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TEACHING HOSPITAL

A Mouse by any Other Name

OT access considerations for people with ALS

Peggy Dellea, MS, OT/L
ALS – Alternative Communication Program
Boston Children's Hospital



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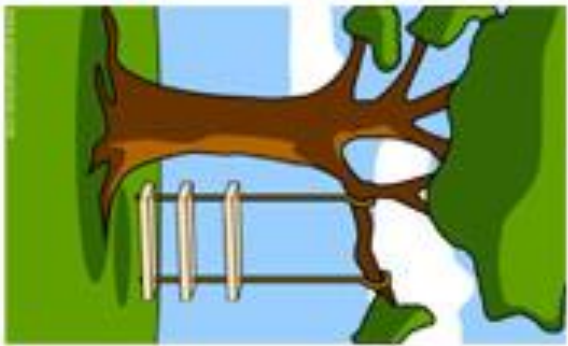


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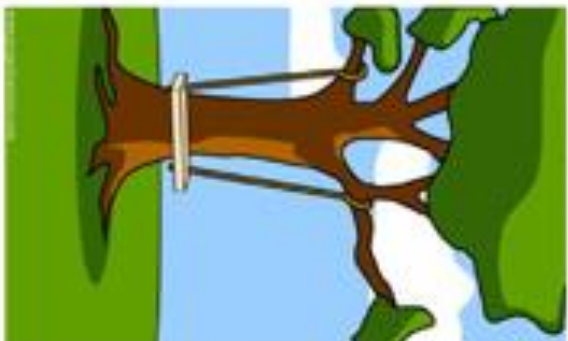
Occupational Therapy / Assistive Technology

- ❖ Access Consideration
 - ❖ **Activity Goal**
 - ❖ Access site
 - ❖ Access method
 - ❖ Access settings
 - ❖ Real life use
 - ❖ Preparing for the next access site





How the customer explained it.



How the project leader understood it.



How the analyst designed it.



How the programmer wrote it.



What the customer really wanted.



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Activity Goal

- ❖ OT related – includes activities of daily living (non-communication, non-computer)
- ❖ Communication –
 - ❖ Relay quick messages – wants/needs
 - ❖ Relay novel messages
 - ❖ Participate in conversation
 - ❖ People with ALS have a lifetime of fast, sophisticated, multimodal communications



Activity Goal

- ❖ Computer –
 - ❖ Email
 - ❖ Facebook
 - ❖ Word Processing
 - ❖ Spreadsheet (often work-related)
 - ❖ Internet
 - ❖ Games
 - ❖ Movies/videos/music
 - ❖ Reading
- ❖ Smart phone or iPad
 - ❖ Phone
 - ❖ Text
 - ❖ Email
 - ❖ Games
 - ❖ Music
 - ❖ Reading



The activity goal drives the process. Other important considerations:

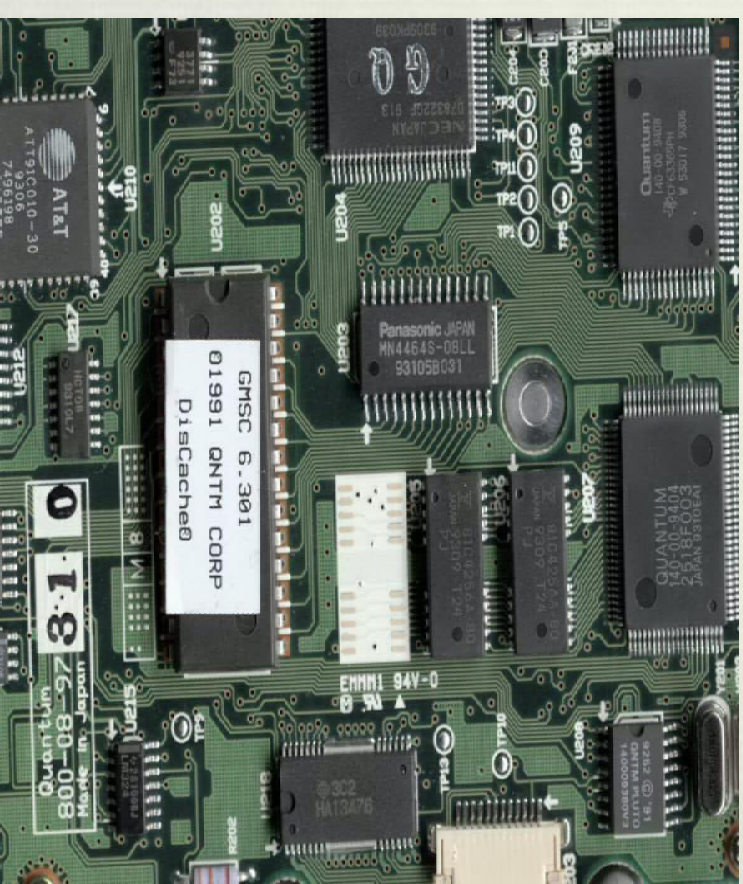
- ❖ Technology availability
 - ❖ Computer at home? PC? Mac?
 - ❖ Casual user or computer whiz?
 - ❖ Somebody nearby to troubleshoot?
- ❖ Motor Control available
 - ❖ Hands? Head? Foot?
- ❖ Speech available
 - ❖ Intelligible?
 - ❖ Breath Support?
 - ❖ Fatiguing?



LOW Tech vs.



HIGH TECH



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Physical Access Control Site assessment

- ❖ Direct selection
 - ❖ Preferred method – if possible
 - ❖ Positioning/ mounting
 - ❖ Adaptive stylus
 - ❖ Computer adjustments
- ❖ Indirect selection
- ❖ Best control site (s)
 - ❖ Head, eyes, mouth, tongue, respiratory (sip/puff), voice, chin, shoulder, trunk, arm/hand, leg, knee, foot.
 - ❖ Pressure, excursion, range



Considerations for access selection:

- ❖ Motor control that is reliable and repeatable
- ❖ Motor control that is fine-tuned
- ❖ Include eye control and voice production
- ❖ Exploit the strengths and circumvent the weakness
- ❖ the range and control of movement
- ❖ the amount of training and practice required to use
- ❖ the short and long-term costs/benefits of using access method



“He cannot use a computer. We have tried everything. He can't use his hands.”



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“I have ceded to the
disease and now I type
with one hand.”

NO. You are not giving into to the disease. You
are outsmarting the disease and getting the job
done another way.



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Direct Selection

- ❖ Touch screen (iPad for example)
 - ❖ Not pressure sensitive – capacitive
 - ❖ Skin (not fingernail), capacitive tip stylus
 - ❖ Timing matters – longer touch results in different action
 - ❖ One point of contact
 - ❖ Cannot drag across the screen
 - ❖ Reposition to be near body, add stylus





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Home made access



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Computer Access



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Direct Selection Keyboard

- ❖ Small keyboard
- ❖ Close to body
- ❖ Support arms / wrists
- ❖ Typing aid (pointer)
- ❖ Type with one hand
- ❖ Keyboard Adjustments – sticky keys and filter keys





Small keyboards –

- One-handed use – easier to reach all keys
- Easy to position close to the body
- Can position a mouse close by

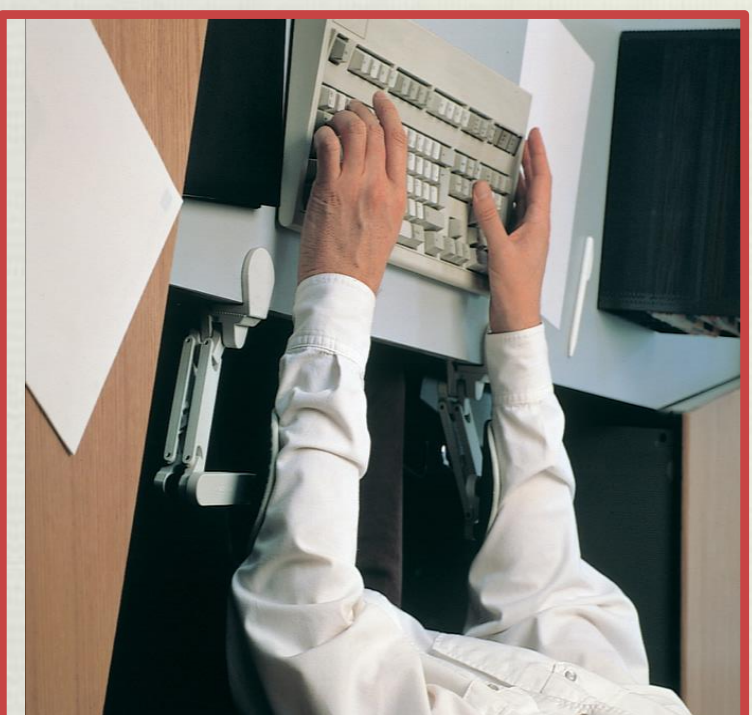


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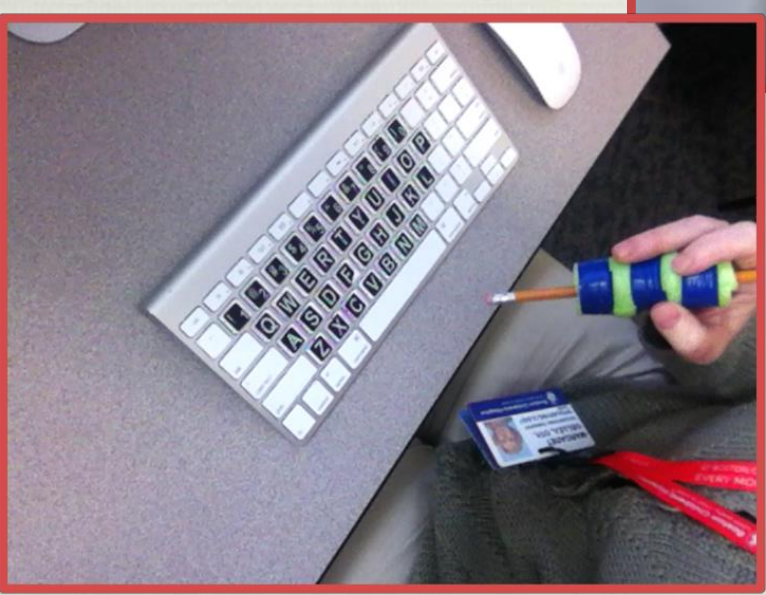
Arm support
Decreases work load of shoulders and elbows
Supports weight of the arms



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Typing Aid

Allows accurate and fast typing with limited finger control

Keeps your fingers above the keyboard

Consider ease of donning/doffing

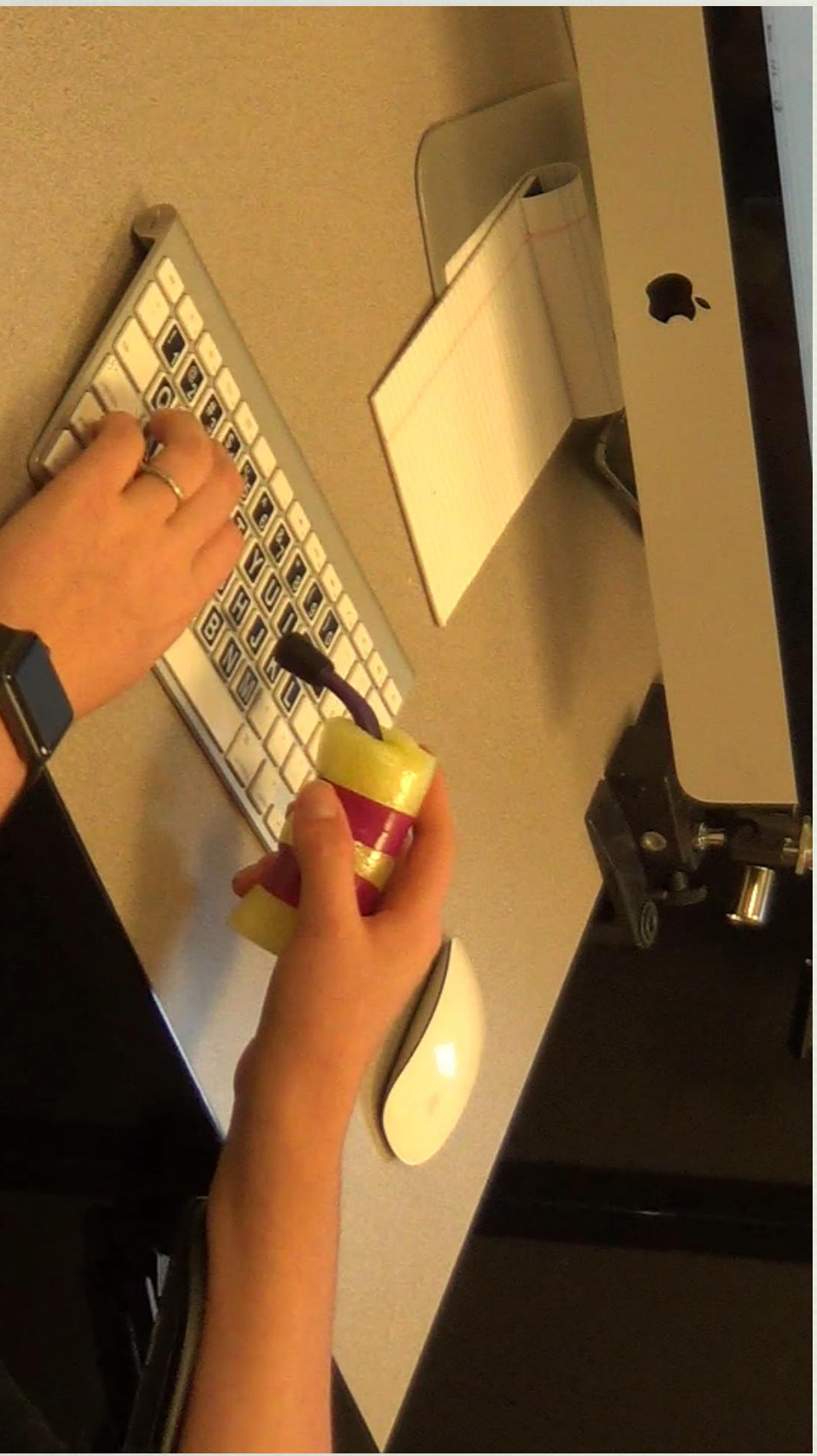


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Typing aid on one hand, touch typing with the other?



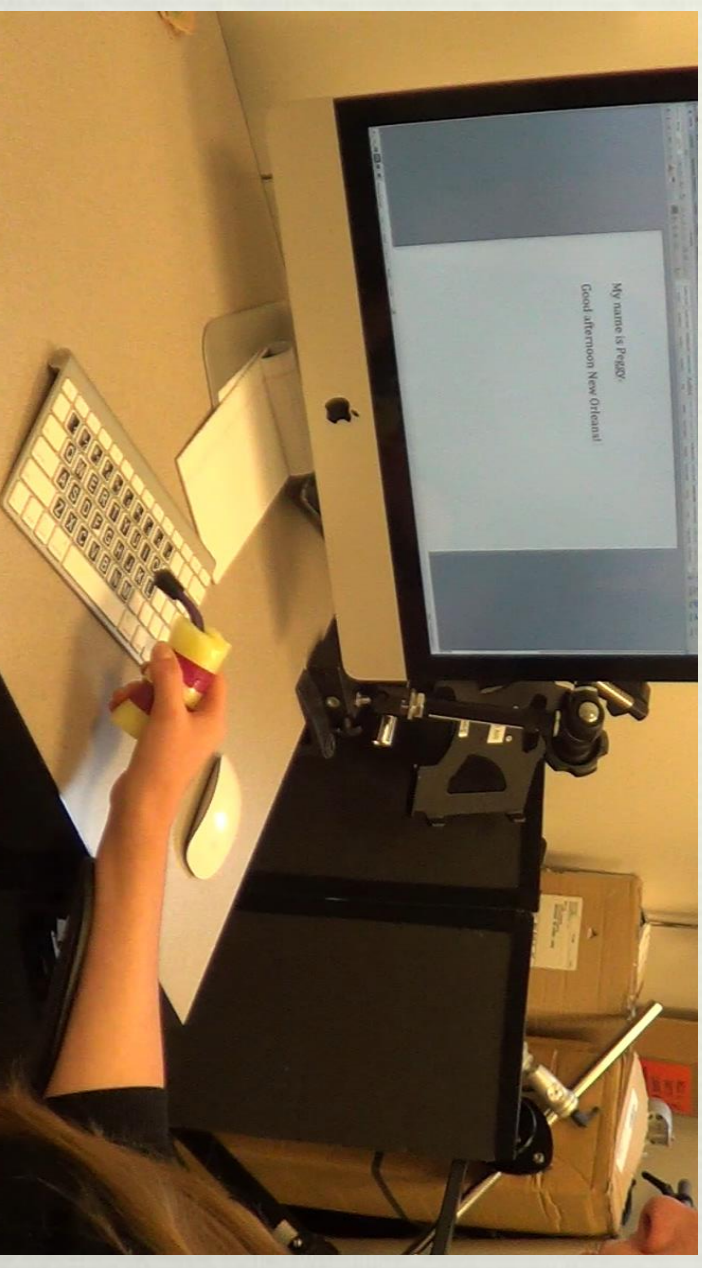
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Keyboard adjustments

- ❖ Sticky keys
- ❖ Allows the user to type keys in a row
- ❖ Designed for one-handed typing
- ❖ Great for poor coordination
- ❖ Press the shift key five times to turn on



Keyboard Adjustments



- ❖ Filter Keys
 - ❖ Adjusts for tremor or for holding the keys down too long
 - ❖ Can add key click for auditory feedback
 - ❖ Hold the right shift key for 8 seconds to turn on



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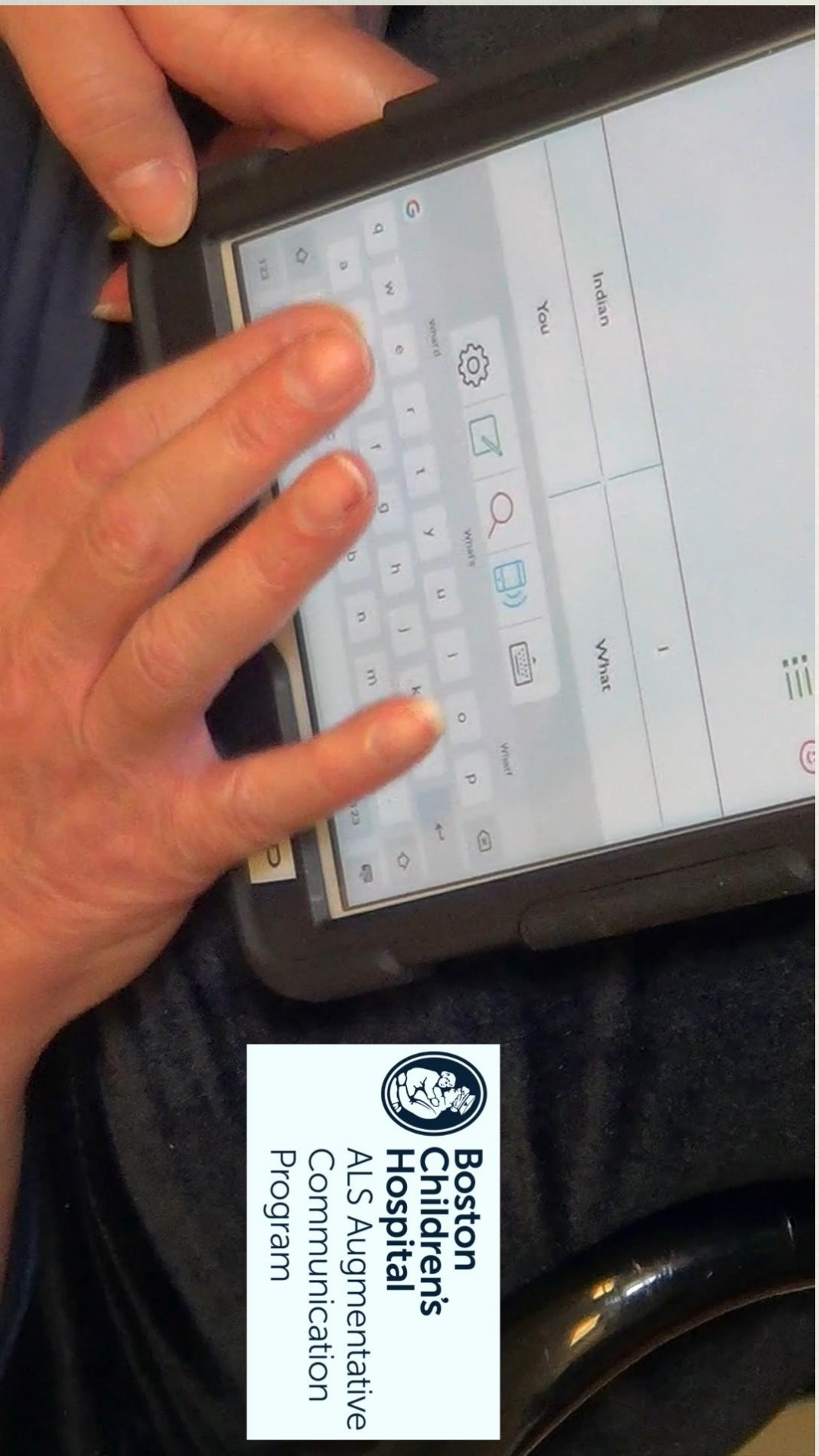
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Direct selection touch screen

- ❖ Position device close to body
- ❖ Support arm
- ❖ Consider stylus – keeps fingers away from the screen, may improve accuracy
- ❖ Consider vertical vs. horizontal orientation
- ❖ Consider swipe –
 - ❖ Increase typing speed
 - ❖ Compensate for tremor/shakiness
 - ❖ Finger lift only between words



Swipe in action



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ALS Augmentative
Communication
Program



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Direct Selection: Mouse

- ❖ Problem – difficulty gripping the mouse, hard to move cursor across the screen, hard to hit the left mouse button, accidentally hitting the mouse buttons
- ❖ Solution – Trackball
 - ❖ Do not need to grip – can move the ball with any part of your hand
 - ❖ Trackball remains stationary – no reaching to move it
 - ❖ Buttons are separated from the mouse movement





- ❖ Problem – difficulty gripping the mouse, hard to move cursor across the screen, hard to hit the left mouse button, accidentally hitting the mouse buttons
- ❖ Solution – Hands-free Cursor control
 - ❖ Foot Mouse
 - ❖ Head Mouse

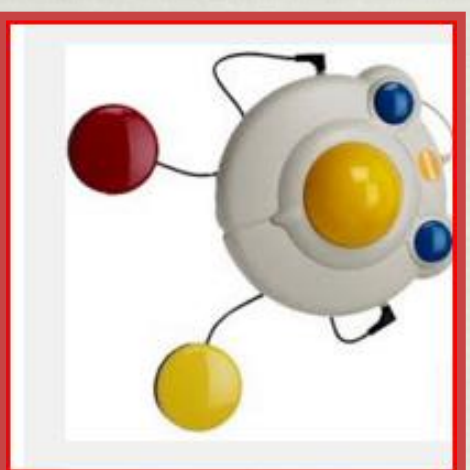


Foot Mouse

- ❖ Foot time mouse



- ❖ Trackball



Foot “mouse”



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Head Mice

- ❖ Origin Instruments
- ❖ Quah Zono
- ❖ Natural Point
- ❖ Tracker Pro



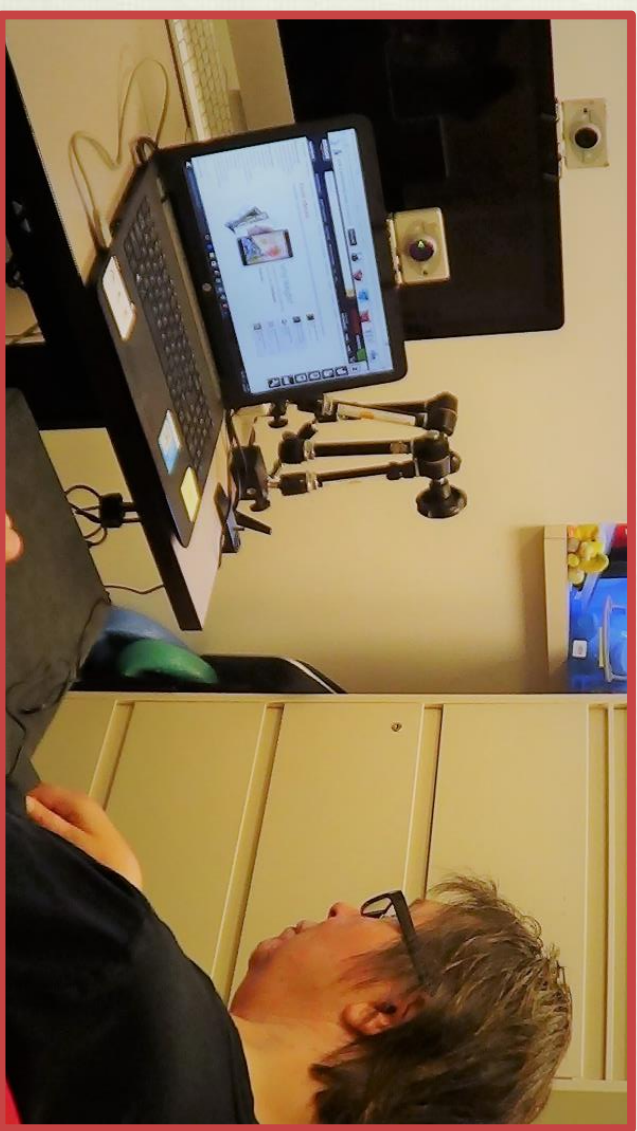
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Head Mice

- ❖ All provide wireless cursor control
- ❖ All involve transmitter and receiver
- ❖ All require USB port (no Bluetooth yet)
- ❖ All require good head control
- ❖ Infrared devices require “line of sight”
- ❖ Quha Zono is gyroscopic – no line of sight required
 - ❖ Can be programmed to be used on hand or foot



- ❖ Head movement provides cursor control – need to add clicking function



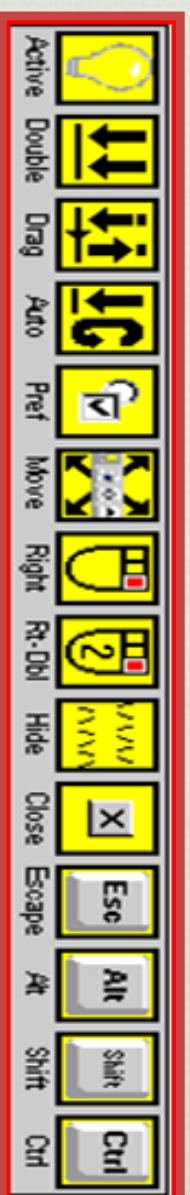
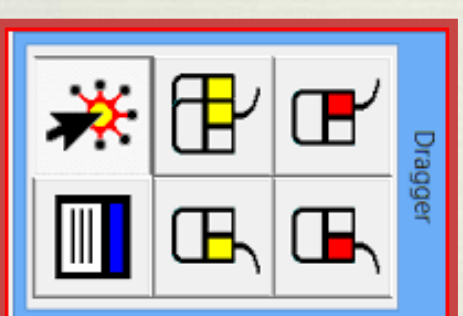
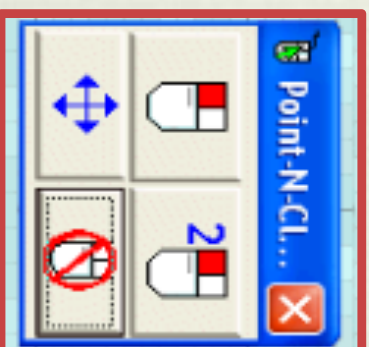
How do I click?

- ❖ Switch click
- ❖ Any reliable switch site – except for the head.
- ❖ Activates left click, double click, and drag



Switchless clicking

- ❖ Auto click dwell software
- ❖ Dragger
- ❖ Smart Click
- ❖ Point n Click



- Set the dwell time
- Set the jitter box
- Have a pause button



Head Mouse in Action



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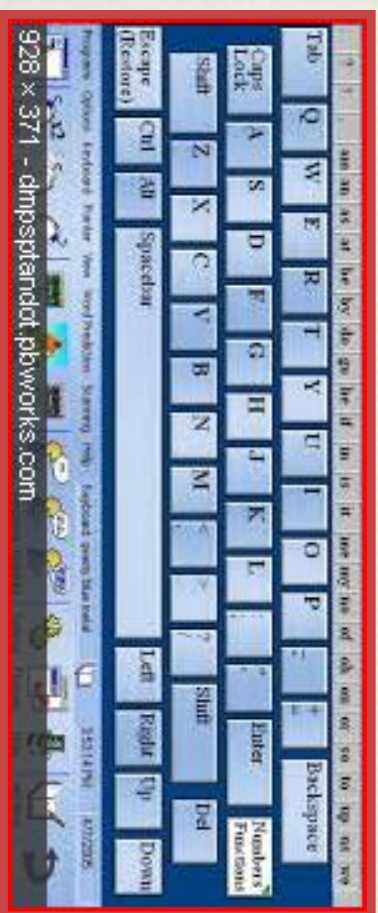


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Mouse-only access

On Screen Keyboard

- ❖ Windows onscreen
- ❖ Onscreen
- ❖ Softype
- ❖ Reach Interface Author

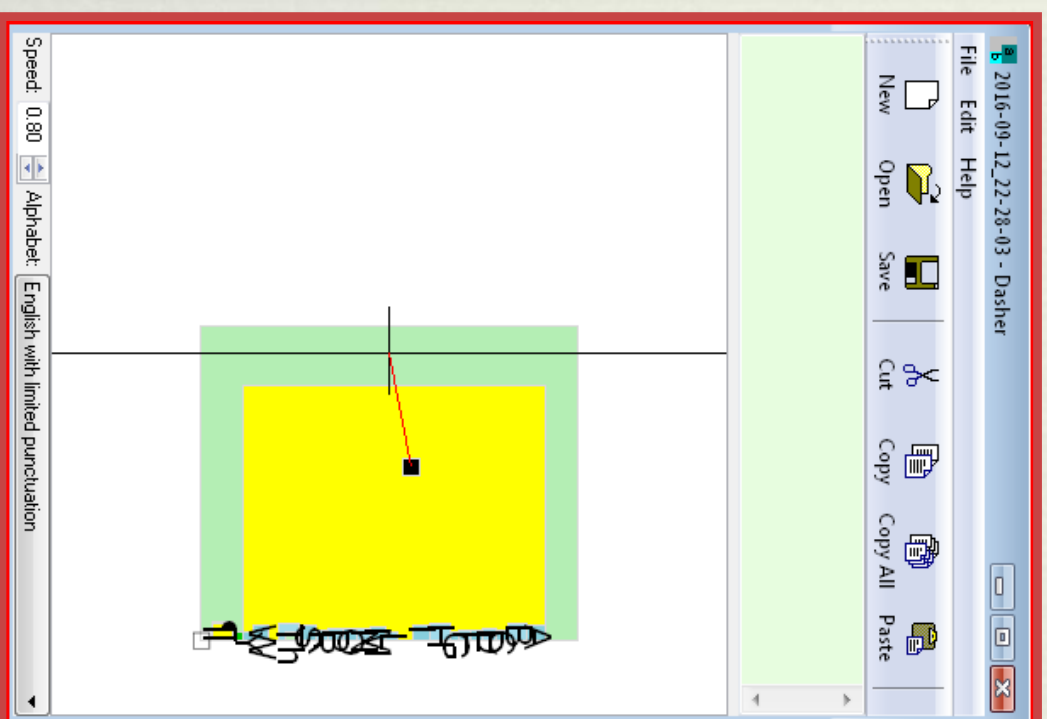


- Features:
- Word prediction
 - Size adjustments
 - Built in dwell option
 - Macro capability



Video game style

- ❖ Dasher
 - ❖ Streaming letters
 - ❖ Attack of the alphabet
 - ❖ Minimal movement
 - ❖ Word and phrase prediction



Dasher

File Edit Help



New



Open



Save



Cut



Copy



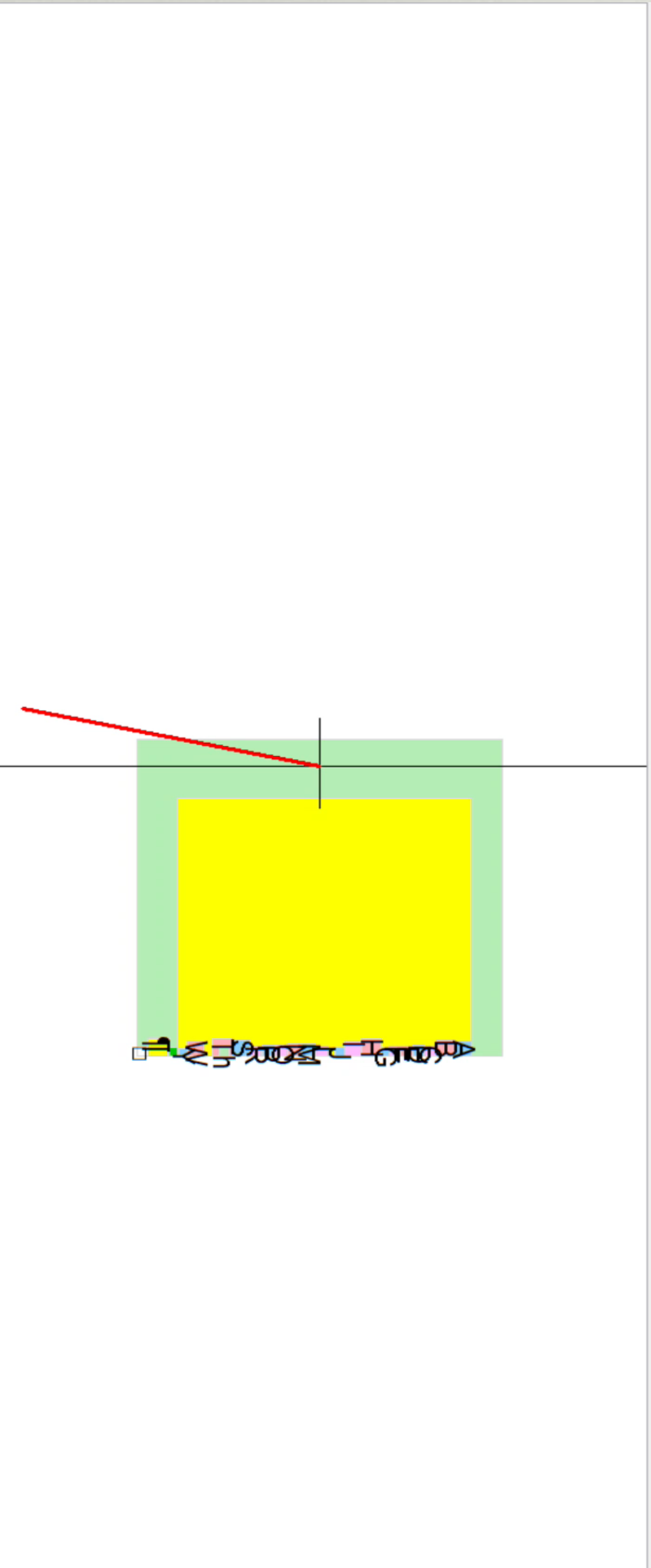
Copy All



Paste



Prefs

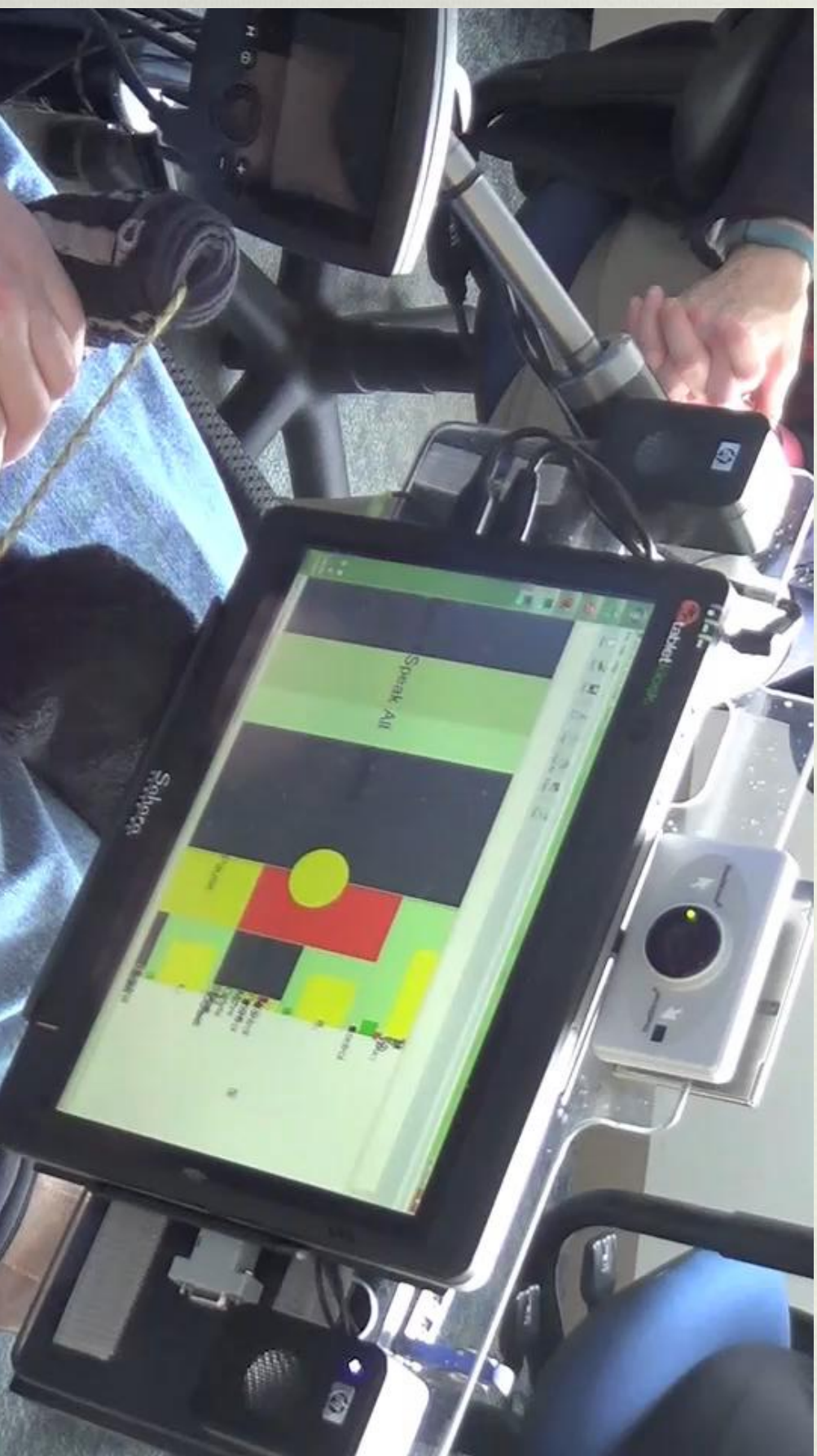


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Dasher in Action



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Voice input

- ❖ (Hey) Siri
- ❖ OK Google
- ❖ Alexa
- ❖ Not intended as an accommodation for a disability.
Will have difficulty with soft or dysarthric speech.
Limited Functionality
 - ❖ Siri cannot voice answer an incoming call
 - ❖ Hey Siri may require the iPhone to be plugged in/may run down the battery quickly



Voice input - computer

- ❖ Dragon Naturally Speaking
 - ❖ Microsoft/Mac built in voice recognition software
- ❖ Not intended as an accommodation for a disability. Will have difficulty with soft or dysarthric speech.
 - ❖ Best for word processing
 - ❖ Custom commands available (Dragon)
 - ❖ Plan for a learning curve





- ❖ For people with limb onset ALS, voice recognition software allows them to remain connected to friends, family and the world. Voice recognition software may provide the means of remaining employed.
- ❖ Use of voice recognition software requires training and customization.
 - ❖ Learning how to dictate, learning commands
 - ❖ Adding vocabulary
 - ❖ Adding text macros
 - ❖ Adding command macros



“Living with ALS seems a bit like going into the witness protection program. Everything I have ever known about myself, how I look, how I act, how I interact with the world, is rapidly and radically changing. When I could no longer type with my hands, I knew I could give up writing entirely or use voice recognition software. I’m not a young woman. This took real work. Interestingly, I write more now than ever before.”

Catherine Royce



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Voice mouse control

- ❖ Mouse Grid
- ❖ Move mouse up/down/right/left
 - ❖ Faster / Much Faster
 - ❖ Slower / Much Slower
 - ❖ Stop
- ❖ “Mouse click” / “Mouse double click”
- ❖ “Drag mouse up/down/right/left”



Macros

- ❖ “Peggy’s email” = Peggy.Dellea@Childrens.Harvard.edu
- ❖ “Visa Card Number” = 5808 330 2435 3319
- ❖ “Bank sign in page” = <https://www4.citizensbankonline.com/efs/servlet/efs/login.jsp>
- ❖ “Bank password” = Give\$Me\$Money\$



- ❖ “Check my email” =
- ❖ Alt + D
- ❖ `https://login.yahoo.com/config/login?.src=fpctx&.intl=us&.lang=en-US&.done=https%3A%2F%2Fwww.yahoo.com`
- ❖ Enter
- ❖ Wait
- ❖ `JohnSmith@yahoo.com`
- ❖ Enter
- ❖ Wait
- ❖ `MySecretPassword`
- ❖ Enter

The image shows a screenshot of a web browser. The background is an advertisement for Charter Spectrum, featuring a football player in a red jersey and helmet, holding a football. Text on the ad includes "Charter Spectrum", "Catch This Great Offer", "SAVE up to \$233*", "In FAST Internet, the MOST HD TV and the BEST Phone", and "GET IT NOW". Overlaid on the bottom right of the ad is the Yahoo! sign-in page. The page has the "YAHOO!" logo and "Sign in" text. There is a text input field labeled "Enter your email" with a blue "Next" button below it. To the left of the "Next" button is a checkbox labeled "Stay signed in" with the text "To sign in, enter your email and tap 'Next'" below it. To the right of the "Next" button is a link "Need help?". At the bottom left of the sign-in form is a link "Don't have an account? Sign up".



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File Edit View History Bookmarks Tools Help

Yahoo - login

what is the keyboard short... Process your mail quicker ...

Allow <https://www.google.com> to run "Dragon"?

Google

what is the keyboard shortcut for junk in outlook

All News Videos Images Maps More Settings Tools

About 295,000 results (0.72 seconds)

Task shortcuts:

Action	Keyboard Shortcut
Create a new task (when in Tasks).	Ctrl+N
Create a new task (from any Outlook folder).	Ctrl+Shift+K
Create a new task request.	Ctrl+Shift+U
Open selected item.	Ctrl+O
7 more rows	

Keyboard shortcuts for Outlook - Slipstick
www.slipstick.com/outlook/keyboard-shortcuts-outlook/

About this result • Feedback

Process your mail quicker with keyboard shortcuts - MSOutlook.info
<https://www.msoutlook.info/question/617>

CTRL, ALT and/or SHIFT are involved with most keyboard shortcuts. Below is an overview of my most commonly used keyboard shortcuts in Outlook to process my incoming emails. ... Mark a junked message as Not Junk, CTRL+ALT+J ...

Search

Continue Blocking Allow...

Sign in

Signing into Yahoo – several steps

Command Macro Examples

- ❖ “Facebook” =
Alt + D
www.facebook.com
Enter
- ❖ “Email sign in” =
johnsmith@aol.com
Tab
my&%secret967password
Enter



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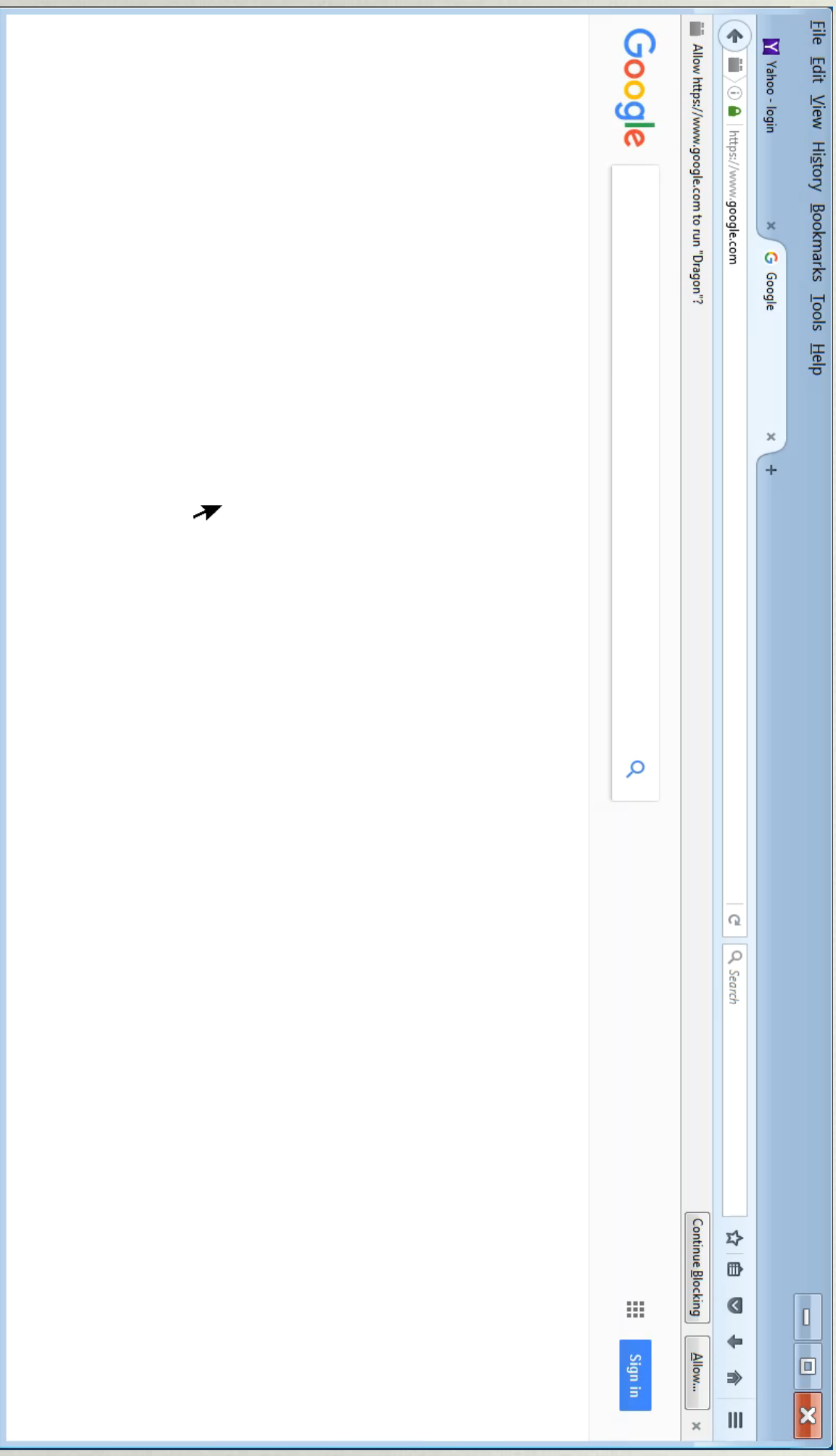
- ❖ “Check my email” =
- ❖ Keystroke: Alt + D
- ❖ Typing:
https://login.yahoo.com/config/login?.src=fpctx&intl=us&.lang=en-US&.done=https%3A%2F%2Fwww.yahoo.com
- ❖ Keystroke: Enter
- ❖ Wait
- ❖ Typing: JohnSmith@yahoo.com
- ❖ Keystroke: Enter
- ❖ Wait
- ❖ Typing: MySecretPassword
- ❖ Keystroke: Enter

The image shows a composite of two screenshots. The top portion is an advertisement for Charter Spectrum, featuring a football player in a red jersey and helmet. The ad text includes: "Charter Spectrum", "Catch This Great Offer", "SAVE up to \$233¹ on FAST Internet, the MOST HD TV and the BEST Phone", and "GET IT NOW". The bottom portion is a Yahoo! sign-in page with the Yahoo! logo, a "Sign in" button, and a text input field labeled "Enter your email". Below the input field is a blue "Next" button. There are also links for "Need help?", "Stay signed in" (with a checked checkbox), and "Don't have an account? Sign up".



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Check my email one step

*Yes - this can be done with individual voice commands/typing.
But Catherine Royce once told me to “Choose easy”.*



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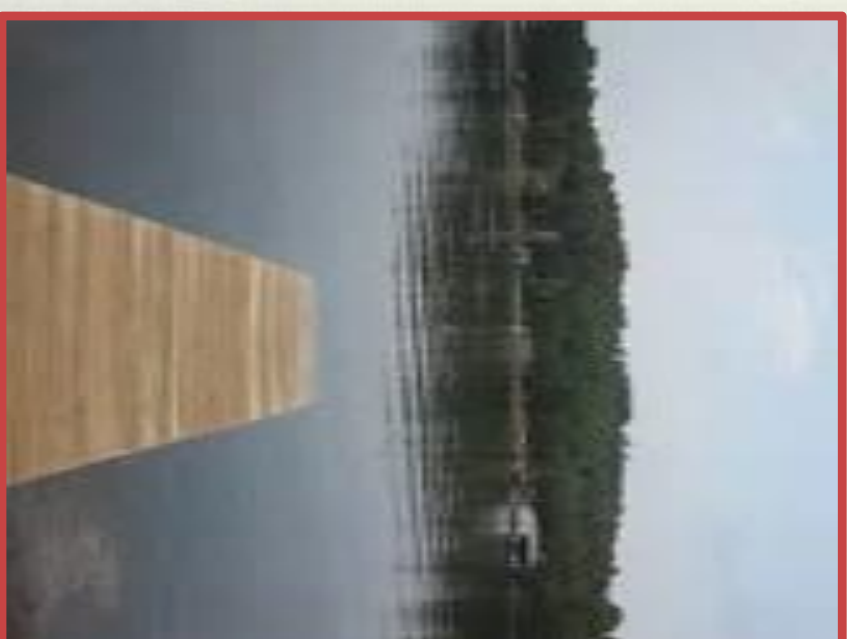


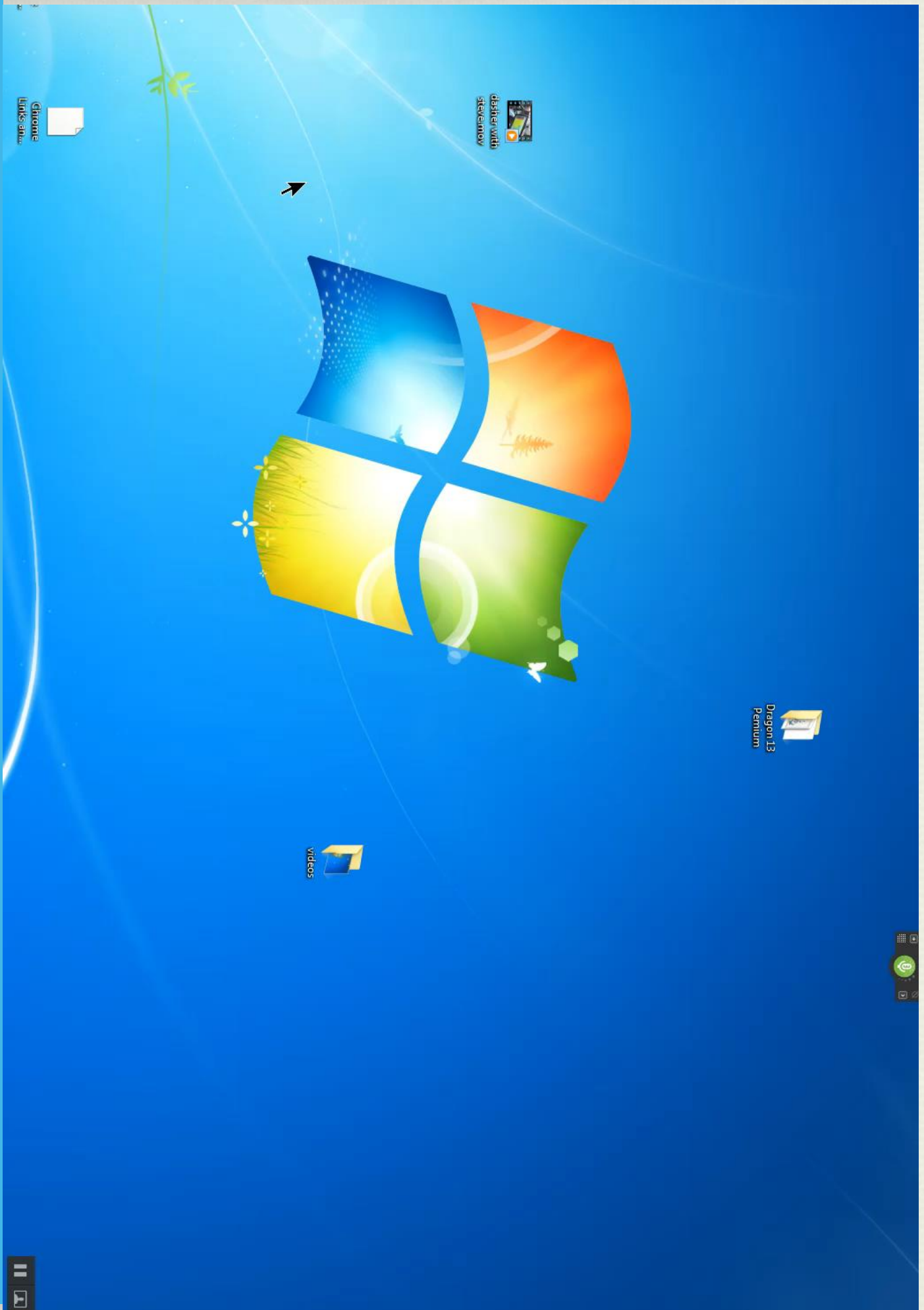
Until every child **Bobby Delella** January 2017



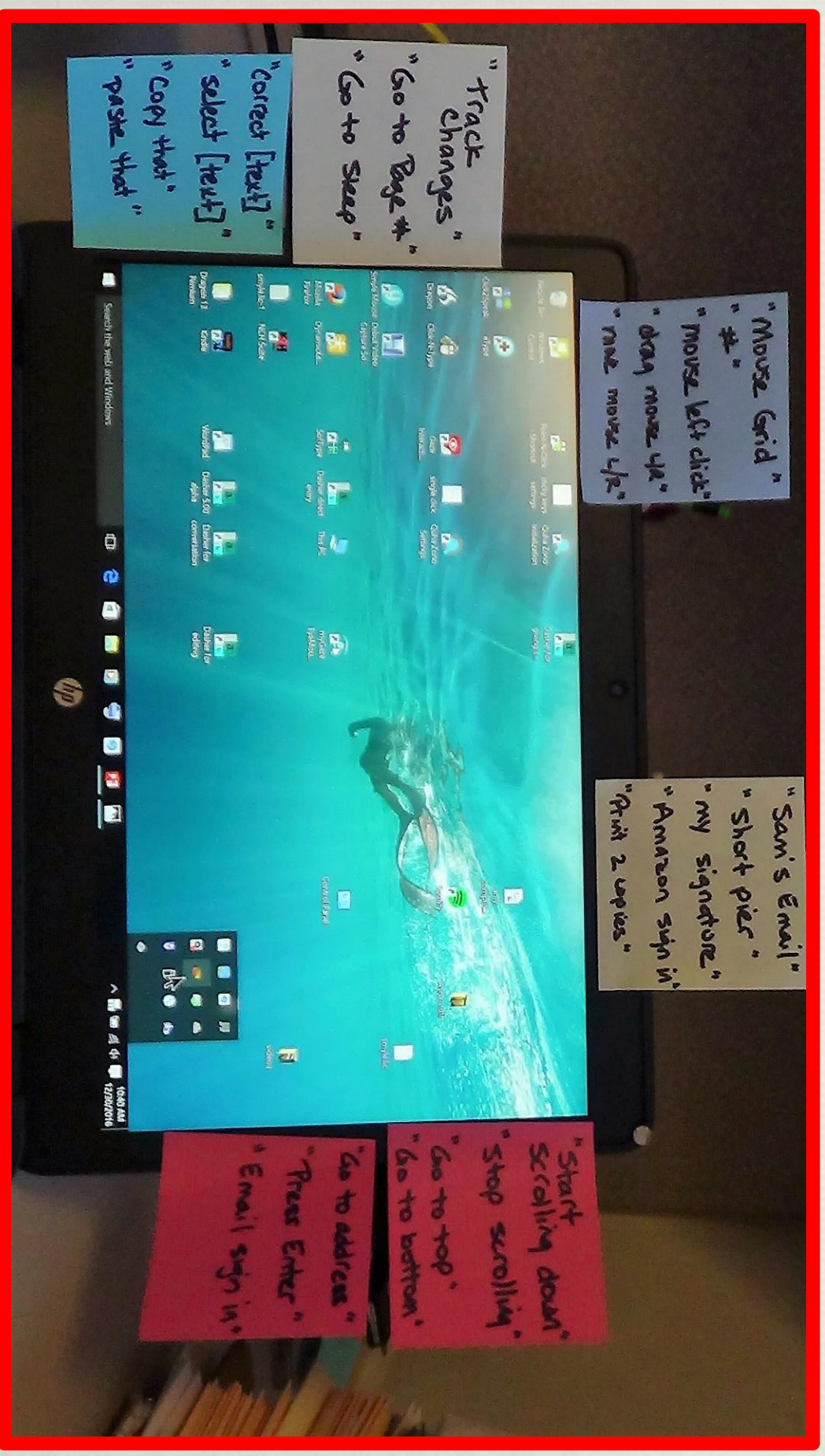
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- ❖ “Short Pier” =
 - ❖ Ctrl + A
 - ❖ Alt + O
 - ❖ F
 - ❖ Times New Roman
 - ❖ Tab
 - ❖ 8
 - ❖ Enter
 - ❖ Control + Enter





A little cognitive assist



Eye Gaze Interface – The eyes have it



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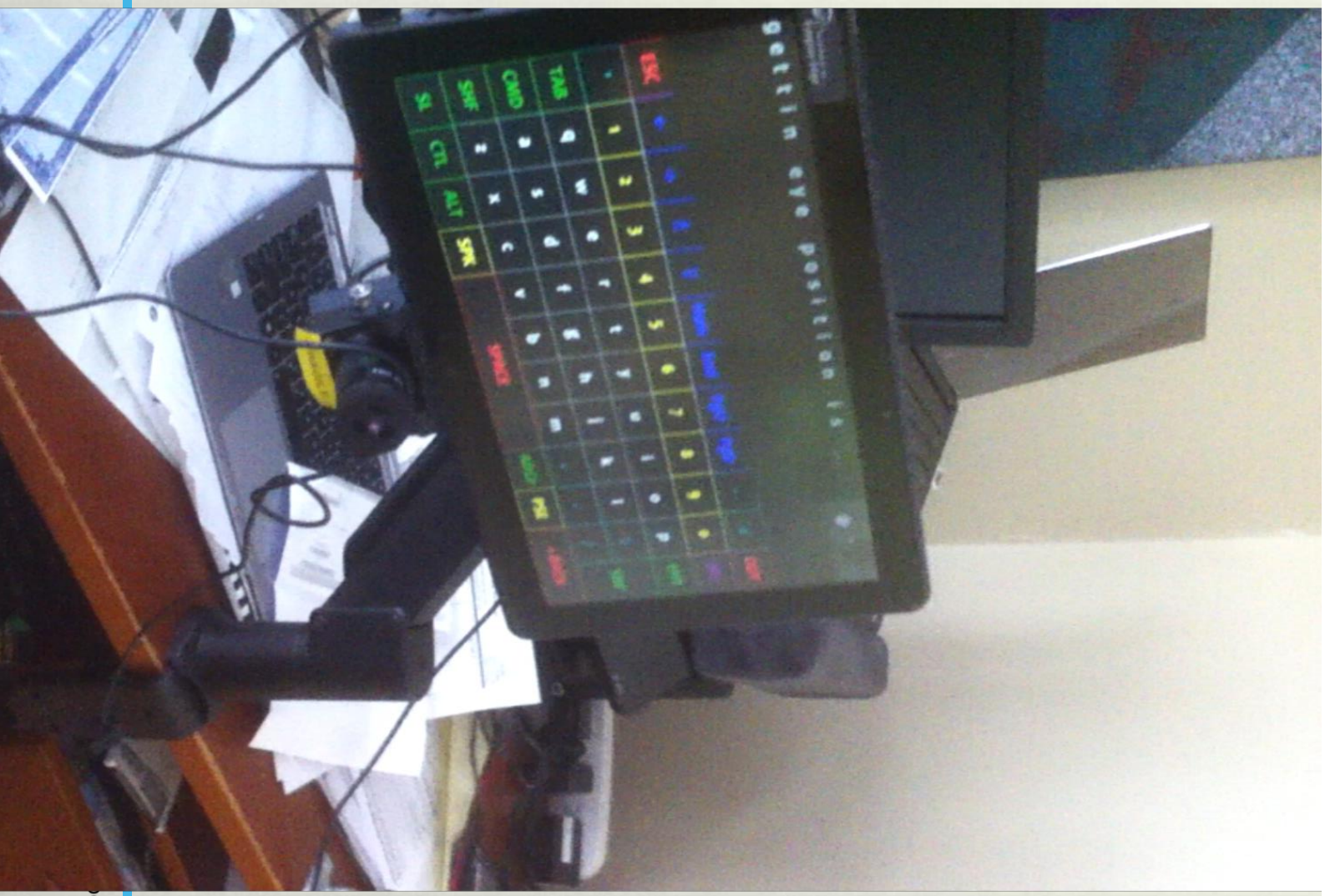
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Eye Gaze

- ❖ Infrared Camera
- ❖ Position Position
- ❖ Enlarged Targets
- ❖ Blink, Dwell, or Switch clicking



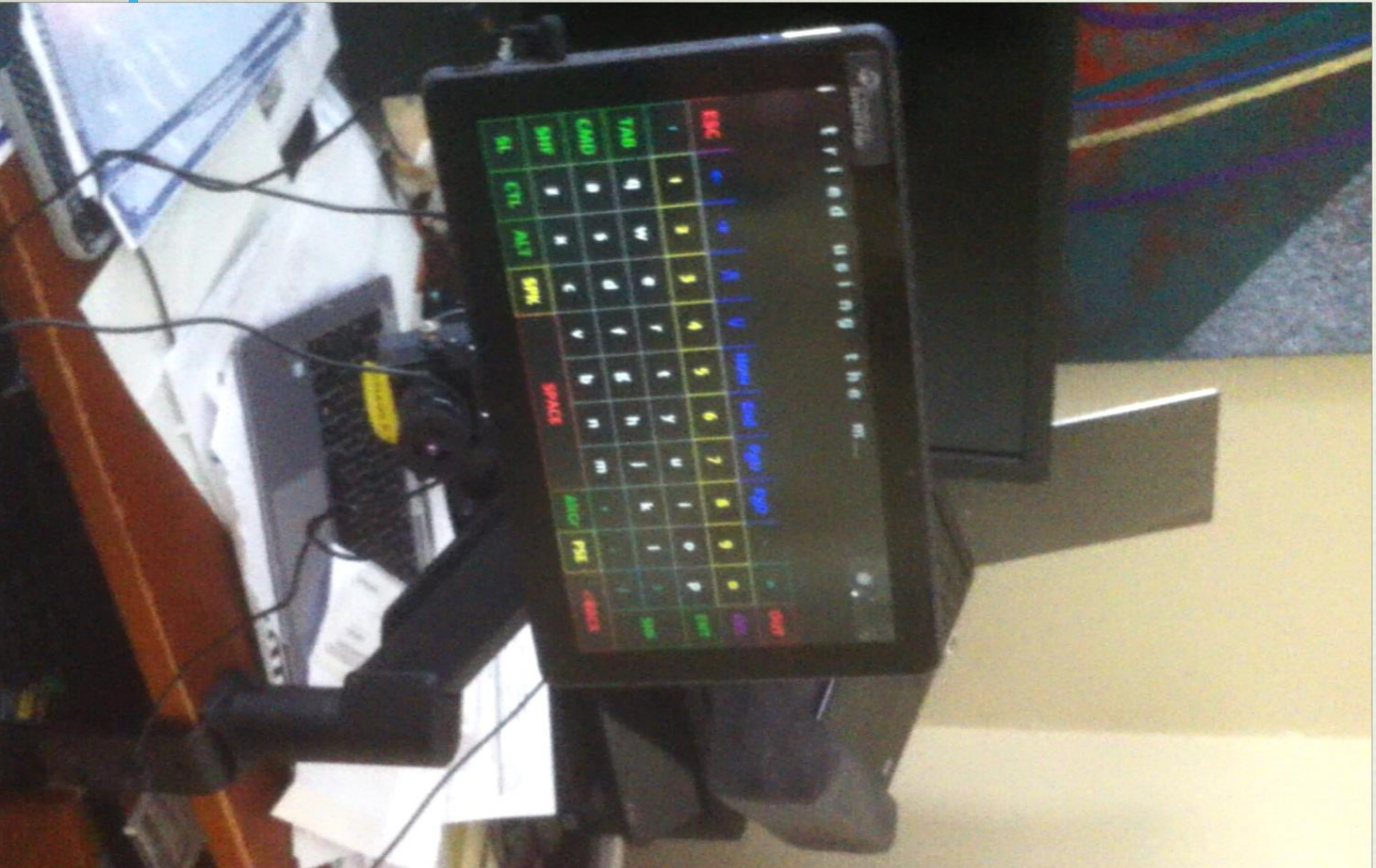
Eye Trackings in Action dwell selection



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Eye tracking -switch click selection



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Problems

- ❖ Ptoxis - camera needs to view the full pupil
- ❖ Pupils dilated or constricted
- ❖ Cataracts
- ❖ Nystagmus
- ❖ Dry Eyes
- ❖ Attentional deficits
- ❖ Head Movement
- ❖ (Re) Positioning (position, position, position)
- ❖ Glasses and Contacts



Eye Gaze for Computer Interface

- ❖ Eye camera “bar” connects via USB
- ❖ Moves cursor across the screen
- ❖ Requires use of “gaze interaction” software



Wheelchair Mounts



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Floor Mounts



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Phone mounts



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“Reading is
huge.”



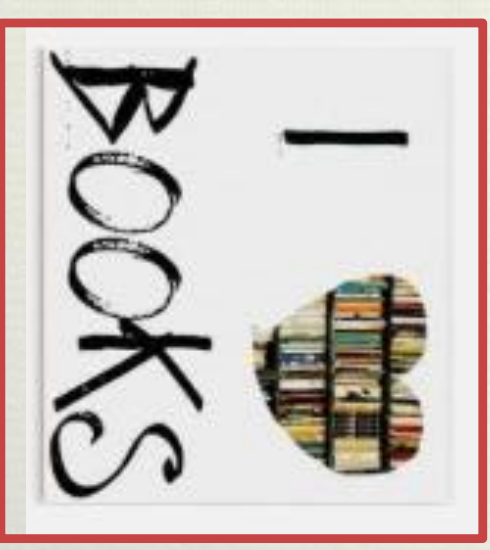
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Access to books (hardcopy or digital)

- ❖ Audio books
- ❖ Hardcopy books / book holders
- ❖ Kindle/iBooks



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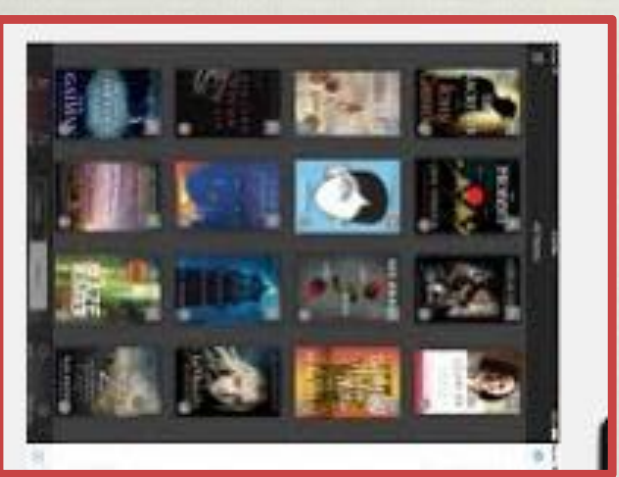


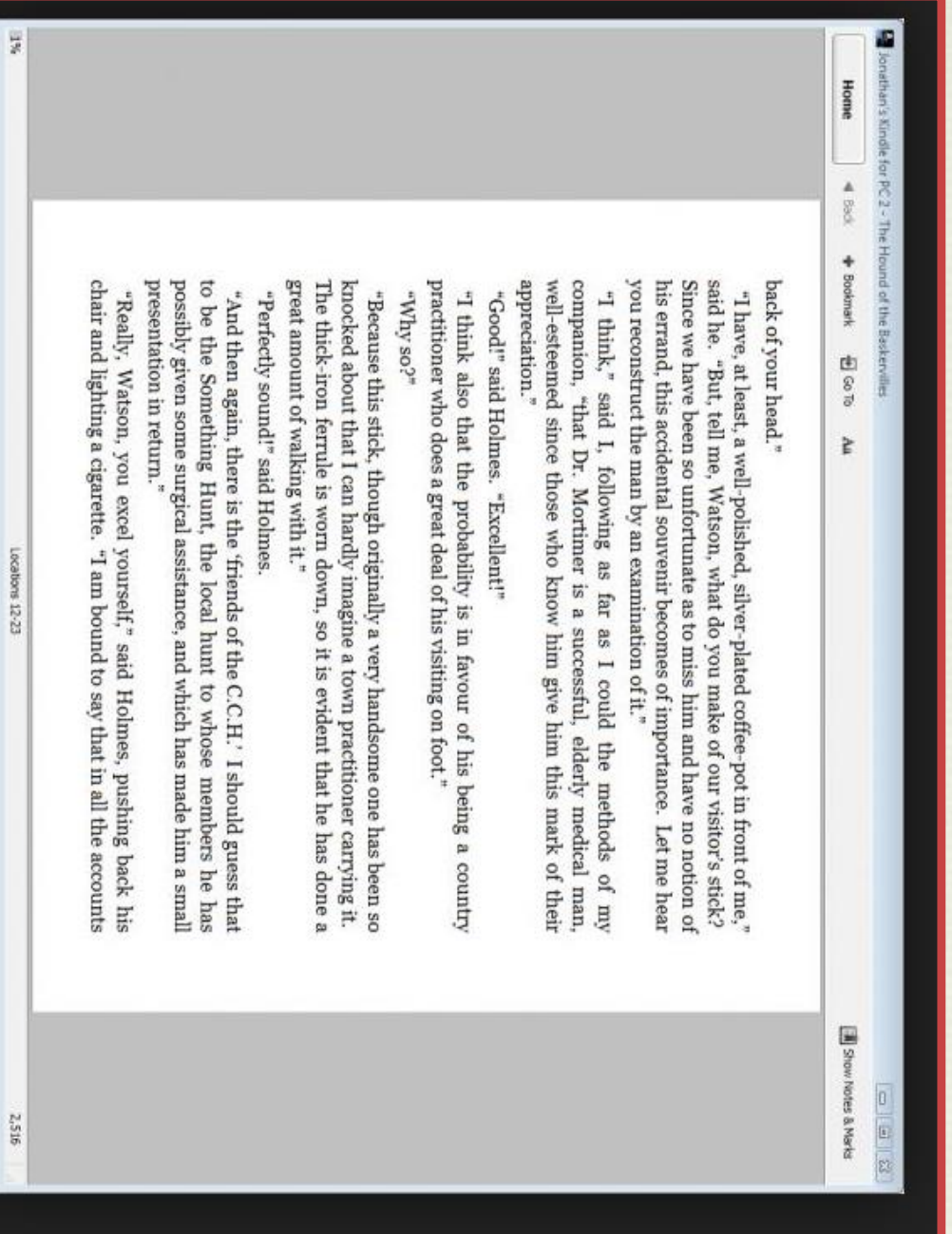
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Kindle for the computer



- ❖ Free download (*Amazon.com*)
- ❖ Available for PC or Mac
- ❖ Out of copyright material is free
 - ❖ (free is good!)
- ❖ Simple program
 - ❖ Easy to adapt





Click to turn page:

- Mouse
- HeadMouse
- Switch-adapted mouse
- Dwell software
- Eye Gaze interface
- Switch programmed to the right arrow key
- “Press right arrow” command
- Custom voice command (e.g. “turn page”)



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“The best thing
about that session
was seeing his face
when he was using
the Kindle software.”



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“Shouldn't he be doing this without the switch? He won't be able to use the switch when the disease progresses.”



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Speech Generating Device Access

(they are often computers, after all)

- ❖ Touch screen
- ❖ Stylus and stylus holders
- ❖ Keyboard
- ❖ Mouse
- ❖ Trackball
- ❖ Head tracking
- ❖ Adapted mouse
- ❖ Switch scanning
- ❖ Eyetracking access



Access to iPad/ Android tablets

- ❖ Position of device
- ❖ Use of finger and/ or stylus
- ❖ Voice typing
- ❖ Adaptive access
- ❖ Siri
- ❖ Mounting options



Phone Access

- ❖ Landline options – large buttons, speaker phone
- ❖ Speaker phone options
- ❖ Smartphone use
- ❖ Hands-free cell phone use
- ❖ Switch scanning on iPhone
- ❖ Siri / OK Google / Alexa
- ❖ Mounting options



Call system / attention signal

- ❖ Commercial wireless doorbell
- ❖ Switch-adapted attendant alarm
- ❖ Baby monitor



- ❖ Portable speech output device with or without switch



Brain Computer Interface (BCI)

Trying to make its way to the end user
yes it is a real thing
no, it cannot read your mind

“Reads” output of brain cells, interprets the signal

Implanted vs. surface electrodes

P300 (“aha” response)





pong



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Tele-treatment



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Feb 16, 2016

Dear John,

Thank you for our meeting last Tues. As we move forward slowly, I appreciate your intent to truly understand Eric and his desires. As you have surmised he is slowly processing what he wants, and "forcing" decisions does not work. I also greatly appreciate your passion and resulting offer to always be available, even to doing home visits. I later realized what relief I felt, knowing we would not somehow be abandoned because we could not resolve the next step in a timely manner. Truly...I was relieved of an anxiety I had not realized I had.

Amelia



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Short Pier

- ❖ Keystroke: Ctrl + A
- ❖ Keystroke: Alt + O
- ❖ Keystroke: ff
- ❖ Type “Times New Roman”
- ❖ Keystroke: Tab
- ❖ Type “g”
- ❖ Keystroke: Enter
- ❖ Keystroke: Alt + S



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A recent email

Dear Peggy:

I am able to use the single command for downloading
CaringBridge. Saved me so much agita!!!

Michelle



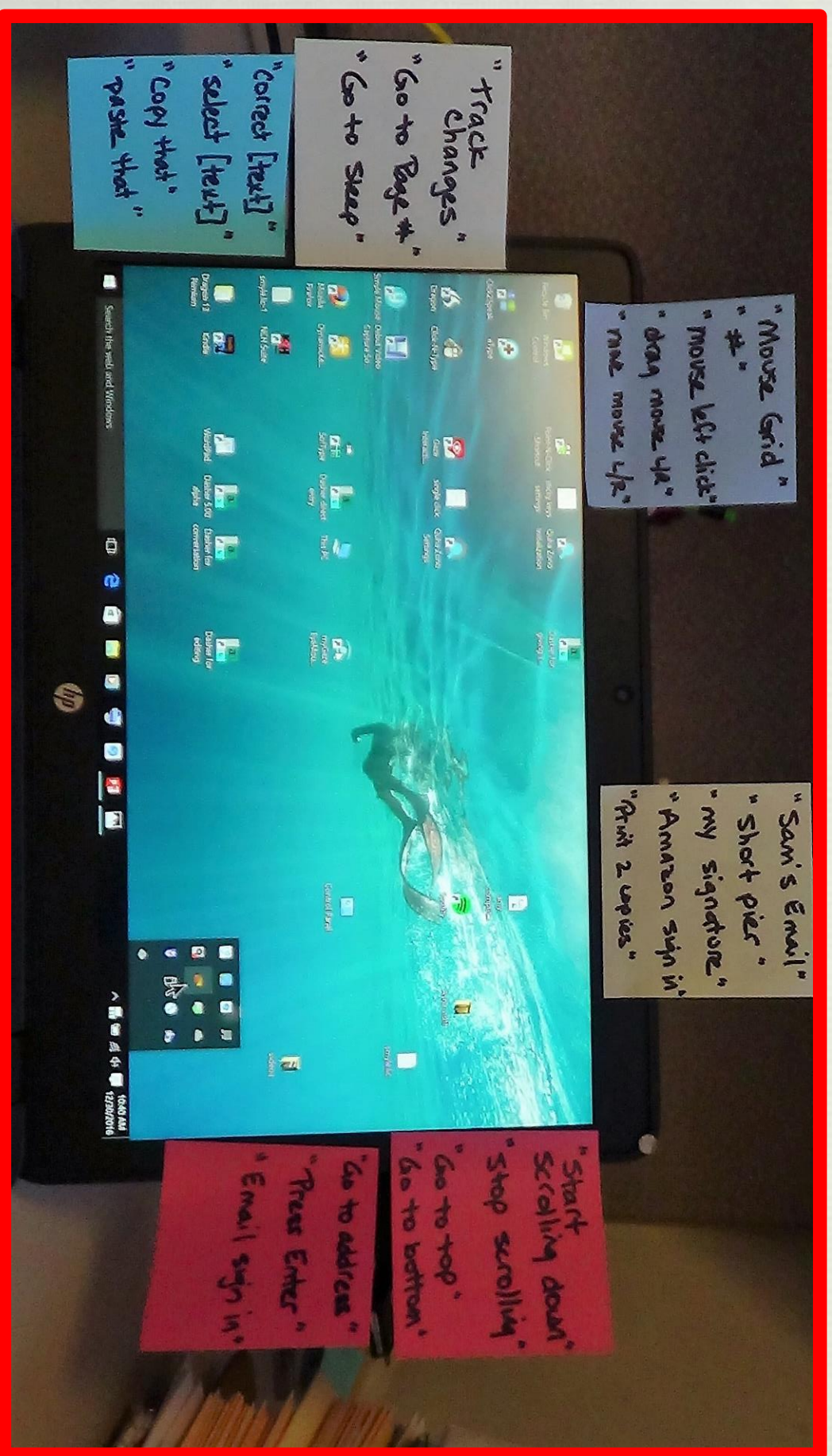
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A little cognitive assist





what is the keyboard shortcut for junk in outlook



Sign in

All News Videos Images Maps More

Settings Tools

About 295,000 results (0.72 seconds)

Task shortcuts:

Action	Keyboard Shortcut
Create a new task (when in Tasks).	Ctrl+N
Create a new task (from any Outlook folder).	Ctrl+Shift+K
Create a new task request.	Ctrl+Shift+U
Open selected item.	Ctrl+O
7 more rows	

Keyboard shortcuts for Outlook - Slipstick

www.slipstick.com/outlook/keyboard-shortcuts-outlook/

About this result • Feedback

Process your mail quicker with keyboard shortcuts - MSOutlook.info

<https://www.msoutlook.info/question/617>

CTRL, ALT and/or SHIFT are involved with most keyboard shortcuts. Below is an overview of my most commonly used keyboard shortcuts in Outlook to process my incoming emails. ... Mark a junked message as Not Junk, CTRL+ALT+J ...

Signing into Yahoo – several steps



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Checking email with text macros and built in commands

- ❖ “go to address bar”
- ❖ “yahoo sign in page” – types URL
- ❖ “press enter” – goes to that page
- ❖ “yahoo user name” – types email address
- ❖ “press enter” – brings up password page
- ❖ “yahoo password” – types password
- ❖ “press enter” – signs you in

Command Macros

- ❖ Input keystrokes, not just text
- ❖ String together several steps
- ❖ Record mouse movements and keystrokes
- ❖ Open programs/files



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Command Macro Examples

- ❖ “Facebook” =
Alt + D
www.facebook.com
Enter
- ❖ “Email sign in” =
johnsmith@aol.com
Tab
my&%secret967password
Enter



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- ❖ “Check my email” =
- ❖ Keystroke: Alt + D
- ❖ Typing:
 - https://login.yahoo.com/config/login?.src=fpctx&intl=us&lang=en-US&.done=https%3A%2F%2Fwww.yahoo.com
- ❖ Keystroke: Enter
- ❖ Wait
- ❖ Typing: JohnSmith@yahoo.com
- ❖ Keystroke: Enter
- ❖ Wait
- ❖ Typing: MySecretPassword
- ❖ Keystroke: Enter



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YAHOO!

Sign in

Enter your email

Next

Stay signed in Need help?
 To sign in, enter your email and tap "Next"

Don't have an account? [Sign up](#)

*Yes - this can be done with individual voice commands/typing.
But Catherine Royce once told me to “Choose easy”.*



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Until every child Betsy Dellea January 2017



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