# Effective Data Presentation
## Fall 2015 SAIRO Assessment Forum

# Session Overview & Outcomes

## Session Flow

Accuracy of perception

Chart types and uses

Pre-attentive processing

Refining chart elements to tell your story

Group practice

## Session Outcomes

Participants will be able to:

Make decisions between various visual displays of information to best convey desired points.

Understand the relationship of visual perception to successful visual displays.

Select design elements best suited to aid the reader in understanding the information presented.

# Important Note:

Data included in this presentation is not all real data—do not cite.

# Effective Design Tells a Story

- Indicates how values relate to one another
- Accurately portrays quantities
- Makes comparison easy
- Organizes the information
- Makes it obvious how you should use the info

Anticipate the kind of questions the audience will have about the information and design accordingly.

# Why not Pies and Donuts?

# Cleveland and McGill's Rank

More Specific
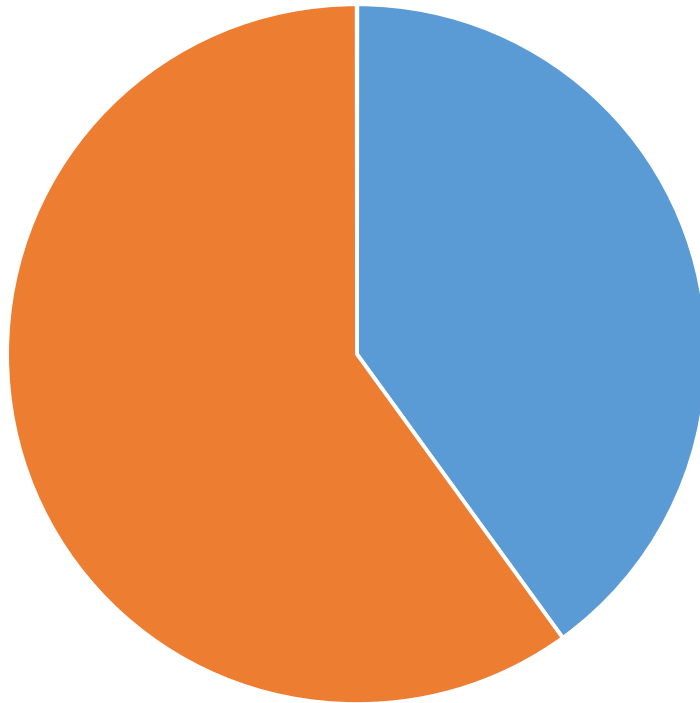Better Accuracy
More Precise

Less Specific
Big Picture
More Generic

1. **Position** along a common scale; e.g. scatter plot
2. **Length**; e.g. bar chart
3. **Angle & Slope** (tie); e.g. pie chart
4. **Area**; e.g. bubbles
5. **Volume, density, and color saturation** (tie); e.g. heatmap
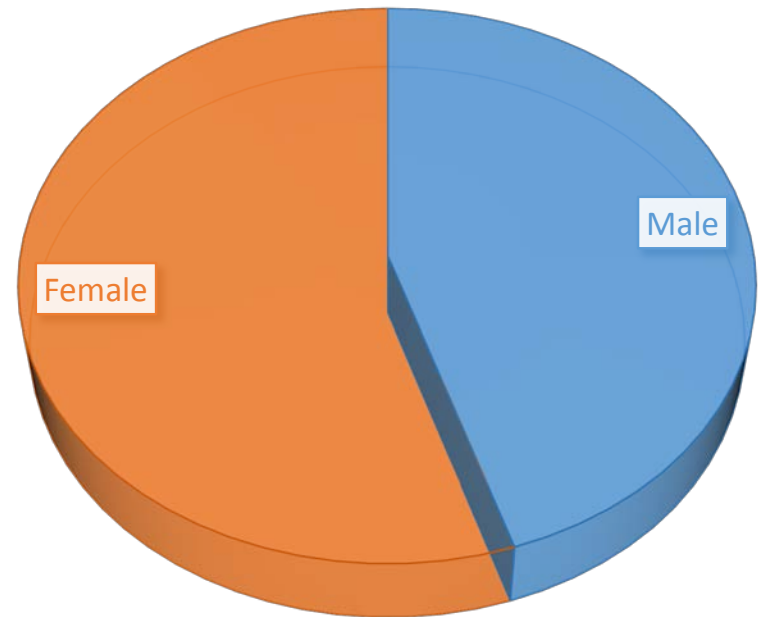6. **Color hue;** e.g. newsmap
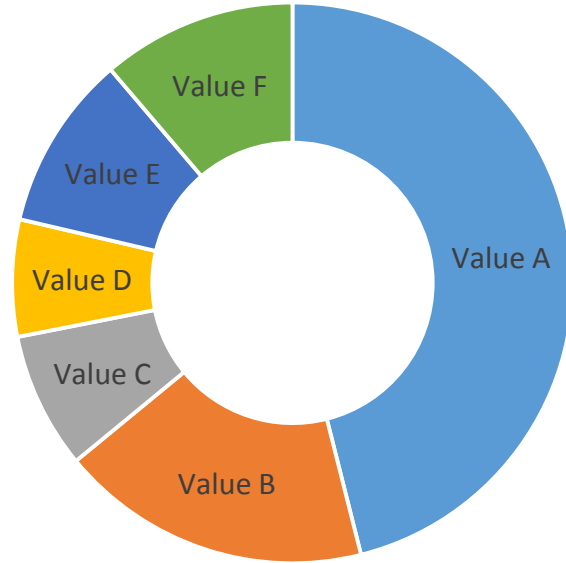
# What's the Difference?
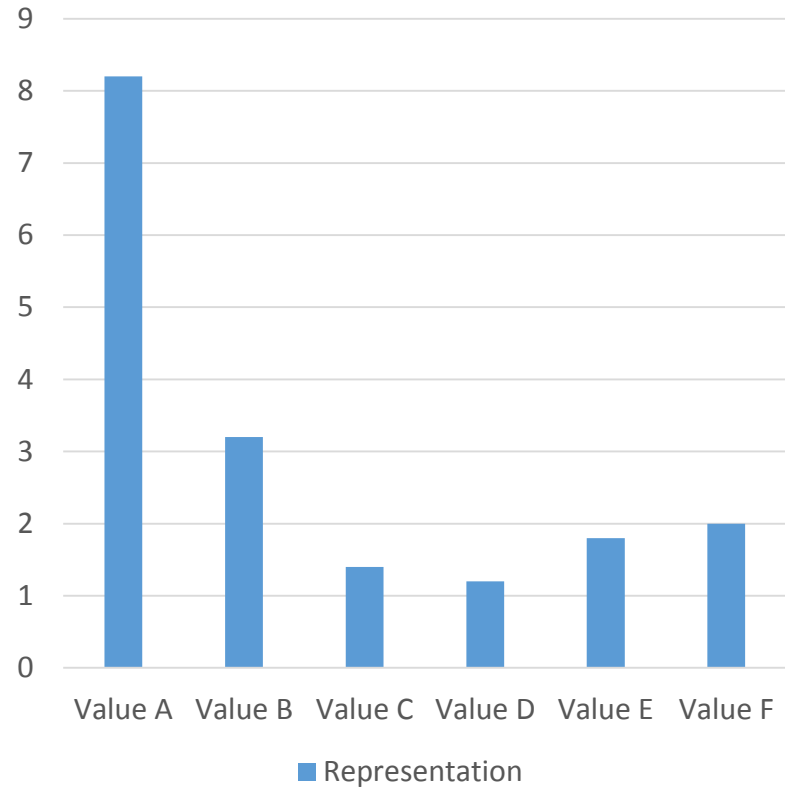


Sex

SEX

Male

Female

Male  Female

# Make Comparison Easier

# Picking the "right" chart

Comparison

    Single values

    Pattern of values
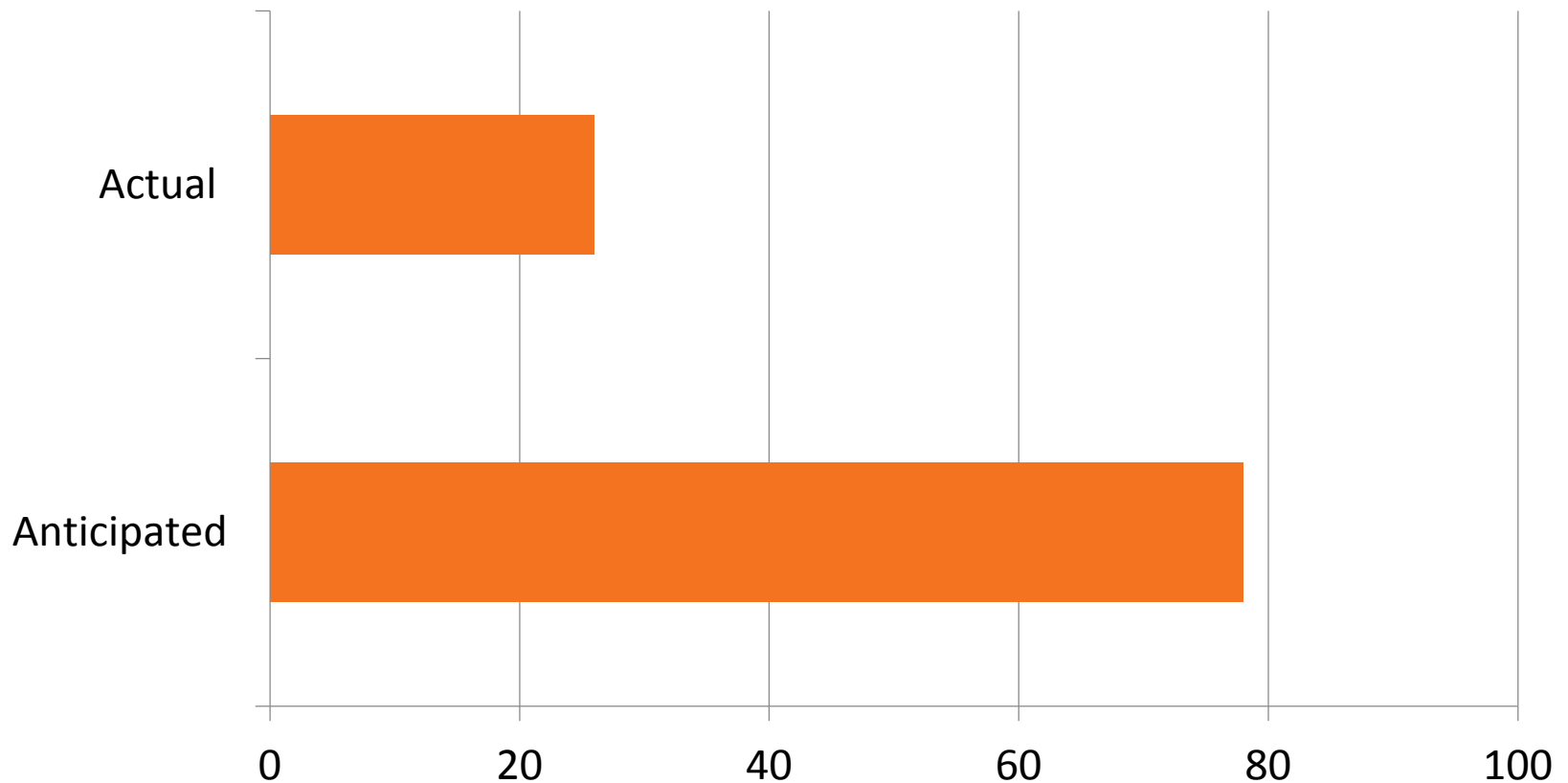
Change over time

Ranking

Distribution

Part-to-Whole

# Example: Comparison

**Undergraduate Research Participation**
**Fewer participate than anticipate engagement at college entry**

Students anticipating participation in faculty research at entry to college:
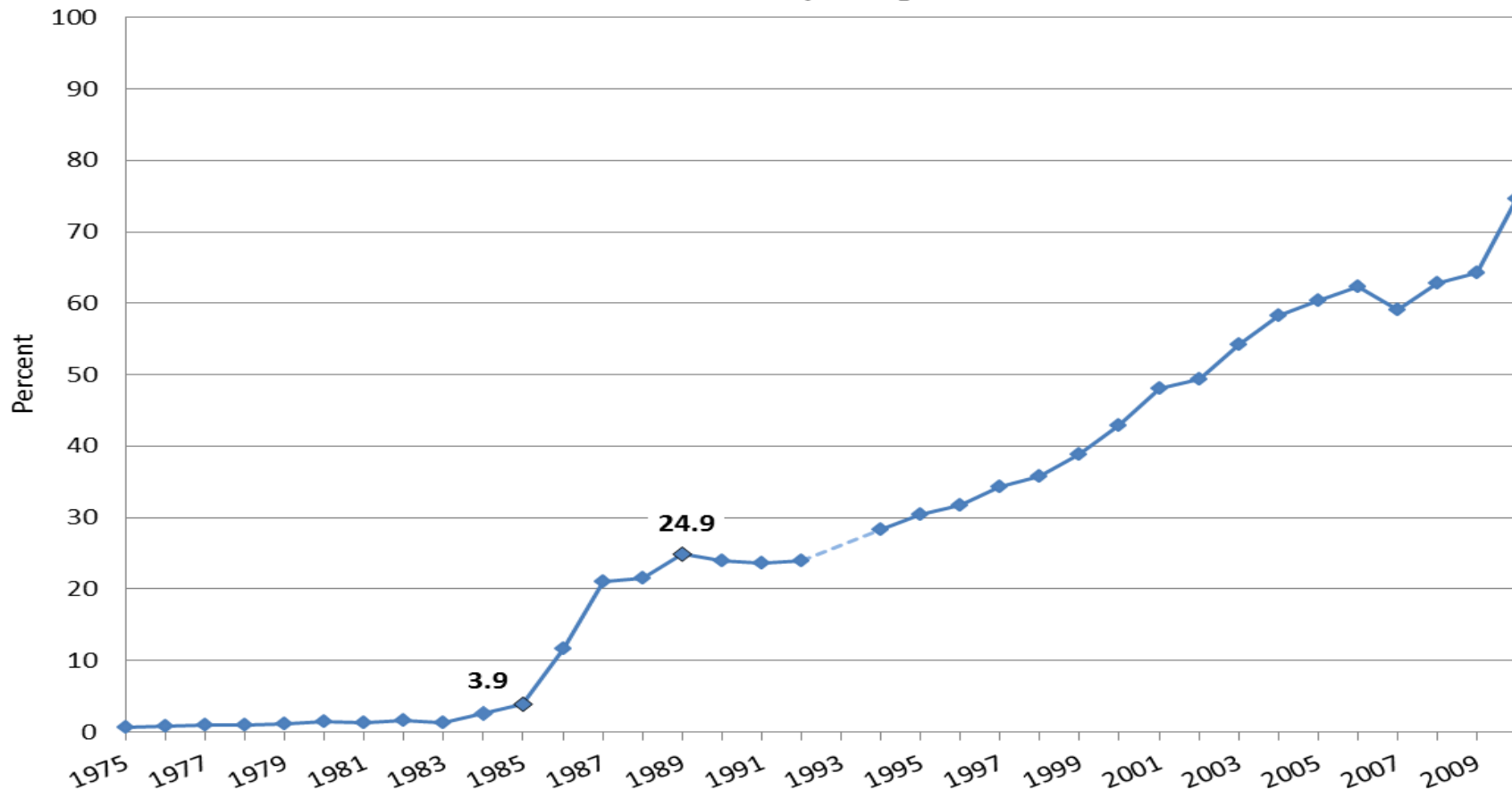
78%

Students who actually participate in faculty research prior to graduating:

26%

# Example: Time Series



**Number of College Applications Submitted for Admission This Year (Not Including UCLA Application)**
% of Students Reporting "6 or More"†

†Data points after 1996 represent the aggregate of three distinct options: "Six"; "Seven to Ten"; "Eleven or More."
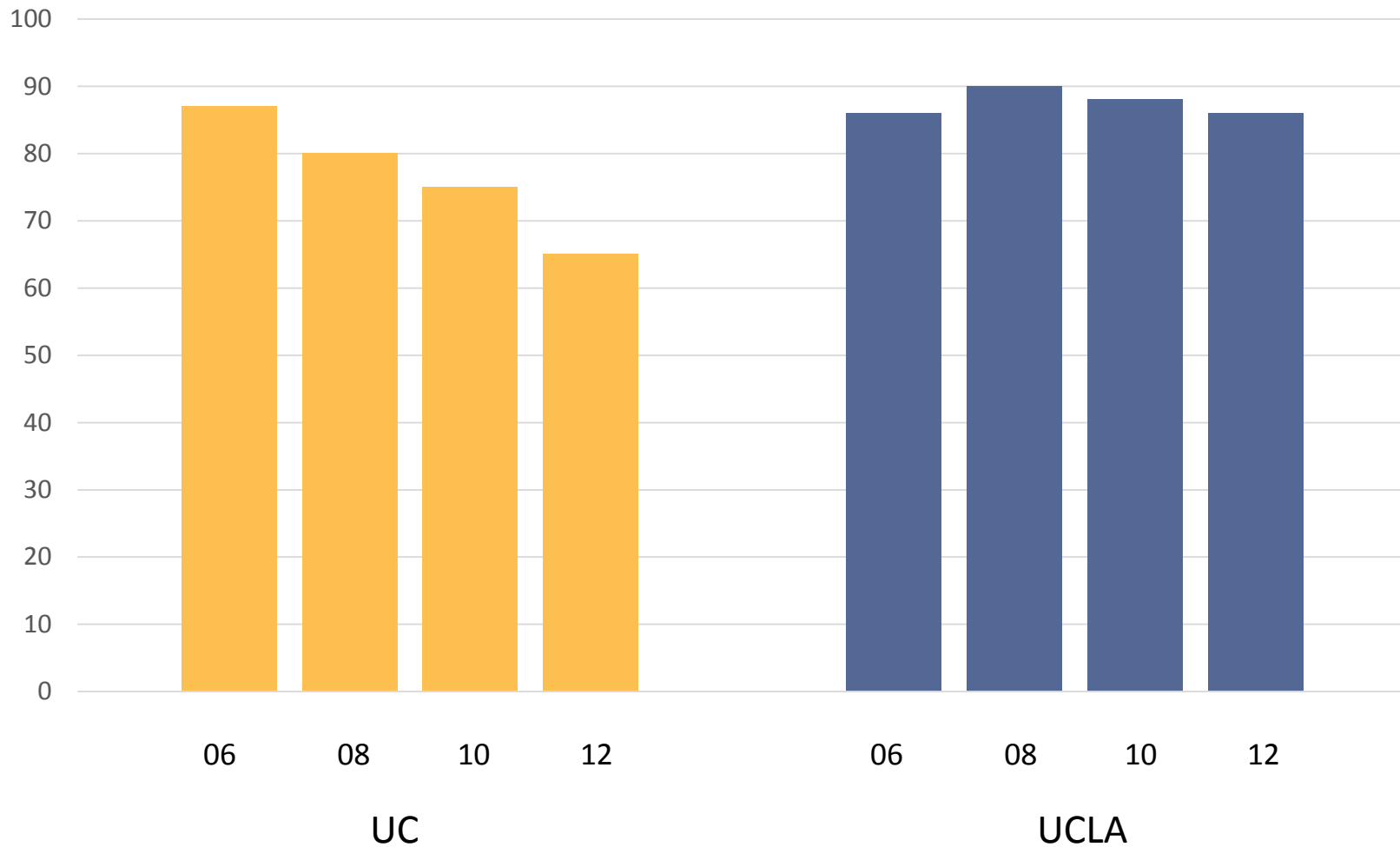
*Survey administration moved to biennial cycle in 2009
Data Source: CIRP Freshman Survey--University of California Los Angeles

# Ex: Longitudinal Comparison



**I feel free to express my religious beliefs on campus
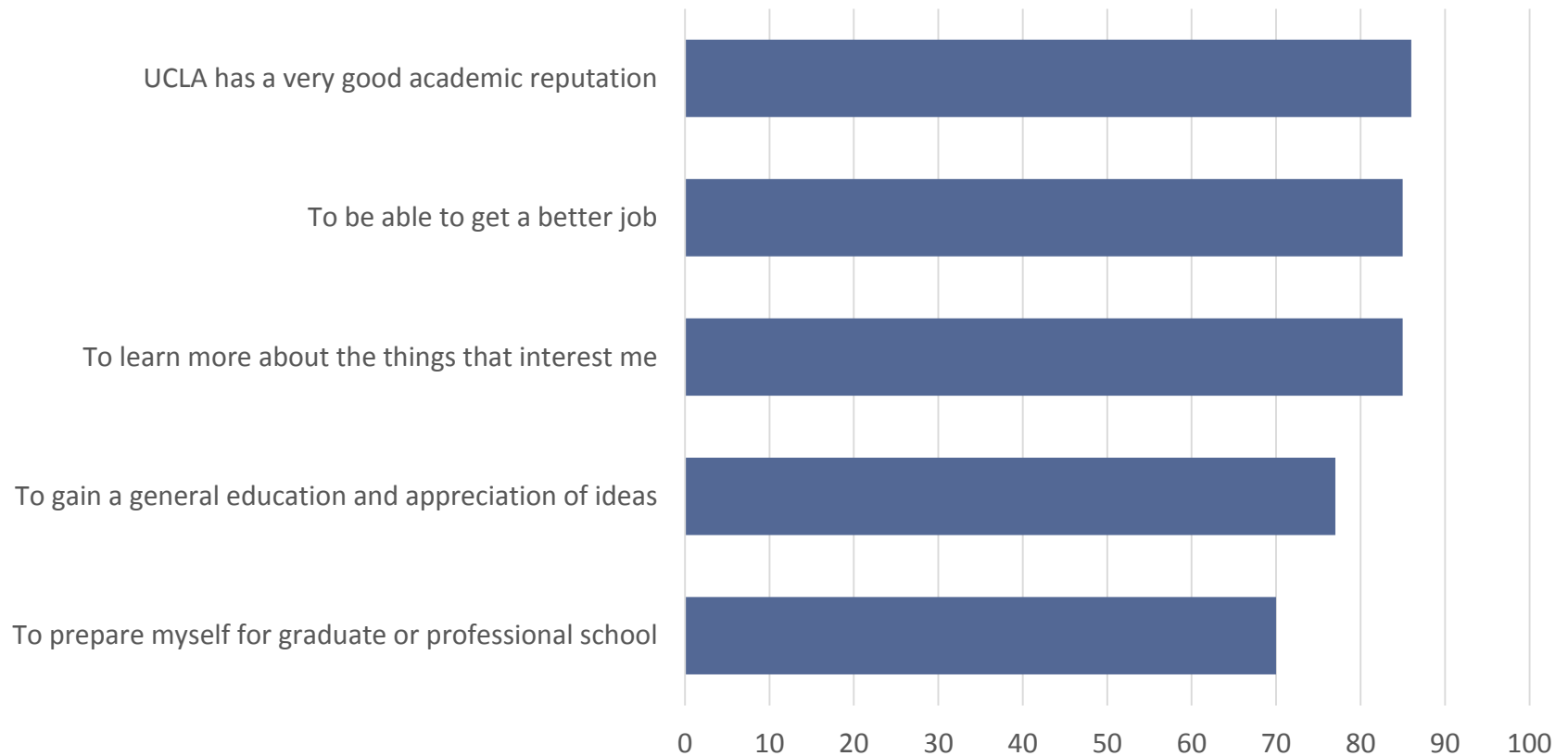% Responded "Somewhat Agree", "Agree", or "Strongly Agree"**
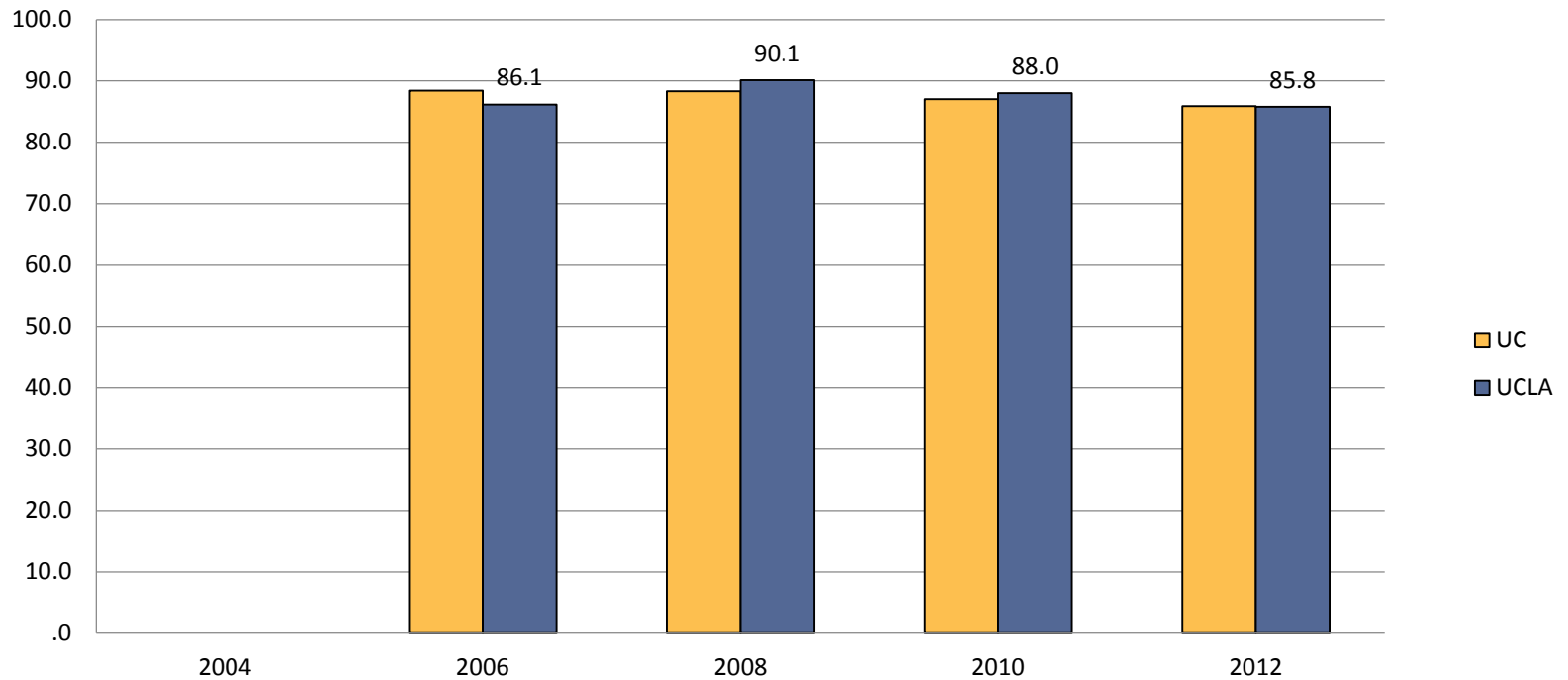
# Story: A Different Pattern of Change
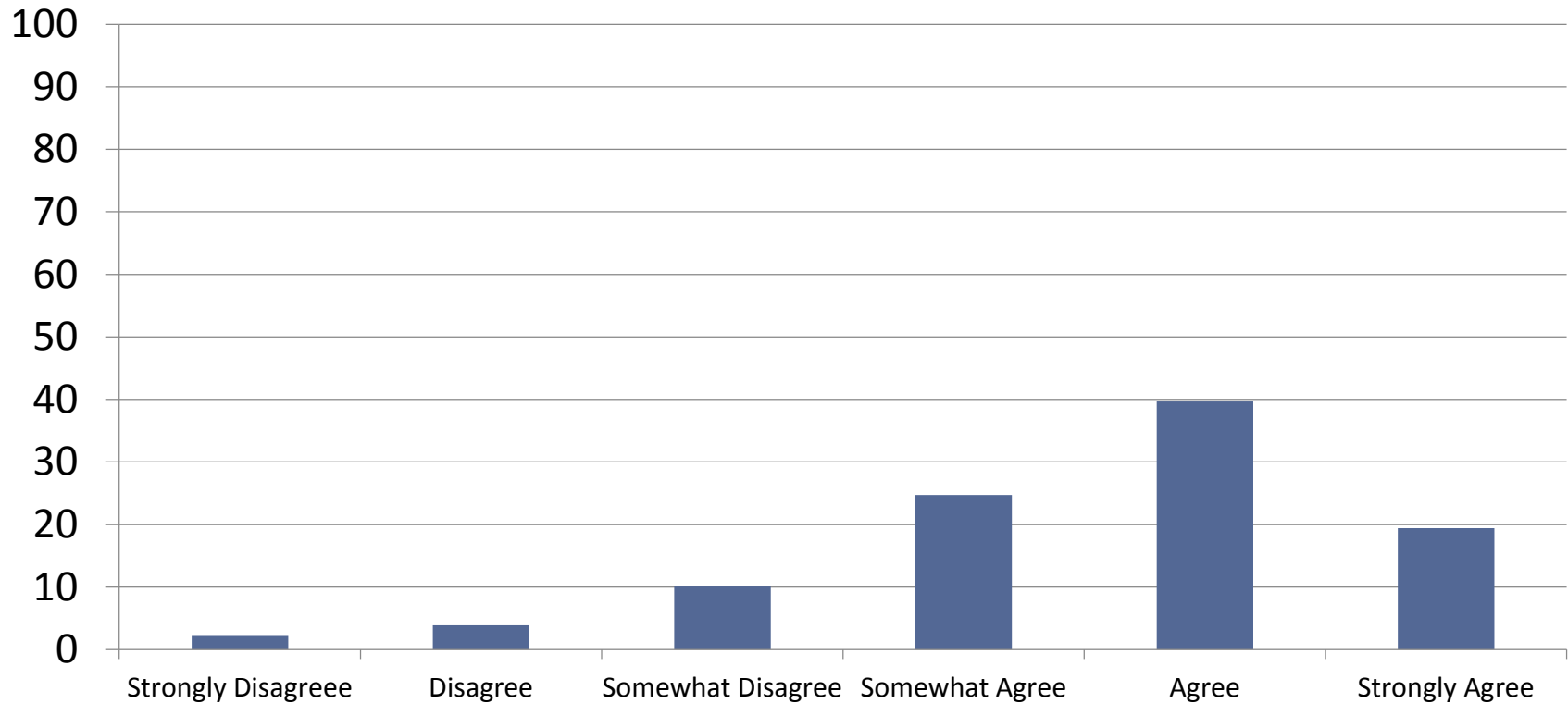
# Example:  Ranking
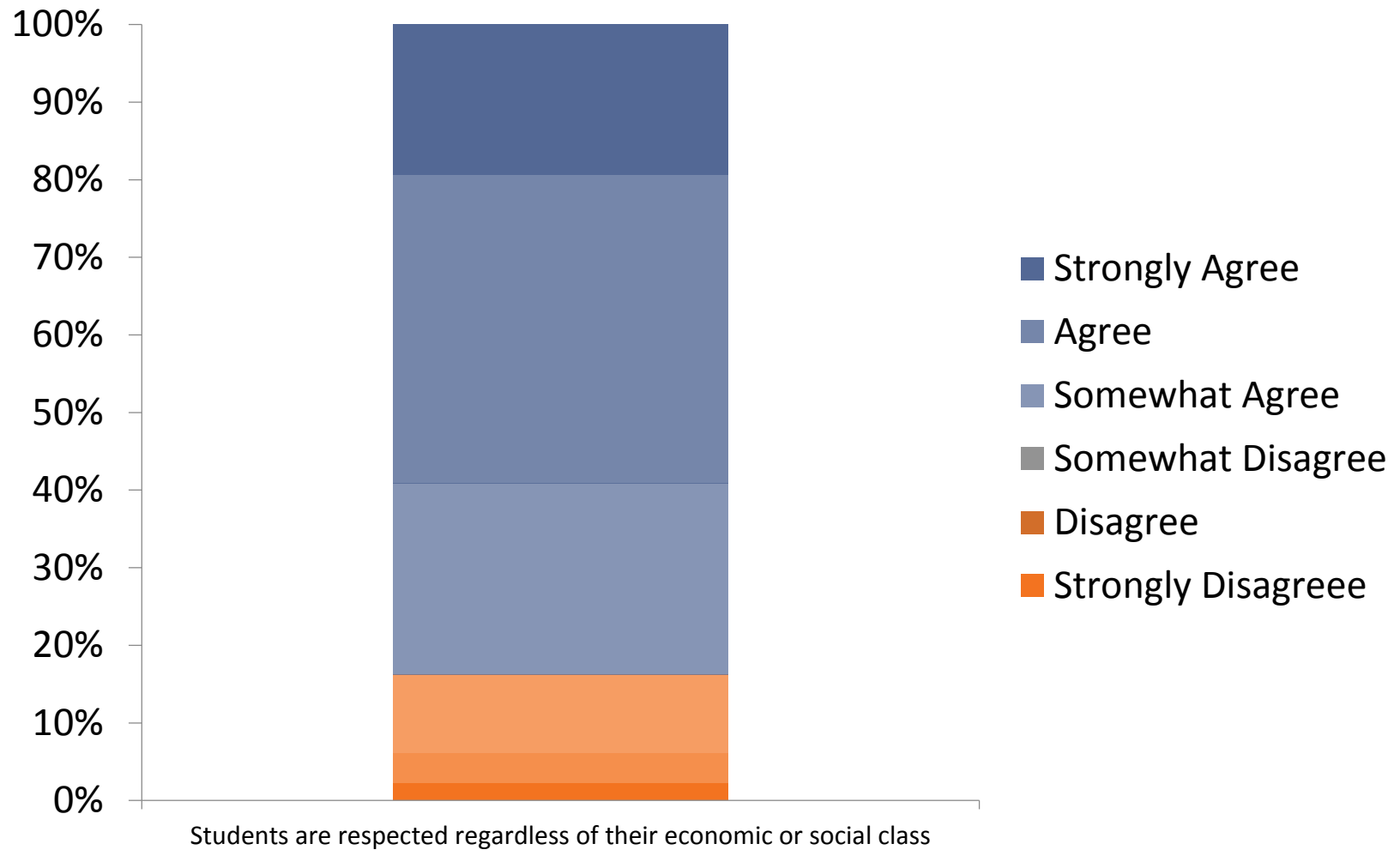
## Top 5 Reasons For Choosing UCLA



% reporting "very important"

# Example: Part to Whole



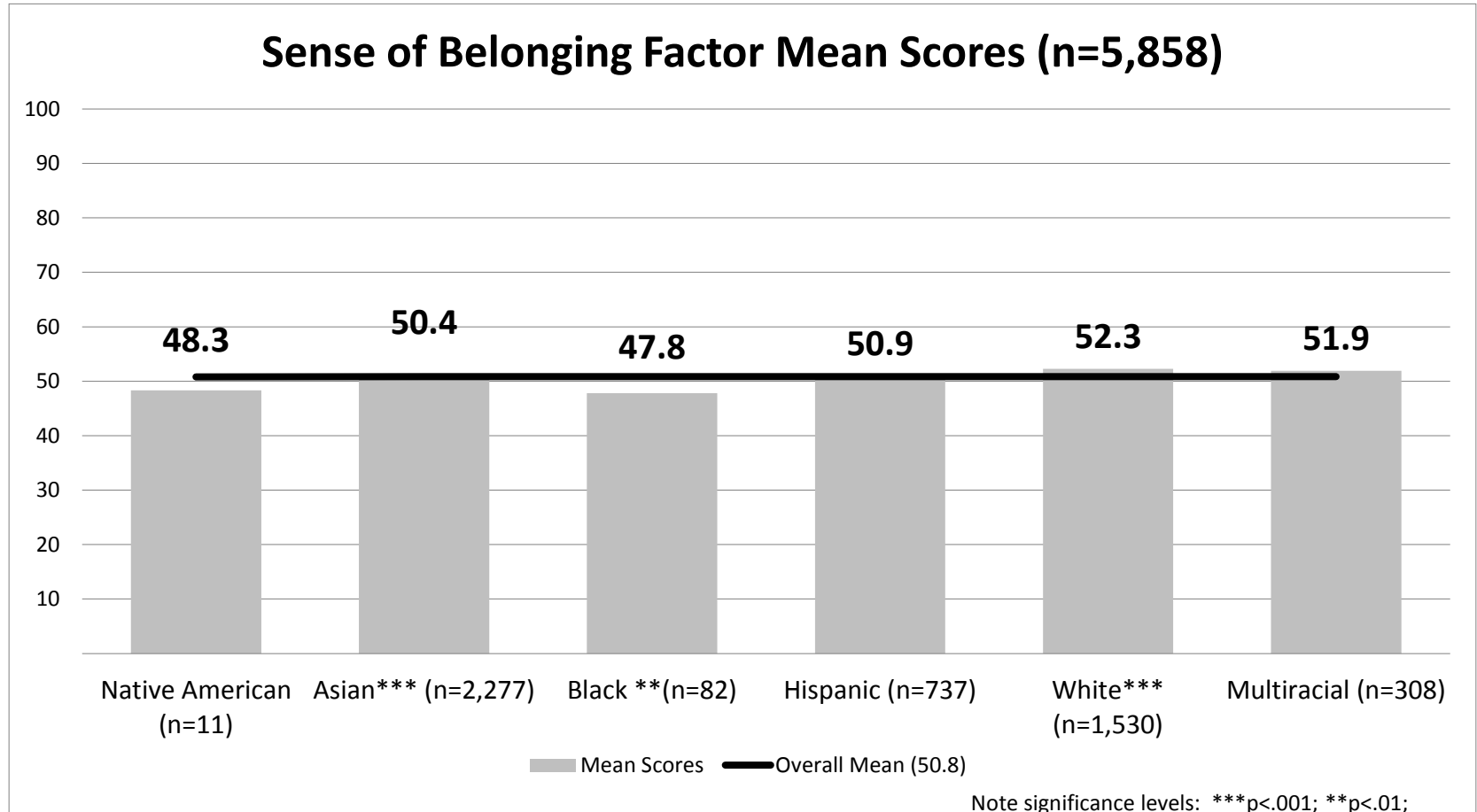**Students are respected regardless of their economic or social class**

# Example: Part to Whole

# Reduce Non-data Ink

# Where can you reduce ink?



**Sense of Belonging Factor Mean Scores (n=5,858)**

| | Mean Scores |
|---|---|
| Native American (n=11) | 48.3 |
| Asian*** (n=2,277) | 50.4 |
| Black **(n=82) | 47.8 |
| Hispanic (n=737) | 50.9 |
| White*** (n=1,530) | 52.3 |
| Multiracial (n=308) | 51.9 |

Mean Scores ▬ Overall Mean (50.8)

Note significance levels: ***p≤.001; **p≤.01;

# Pre-Attentive Processing

Unconscious and high-speed processing that detects specific visual attributes.
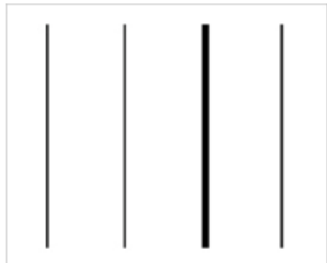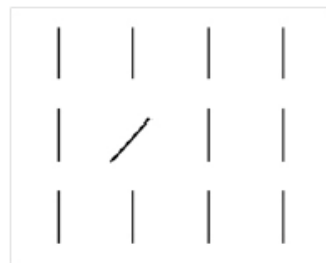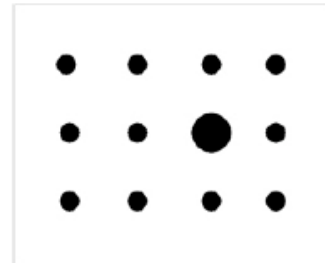


Stimulus        Eye        Brain
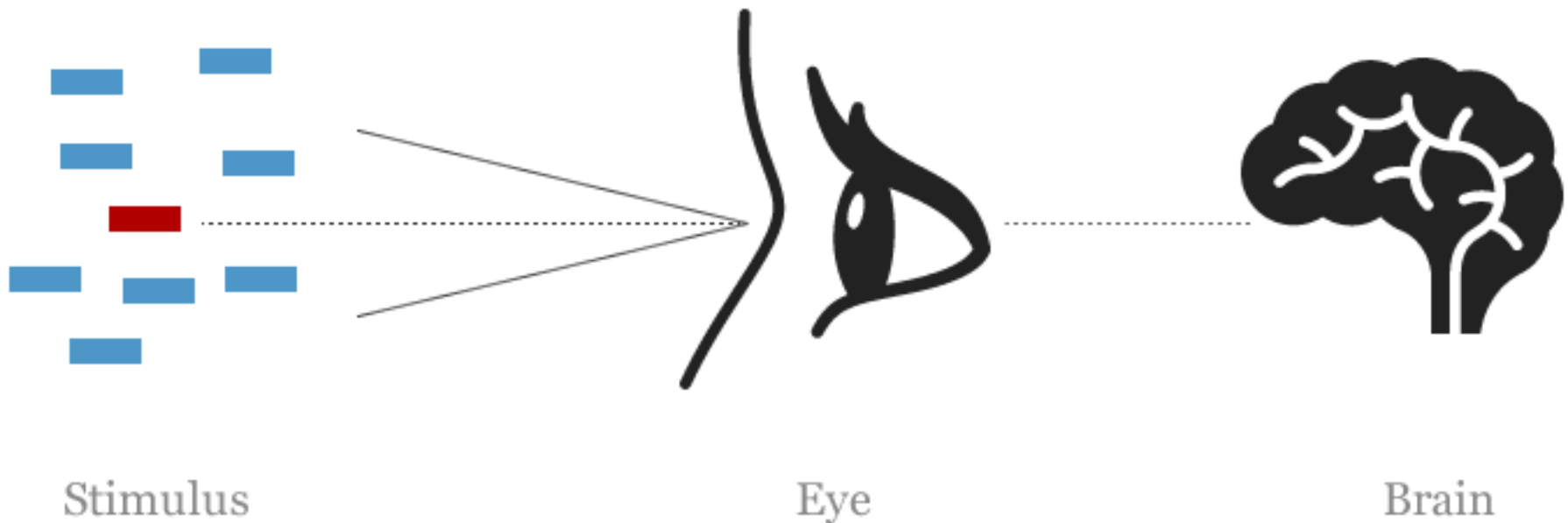
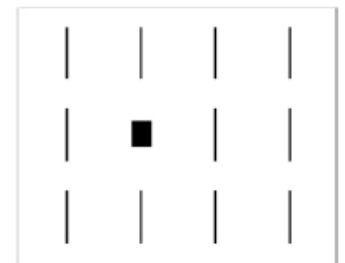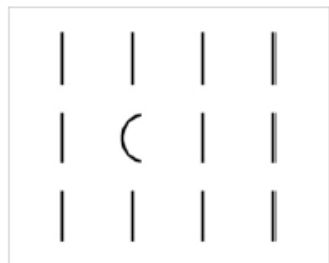# Preattentive attributes of visual perception

## Form
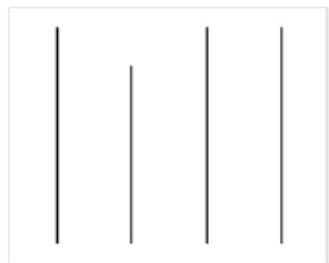


| Length | Width | Orientation | Size | Shape |



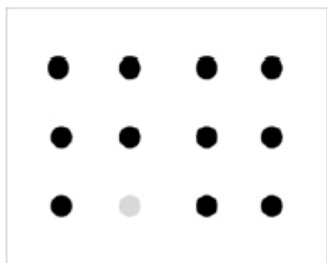| Curvature | Enclosure | Blur |
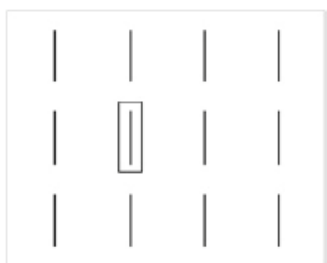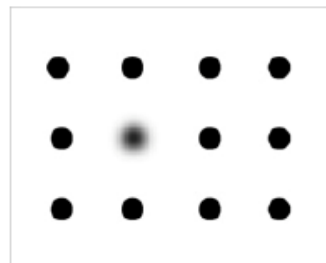
## Color



| Hue | Intensity |

## Position
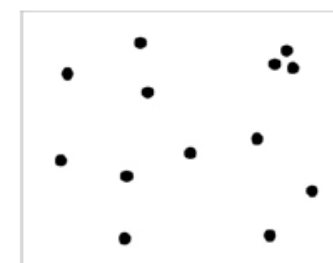


| 2-D position | Spatial Grouping |

## Motion



Direction of Motion

# Gestalt Principles

| Principle | Description |
| --- | --- |
| Proximity | Objects that are close together are perceived as a group. |
| Similarity | Objects that share similar attributes (e.g., color, shape) are perceived as a group. |
| Enclosure | Objects that appear to have a boundary around them (e.g., border or area of common color) are perceived as a group. |
| Closure | Open structures are perceived as closed, complete and regular whenever they can be interpreted as such. |
| Continuity | Objects that are aligned together or appear to be the continuation of one another are perceived as a group. |
| Connection | Objects that area connected (e.g., by a line) are perceived as a group |

# Using Color to Draw Attention



**Percent reporting "none"**
**UCLA compared to other UCs**
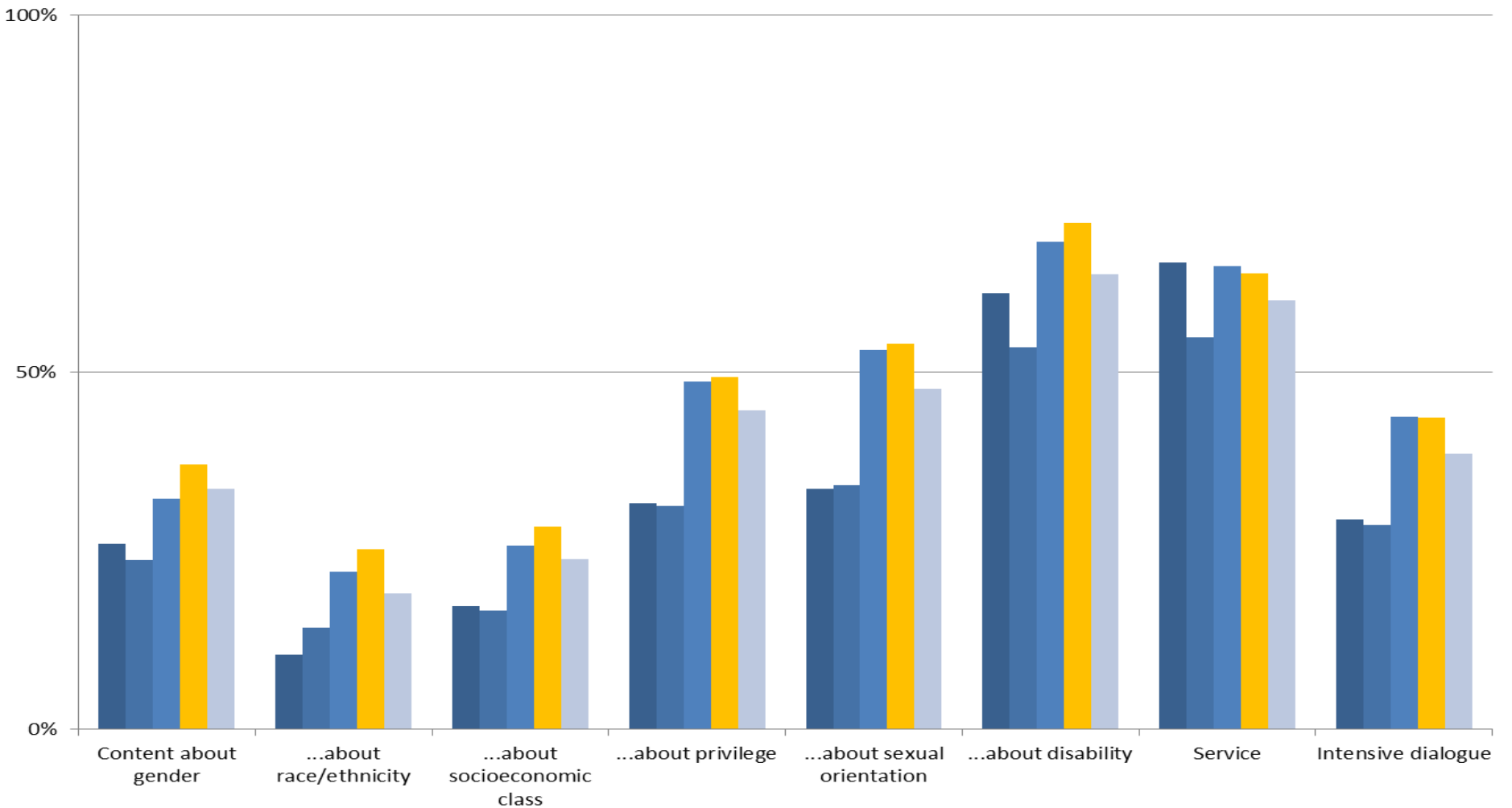
# Example:  Too much color
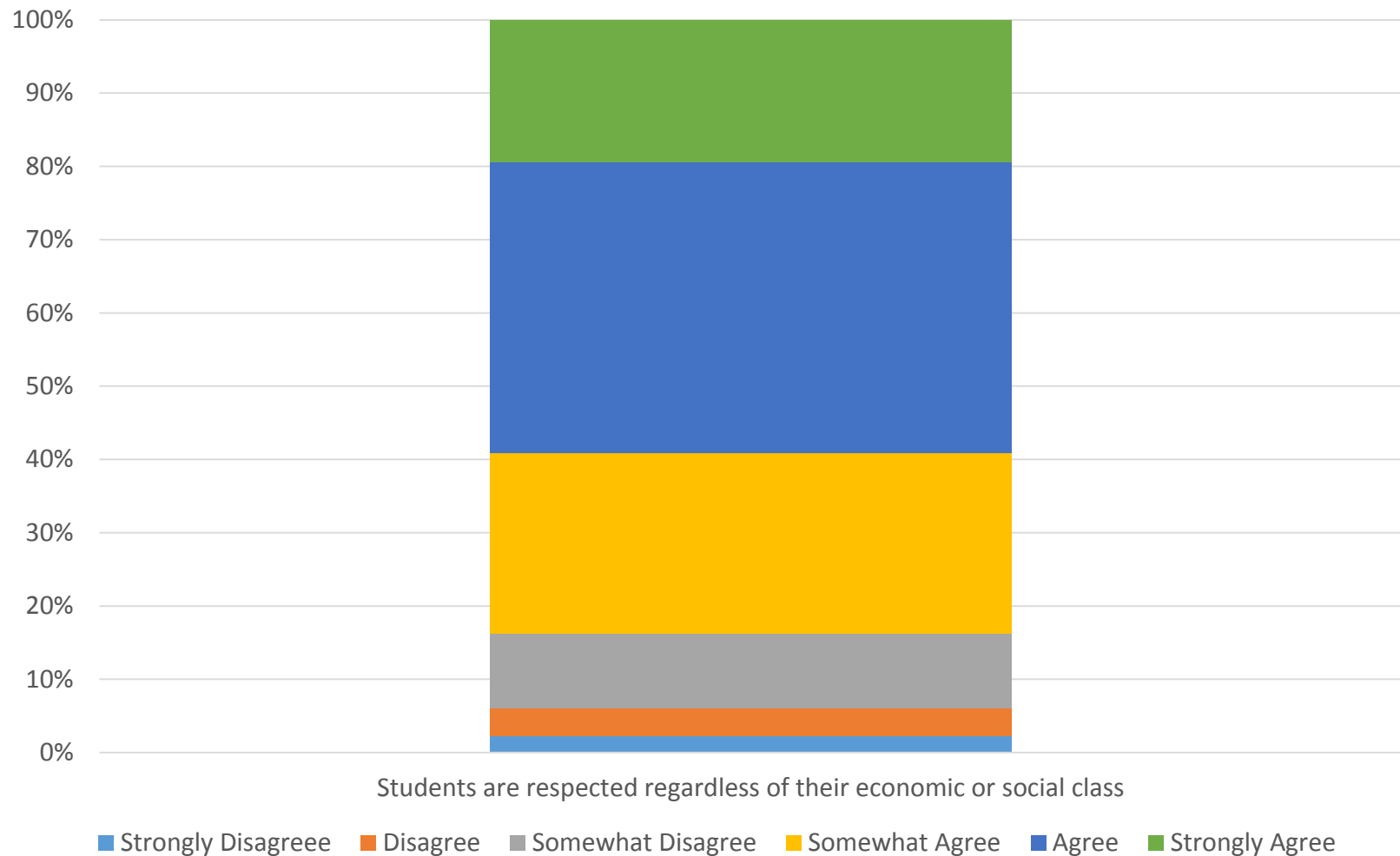
# Where is attention directed?


Representation
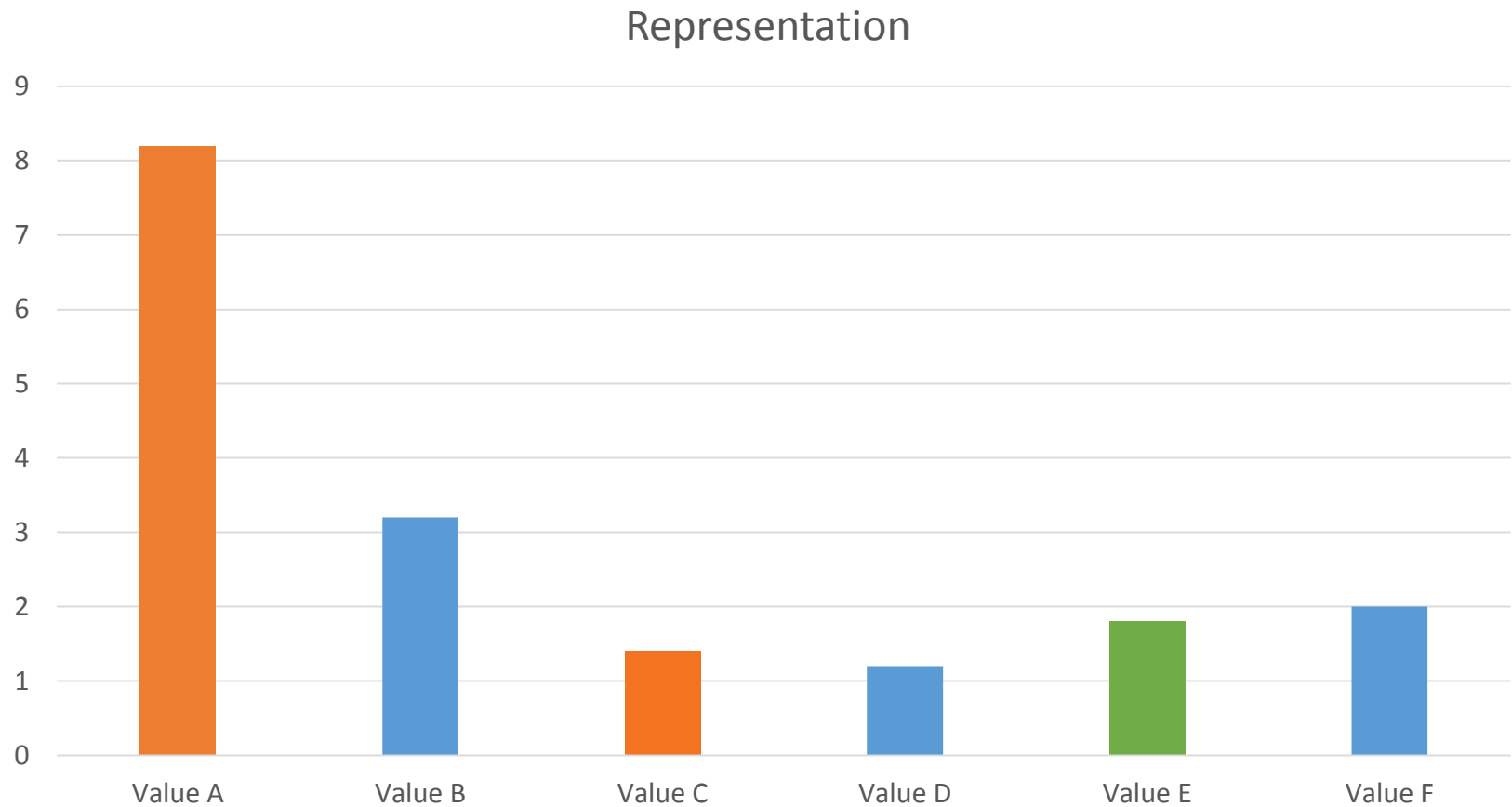
# Use Style to Reinforce Story

Bigger, Brighter, Bolder, More Distinct = Important

- Color contrast (draw attention)

- Color similarity (invite comparison)

- Larger text and bold colors draw attention

Grouping to aid comparison

- Things that are similar (e.g. length, color, shape, size, etc.) are perceived as a group.

- Things enclosed together or connected by lines are perceived as a group.

# Key Summary Points

Focus on FUNCTION before FORM/STYLE

    Use visuals to communicate your findings, not simply to entertain

    Select a chart type that is appropriate to your data and message

Minimize use of "non-data ink"

Use aspects of perception to help tell your story

    Don't use excessive color variation

    Don't unintentionally highlight aspects that aren't important

# Case Studies

How would you do it?

Review case

Discuss what story you might want to communicate

Decide on a visual

Draw your visual on the flip-chart paper

# More Things to Explore

Steven Few's Website:   www.perceptualedge.com

Nathan Yau's Website:   flowingdata.com

Stephanie Evergreen's Website: stephanieevergreen.com

Cole Nussbaumer's Website: www.storytellingwithdata.com

Cole's YouTube Video on Using Color in Presentation
https://youtu.be/AiD6etOB6qI

# References

Alberto Cairo. (2012). The Functional Art.

Stephanie Evergreen (2014).  Presenting Data Effectively.

Stephen Few (2013). Data Visualization for Human Perception.

Stephen Few (2012). Show Me the Numbers: Designing Tables and Graphs to Enlighten.

Nathan Yau.  (2013). Data Points: Visualization that means something.

# Questions?

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