

Touchscreen Accessibility

Supporting Individual Motor Abilities

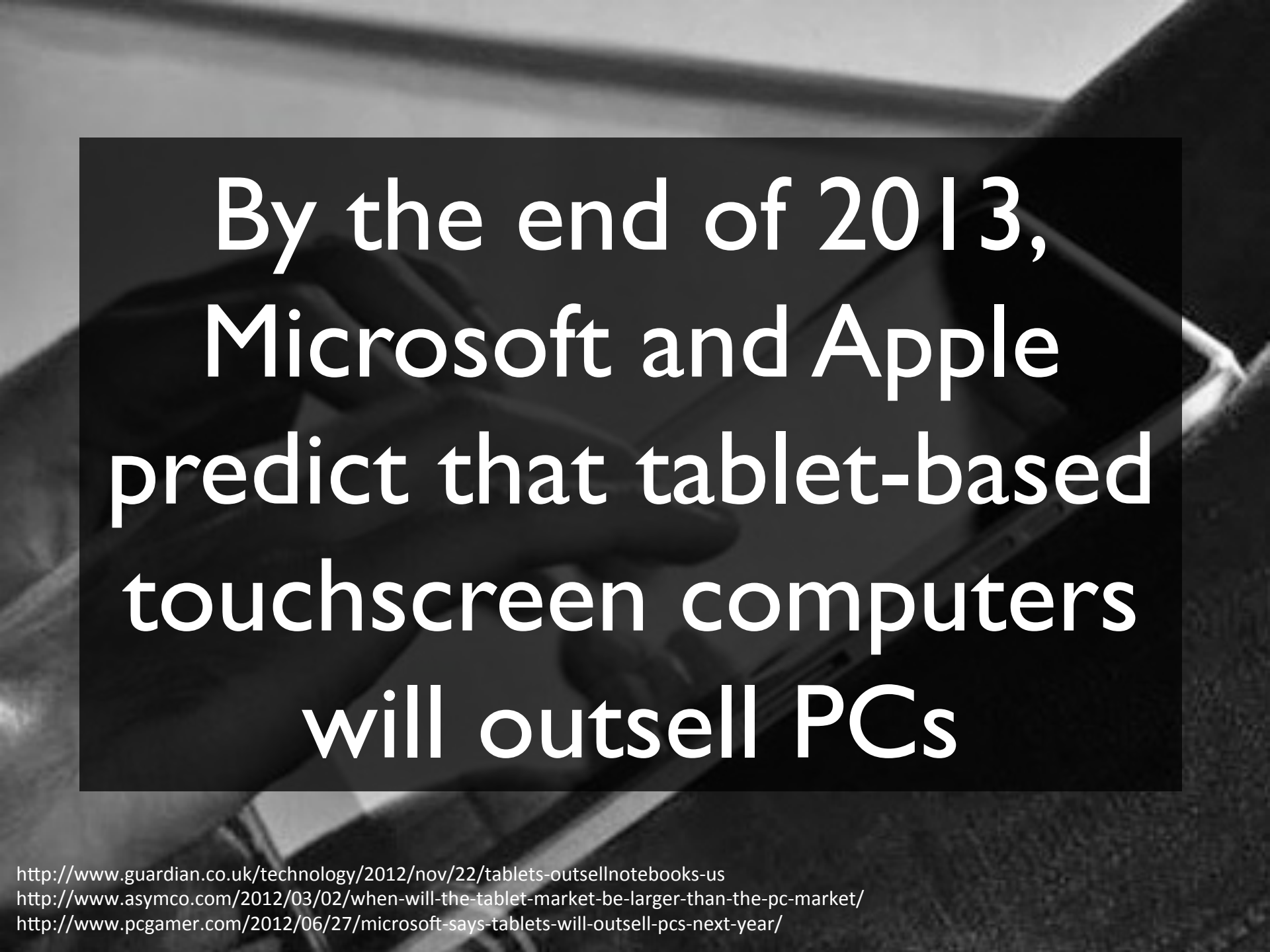
Leah Findlater

Collaborators

Lisa Anthony, UMBC

Yoojin Kim, UMCP



A grayscale background image showing a hand holding a tablet computer. A stylus is visible on the right side of the tablet. A large, dark, semi-transparent rectangular box is centered over the image, containing white text.

By the end of 2013,
Microsoft and Apple
predict that tablet-based
touchscreen computers
will outsell PCs

<http://www.guardian.co.uk/technology/2012/nov/22/tablets-outsellnotebooks-us>

<http://www.asymco.com/2012/03/02/when-will-the-tablet-market-be-larger-than-the-pc-market/>

<http://www.pcgamer.com/2012/06/27/microsoft-says-tablets-will-outsell-pcs-next-year/>







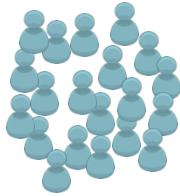
What are mainstream touchscreen devices being used for on a daily basis?

What adaptations are users making to improve accessibility?

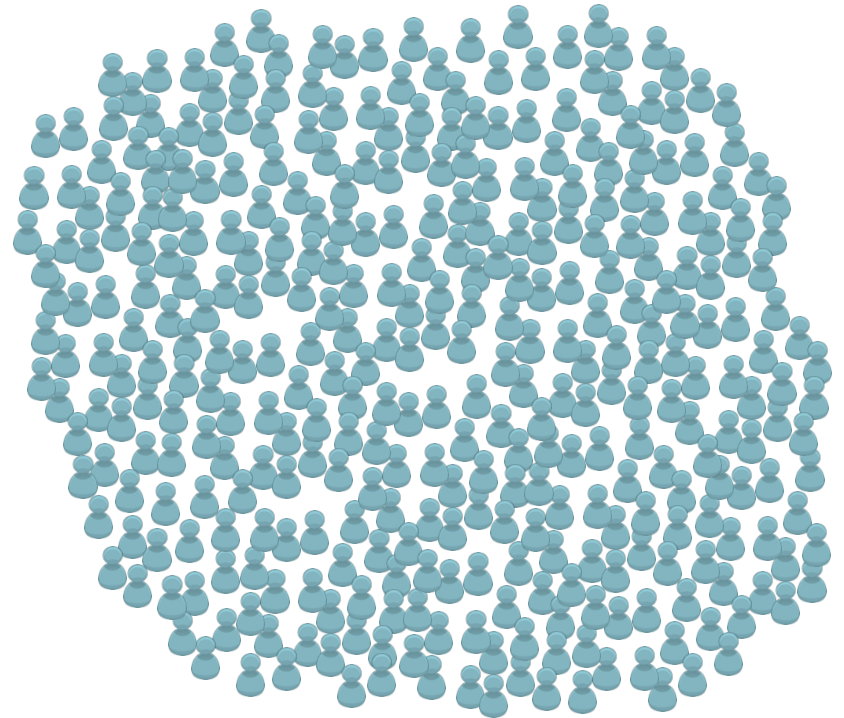
Most studies on accessibility
and motor impairments:



5-20 participants



Our goal:





Approach: Find and analyze **user-generated content** (YouTube videos) of people with physical disabilities interacting with mainstream touch devices



[Slide adapted from Lisa Anthony]

Qualitative analysis of existing material



Qualitative analysis of existing material

Created a dataset of 187 videos

YouTube Search

60 disability-related terms (e.g., cerebral palsy)

× 9 technology-related terms (e.g., smartphone)

= a lot of searches, 187 videos, 101 uploaders

Qualitative analysis of existing material

Created a dataset of 187 videos

Coded videos along 21 dimensions

Examples:

Age of user

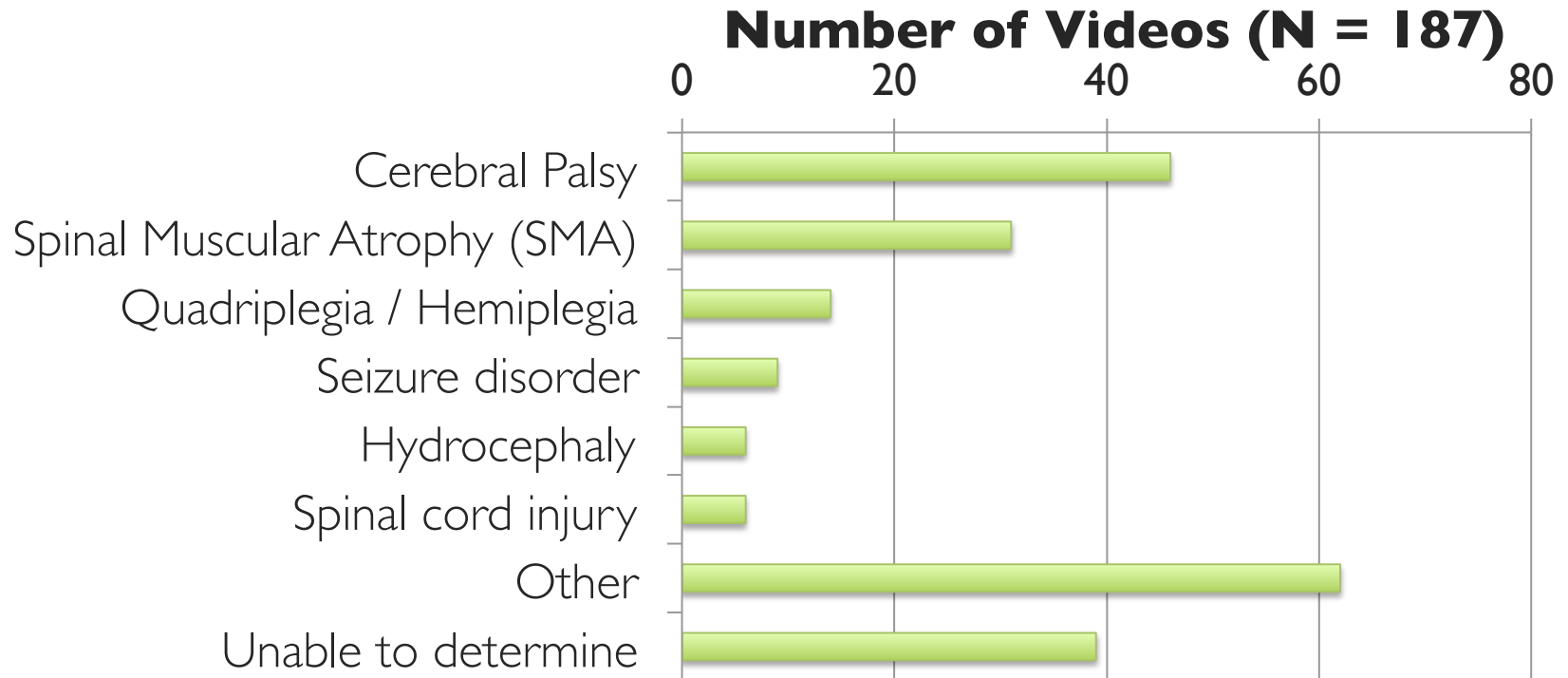
Video emotion (negative or not)

Direct vs. indirect interaction

Direct touch detail (e.g., index finger + thumb)

Use of external objects (e.g., head pointer)

User Characteristics



Age: Almost half (47% were small children)

Gender: 43% female, 57% male

Devices

iPad
78%



iPhone
17%



Other
5%



Findings



Theme #1

Interaction Styles

Interaction Styles

92%

Direct Touch

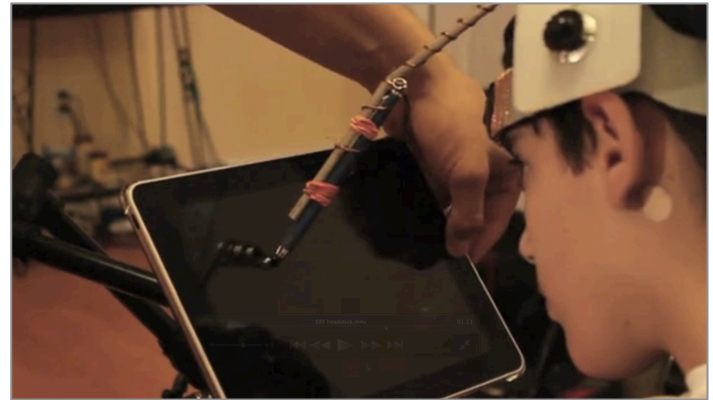
e.g., finger, knuckle,
hand, foot, nose



8%

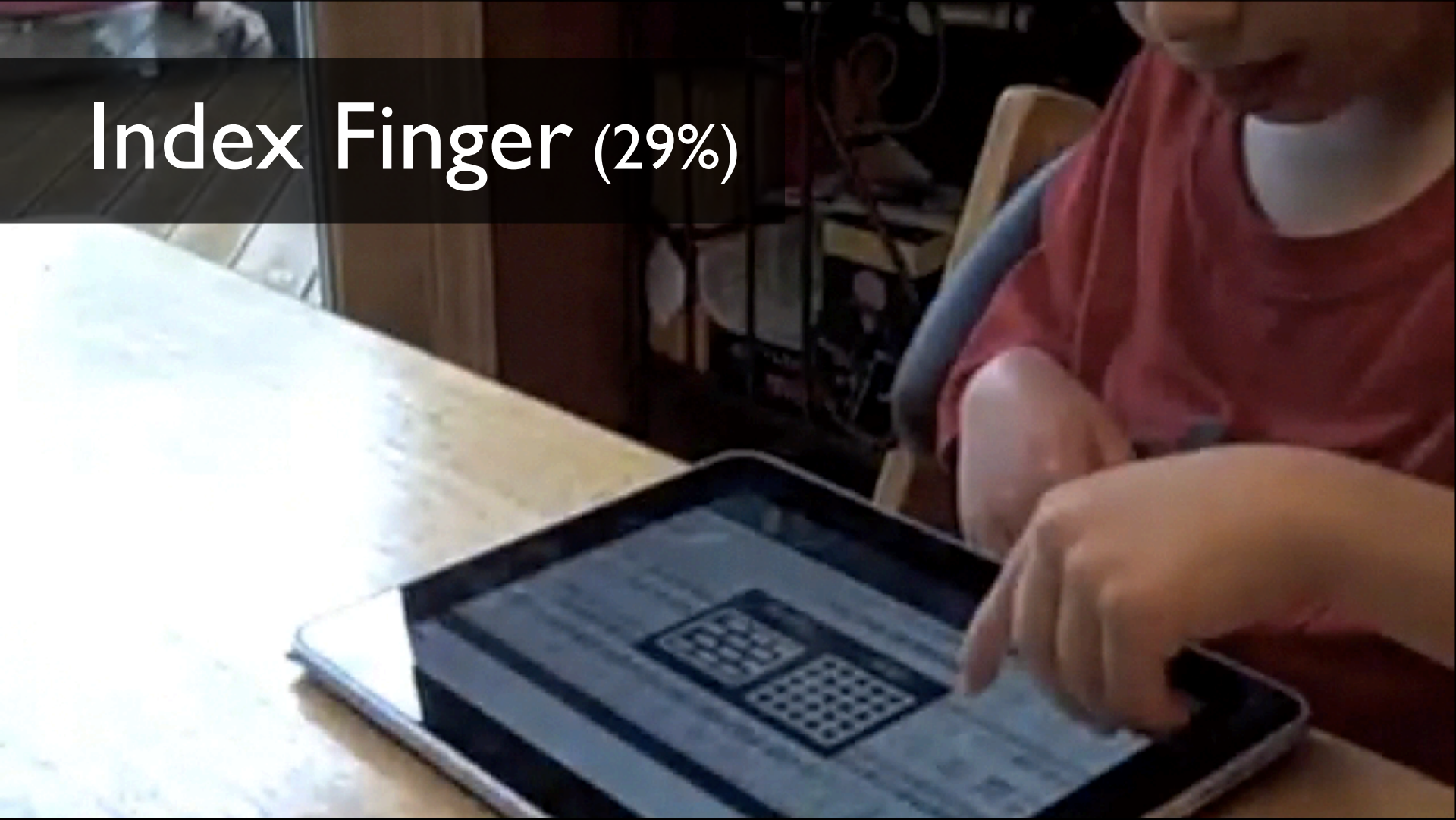
Indirect Input

e.g., head stick,
mouth stick



Somewhat standard interaction styles....

Index Finger (29%)



A person wearing a red shirt is sitting at a desk, using a tablet. The tablet screen displays a grid-like interface. A semi-transparent black box with white text is overlaid on the top left of the image. The background shows a wooden desk and some clutter.

Index Finger (29%)

“[He] has been doing a much better job of touching the screen with the pad of his finger, instead of his nail.” (V8).

Hand (16%)



Hand (16%)



Wider variety of interaction styles....

Nose (3%)



Feet (1%)



Slings to Support Limbs: | 3% of videos

Common Interaction Issues

Hitting with fingernail

Excessively long dwell times

Accidental touches

Problematic dragging and sliding motions

Inability to complete multitouch gestures

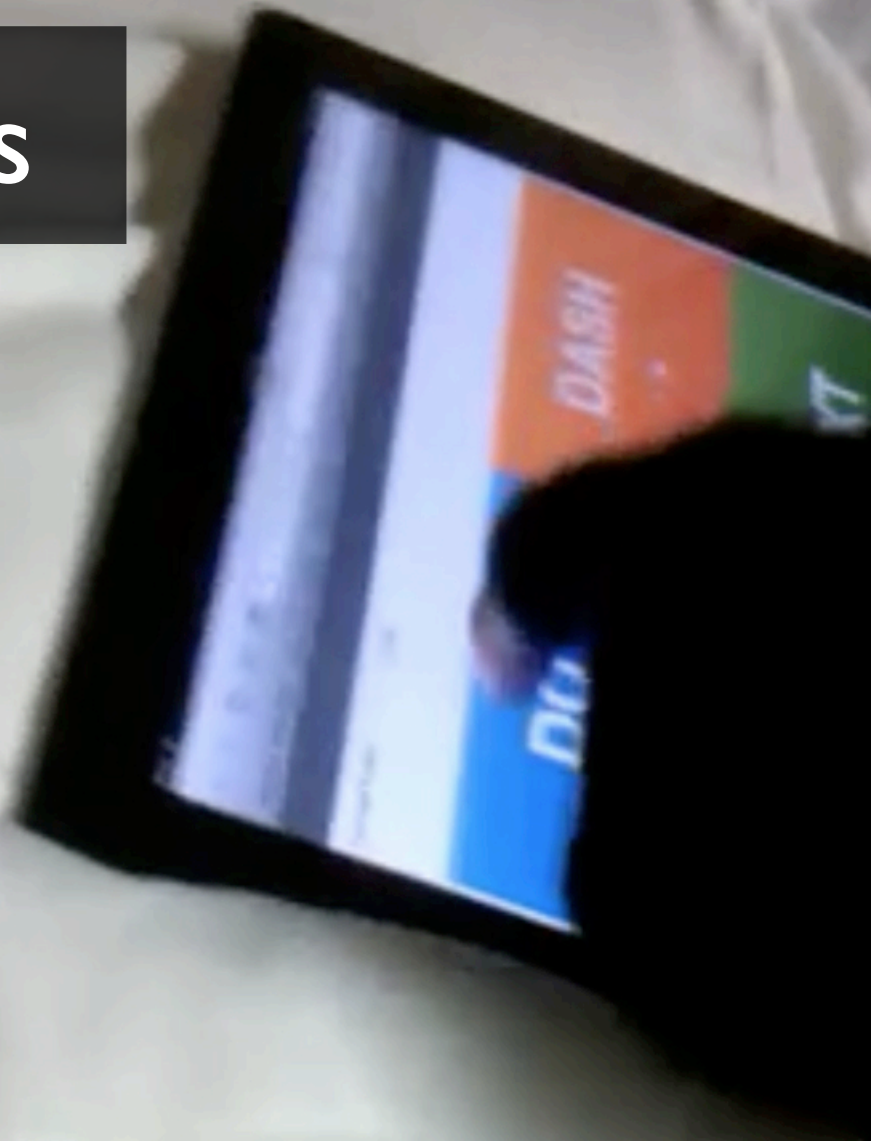
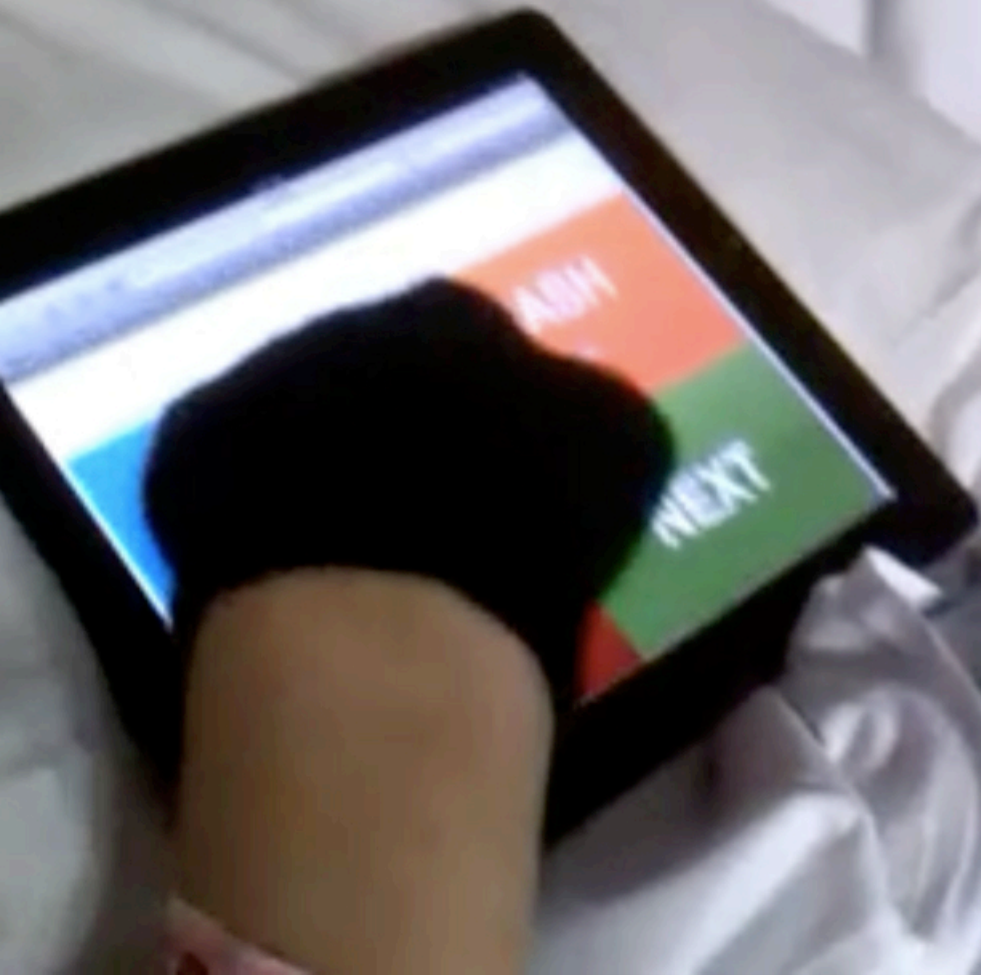
Theme #2

Homemade Adaptations

Screen Protectors



Gloves and Sleeves



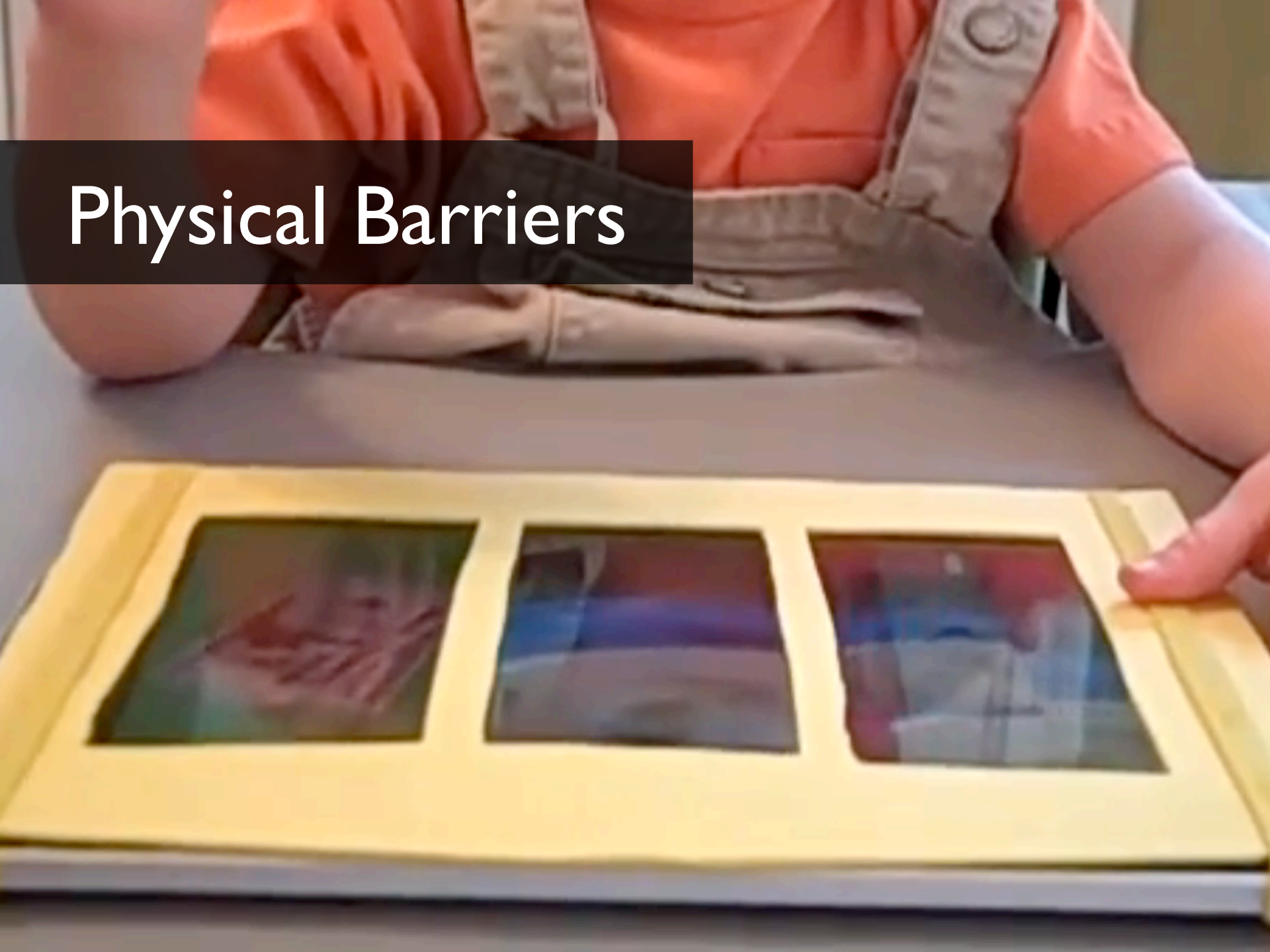
Pointing Devices



Pointing Devices



Physical Barriers



Theme #3

Sentiment Expressed

Positive and Negative Sentiment

Mostly positive or neutral sentiments, e.g.:

Adult female with a spinal cord injury who uses capacitive stylus attached to her mouth stick (V22)

“My main concern was if I would be able to use it given the fact that-it’s designed to be used with your hands...It gives me the freedom and independence to...do a lot of things on my own, which is great.”

Six videos with obvious negative sentiment, e.g.:

Young adult male with cerebral palsy (V250)

Unable to control hands enough to even touch the device

How can we design more
accessible touchscreen interaction?

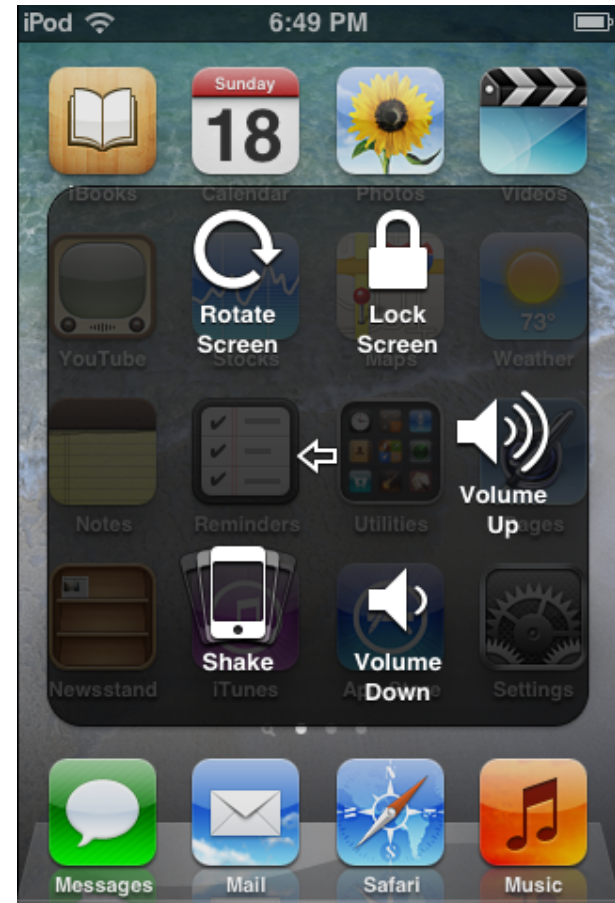
Design Implications

Allow control over sensitivity of the device

Provide alternatives to multitouch

Ignore long touches

Support DIY physical guides



Apple's AssistiveTouch

Reflecting on the Method

Demonstrated the effectiveness of using publicly available, user-generated content to inform input and interaction design

Thank you

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Google

