Finding Access
…where it may be found

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Cerebral Palsy and Access

- “Individuals with cerebral palsy primarily experience difficulty with motor skills, which vary depending on the location of the brain lesion” (Beukelman & Mirenda, 2005, p.236)

- The incidence of dysarthria among persons with cerebral palsy estimated from 31% to 88%. (ibid, p.237)
Cerebral Palsy and Access

- Modern Augmentative and Alternative communication (AAC) technology can help nonspeaking persons to achieve communication and environmental control.

- A significant number of individuals with CP find problems with access to AAC technology.
Society’s tools define “standards of access”

- Typical standard input systems involving fine-motor dexterity

Keyboard
- Mouse
- Key-operated lock
- Door handle
- Steering wheel
- Foot pedal
Hierarchy of Control Site Preference

Most Preferred

Hand
Head
Mouth
Eye
Foot

Least Preferred
Hierarchy of Control Sites

- Hand
  - Multi-finger keyboarding
  - Single-finger pointing and activating keys
  - Splint-mounted pointer
- Head movement with
  - Head-mounted pointer/stick
  - Head-mounted light sensor
  - Switch/es mounted on head rest
  - Camera aimed at face or reflector
Hierarchy of Control Sites

- **Mouth**
  - Orofacial gestures
  - Lip reading
  - Mouthstick

- **Eyes**
  - Eye gazing monitored by camera
  - Eye gazing monitored by visual evoked response
  - Blinking to control single switch
  - Winking to activate single switch

- **Foot**
  - Pedal switch
  - Foot-operated 2-dimensional pointer (joystick)
Pattern Recognition

- Pattern Recognition of
  - Eye-blink patterns
  - Speech (Speech Recognition)
  - Individual Words and Phrases (Word Recognition)
  - Vocalizations (Vowel Recognition)
  - Facial Gestures
The SCATIR Switch

- **Self-Calibrating Auditory-Tone InfraRed Switch** – Developed at MSU Artificial Language Lab, Digital SCATIR switch manufactured and marketed by Tash, Inc.

- An IR light beam is reflected off a surface (face, eye, eyelid, toe, etc.)

- Detects purposive movement by monitoring the derivative of the intensity of the reflected IR light.

- Useful for capturing purposive contraction of small muscle groups.
Optical Detented Joystick

- For hand or foot control
- Filters out spasticity and tremor by providing local mechanical stability at individual points within a two-dimensional field of stations.
- Present status: in use.
- In development: digital version, using force-feedback design.
Towards a Michigan Access Initiative

- Promote Michigan collaboration in research on Access
- Regular conferences on Access Techniques
- Identify current centers of excellence within Michigan’s universities, hospitals, rehab centers, and school districts
- Identify critical problem areas for study

