Design Approaches

05-499/899 Fall 2024

Celebrating Accessibility

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

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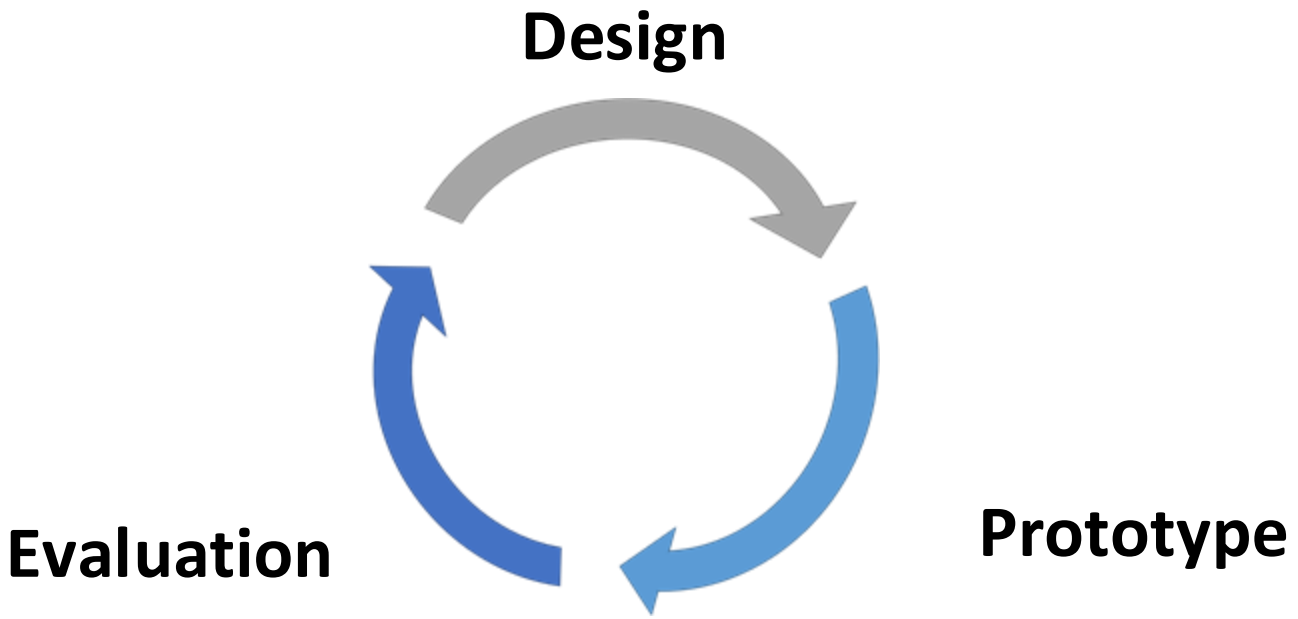
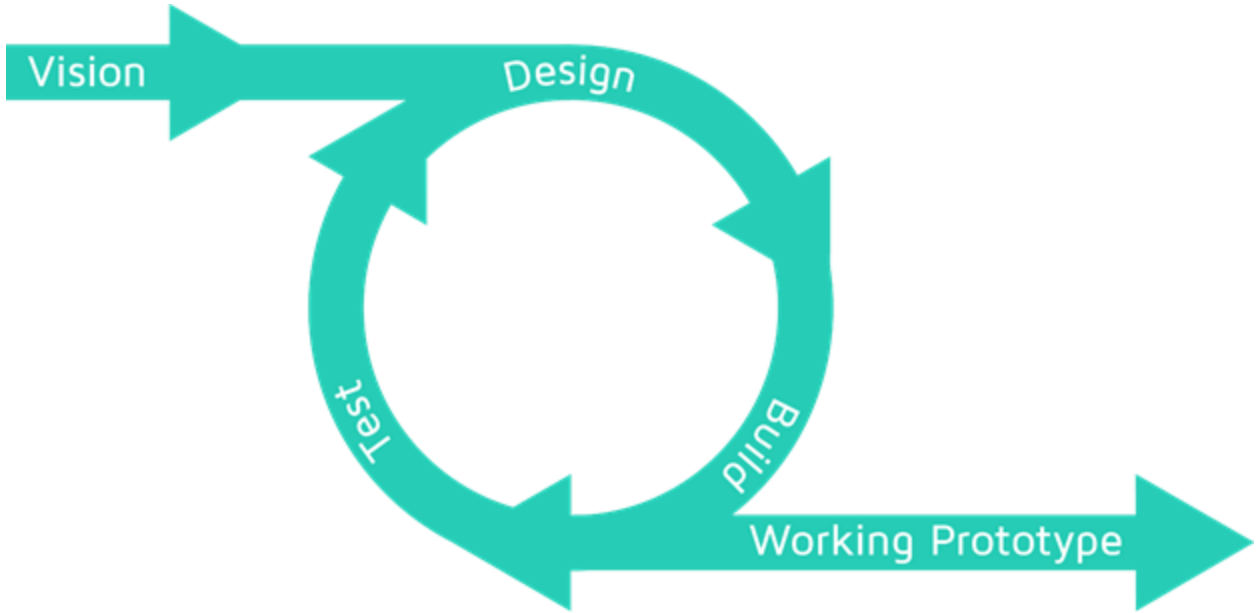
Administrivia

- An overview of the class project is now on the course home page.
- 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



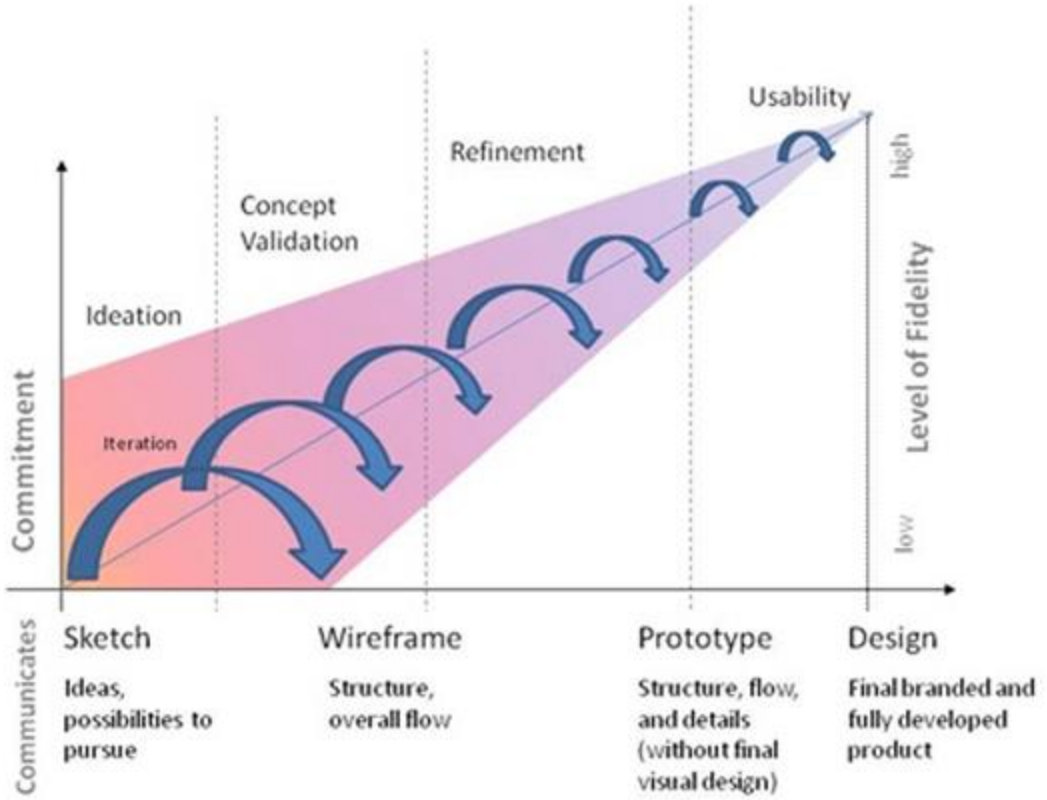
Also Iterative but with a way out



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?

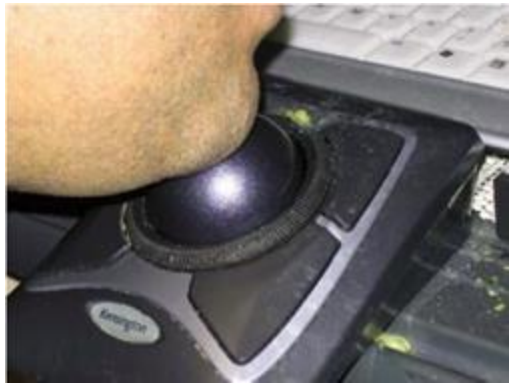
(There are more than you think…)

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.

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 form Assistive Tech and Rehabilitation Engineering.

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

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

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

top text

♪ *upbeat dance music slows to a disappointing finish* ♪

bottom text

alt-text template

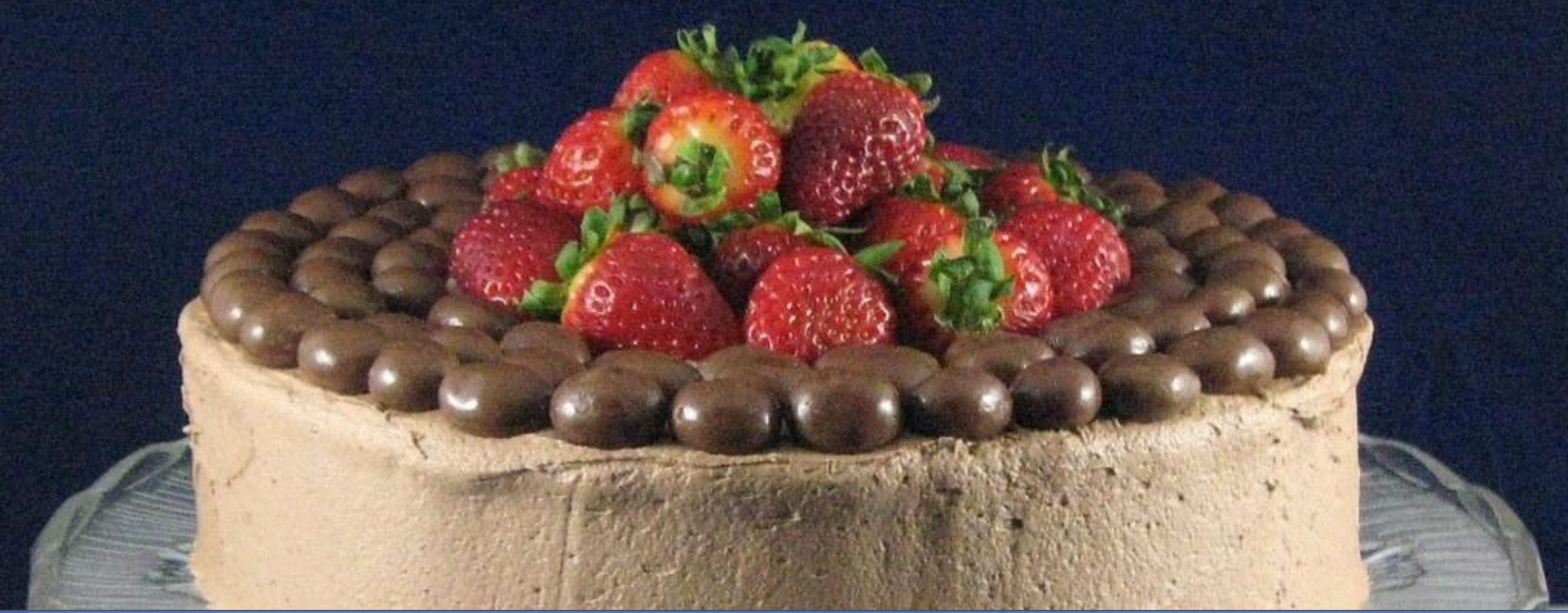
Top half of penguin facing right on a red background. Bottom half of penguin reversed on blue background.

Overlaid text on top:

top text

Overlaid text on bottom:

bottom text



Accessibility on Social Media

Popular Websites

40%

Bigham et al (2006)

72%

Guinness et al. (2018)

Accessible Image on Twitter:

0.1%

Gleason et al. (2019)

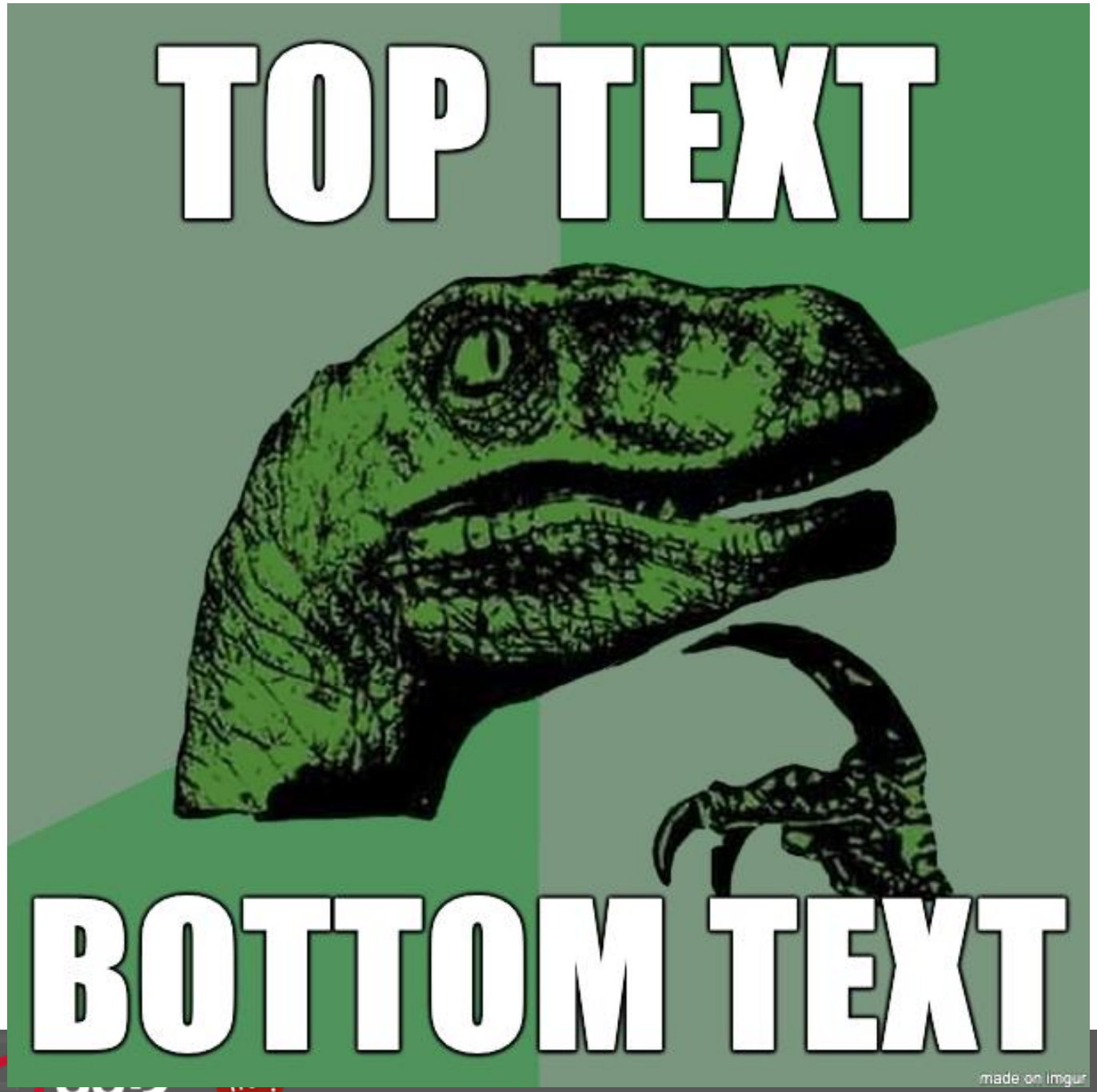
Meme: Success Kid

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 it's chin and mouth open, as if it is contemplating something.



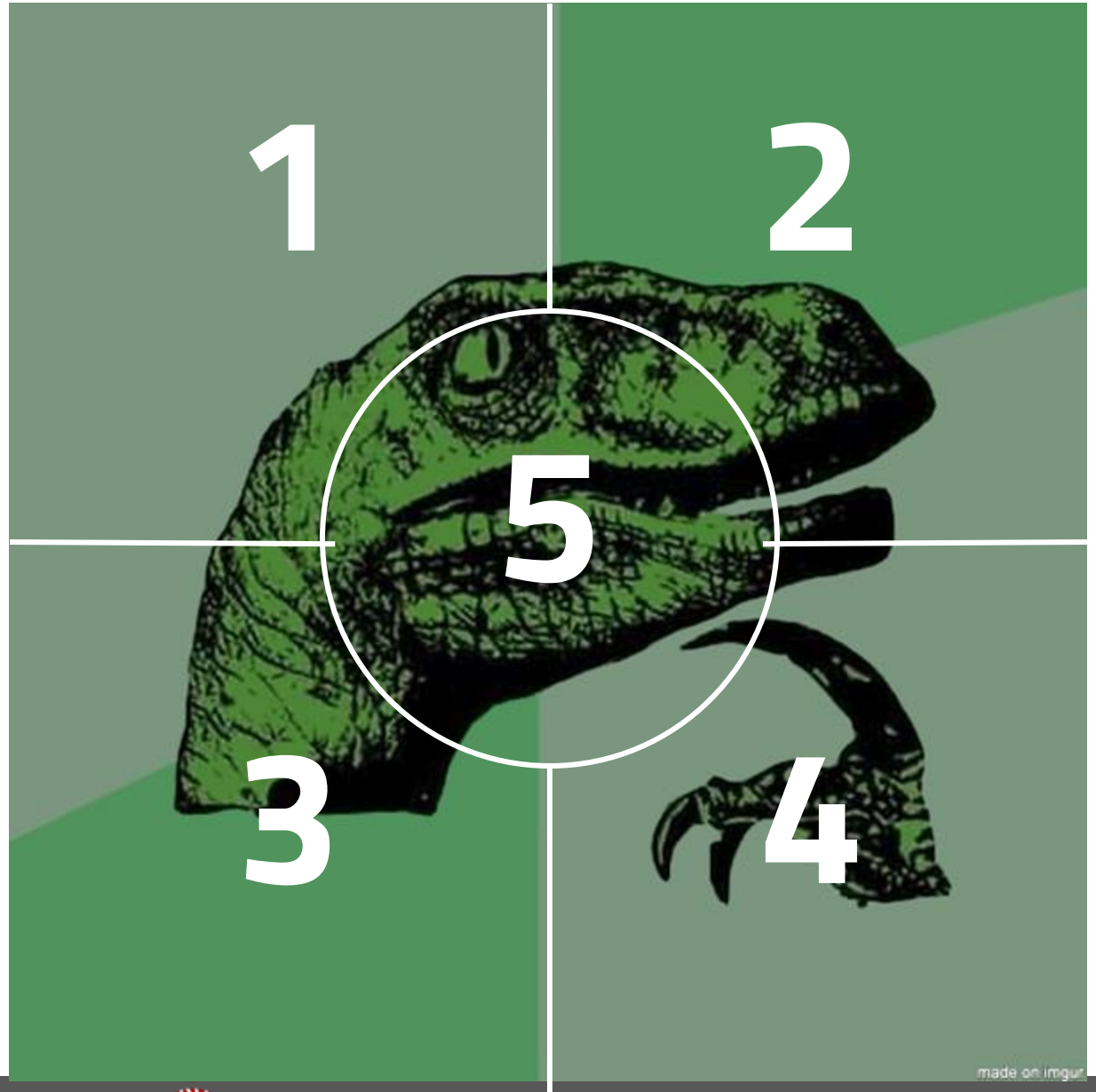
Alt Text:

A drawing of a green dinosaur raptor with a claw to it's 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 it's 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?

Audio template:



Recognizing the meme type

1. **Color Histograms of 5 areas**
   Accuracy: 78%

1. **Structural image similarity**
   Accuracy: 79%

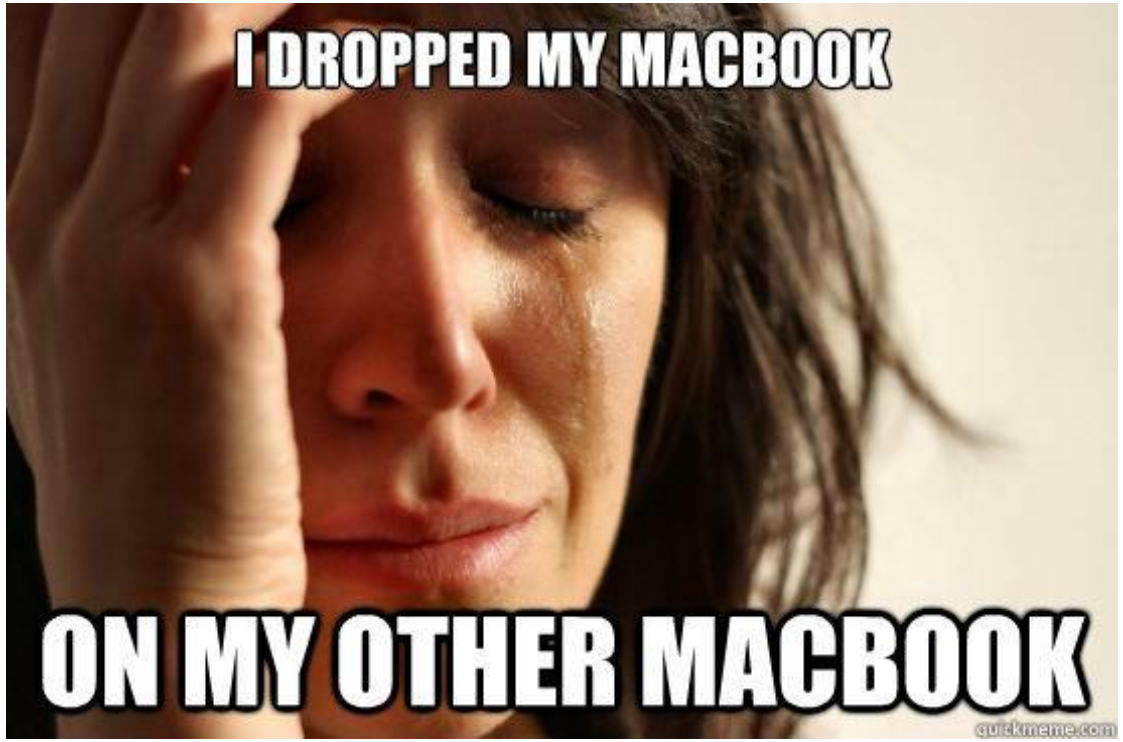
Combined: 92% accuracy

Meme formats for User Study

Audio:

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

User Study

- 10 participants with vision impairments (remotely)
- 3 conditions:
  - Alt Text
  - Audio Meme
  - Just Text
- Random order of 9 meme types (5 examples each).

For each of (Alt Text, Audio, Text Only)

Metrics

After 5 instances of same meme:

- Q1: How well do you feel you understood this meme? (Likert 1-5)
- Q2: What was the common element of these examples?

At end: Preference for format.

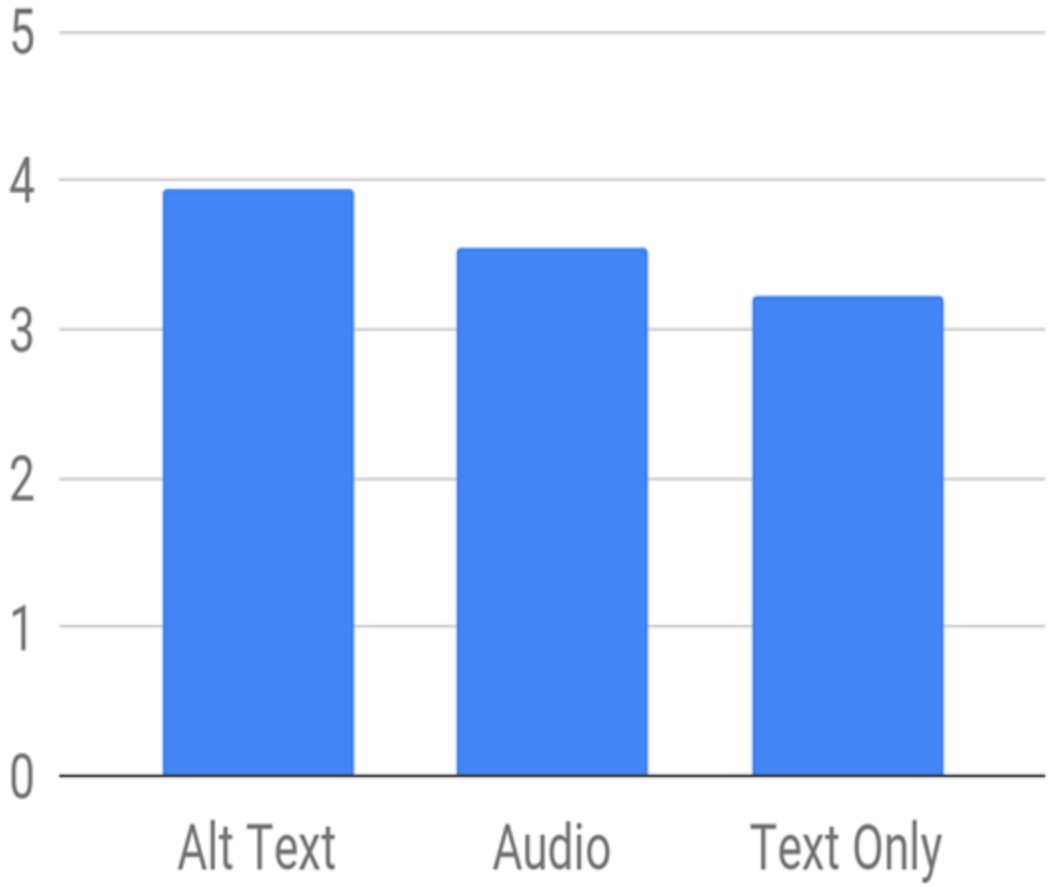
Grading accuracy

Rubric: victory/outcome/success (especially minor)

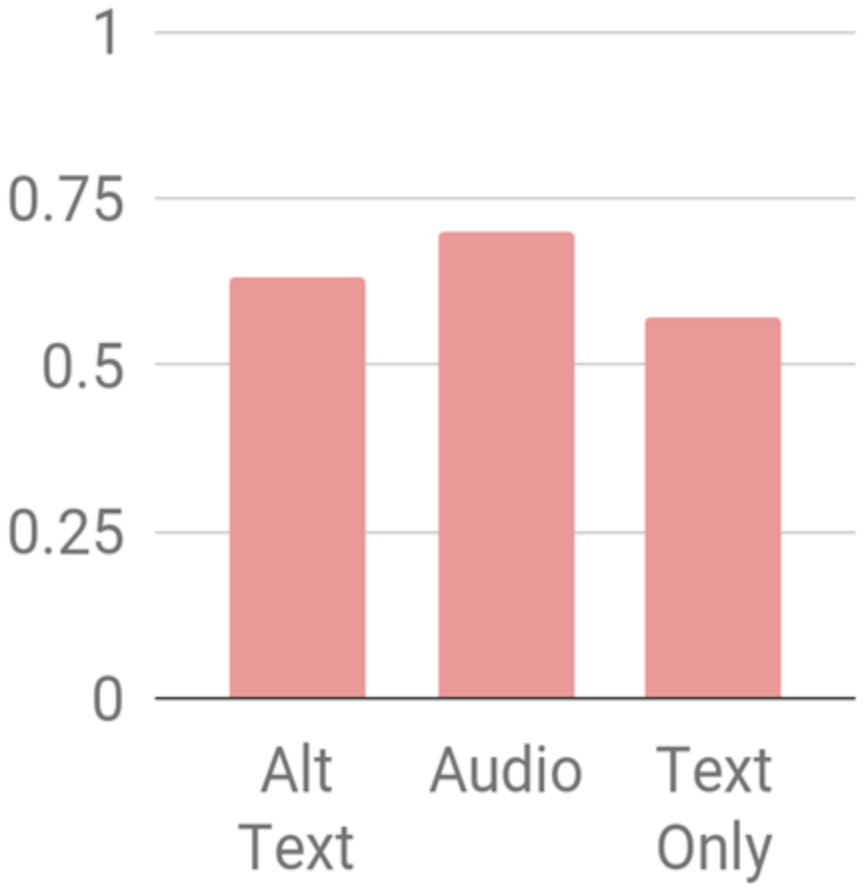
Participants:

- "Little triumphs, little minute triumphs"
- "Something bad and then something good"

Confidence (Out of 5)



Accuracy (percent correct)



[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

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:
  - Audio-First Art Gallery
  - Wheelchair First VR Experience
  - Tactile First Web Browser
- Turn in your paper at the end of class.