A Mouse by any Other Name

OT access considerations for people with ALS

Peggy Dellea, MS, OT/L

Boston Children’s Hospital
ALS – Alternative Communication Program
Occupational Therapy

Assistive Technology

Access Consideration

Activity Goal

Access Site

Preparing for the next

Real Life use

Access settings

Access method

Access Site

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.
Activity Goal

OT related – includes activities of daily living (non-

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

- Reading
- Movies/videos/music
- Games
- Internet (work-related)
- Spreadsheet
- Word Processing
- Facebook
- Email
- Computer
- Smart phone or iPad
- Text
- Games
- Email
- Phone
- Music
- Reading
The activity goal drives the process.

Other important considerations:

- Technology availability
- Computer at home? PC? Mac?
- Hands? Head? Foot?
- Motor control available
- Somebody nearby to troubleshoot?
- Casual user or computer whiz?
- Speech available
- Intelligible?
- Breath support?
- Fatiguing?
- Breath support?
- Interpretability?
- Technology availability?
Low Tech vs. High Tech
Physical Access Control Site assessment

Preferred method – if possible

Positioning/mounting

Adaptive stylus

Computer adjustments

Direct selection

Indirect selection

Head, eyes, mouth, tongue, respiratory (sip/puff), voice, chin, shoulder, trunk, arm/hand, leg, knee, foot.

Pressure, excursion, range

Best control site(s)
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 weaknesses
- The short and long-term costs/benefits of using the access method
- Use the amount of training required to move movement
- The range and control of movement

Access Selection Considerations:
He cannot use a computer. We have tried everything. He can't use his hands.
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.
Direct Selection

- Reposition to be near body, add stylus
- Cannot drag across the screen
- One point of contact
- Timing matters – longer touch results in different action
- Skin (not fingernail), capacitive tip stylus
- Not pressure sensitive – capacitive
- Touch screen (iPad for example)
Home made access
Computer Access
Keyboard Adjustments – sticky keys and filter keys

Type with one hand

Typing aid (pointer)

Support arms/wrists

Close to body

Small keyboard

Direct Selection

Keyboard
Small keyboards
– One-handed use – easier to reach all keys

Can position a mouse close by
Easy to position close to the body

– Small Keyboards
Arm support

Decreases work load of shoulders and elbows

Supports weight of the arms

Arm support
Typing Aid

Allows accurate and fast typing with limited finger control.

Keeps your fingers above the keyboard.

Consider ease of donning/doffing.

Finger control allows accurate and fast typing with limited finger control.

Typing Aid
Typing with the other hand, touch typing with the other?
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

Sticky keys

Keyboard adjustments
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
Direct selection touch screen

- Finger lift only between words
- Compensate for tremor/shakiness
- Increase typing speed
- Consider swipe –
- Consider vertical vs. horizontal orientation

- Improve accuracy
- Consider stylus – keeps fingers away from the screen, may
- Support arm
- Position device close to body
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
  - no reaching to move it
  - Trackball remains stationary
  - Do not need to grip
  - Your hand can move the ball with any part of

Solution – Trackball

• Direct Selection: Mouse

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

- Head Mouse
- Foot Mouse
- Head Mouse
Foot Mouse

- Foot time mouse

- Trackball
“Foot mouse”
Tracker Pro
Natural Point
Quah Zono
Origin Instruments

Head Mice
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

Can be used with head, hand or foot

Head Mice
How do I click?

Any reliable switch site except for the head.

Activates left click, double click, and drag.

Switch-click.
Switchless clicking

Auto click dwell software

Dragger

Smart Click

Point n Click

Have a pause button

Set the jitter box

Set the dwell time

Switchless clicking

Auto click dwell

Dragger

Smart Click

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

On-Screen Keyboard

Mouse-only access

Reach Interface Author

Softype

Onscreen

Windows onscreen
Video game style

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

Dashier

Video game style
Dasher in Action
run down the battery quickly
Hey Siri may require the iPhone to be plugged in/may
Siri cannot voice answer an incoming call

Limited Functionality
Will have difficulty with soft or dysarthric speech.
Not intended as an accommodation for a disability.

Alexa

OK Google

( Hey) Siri

Voice input
Voice input - computer

Plan for a learning curve

Custom commands available (Dragon)

Best for word processing

Will have difficulty with soft or dysarthric speech.

Not intended as an accommodation for a disability.

Microsoft/Mac built in voice recognition software

Dragon Naturally Speaking

Voice Input - Computer
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.

- Adding command macros
- Adding text macros
- Adding vocabulary
- Adding command macros

Learning how to dictate, learning commands

For people with limb onset ALS, voice recognition software allows them to remain connected to friends, family and the world.
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. I write more now than ever before. Catherine Royce
Voice mouse control

“Drag mouse up/down/right/left”

“Mouse click” / “Mouse double click”

Stop

Slower / Much Slower

Faster / Much Faster

Move mouse up/down/right/left

Mouse Grid
Macros

Bank password = GiveMeMoney$§

Bank sign in page = https://www4.citizensbankonline.com/efs/servlet/efs/log

Visa Card Number = 5808 330 2435 3319

Peggy’s email = Peggy.Dellea@Childrens.Harvard.edu
Check my email = Alt + D


Enter

MySecretPassword

Wait

Enter

JohnSmith@yahoo.com

Wait

Enter

MySecretPassword

Wait

MySecretPassword

Enter


Alt + D

“Check my email” =
Signing into Yahoo – several steps

Peggy Dellea January 2017
Command Macro Examples

„Email sign in“ = Enter
mysecret97password
Tab
johnsmith@aol.com

„Facebook“ = Enter
www.facebook.com
Alt + D

Facebook
Keystroke: Enter
Typing: MySecretPassword
Wait
Keystroke: Enter
Typing: JohnSmith@yahoo.com
Wait
Keystroke: Enter
Typing: MySecretPassword
Wait
Keystroke: Enter
Typing: JohnSmith@yahoo.com
Wait
Keystroke: Enter
Check my email one step
Yes – this can be done with individual voice commands/typing.

But Catherine Royce once told me to "choose easy." Peggy Dellea January 2017.
A little cognitive assist
Eye Gaze Interface — The eyes have it
Eye Gaze

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

Infrared Camera
Eye Tracking in Action: dwell selection
Eye tracking - switching click selection
Problems

- Ptosis
- Cataracts
- Dry Eyes
- Head Movement
- Glasses and Contacts
- Attentional Deficits
- Nystagmus
- (R) Positioning
- Position, Position, Position
- (Re) Positioning
- Constricted or Dilated Pupils
- View the Full Pupil
- Camera needs to move
- Problems
Eye Gaze for Computer Interface

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

Eye Gaze for Computer Interface
Wheelchair Mounts
Floor Mounts
Phone mounts
Reading is "huge."
Access to books (hardcopy or digital)

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

Boston Children's Hospital

Until every child is well

Harvard Medical School
Teaching Hospital
Easy to adapt
Simple program (free is good)
Out of copyright material is free
Available for PC or Mac
Free download (Amazon.com)
Click to turn page:

- "Custom Voice Command (e.g."
- "Press right arrow" command
- Right arrow key
- Switch programmed to the
- Eye Gaze Interface
- Dwell software
- Switch-adapted mouse
- HeadMouse
- Mouse

"Turn page" command

"Press right arrow" command

Right arrow key

Switch programmed to the

Eye Gaze Interface

Dwell software

Switch-adapted mouse

HeadMouse

Mouse

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

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

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

"The best thing about that session was seeing his face when he was using the Kindle software."
"Shouldn't he be doing this without the switch? He won't be able to use the switch when the disease progresses."
Speech Generating Device Access

(they are often computers, after all)

- Trackball
- Mouse
- Keyboard
- Stylus and stylus holders
- Touch screen
- Switch scanning
- Adapted mouse
- Head tracking
- Eyetracking access
Access to iPad/Android tablets

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

Position of device
Phone Access

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

Phone Access
Call system/attention signal

Baby monitor

Switch-adapted attendant alarm

Commercial wireless doorbell

Portable speech output device with or without switch
Brain Computer Interface (BCI)

Trying to make its way to the end user

P300 ("aha" response)

Implanted vs. surface electrodes

"Reads" output of brain cells, interprets the signal

no, it cannot read your mind

yes, it is a real thing

Trying to make its way to the end user
Tele-treatment
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 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...

I also greatly appreciate your passion and resulting offer to always be available, even to doing home visits. Truly realizing what he wants, and "forcing" decisions does not work.

In short I truly understand Eric and his desires. As you have surmised he is slowly processing what he wants, and "forcing" decisions does not work.

Thank you for our meeting last Tues. As we move forward slowly, I appreciate your intent to truly understand Eric and his desires.

Amelia

[Signature]

直到每个孩子都健康
Key stroke: Alt + S
Key stroke: Enter
Type “8”
Key stroke: Tab
Type “Times New Roman”
Key stroke: Ff
Key stroke: Alt + O
Key stroke: Ctrl + A

Short Pier
A recent email

Dear Peggy:

I am able to use the single command for downloading CaringBridge. Saved me so much agita!!!
A little cognitive assist
Signing into Yahoo – several steps

Process your mail quicker with keyboard shortcuts - Microsoft Outlook

Keyboard Shortcuts for Outlook - Slippstick

- Ctrl + 0 - Open selected item
- Ctrl + Shift + U - Create a new task in Outlook
- Ctrl + Shift + K - Create a new (item in dataset)
- Ctrl + N - Open new item

Task Shortcuts

About this mail + Feedback

Sign in
Checking email with text macros and built-in commands

“go to address bar”

“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

“yahoo sign in page” – types URL

“go to address bar”
Command Macros

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

Enter
my%secret67password
Tab
johnsmith@aol.com

Email sign in = "Email sign in"

Enter
www.facebook.com
Alt + D
Facebook = "Facebook"

Facebook = "Facebook"
"Check my email" = Keystroke: Alt + D


Keystroke: Enter

Wait

Keystroke: Enter

Typing: JohnSmith@yahoo.com

Keystroke: Enter

Wait

Keystroke: Enter

Typing: MySecretPassword

Keystroke: Enter

Peggy Dellea January 2017
Yes – this can be done with individual voice commands/typing.

But Catherine Royce once told me to "choose easy".