

# Make it Clear



# Your Turn

Take turns presenting your topics to the group (~5:00 per person).

Record your presentation if you can (perhaps with your laptop or cell phone)

Give feedback to each other.

what will go  
wrong?



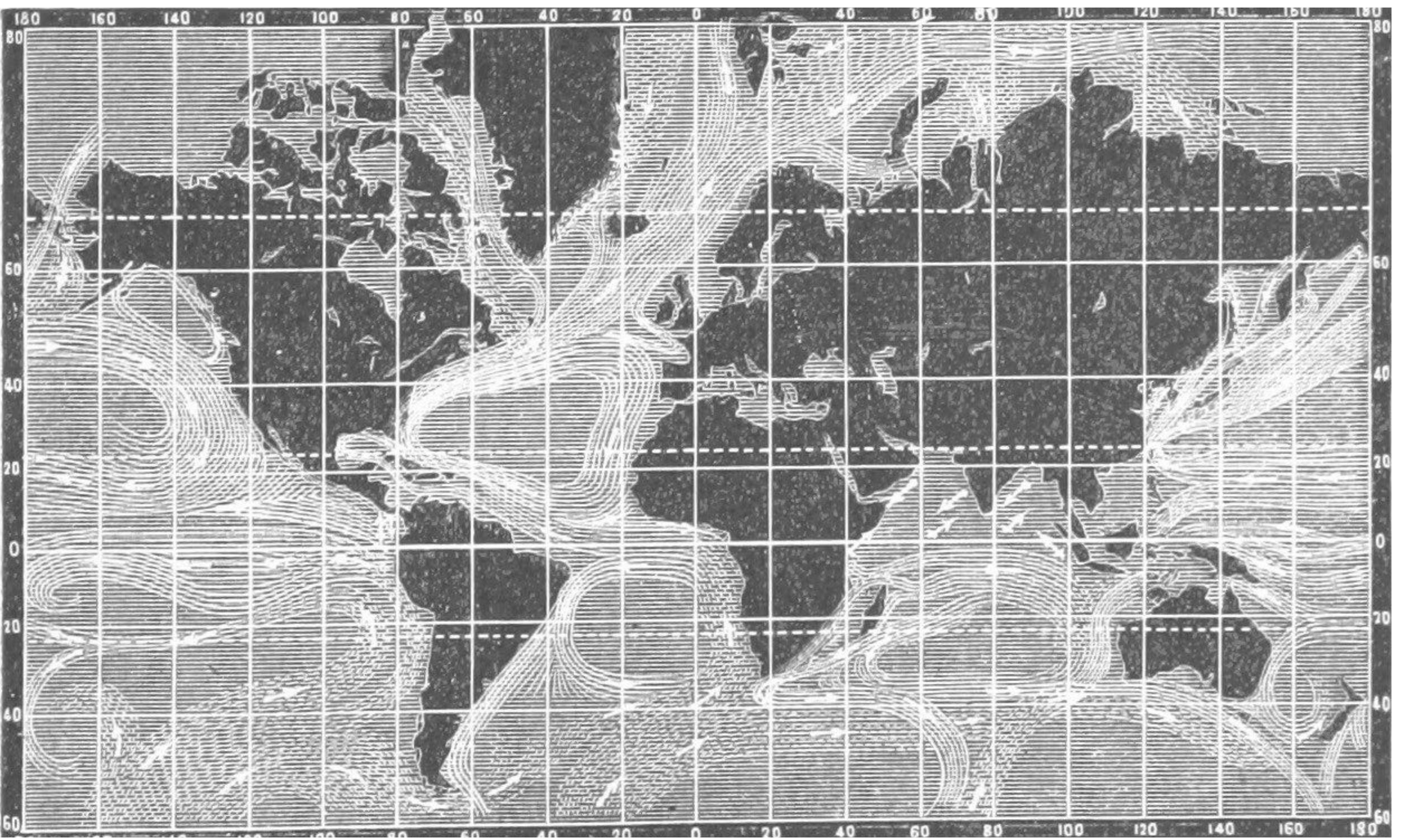
# Question

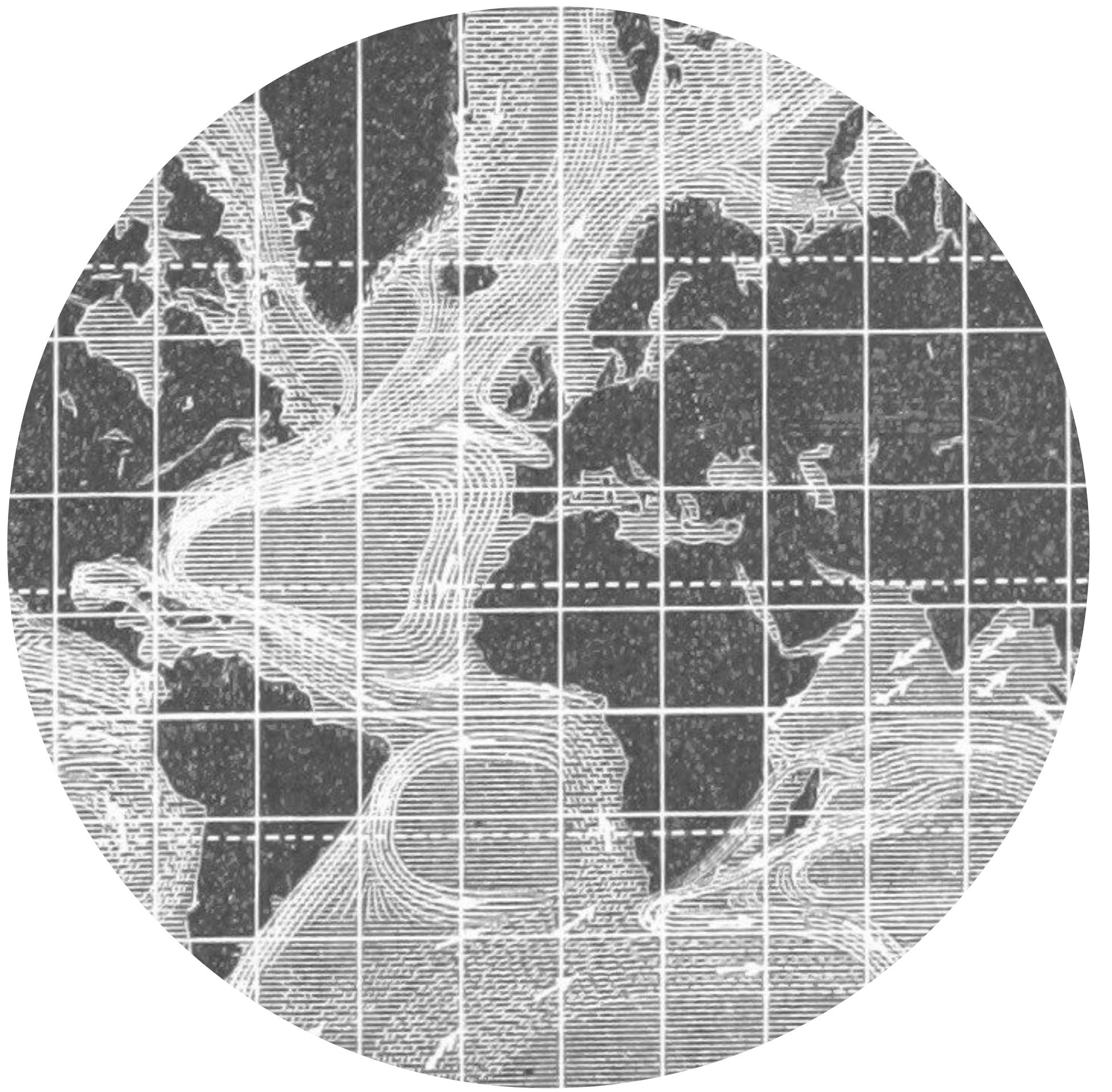
What if a student already has a mental model, *and it is wrong?*

**BIG DEAL!!!**

# Incorrect mental models







RStudio – Open source and enterprise-ready professional software for R

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Our developers create popular packages to expand the features of R. Includes ggplot2, dplyr, R Markdown & more.

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How do you know that a student  
has an incorrect mental model?

# Your Turn

```
foo <- function(aa = 1, ab = 2) aa / ab
```

What will `foo(a = 4)` return?

# Your Turn

```
foo <- function(aa = 1, ab = 2) aa / ab
```

What will `foo(a = 4)` return?

- A. `a = 2` matches **first** case
- B. `a = 2` matches **both** cases
- C. `a = 2` matches **no cases** (and is ignored)
- D. `a = 2` causes an **error**



```
foo <- function(aa = 1, ab = 2) aa / ab
```

What will `foo(a = 4)` return?

- A. 2
- B. 1
- C. 0.5
- D. Error in `foo(a = 4)`: argument 1 matches multiple formal arguments

# How do you correct an incorrect mental model?

## 4-Import-Data

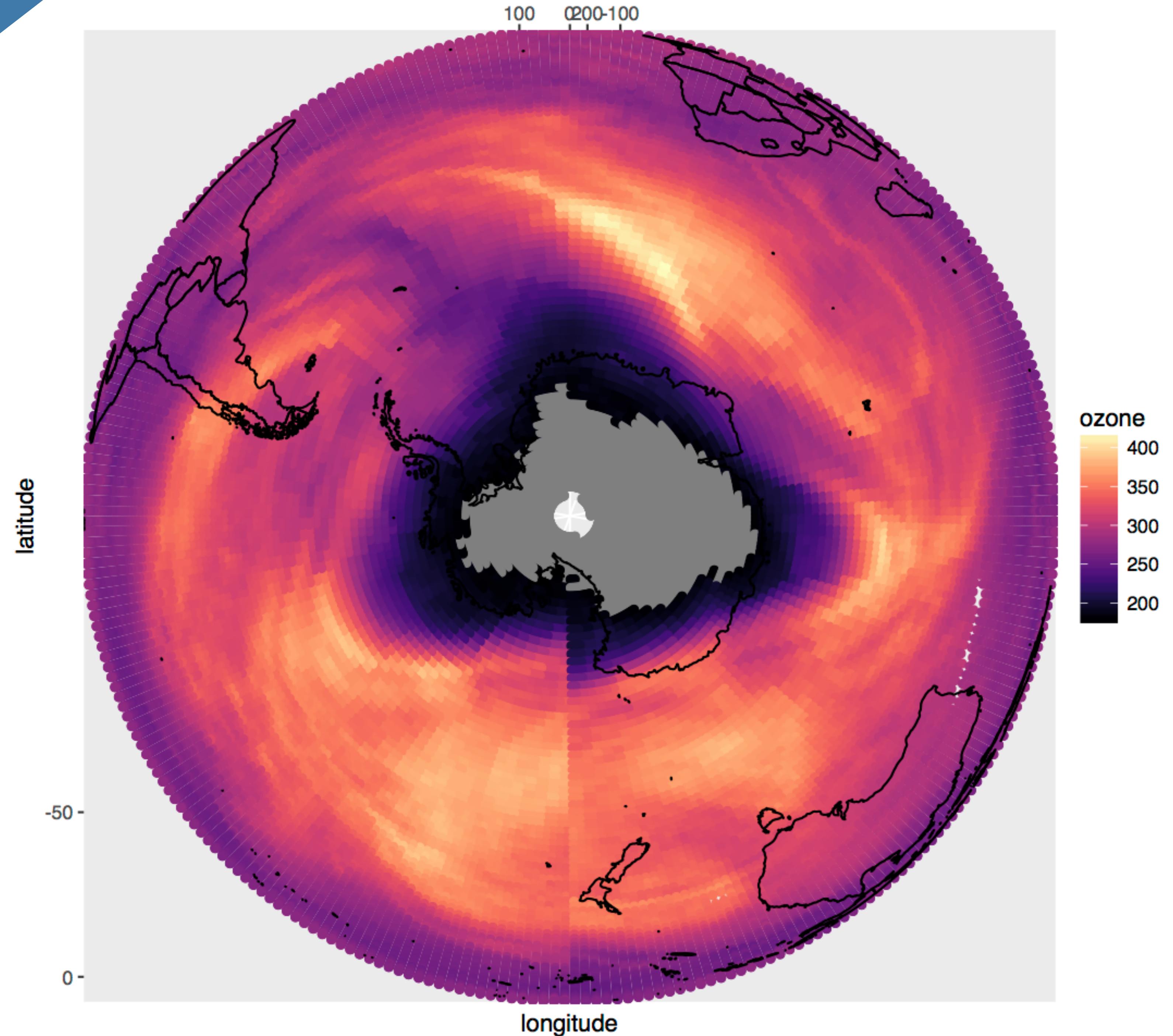


# nimbus.csv

```
date,longitude,latitude,ozone
1985-10-01T00:00:00Z,-179.375,-87.5,.
1985-10-01T00:00:00Z,-178.125,-87.5,.
1985-10-01T00:00:00Z,-176.875,-87.5,.
1985-10-01T00:00:00Z,-175.625,-87.5,.
1985-10-01T00:00:00Z,-174.375,-87.5,.
1985-10-01T00:00:00Z,-173.125,-87.5,.
1985-10-01T00:00:00Z,-171.875,-87.5,.
1985-10-01T00:00:00Z,-170.625,-87.5,.
1985-10-01T00:00:00Z,-169.375,-87.5,.
```



## 4-Import-Data



# Expert Blindsight



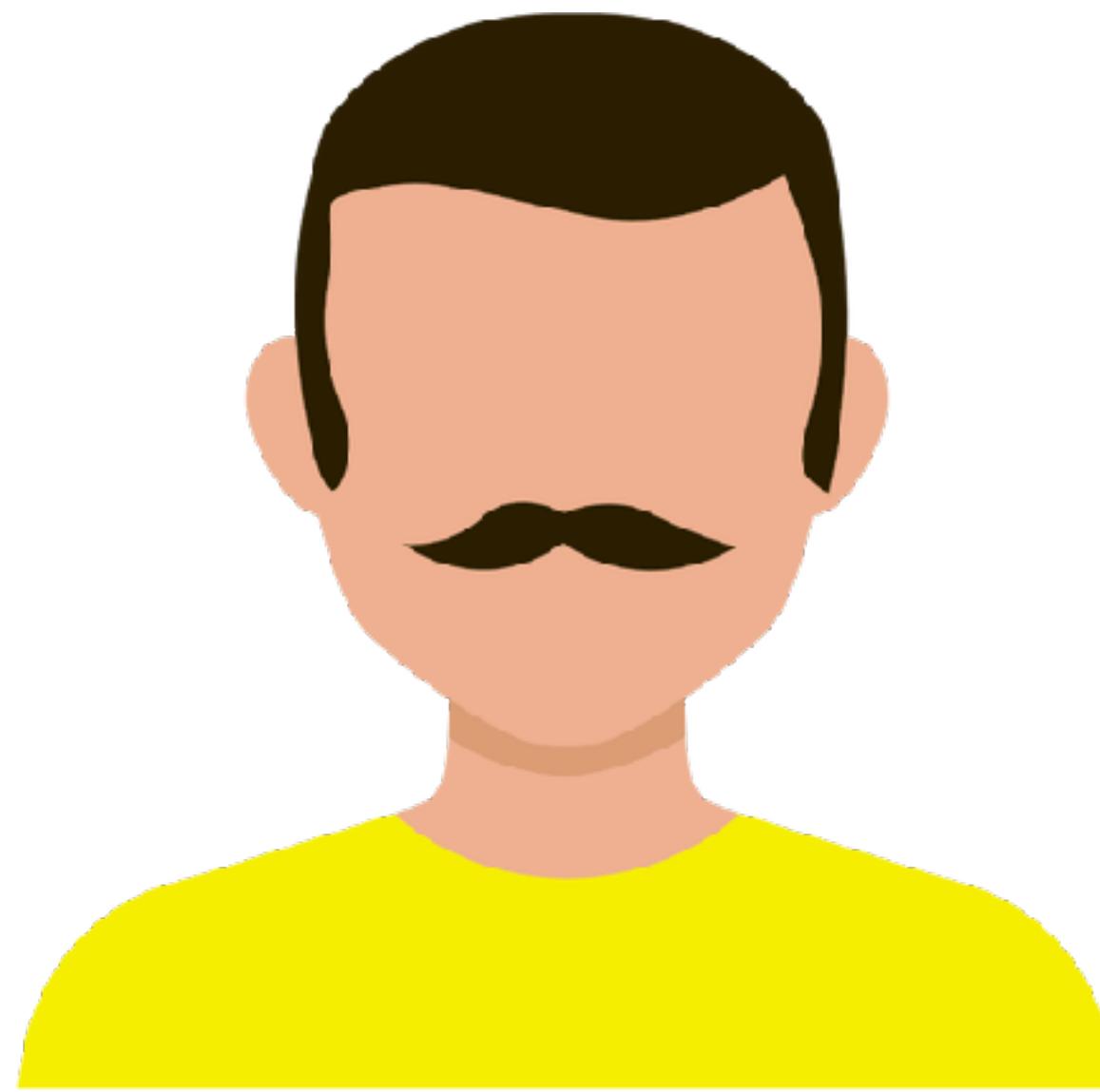
# Expert Blindspot

Beginner



"I don't know what  
I don't know."

Expert



"Neither do I"

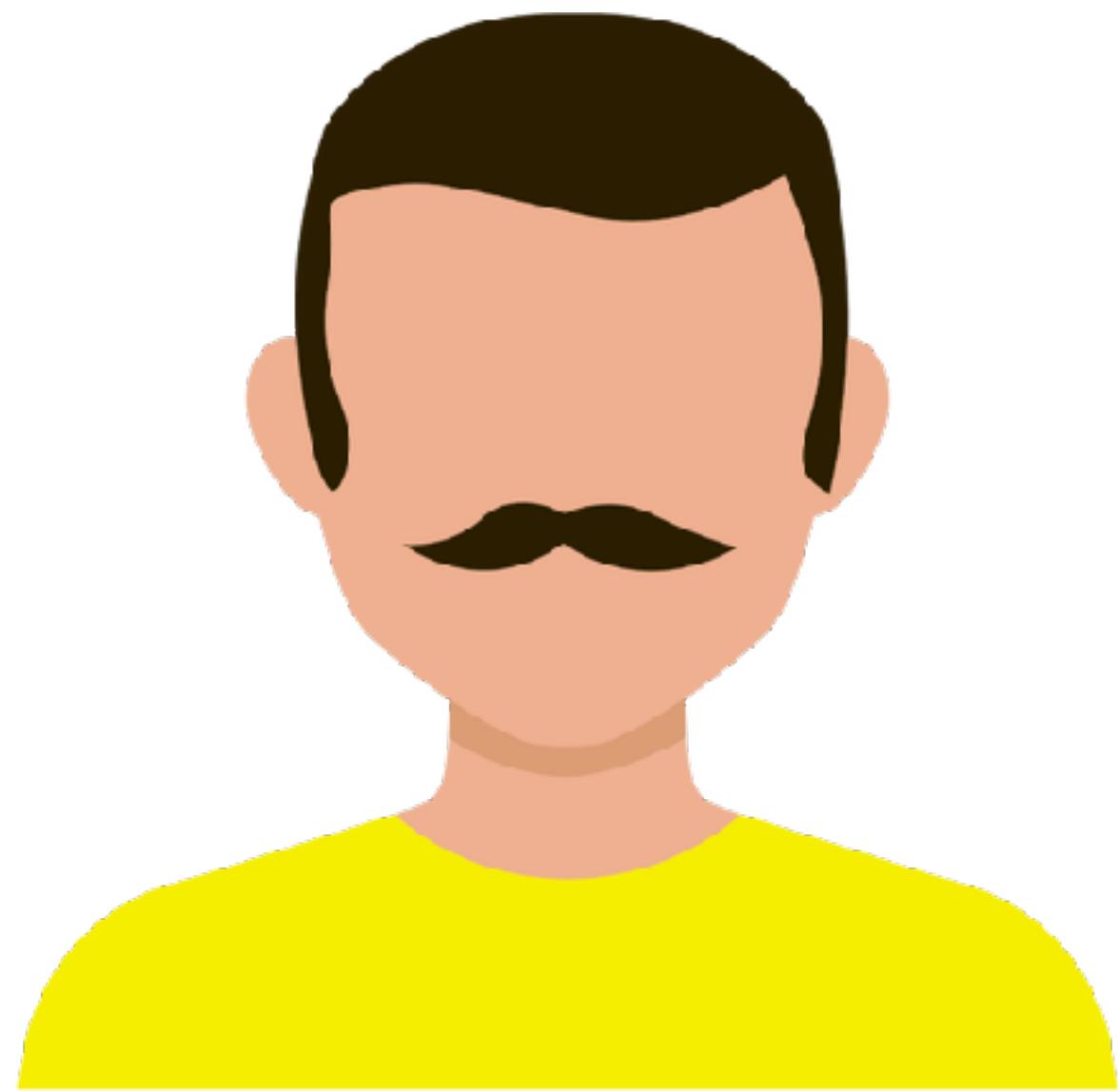
# Expert Blindspot

Beginner



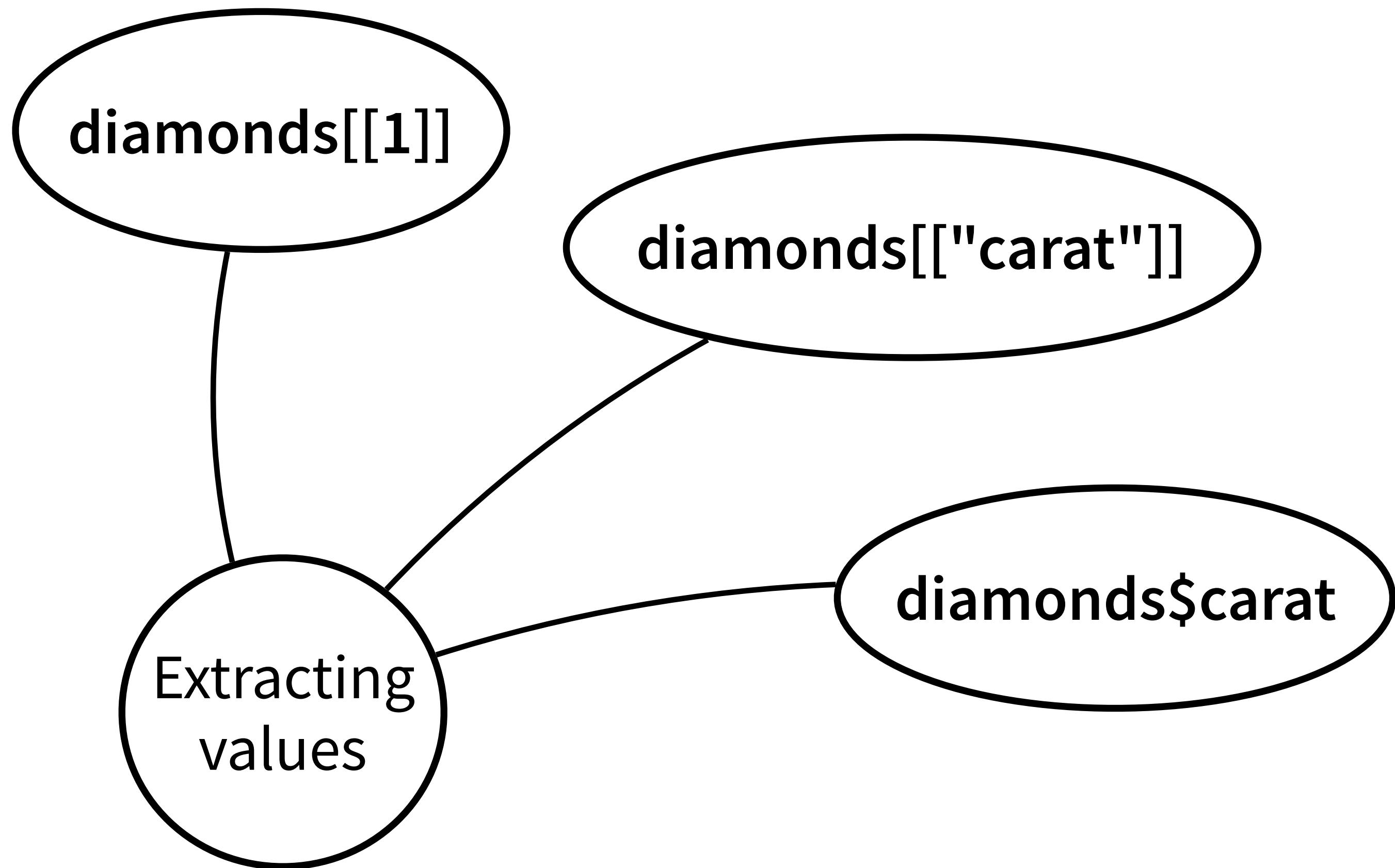
"I don't know what  
I don't know."

Expert

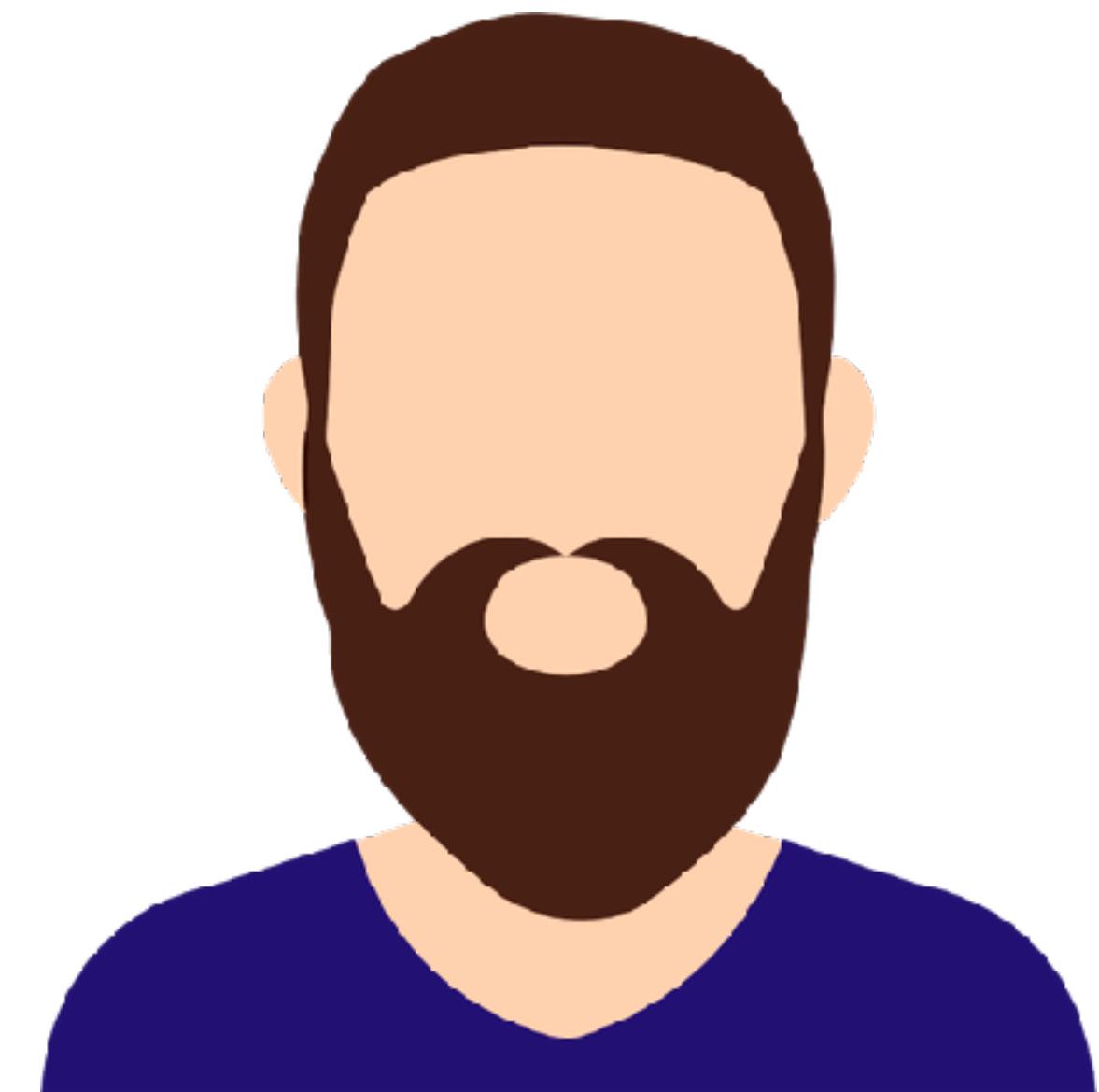


"I don't know what  
I **do** know"

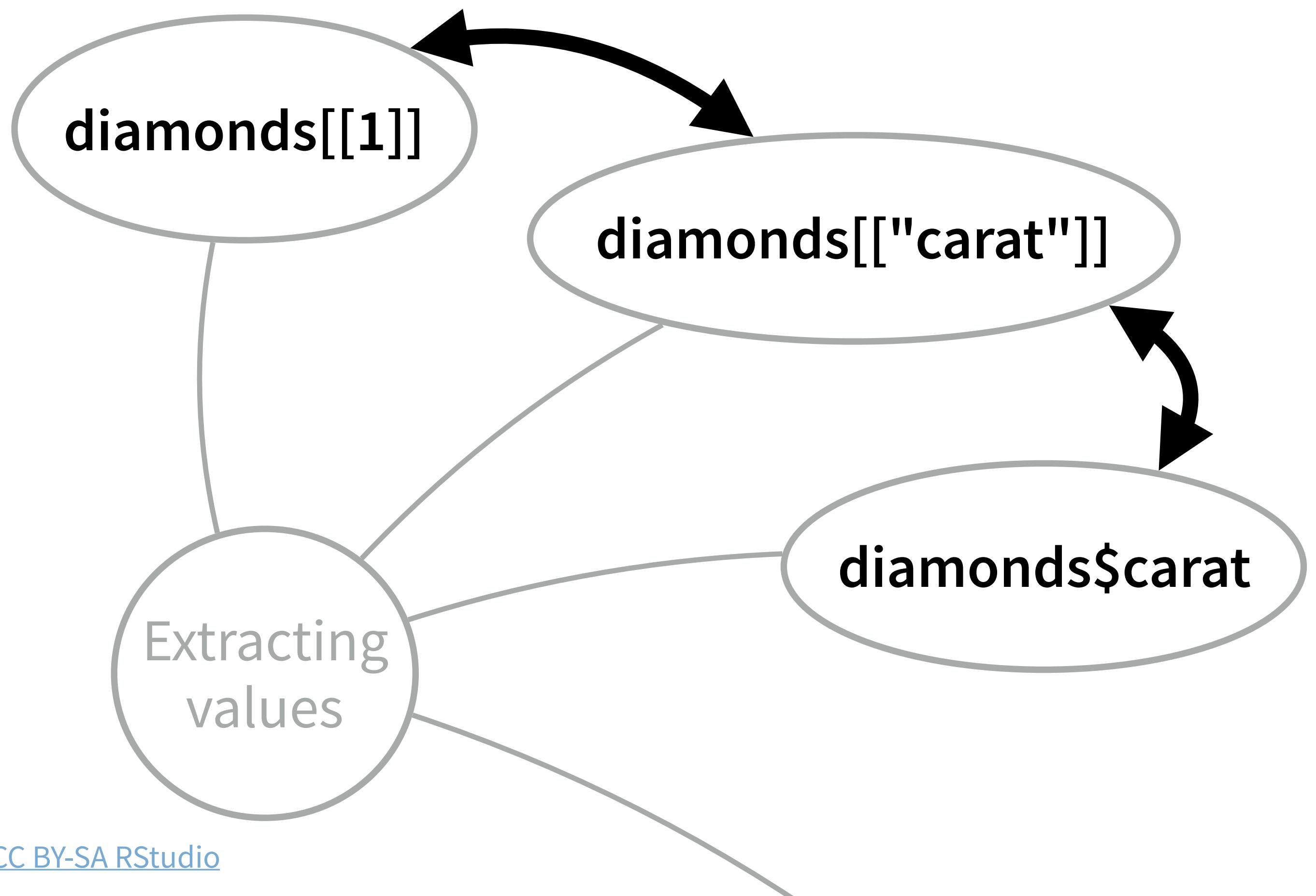
# Expert Blindspot



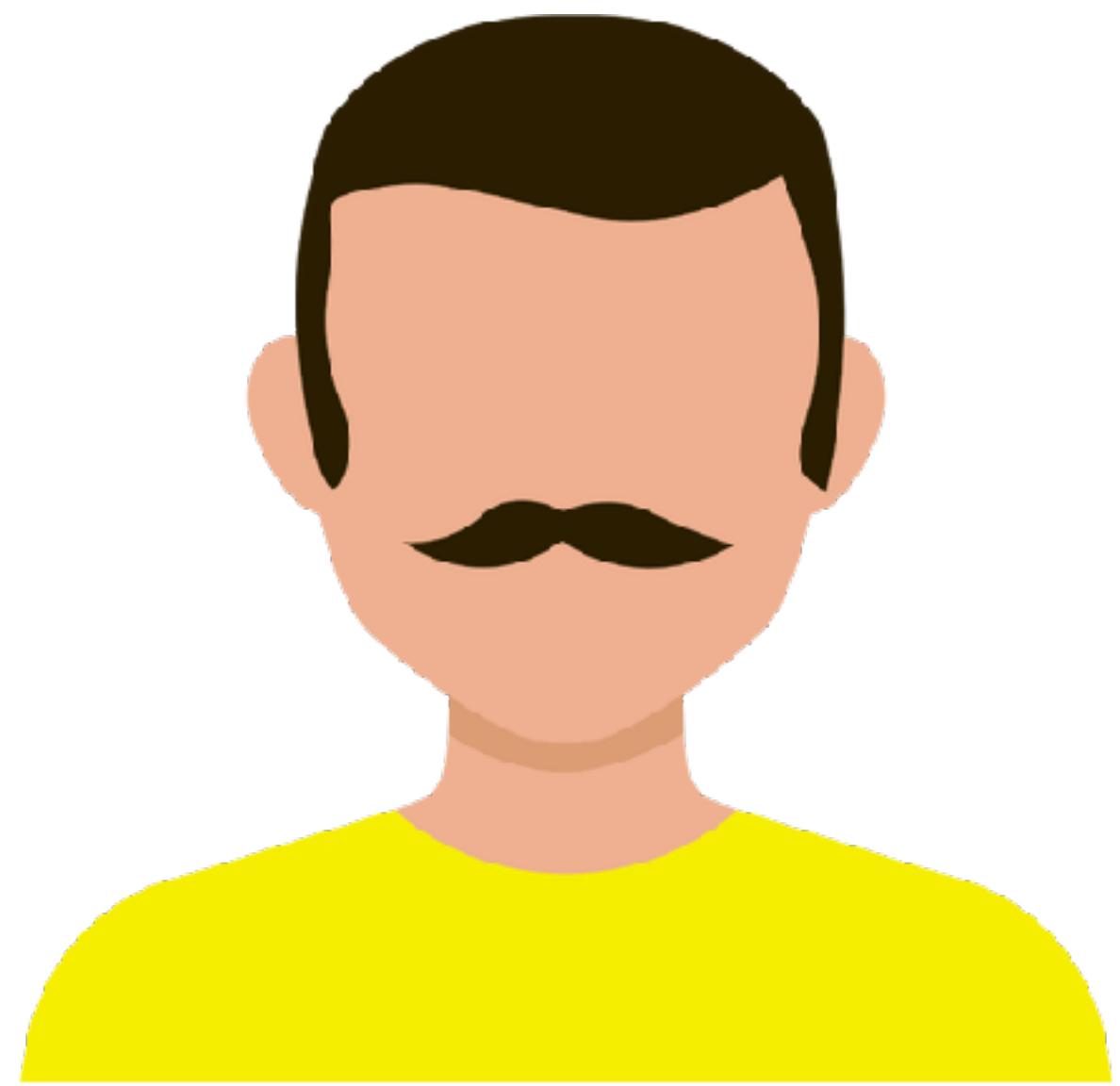
Beginner



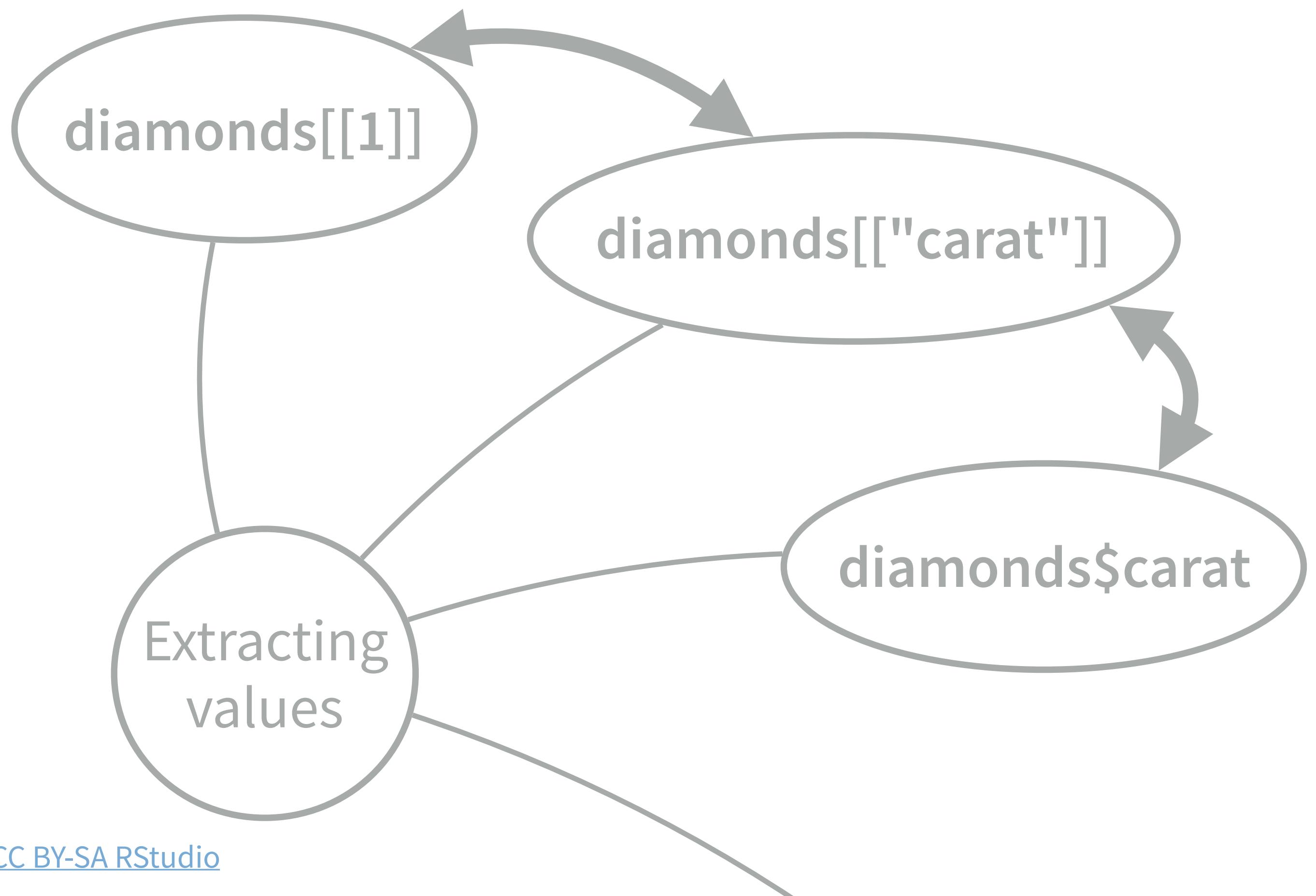
# Expert Blindspot



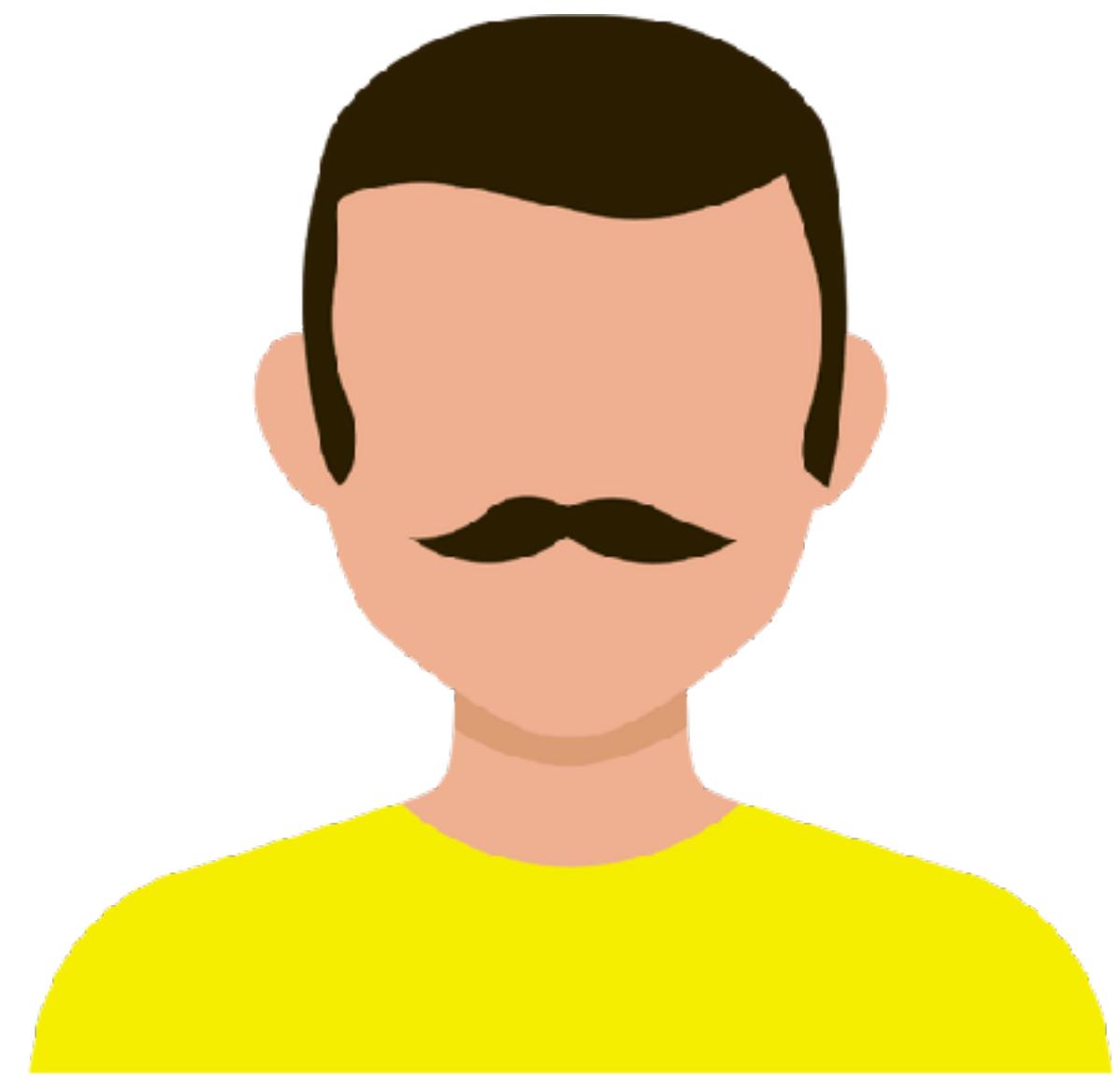
Expert



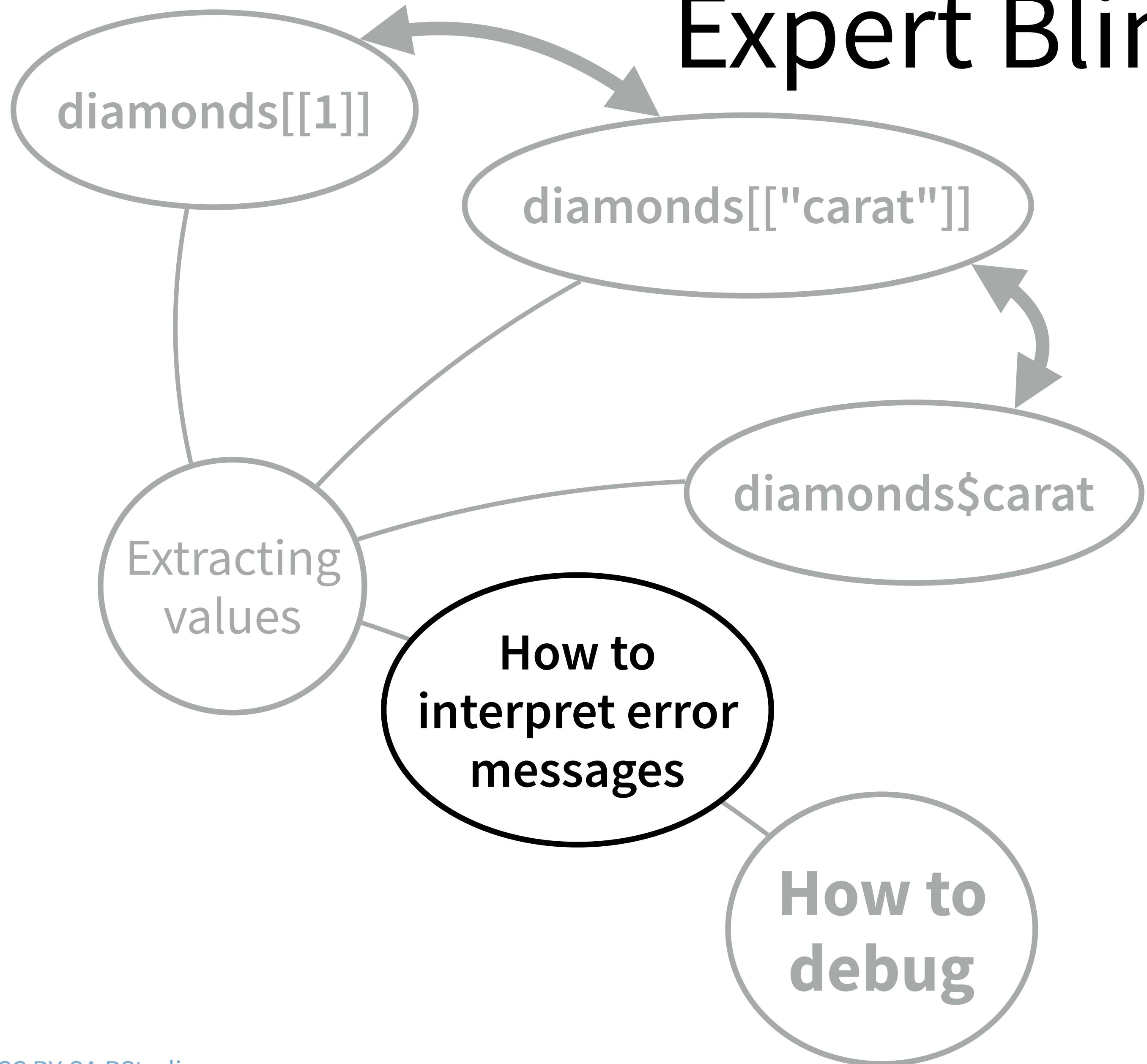
# Expert Blindspot



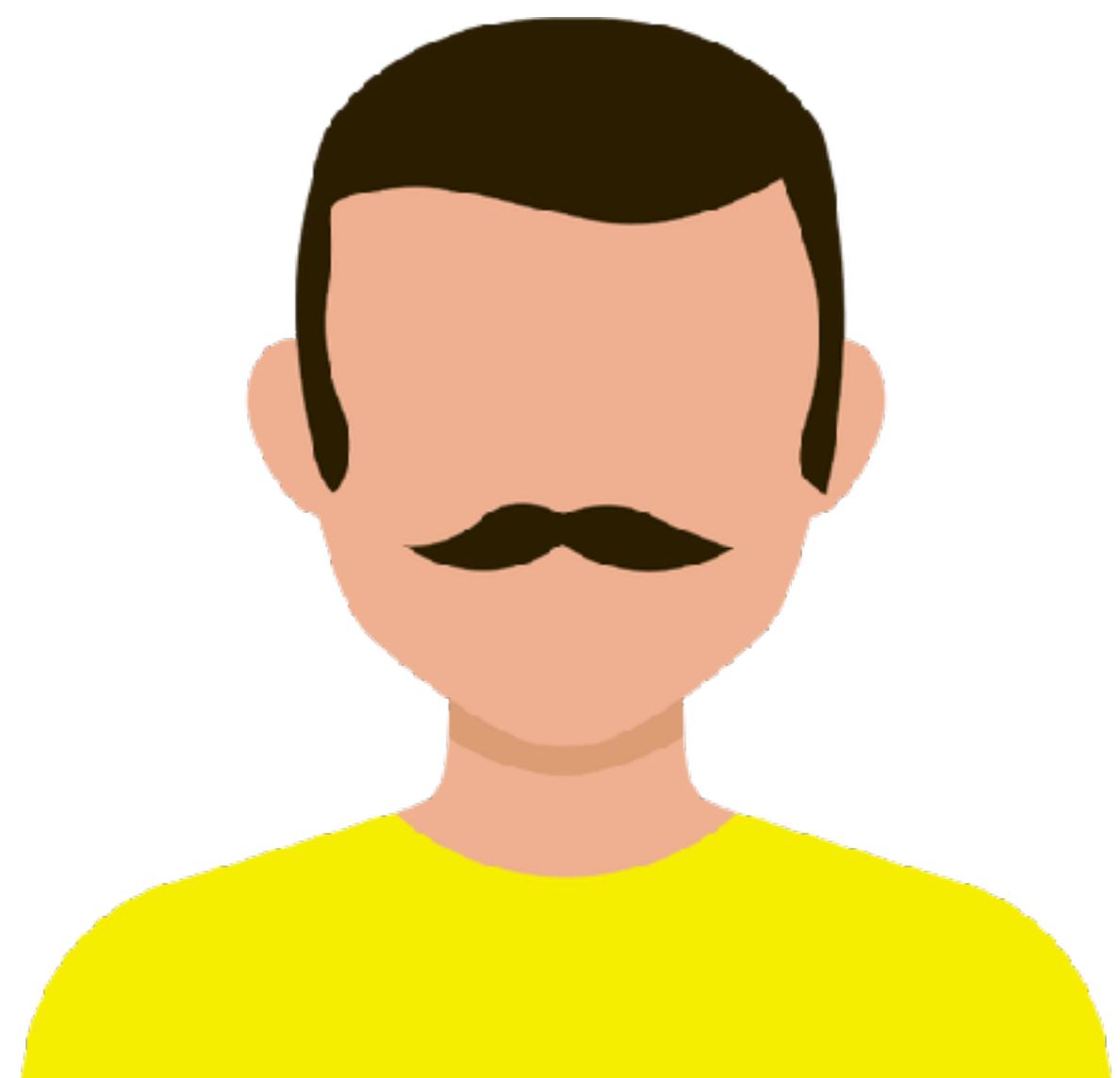
Expert



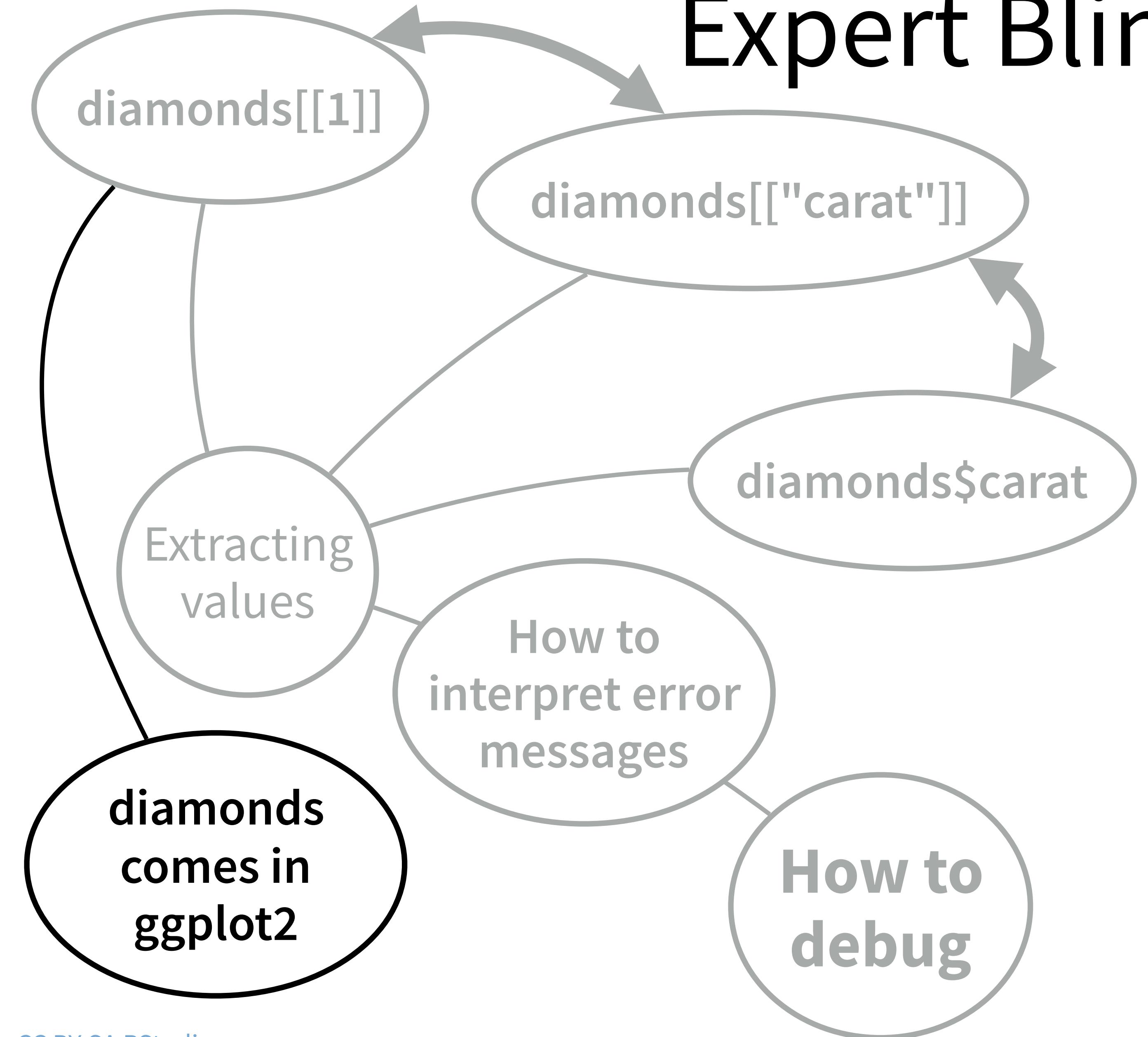
# Expert Blindspot



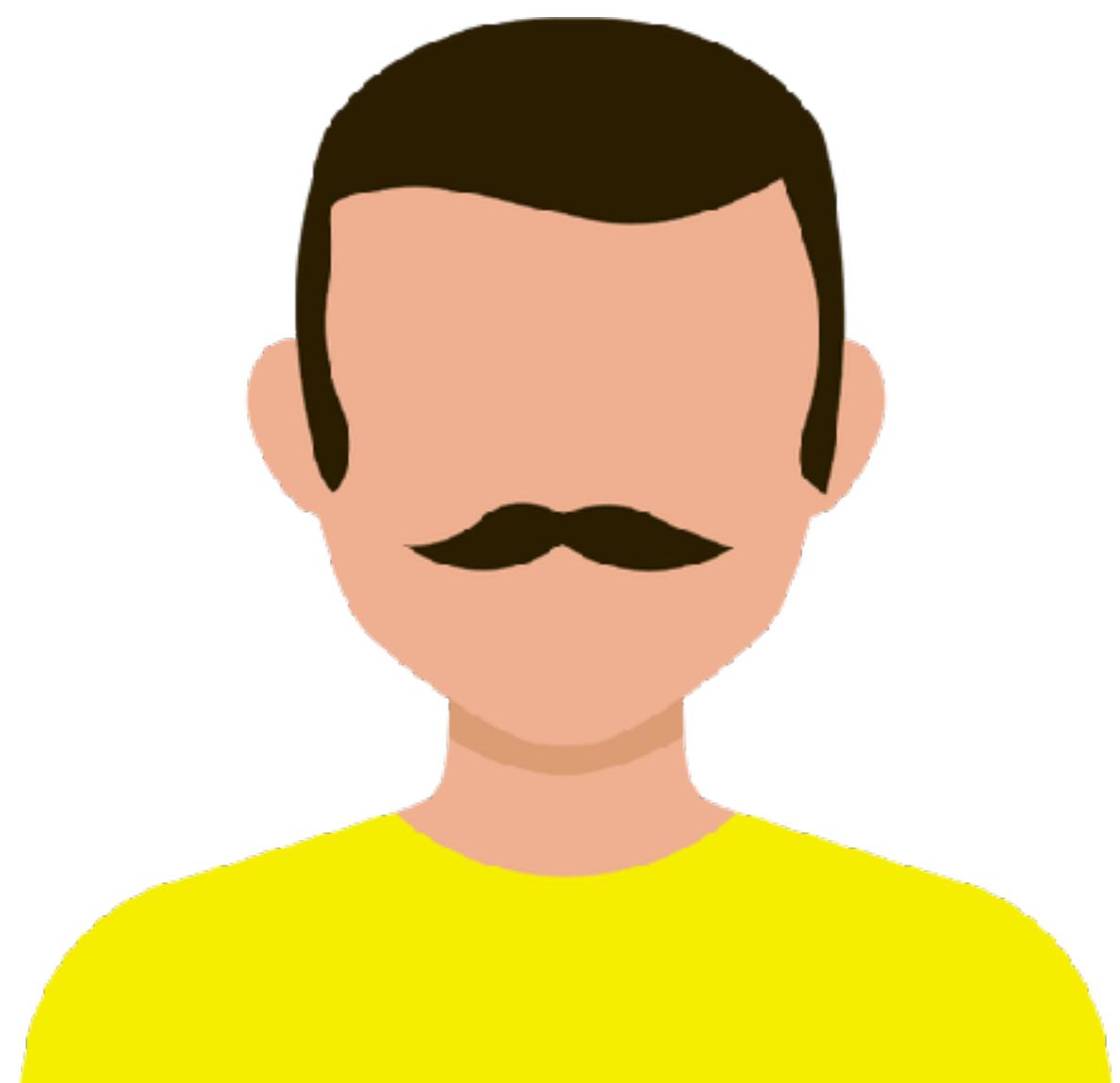
Expert



# Expert Blindspot



Expert



# Saving plots

Find the largest carat size in diamonds

```
library(ggplot2)  
max(diamonds$carat)  
# 5.01
```



# Saving plots

Find the largest carat size in diamonds

```
max(diamonds$carat)  
# Error: object 'diamonds' not found
```



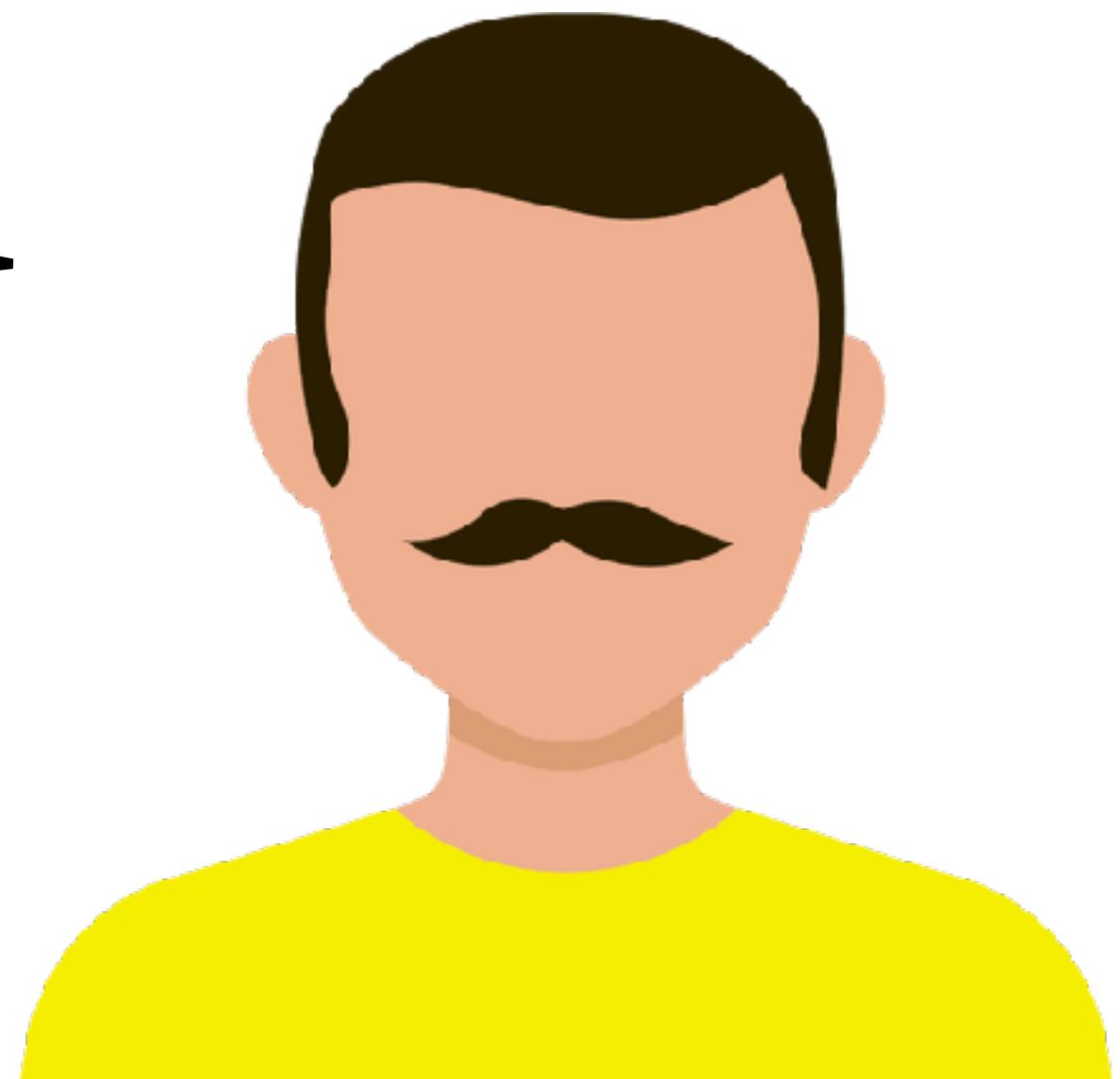
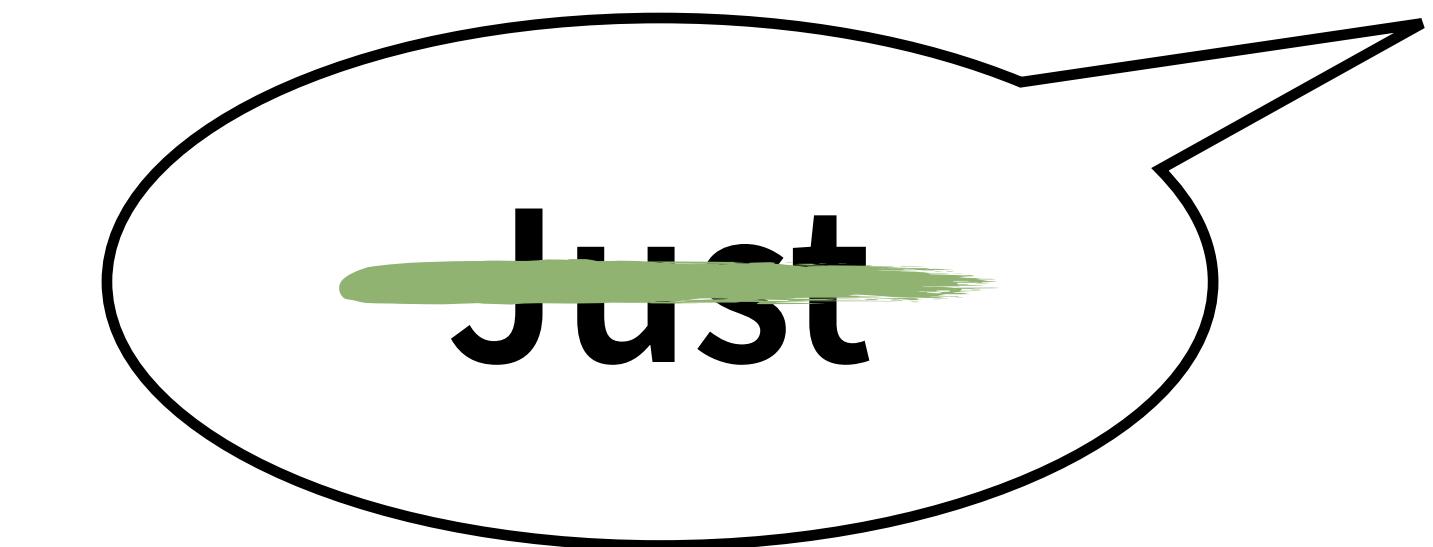
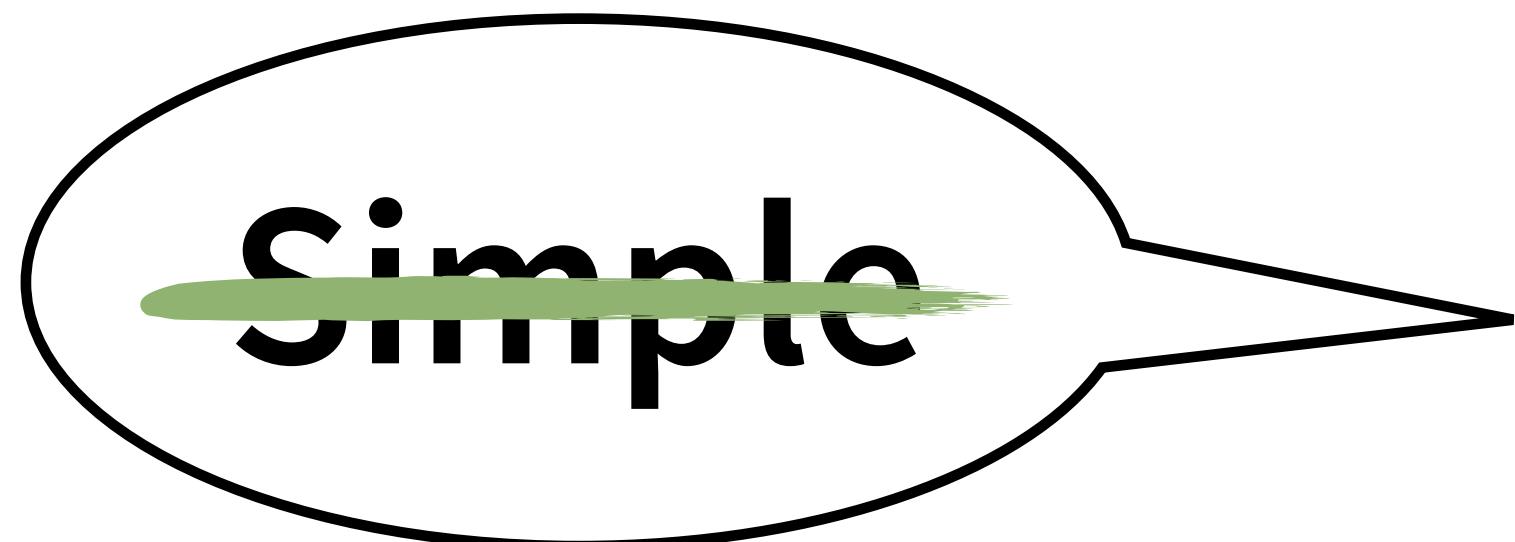
# Suggestions

1. Be consistent
2. Steer around errors and bugs
3. Provide frequent opportunities for technical help
4. Avoid after the fact information.

# Expert Blindspot



Expert



# Your Turn

What are some blindspots that we should add to our tidy data map (or avoid altogether)?

# Your Turn

Examine your topic concept map.

Add topics that you may have missed due to expert blindspot. Alter your outline if necessary.

Note on the back expert things related to your topic that you should **avoid** doing.

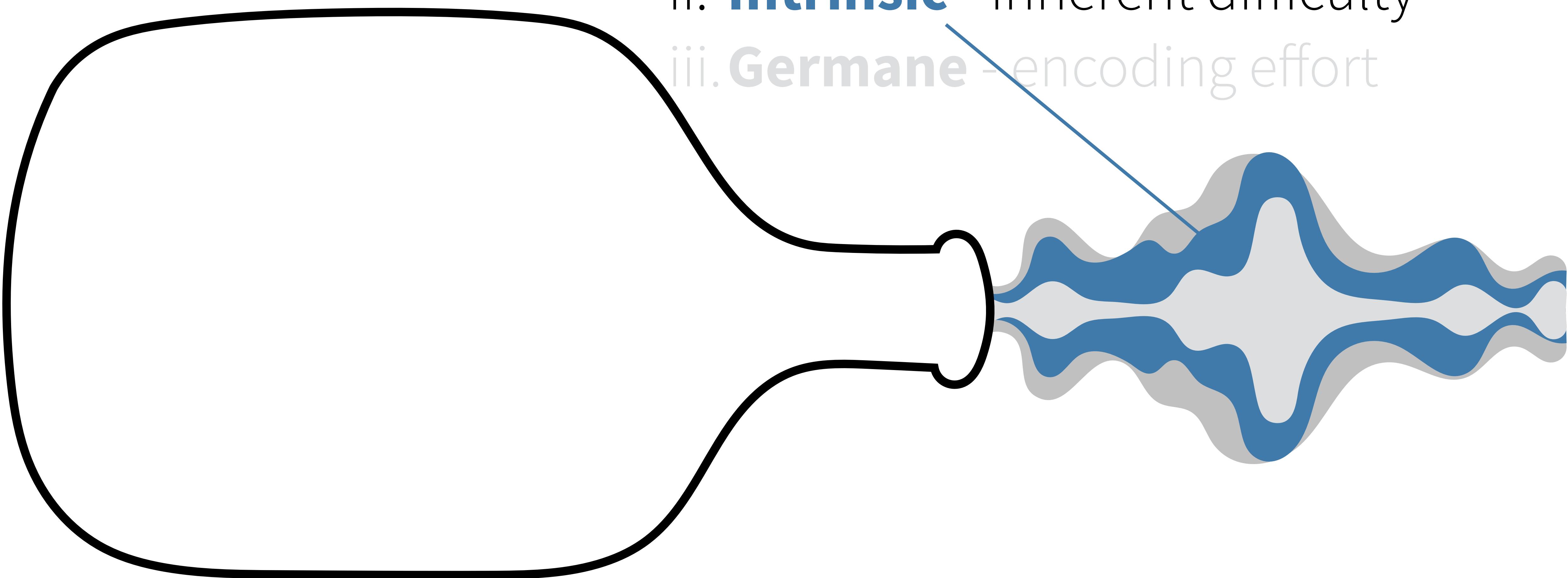


# Extrinsic Load

R  
R

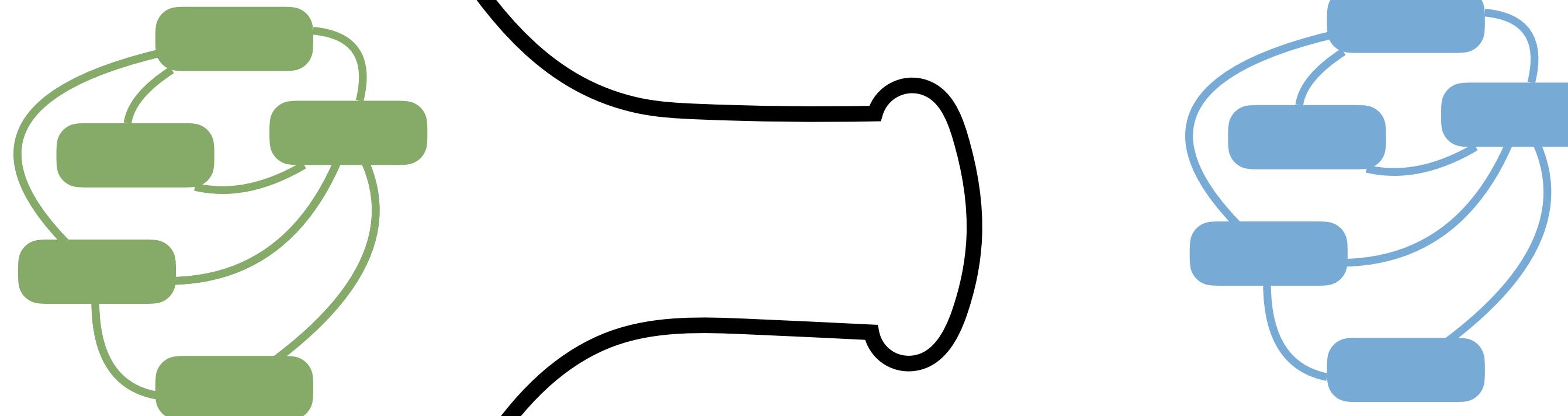
### 3. Learning tasks involve **three types of load**

- i. **Extraneous** - lost to distractions
- ii. **Intrinsic** - inherent difficulty
- iii. **Germane** - encoding effort



### 3. Learning tasks involve **three types of load**

- i. **Extraneous** - lost to distractions
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- iii. **Germane** - encoding effort

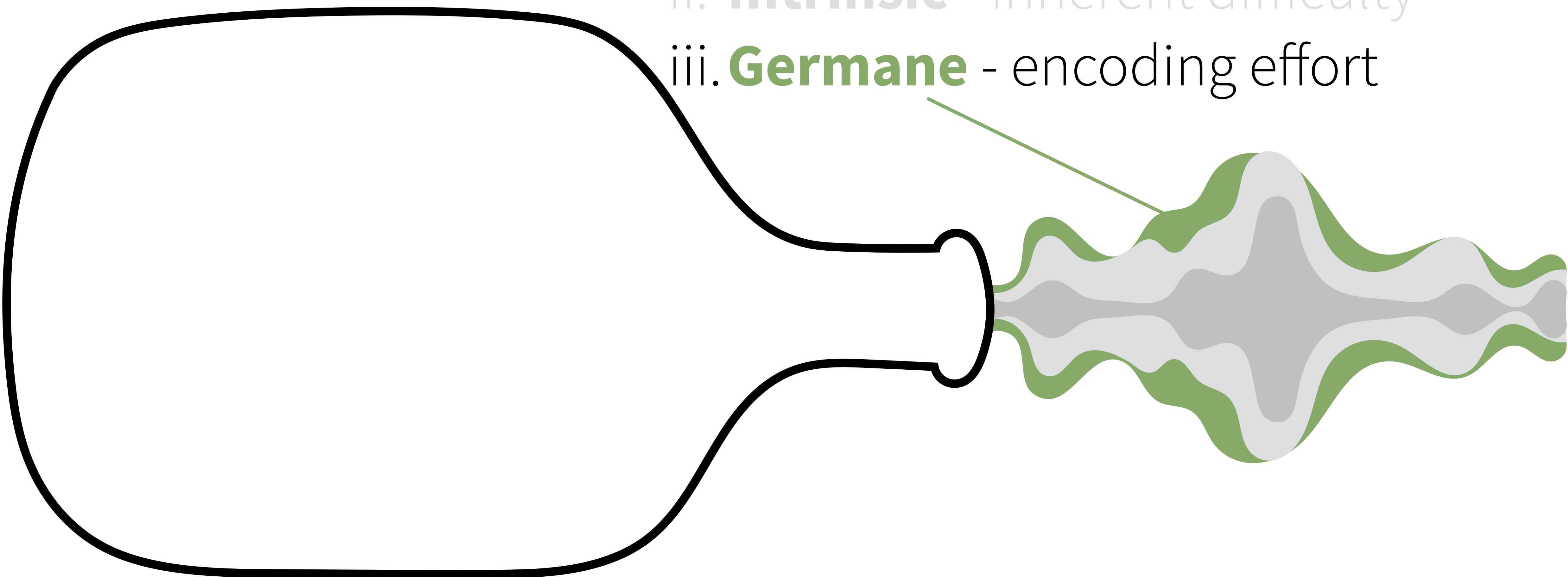


Everything should be made as simple  
as possible, but not simpler.

- Albert Einstein

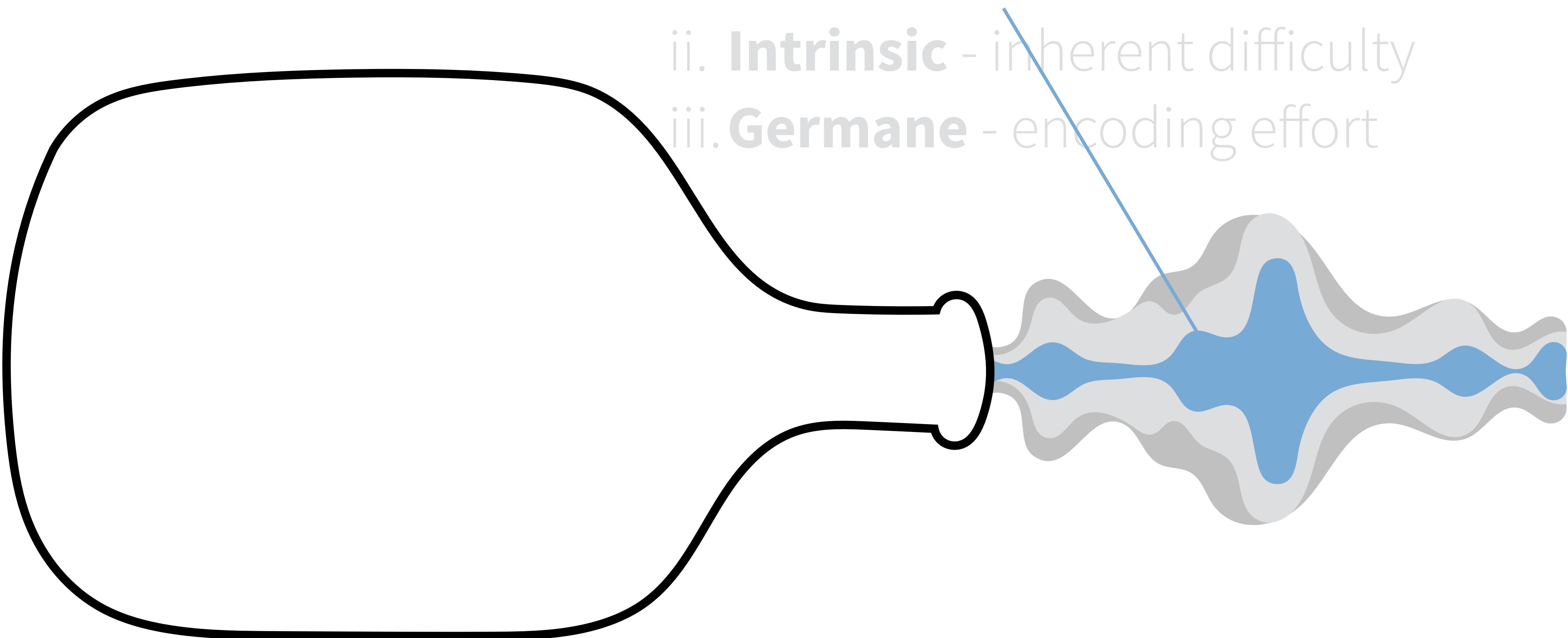
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### 3. Learning tasks involve **three types of load**

- i. **Extraneous** - lost to distractions
- ii. **Intrinsic** - inherent difficulty
- iii. **Germane** - encoding effort



# Your Turn

Examine the recording of your presentation.

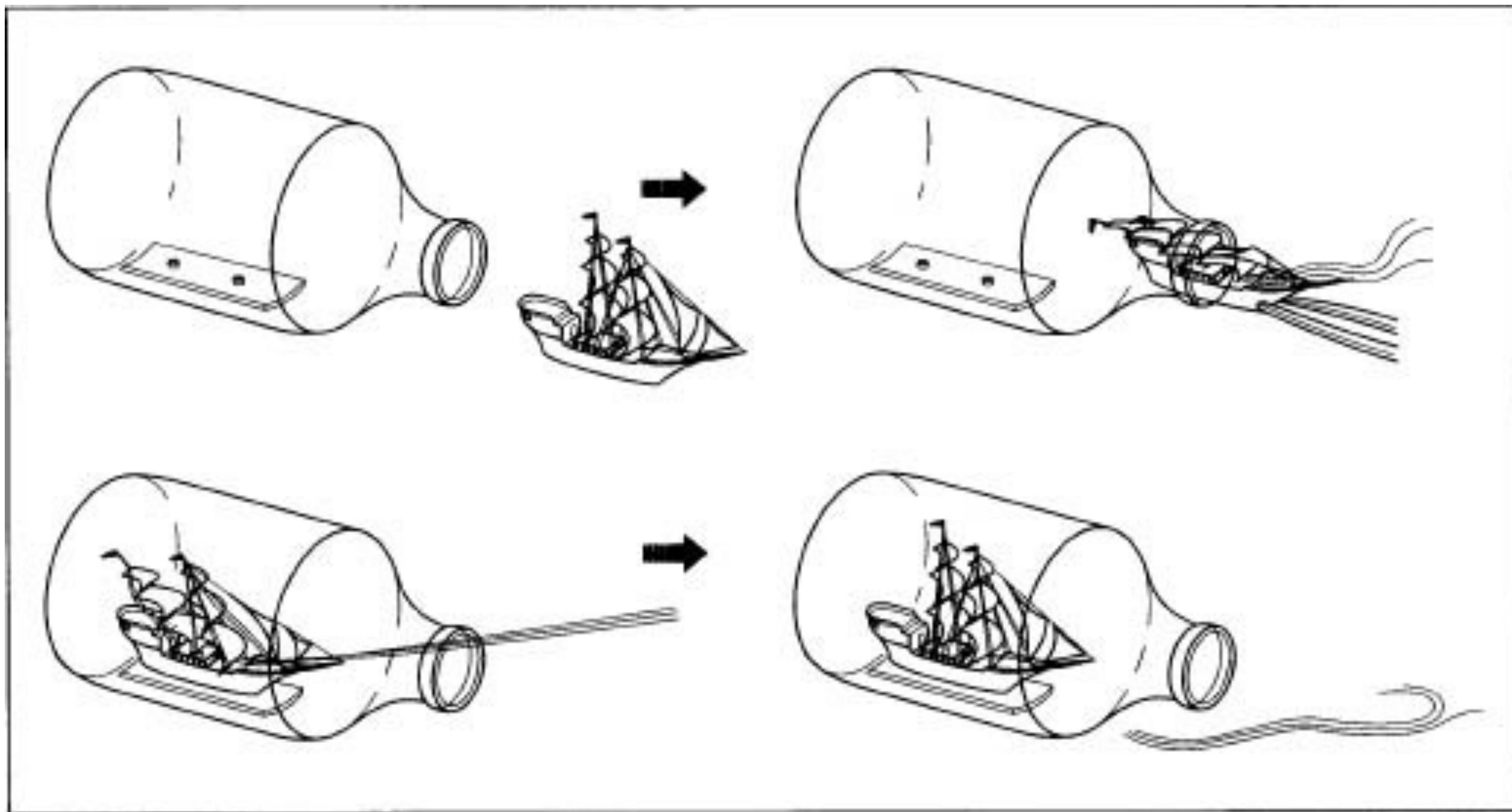
What is distracting?

What did you not expect to see?

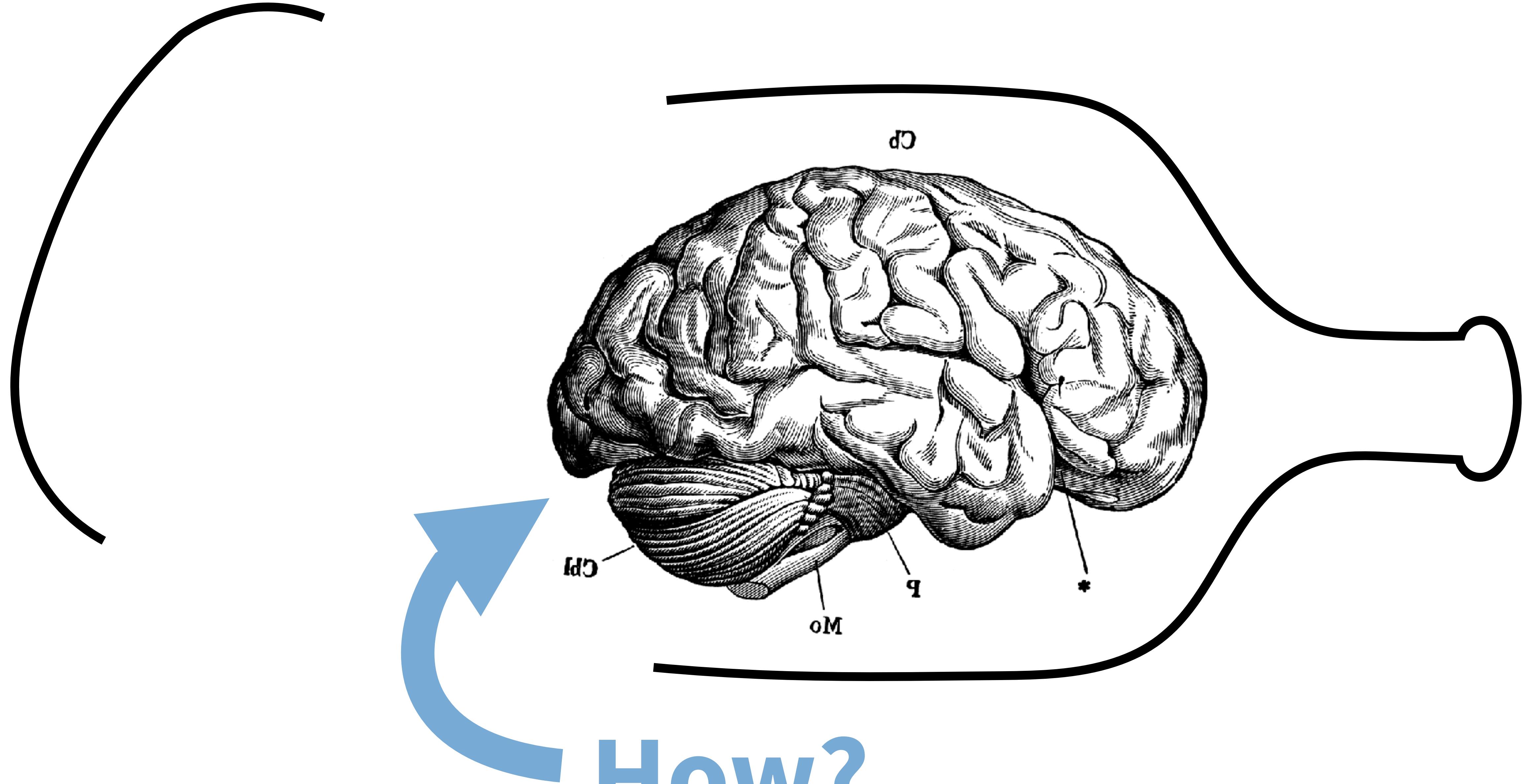


# **Look out for**

1. Um's, Uh's, Ah's
2. Speaking to the board (or computer)
3. Speaking too quietly, mumbly
4. Speaking too fast



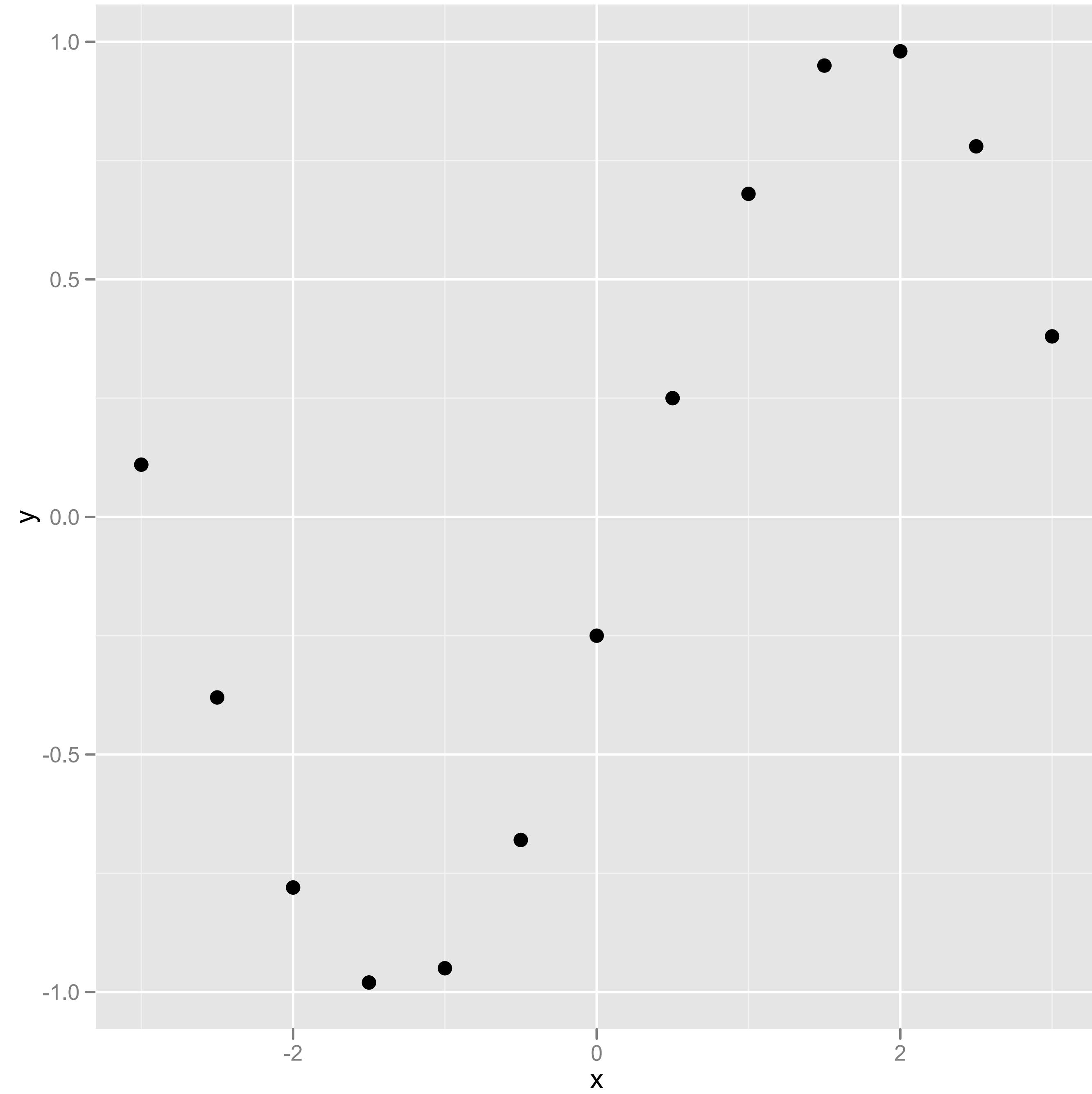




# Visualization

R

x	y
0	-0.25
-0.5	-0.68
-1	-0.95
-1.5	-0.98
-2.5	-0.38
0.5	0.25
2	0.98
1.5	0.95
3	0.38
1	0.68
2.5	0.78
-3	0.11
-2	-0.78



<b>x</b>	<b>y</b>
0	-0.25
-0.5	-0.68
-1	-0.95
-1.5	-0.98
-2.5	-0.38
0.5	0.25
2	0.98
1.5	0.95
3	0.38
1	0.68
2.5	0.78
-3	0.11
-2	-0.78

Vision

**83%** of info

**30%** of neurons

Hearing

**11%** of info

**2%** of neurons

Smell

3.5% of info

Touch

1.5% of info

**8%** of neurons

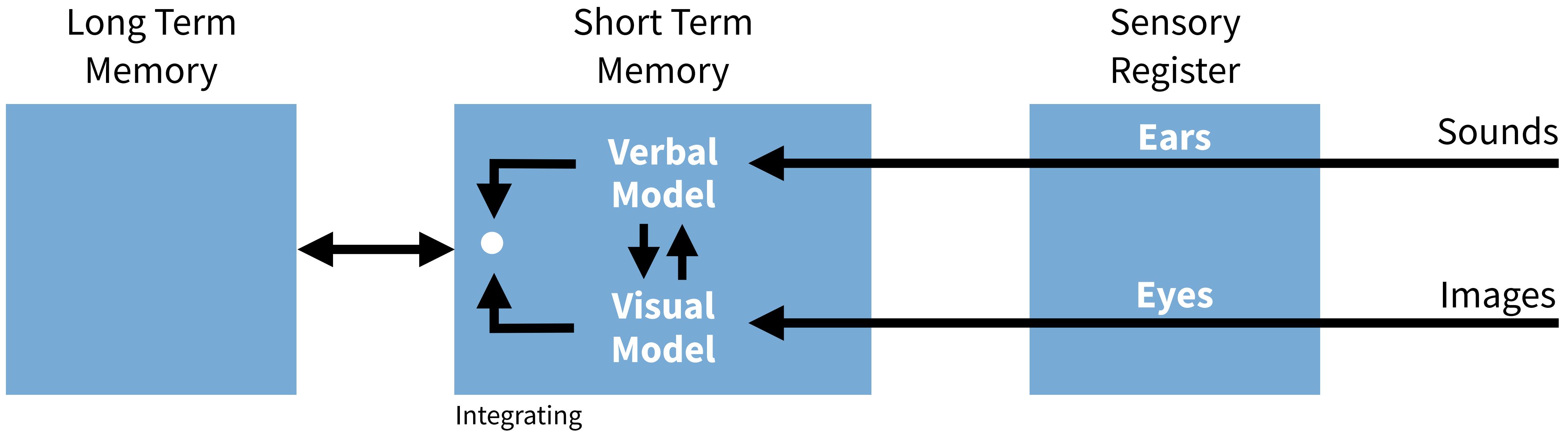
Taste

1.0% of info

[Telling Ain't Training](#)

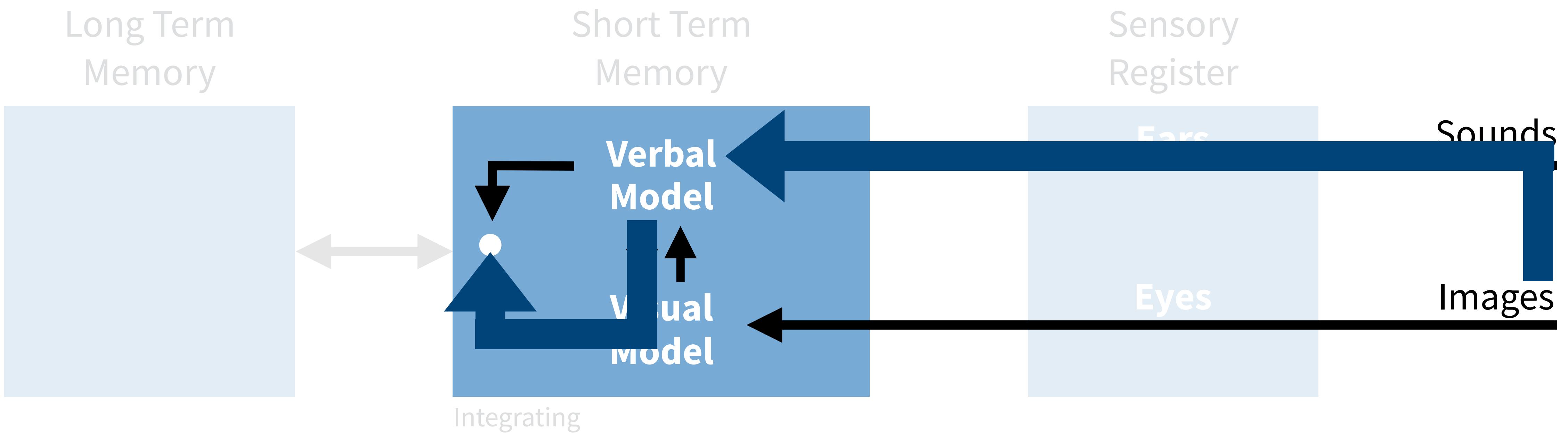
[nationalgeographic.com](#)

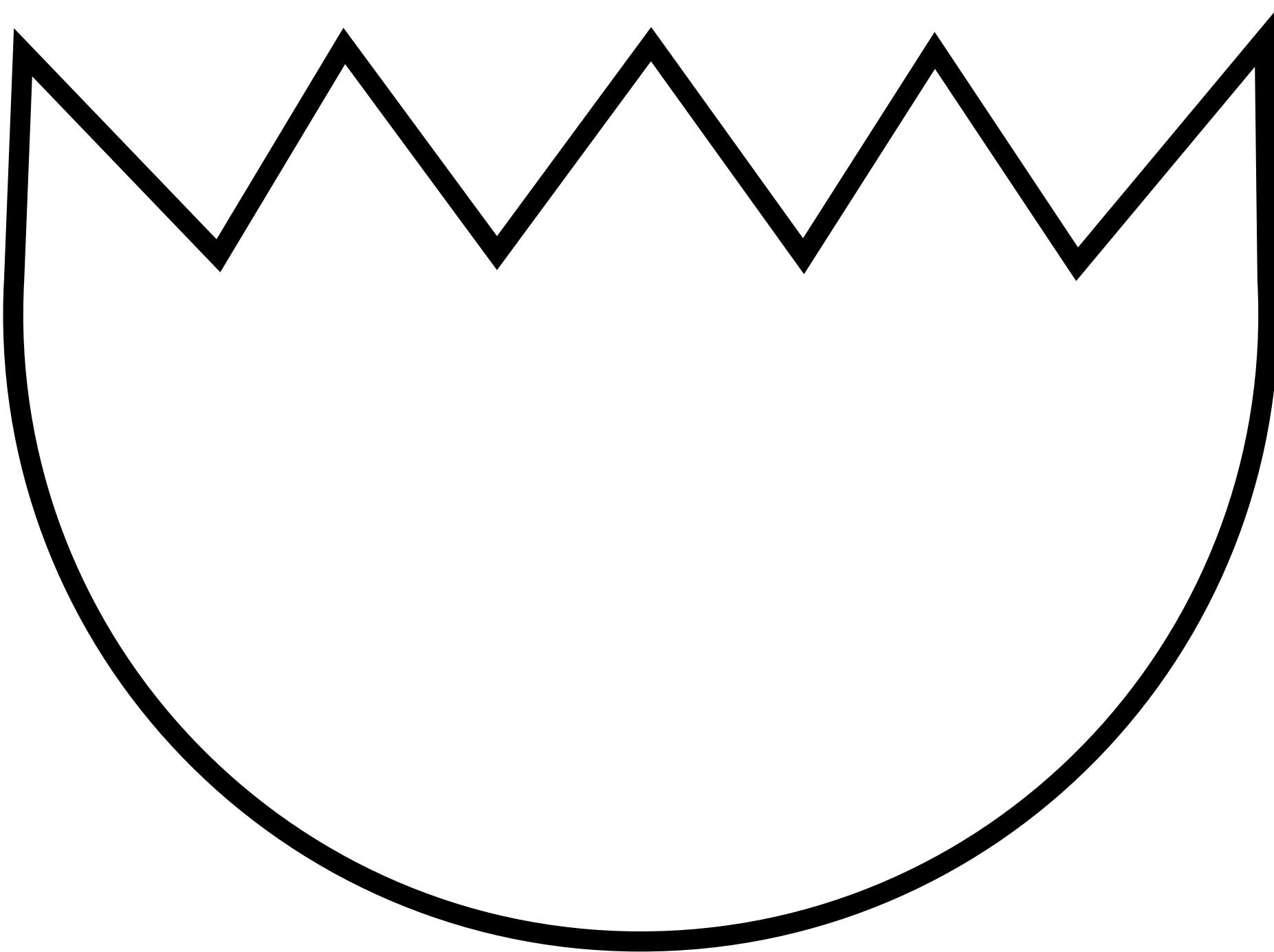
# Dual Coding Theory



- Adapted from Mayer, R. E. (2002). Multimedia learning. Psychology of learning and motivation, 41, 85-139. Chicago

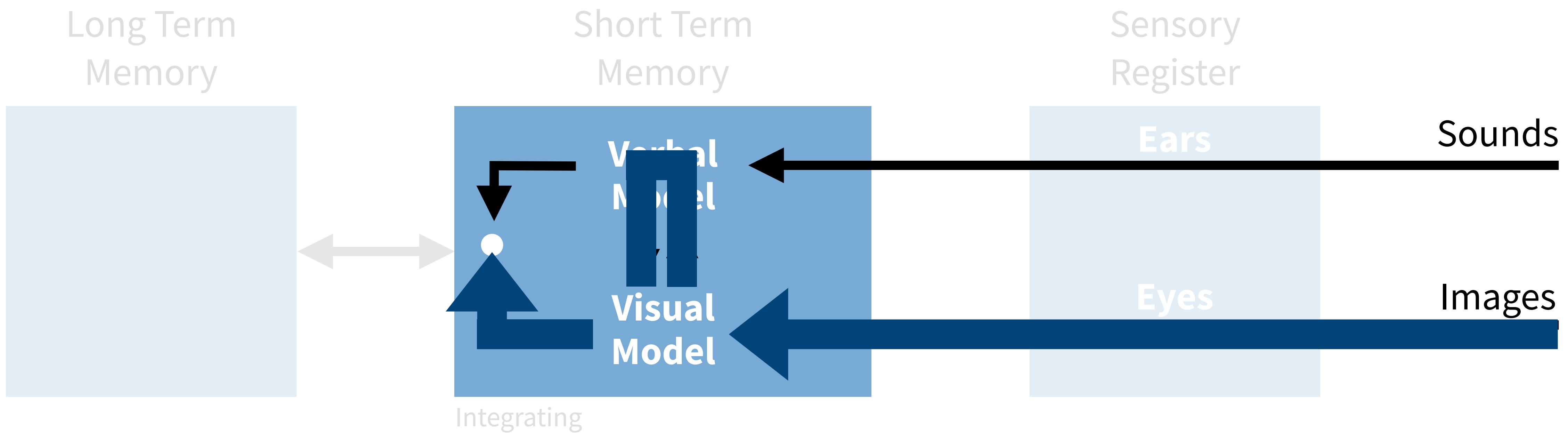
# Dual Coding Theory



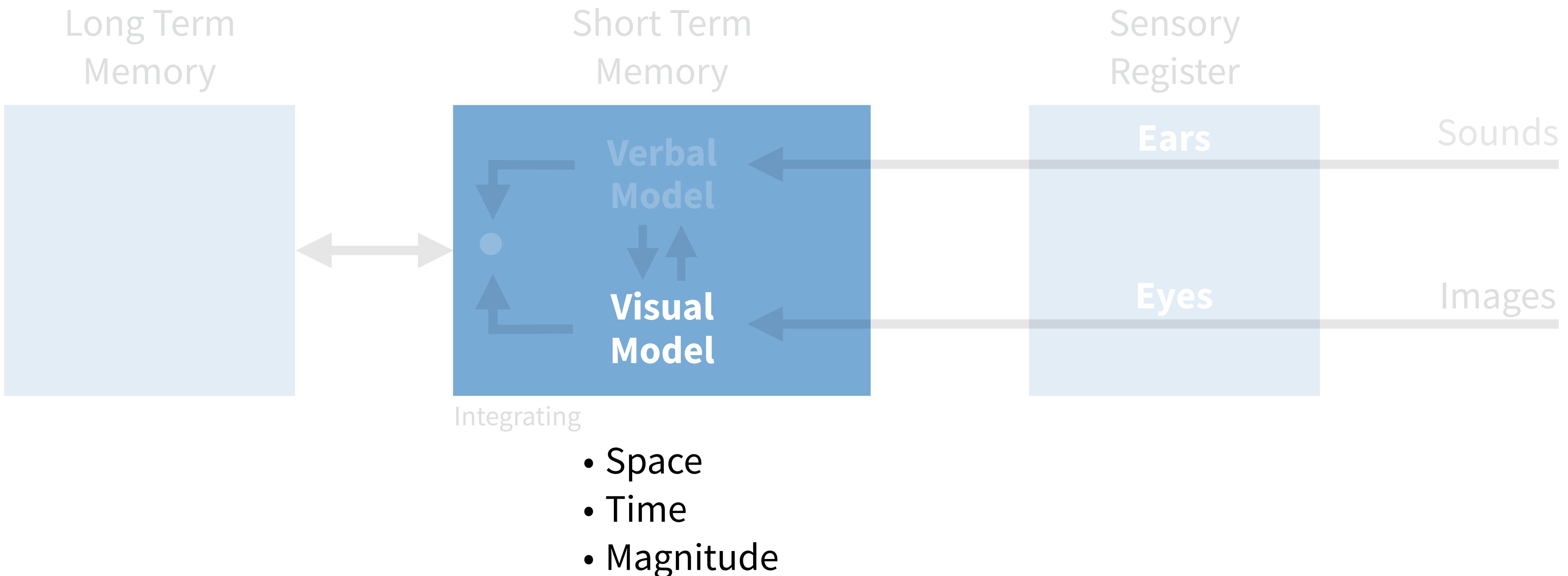


Picture a shape that is a half circle on the bottom, but a flat squiggly line across the top.

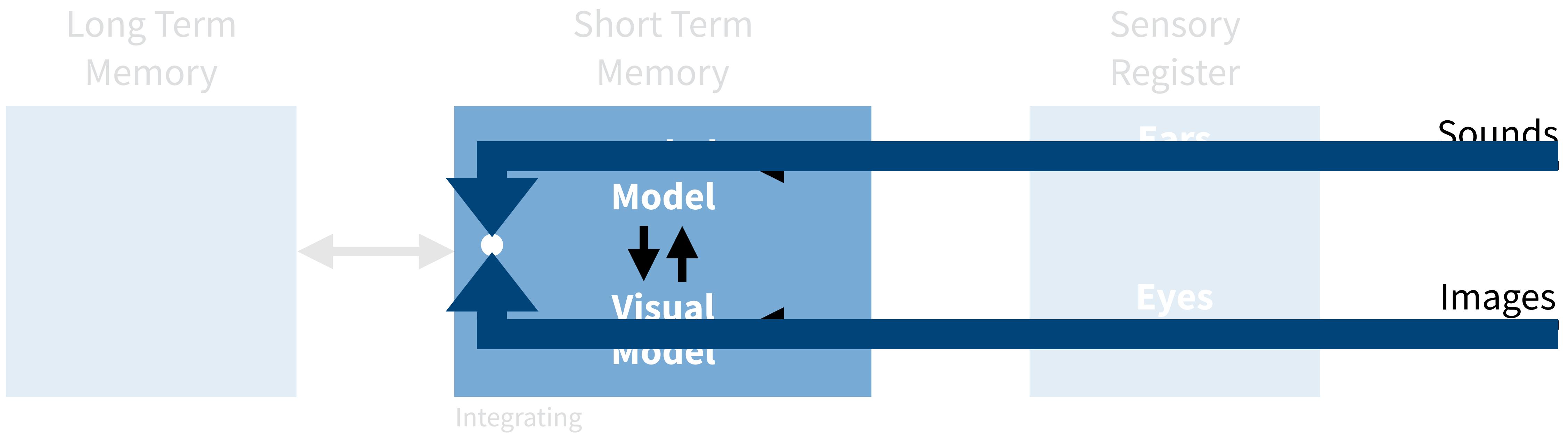
# Dual Coding Theory



# Dual Coding Theory



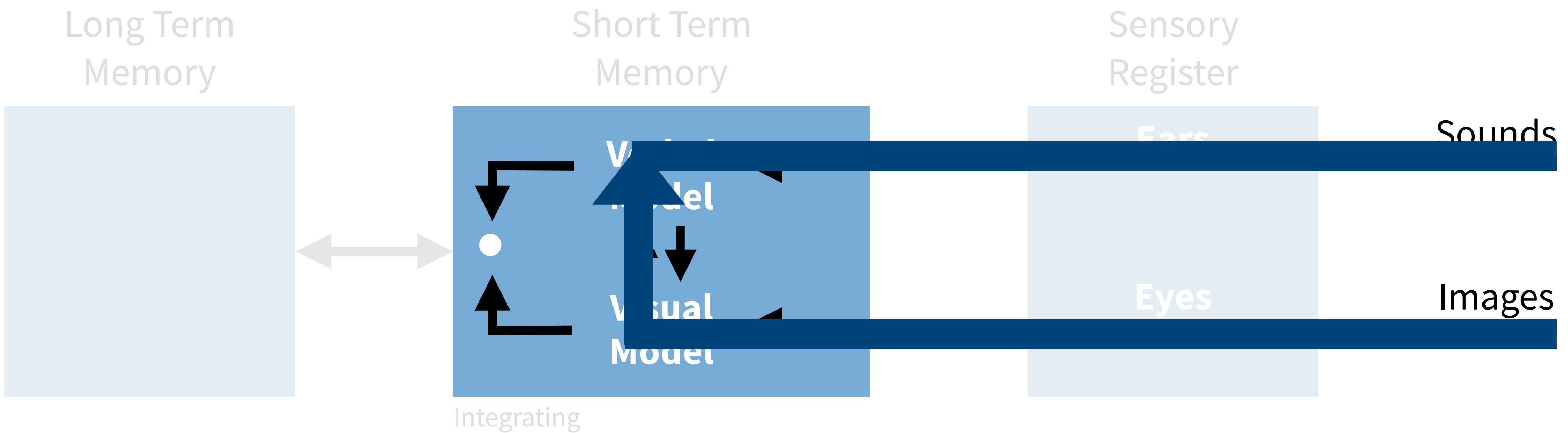
# Dual Coding Theory



We're excited to announce [community.rstudio.com](https://community.rstudio.com), a new site for discussions about RStudio, the tidyverse, and friends. To begin with, we're focussing on three main areas: The Tidyverse, Shiny, and the RStudio IDE.

In the near future, we expect to launch a category for RStudio admins. This will be a place to coordinate knowledge about best practices for installing, configuring, and managing RStudio products, and for running R in production. Stay tuned for more details!

# Dual Coding Theory



# Your Turn

What is the most common way to pair visual and verbal information in a presentation?

# Slides

The image shows a collage of four overlapping slides. The top-left slide has a green background with a faint circular watermark. The top-right slide has a light blue background with a faint circular watermark. The bottom-left slide has a white background with a faint circular watermark. The bottom-right slide has a white background with a faint circular watermark. Overlaid on these slides are several text elements and a small illustration:

- A large, bold, black text "Make it Clear" is positioned in the center-right area.
- A small, dark illustration of a person standing on a rocky shore, looking through a telescope at the horizon, is located in the bottom-right corner of the bottom-right slide.
- Faint, semi-transparent text is visible across the slides, including "What is it?", "CC BY-SA RStudio", and "CC BY-SA RStudio".

# Your Turn

Complete the handout.



# Slides

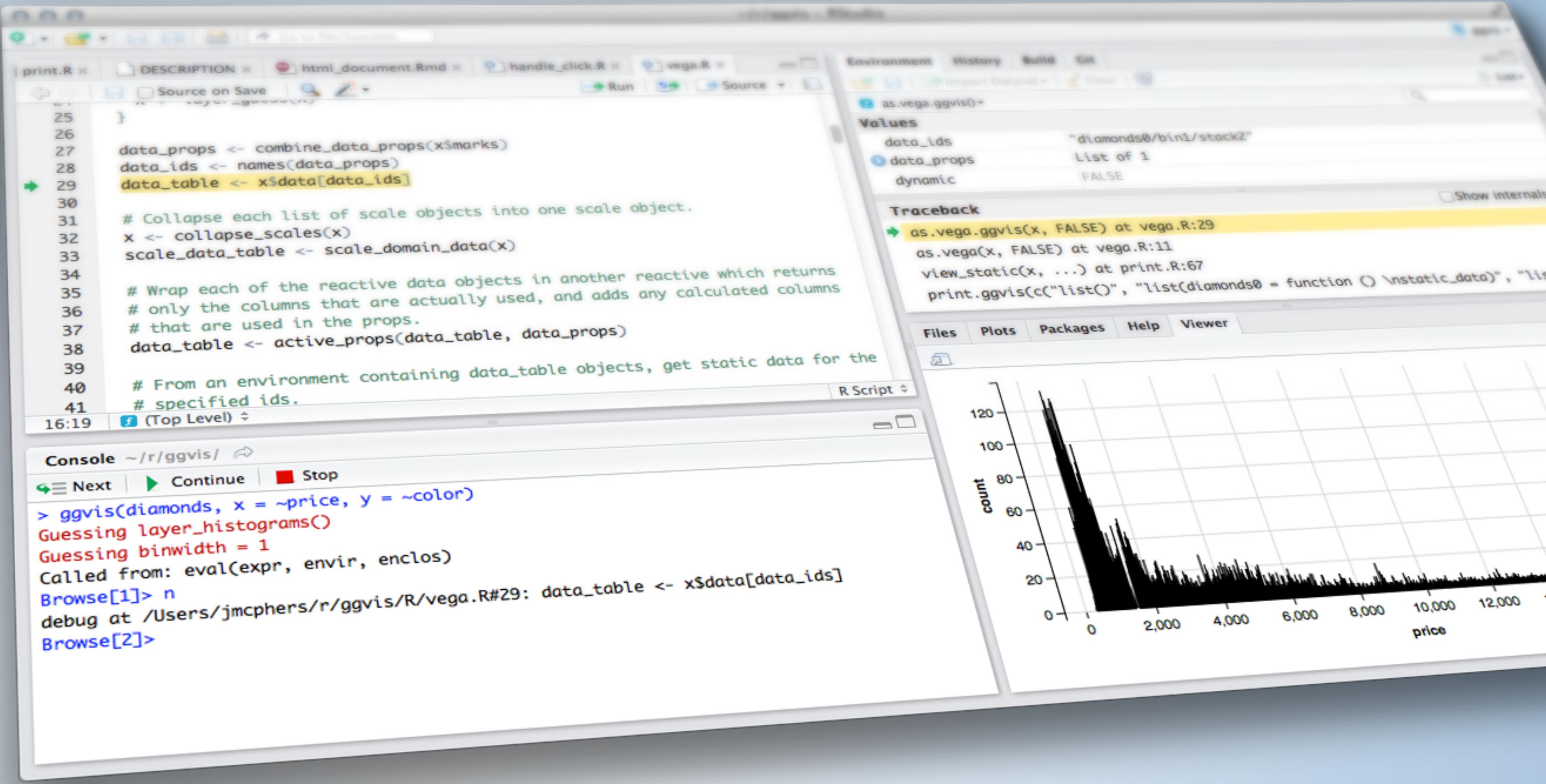


# Your Turn

What works **well** in the following slide presentation?

What works **poorly** in the following slide presentation?

# WHAT IS SHINY?



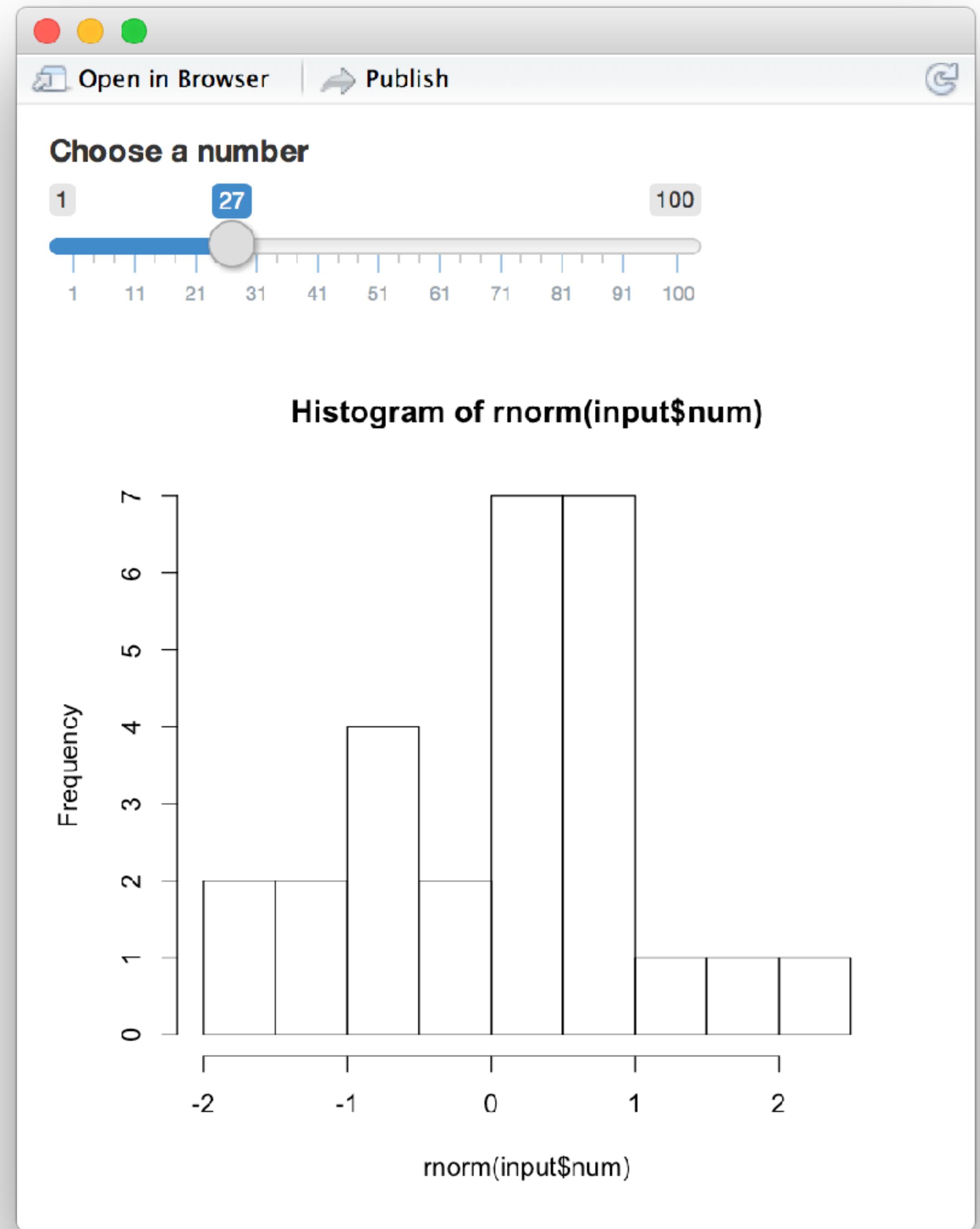
Shiny from  R Studio

Shiny is an R package that makes it easy to build interactive web apps straight from R.

Shiny applications have two components, a user interface object and a server function. You create an app by defining these components and then passing them as arguments to the shinyApp() function.

When you run shinyApp(), R launches a web server that serves up a webpage, the one defined by the user interface object of your app. Parts of that webpage will be interactive. For example, they might contain drop down menus or sliders. A user can interact with these parts to change an input value used by the app. When this happens, R will immediately run code to update the output values displayed by the app.

You can launch this webserver locally on your computer, or you can place the app online with a Shiny Server Pro or shinyapps.io.



# Multimedia Learning Theory

# Multimedia Learning Theory

1. There are **two channels** for processing information:  
visual and verbal/acoustic.
2. Each channel has a **limited capacity**.
3. Learning is an **active process**.
  - [Mayer, R. E. \(2002\). Multimedia learning. Psychology of learning and motivation, 41, 85-139. Chicago](#)

# Multimedia Learning Theory

1. Dual Coding Theory

2. Cognitive Load Theory

3. Active Learning

- Mayer, R. E. (2002). Multimedia learning. Psychology of learning and motivation, 41, 85-139. Chicago

# Your Turn

Complete your handout in your own words as we go.

# Multimedia Principle

city	large	small
New York	23	4
London	2	6
Beijing	121	56

city	large	small
New York	23	4
London	2	6
Beijing	121	56

*Variables in the columns*



# Redundancy Principle

	city	large	small
New York	3	4	
London	2	6	
Beijing	121	56	

*Variables in the columns*



	city	large	small
New York	3	4	
London	2	6	
Beijing	121	56	

*Variables in the columns*



**Variables in  
the columns**



# Coherence Principle

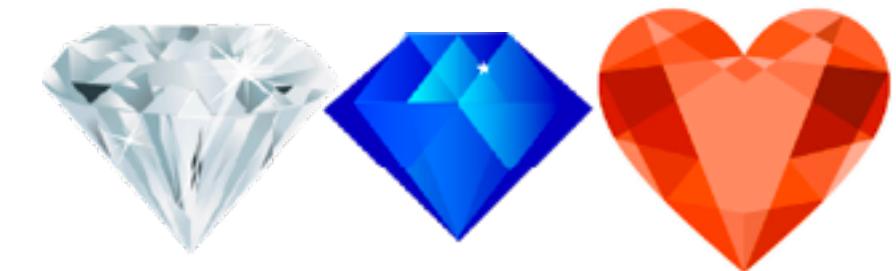
	city	large	small
city	New York	13	4
large	London	2	6
small	Beijing	121	56

*Variables in the columns*



	city	large	small
city	New York	13	4
large	London	2	6
small	Beijing	121	56

*Variables in the columns*



diamonds from  
the ggplot2  
package

*Blah...*

*Blah...*

*Blah...*

# Pre-Training Principle

Previously...

Variables are \_\_\_\_\_



Columns are \_\_\_\_\_



	city	large	small
New York	3	4	
London	2	6	
Beijing	121	56	

Variables in the columns



city	large	small
New York	3	4
London	2	6
Beijing	121	56

Variables in the columns



# Signaling Principle

```
babynames %>%  
  group_by(name, sex) %>%  
  ungroup() %>%  
  summarise(total = sum(n)) %>%  
  arrange(desc(total))  
#> #> total  
#> #> 1 340851912
```

```
babynames %>%  
  group_by(name, sex) %>%  
  ungroup() %>%  
  summarise(total = sum(n)) %>%  
  arrange(desc(total))  
#> #> total  
#> #> 1 340851912
```

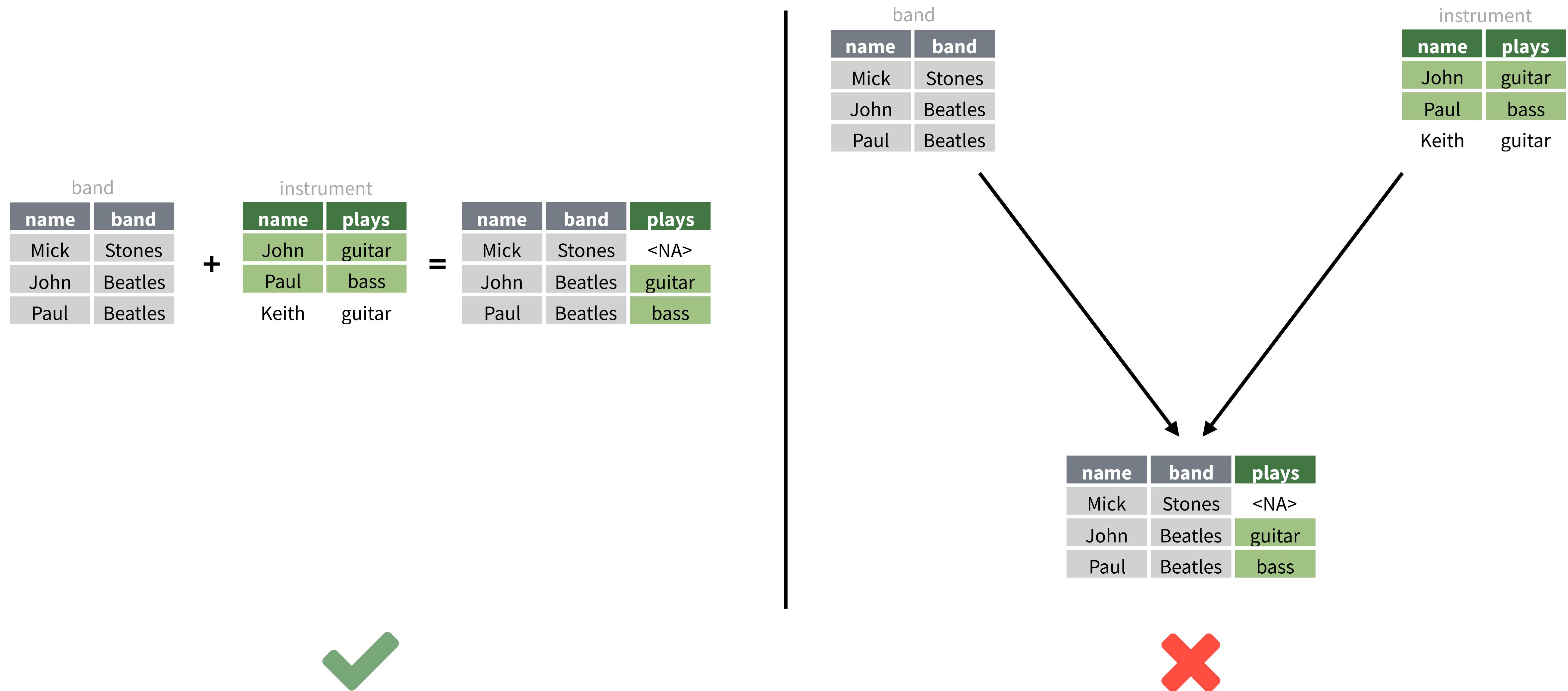
*Use ungroup()  
to...*



*Use ungroup()  
to...*



# Spatial Contiguity Principle



# Temporal Contiguity Principle

band	
name	band
Mick	Stones
John	Beatles
Paul	Beatles

+

instrument	
name	plays
John	guitar
Paul	bass
Keith	guitar

=

name	band	plays
Mick	Stones	<NA>
John	Beatles	guitar
Paul	Beatles	bass



# Modality Principle

```
mod <- (tc2009 ~ low, data = crime)
```

*modelling  
functions share  
the same syntax*

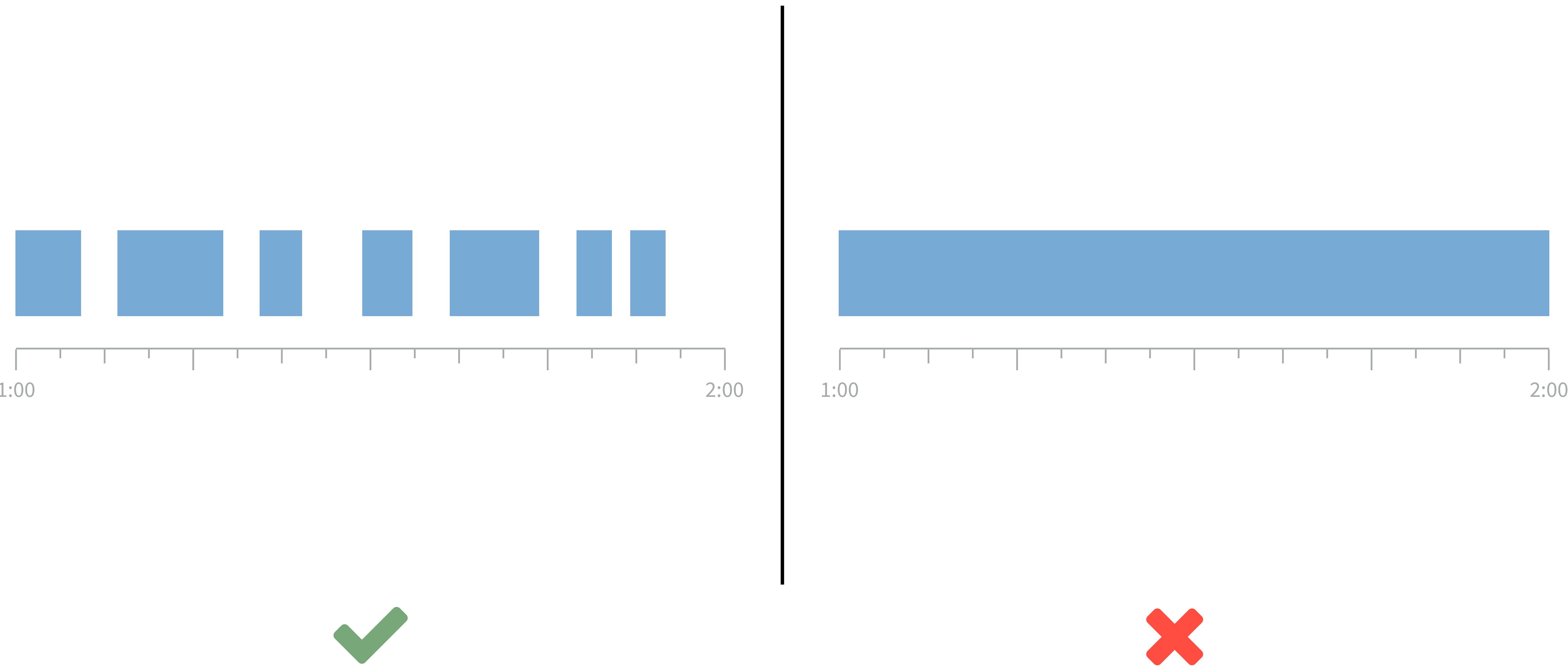


**Modelling functions share a syntax**

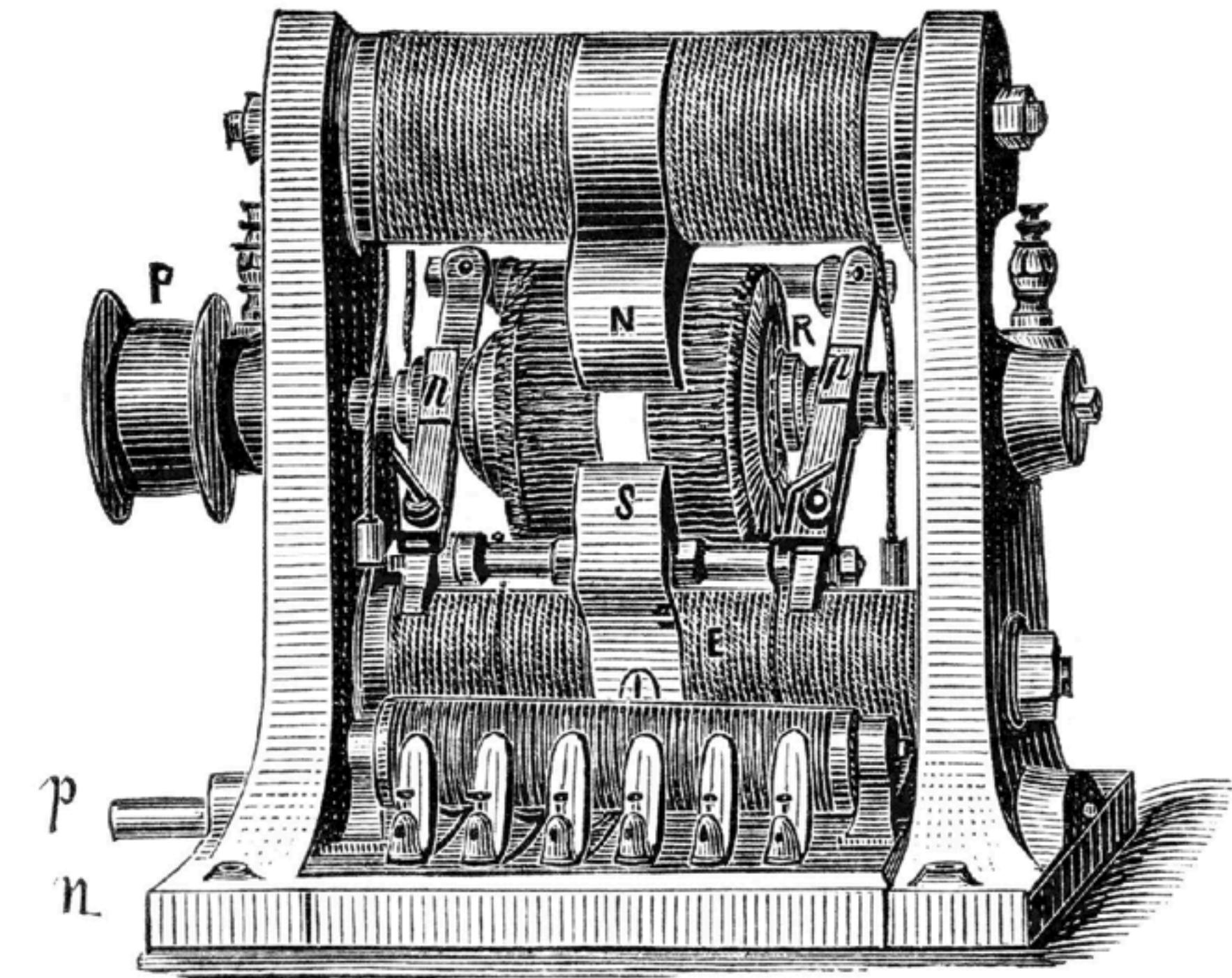
```
mod <- (tc2009 ~ low, data = crime)
```



# Segmenting Principle



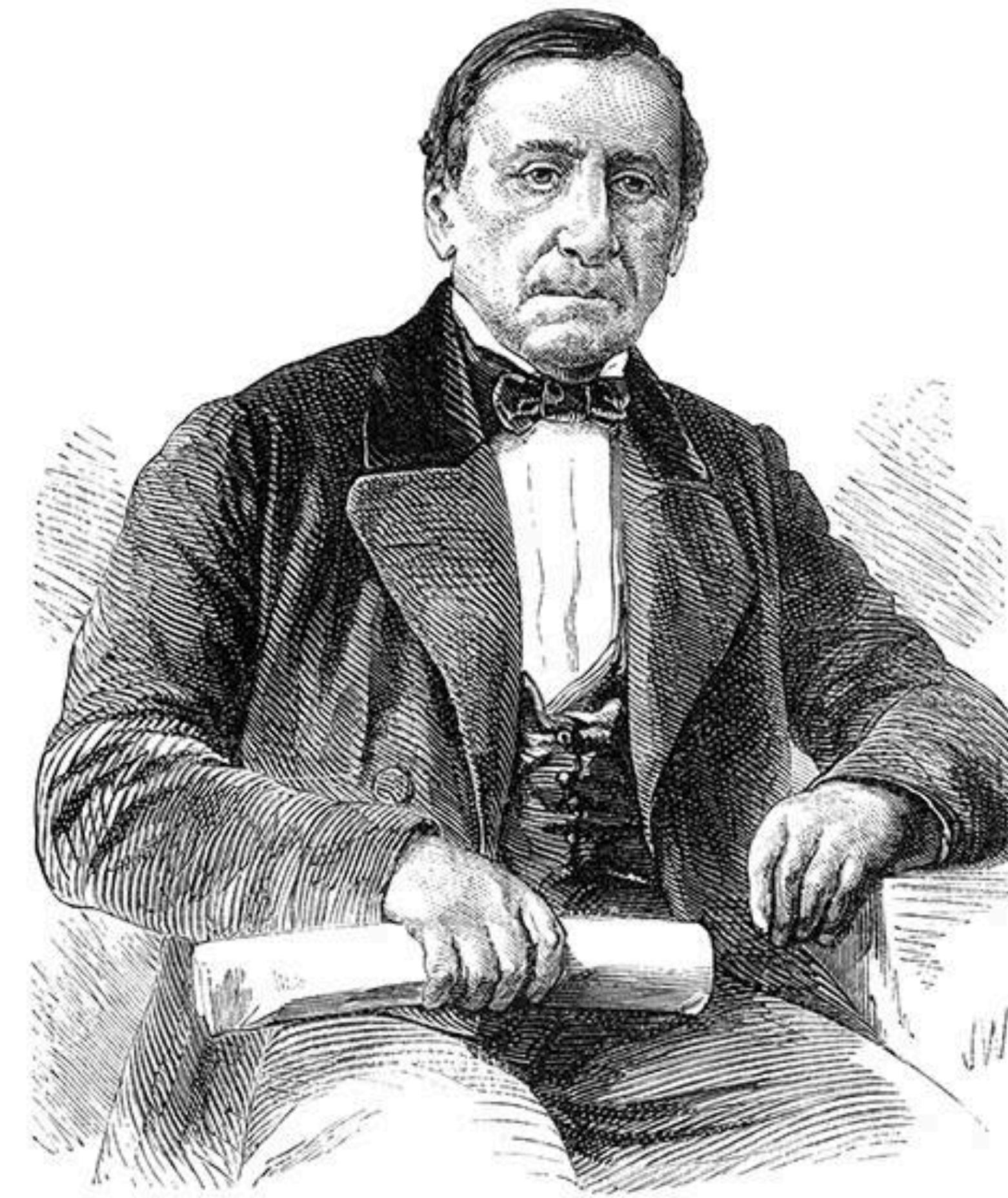
# Voice Principle



oldbookillustrations.com



# Personalization Principle



# Your Turn

Choose a slide from today's slides or from Master the Tidyverse. Use Multimedia Learning Theory to improve the slide.



# Your Turn

Complete the Make it Clear handout.



# Application

R

# Your Turn

Use what you have learned to recreate your explanation as a visual and verbal presentation.  
(~5:00).

Use images.\* as a resource for building slides.

# Your Turn

In your original group, take turns delivering your presentations and providing feedback.

# Make it Clear

