changes
- Use sparklines as compact inline trend indicators
- Always start area chart y-axis at zero to avoid distortion

Line Chart

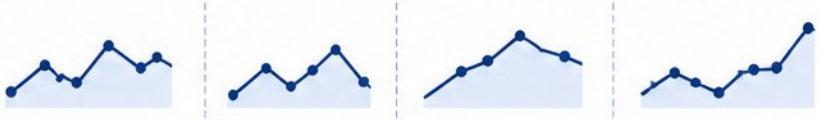


Area Chart

Slope Graph



Sparklines

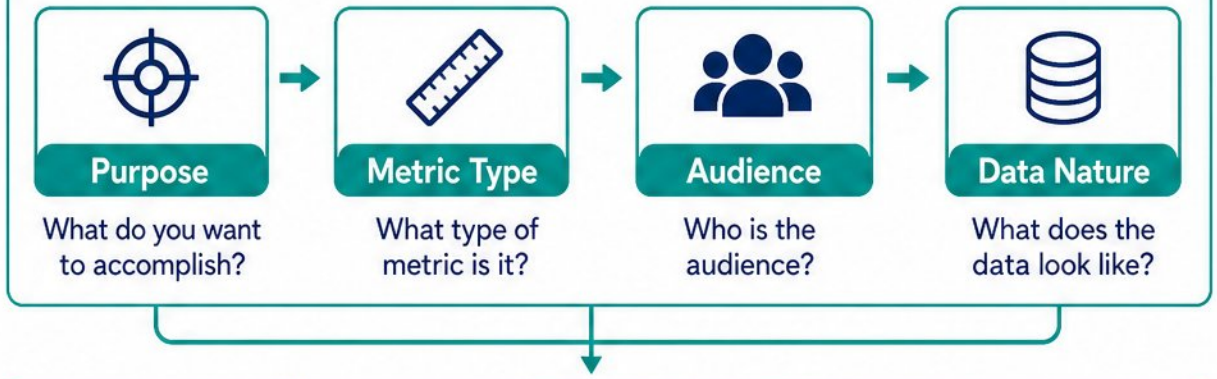


Always start area chart y-axis at zero to avoid distortion

Practical Selection Guidelines

- Match chart type to comparison goal and data pattern
- Use decision tree: purpose, metric type, audience, data nature
- Avoid truncated axes, overused pie charts, chartjunk
- Quick checklist: goal, chart family, encoding, design, review

Chart Selection Decision Tree



Data Pattern	Recommended Chart Type (by Goal)			
	Compare	Change Over Time	Part-to-Whole	Relationship
Categorical (Discrete)				
Time Series (Ordered)				
Composition (Parts)				
Relationship (Variables)				

Common Visualization Mistakes

- Truncated bar axes distort differences; start at zero
- Dual axes create false correlations; use separate panels
- 3D charts and area encoding mislead perception
- Rainbow colormaps hinder readability; use perceptually uniform palettes
- Cherry-picked time ranges hide context; show full series

Matching Charts to Audience and Context

Executive Slide (Simple)

Overall Trend

The metric is rising over time.

Takeaway: The trend is upward.

Analyst Dashboard (Dense)

Takeaway: Multiple factors drive the upward trend.

- Executives prefer simple charts; analysts tolerate dense ones
- Static slides need strong labels; dashboards support interaction
- Use explanatory charts with annotated takeaways
- Balance ideal choices with tools, time, and constraints

Hands-On Practice Scenarios

- Apply the decision framework: purpose, metric type, audience, and data
- Scenario: compare revenue across regions → horizontal bar chart
- Scenario: show profit margins over time → line chart
- Adapt choices for executive summaries vs. analyst reviews
- Review each selection against the five-step checklist

Scenario: compare revenue across regions
→ horizontal bar chart

Sample Data

Build your horizontal bar chart here

Scenario: show profit margins over time
→ **line chart**

Sample Data

Build your line chart here

Five-Step Checklist

1. Purpose → 2. Metric Type → 3. Audience → 4. Data → 5. Validate

Quick Reference Checklist

Step 1: Identify the comparison goal or data pattern

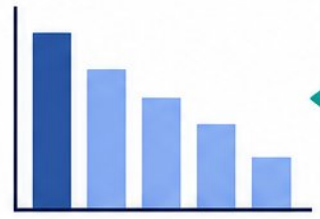
Step 2: Choose the chart family that matches that goal

Step 3: Check perceptual efficiency: use position and length when possible

Step 4: Apply design rules: start bars at zero, limit categories, and label directly

Step 5: Review for common mistakes before publishing

COMPARISON BEST PRACTICES



Use position and length for clearest comparisons.

Start bars at zero for accurate interpretation.

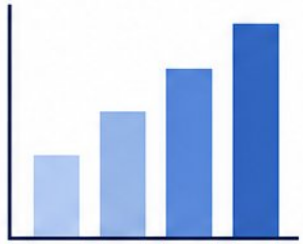
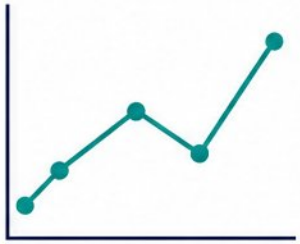
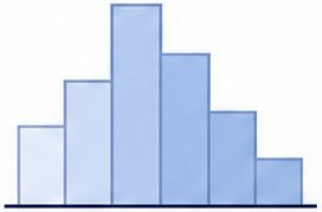
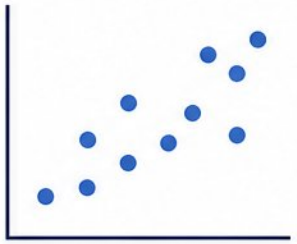
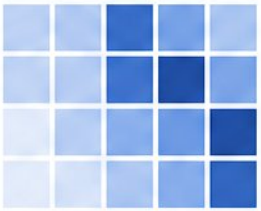
Limit categories and label directly.

Avoid non-zero baselines, 3D effects, and clutter.

Summary and Key Takeaways

- Bar charts for ranking, line charts for trends
- Histograms for distribution, pies for simple shares
- Scatter plots reveal relationships, heatmaps for correlations
- Match chart to goal: compare, show change, or distribution
- Start bars at zero, label directly, avoid 3D and dual axes

MATCH THE CHART TO YOUR GOAL

COMPARE	SHOW CHANGE	DISTRIBUTION
		
Bar Chart	Line Chart	Histogram
SIMPLE SHARES	**RELATIONSHIPS**	**CORRELATIONS**
		
Pie Chart	Scatter Plot	Heatmap

Next Steps and Resources

- Explore tools: Excel, Tableau, Power BI, R, Python libraries
- Practice each chart category with real datasets
- Learn advanced topics: faceting, small multiples, dashboards
- Apply the checklist and seek peer review

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