# PHOTOVISUALIZATION

A personal exploration and the use of photovisualization
as a technique to humanize data

Capstone II
Christopher Hayes
Maryland Institute College of Art
Masters Thesis
MVIS 5706.01
12 | 10| 2022

Source photograph: Chris Hayes, 2022

THANK
YOU

Source photograph: Chris Hayes, 2020

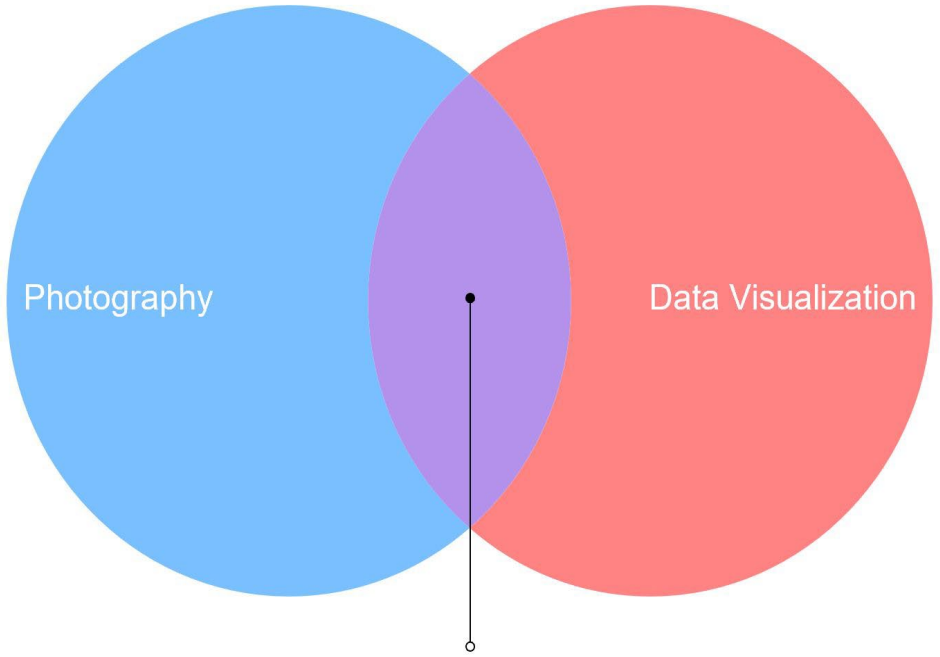
Source photograph:  Chris Hayes, 2022

# PHOTOVISUALIZATION

"***Photovisualization***" is at the intersection of photography and data visualization, and is a type of data visualization that is a collection of images that use various techniques.

This involves where the photograph is altered by techniques called Snapshot, Exposure and Post Processing to capture visual information, and complex phenomena in new ways.

These can be single or a collection/connection of 100, 1000's of photographs.



Source photograph:  Chris Hayes, 2020

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# THE MOST IMPORTANT QUESTION

# IS PHOTOVISUALIZATION PART OF DATA VISUALIZATION?

# ONE POV

the purpose of visualization is insight, not pictures. By addressing meaningful problems and difficult decisions.

Ben Shneiderman

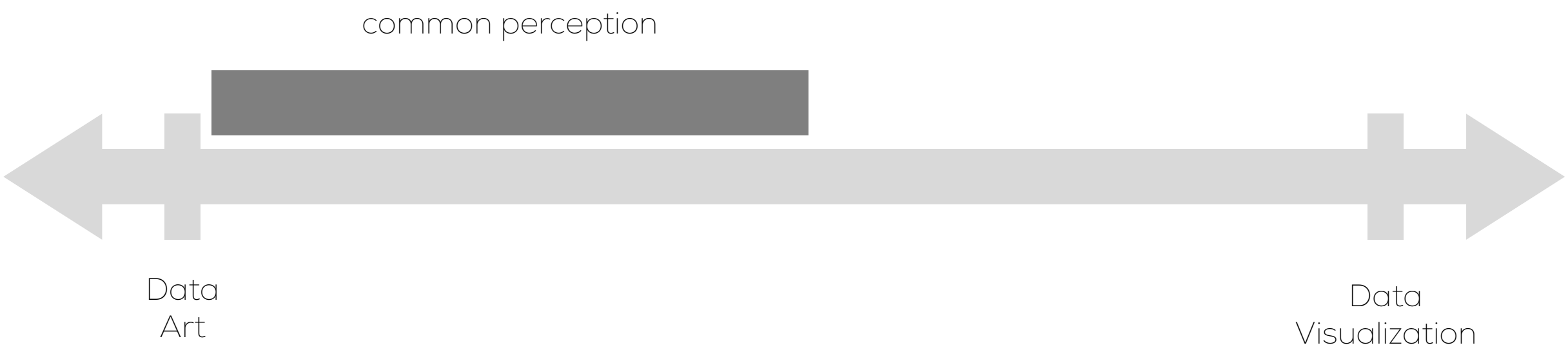
photography as data visualization is slippery slope down which we descend when we allow the meanings of important terms to morph without constraint

Stephen Few

# ANOTHER POV

Source photograph: Ismail Kaplan/Anadolu Getty Images

# WHERE DOES PHOTOVISUALIZATION FALL

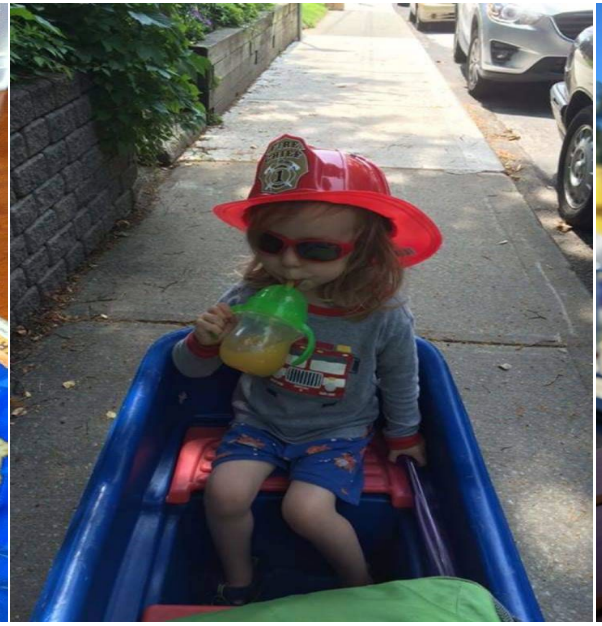


# WHERE DOES PHOTOVISUALIZATION FALL

This project explores **photovisualization approaches** centered on **selected moments** and **memories**.

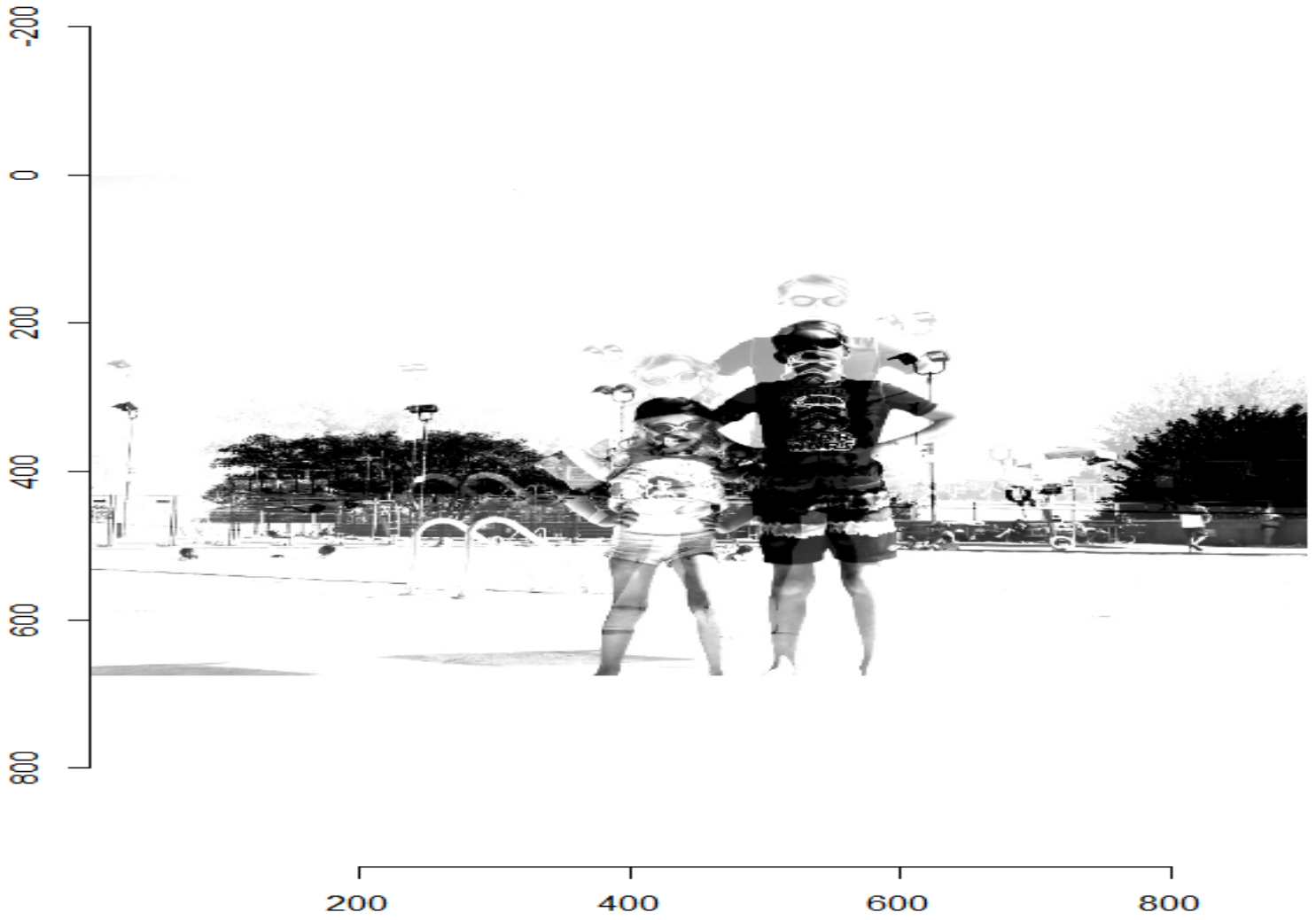
Source photograph:  Chris Hayes, 2020

It will be through these approaches, the exposure and development of the **image will be altered** thus **creating new worlds and different perspective on change and time.**



Source photograph: Chris Hayes, 2020

**Dispel the myth that** designing a **visualization is only for the end of a data analysis process** or when you are potentially ready to communicate insights perhaps **by a more conventional chart choice.**




Source photograph: Chris Hayes, 2020

**Photovisualization** can be **used for sustained reflection** and **imaginative response**.

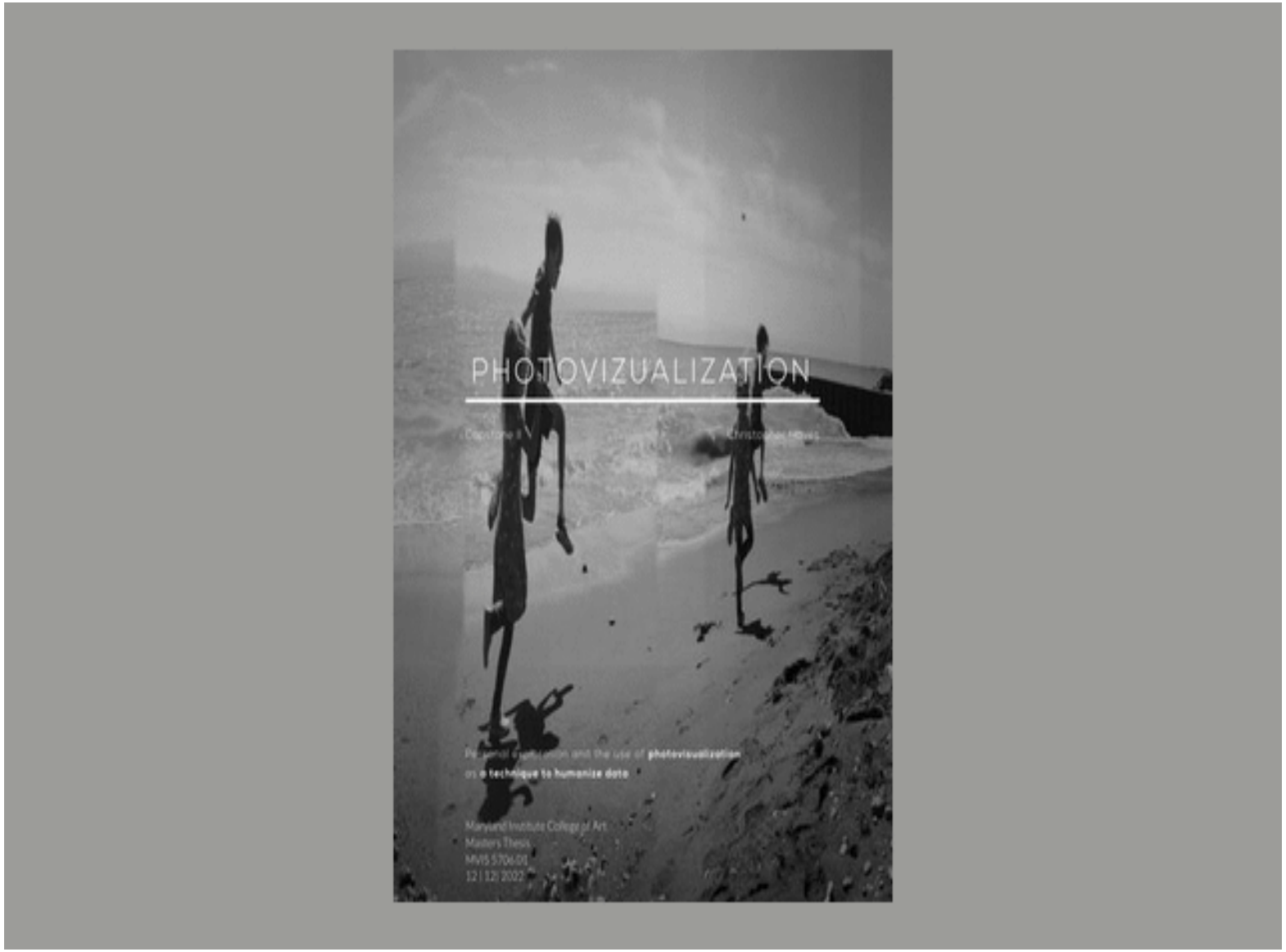
Source photograph: Chris Hayes, 2020

If **data visualization is** about **telling stories**, **then** using the techniques and styles within **photovisualization is another** practical **way to tell a compelling story through images and develop an emotional response and connection**.

Source photograph: Chris Hayes, 2020

# PROTOTYPE OVERVIEW

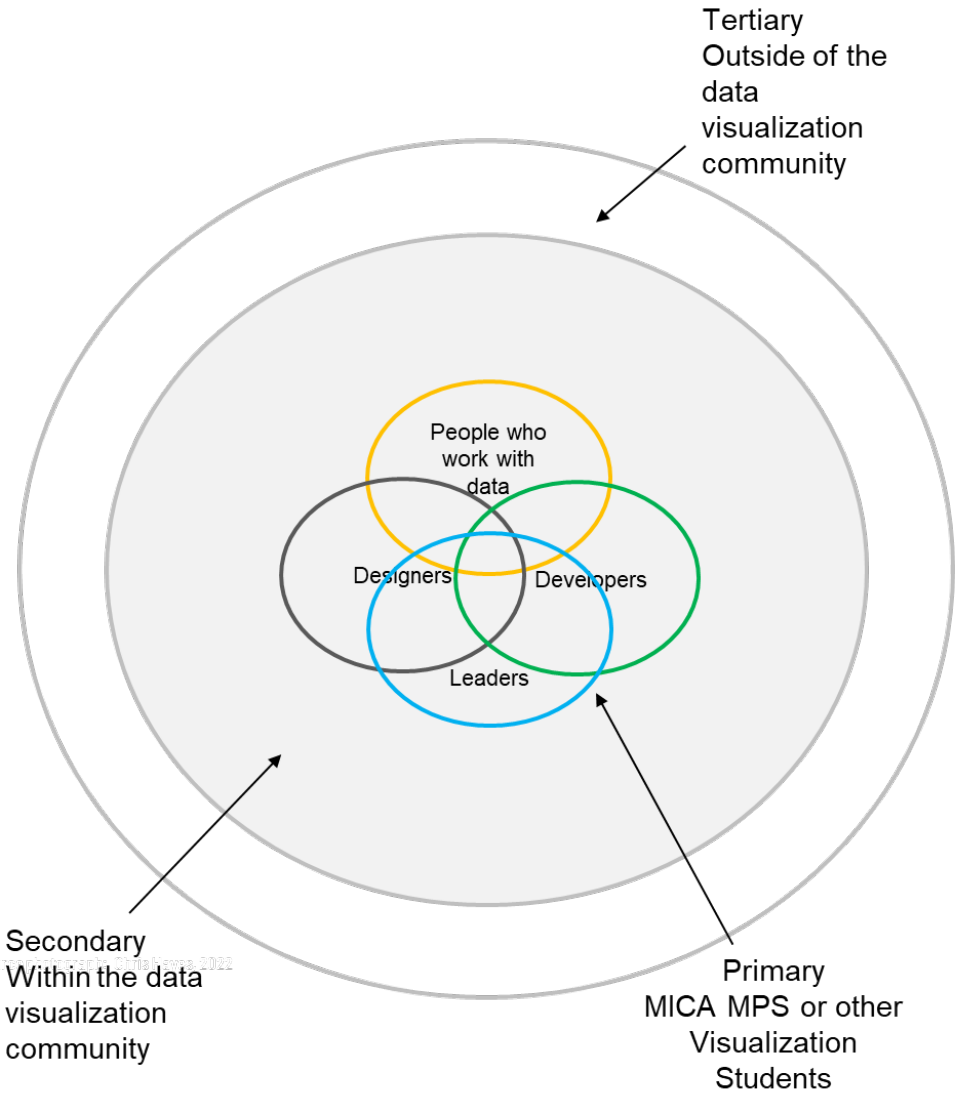
# PROTOTYPE OVERVIEW



# AUDIENCE

I will be aiming this work at 4 primary audience groups:

| | Who | What do they do? | Important Elements to bring forward in the prototype |
|---|---|---|---|
| 1 | Analyst | primarily work with data | tools employed, and linking the technique and style to data visualization use cases |
| 2 | Designers | involved with the entire design process of a product | ensuring maximizing impact across all senses. |
| 3 | Developers | primarily focused new product development | Maximize utility of the medium and all of the features and functionality |
| 4 | Leaders | set direction to do the right thing to move forward | ensure the vision via the rational, and provide well designed 'argument' to change mindsets, and worlds |



# READING STYLES

I have also accounted for 4 various and different reading styles:

| | Style | Description | Important Elements to bring forward in the prototype |
|---|---|---|---|
| 1 | Elementary | Basic, rudimentary level of reading. follow the plot, and have a solid grasp what the material is trying to say | visual encoding via colour tie the various techniques to the taxonomy, and use case examples |
| 2 | Inspectional systematic skimming | Scroll through and read to gauge interest, if so scroll back to the top and view/read structured manner | consistency in layout, organizational structure, and same location/symbology would be critical. |
| | Inspectional Superficial Reading | Viewer would go from page to page, reading every single word but not stopping | Ensure natural flow of the product itself, combined with rich photovisualization examples and content within would be critical. |
| 3 | Analytical | This style is used when the viewer wants to understand the topic in depth | Project covers rationale, data analysis & interpretation, audience, design, & user experience are answered with completeness. |
| 4 | Syntopic | Comparative reading | sources resources on subject to compare and contrast the ideas are presented and made available |

# WHY THIS IS IMPORTANT

"A photograph takes the chaotic, tangible, multi-dimensional world and reduces it into something flat, and still."

Source photograph: Chris Hayes, 2020

to think about data visualization beyond a chart that preserves the numbers it represents, but suggesting photographs too could be used as an optical technique to reveal a complex phenomenon, abstract rather than intuitive.

Source photograph: Chris Hayes, 2020

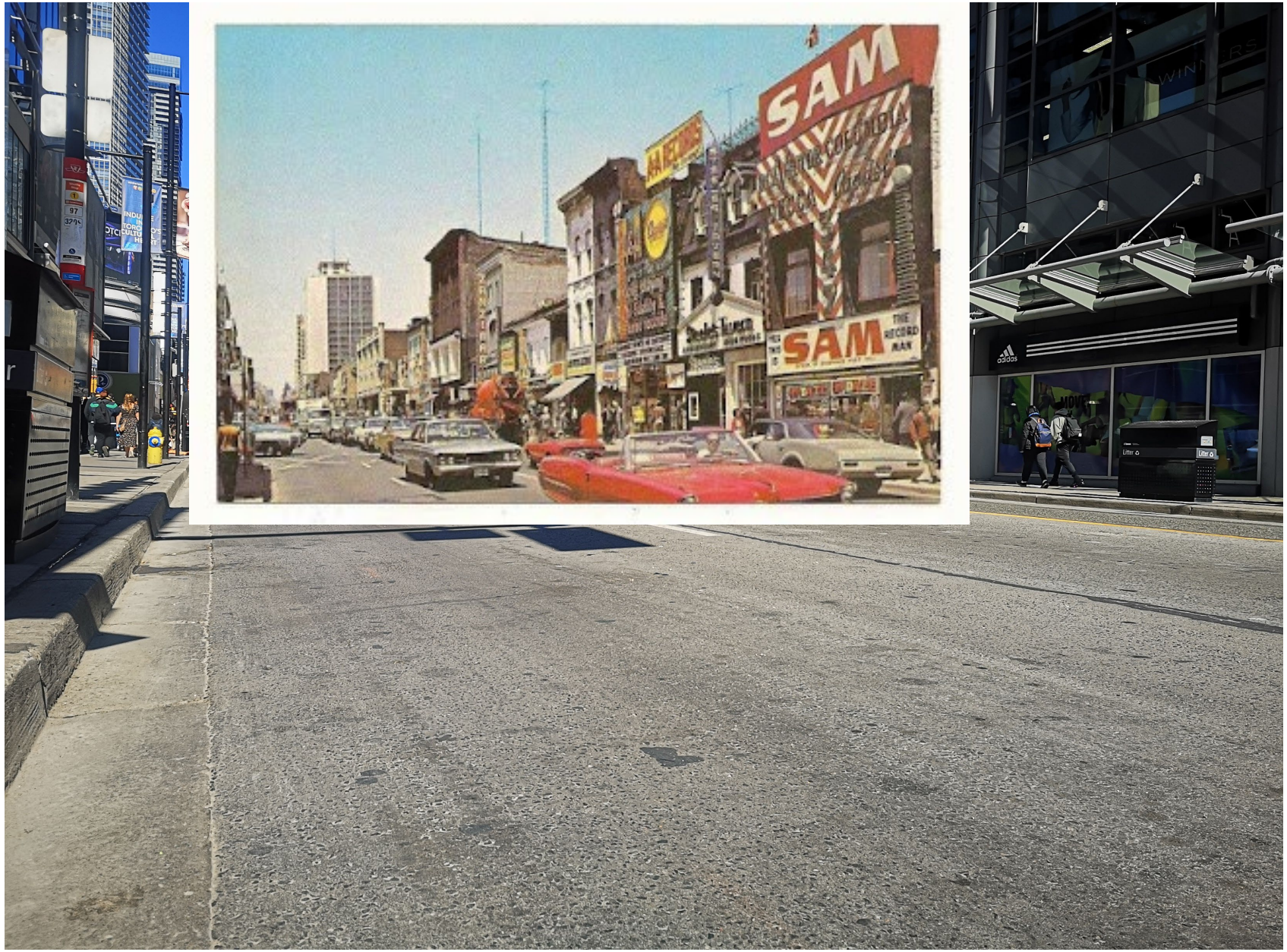
promote sustained reflection rather than immediate insight by provoking a unique imaginative response in each viewer.

Source photograph:  Chris Hayes, 2020

immerse into the photograph to see the passage of time, the connectedness of family

Source photograph: Chris Hayes, 2020

immerse into the photograph to see the passage of time, and of place




Source photograph: Chris Hayes, 2020

immerse into the photograph to see events, and the motion along an unseen vertical axis.

Source photograph:  Chris Hayes, 2020

# INSPIRATION

PHOTOVIZ BY
NICHOLAS FELTON

Photoviz shows how data is being visualized through photographic techniques such as long and multiple exposures. making the invisible visible, and revealing more detail than classic photojournalism.

BABK FAKHAMZADEH
SNAPSHOT
THEN AND NOW

Babak Fakhamzadeh places old postcards over current images of Freetown, Sierra Leone. Apart from showing the differences in terms of construction and development, the images depict the economic and social changes over time

# INSPIRATION

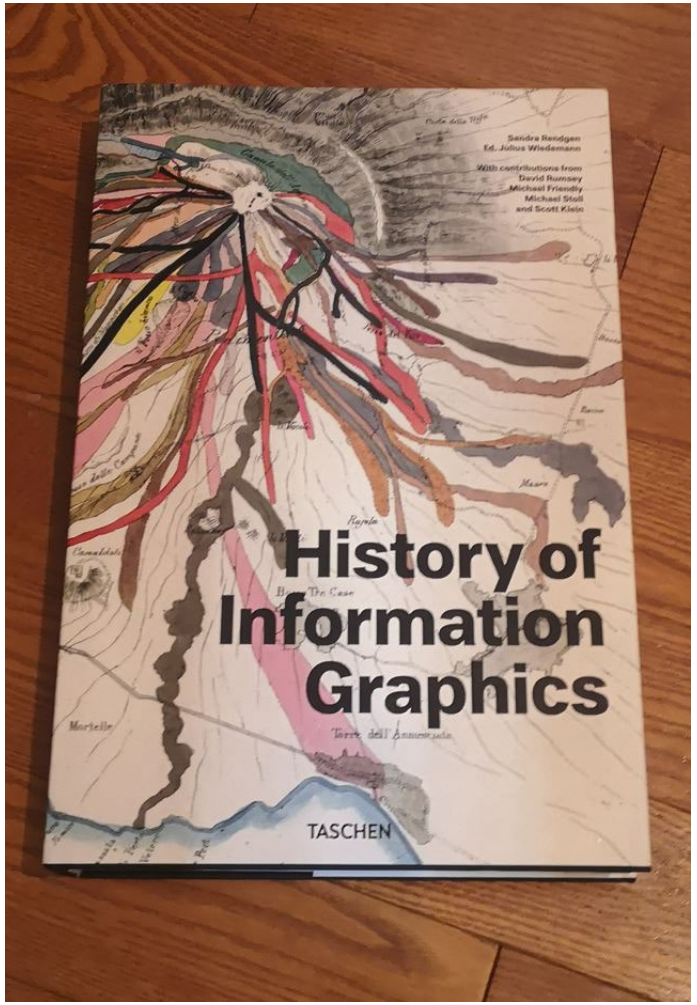
JULIE JACOBSON
POST PROCESSING
BLEND

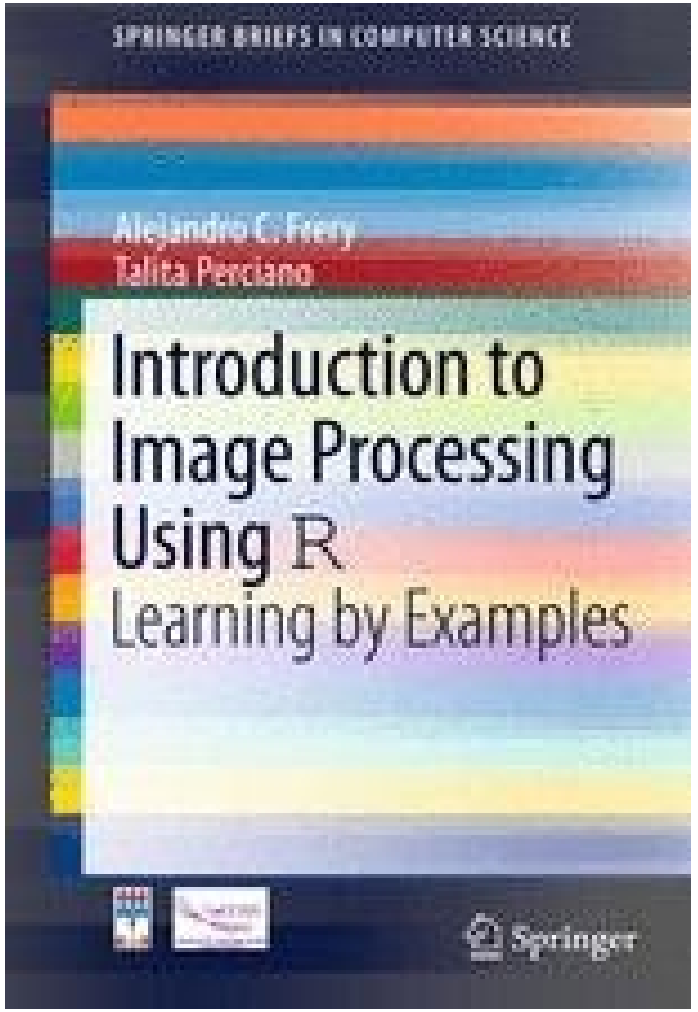
In this multiple exposure photo which has been alerted via post processing, U.S. gymnast Kyla Ross performs on the balance beam during the Artistic Gymnastics women's team final at the 2012 Summer Olympics, Tuesday, July 31, 2012, in London

BOBBLY NEEL
POST PROCESSING
COLLAGE

Bobby Neel Adams captures the passage of time and family relationships, creating images by combining two separate photos that are carefully torn in a certain way and reassembled. He calls this method photo-surgery.

# INSPIRATION



# DATA

**"the photos are the data, it carries the data with it."** Andy Kirk

Nearly 600+ photographs since 2020 were taken and considered

# PROCESS EXAMPLE

1. Breath
2. Patience
3. Google is your friend
4. Experiment

```
# CHAYES
# MVIS 5705.01 CAPSTONE II EXAMPLE:
# PHOTOVIZ

# Clear environment
rm(list = ls())

# Clear console
cat("\014")  # ctrl+L

# Install Packages, Load Libraries ----
packages_required <- c("tidyverse", "magick", "scales", "imager", "RsimMosaic", "magrittr",
                       "tictoc", "EBImage", "imager") ## List of required packages

## List of packages to be installed
new_packages <- packages_required[!(packages_required %in% installed.packages()[,"Package"])]

if(length(new_packages)) install.packages(new_packages) ## Install packages if necessary

lapply(packages_required, library, character.only = TRUE) ## Load libraries if necessary
```

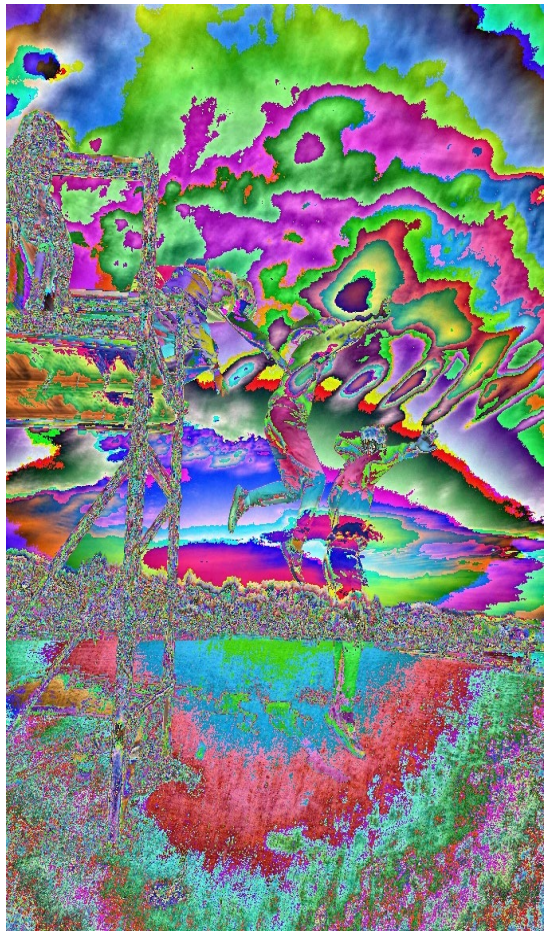
# PROCESS EXAMPLE

```
#Beach Jump Parker New

### IMPORT IMAGE FILES
Parker_jump_Image1_new <- image_read("C:/Users/User/Desktop//CAPSTONE 1/PHOTOVIZ/IMG_20221106_132109_3.jpg")
Parker_jump_Image2_new <- image_read("C:/Users/User/Desktop/CAPSTONE 1/PHOTOVIZ/IMG_20221106_132110.jpg")
Parker_jump_Image3_new <- image_read("C:/Users/User/Desktop/CAPSTONE 1/PHOTOVIZ/IMG_20221106_132110_1.jpg")
Parker_jump_Image4_new <- image_read("C:/Users/User/Desktop/CAPSTONE 1/PHOTOVIZ/IMG_20221106_132110_2.jpg")

# Stack layers on top of each other

# Import and scale images:
Beach_Parker_Jump_new <- c(Parker_jump_Image1_new, Parker_jump_Image2_new, Parker_jump_Image3_new,
                           Parker_jump_Image4_new, Parker_jump_Image2_new, Parker_jump_Image3_new,
                           Parker_jump_Image4_new)
Beach_Parker_Jump_new <- image_scale(Beach_Parker_Jump_new, "900x900")
image_info(Beach_Parker_Jump_new)

# Print images:
# Prints images on top of one another
image_mosaic(Beach_Parker_Jump_new)

# Create a single image which has the size of the first image
image_flatten(Beach_Parker_Jump_new)

# Adding images
image_flatten(Beach_Parker_Jump_new, 'Add')

# Modulate images
image_flatten(Beach_Parker_Jump_new, 'Modulate')

# develop annimation
image_animate(image_scale(Beach_Parker_Jump_new, "200x200"), fps = 2, dispose = "previous")

# generate gif outfile
Beach_Parker_Jump_new.gif <- image_animate(Beach_Parker_Jump_new, fps = 2);
image_write(Beach_Parker_Jump_new.gif, "output.gif")
```

# PROCESS EXAMPLE

# Create a single image which has the size of the first image

# Adding images



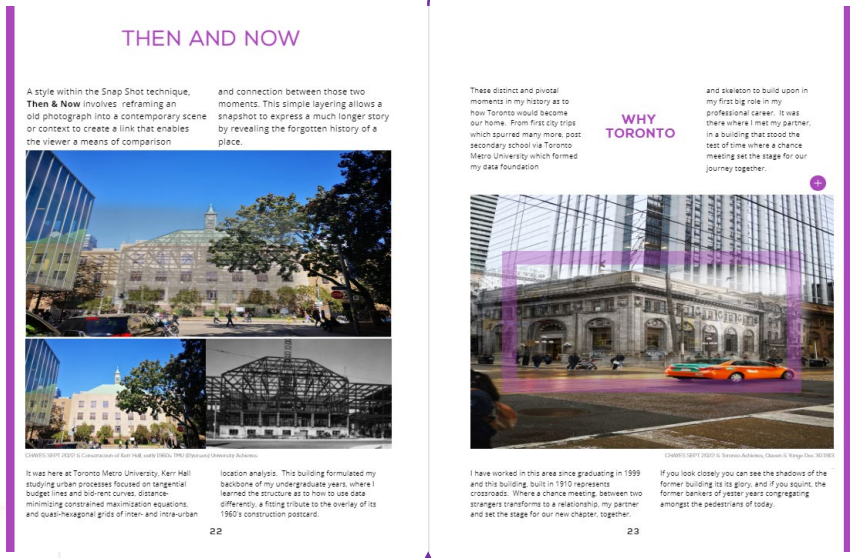
# Modulate images

# develop animation

Source photograph: Chris Hayes, 2020

# DESIGN

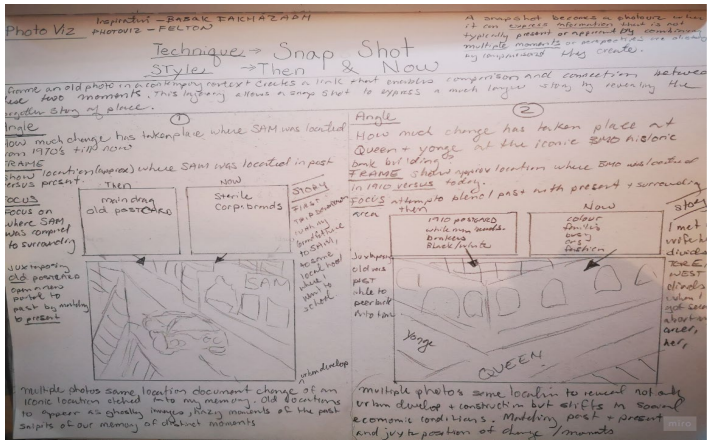
SNAP SHOT
A snap shot becomes a photoviz when it can express information about the depicted scene that is not typically visible or naturally apparent. By capturing multiple views and combining multiple moments or perspectives, snapshots are distinguished by comparisons they allow and the larger view they create.
20
21

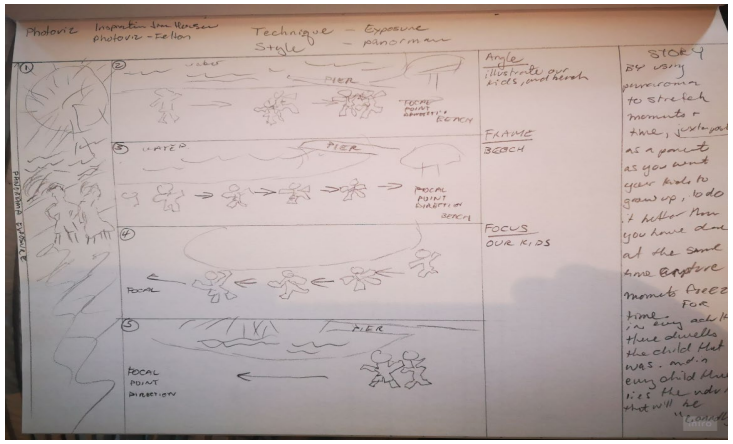

THEN AND NOW
A style within the Snap Shot technique, Then & Now involves reframing an old photograph into a contemporary scene or context to create a link that enables the viewer a means of comparison and connection between those two moments. This simple layering allows a snapshot to express a much longer story by revealing the forgotten history of a place.
It was here at Toronto Metro University, Kerr Hall studying urban processes focused on tangential budget lines and bid-rent curves, distance-minimizing constrained maximization equations, and quasi-hexagonal grids of inter- and intra-urban location analysis. This building formulated my backbone of my undergraduate years, where I learned the structure as to how to use data differently, a fitting tribute to the overlay of its 1960's construction postcard.
22
WHY TORONTO
These distinct and pivotal moments in my history as to how Toronto would become our home. From first city trips which spurred many more, post secondary school via Toronto Metro University which formed my data foundation and skeleton to build upon in my first big role in my professional career. It was there where I met my partner, in a building that stood the test of time where a chance meeting set the stage for our journey together.
I have worked in this area since graduating in 1999 and this building, built in 1910 represents crossroads. Where a chance meeting, between two strangers transforms to a relationship, my partner and set the stage for our new chapter, together.
If you look closely you can see the shadows of the former building its its glory, and if you squint, the former bankers of yester years congregating amongst the pedestrians of today.
23

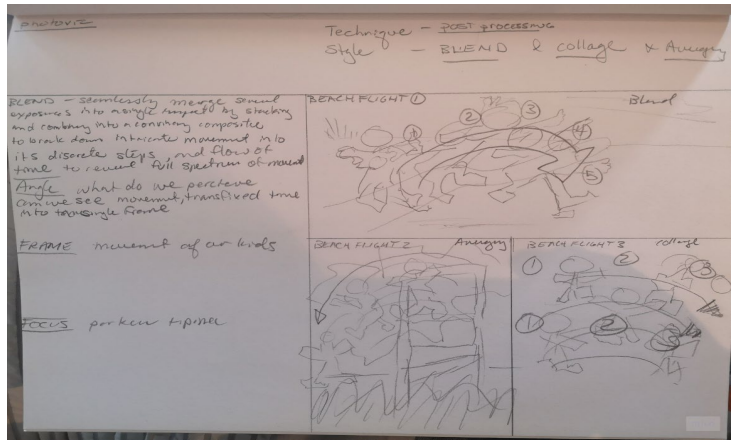
WHY TORONTO
It was here, at Sam The Record Man where my grandfather would take me in 1979 through the 1980's. The neighbourhood was electric, pocketed with different retail, fashion and people. I often wonder, was it those trips where the seeds planted, that Toronto would become my destination to spend the majority of my adult life from 1994 onwards.
Although this portion of Yonge Street where Sam was located has been corporatized, one can spot glimpses of its former glory. If you look hard, you can reimagine the 1970's vehicles and pedestrians are interwoven proving that times do change amongst of the present streetscape.
24
TOOLS
Huawei P10
ADOBE PHOTOSHOP
POWERPOINT
DATA VISUALIZATION APPLICATIONS
COMPARISON OF PLACE AND TIME
VISUAL PERCEPTION
EMOTIONAL RESPONSE CONNECTION
25

# DESIGN

"Be stubborn on vision but flexible on details"



## SNAPSHOT

A snap shot becomes a photoviz when it can express information about the depicted scene that is not typically visible or naturally apparent. By capturing multiple views and combining multiple moments or perspectives, photoviz snapshots are distinguished by comparisons they allow and the larger view they create.

### THEN & NOW

This technique involves reframing an old photograph or post card into a contemporary scene / or context to create a link that enables the viewer a means of comparison and connection between those two moments. This simple layering allows a snapshot to express a much longer story by revealing the forgotten history of a place.

It was here, at this block at Sam The Record Man where my grandfather would take me in 1979, and through the 1980's. The neighbourhood was alive, electric, pocketed with different retail, fashion and people. I often wonder, was it those trips where the seeds planted, that Toronto would become my destination to spend the majority of my adult life from 1994 onwards. Although this portion of it has been corporatized even today one can spot glimpses of its former glory and ghosts of the not so distant past.

It was here then, 1994, a block away from Sam the Record man, at the now Toronto Metro University at Kerr Hall where I spent the majority of my classes studying urban processes and assignments focused on tangential budget lines and bid-rent curves, distance-minimizing constrained maximization equations, and quasi-hexagonal grids of inter- and intra-urban retail location analysis. This building formulated my backbone, structure as to how to use data differently, a fitting tribute to the overlay of its 1960's construction postcard.

**Three distinct and pivotal moments in my history as to how Toronto would become my destination to go to Toronto Metro University which formed the foundation regarding data, and its power in use, and skeleton to build upon in my first big role in my professional career. It was there where I met my partner, in a building that stood the test of time where a chance meeting set the stage for journey together.**

I have worked in this area since graduating in 1999 and this building, built in 1910 represents crossroads, a hub of connection, of something old, and yet something new, a dividing line of where I was, to where I am– of commitment to something greater than myself. Where a chance meeting, becomes my partner and wife set the stage for a new chapter. If you look closely you can see the shadows of the former 1910 building in its glory, and if you squint, the former BMO bankers of yester-years congregating amongst the pedestrians of today.

## EXPOSURE

By manipulating the way the image is captured several photoviz techniques and styles can be captured. These approaches expand our perception by reframing time, or presenting a different field of view

### PANAROMA

Typically these are produce by moving the camera results in the photograph where different sections of the image occurred at different times. An exposure moving through space and time makes this technique ideal for capturing longer moments. With digital smart phones with panorama features are capable of creating seamless images by digitally stitching together a stream of images as the phone is panned. This feature can be re-purposed to produce beautiful composites if the phone is held still while the scene is in motion. This attempt to reconcile the source images renders motion visible by extruding or duplicating objects in motion like people, or vehicles.

Attempts of a father to capture two kids who generally never stop, 15 images, each frozen in mid stride or in pose as they run, jump, at our beach, one of their most happiest of places during first summer of summer of precious normalcy

5 minutes debating first dive into the dive tank of our Olympic Pool. These images capture those moments we all have, first jump into the unknown, the struggle, the challenge, and once at ease, we repeat with comfort as if we knew all along

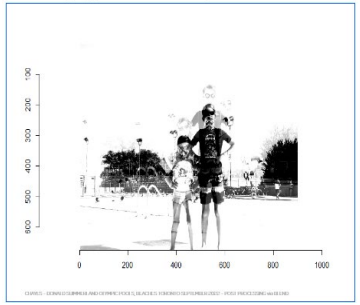
The Leuty Lifeguard Station built in 1920 is one of our neighbourhood icons; and has stood the test of history. Lived and seen the last pandemic — Spanish flu, world wars, recessions an important reminder that there will be another day, we will get through this, the Leuty Lifeguard Station remains."

## POST PROCESSING

Involves reorganizing and recombining existing photographs makes it possible to condense images into a single information rich aggregate image. Techniques here range from hand made to computer assisted and from subtle to overt. The composite image can be nuanced that the alteration can even go unnoticed or it can transport the source images so far from the original that only the vaguest connection can be made.

### BLEND

Multiple images can now be stacked and combined into a convincing or surreal composite, a favourite to break down intricate movements into their discrete steps, and discover how selective blending can allow to reorganize the world. Here, I am seamlessly merging several exposures into a single image using R Studio's Magik, Imager, and Collage Libraries allowed me to essentially stack and combine these photos into a convincing composites; one to illustrate future height growth, the other two able to break down the intricate jumping movement into their discrete steps.



Spring 2022, Covid-19 restrictions have ended and the anticipation of summer is in the air, "Summertime is always the best of what might be." These kids never stop moving, here is where I wasn't even thinking photoviz as a something to explore, but I happened to take a random series of my son and daughter moving, their expression, their excitement can be seen frame by frame, but when stacked, reveals something entirely new, and sequence of movements start middle and end into a rich image of movement, place and time.

# DESIGN

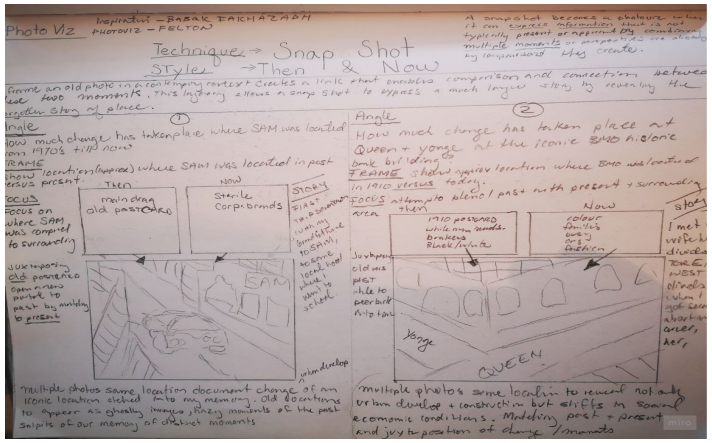
## Is Photovisualization Data Visualization?

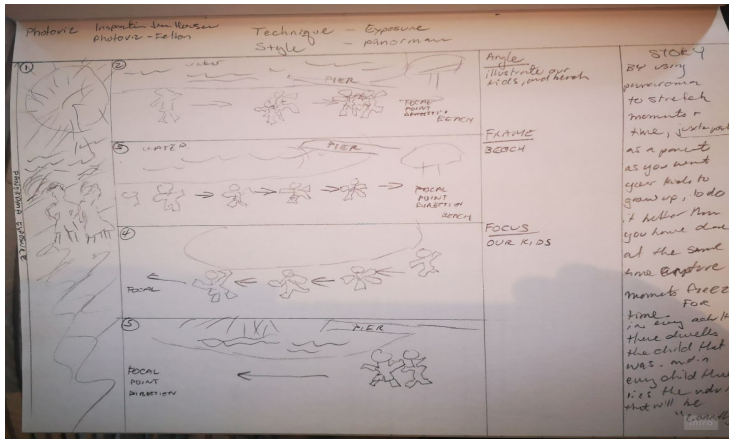
"Be stubborn on vision but flexible on details"

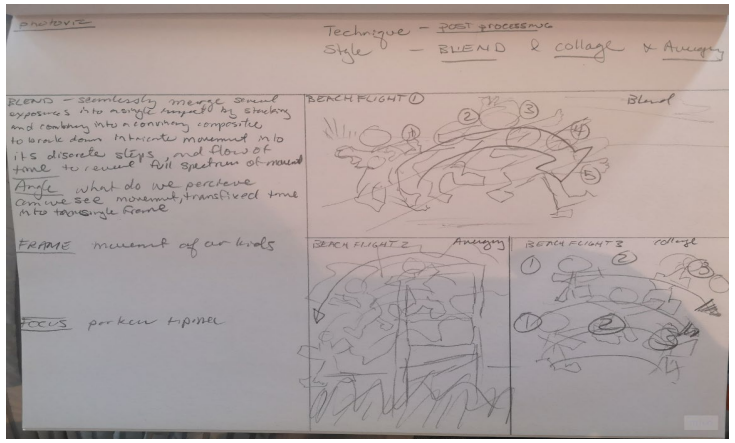
**KEY WORDS**

EXPLANATORY | BOLD | EDGY | AUTHENTIC | STRUCTURED | RELATABLE / PERSONALBLE

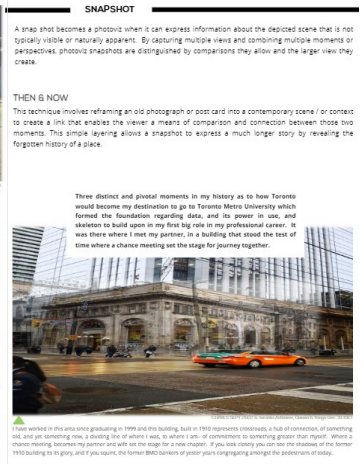
**CONCEPT SKETCHES**

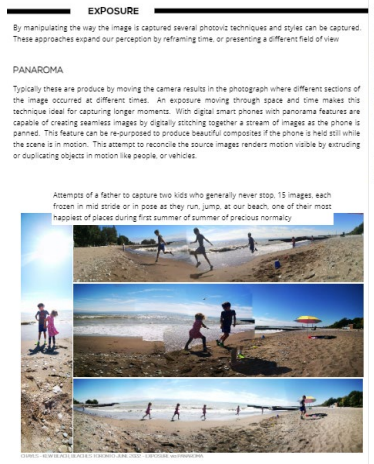


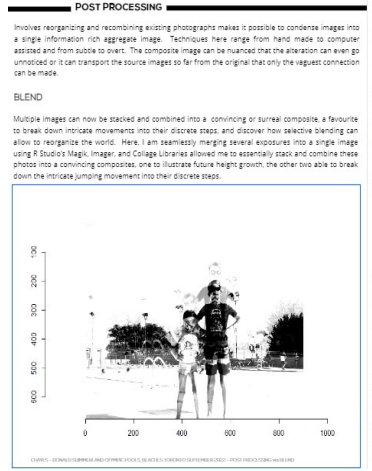




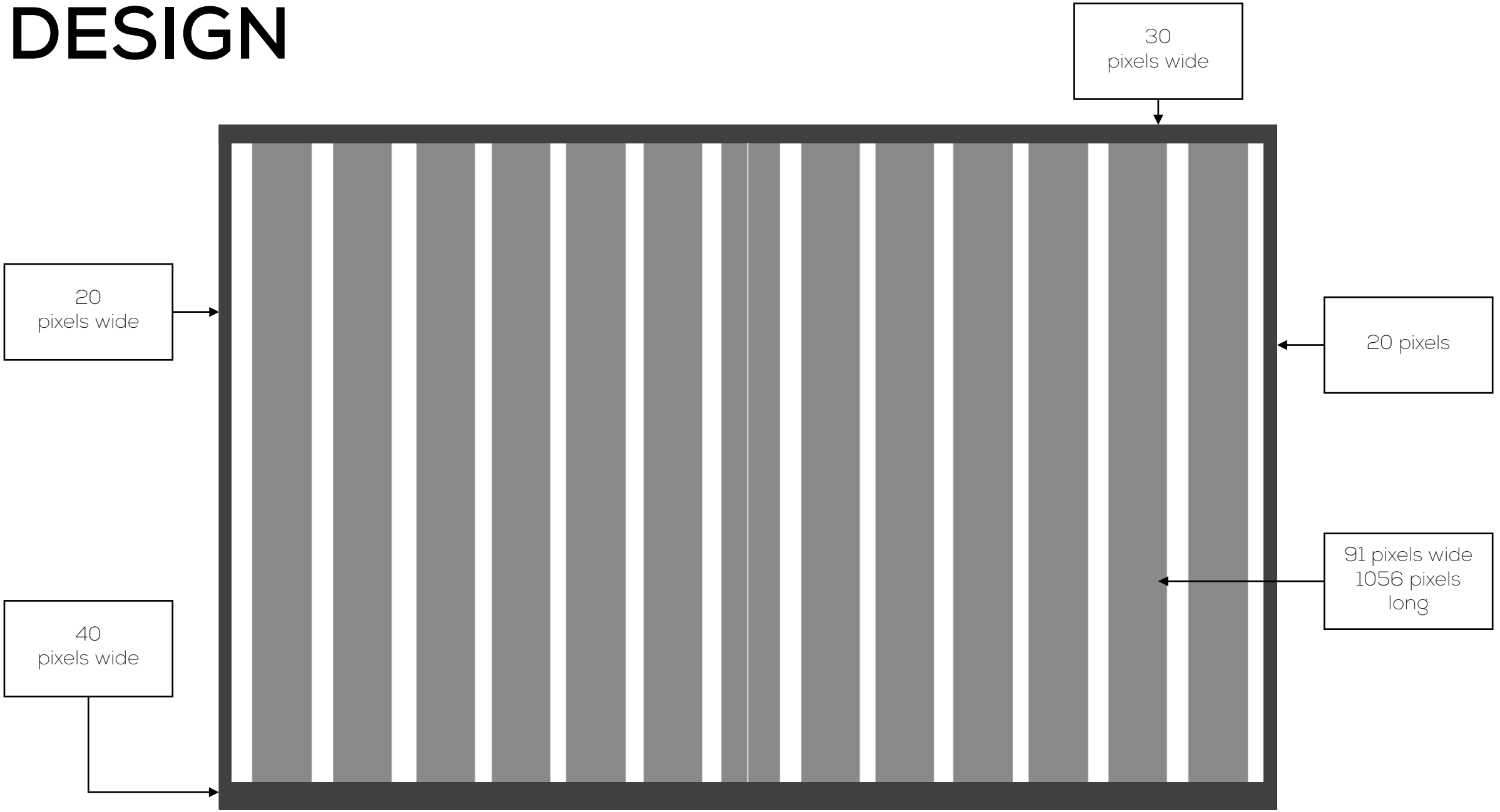
**DESIGN ITERATIONS**





# DESIGN


30
pixels wide
20
pixels wide
20 pixels
91 pixels wide
1056 pixels
long
40
pixels wide

# DESIGN

40pts font
Nexa Demo
Regular, left justified, letter spacing 60, line height 1.1

## THEN AND NOW

16pts font
Open Sans
Regular, left justified, letter spacing 40, line height 1.5

A style within the Snap Shot technique, **Then & Now** involves reframing an old photograph into a contemporary scene or context to create a link that enables the viewer a means of comparison and connection between those two moments. This simple layering allows a snapshot to express a much longer story by revealing the forgotten history of a place.

CHAYES SEPT 2022 6 Construction of Kerr Hall, early 1960s TMU (Ryerson) University Achieves

13pts font
Open Sans
Regular, left justified, letter spacing 30, line height 1.5

It was here at Toronto Metro University, Kerr Hall studying urban processes focused on tangential budget lines and bid-rent curves, distance-minimizing constrained maximization equations, and quasi-hexagonal grids of inter- and intra-urban location analysis. This building formulated my backbone of my undergraduate years, where I learned the structure as to how to use data differently, a fitting tribute to the overlay of its 1960's construction postcard.

15 – Nexa Demo bold



14pts font
Open Sans
Regular, left justified, letter spacing 10, line height 1.5

25pts font
Open Sans
Regular, left justified, letter spacing 60, line height 1.1

## WHY TORONTO

These distinct and pivotal moments in my history as to how Toronto would become our home. From first city trips which spurred many more, post secondary school via Toronto Metro University which formed my data foundation and skeleton to build upon in my first big role in my professional career. It was there where I met my partner, in a building that stood the test of time where a chance meeting set the stage for our journey together.

CHAYES SEPT 2022 6 Toronto Achieves, Queen & Yonge Dec 30 1913

I have worked in this area since graduating in 1999 and this building, built in 1910 represents crossroads. Where a chance meeting, between two strangers transforms to a relationship, my partner and set the stage for our new chapter, together.

If you look closely you can see the shadows of the former building its its glory, and if you squint, the former bankers of yester years congregating amongst the pedestrians of today.



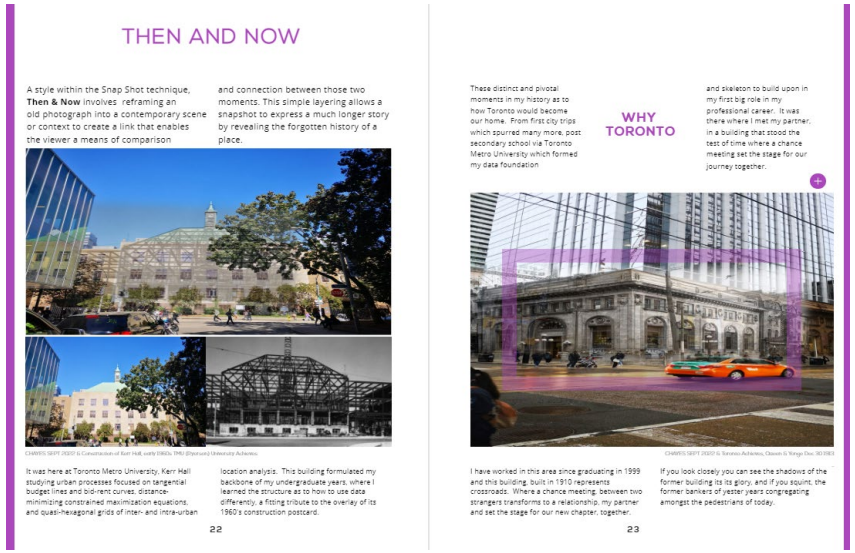
Interactivity identified via shape and colour

Interactivity identified via enclosure, and colour

20 pixels

13pts font
Open Sans
Regular, left justified, letter spacing 30, line height 1.5

# DESIGN



## Gestalt Laws

**Proximity** by context near visuals, use of small multiples.

**Connectedness** by grouping relationships.

**Continuity** by limiting and reducing colour intensity.

**Enclosure** by use of 'white space' and colour to frame content between visuals and create organization.

**Symmetry** via a sense of solidity and order, via horizontal and vertical organization of content.

## Visual Queries

**Consistency** and limited use of colour to visual encode area within the product, and text highlighting for interactivity elements.

**Shape** via symbology via symbols, frames, to illustrate interactive elements

**Proximity** via visual elements and text are grouped together with the aid of white space to draw the eye toward them.

**Size** via text sizing and images to aid user to notice larger elements easily, and create structure / flow.

## Pattern Perception

**Consistency** across content pieces allows viewer to recognize important elements,

The use of line on major focus pieces separate journey story.

Compositions components layout are organized in same location regardless of photovisualization technique/style.

Text is structured via font size to create visual hierarchy across composition.

## Universal Design Principles

**Hierarchy** by organizing information in same location(s) so the viewer gains extensive knowledge of the design system.

**Consistency & Proximity** in component placement created connectedness thereby for the viewer to easier group/chunk element properities.

**Alignment** of content in vertical blocks, right to left to create unity and lead the viewer through the design.

**Affordance** via icons that viewers are generally familiar. This is reinforced via wayfinding page.

**Symmetry & Attractive Bias** through image, text, colour, whitespace, placement and size creates balance, harmony, and stability keeping the design clean and colorful.

## Feature Channels

**Lines, page borders**, and to create sections

**Shape** through the use of symbols / icons to bring attention to viewer interactive elements present, and tool usage

**Area** via interactive highlighting box, or containment

Use of **Redundant coding** to enhance perception speed

# DEMO

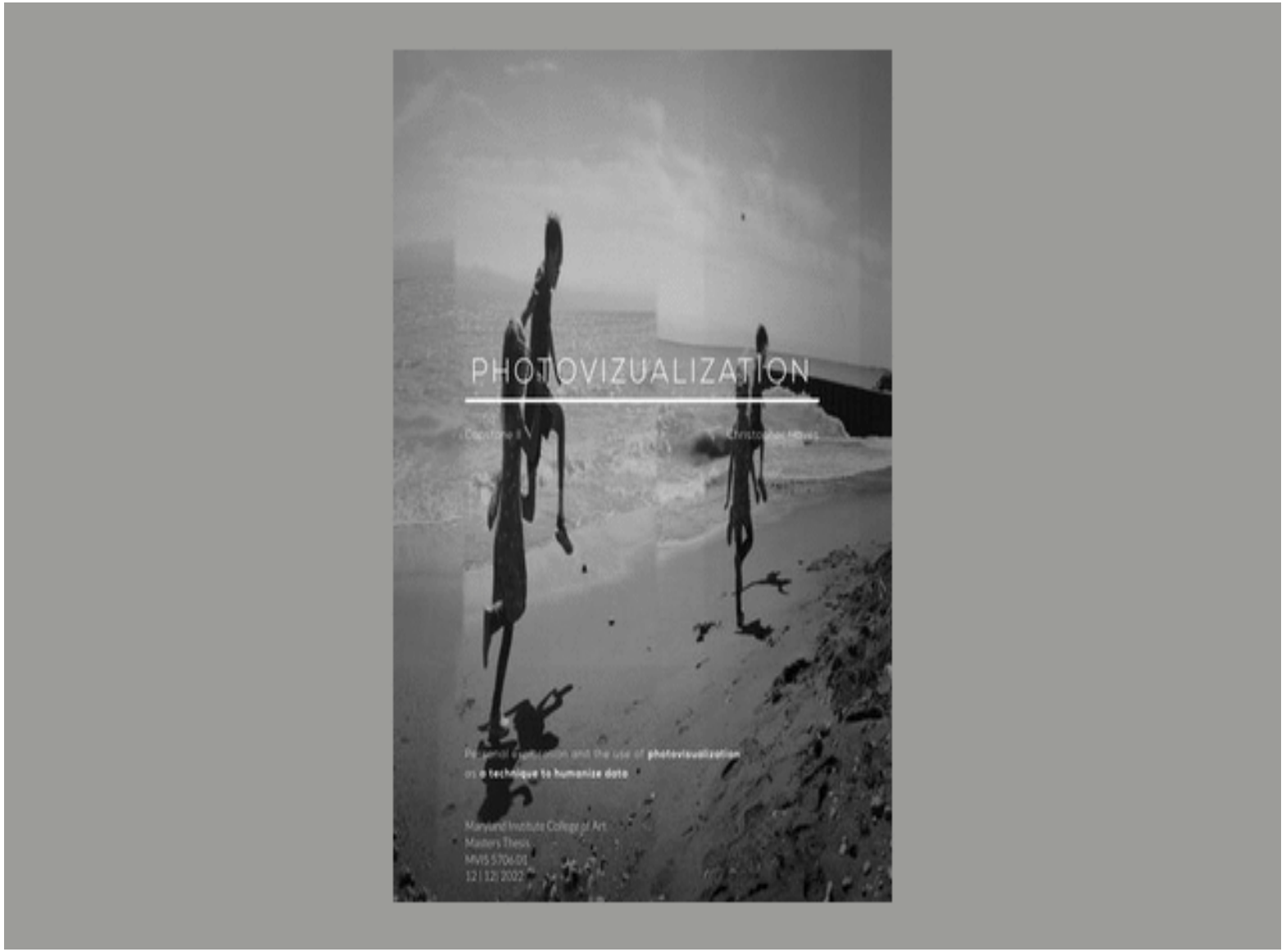
# WHATS NEXT

1. REST
2. COMPLETE REMAINDER OF STYLES
3. ENSURE ACCESSIBILITY ACROSS ALL CONTENT
4. MONITOR & MEASURE
5. DETERMINE AND BUILD BUSINESS CASE
6. DEVELOP PHOTOVISUALIZATION BOOK

Source photograph: Chris Hayes, 2022

"The greatest value of a picture is when it forces us to notice what we never expected to see."

John Tukey

# Thank you

Capstone II
Christopher Hayes
Maryland Institute College of Art
Masters Thesis
MVIS 5706.01
12 | 12| 2022