CPSC 100

Computational Thinking

Data Visualization

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University of British Columbia

Agenda

- Course Admin
  - Milestone 4 FAQ
  - Digital Artifact Choices Popcorn
  - Milestone 5 Final Presentation
    - In-class (**live feedback** to improve before Dec 5)
    - Recorded Presentation (**no** feedback!)
-

Course Admin

Milestone 4 FAQ

- One big thing? Or a bunch of small things?
  - Remember your contracted grade and the “Cohesiveness”
    - For A+ and A projects, the final digital artifact needs to be cohesive and a consistent single artifact (but it can have multiple pages, videos, etc…).
- Is the final final version due on Nov. 28th?
  - No, your submission on Nov. 28th should be at least 70% of the way there. You will get some early feedback before the final version is due on Dec. 5th

Milestone 5 Preview

- Will we present it to the whole class?
  - You're encouraged to, but this is not required!
  - Two options:
    - Option 1: Present in class next week (and get live feedback from me) + submit a digital version (if you want)
    - Option 2: Submit a link to a video recording (Zoom is easiest)
  - You MUST sign up as a group, all members should be there together for it to be graded
- Booking slots will open on Friday at 4 PM

Learning Goals

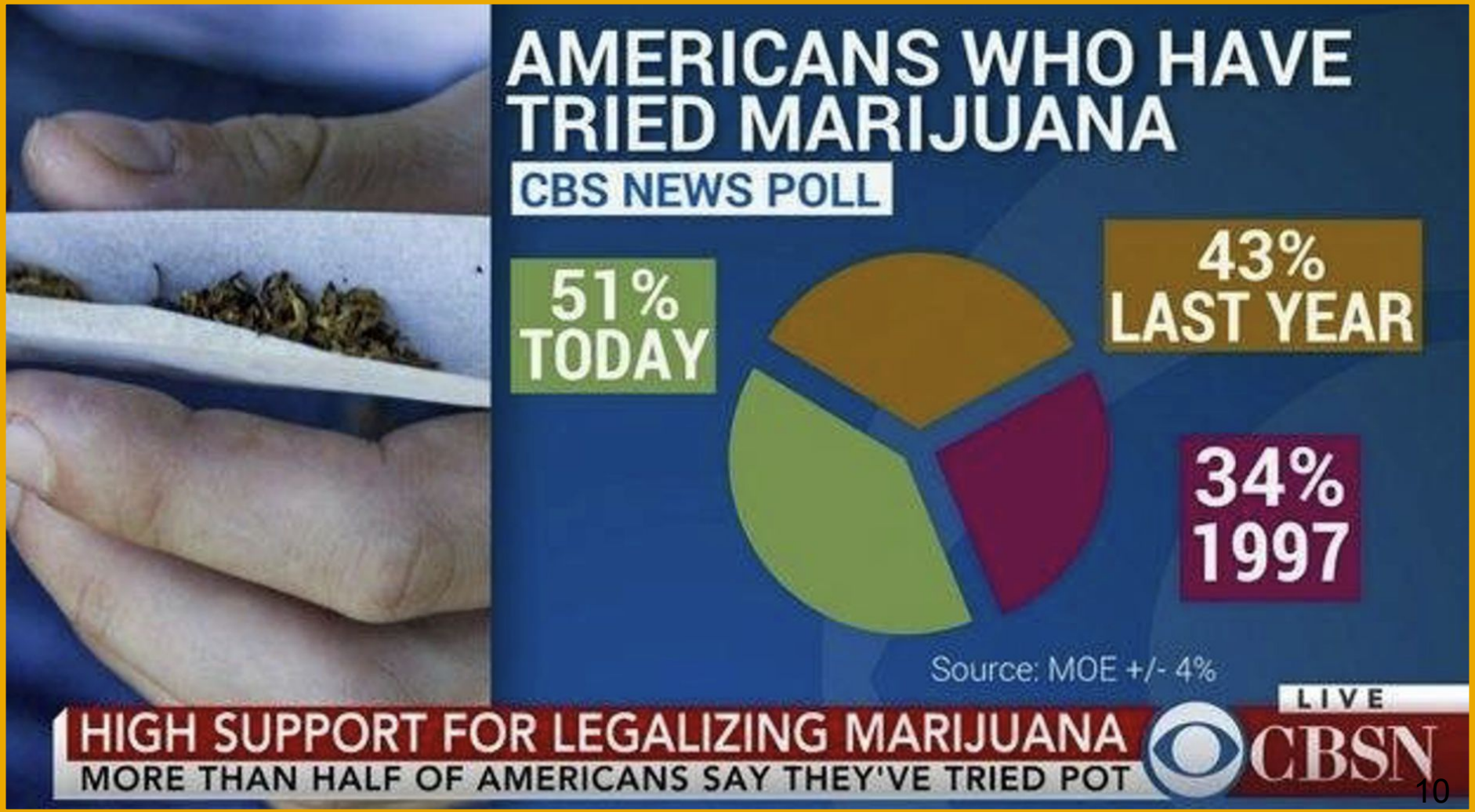
Learning Goals

After this **today's lecture**, you should be able to:

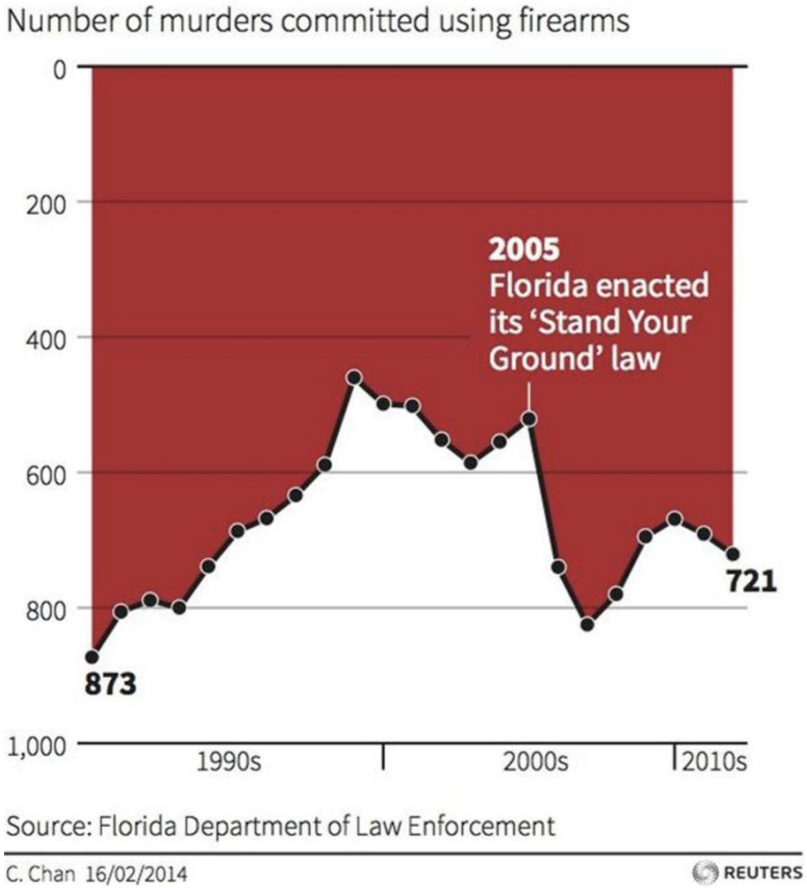
- Understand, define, name Gestalt Principles and explain their role in visualization
  - Demonstrate how these principles appear in real life—such as recognizing how proximity is used in store displays or how logos use closure to create memorable designs.
- Explore how understanding these principles can inform better visual communication, whether for creating infographics, arranging elements on a webpage, or organizing a physical space.

What's wrong with the following visualizations?

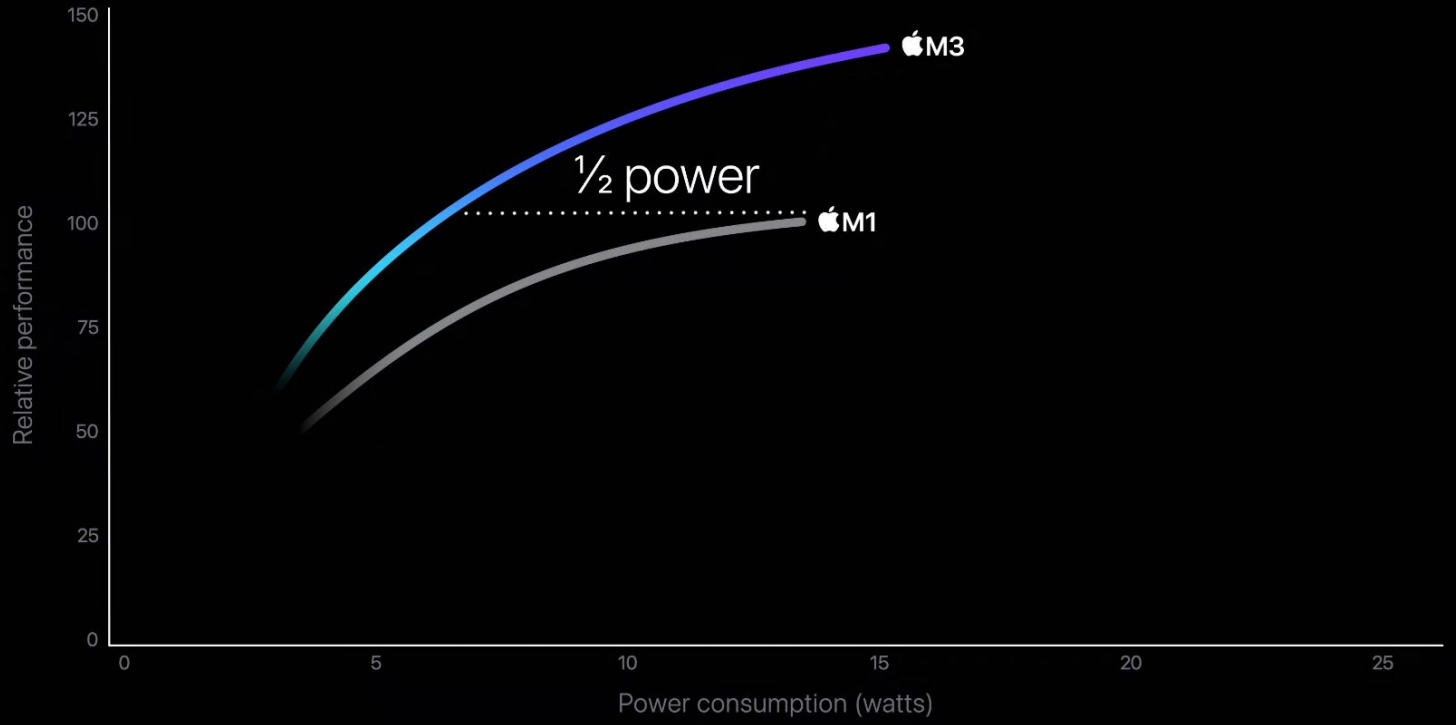

0
24
48
Super Bowl wins
by country


AMERICANS WHO HAVE TRIED MARIJUANA
CBS NEWS POLL
51% TODAY
43% LAST YEAR
34% 1997
Source: MOE +/- 4%
HIGH SUPPORT FOR LEGALIZING MARIJUANA
MORE THAN HALF OF AMERICANS SAY THEY'VE TRIED POT
LIVE
CBSN

Gun deaths in Florida



M3 CPU performance



Visualization for Data Science
Visual Marks & Channels

Learning Goals

Describe a visualization using appropriate viz grammar (marks & channels)

Differentiate between effectiveness and expressiveness

Compare and contrast the benefits and limitations of channels for a given task

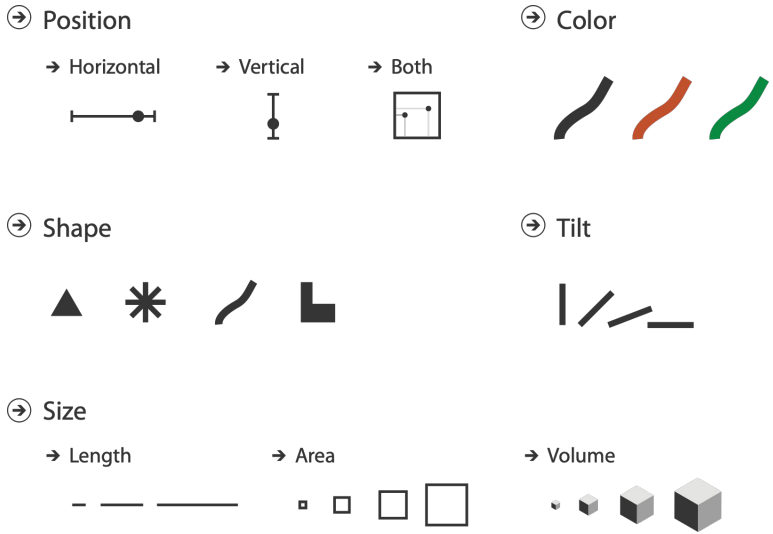
Definitions: Marks and channels

marks

– Building blocks of the plot (points, lines, areas, etc...)

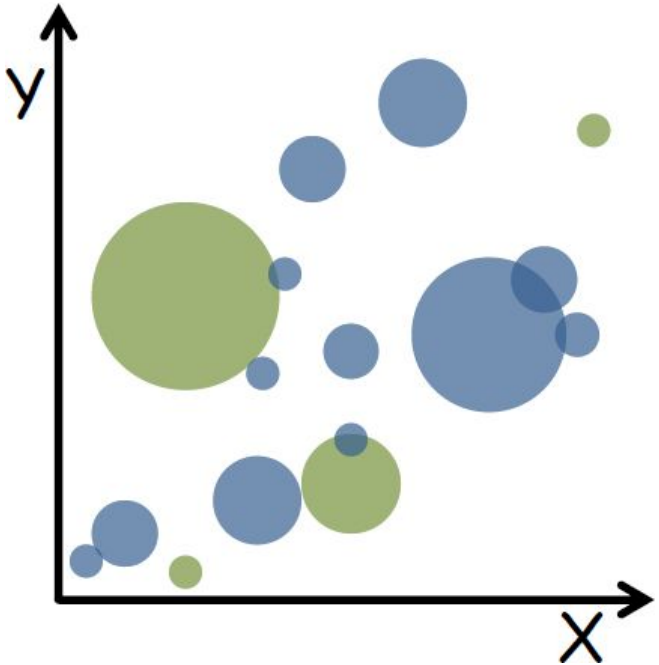
channels

– control appearance of marks



Question 1

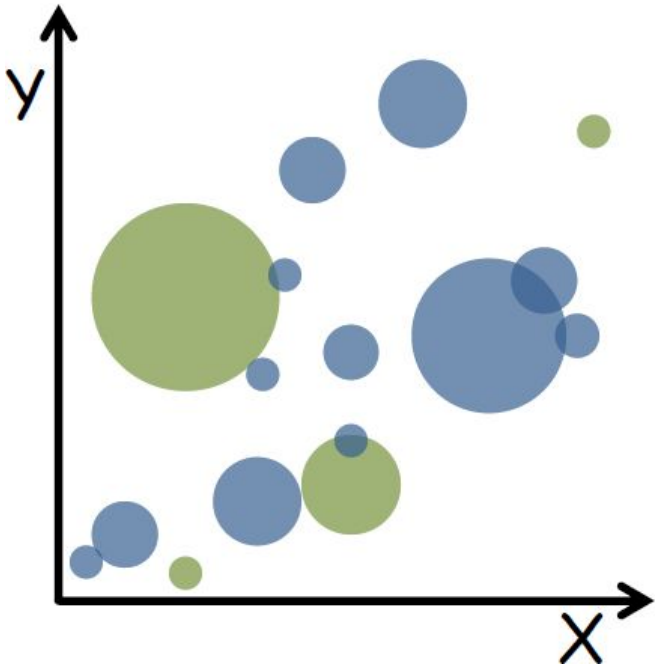
MARKS:



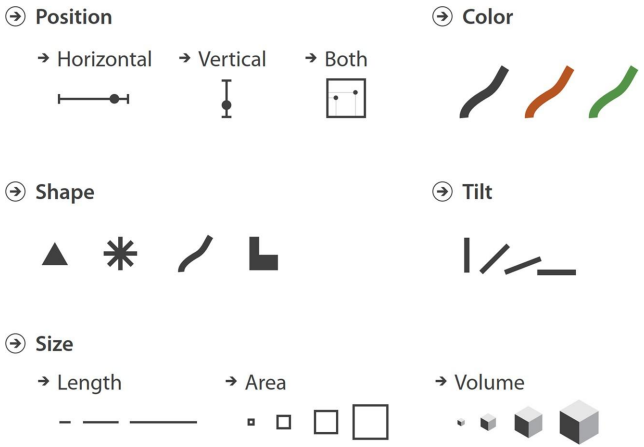
What mark is being used

A. Point
B. Line
C. X
D. Area
E. Size

Question 2



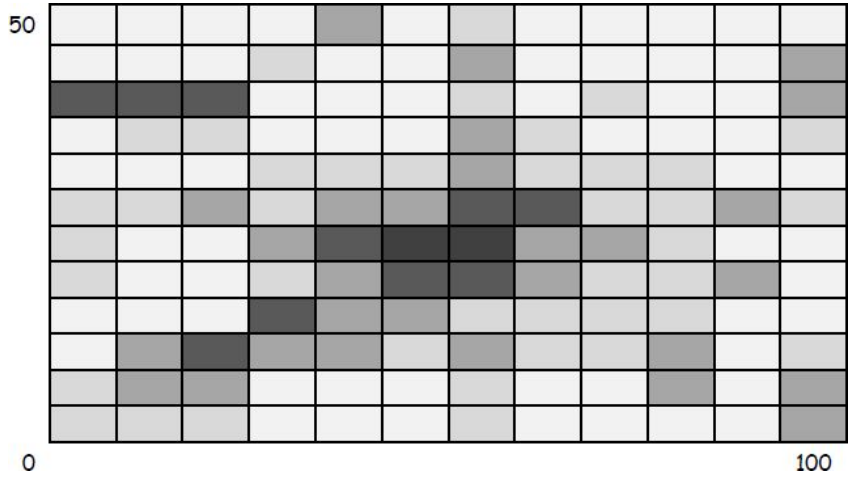
Channel:



What channel(s) are being used

A. Horizontal
B. X & y
C. Vertical
D. Color
E. Area

Question 3



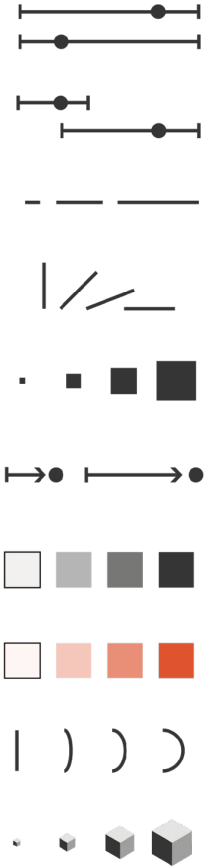
What channel(s) are being used

A. Horizontal
B. X & y
C. Vertical
D. Color
E. Area

Channels

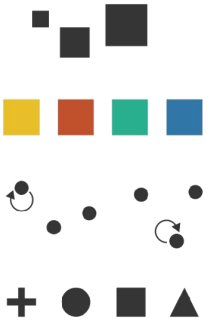
Magnitude Channels: Ordered Attributes

- Position on common scale
- Position on unaligned scale
- Length (1D size)
- Tilt/angle
- Area (2D size)
- Depth (3D position)
- Color luminance
- Color saturation
- Curvature
- Volume (3D size)

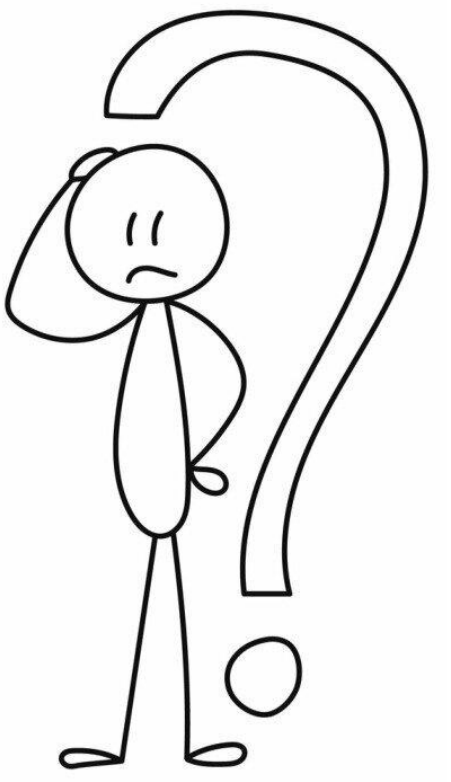


Identity Channels: Categorical Attributes

- Spatial region
- Color hue
- Motion
- Shape



How do I pick *which* marks or channels to use?



Channel Selection

Before we can select channels we must understand how its various properties influence their use.

We must consider both:

Expressiveness: match the channel type to data characteristics: the visual encoding should express all of, and only, the information in the dataset attributes.

Effectiveness: for a given task, some channels are better than others so it is important to select the most effective channel for the data

Channel Characteristics

Discriminability: how many unique steps can we perceive?

Separability: is our ability to use this channel affected by another one?

Popout: can things jump out using this channel?

Grouping: can a channel show perceptual grouping of items?

Accuracy: how precisely can we tell the difference between encoded items?

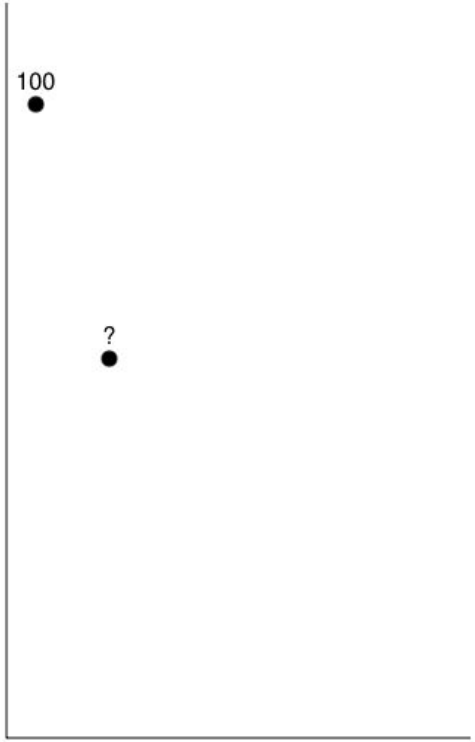
Activity

Designing an experiment

Imagine that you are computational thinking researchers.

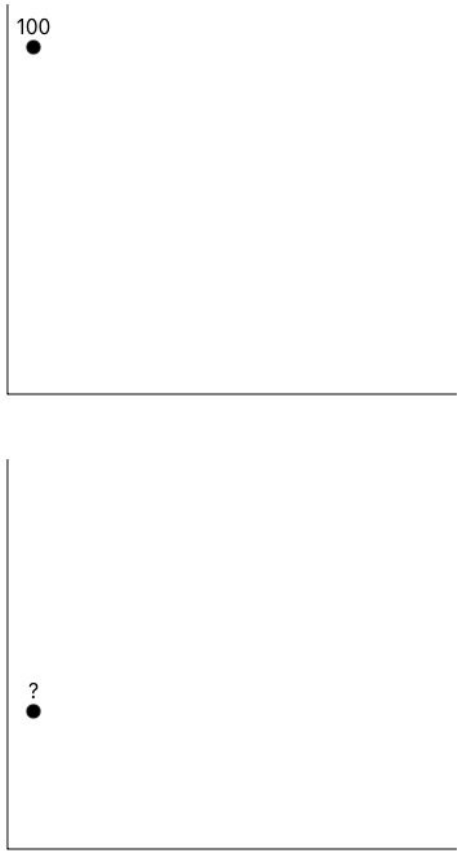
Work with 3-4 people around you to design an experiment - involving human subjects - that would help visualization researchers answer the question:

Which channel is most effective for a particular question with a particular dataset?

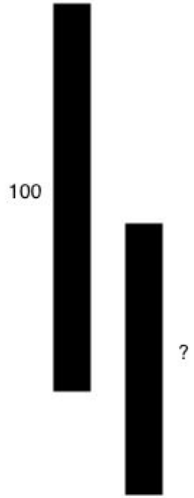


The one marked with a 100 is 100 blocks high. How high is the one marked with a ?. Type your answer below.

Next

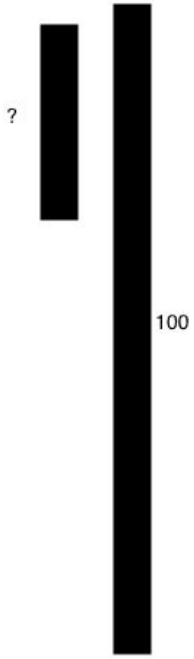


The one marked with a 100 is 100 blocks high. How high is the one marked with a ?. Type your answer below.



The one marked with a 100 is 100 blocks long. How long is the one marked with a ?. Type your answer below.

Next

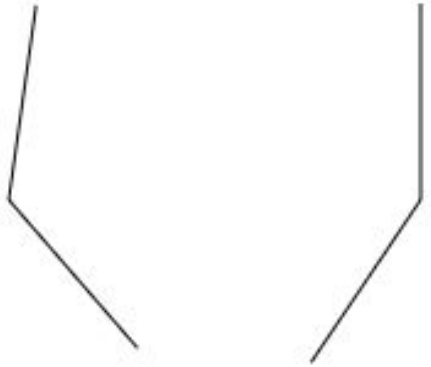


The one marked with a 100 is 100 blocks long. How long is the one marked with a ?. Type your answer below.

Next

The one marked with a 100 is 100 blocks wide. How wide is the one marked with a ?. Type your answer below.

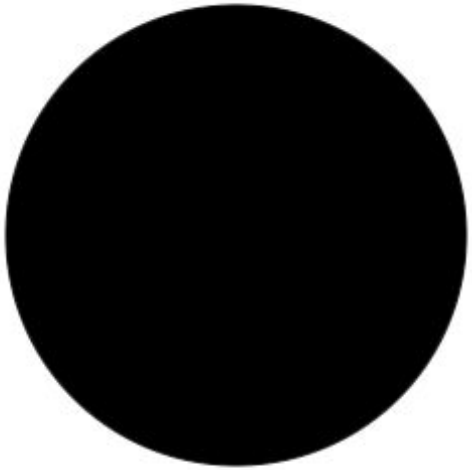
Next



The one marked with a 100 is 100 blocks wide. How wide is the one marked with a ?. Type your answer below.

Next

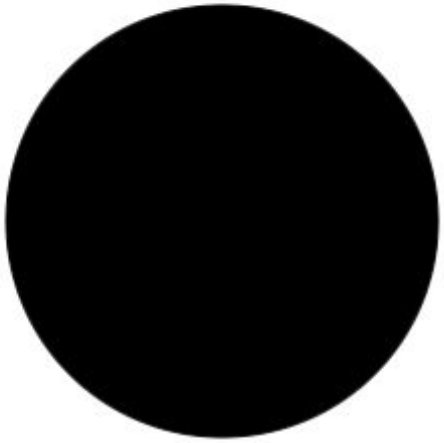
?



100

The one marked with a 100 is 100 blocks big. How big is the one marked with a ?. Type your answer below.

Next



?

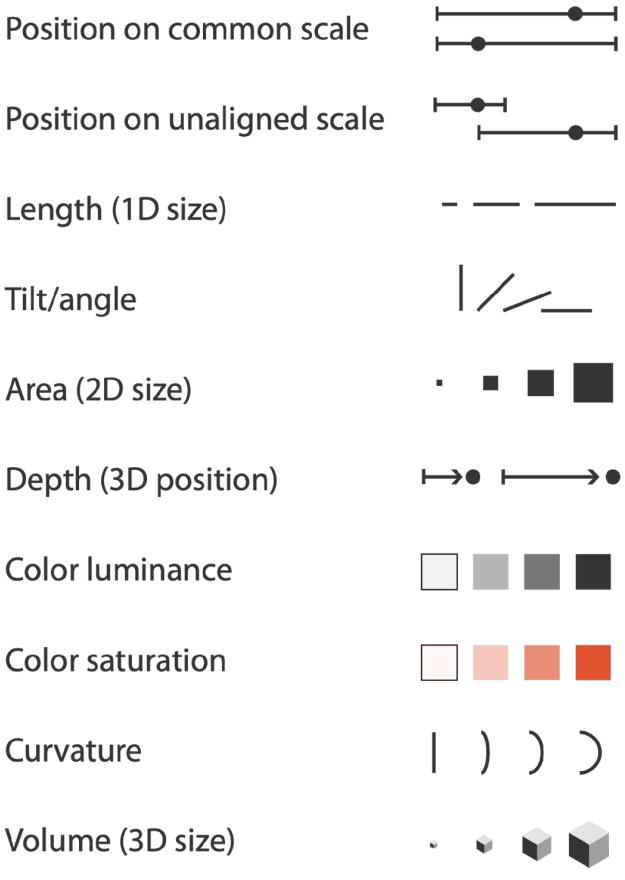
100

The one marked with a 100 is 100 blocks big. How big is the one marked with a ?. Type your answer below.

Next

Channels: Rankings

Magnitude Channels: Ordered Attributes



Identity Channels: Categorical Attributes

- expressiveness
  - match channel and data characteristics
- effectiveness
  - channels differ in accuracy of perception
  - spatial position ranks high for both