

# An Isometric Tongue Pointing Device

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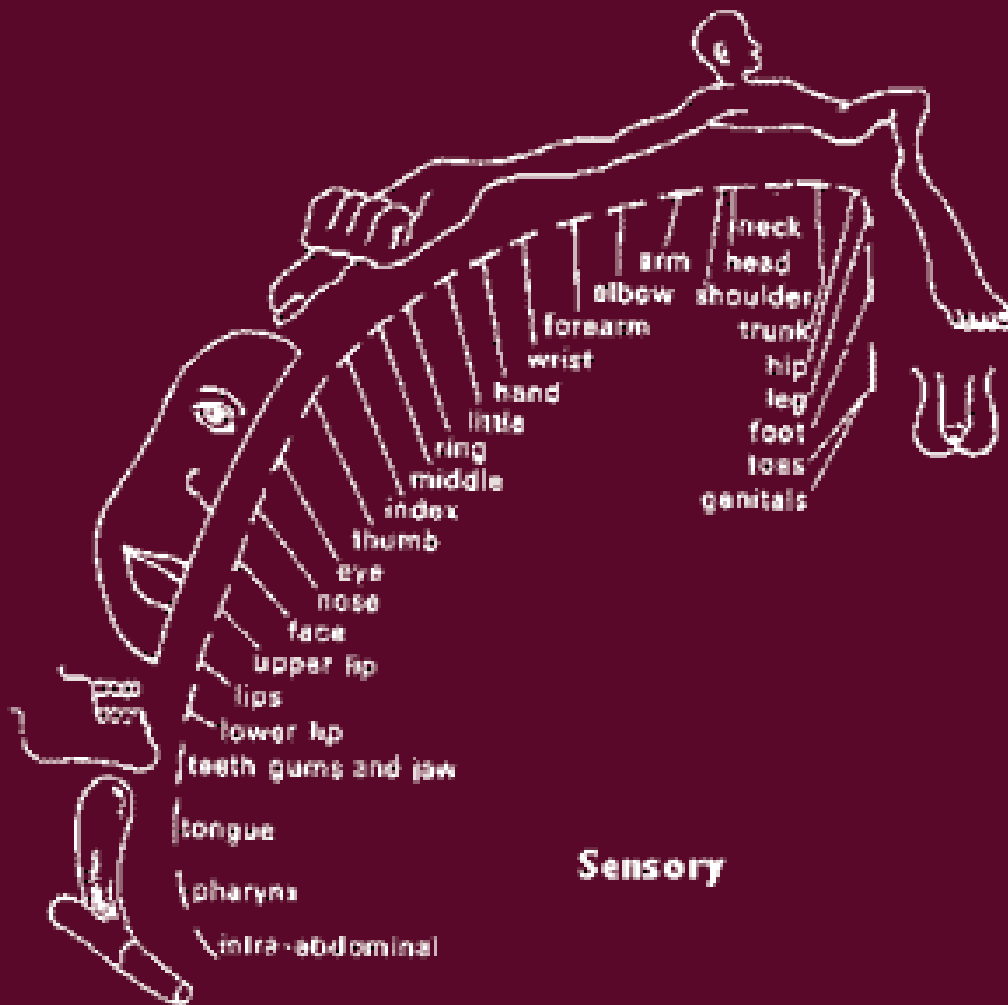
# Pointing

- Key to modern human computer interfaces
- Typically by hand
- Problematic when hands not available
  - disability
  - dedicated to other tasks (e.g. driving, piloting)

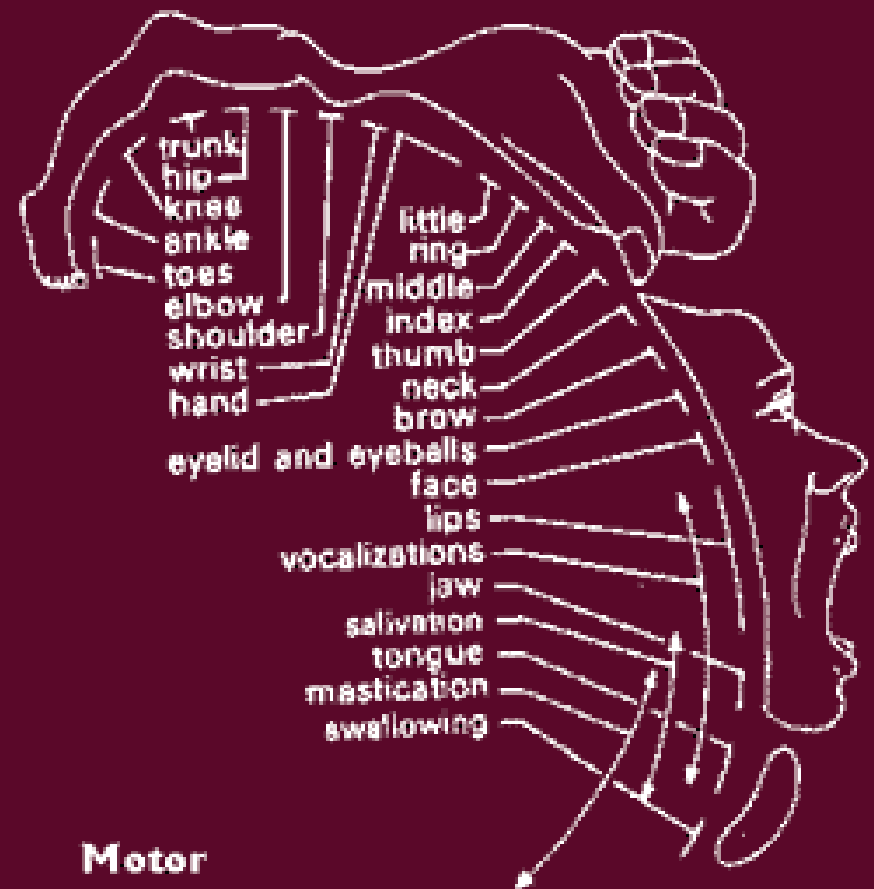
# Seeking Alternatives

- Foot
- Head (neck)
- Gaze (eye-tracking)
- EMG

# Sensory and Motor Cortex



**Sensory**

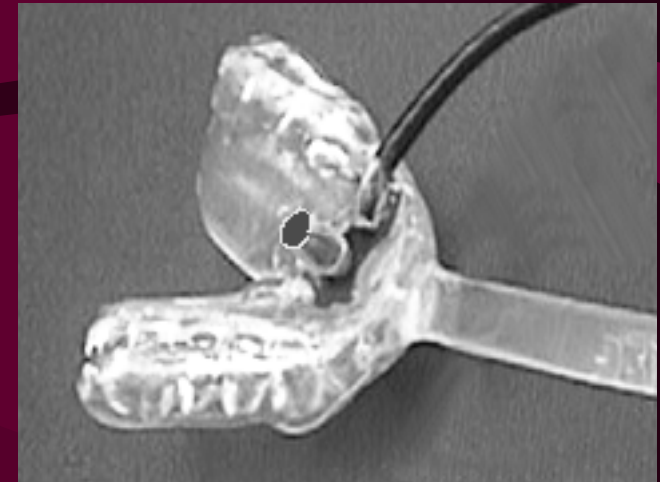


**Motor**

# Tongue as manipulation device

- Vocalization
- Mastication
- Pointing?
  - constrained in mouth
  - limited movement range

# Design



- Isometric, miniature joystick (TrackPoint™)
  - small space, no movement required
- Mounted on form fitting mouth-piece, pointing to tongue tip
- Button: bite or other body parts

# Pilot User Testing

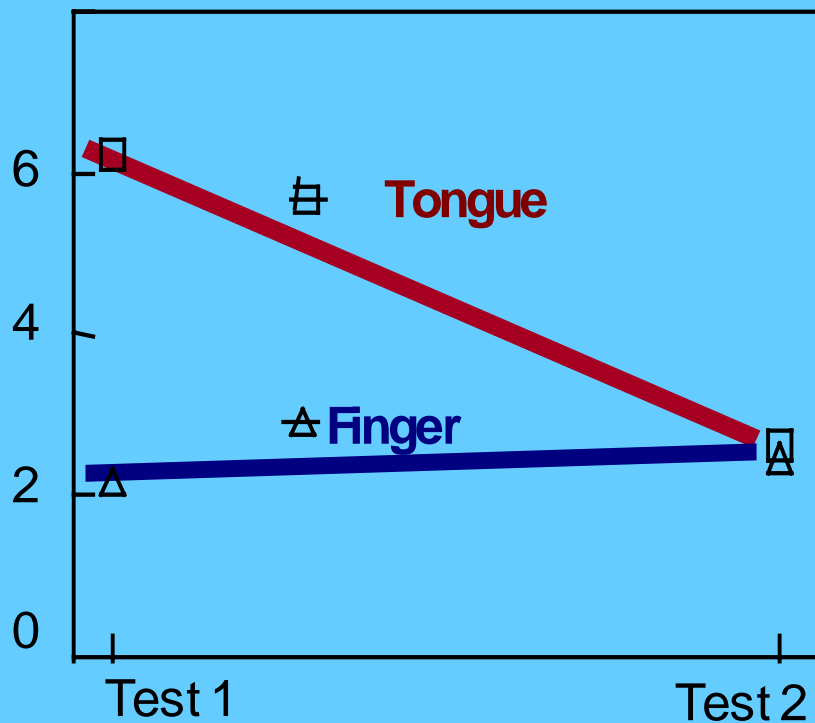
- Preliminary (further development pending)
- Two subjects
  - total novice, never used an isometric device
  - one finger first, one tongue first
- Tongue vs. finger performance

# Testing Task

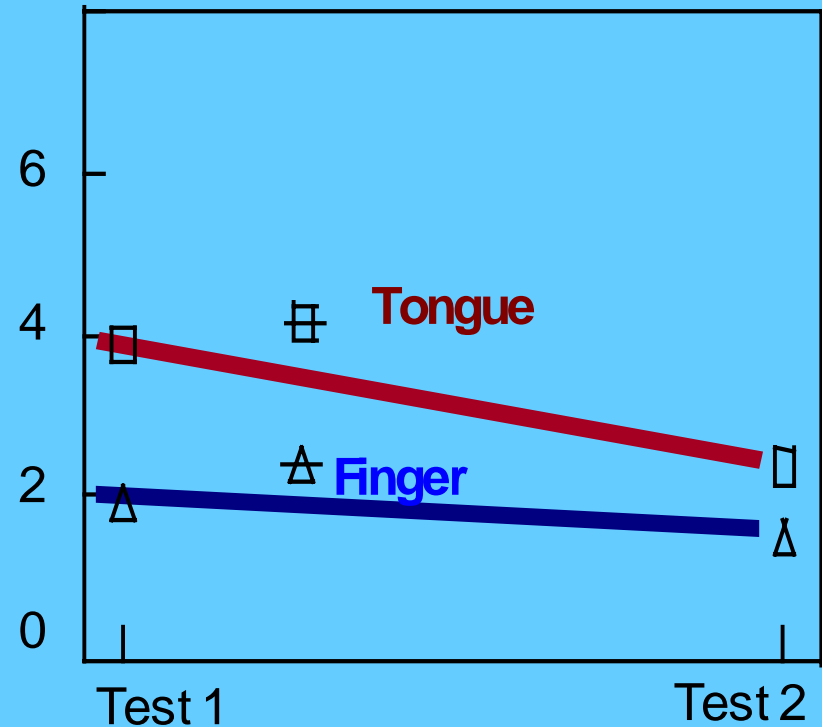
- Target selection
  - 4X5 array of buttons
  - target highlighted
  - timed till target button clicked
- 2 tests, 30 min practice in between
- 3 sets of trials each test
  - 15, 30, 45 pixel buttons

# Testing Data (Selection Time)

Subject 1



Subject 2



# Results and Conclusions

- Tongue pointing slower than finger
- The difference reduces with practice
- It is possible to make practical isometric tongue pointing
- More development and evaluation needed

# Acknowledgements

- Ted Selker
- Kim May
- IBM Almaden Colleagues