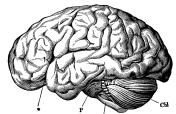


How to Teach All the Things (including Shiny and the Tidyverse)



Multimedia Learning

1

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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**.

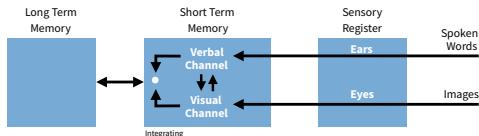
2

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The definitive summary of this research is the book MultiMedia Learning Theory, and I recommend it to you if you are interested. However, the important takeaways are easy to share here.

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

Dual Coding Theory



3

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One reason for this is that our brain uses a different cognitive pathway to process visual information than it does other types of information, such as verbal or symbolic information.

This has a direct effect on extrinsic load, the bad type of load. Suppose I am trying to explain something visual to you, like the shape of an object. If I tell you that the object looks like a circle on the bottom, but is flat on the top with five spiky parts, it will take more cognitive load to make sense of what I am saying than it would to just show you the object.

Multimedia Principle

The diagram illustrates the Multimedia Principle by showing two tables side-by-side. The left table has three columns: 'New York' (top), 'London' (middle), and 'Beijing' (bottom). The right table has four columns: 'New York' (top), 'London' (second), 'Beijing' (third), and 'all' (bottom). Arrows indicate vertical movement between rows and horizontal movement between columns. A speech bubble contains the text "Variables in the columns". Below the tables are two icons: a question mark inside a green square and a red square with a question mark.

Variables in the columns

?

?

Multimedia Principle: people learn better from words and pictures than from pictures alone.

Redundancy Principle

Variables in the columns

Variables in the columns

Variables in the columns

5

Redundancy Principle: do not use text to repeat information delivered auditorily.

The diagram illustrates the Coherence Principle in ggplot2. It consists of two side-by-side plots separated by a vertical line.

Left Plot: Shows a data frame with four rows: New York, London, Paris, and Beijing. Each row has three double-headed arrows pointing up to the column headers 'New York', 'London', 'Paris', and 'Beijing' respectively. Below the plot, a speech bubble contains the text "Variables in the columns". A question mark icon is at the bottom left.

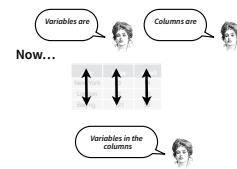
Right Plot: Shows the same data frame. The first three rows (New York, London, Paris) have double-headed arrows pointing up to their respective column headers. The fourth row (Beijing) has a single-headed arrow pointing down to its column header. Below the plot, a speech bubble contains the text "Variables in the columns". Three speech bubbles above the plot contain the text "Blah... Blah... Blah...". A question mark icon is at the bottom left.

6

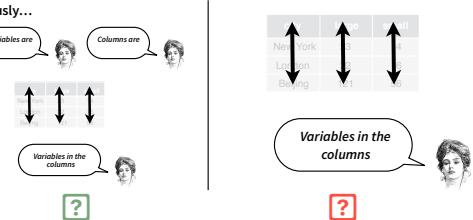
Coherence Principle: exclude extraneous words, pictures, sounds.

Pre-Training Principle

Previously...



Now...



Pre-training Principle: explain the names and characteristics of the main concepts ahead of time.

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...

Signaling Principle: highlight essential material and the organization of the material.

Spatial Contiguity Principle

band	
Mick	Stones
John	Beatles
Paul	Beatles

play	
John	guitar
Paul	drums
Keith	guitar

play	
Mick	Stones
John	Beatles
Paul	Beatles

Spatial Contiguity Principle: put related material close to each other, not far apart.

Temporal Contiguity Principle

10

Temporal Contiguity Principle: present related material simultaneously instead of successively.

name	band
Mick	Stones
John	Beatles
Paul	Beatles

+ instrument

name	plays
John	guitar
Keith	guitar

= name band plays

Mick	Stones	drums
John	Beatles	drums
Paul	Beatles	bass

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Modality Principle

11

Modality Principle: move text to narration when the visual channel is overloaded (e.g. due to animations).

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

Modelling functions share a syntax

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

*modelling
functions share
the same syntax*

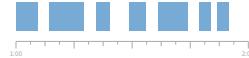


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Segmenting Principle

12

Segmenting Principle: people learn better from user paced segments than from a continuous whole.



100 100 100 100 100 100 100 100 100 100 200

?

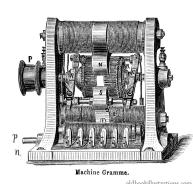


100 100 100 100 100 100 100 100 100 100 200

?

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Voice Principle



13

Voice Principle: people learn better when words are delivered in a friendly human voice (versus e.g. a computer voice).

Personalization Principle



14

Personalization Principle: people learn better when words are delivered in a conversational style instead of a formal style.

"Learning Styles" Are a Myth

~~Visual
Auditory
Kinesthetic~~

15

Note: VAK is a myth – after repeated study, there is no evidence that matching instructional styles to people's declared preference improves outcomes. (Meyer-Briggs is pseudoscience too, in case you were wondering...)

Create a Visual

16

1. Sketch a small single-page cartoon that captures one core idea from the class you are next going to teach.
2. Compare it with your neighbor's. What is one feature of yours that can be removed? What one feature should be added?

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