Deliberate Doodling: Visualizing Course Concepts with Sketchnotes

Alan Russell
Deliberate Doodling

- What are Sketchnotes?
- Dual coding theory.
- Moving beyond illustration.
- Metaphor and Simile.
- Student Examples
- Where can we go?
What are Sketchnotes?

• Visual Note Taking.
• Research, Gather Materials, Arrive Early, Create a Title, Sketchnote, Photograph.
• Focus on simple drawings and typography.
• Largely processing lectures.
What are Sketchnotes?
**FIVE BASIC ELEMENTS** Exercise

Now it's time for you to draw! In the grid below, use the five basic elements—square, circle, triangle, line, and dot—to create drawings of each word in the grid. If you get stuck, skip to the next word.

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Dual Coding Theory

• Initially proposed by Allen Paivio in 1960s.
• Powerful mnemonic effects of imagery on memory.
• Stood the test of time in face of controversy.
• Paivio (2007) has continued to develop, elaborate, and defend it.
Moving Beyond Illustration

Making Peace With Regret

The Universality

"We're all in this together"

Laugh

At yourself

Allow for the Passage of time

Source: Kathryn Schulz TedTalk

thegraphicrecorder.com
Moving Beyond Illustration

Introduction to Mathematical Thinking: What is mathematics? Background Reading by Keith Devlin

- More than arithmetic

Past

Development of mathematics

Development of math education

Present

- Complexity Theory
- Dynamical Systems Theory
- Many more...

Math as Science of Patterns

Numbers for arithmetic

Geometry

Math as Area of Study

Calculus

Probability Theory

The Era of Greek Mathematics

Where high school education stops
Metaphor and Simile

- **Metaphor** is a rhetorical device that transfers the sense or aspects of one word to another.
- “The moon was a ghostly galleon tossed upon cloudy seas.” — *The Highwayman*, Alfred Noyes.
- A **simile** is a type of metaphor in which the comparison is made with the use of the word *like* or its equivalent.
- “My love is like a red, red rose.” — Robert Burns
Mind is Like . . .

• Choose the most obvious metaphor for the mind.
• Take a moment to point out the similarities.
• Take those to the extreme.
• *Elaboration* from Williams’ Taxonomy of Creative and Divergent Thinking.
Mind is Like . . .

- A Snow Globe
- A Machine
- A Black Hole
- Google
- A Scrapbook
- A Computer
My mind is like a steel trap, rusty and illegal in 37 states.

Your mind is like a motorway - sometimes it can be jammed by too much traffic - avoid the jams by never using your mind on a holiday weekend.

A weak mind is like a microscope, which magnifies trifling things, but cannot receive great ones.

(Lord Chesterfield)
Your mind is like a parachute. It only works if it is open.
Student Examples

• Illustration
Student Examples

- Illustration
  Not always helpful!

Single Blind
- when participants don’t know if they are in the treatment or control group

Double Blind
- if neither the participants nor any experimenters know who belongs to the treatment or control group
Student Examples

- Illustration

**CHAPTER 4**

4.1 What's average?

4 + 4 + 6 + 7 + 11 = 30

\[ \text{median} = \text{middle #} \]

\[ \frac{4 + 4 + 6 + 7 + 11}{5} = \frac{30}{5} = 6.4 \]

\[ \text{mean} = \text{average} \]

**Outliers**

- Effect the mean
- Median is resistant

\[ Q_1, Q_3 \]

\[ Q_3 + 1.5 \times \text{IQR} = \text{Outlier} \]

\[ Q - 1.5 \times \text{IQR} = \text{Outlier} \]
Student Examples

- Illustration

2. SHAPES OF DISTRIBUTIONS

- Left skewed (symmetric)
- Right skewed

Variation:
- Low
- Moderate
- High
Bar Graph
- Frequency
- Title

Pareto
- Shows bars in descending order

Stem & Leaf

Dot Plot
- Represents 1 data value

Pie Chart
- 36%
- 16%
- 12%
- 8%
- 28%
- Qualitative data

Histogram

Line Chart
- Quantitative data
Central Limit Theorem:
- No matter the sample size, a large enough sample will always turn average.

Confidence Intervals:
- Calculate the:
  - Mean ($\bar{x}$)
  - SD ($s$)
  - Sample Size ($n$)

46% or $\bar{x}$ or $p$ = Point Estimate

50% or $\pm 4\%$ = Margin of Error

Have your guess and then find "wiggle room" and MOE

Confidence intervals must be symmetric.
A lower sample size produces a higher confidence interval.
Student Examples

• Metaphor

![Image of a sketch with a margin of error and a point estimate]
Student Examples

• Metaphor
Student Examples

• Metaphor
  Recreated faithfully from a student test.
Takeaways

• Illustration probably never hurts.
• Metaphor seems much more profitable for learning.

Explain the concept of confidence intervals to a fellow student using this little guy from our Sketchnotes.
Where can we go?
Where can we go?
## Williams’ Taxonomy

### Ways to Think
- **Fluency**
  - Many solutions.
- **Flexibility**
  - Restricted solutions.
- **Originality**
  - Combining two.
- **Elaboration**
  - More details.

### Ways to Act
- **Risk-taking**
  - Embrace failure.
- **Complexity**
  - Finding order in chaos.
- **Curiosity**
  - Lifelong learning.
- **Imagination**
  - Mental pictures.
**FIVE BASIC ELEMENTS Exercise**

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<td>LAPTOP</td>
<td>COFFEE MUG</td>
<td>BOAT</td>
<td>IGLOO</td>
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<tr>
<td><img src="image" alt="Laptop" /></td>
<td><img src="image" alt="Coffee Mug" /></td>
<td><img src="image" alt="Boat" /></td>
<td><img src="image" alt="Igloo" /></td>
</tr>
<tr>
<td>CAT</td>
<td>DOG</td>
<td>TRUCK</td>
<td>TRAIN</td>
</tr>
<tr>
<td><img src="image" alt="Cat" /></td>
<td><img src="image" alt="Dog" /></td>
<td><img src="image" alt="Truck" /></td>
<td><img src="image" alt="Train" /></td>
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<tr>
<td>TRACTOR</td>
<td>LIGHTBULB</td>
<td>EARTH</td>
<td>SATURN</td>
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<td><img src="image" alt="Tractor" /></td>
<td><img src="image" alt="Lightbulb" /></td>
<td><img src="image" alt="Earth" /></td>
<td><img src="image" alt="Saturn" /></td>
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<td>MOUNTAIN</td>
<td>TREE</td>
<td>HAMMER</td>
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<td><img src="image" alt="Mountain" /></td>
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<td>FISH</td>
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<td>FLASHLIGHT</td>
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<td>SUBMARINE</td>
<td>SANDWICH</td>
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<td>HEADPHONES</td>
<td>MILK JUG</td>
<td>BATTERY</td>
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<td>MINIVAN</td>
<td>BIKE</td>
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<td>BASEBALL CAP</td>
<td>T-SHIRT</td>
<td>SHOES</td>
<td>TRASH CAN</td>
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<tr>
<td>HAMBURGER</td>
<td>PEN</td>
<td>PENCIL</td>
<td>WATCH</td>
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**DRAWING PEOPLE Exercise**

In the grid below, use the Gray Method to draw people. I’ve written some suggestions in the open grids to challenge you a bit. Try adding clothes, shoes, hats, and other details — have fun!

<table>
<thead>
<tr>
<th>STANDING</th>
<th>RUNNING</th>
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<tr>
<td><img src="image" alt="Standing drawing" /></td>
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<tr>
<th>WALKING</th>
<th>JUMPING</th>
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<td><img src="image" alt="Walking drawing" /></td>
<td><img src="image" alt="Jumping drawing" /></td>
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<td>SITTING</td>
<td>ON THE PHONE</td>
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<td>DAD &amp; SON WALKING</td>
<td>BACKPACKER</td>
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<td>TENNIS PLAYER</td>
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**DRAWING FACES Exercise**

Now it’s your turn to create faces using Austin’s approach:

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Next, try that same technique on some blank faces:
DRAW MORE FACES Exercise
Now it’s time to create more faces. I’ve provided a few eye and mouth options, but feel free to make up your own.

WHAT OTHER FACIAL EXPRESSIONS CAN YOU CREATE?
DRAWING TYPE Exercise

Practicing hand-lettering techniques will help you quickly create type for your sketchnotes in a meeting. Use these pages to practice creating single-line, two-line, triple-line, and block lettering.

SINGLE-LINE LETTERING:

ABCabc

TWO-LINE LETTERING:

ABCabc
TRIPLE-LINE LETTERING:

ABCabc

BLOCK LETTERING:

ABCabc
**VISUAL LIBRARY Exercise: Kitchen**

In the grid below, draw as many items from your kitchen from memory as you can recall. Remember to use the five basic elements to draw the images you’re seeing in your head.

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**VISUAL LIBRARY Exercise: Office**

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