

# Lecture 10: Interaction and Faceting

DS 4200  
SPRING 2023

Prof. Ab Mosca (*they/them*)  
NORTHEASTERN UNIVERSITY

Slides and inspiration from Cody Dunne, Michelle Borkin, Dylan Cashman, Krzysztof Gajos, Hanspeter Pfister, Miriah Meyer, Jonathan Schwabish, and David Sprague

# Last Class

**We:**

- Looked at the “Arrange” step of table visual encodings

**Any Questions?**

# Today

- Review Interaction
- Review Faceting

# INTERACTION

# Interaction

## Benefits of Interaction

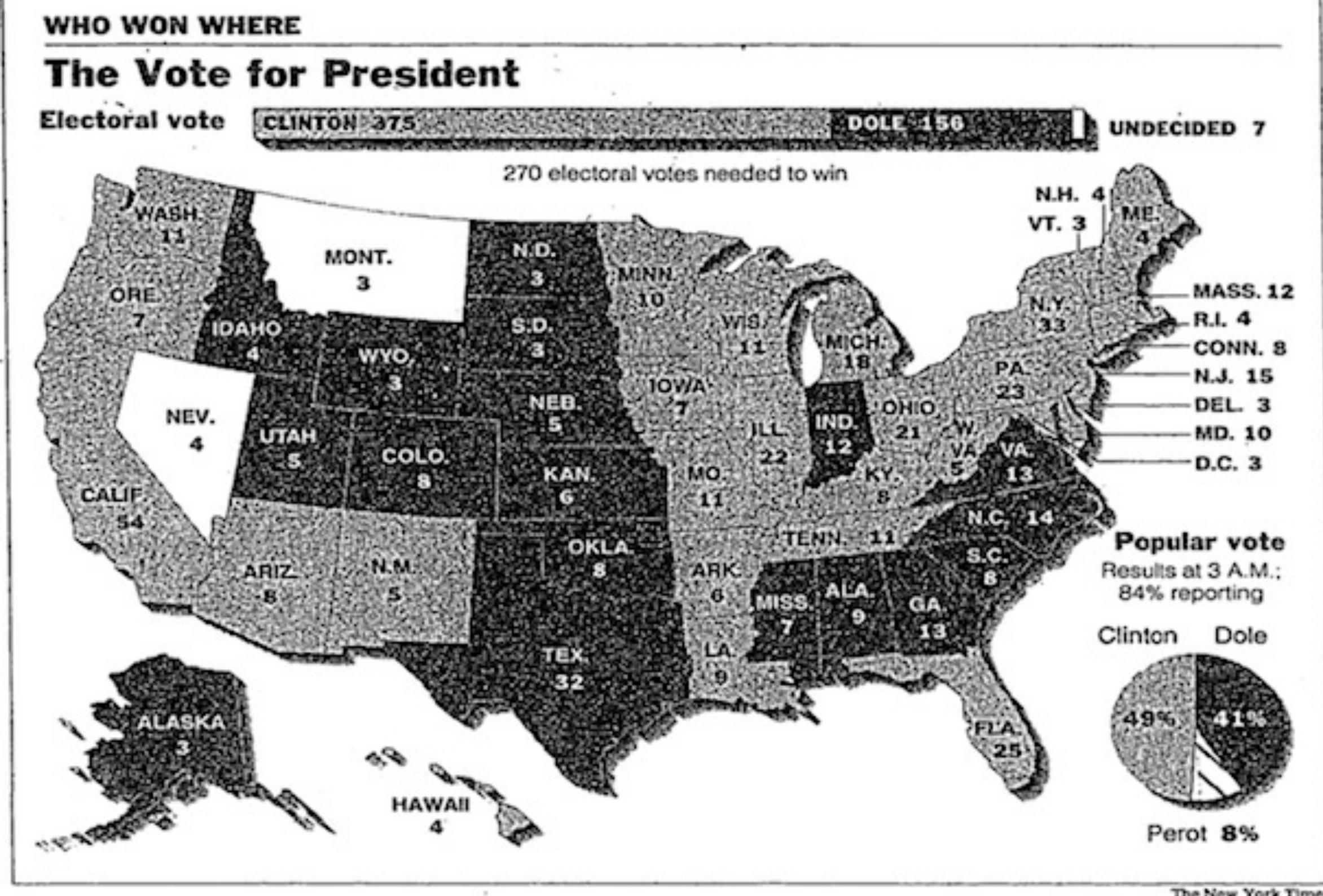
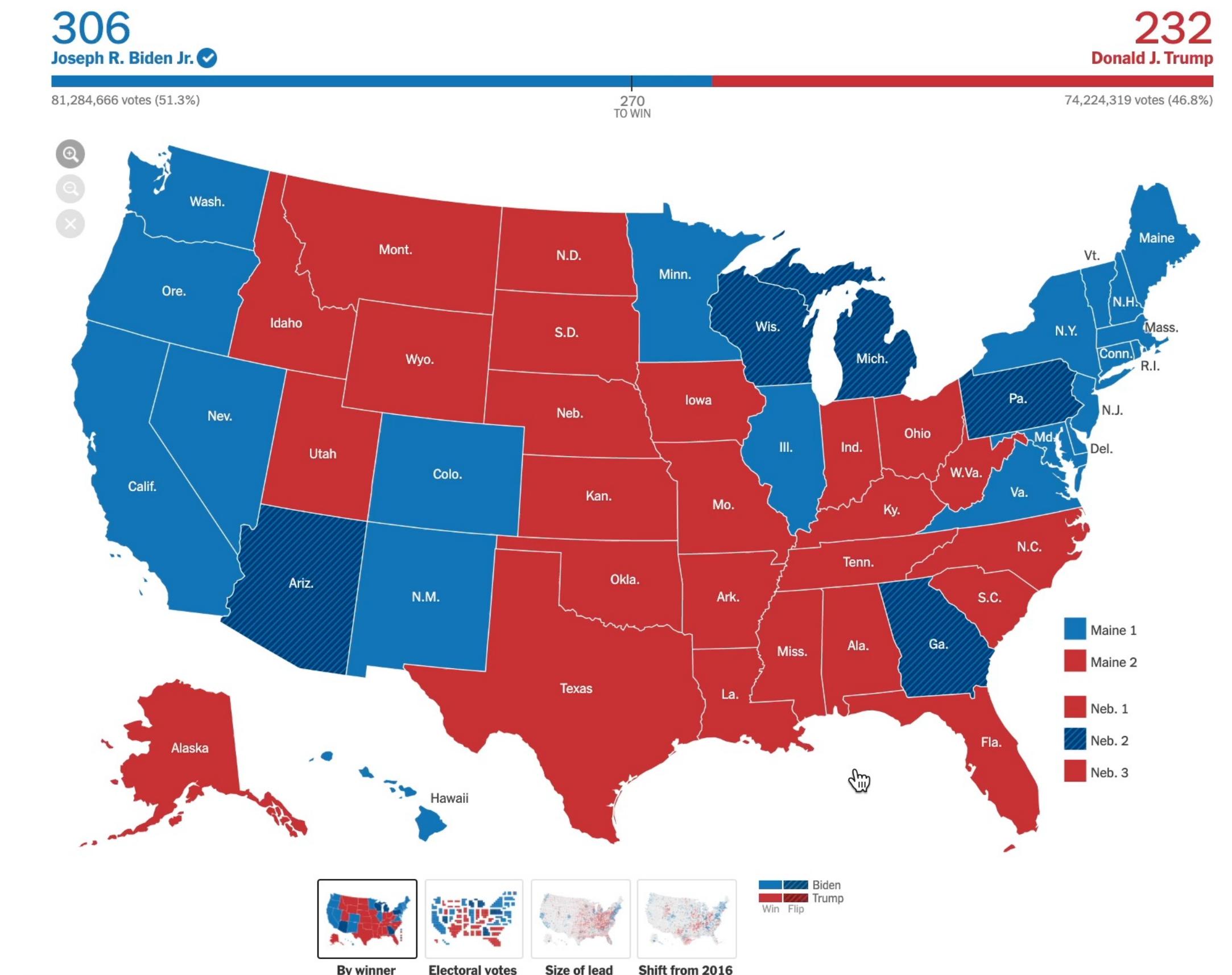
- Enables visualization of large amounts of data
- Amplifies user cognition (supports sensemaking)
- Increases engagement (vis becomes personal to user)
- Increases deep learning and learning transfer

# Interaction

**1996 → 2020**

## Presidential Election Results: Biden Wins

Joseph R. Biden Jr. was elected the 46th president of the United States. Mr. Biden defeated President Trump after winning Pennsylvania, which put his total of Electoral College votes above the 270 he needed to clinch the presidency.



<https://www.theatlantic.com/technology/archive/2012/11/116-years-of-electoral-infographics-from-the-new-york-times/264692/>

<https://www.nytimes.com/interactive/2020/11/03/us/elections/results-president.html>

# Interaction

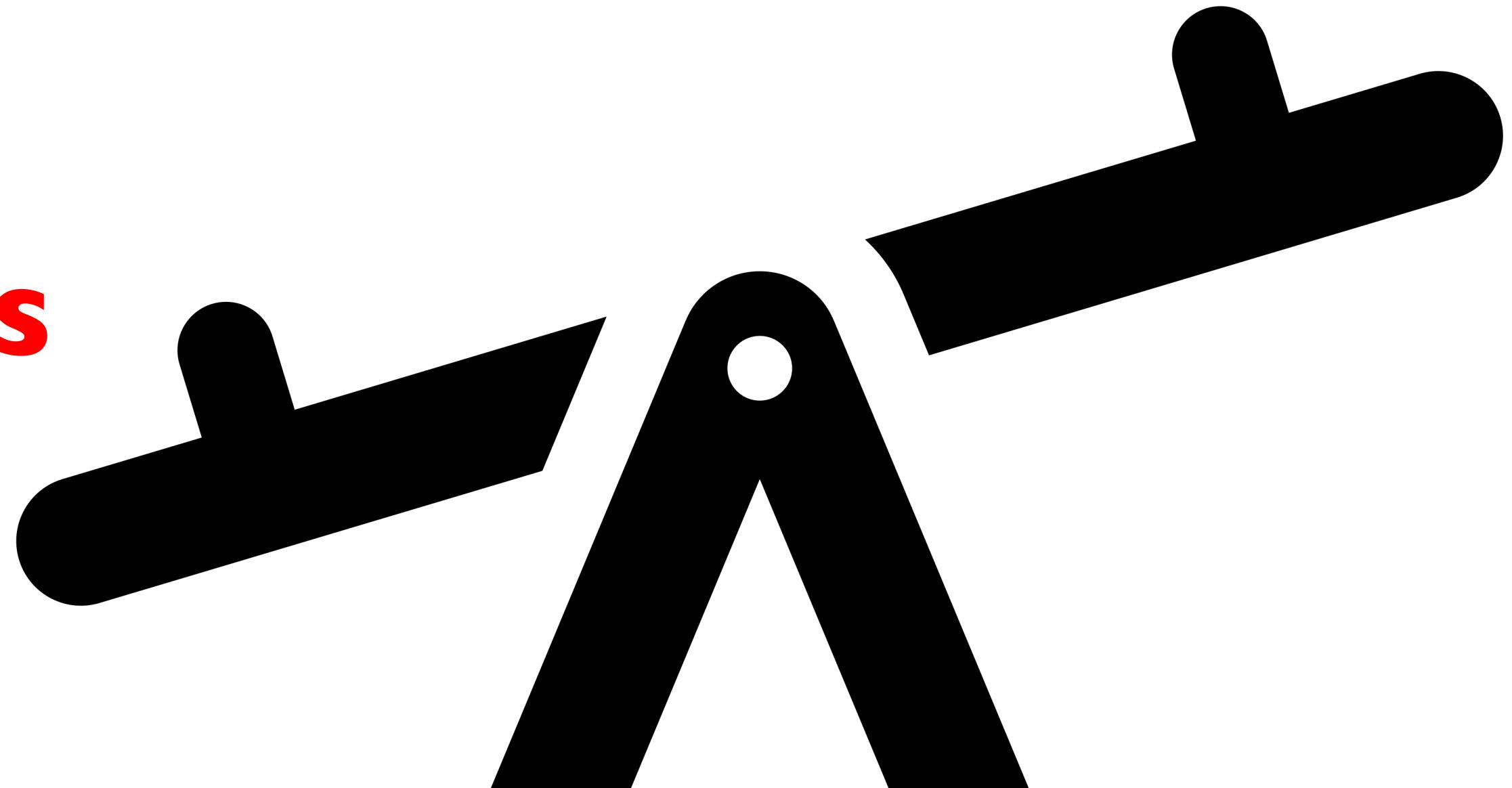
## Caveats of Interaction

- Requires human time and attention
- Increase perceptual and exploration costs (van Wijk 2005)
- Interaction costs (Lam 2008)
- Multiple user studies find no increase in performance  
(Theis et al. 2016, Ragan et al. 2012, Mosca et al. 2021)

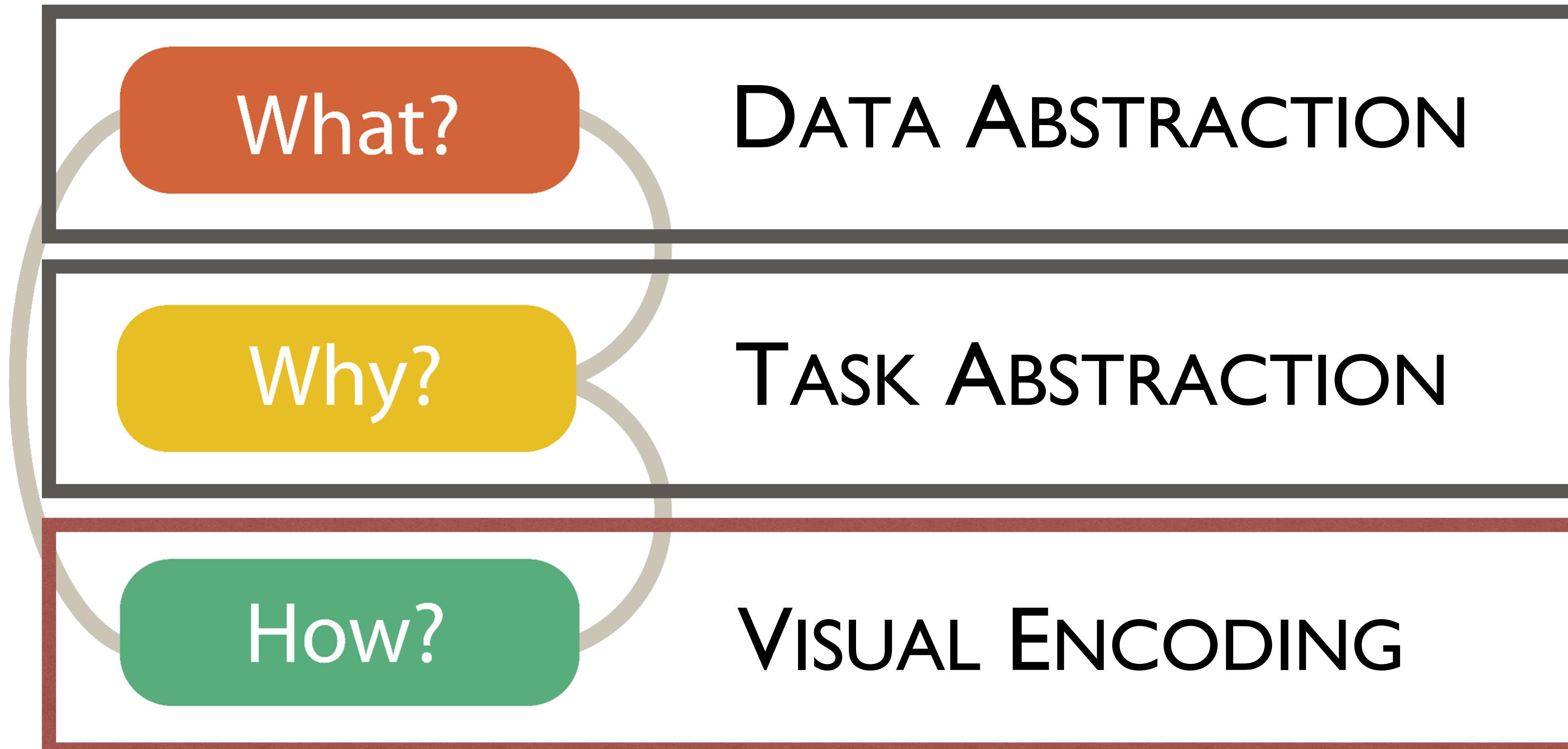
# Interaction

**Costs**

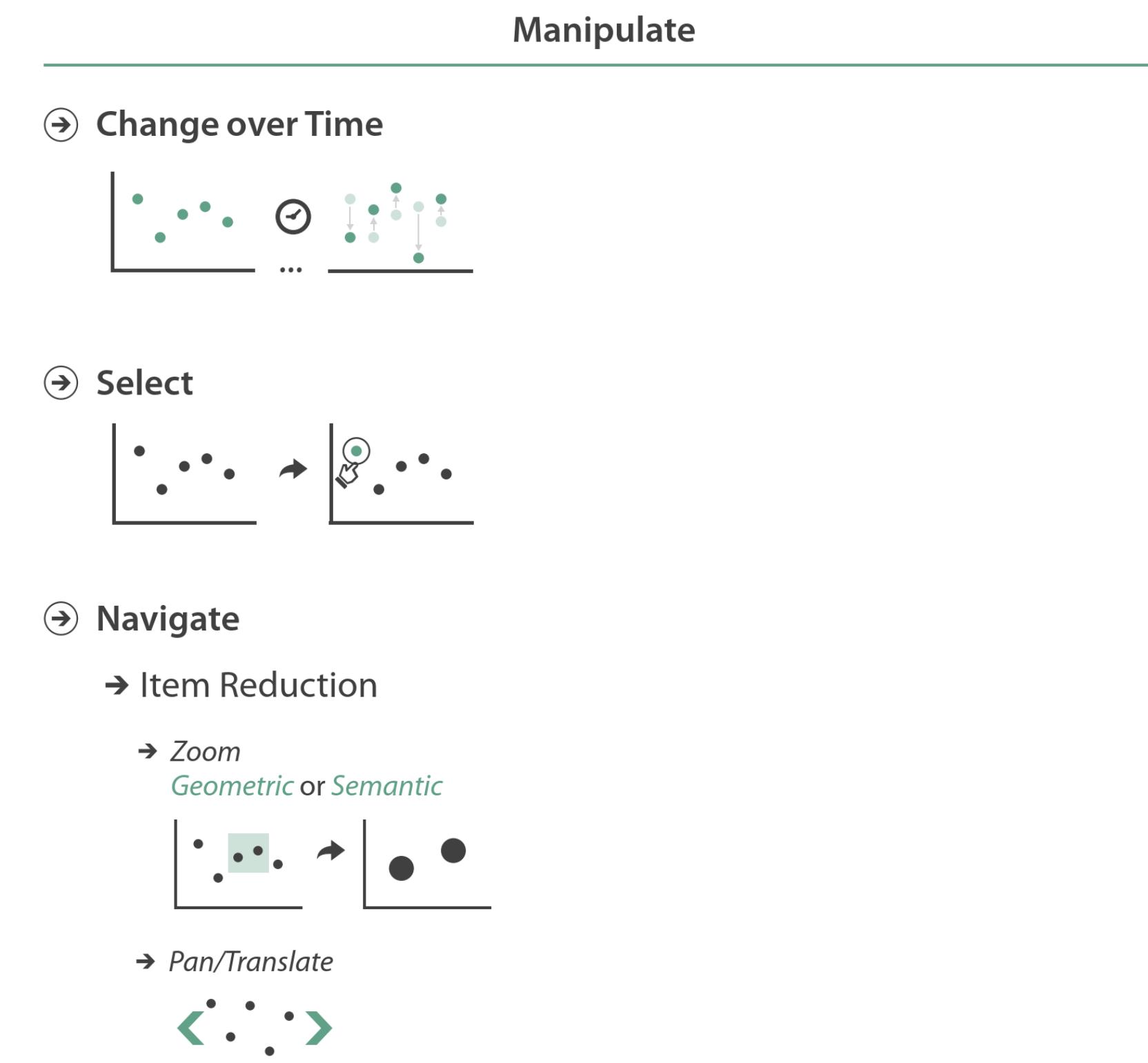
**Benefits**



# Visualization Building Blocks



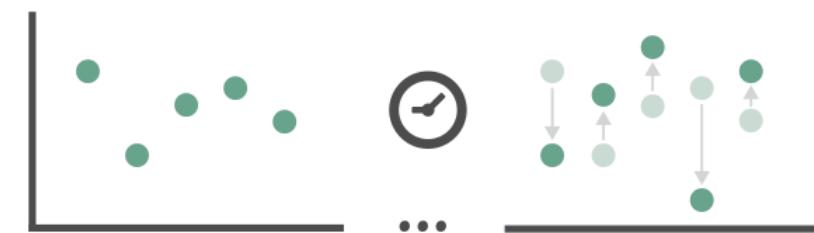
# Interaction Taxonomies: Munzner



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## Change over time

→ Change over Time



Example: D3

Animated  
Transitions

flexible transitions

<http://mbostock.github.io/d3/talk/20111116/#11>

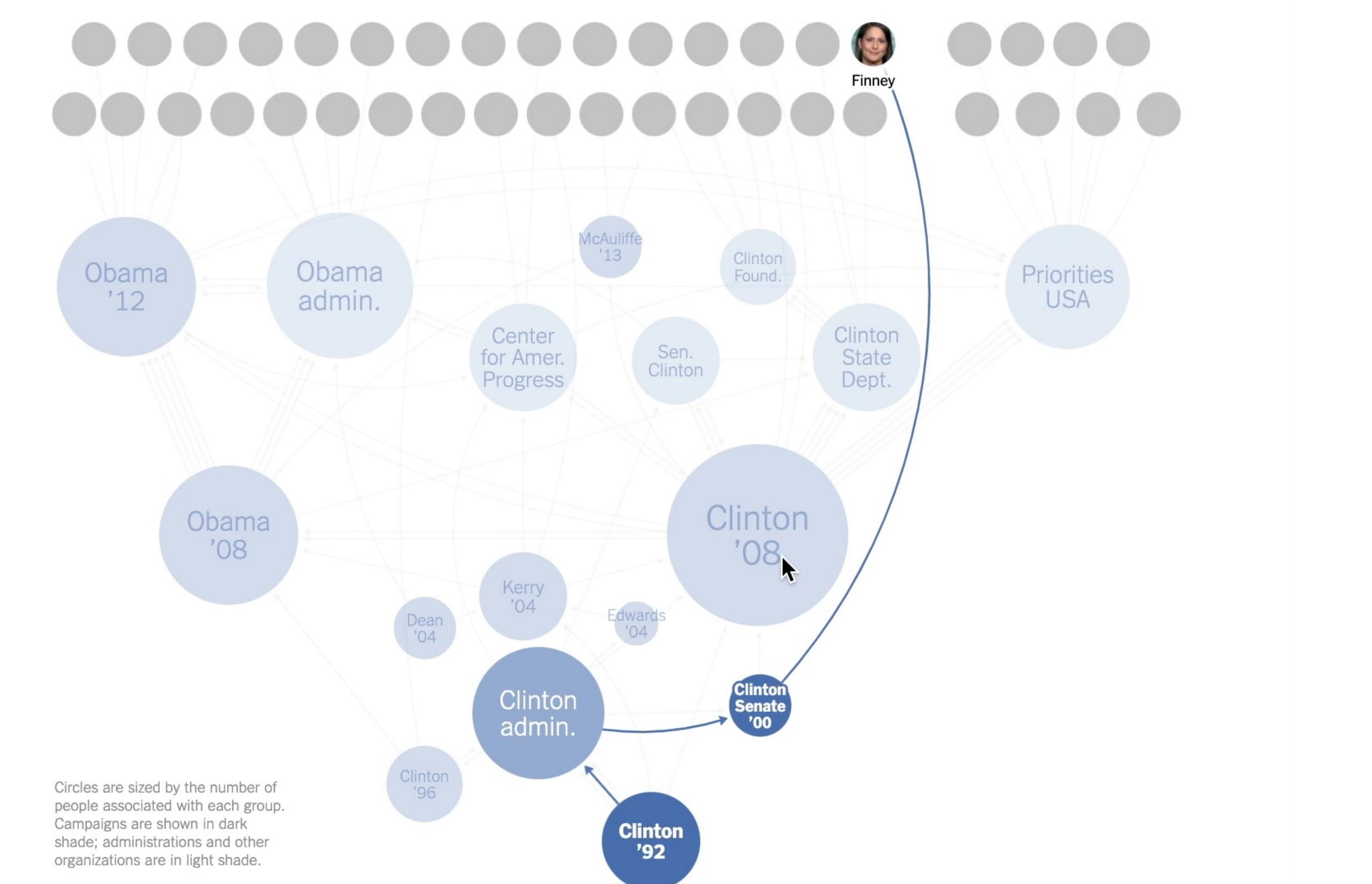
# Interaction Taxonomies: Munzner

## Selection

④ Select



Example: NYT  
Campaign  
Connections

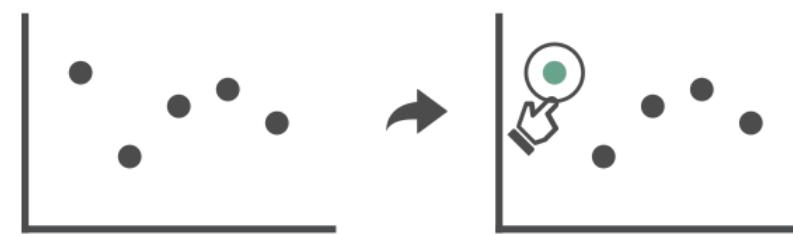


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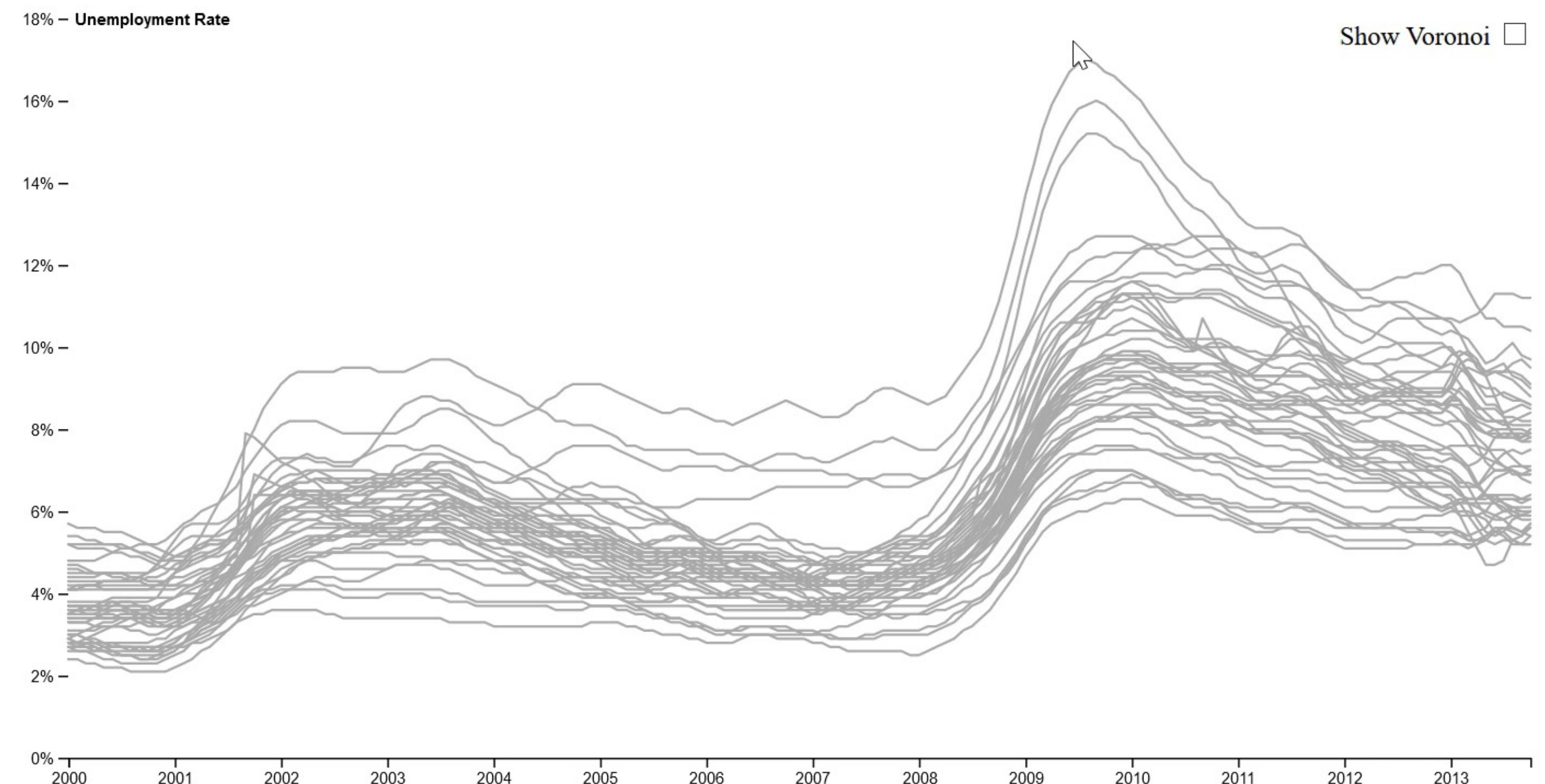
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Example:  
Voronoi  
 Cursors



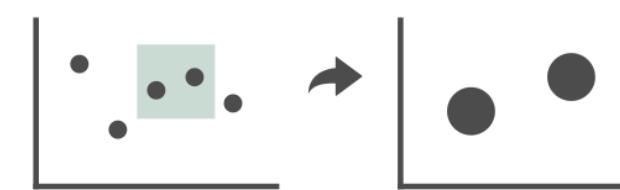
# Interaction Taxonomies: Munzner

## Navigate

### ④ Navigate

→ Item Reduction

→ Zoom  
Geometric or Semantic



→ Pan/Translate



### → Attribute Reduction

→ Slice



→ Cut



→ Project



**Attributes**

College	Major	Num Students
Khoury	Computer Science	300
Khoury	Data Science	475
Khoury	Math	699
COS	Math	80
COS	Data Science	402
D'Amore-McKim	Computer Science	337
D'Amore-McKim	Data Science	920

**Items**

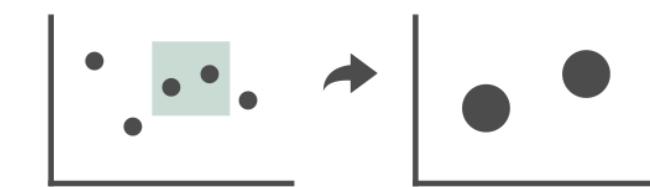
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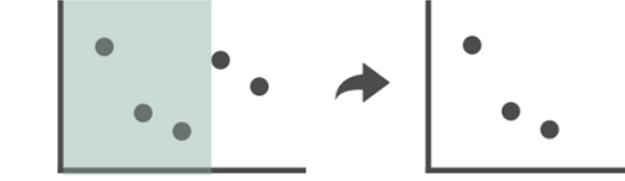


#### → Attribute Reduction

##### → Slice



##### → Cut



##### → Project



## Filtering and Aggregation

## Items

## Attributes

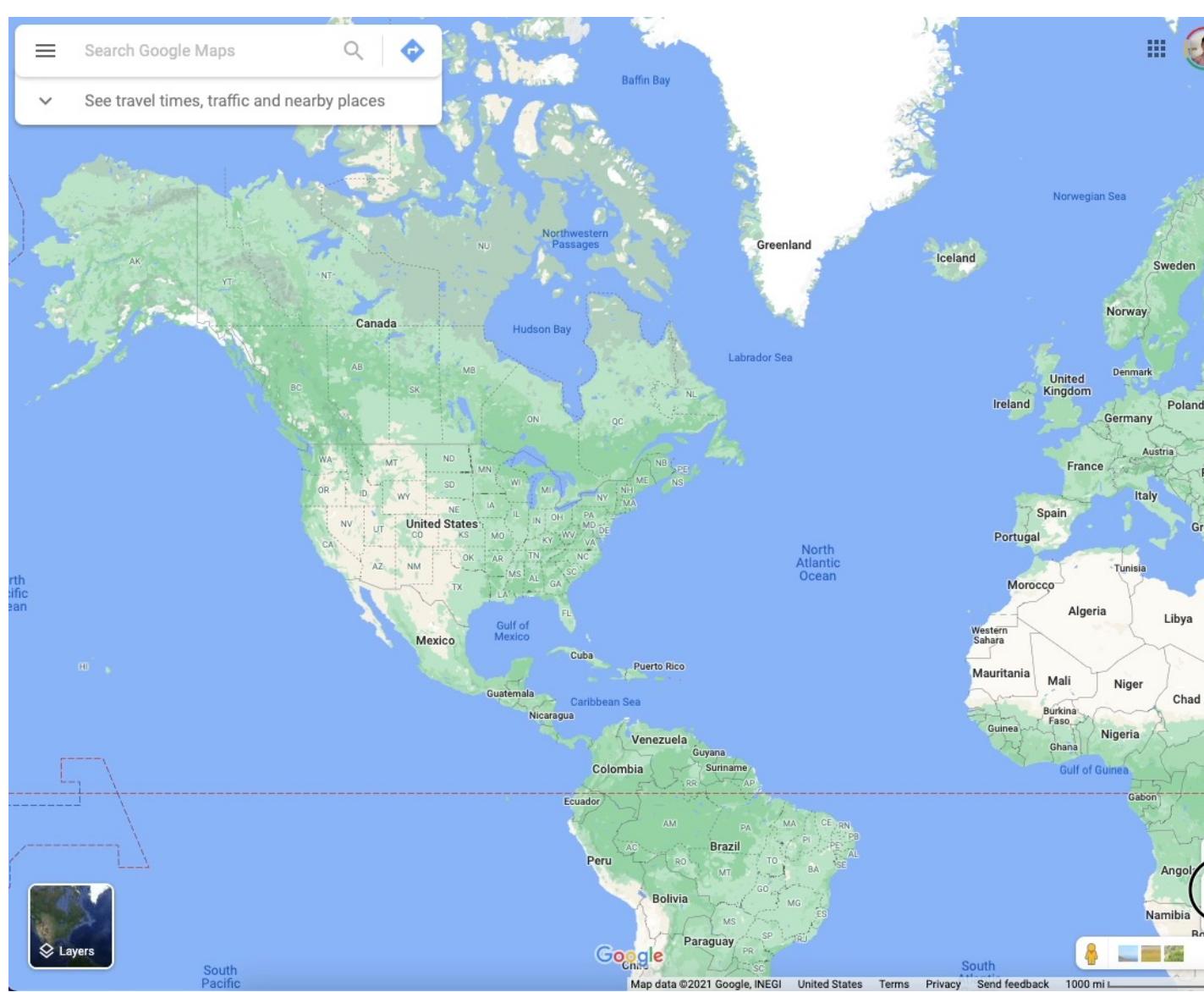
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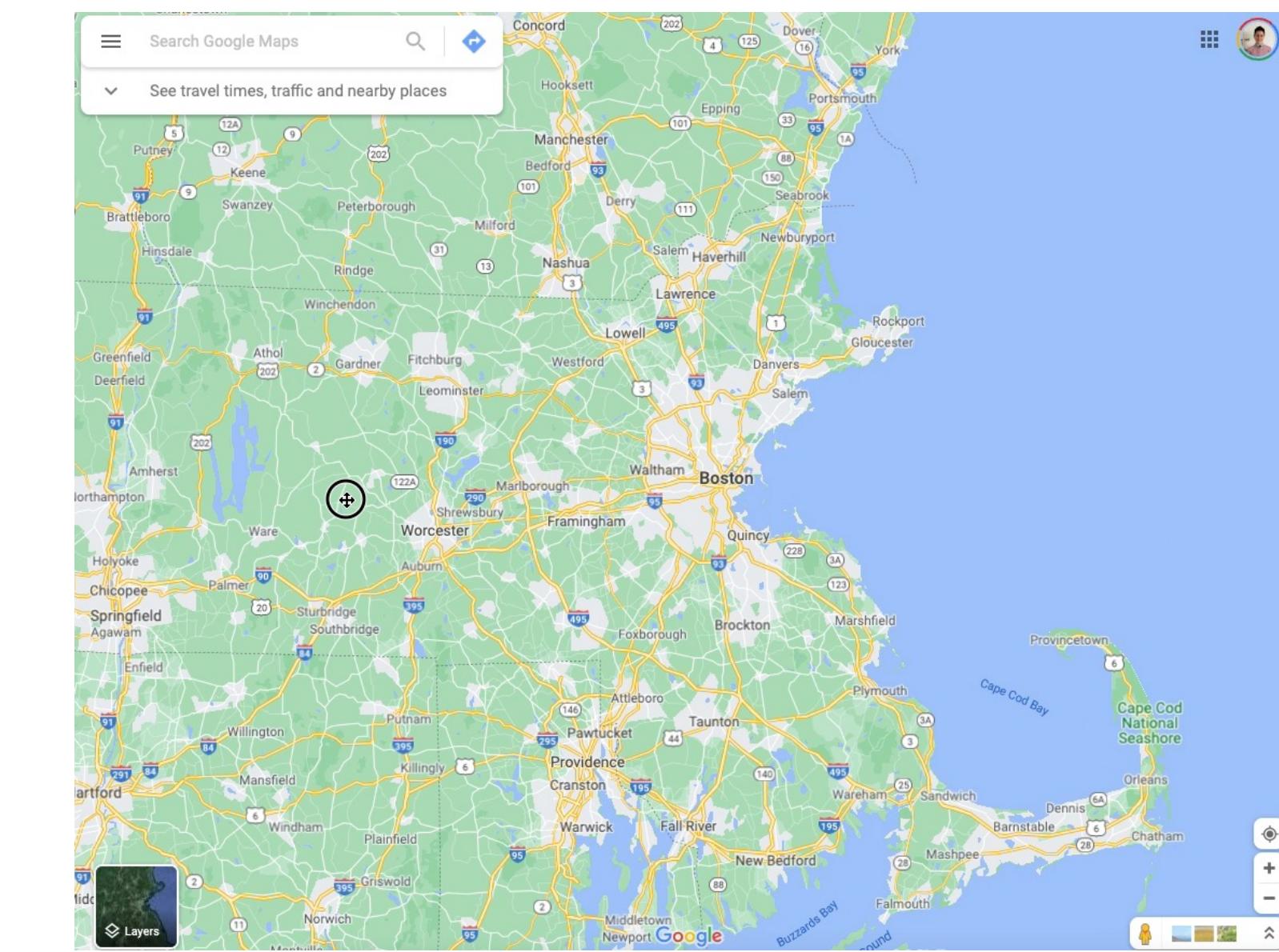
**Navigate → Item reduction → Pan/Zoom**

→ Zoom

*Geometric or Semantic*

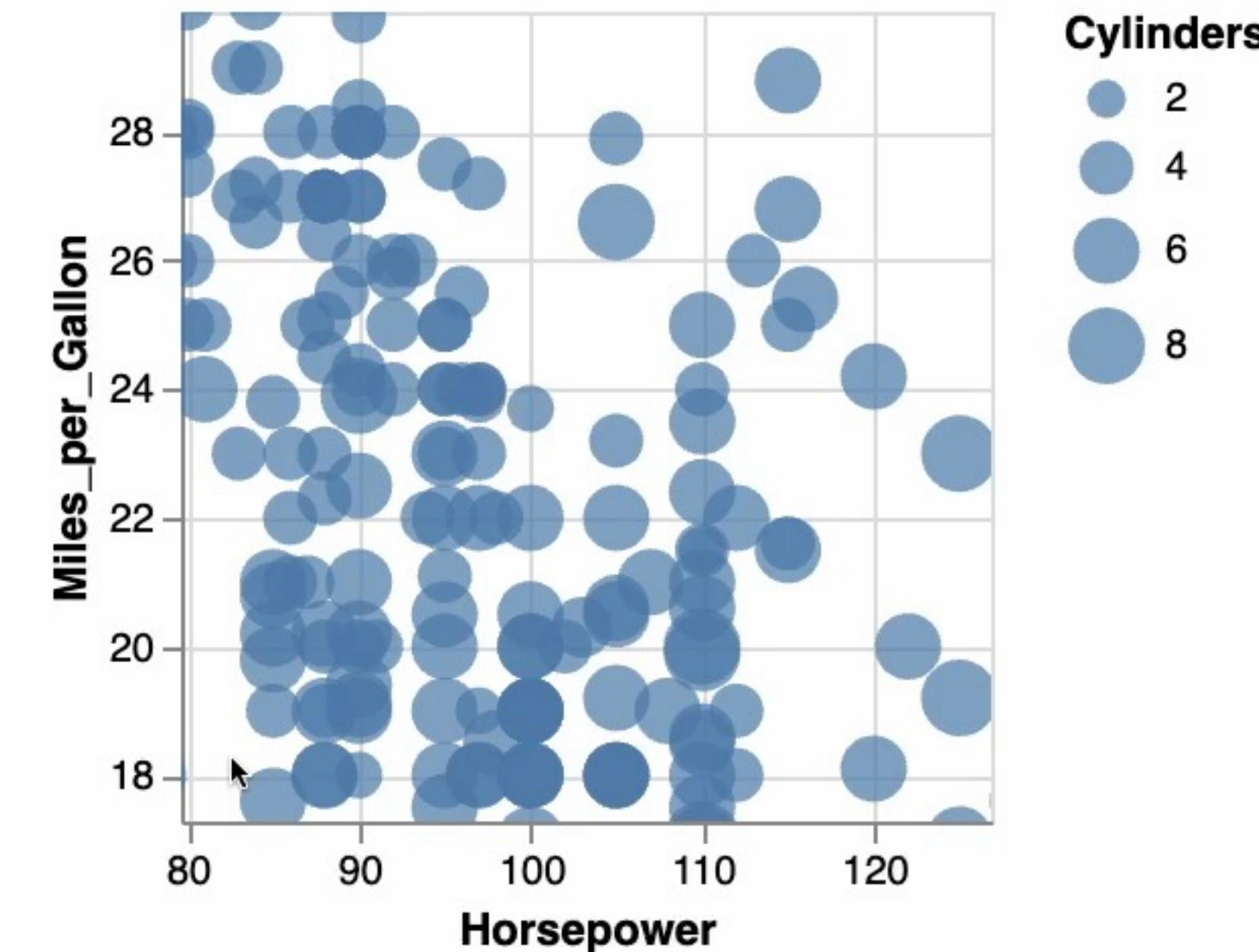
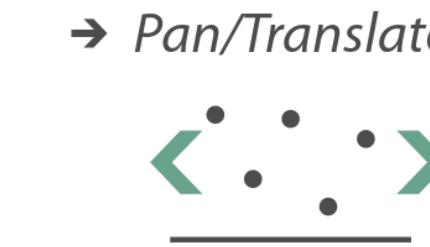
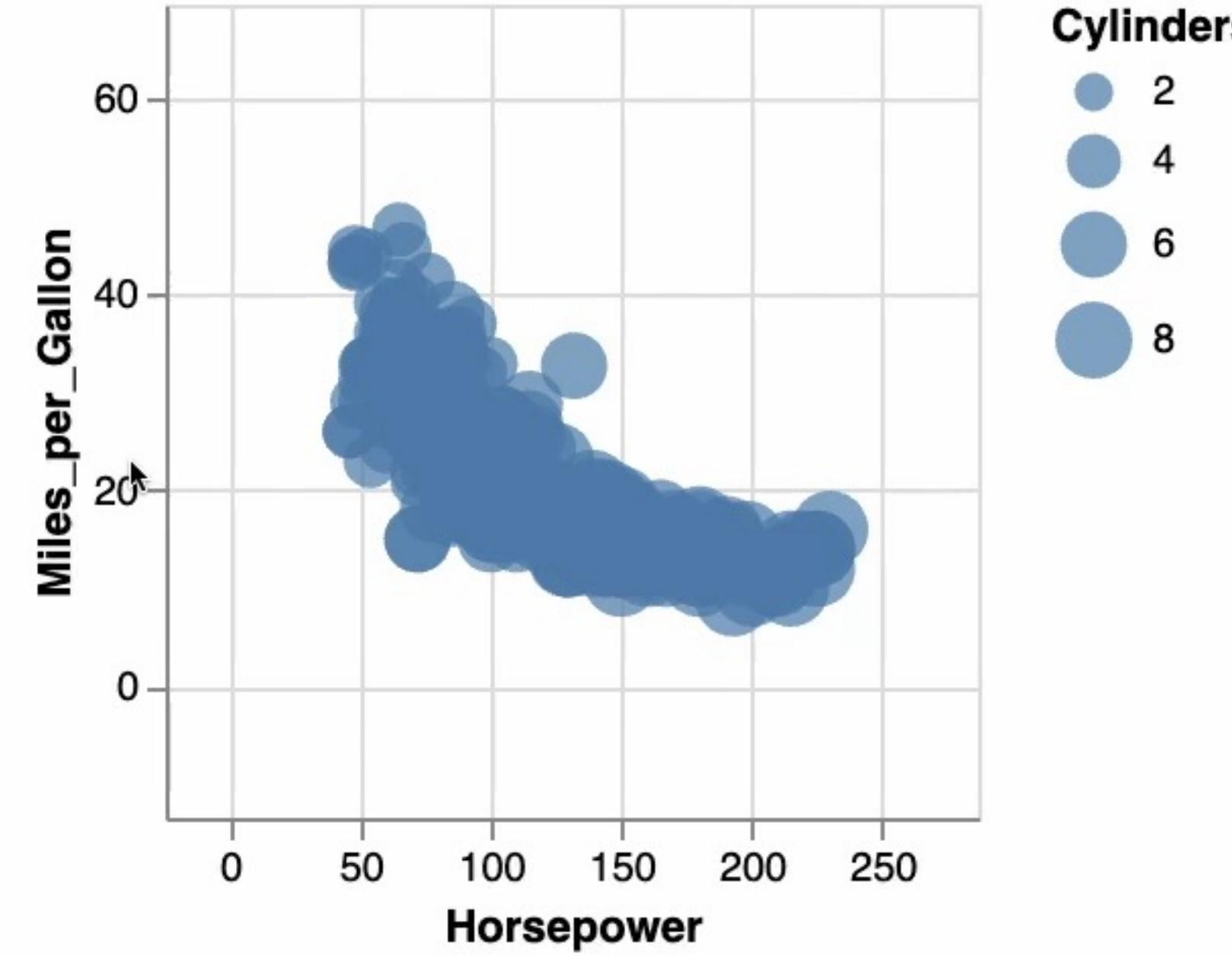
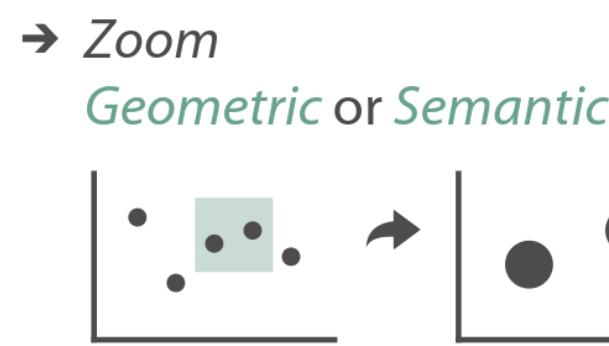


→ Pan/Translate



# Interaction Taxonomies: Munzner

**Navigate → Item reduction → Pan/Zoom**



# Interaction Taxonomies: Yi et al.

## Toward a Deeper Understanding of the Role of Interaction in Information Visualization

Ji Soo Yi, Youn ah Kang, John T. Stasko, *Member, IEEE*, and Julie A. Jacko

- *Select*: mark something as interesting
- *Explore*: show me something else
- *Reconfigure*: show me a different arrangement
- *Encode*: show me a different representation
- *Abstract/Elaborate*: show me more or less detail
- *Filter*: show me something conditionally
- *Connect*: show me related items

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flexible transitions

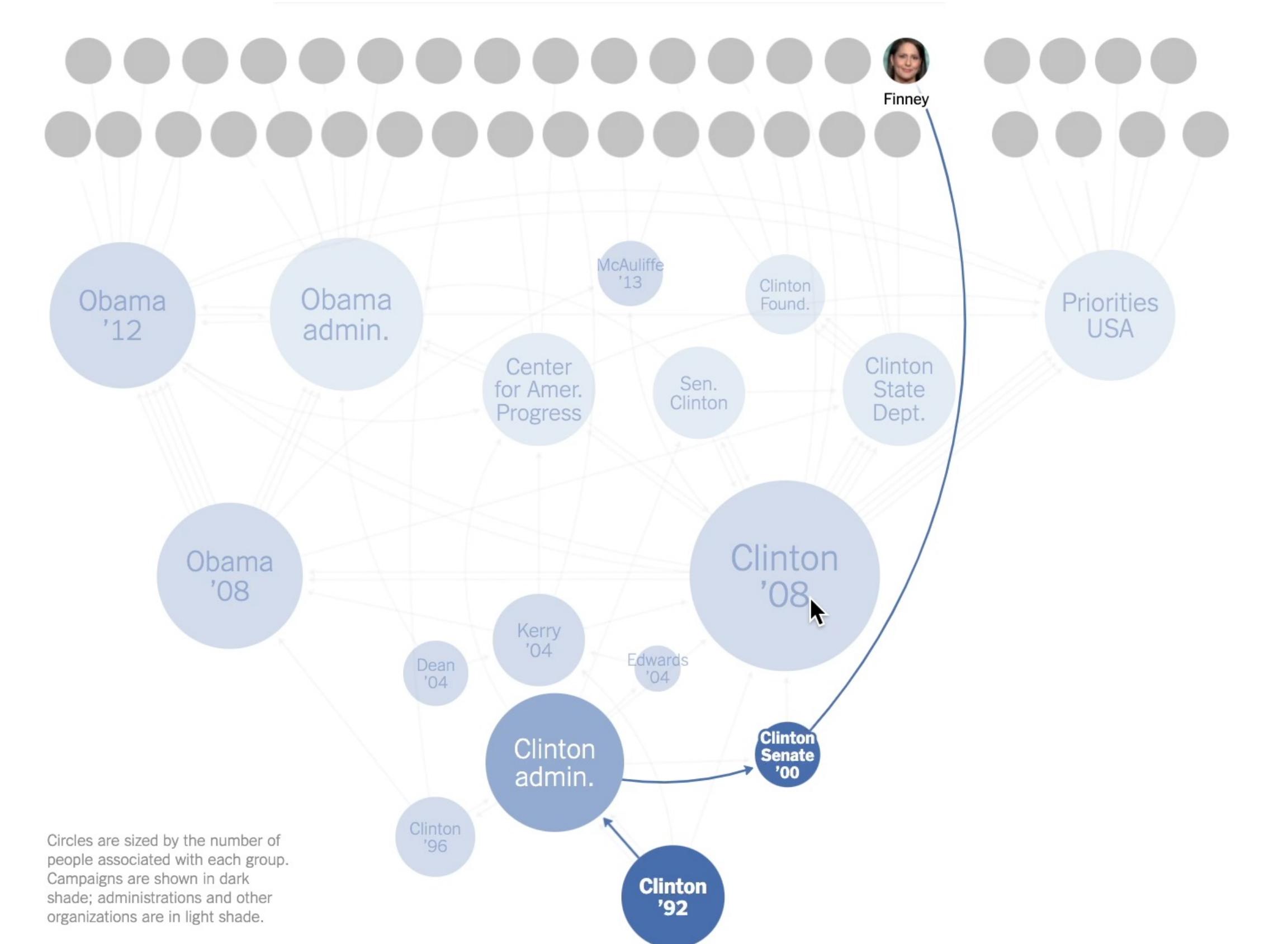
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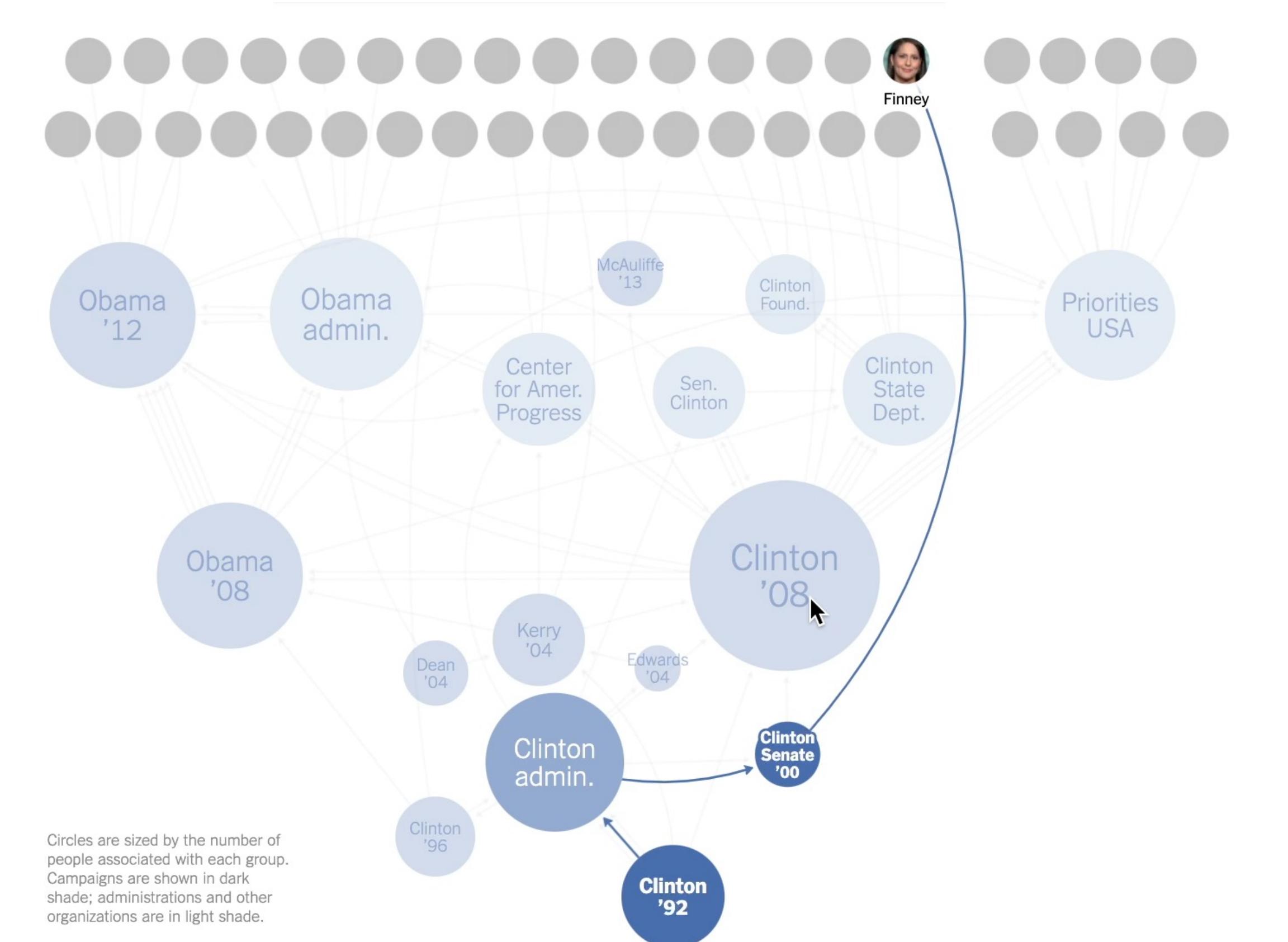
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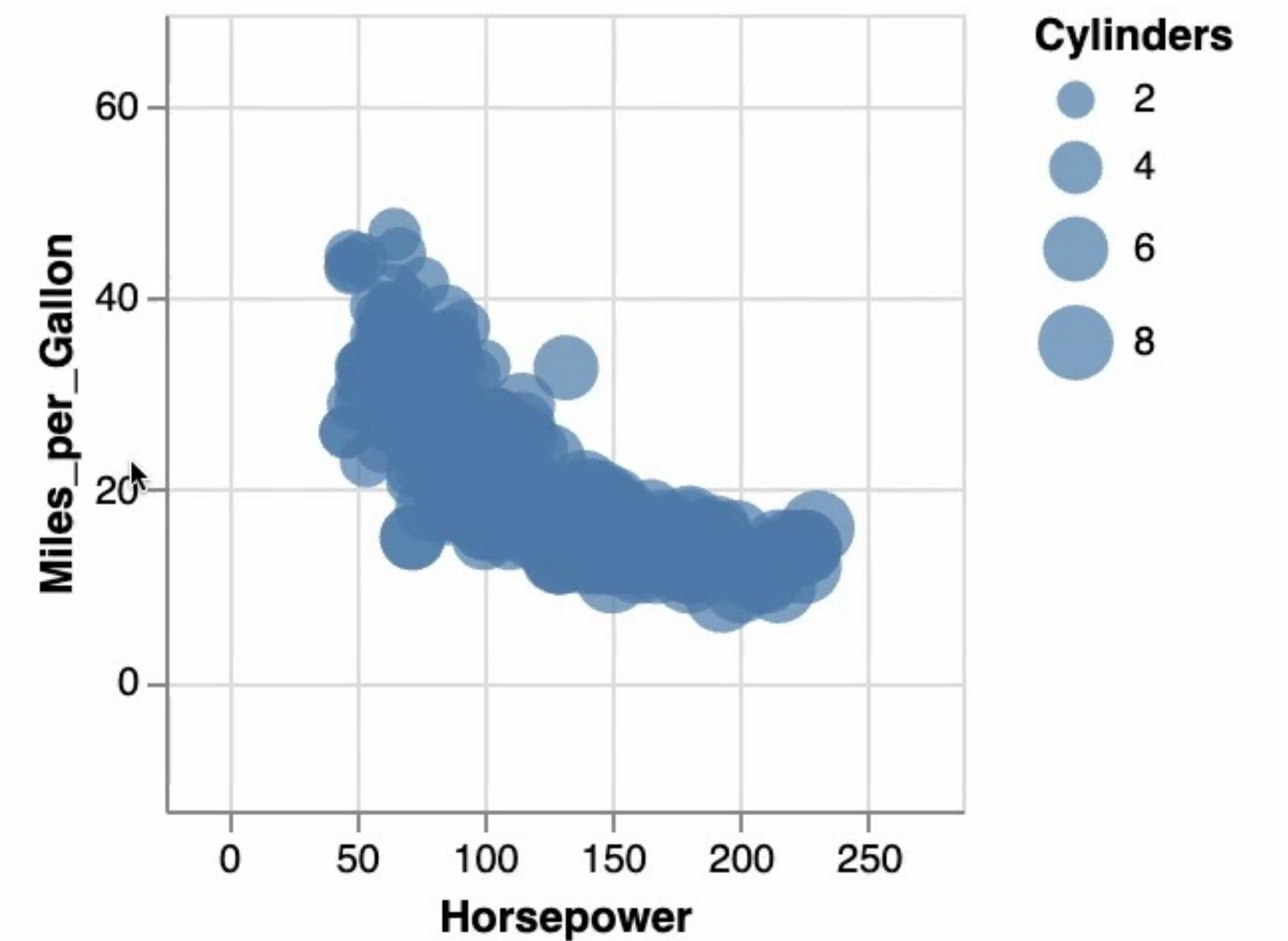
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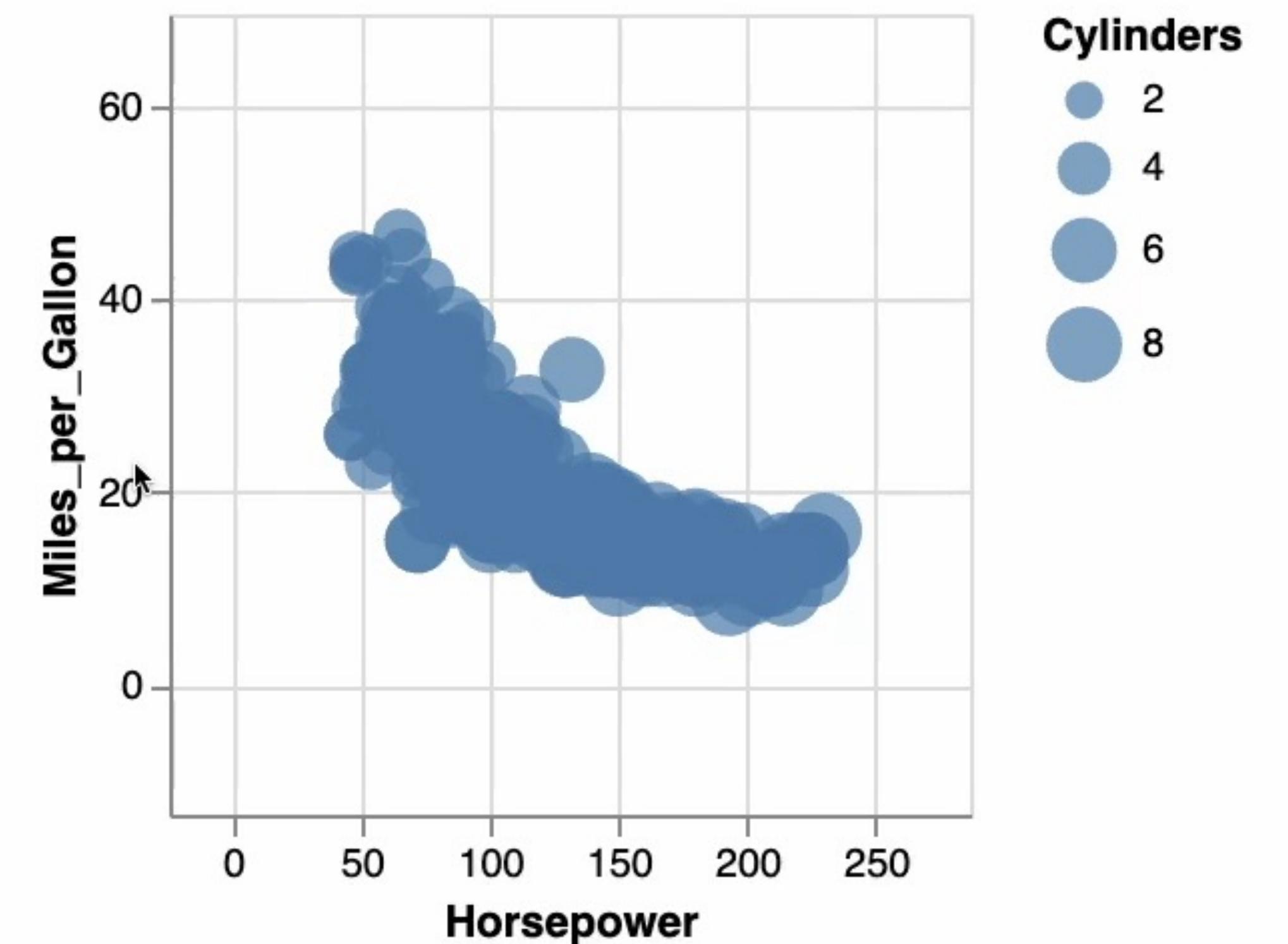
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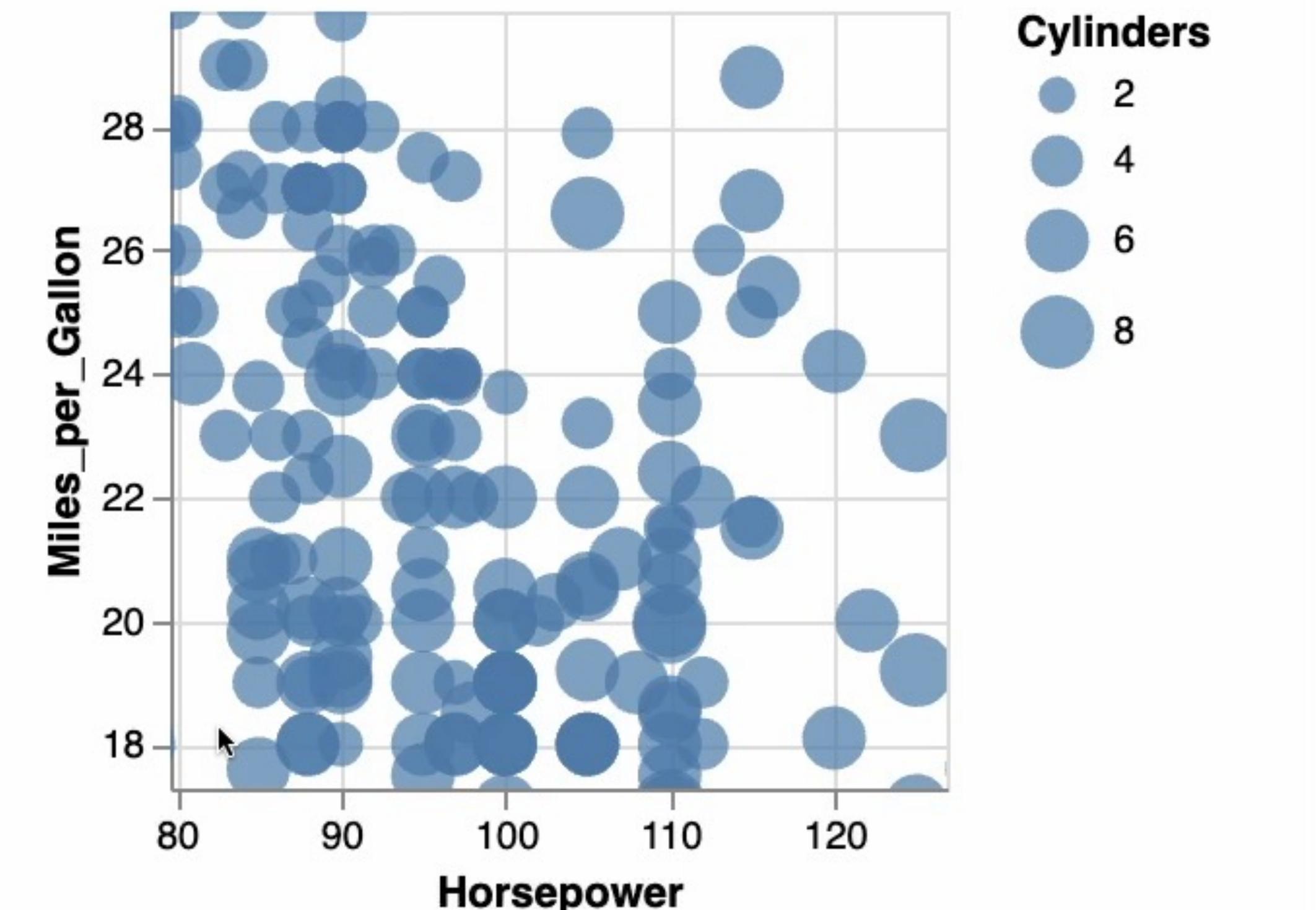
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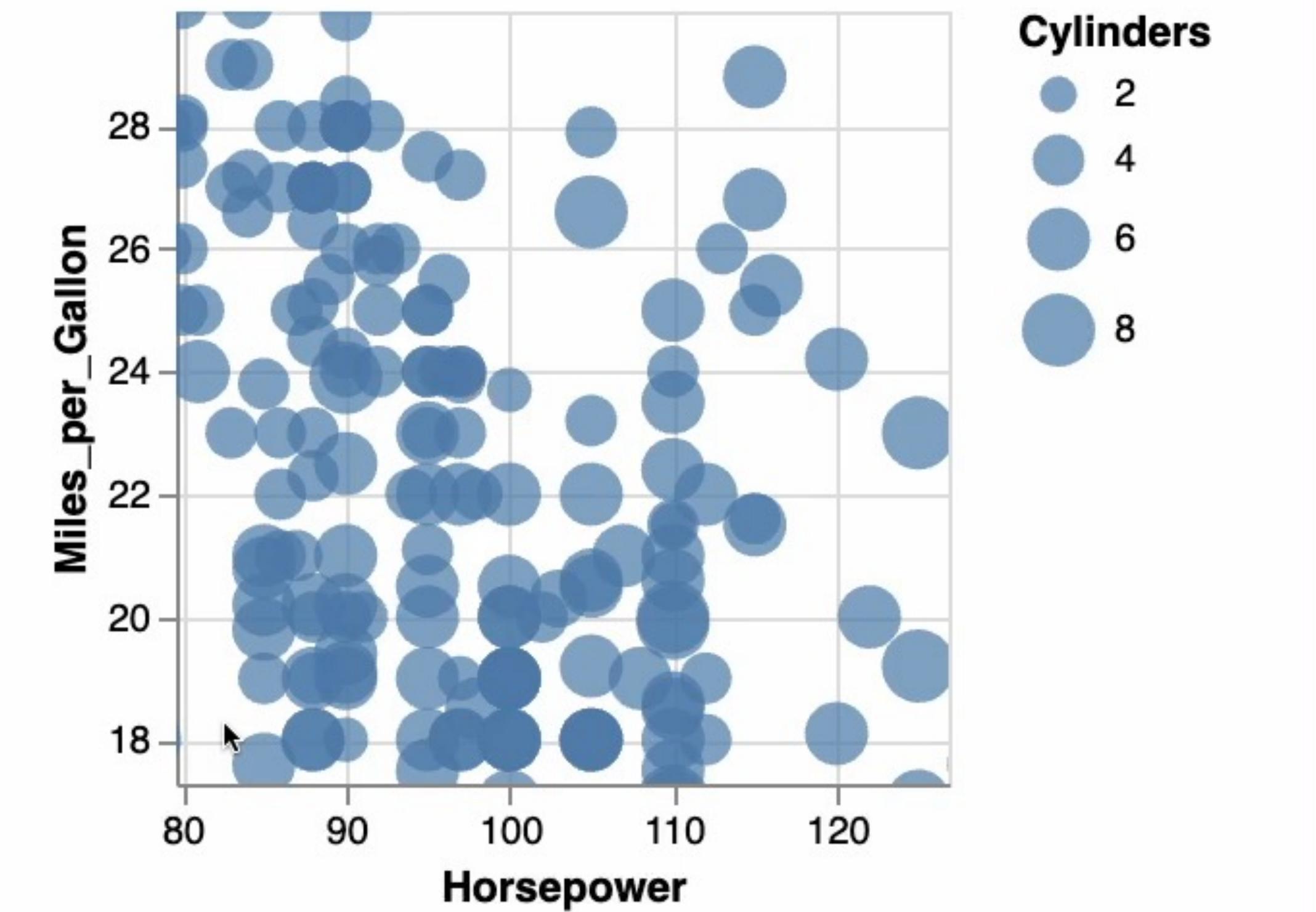
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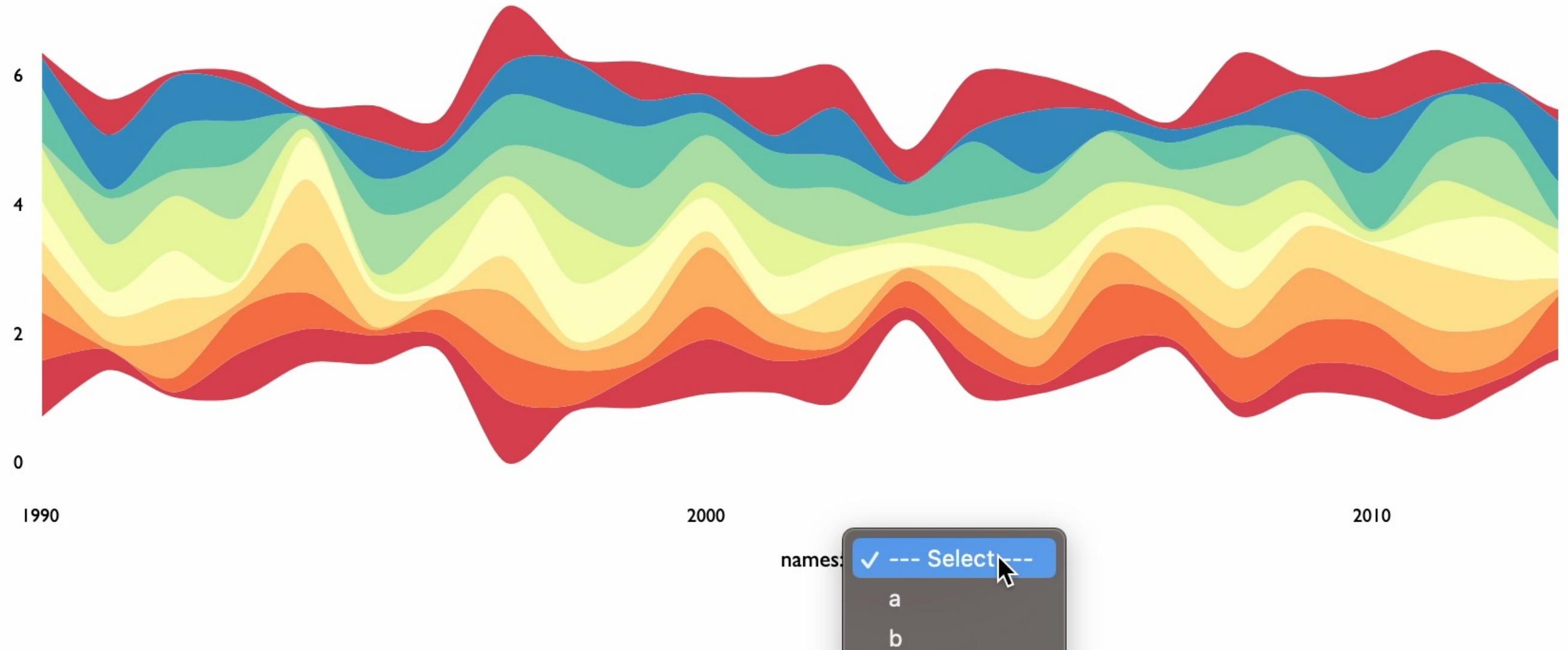


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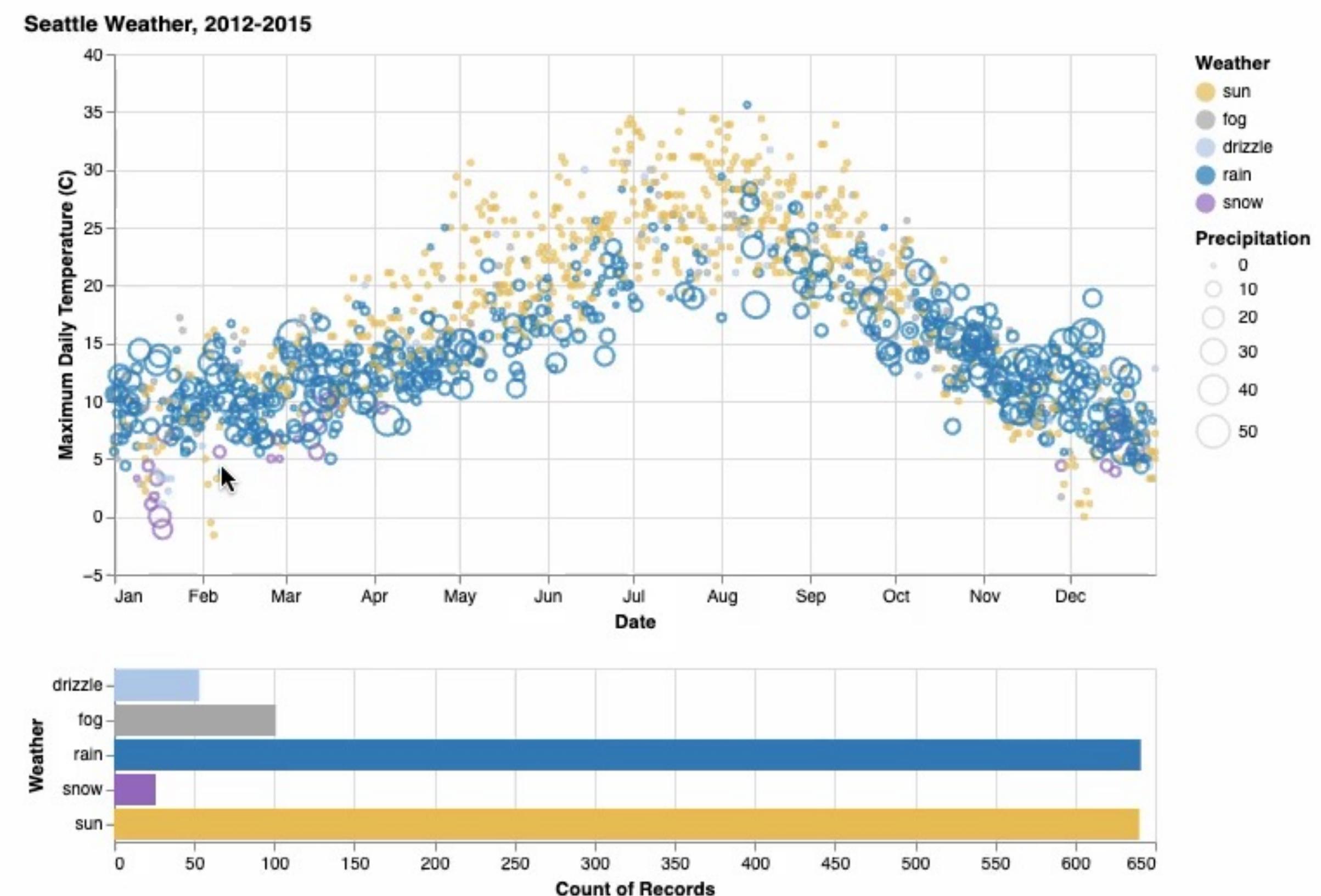
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[https://vega.github.io/vega-lite/examples/interactive\\_seattle\\_weather.html](https://vega.github.io/vega-lite/examples/interactive_seattle_weather.html)