

Design Approaches

05-499/899 Fall 2024

Celebrating Accessibility

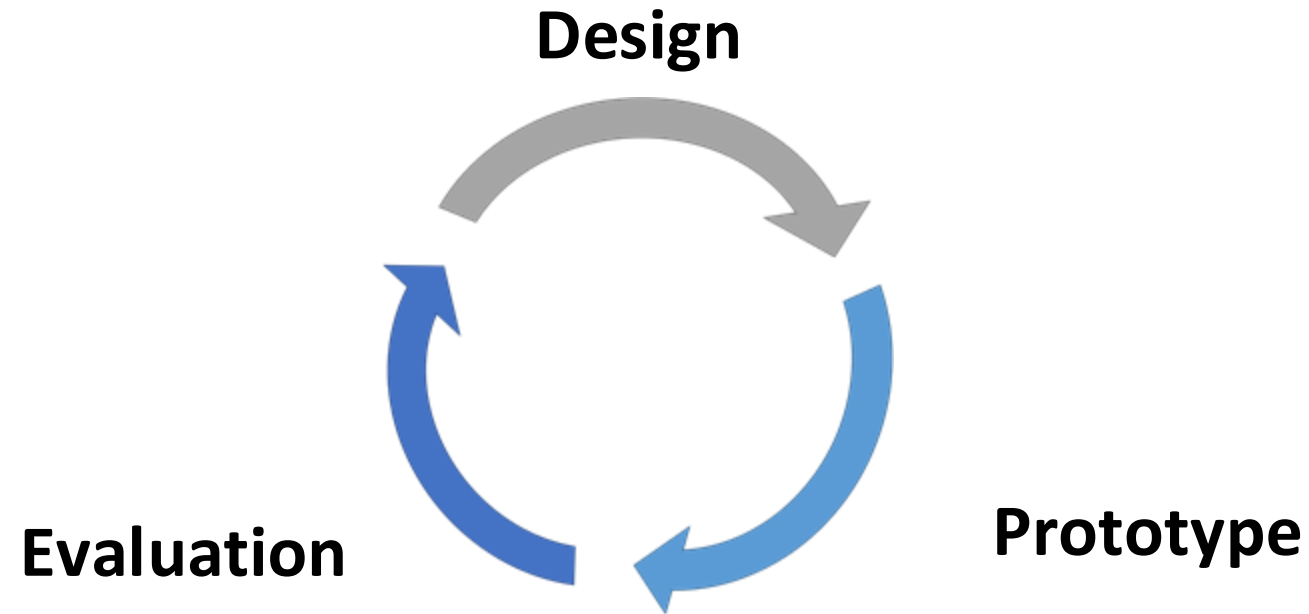
<https://cmu-05-499.github.io>

Andrew Begel and Patrick Carrington

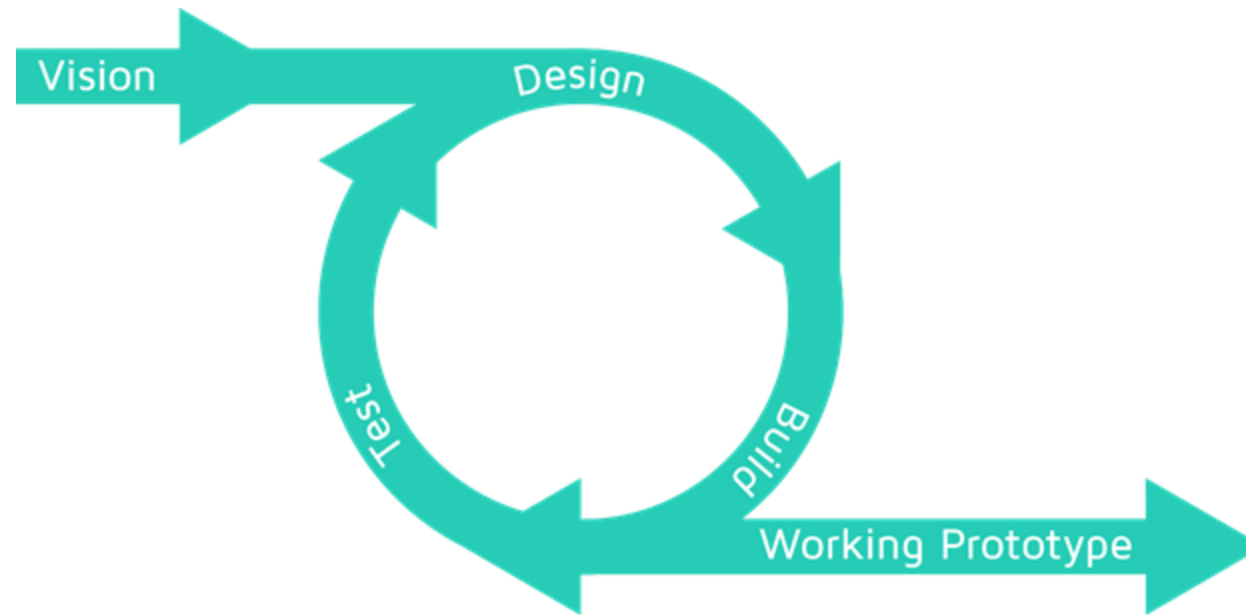
Administrivia

- Project overview added to the course website.
- Please welcome Amy Tavares from the Olitsky Career Readiness Program at CMU.
- We reorganized a couple of class sessions including the readings signups so please double-check your session.

Iterative Design



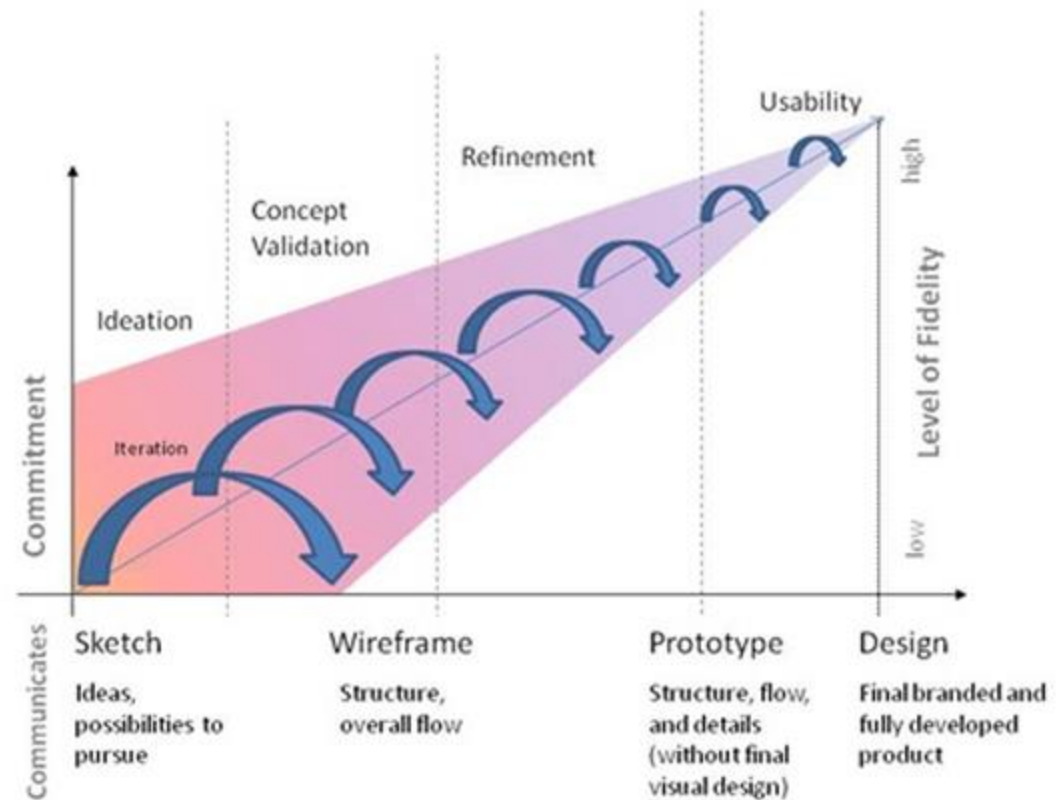
Also Iterative but with a way out



Progressive Refinement

Uncoil the loops

Increase Fidelity/Detail



Who/What are we designing for?

Oblivious Systems

Most interactive systems have no idea about people's abilities

or the situations people are in.

What if they knew a lot more?

What could we do?



Ability Assumptions



Ability Assumptions

All human-operated technologies contain embedded “ability assumptions,” whether explicit or implicit.

Consider a touch screen.

What are the assumed abilities?

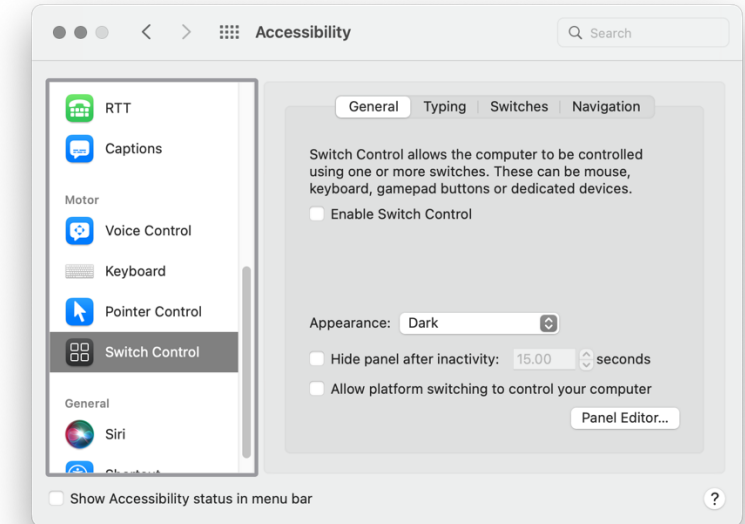
(There are more than you think...)

The Burden of Adaptation

Because systems are oblivious, the burden is on the user to adapt him- or herself to the ability-demands of interactive systems.



Operating Systems offer some level of customizable adaptation to modify inputs and outputs for applications



The Burden of Adaptation

Interactive systems have no idea the user is having to do this, or why.

How can we move the burden of adaptation from the user to the system to take advantage of whatever abilities the user does have?



Assistive Tech and Rehab Engineering

Assistive Technologies are often created to enable people with disabilities to use computing systems and devices.

Rehabilitation Engineering emerges as a way to more systematically adapt to human abilities rather than trial and error approach.

Universal Design

A concept that involves designing products and environments to be usable by people of all abilities without the need for special accommodations. UD is based on the idea that environments should be designed to be usable by everyone without the need for adaptation.

From architecture and in response to limitations of add-on approaches from Assistive Tech and Rehabilitation Engineering.

MACE, R. L., HARDIE, G. J., AND PLACE, J. P. 1991. Accessible environments: Toward universal design. In Design Intervention: Toward a More Humane Architecture, W. E. Preiser, J. C. Vischer, and E. T. White Eds., Van Nostrand Reinhold, New York.

Inclusive Design

Similar to Universal Design but emphasizes the explicit inclusion of people from diverse backgrounds and abilities.

“If you do not intentionally, deliberately and proactively include, you will unintentionally exclude.”

- Joe Gerstandt



Clarkson, P. J., Coleman, R., Keates, S., & Lebbon, C. (2013). Inclusive design: Design for the whole population.

Discussion of Readings

- Discussion Leader(s): Naomie Williams, Rebecca Jiang
 1. From GenderMag to InclusiveMag: An Inclusive Design Meta-Method
 2. Ability Based Design Communications Article

<https://docs.google.com/presentation/d/1R15jxEghHg8MKtPEbVGLY3pCfd4ezt0btzyLQ7R7wY/edit?usp=sharing>

Olitsky Career Readiness Center

- <https://www.cmu.edu/career/students-and-alumni/diversity-equity-inclusion/olitsky/index.html>
- Amy Tavares, Program Manager
- There are many barriers in the job search process and the workplace for individuals with cognitive and emotional differences. These barriers cause the higher-than-average underemployment/unemployment rates for these talented individuals. The Olitsky Family Foundation Career Readiness Program at CMU aims to reduce those barriers to employment by working with students, alumni, faculty, staff, and employers to spread awareness of the strengths of the population, inform people on how to reduce barriers in the recruitment process and the workplace and provide resources for talent to feel more confident and prepared in their job search and workplace.

Ability-Based Design

A design approach in which the human abilities required to use a technology in a given context are scrutinized, and systems are made operable by or adaptable to alternative abilities.

(Wobbrock et al. 2011, 2014)

Ability-Based Design vs Universal Design

Focus on abilities of a user

Focus on what one person can do

Design for one

Runtime adaptation

Sense, model, adapt

Usually dynamic

Focus on accessibility of environment

Focus on what many people can do

Design for all

Design-time accommodation

Understand, design, test, deploy

Usually fixed

Making Memes Accessible

Cole Gleason, Amy Pavel,
Xingyu Liu, Patrick Carrington,
Lydia Chilton and Jeffrey Bigham

Carnegie
Mellon
University

meme example



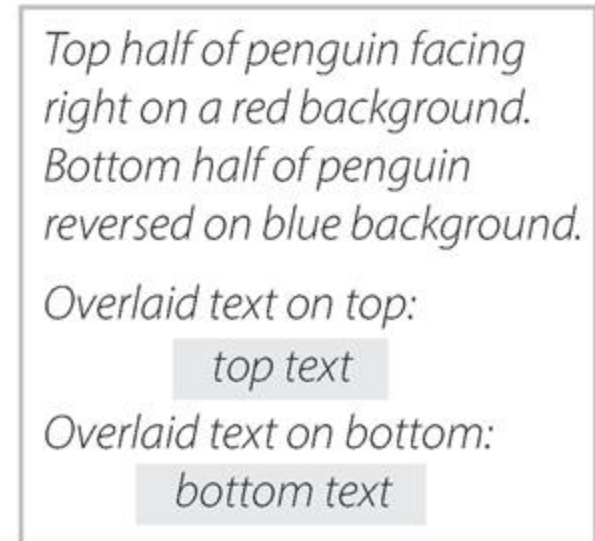
meme example



audio template



alt-text template







Meme: Success Kid

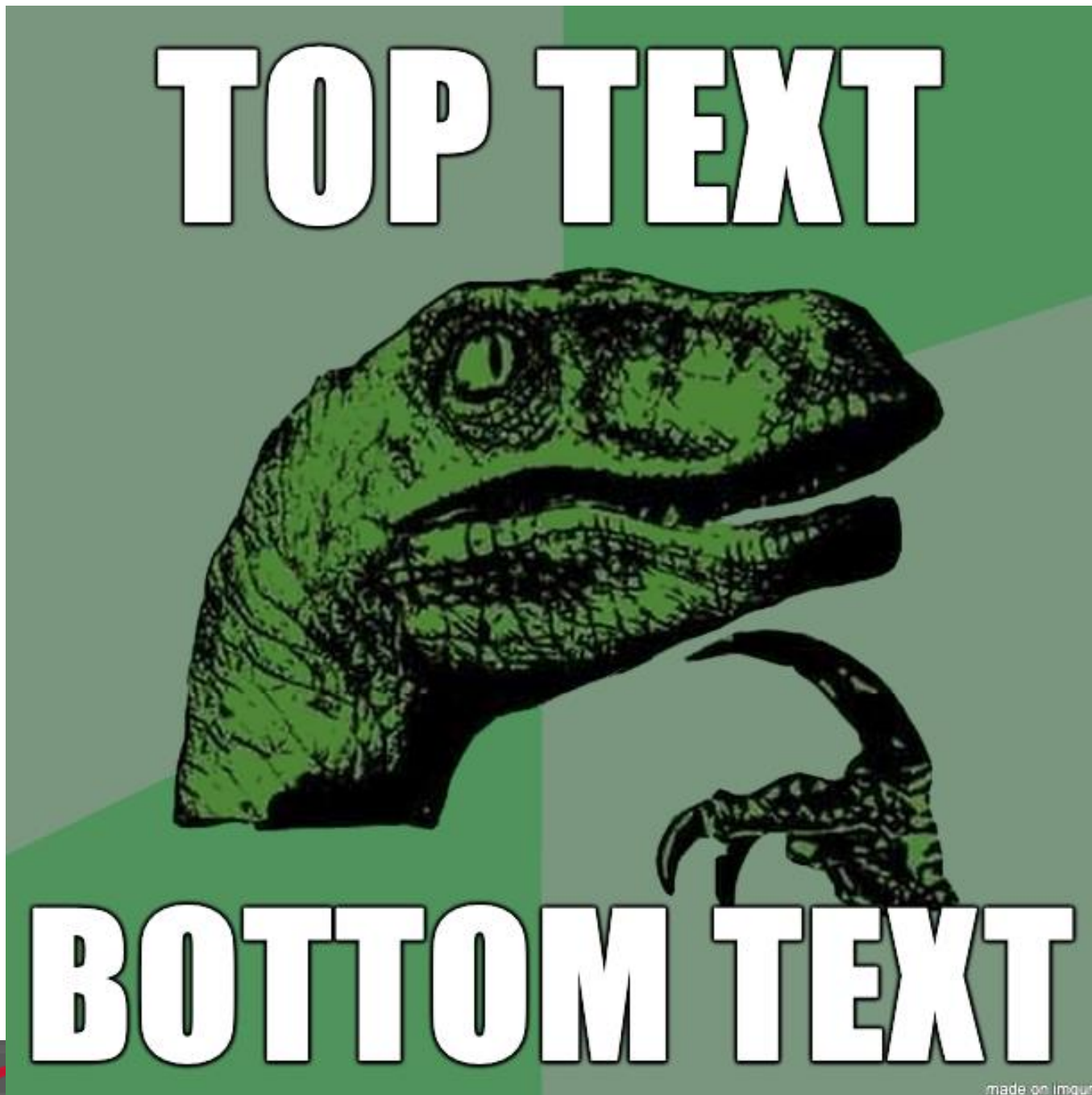
Theme: small victories or little triumphs celebrated in an outsized fashion.

How do we convey the theme embedded in the meme image in alternative formats?



Alt Text:

A drawing of a green dinosaur raptor with a claw to its chin and mouth open, as if it is contemplating something.



Alt Text:

A drawing of a green dinosaur raptor with a claw to its chin and mouth open, as if it is contemplating something. Overlaid text on top: [TOP TEXT] Overlaid text on bottom: [BOTTOM TEXT]



Alt Text:

A drawing of a green dinosaur raptor with a claw to its chin and mouth open, as if it is contemplating something. Overlaid text on top: WHY DO WE BAKE COOKIES Overlaid text on bottom: AND COOK BACON?

**WHY DO WE BAKE
COOKIES**



**AND COOK
BACON?**

memestache.com

Audio template:



Recognizing the meme type

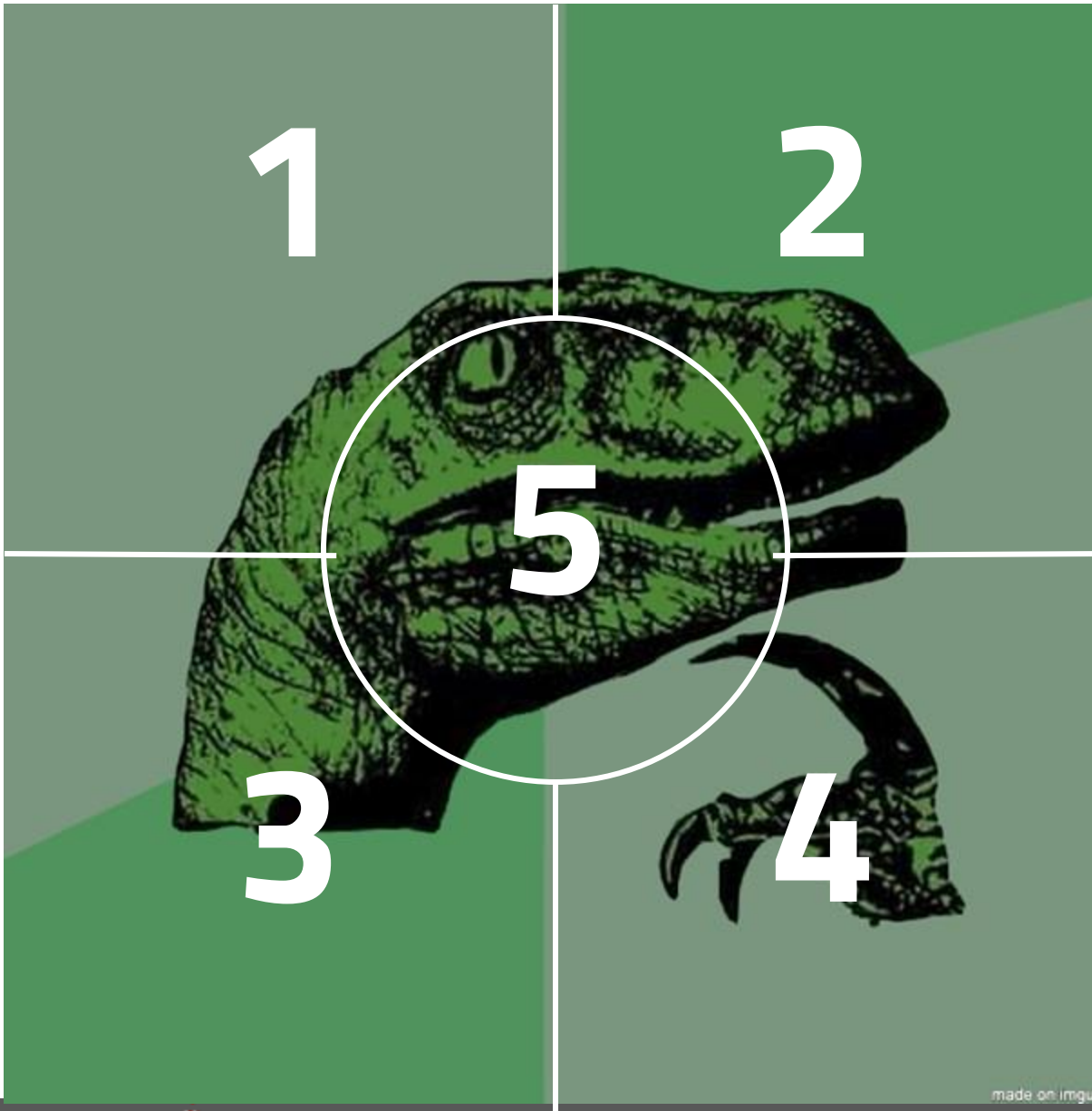
1. Color Histograms of 5 areas

Accuracy: 78%

1. Structural image similarity

Accuracy: 79%

Combined: 92% accuracy



made on Imgur

Meme formats for User Study

Text Only:

I DROPPED MY MACBOOK ON
MY OTHER MACBOOK

Alt Text:

Close up on a woman with her eyes closed, head in one hand, and a stream of tears running down her cheek. Overlaid text on top: I DROPPED MY MACBOOK Overlaid text on bottom: ON MY OTHER MACBOOK

Audio:



“

[The alt] gives you “head in hands, crying”. I could get the emotion, but the reason for the emotion appears in the text. -- P3

It's a little confusing, because I'm like “Why is a bear saying this?” or “Why is a penguin saying this?” -- P6



Preference Results

- 8/10 participants preferred alt text memes
 - “Characters” sometimes aided understanding.
 - Uses existing infrastructure (screen reader alt)
 - More universally accessible.
- Other participants wanted more efficient methods:
 - P6: Audio quickly conveyed tone
 - P9: Text only less verbose

Project Torino/Code Jumper



Participation Activity - Redesign

- Pair up with a neighbor and write your names on a piece of paper.
- Design a new experience for one of the following:
 1. Audio-First Visual Art Gallery for someone with only light perception
 2. Wheelchair First VR Experience for a wheelchair user
 3. Tactile First Web Browser for deaf-blind user
- Write down the user story for the experience of your choice, draw a mockup or storyboard
- We will share at the end
- Turn in your paper at the end of class