



AP 2-D Art and Design Portfolio

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2025

Written Evidence

Sustained Investigation

Identify the inquiry that guided your sustained investigation.

Response:

How do we package reality to make sense of it—and what is lost in the process? Science uses equations and models, while the eye and brain filter signals to create a stable image. I aim to unpack these frameworks, revealing their distortions or oversimplifications. I explore concepts like the wave-particle duality of light, mass-energy equivalence, and illusions like Troxler fading and the Moiré effect and repackage them—through organic processes like screen printing and darkroom work; highlighting how our understanding is always imperfect, refined through trial, error, and reinterpretation.

Describe ways your sustained investigation developed through practice, experimentation, and revision.

Response:

Initially, my sustained investigation explored the physical properties of light through wave-particle duality, ray diagrams, and interference. However, through iterative material exploration—particularly layering, phototransfer, and distortion—I experienced a conceptual shift. I began to question how both scientific models and perceptual systems compress information into abstractions. This insight led me to expand my investigation from purely physical optics to optical illusions, focusing on how context, expectation, and visual systems construct and manipulate perception.

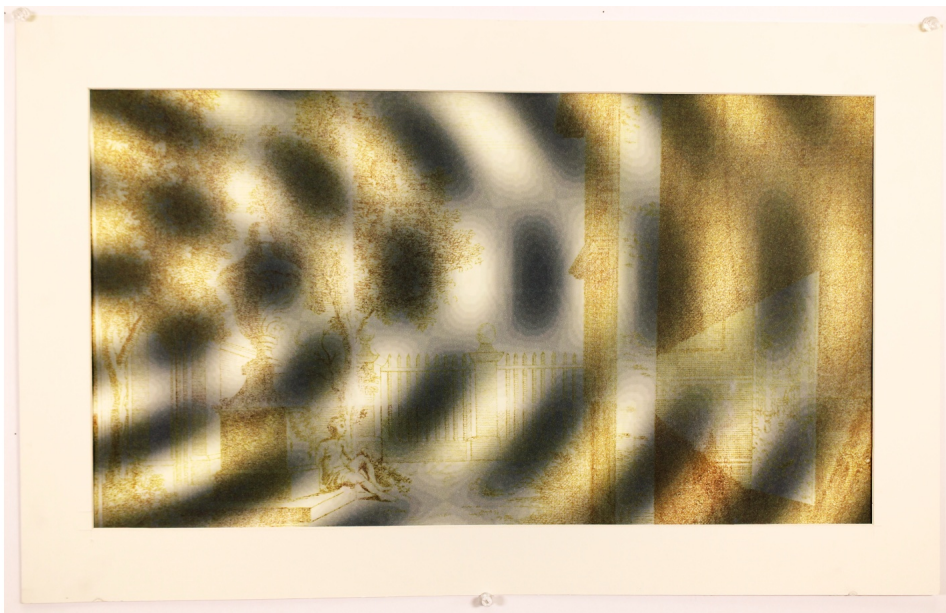


Image 1

Sustained Investigation

Height: 8

Width: 15

Materials:

Stonehenge cotton deckled paper to reflect organic interaction between light and understanding it.

Process(es):

Acetone phototransfer of historical camera obscura diagram; inkjet of double slit interference

Use of Digital Tool(s): Yes

Digital Tool(s) used: Photoshop

Citation(s):

Young, T. (1802). The Bakerian Lecture II: On the theory of light and colours.



Image 3

Sustained Investigation

Height: 12

Width: 15

Materials:

Transparencies, double-sided tape, displayed with window to sunlight for additional temporal layer.

Process(es):

Inkjet on transparency to display moiré effect and allow layered shifts in perception/interference.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code for moiré effect.

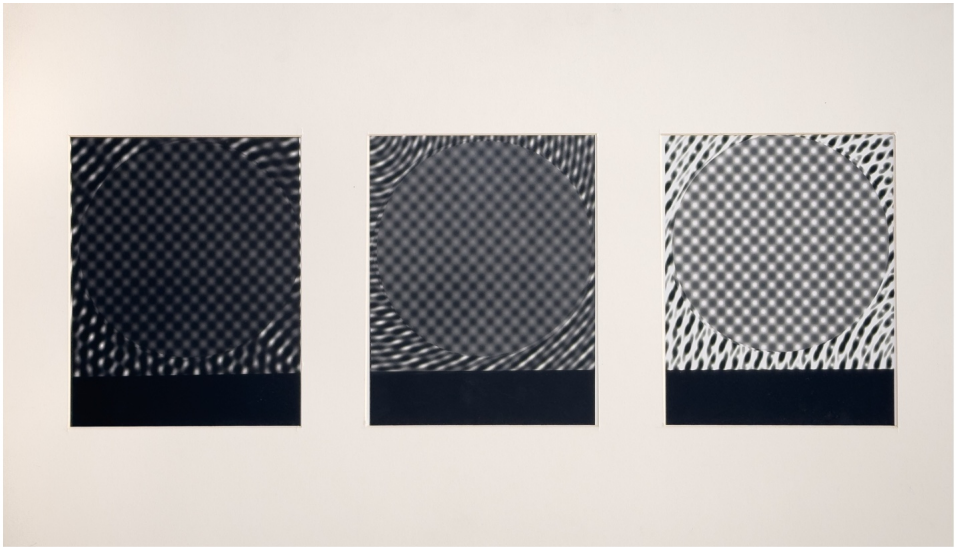


Image 4

Sustained Investigation

Height: 16

Width: 30

Materials:

Ilford photosensitive paper,
transparencies; to reflect multilayered
ideas and show optical effects.

Process(es):

Multiple exposure negative contact
darkroom print to repackage illusory
concepts into cohesive form.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code (mathematical
functions)

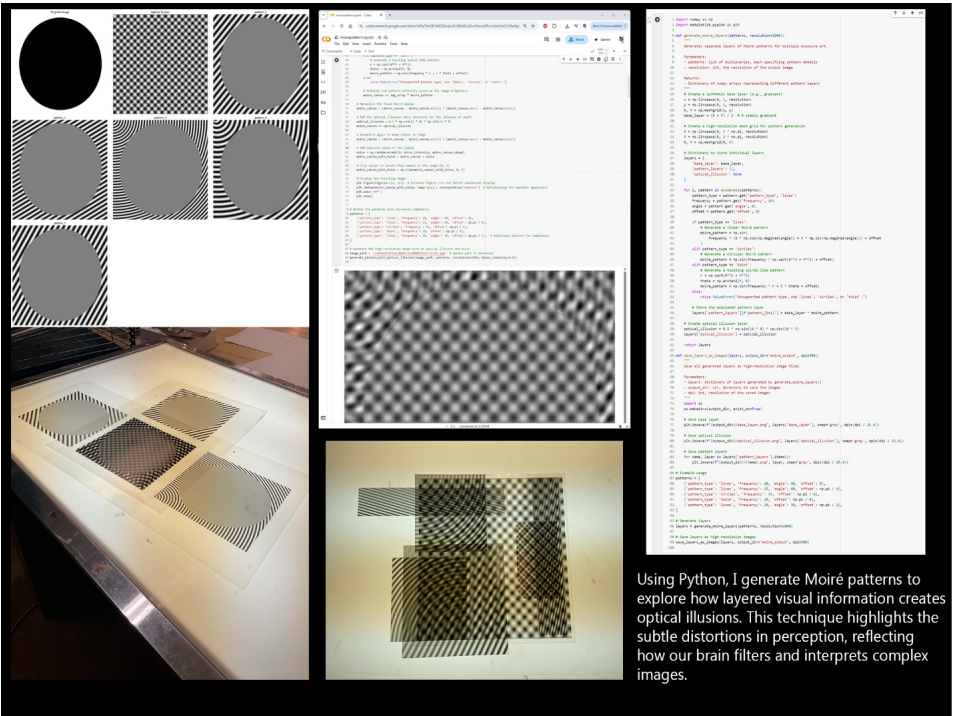


Image 5

Sustained Investigation

Height: N/A

Width: 2100

Materials:

Documentation for transparency
involved projects; process for repackage
complexity of illusions.

Process(es):

Mathematical modeling of optical
illusions, coded with Matplotlib gaussian
sine and cosine waves.

Use of Digital Tool(s): Yes

Digital Tool(s) used: Photoshop



Image 6

Sustained Investigation

Height: 13

Width: 13

Depth: 2

Materials:

Working analog clock, transparency paper;

Process(es):

Manipulation of mechanical components of clock to visually represent complexity of time.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code (mathematical functions)

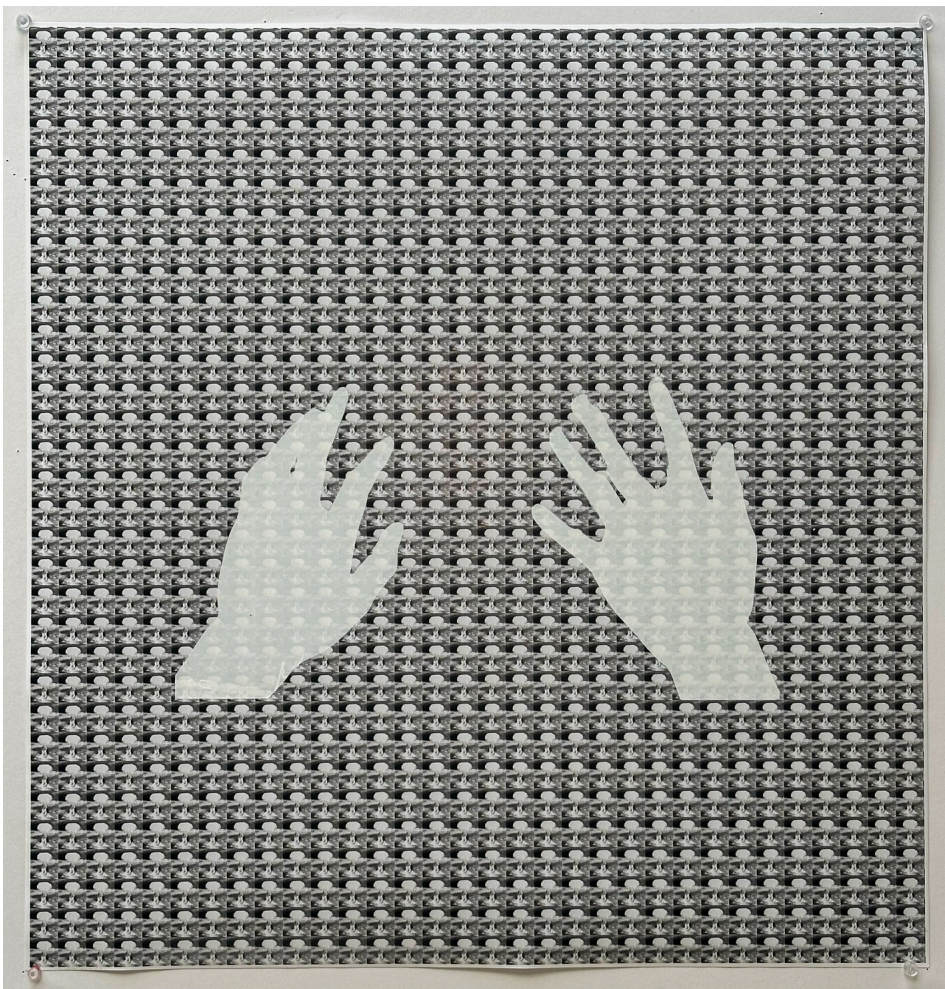


Image 7

Sustained Investigation

Height: 30

Width: 30

Materials:

Speedball ink, premium luster photo paper

Process(es):

Darkroom Rayograph, digital scanning, screen printing, inkjet print; involvement of many techniques.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Photoshop for tiling of atomic bomb.



Image 8

Sustained Investigation

Height: N/A

Width: N/A

Materials:

Documentation/brainstorming for IMG 9;
reiterative calculations to express
varying equivalencies.

Process(es):

Mathematical calculation of atomic bomb
energy equivalent to mass of hands
using $E = mc^2$.

Use of Digital Tool(s): Yes

Digital Tool(s) used: Photoshop

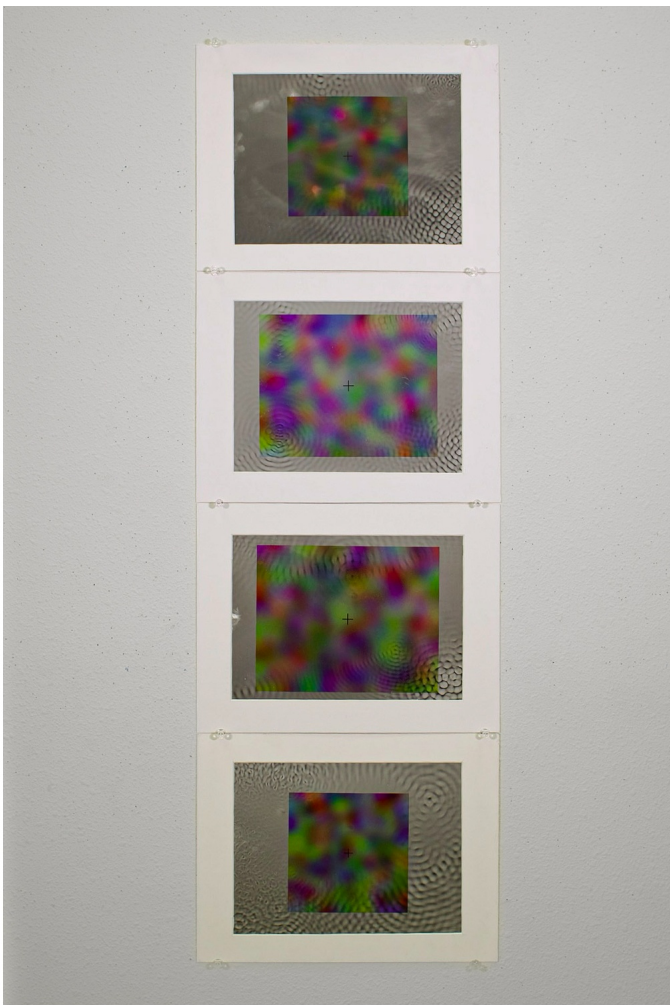


Image 9

Sustained Investigation

Height: 40

Width: 13

Materials:

Ilford photosensitive paper, archival mat board to reiterate the theme of organic involvement.

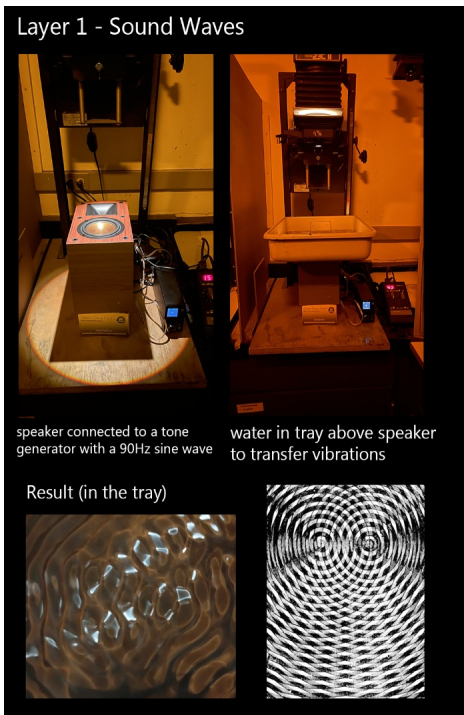
Process(es):

Experimental darkroom tone generation exposure for water ripples using overhead flash, inkjet print.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code (mathematical functions) for Troxler effect (blurred color rectangle).



Layer 2 - Troxler Effect

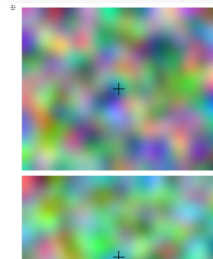
```

1 // Troxler Effect
2 // This code generates a random image and then applies the Troxler effect to it.
3 // The Troxler effect is a visual illusion where the edges of a static image fade away when the viewer's gaze is fixed on a central point for a prolonged period of time.
4 // This is due to the way our visual system processes information. The visual system filters out constant, unchanging stimuli, revealing how perception depends on contrast and attention.
5 // The code below generates a random image and then applies the Troxler effect to it.
6 // The result is a blurred image where the edges have faded away.
7 // The code is written in Processing, a Java-based language for creating visual art and animation.
8 // The code is available on GitHub: https://github.com/processing/processing
9 // The code is licensed under the Creative Commons Attribution-ShareAlike license.
10 // The code is written by the author of this document.
11 // The code is written in a way that is easy to understand and modify.
12 // The code is written in a way that is easy to learn from.
13 // The code is written in a way that is easy to share with others.
14 // The code is written in a way that is easy to use.
15 // The code is written in a way that is easy to adapt to other projects.
16 // The code is written in a way that is easy to integrate with other software.
17 // The code is written in a way that is easy to maintain.
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96 // The code is written in a way that is easy to update.
97 // The code is written in a way that is easy to debug.
98 // The code is written in a way that is easy to test.
99 // The code is written in a way that is easy to document.
100 // The code is written in a way that is easy to communicate.

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What is the Troxler Effect?

When you fix your gaze on the center cross for around 15 seconds, your brain begins to ignore the surrounding image. Over time, the edges fade and seem to disappear. This happens because, without movement or change, our visual system filters out constant, unchanging stimuli — revealing how perception depends on contrast and attention.



Code that generates randomly generated troxler gradients

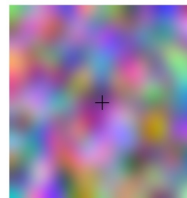


Image 10

Sustained Investigation

Height: 3

Width: 3

Materials:

Documentation for IMG 9: multilayered process surrounding wave effects and optical perception.

Process(es):

Hardware setup in darkroom, experimentation on resonance frequency of plastic tub.

Use of Digital Tool(s): Yes

Digital Tool(s) used: Photoshop

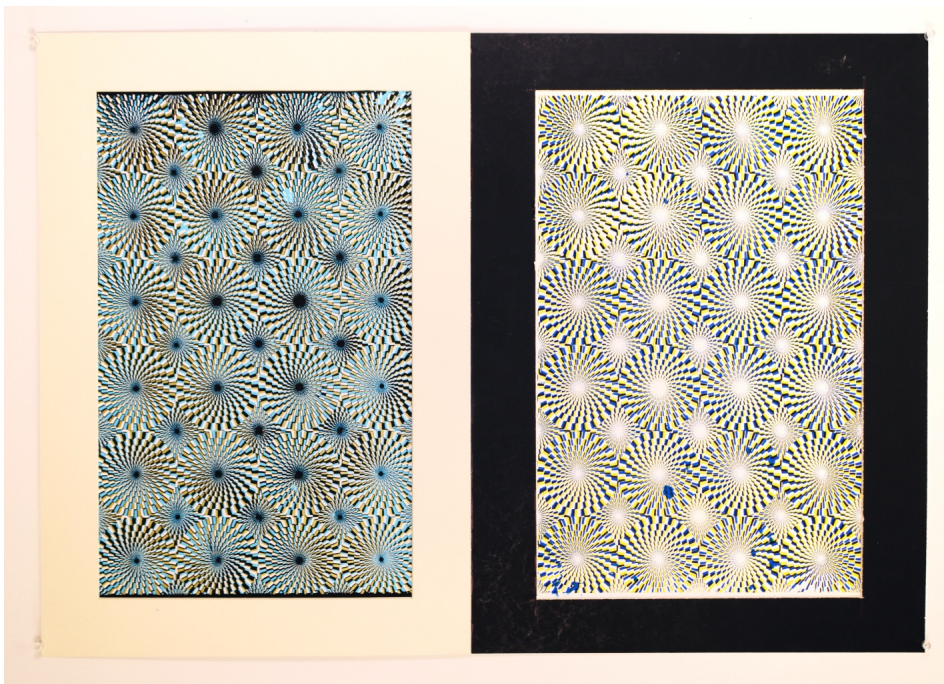


Image 11

Sustained Investigation

Height: 12

Width: 30

Materials:

Speedball ink, handmade custom-cut archival mat board,

Process(es):

3-layer screen print of optical effect to emphasize human interaction of visual cortex in illusions.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code (mathematical functions) for ring illusion.

Citation(s):

Illusion pattern inspired by "Rotating Snakes" by Akiyoshi Kitaoka



1. Coded shapes on Python
2. Printed transparencies
3. Burned screens
4. Made 2 contrasting prints on black and white
5. Framed with archival mat board and made it a diptych

Image 12

Sustained Investigation

Height: N/A

Width: N/A

Materials:

Documentation for IMG 11; investigated suitable colors to achieve best contrast for the illusion.

Process(es):

Involved process of registering and aligning each screen when printing to achieve optical illusion.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code (mathematical functions) for ring illusion.

Citation(s):

Illusion pattern inspired by "Rotating Snakes" by Akiyoshi Kitaoka



Image 13

Sustained Investigation

Height: 7

Width: 7

Materials:

Ilford photosensitive paper,
transparencies; reiterate and project
illusion onto different medium.

Process(es):

Darkroom negative contact using
transparencies of optical illusions using
Beseler enlarger as light.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code (mathematical
functions) for ring illusion.

Citation(s):

Illusion pattern inspired by "Rotating
Snakes" by Akiyoshi Kitaoka

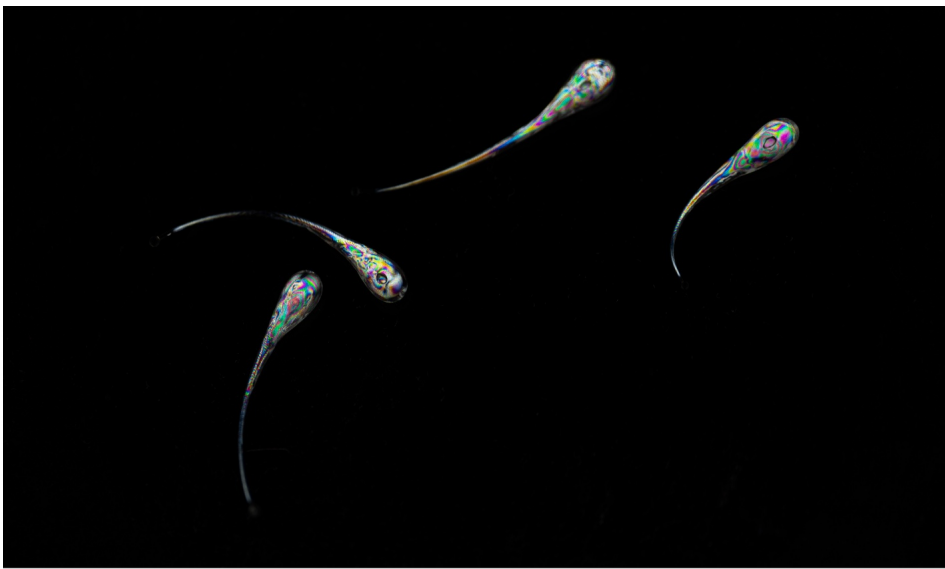


Image 14

Sustained Investigation

Height: 5345

Width: 9504

Materials:

Prince Rupert's drops, polarizing filters
to express internal stresses during drop
formation.

Process(es):

Photography with photoelasticity effect
utilizing 2 polarized light sources show
layered interaction

Use of Digital Tool(s): No

Setup



Polarized filter

Polarized light
(Computer monitor)

Experimentation on tape
roll -->

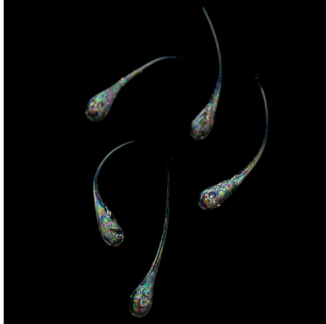
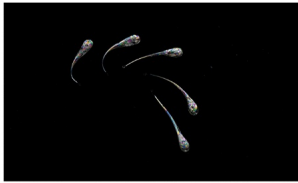
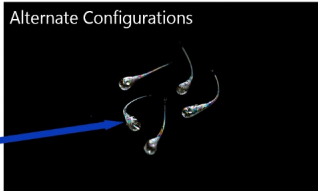


Image 15

Sustained Investigation

Height: N/A

Width: N/A

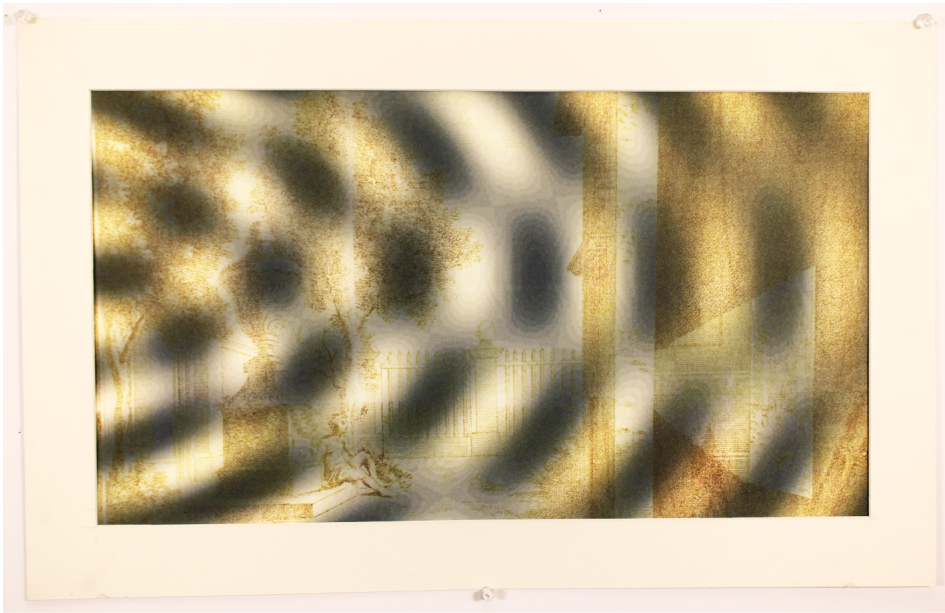
Materials:

Documentation for IMG 14; digital
photography setup including tripod and
polarization adjustment.

Process(es):

Experimental investigation:
photoelasticity, Prince Rupert's drops'
science and symbolic value.

Use of Digital Tool(s): No



Work 1

Selected Works

Height: 8

Width: 15

Idea(s):

Light wave-particle duality. Layer1=light as a ray/particle, Layer2=wave to indicate Enmeshment.

Materials:

Stonehenge cotton deckled paper to reflect organic interaction between light and understanding it.

Process(es):

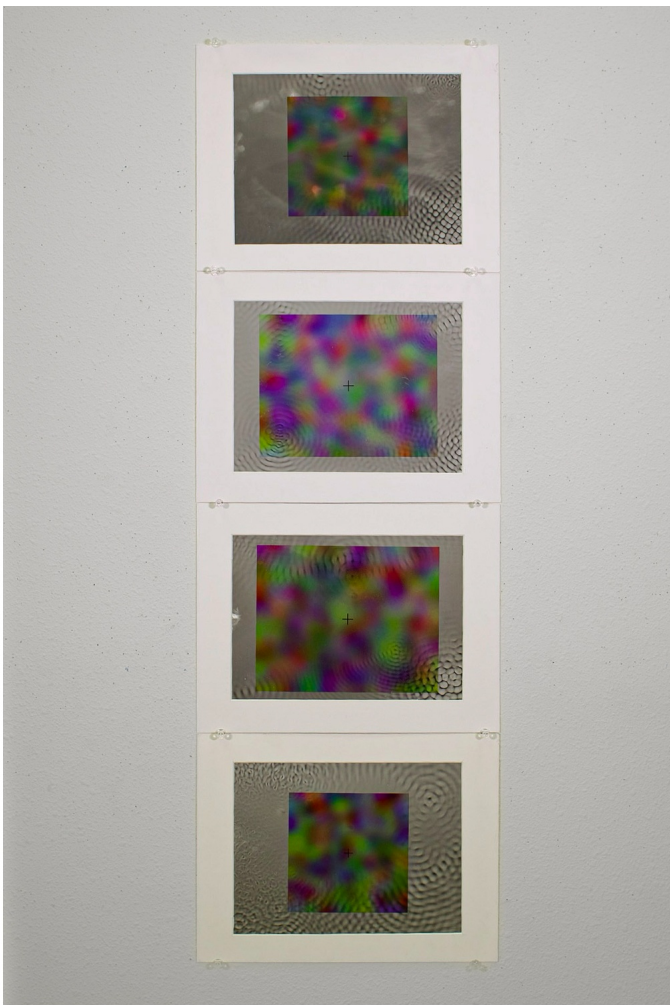
Acetone phototransfer of historical camera obscura diagram; inkjet of double slit interference

Use of Digital Tool(s): Yes

Digital Tool(s) used: Photoshop

Citation(s):

Young, T. (1802). The Bakerian Lecture II: On the theory of light and colours.



Work 2

Selected Works

Height: 40

Width: 13

Idea(s):

Stare at the center cross (15s)-the colors fade away-the Troxler effect- superimposed on water waves.

Materials:

Photosensitive paper + troxler (vision);
water waves used to add additional
senses (touch, sound).

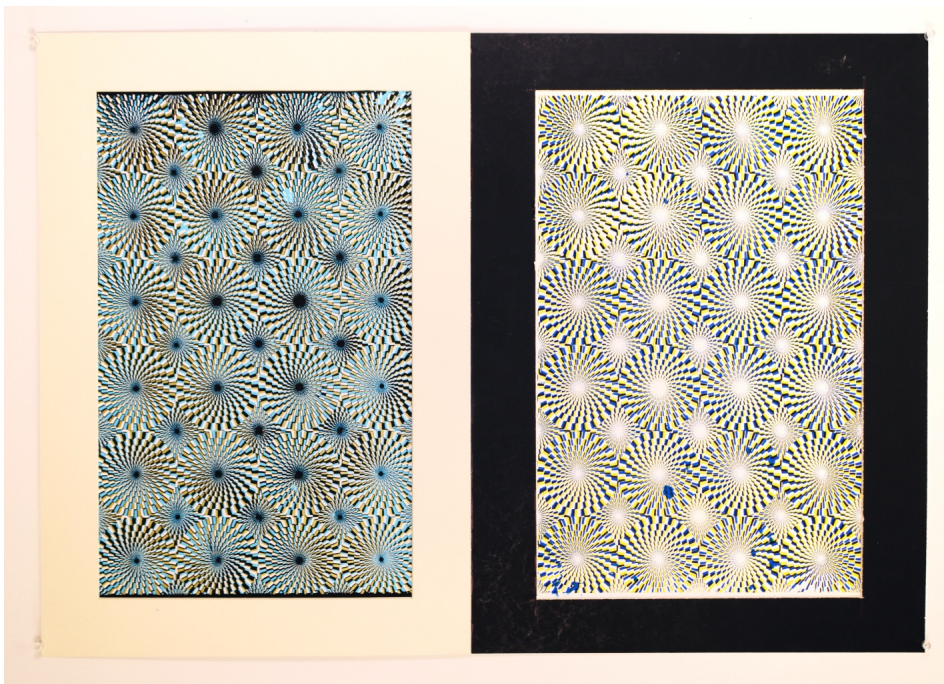
Process(es):

Experimental darkroom tone generation
exposure for water ripples using
overhead flash, inkjet print.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code (mathematical
functions) for Troxler effect (blurred color
rectangle).



Work 3

Selected Works

Height: 12

Width: 30

Idea(s):

Reiteration of handmade process to birth unexpected optical illusion effect usually seen digitally.

Materials:

Speedball ink, handmade custom-cut archival mat board; to mix (in)tangibility of optical illusions.

Process(es):

3-layer screen print of optical effect to emphasize human interaction of visual cortex in illusions.

Use of Digital Tool(s): Yes

Digital Tool(s) used:

Python Matplotlib code (mathematical functions) for ring illusion.

Citation(s):

Illusion pattern inspired by "Rotating Snakes" by Akiyoshi Kitaoka



Work 4

Selected Works

Height: 3265

Width: 4928

Idea(s):

Photoelasticity iteration, moire effect via screen pixelation and alignment, abstract iconography.

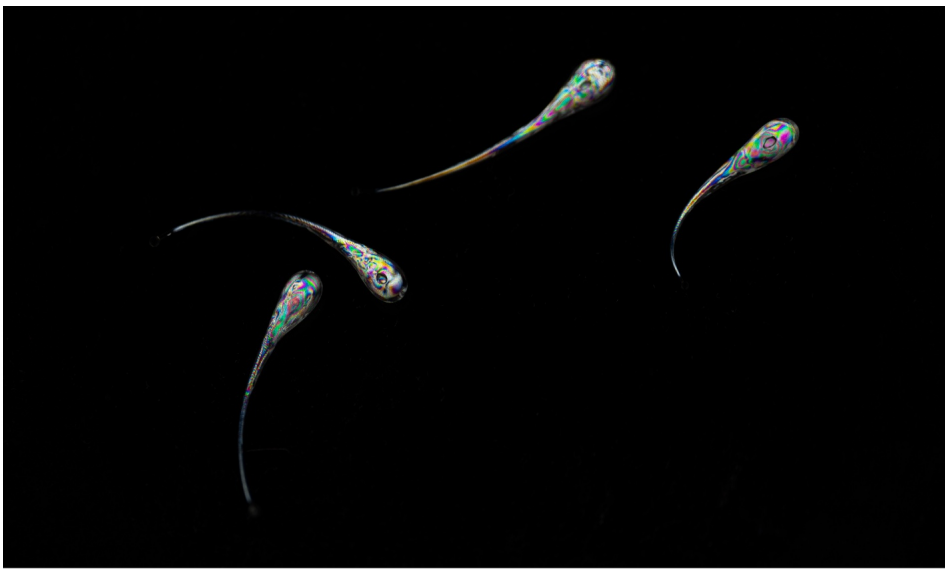
Materials:

Polystyrene bag, polarizing filters to show internal photoelastic stress in the form of colors.

Process(es):

Photography with photoelasticity effect; with skewed polarization angle for background gradient.

Use of Digital Tool(s): No



Work 5

Selected Works

Height: 5345

Width: 9504

Idea(s):

Internal structure's manifold implication despite being visually discreet; underlying complexities.

Materials:

Prince Rupert's drops, polarizing filters to express internal stresses during drop formation.

Process(es):

Photography with photoelasticity effect utilizing 2 polarized light sources show layered interaction

Use of Digital Tool(s): No