KPR Koester Performance Research

Better Computer Access Solutions through the Use of Evidence

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Overview

- Brief Introduction
  - Computer Access Intervention Process
  - Clear Evidence, Better Solutions
- Use of Evidence in Computer Access
  - Pointing Devices
  - Text Entry
  - Switch Use

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Access Intervention Process

- Goal: to find the best computer access solution for an individual's needs

- Determine client needs and goals
- Assess characteristics of client, environment, tasks
- Compare possible solutions for input & output
- Recommend & implement particular solution
- Configure for user's needs
- Measure outcomes

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Clear Evidence, Better Solutions

- Make decisions based on clear evidence related to the client
  - External or field evidence
  - Knowledge & skills of the providers
  - Individual evidence
    - Discussion with client
    - Functional skills assessment
    - Trials with potential interventions

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Clear Evidence – example uses

- Setting goals: therapy, IEP, etc.
  - Identifying needs
  - Justifying areas of work
- Funding support
- Choosing methods and techniques
- Tracking progress
- Measuring outcomes

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Types of Evidence

- Observation
- User Feedback
- **Measurement**

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Measurement Focus

- Assess user abilities that are most relevant to computer usage
- Speed and accuracy during performance of specific fundamental tasks
  - Text entry
  - Target selection
  - Target dragging
  - Switch press

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Computer-based Measurement Tools

- Present tasks that are repeatable, relevant, and realistic
- Efficient data collection and report generation
- Ideally – get the information you need, in less time!
- Focus on KPR software, but will mention other options

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Pointing Device Use

- Select best pointing method
  - Mice, trackballs, trackpads, head-controlled mice, keyboard-based approaches, etc.
- Configure for user's needs
  - Location, splinting, device behavior, etc.
- Follow-along
- Very little external evidence available

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Skills & Measures for Pointing

- Target Acquisition
  - Dwell, click, double-click
- Dragging
- Menu Selection
- Speed & accuracy
- Complements observations & feedback

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Gathering Pointing Device Evidence

- Available, but not recommended:
  - Custom Solutions website
  - Reach assessment tests
- Better, research-based options (IMHO):
  - Compass software
  - Pointing Wizard

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Compass Software

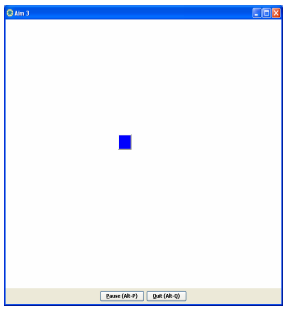
- Aim, Drag, and Menu tests specifically for pointing device skills
- Assess on-screen keyboard use with text entry tests
- Setup is highly customizable, if desired
- Validity has been demonstrated
- Compatible with alternative inputs and outputs
- Reports and data are stored for easy review and retrieval

Compass Example

- Selecting the best pointing device for an individual with upper extremity impairments
- Young adult with CP performed Compass Aim tests with three different pointing devices
- Test set-up was identical for each device

Compass Aim Test

- Measures speed and accuracy of user's target selections
- Reports averages across targets, as well as target-by-target data



Compass Example: Results

	Trial Time (sec)	Entries
Mouse	2.6	1.4
Trackpad	4.9	1.3
Trackball	5.4	1.3

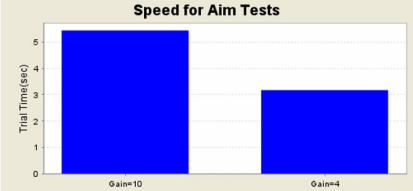
- View PDF Report…
- Control looked similar, qualitatively
- But performance was much faster with the mouse
- Provides team (including user) with means of making an informed decision

Pointing Wizard Example

- Adjusting Windows settings to meet user's needs
- Pointer speed: gain of the pointing device
- Double-click settings:
  - Double-click time
  - Double-click distance
- Object sizes: menus, caption buttons, scrollbar, taskbar

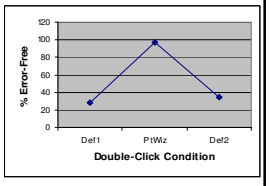
Pointing Wizard Example

- 52 year-old man with cerebral palsy
- Slower pointer speed yielded:
  - 42% increase in speed relative to default
  - 41% decrease in entries relative to default



Pointing Wizard Example #2

- 57 year-old man with history of stroke
- With wizard-recommended settings:
  - 97% error-free performance
  - Major improvement relative to default settings
  - Double-click distance was the most important change



Pointing Summary

- Clear evidence, Better solutions
- Compass: for assessment, more formal evidence-gathering
- Pointing Wizard: tool for end user to leverage Windows settings effectively

Text Entry

- Using keyboard or alternatives such as on-screen keyboard, speech recognitions, scanning
- Some external evidence exists
- Gather internal evidence about the user:
  - Choose the best text entry method
  - Configure the text entry method
  - Track progress

Skills & Measures for Text Entry

- Reliable and efficient access to all characters and functions
- Words (or characters) per minute
  - overall and with errors removed
- Errors
- Complements observations and feedback

External Evidence for Typing

Input Method	Text Entry Performance (wpm)		
	Slow	Average	Fast
UE Typing, touch	20	30	60
Speech Recognition	< 10	16	30
UE Typing, C5-6	4	16	25
Mouthstick Typing	< 5	10 – 12	20
Morse Code	< 5	8	12
On-Screen Keyboard	< 5	6 – 8	10
Row-Col Letter Scanning	< 1	4	8
UE Typing, MS	2	?	7
Tongue-touch Keypad	< 1	2	5

How would you use this sort of information?

Gathering Text Entry Evidence

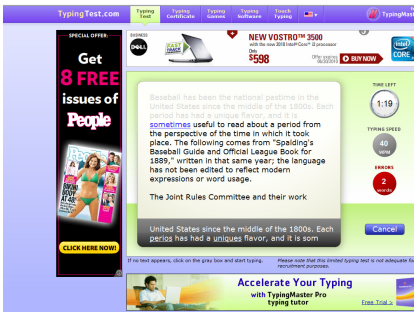
- List of tools:
  - “Standard” typing tests
  - TextTest and StreamAnalyzer
  - Compass software
  - Keyboard Wizard

Free Typing Tests

- TypingTest.com
- speedtest.10-fast-fingers.com

- Typical limitations:
  - Distracting screen
  - One size fits all
  - Can’t save results
  - Psychometric validity unknown

Example of distractions, in TypingTest.com



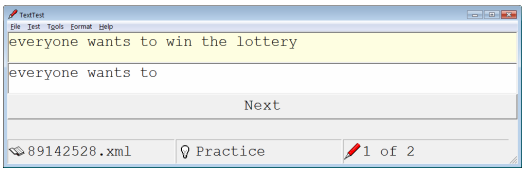
Mavis Beacon Teaches Typing

- About $20
- Intended as a tutor but includes speed tests
- "Detailed" tracking and progress reports
- Games and music
- English, French, and Spanish

broderbund.com/c-33-mavis-beacon.aspx

TextTest and Stream Analyzer

- faculty.washington.edu/wobbrock/ - J. Wobbrock
- Free, HCI research tool
- Practice and test modes
- Two included phrase sets or create a custom set



StreamAnalyzer

```
Num Testing? Time WPM AdjWPM CPS KSPS GPS Intra Inter StrDist M
1 0 34.188 11.583 11.293 0.965 1.258 1.293 0.6309546 0.1598864
2 1 21.532 14.49 13.997 1.208 1.393 1.489 0.531258 0.1834839 1
```

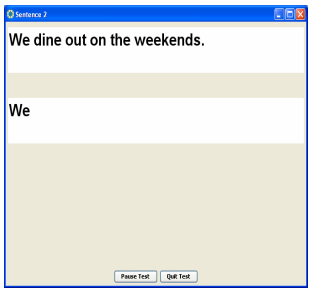
- Trial number
- Test or practice
- Total time for trial
- WPM
- WPM adjusted with errors
- Characters per second
- Keystrokes per second
- Gestures per character
- Average time per character
- Average time between characters
- Plus 24 more

Compass Software

- Letter, word, and sentence tests specifically for text entry skills
- Setup is highly customizable, if desired
- Validity has been demonstrated
- Compatible with alternative inputs and outputs
- Reports and data are stored for easy review and retrieval

Compass Sentence Test

- Compatible with alternative text entry methods
- Adjustable font, size, text difficulty, feedback, etc.
- Accurate and valid measurements



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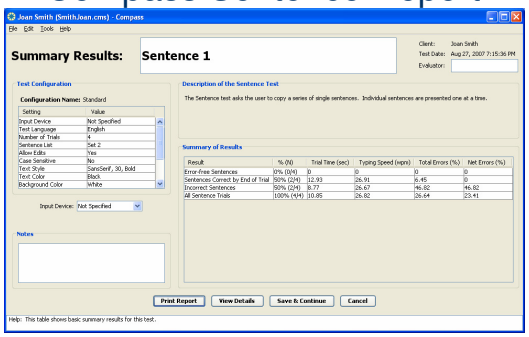
Compass Sentence Report



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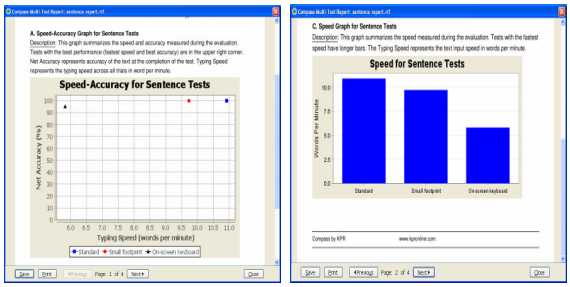
Compass Comparison Report



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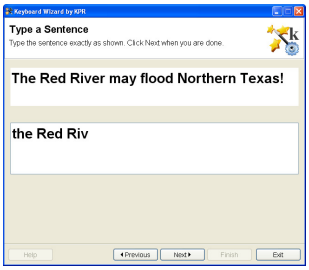
Keyboard Wizard Demo

- For Sticky Keys and Repeat settings



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Text Entry Example

- 68 y/o woman with multiple sclerosis
- Runs through Keyboard Wizard (demo)
- Adjusting auto-repeat setting:
  - Improved typing speed 50% (from 2.2 to 3.2 wpm)
  - Reduced errors 32 pp (from 60% errors to 28%)

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Text Entry Summary

- Clear evidence, Better solutions
- Use external evidence for perspective
- Free typing tests OK with caveats
- Compass: for assessment, more formal evidence-gathering
- Keyboard Wizard: tool for end user to leverage Windows settings effectively

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Switch Use

- Select best switch
  - Location
  - Activation method
- Configure scanning software
  - Scan rate
- Compass or SSPT for gathering evidence

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Skills & Measures for Switch Use

- Reliable and efficient switch press
- Press time
- Release time
- Errors (extra switch hits)
- Complements observations and feedback

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Single Switch Performance Test

- Free from www.aacinstitute.org

- Three Tests
  - Activation
  - Release
  - Repetition

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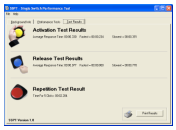
Single Switch Performance Test





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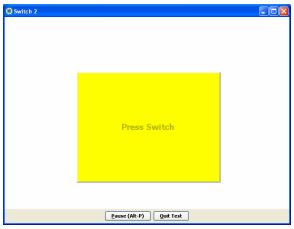
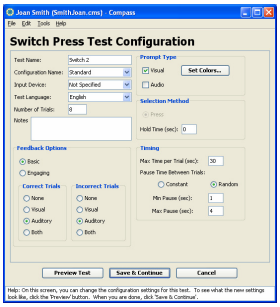
Compass Switch Press Test





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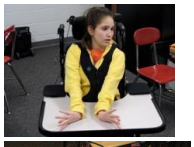
Finding the best switch site

- High school student with cerebral palsy
- No reliable use of a single switch to access a computer or other devices
- Use Compass to compare several switch sites

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Compass Switch Press Results

	Correct Trials	Avg. Trial Time (s)	Avg. Press Time (s)	Avg. Release Time (s)
Head Right	5/5	8.5	7.8	0.64
Head Left	5/5	9.0	8.5	0.57
Head Posterior	4/5	17.4	11.1	6.32
Right Hand	2/5	19.4	15.6	3.8
Right Finger	4/5	11.2	8.6	2.5

How would you use this information?

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Choosing an appropriate scan rate

- Simple estimate:
  - Appropriate scan rate = pressTime * 1.5
- Establishes a scan rate that is generally neither too fast nor too low, for an experienced scanner
- Example: pressTime = 2.5 seconds
  - Scan rate = 2.5 * 1.5 = 3.8 sec

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Switch Use Summary

- Clear evidence, Better solutions
- Measure switch press time for:
  - Finding best switch site
  - Establishing an appropriate scan rate

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Conclusions

- Gathering clear evidence can enhance decision-making and document success of an intervention
- Clients themselves often really appreciate seeing data about their performance
- Give one of these tools a try, if you haven't already

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KPR Software Details

- Resources at KPR website, kpronline.com
  - Compass, Win/Mac, $179
  - Wizards, Win, $16.95 each
  - Compass + Wizards bundle, $195
  - Free trial of Compass available
  - Demonstration videos
- Compass also available through Infogrip, EnableMart, and Technology for Education

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Final Words

- KPR research & development is supported by:
  - National Institutes of Health
  - Paralyzed Veterans of America Research Foundation
- Thanks for being here today!
- Contact: Heidi Koester
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