

Tactile Images

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THE PROBLEM

Individuals who are blind and/or visually impaired have no effective way of interacting with 2D visual information. Some of this information can be easily communicated with language vocally or using braille text, but some information is inevitably lost.

BACKGROUND

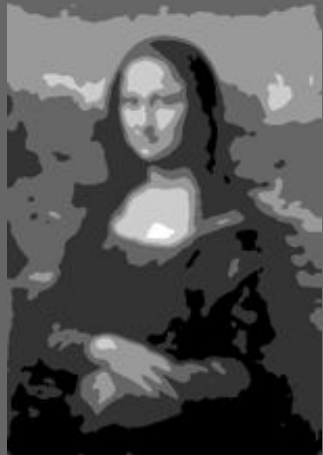
- Braille indicates that touch can be used to communicate complex information
- There are tactile image guidelines & best practices:
 - ◆ Avoid clutter
 - ◆ Use labels intelligently
 - ◆ Eliminate irrelevant information
 - ◆ Proofread with you fingers

HOW CAN WE TACTICALLY PORTRAY
THE VISUAL INFORMATION IN AN IMAGE?



Remove sharp
features

SMOOTHING

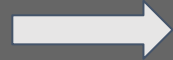


QUANTIZATION



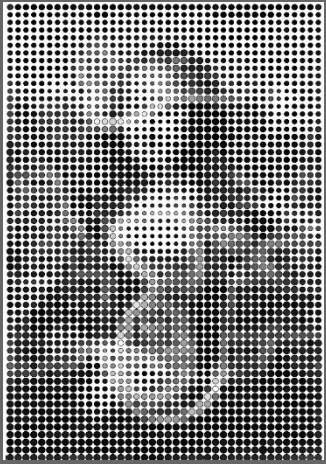
Reduce number
of intensity levels

Extrude

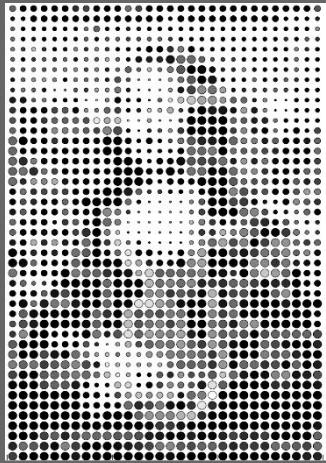


LESSONS

- Extrusion based on color intensity produces height maps which are not tactically meaningful
- Complex images get lost
- Scale required for representation can be difficult to use



HALFTONE

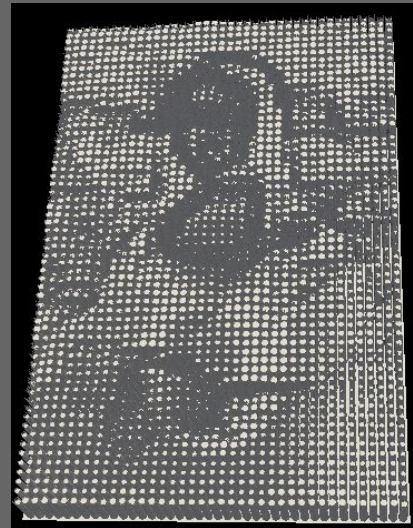
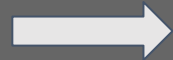


HALFTONE w/
gradients



Simple
elements,
reduces
resolution

Extrude



LESSONS

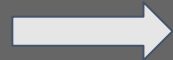
- Detailed images need high resolution of circles
- Unclear if image can be perceived with touch
- Appears that depth is more easier to perceive than size variation



High
gradient/s
alient
edges



Extrude



Dilate for
printability



LESSONS

- Highly abstract, easy to generate
- But, what is the value ? How does this aid or inform someone?

IS THERE A TYPE OF IMAGE
THAT FITS THIS APPROACH BETTER?

EDUCATIONAL DIAGRAMS

Simple diagrams are often used to help students create a mental model of concepts that are difficult to understand without the visual aid.

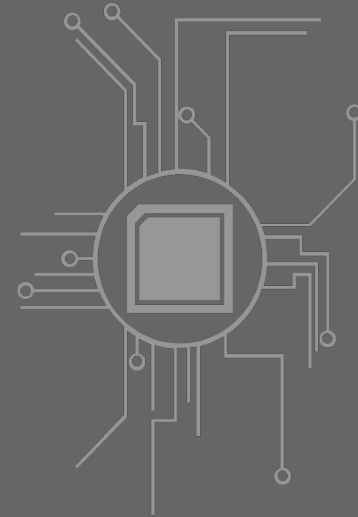
EDUCATIONAL DIAGRAMS



SOLAR SYSTEM

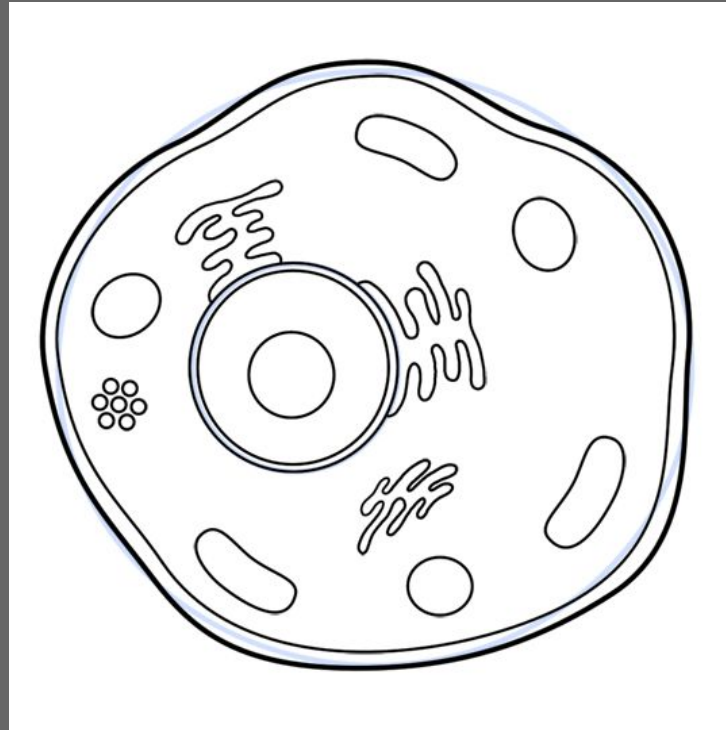
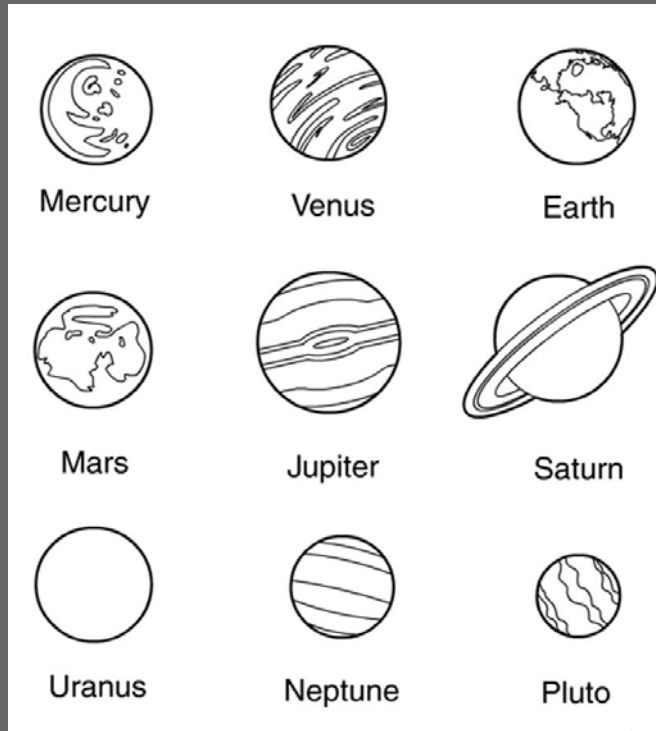


CELL

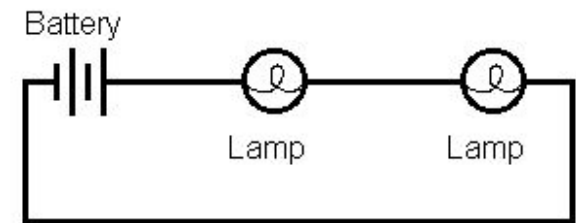


CIRCUIT

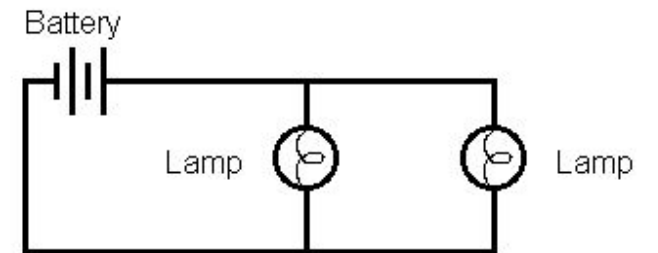
THE DIAGRAMS



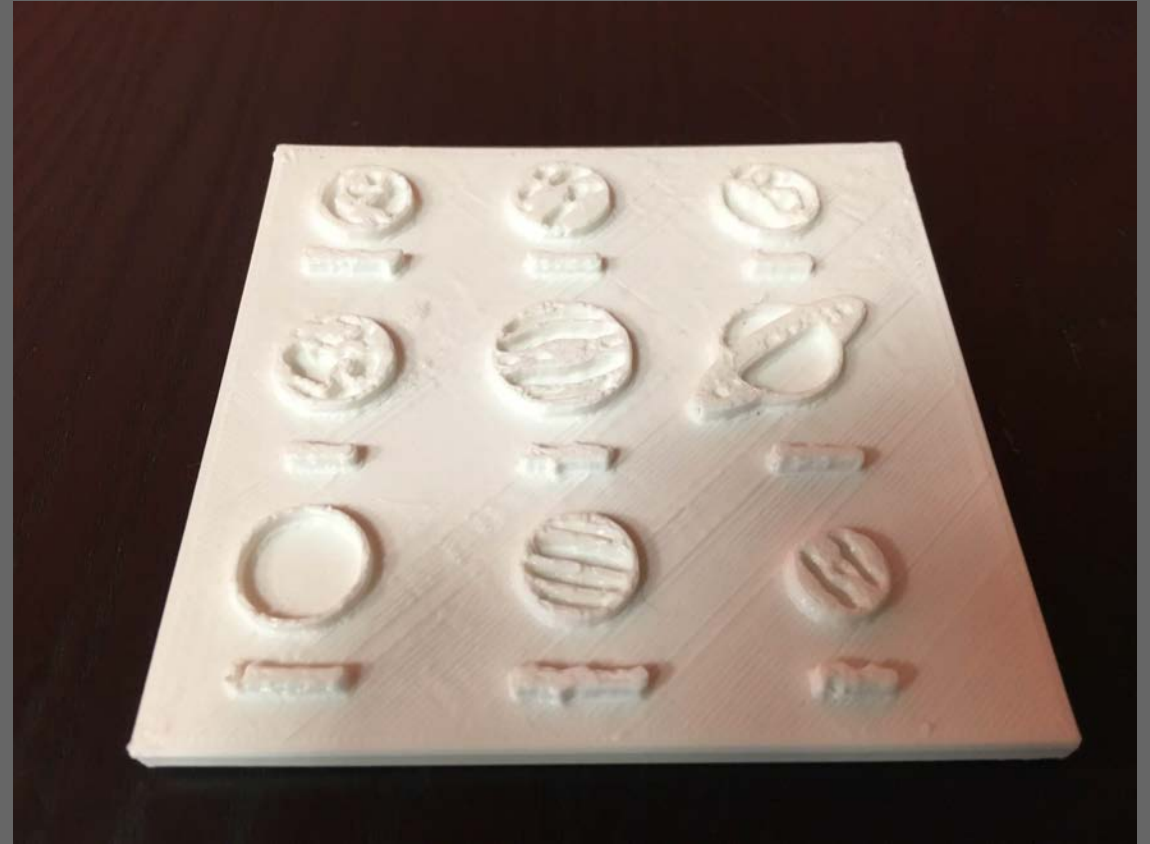
SERIES



PARALLEL



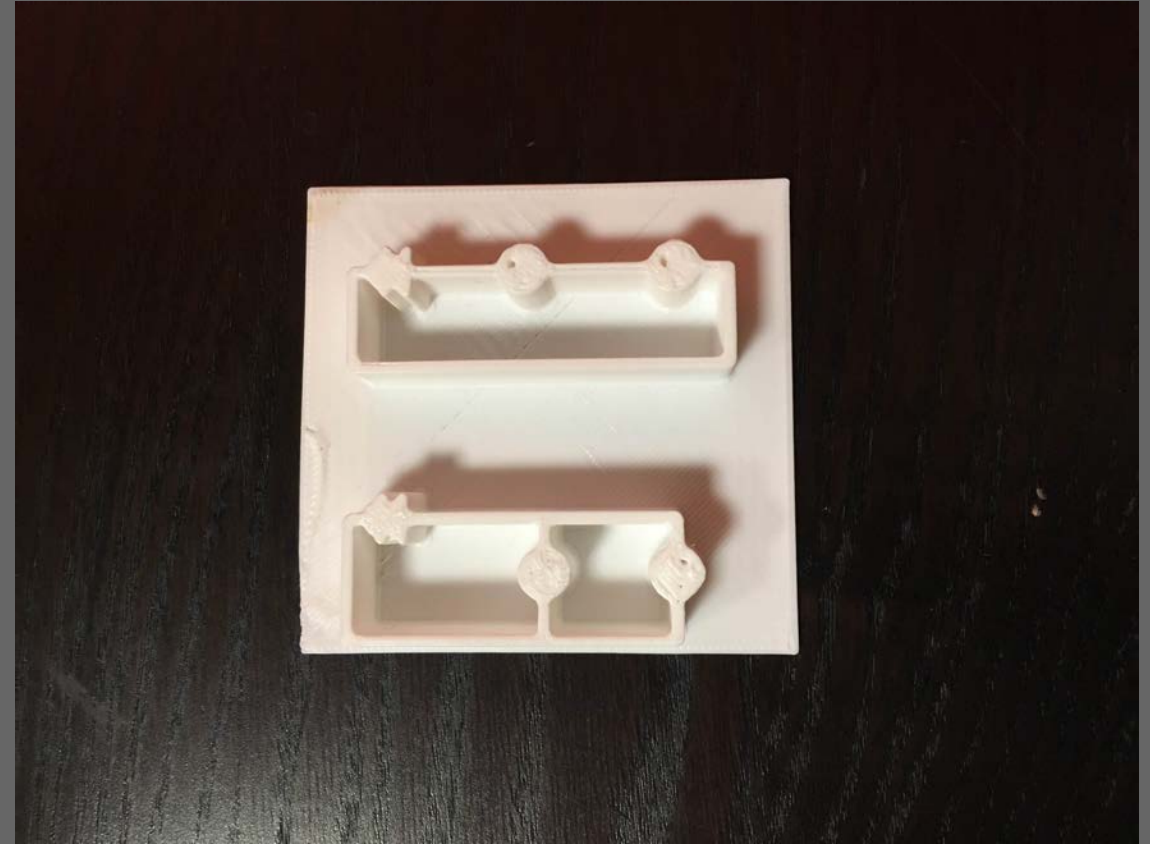
THE SOLAR SYSTEM



THE CELL



THE CIRCUIT



EDUCATIONAL APPLICATION



NEXT STEPS

The representation of complex images in a manner that aids perception proves to be very difficult whereas trying to replicate a simple diagram is very efficient.

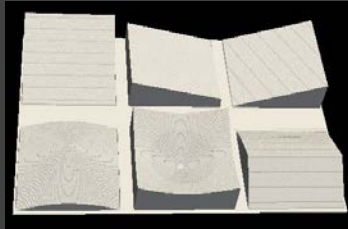
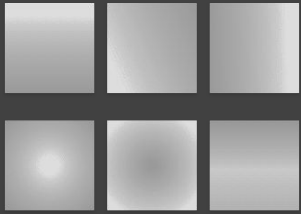
- Are there additional educational illustrations or diagrams that can be represented using this manner?
- Can we begin to use texture or material to add depth or reality to these diagrams?
- Is there a way to simplify the complex images in such a way it reads as a diagram? Or in those cases simply using braille or voice is more effective?

Thank you!

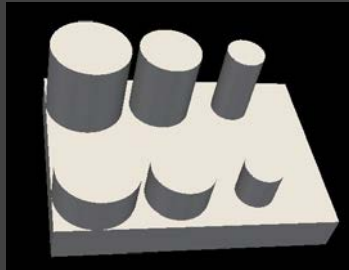
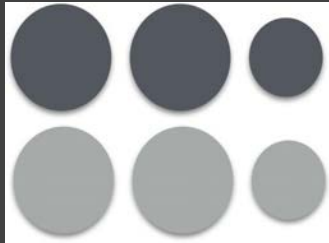
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Tests

Scale required for perceiving gradient variation



Depth vs size



Etching

Resolution vs perception

