Assistive Technology and Computer Access

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Weiss Center Purpose

From the call for proposals:

"We will use the priority to award a cooperative agreement for an Accessible Data Center to focus attention on an identified need to support States in collecting, reporting, analyzing, and publishing their data in formats that provide **equitable access and visualizations to persons with disabilities**, particularly those with blindness, visual impairments, motor impairments, and intellectual disabilities."

Equitable Access

Provide the same level of access as that granted to people without disabilities.

- Understandable—ease of comprehension
- Usable—ease of interaction
  - Accessible

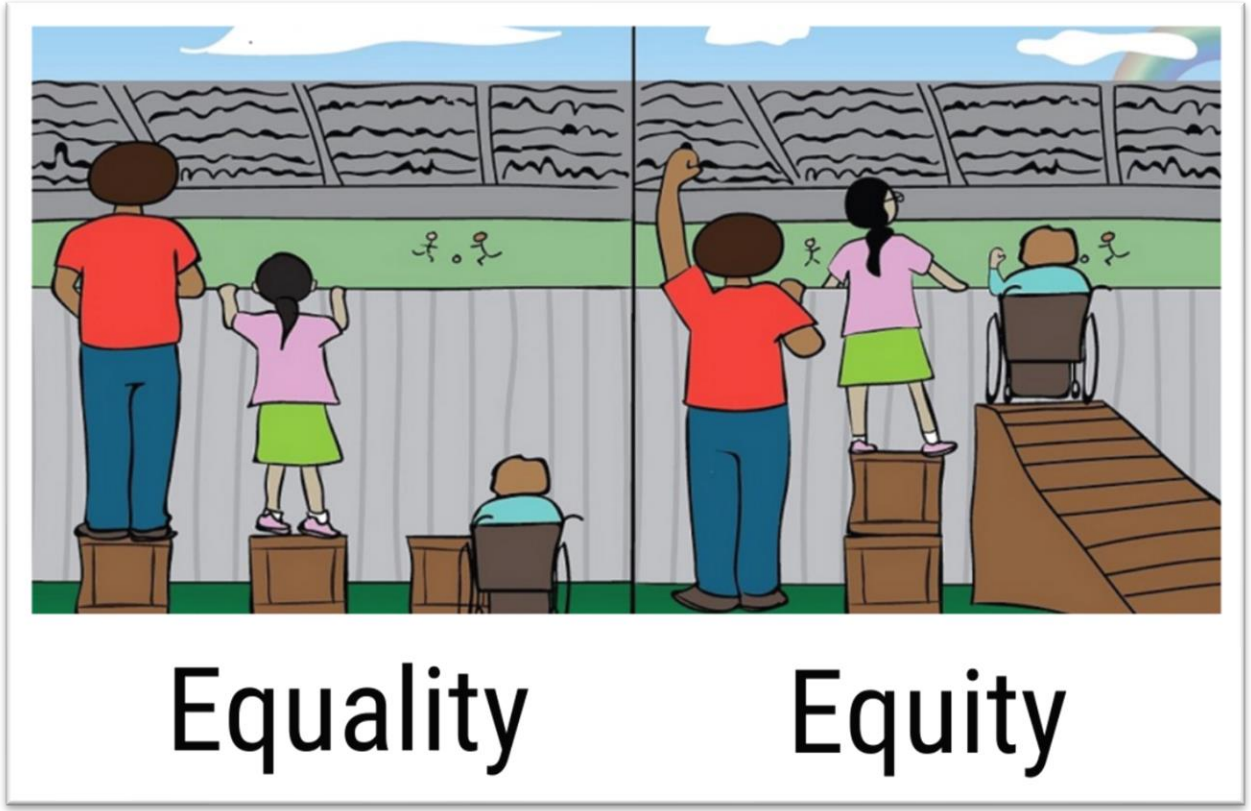


***Image Credit**: Interaction Institute for Social Change | Artist: Angus Maguire.*

Accessibility

Describes a state where the abilities of an individual match the demands of an environment.

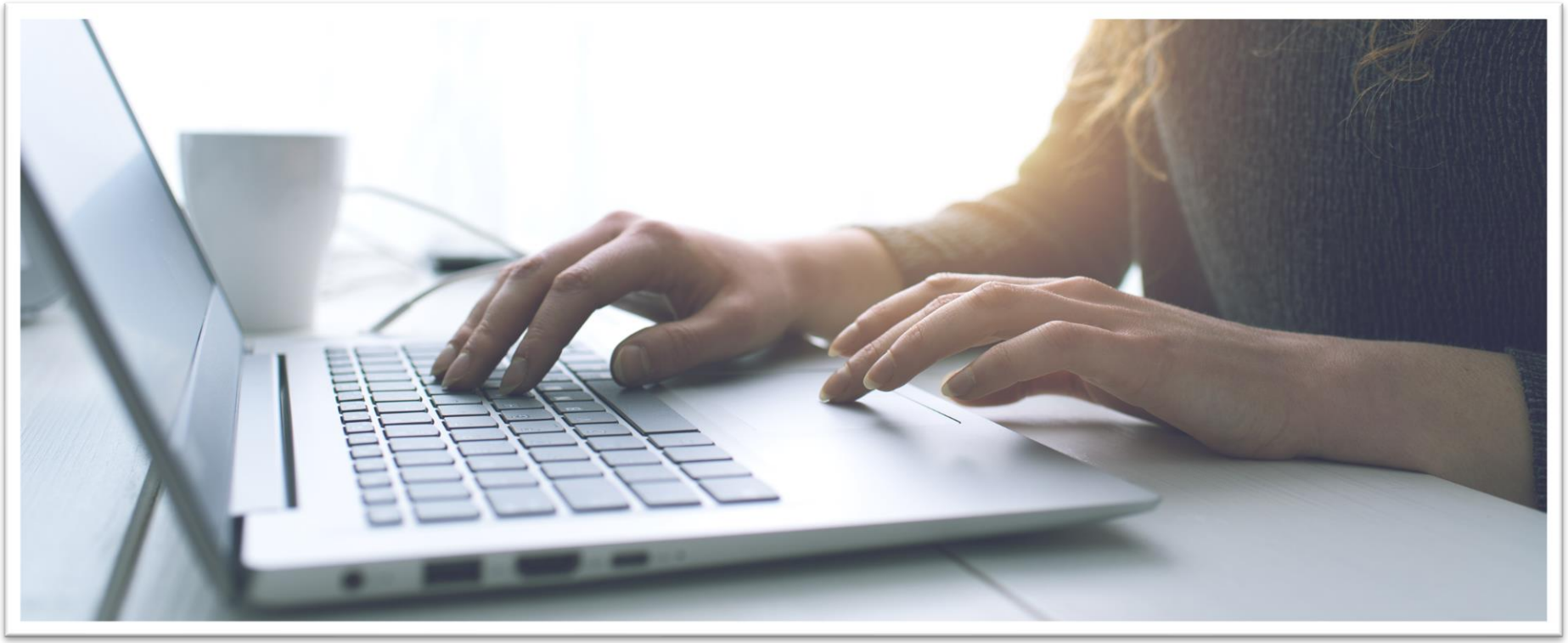
Can be achieved in two ways:

Universal Design	Accommodation/Modification
	• Assistive Technology

Barriers to Computer Access

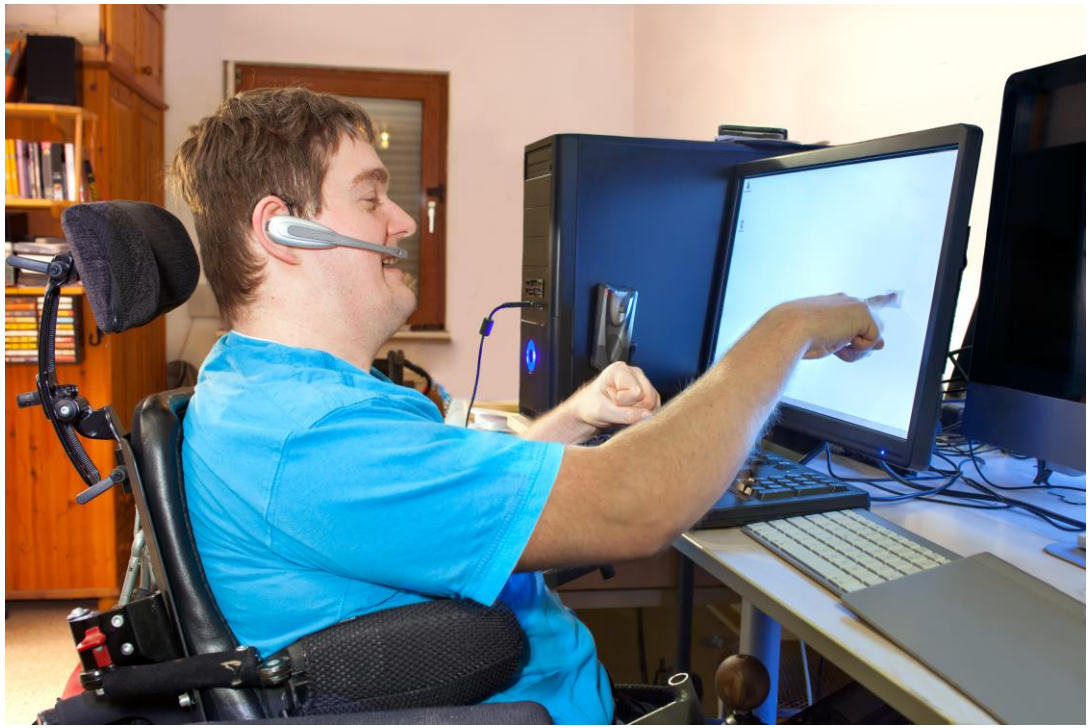
Computer Access

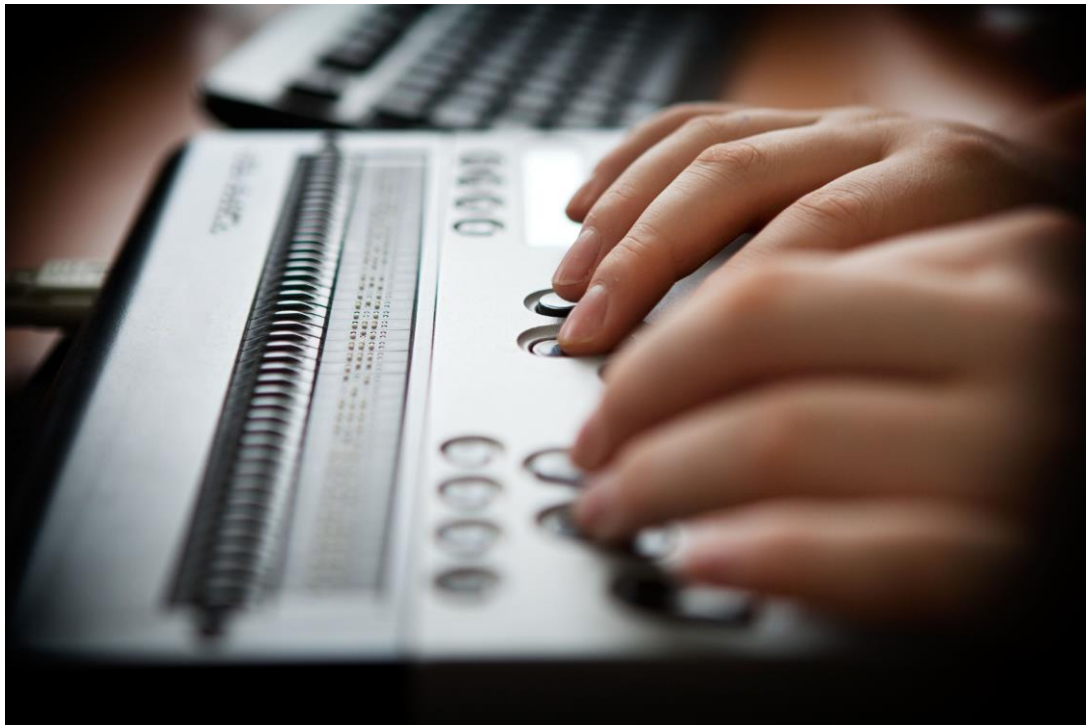
Computers are designed for people with normative function.



Computer Access for People with Disabilities

People with disabilities use assistive technologies to input and access information from computers in alternate ways.

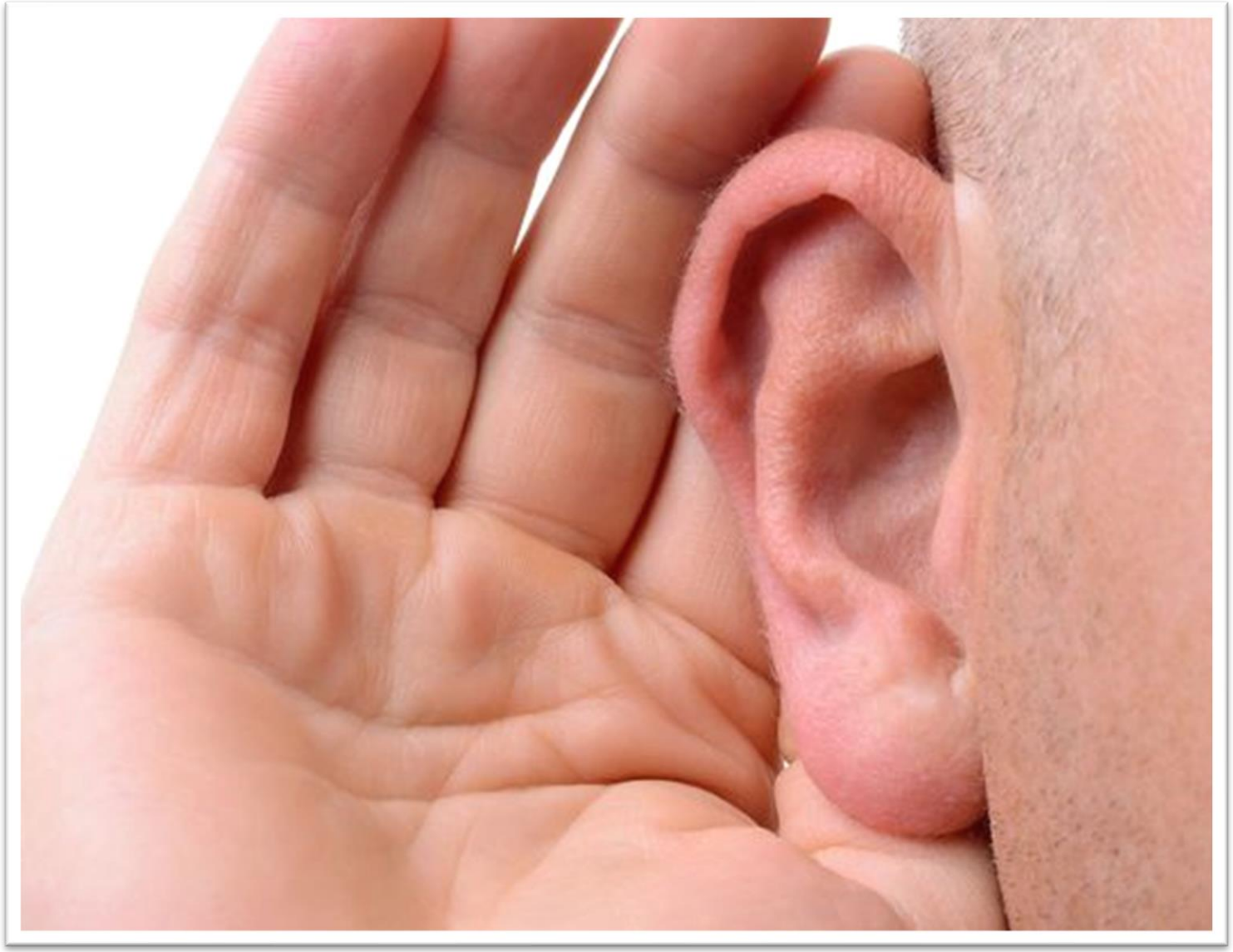




Types of Assistive Technology

AT to support:

- Hearing
- Vision
- Movement
- Reading
- Cognition



Hearing Loss

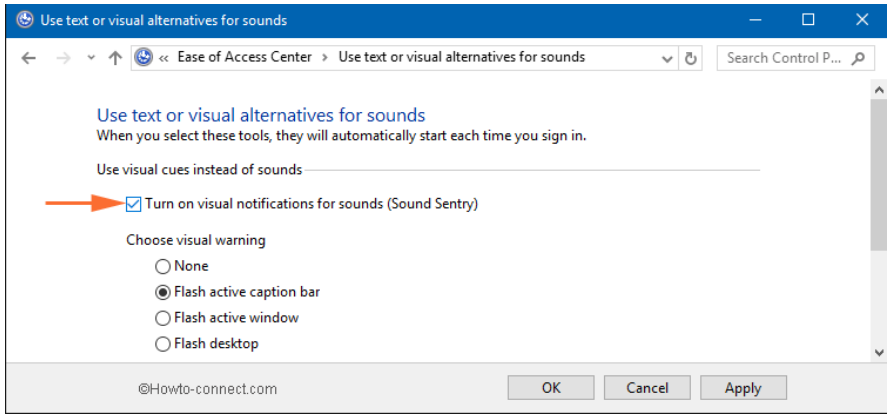
Primary issue: content with multimedia cannot be heard

Hearing Loss Solutions

Use text

- Captions or transcription

Visual alternatives to sounds



Hearing Loss—Built-In OS options

Windows - Ease of Access

- Live Captions
- Closed Captions
- Show audio alerts visually
- Mono Audio

Mac OS – Accessibility

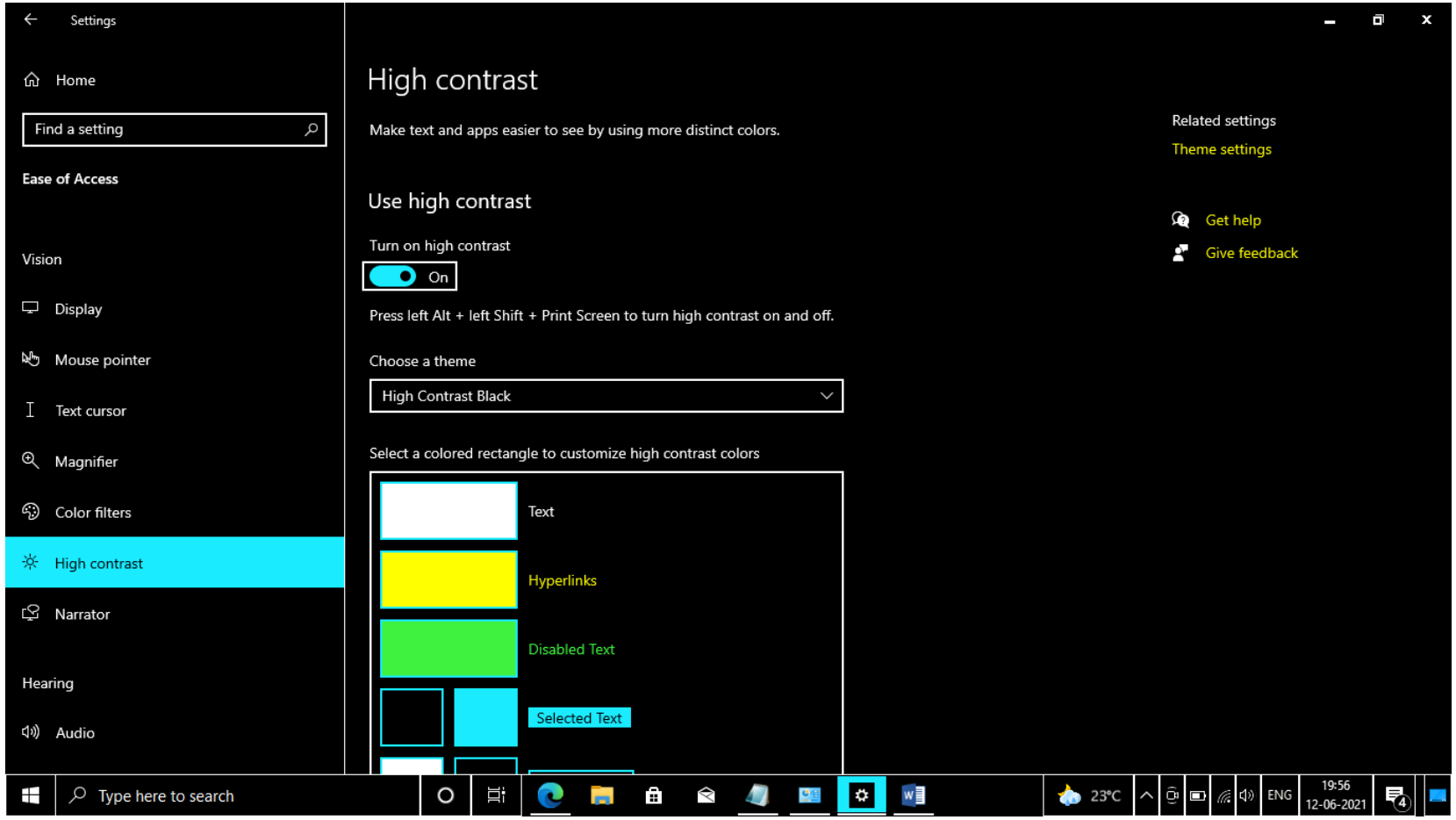
- Real-time captioning of audio in podcasts, FT
- Closed Captions
- Sensory Alerts (visual or vibrating)
- Mono Audio

Vision Loss

Difficulty or unable to visually access the content on the screen

Mouse navigation

Change Contrast



PC Screen Magnification

Change magnification

Options for pointer, color scheme, cursor

Screen Reader to offset eye fatigue, improve accuracy and efficiency

Works with dual monitors

Zoomtext Magnifier/Reader $600

www.aisquared.com

Supernova Magnifier with Speech $715

https://yourdolphin.com/product?id=2

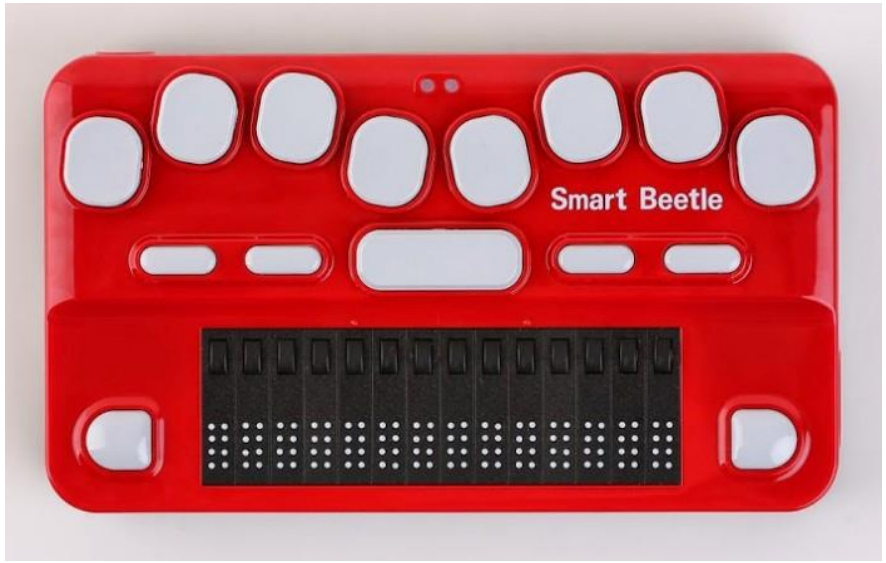
PC Screen Readers

Jaws for Windows Pro and Home, $1100 and $900 www.freedomscientific.com

Supernova Screen reader, $955 https://yourdolphin.com/screenreader

- Full speech, reads everything
- Keyboard driven
- Runs a Braille display
- Can customize with scripts
- Requires training

Braille Display



Smart Beetlrte 14 cell

Focus 40 cell

Mobility Limitations

Upper extremity motor function limitations affect use of input devices

Keyboards

Compressed Keyboards

Small footprint requires less area to cover.

Can allow better access to mouse.

Large Keys Keyboard

Useful for people with low vision and/or limited fine motor control.

Job Station Program

One Handed Keyboards

Most experienced keyboard users prefer a standard keyboard

Requires evaluation of individual's capacity for new learning

Large learning curve

Large Keys Keyboard

Useful for people with low vision and/or gross motor control

Voice Recognition

Computer transcribes dictated text

Allows for some command and control features

Not totally hands free

Requires cognitive load

Dragon and Mac Dictation (limited mouse control features)

Jsay

- brings together Dragon NaturallySpeaking and JAWS

Pointing Devices

Can be controlled by

- Mouth
- Eyes
- Head
- Hand

- Clicks performed by
  - Switches
  - Software
  - Sip/puff

Pointing Device Examples

Switches

Switch Interface

Standard Switches (require force)

Proximity Switches (detect movement near switch)

Sip and Puff

GlassOuse

HeadMouse

Lighting and positioning important for accuracy

Requires very fine motor control of neck

Users typically dependent for placement of transmitting device

May initially cause neck stiffness or pain

Eye Gaze

Lighting may impact accuracy

Eye glasses (bifocal) may impact accuracy

Cost decreasing but still expensive option

Supplement with switch clicks if possible

Initial training time dependent on cognitive skills, environment and pre-morbid computer knowledge

Mouse Options for Tremors

Software

- SteadyMouse

Device

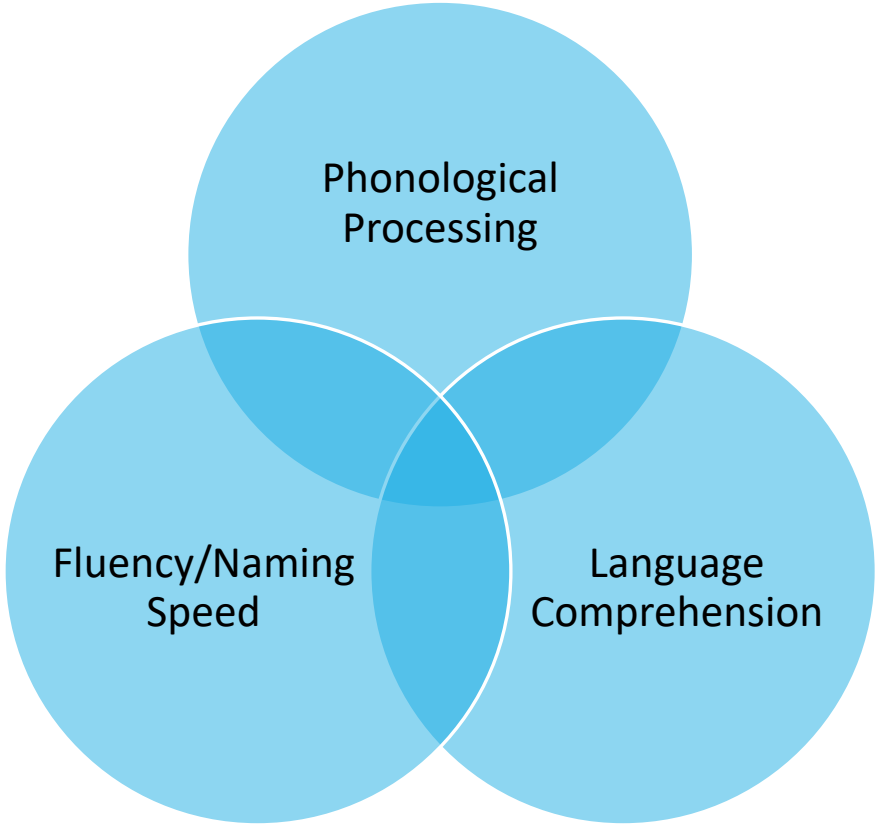
- AMAneo USB
  - Assistive Anti Tremor Mouse Adapter

Reading Disability

Difficulty in reading but not in other skills.

Can be several causes:

- Phonological processing—difficulty learning sound-symbol correspondence.
- Fluency/naming speed—difficulty with speed of word recognition and recall of word spellings.
- Language comprehension—accurate decoding but difficulties understanding meaning.



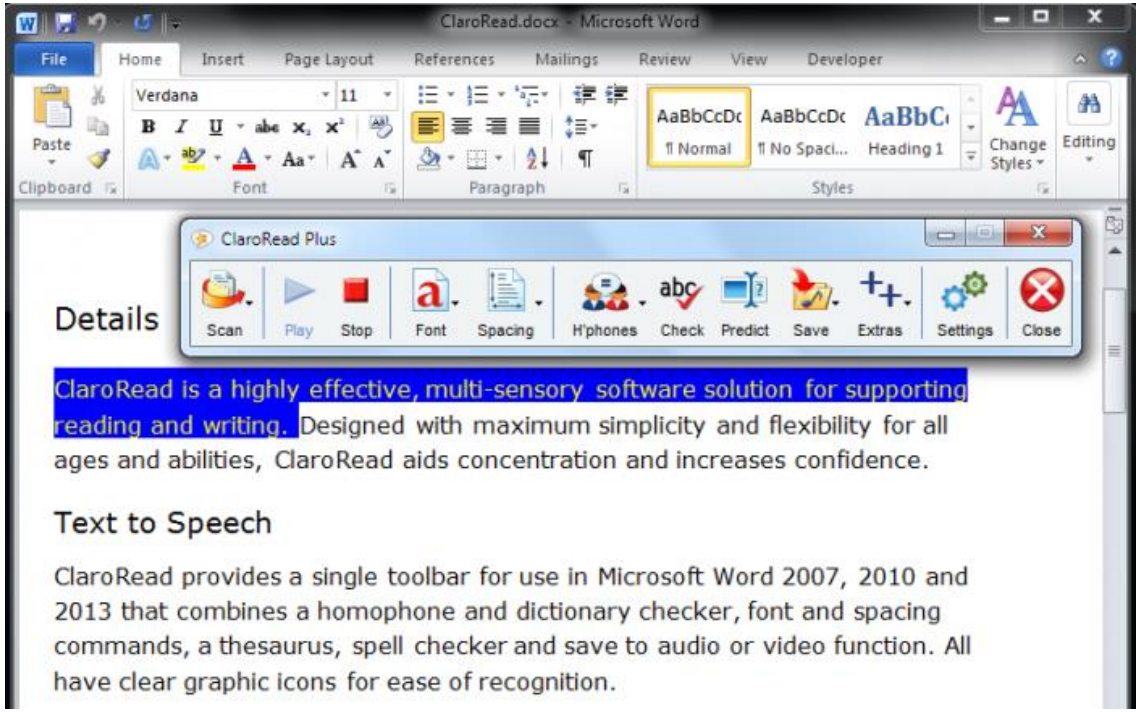
Reading

Text to Speech Software

- ClaroRead, TextHelp etc

Text to Speech Mobile Apps

- Learning Ally, Bookshare, Audible, Dolphin EasyReader

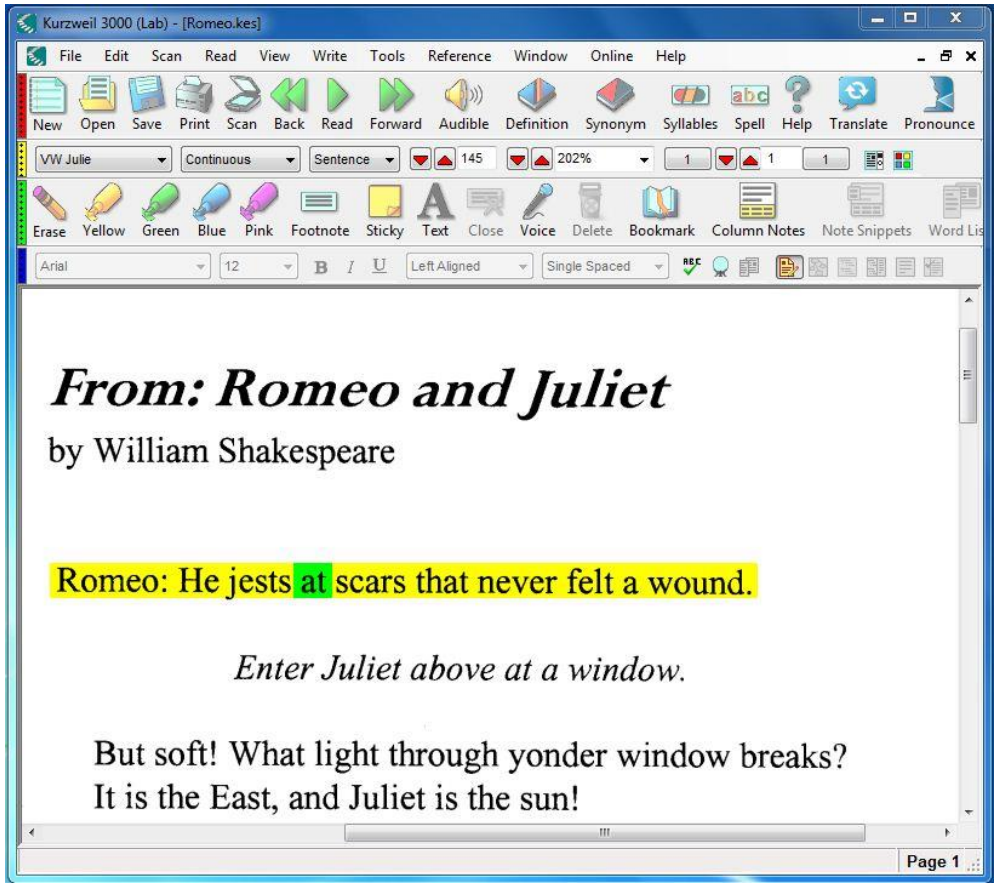


Highlighting

Masking: Bimodal highlighting

Used for people who need both visual and audio feedback

Highlights words in conjunction text-to-speech



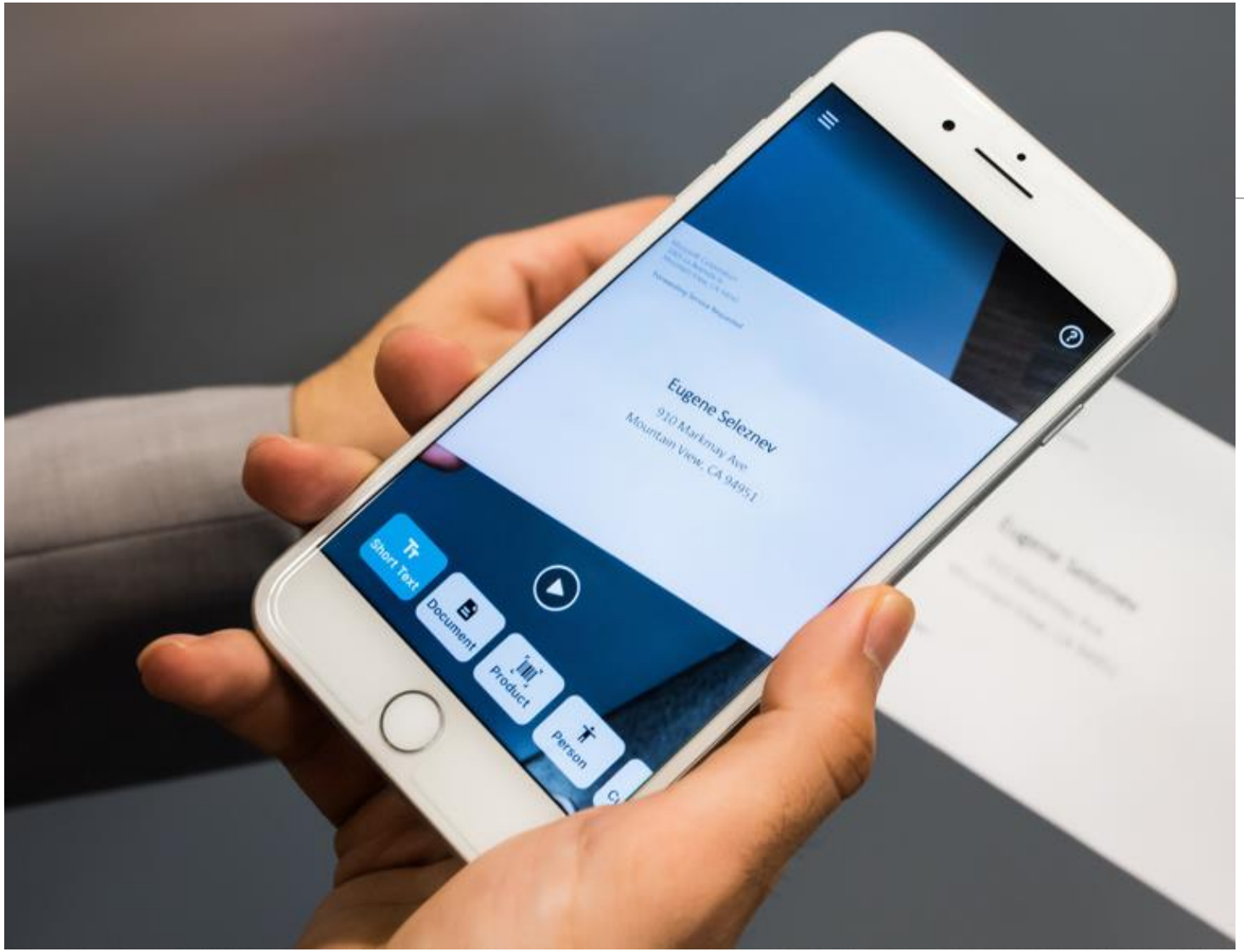
OCR SCANNING

KNFB Reader App

Seeing AI App

CPEN

OrCam Read



Seeing AI

- Text recognition
- Barcode Scanner
- Describes people and scenes
- ID currency
- Handwriting Recognition
- Free, iOS only

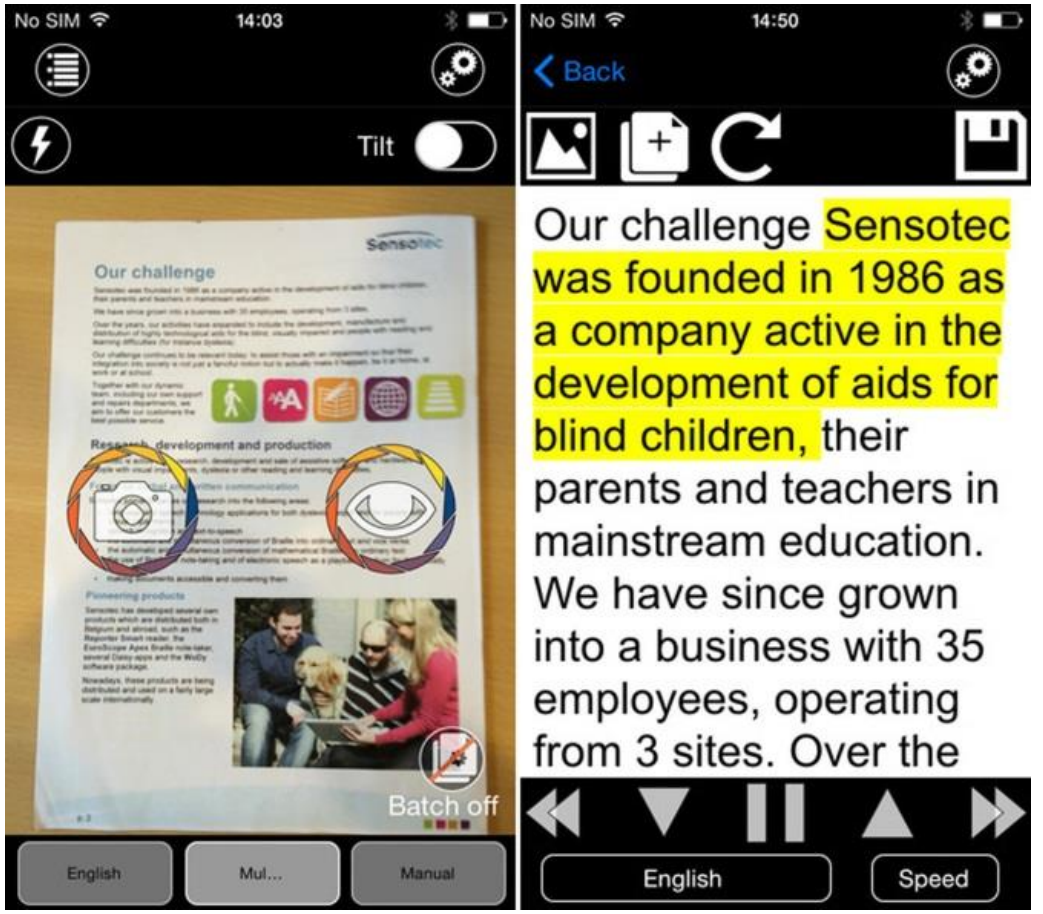
Kurzweil KNFB Reader App

Converts printed text-to-speech

Text highlighting feature

Supported devices iPhones 6+ thru 4s

And 5th generation iTouch



Cognitive/Intellectual Disability

Cognitive disability is when a person has trouble remembering, learning new things, concentrating, or making decisions that affect their everyday life.

Reduced speed of information processing, limited working memory, distractibility, potential impulsivity.

With cognitive disability, “thinking” requires more effort/vigilance, and can contribute to fatigue.

Cognitive Accessibility Guidance

Supplemental guidance to the Web Content Accessibility Guidelines:

- Help Users Understand What Things are and How to Use Them
- Help Users Find What They Need
- Use Clear and Understandable Content
- Help Users Avoid Mistakes and Know How to Correct Them
- Help Users Focus
- Ensure Processes Do Not Rely on Memory
- Provide Help and Support

- All Supplemental Guidance | WAI | W3C

Data Accessibility for people with IDD

Understanding data accessibility for people with intellectual and developmental disabilities. (Wu, et al., 2021)

- "We identify three visualization design elements that may improve data accessibility: chart type, chart embellishment, and data continuity."

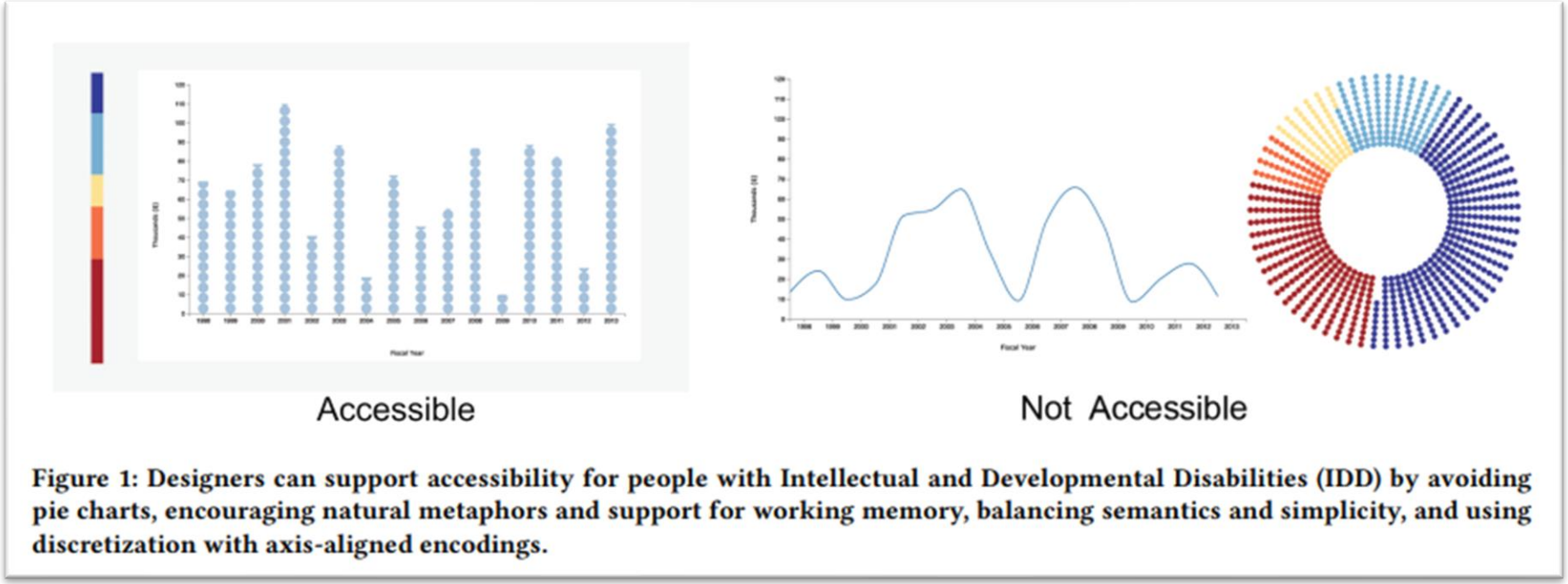
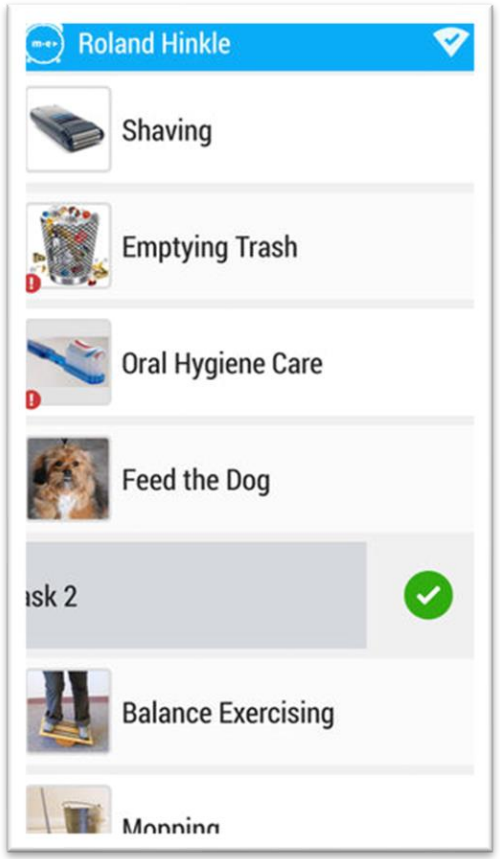


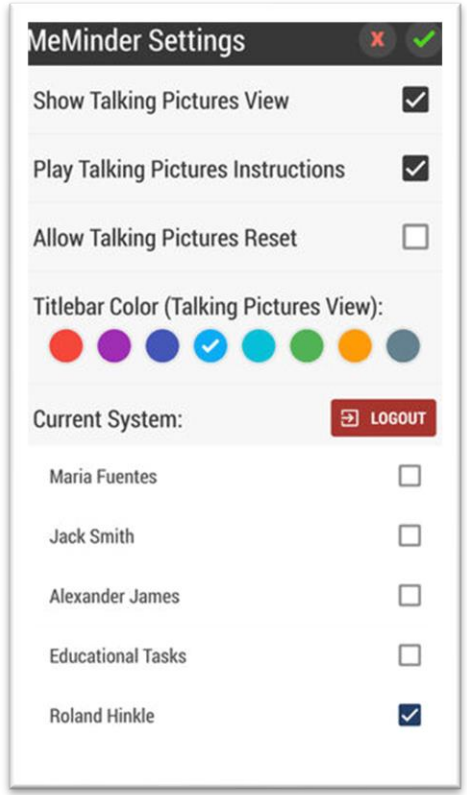
Figure 1: Designers can support accessibility for people with Intellectual and Developmental Disabilities (IDD) by avoiding pie charts, encouraging natural metaphors and support for working memory, balancing semantics and simplicity, and using discretization with axis-aligned encodings.

Meminder app

Talking pictures to-do list and video modeling tool for people who need help with reminders, sequencing and how to perform tasks at home, work, or school.

Hundreds of tasks are preprogrammed with pictures and audio, easy to setup for the consumer





Visual Schedule Planner

Designed to give an individual an audio/visual representation of the “events in their day“

Able to view events daily, weekly or via a monthly calendar

- Custom images
- Custom sound
- Activity schedules
- Video Modeling
- Timer
- Checklist
- Reminders
- Notes

Text Simplification

Ongoing work with large language AI models related to text simplification.

MH

Summarize the article titled: "Disability Discrimination in the Workplace: An Overview" by the Disability Rights Education & Defense Fund (DREDF). Use language that is at 5th grade level and appropriate for someone with an intellectual disability.

The article titled "Disability Discrimination in the Workplace: An Overview" by the Disability Rights Education & Defense Fund (DREDF) talks about how some people with disabilities face unfair treatment at work. It explains that discrimination means treating someone differently because of their disability, and it is not right.

The article gives examples of discrimination, such as when employers don't hire or promote someone because they have a disability. It also says that it's against the law to discriminate against people with disabilities at work.

The article explains that people with disabilities have rights that protect them from discrimination. These rights make sure they have equal opportunities in the workplace. It talks about laws that help protect these rights, like the Americans with Disabilities Act (ADA).

Equitable Access to Data

Will require work that address:

- Data representation to ensure understandability.
- Guidance, education, and prompting to support comprehension.
- Accessible ICT and an awareness of AT to support access.

Questions?