6.S196: Principles and Practice of Assistive Technology
Lab: Alternative Text Input Devices and Strategies

Objectives:
- Experience using alternative text input methods
- Learn how language models can be used to improve or degrade word prediction

Activities
- Lab session with laptop computers (bring your own computer if possible).

Deliverables
- Write a brief (1.5-2 pages) reflection on this activity.

You should do the "Conventional Typing" activity first on a laptop; afterward, you can do the other activities in any order depending on equipment availability.

Conventional Typing

For this exercise, you need a laptop computer to obtain a baseline of your conventional typing speed.

1. Go to http://www.typingtest.com/ and conduct a minute-long typing test.
2. Repeat two more times for a total of three trials. Note whether your typing speed (adjusted for errors) has increased or decreased (due to learning effects or fatigue).

Dasher

For this exercise, you will test out Dasher, an input method developed by the Inference Group at the University of Cambridge.

1. On your laptop, go to www.inference.phy.cam.ac.uk/dasher/ and click on "Download" in the sidebar.
2. Download and install Dasher for your operating system (there are Windows, MacOS, and Linux versions.)
3. Once installed, play around with Dasher for a minute or two. What are your first impressions and thoughts about the interface? Based on your interaction, how do you think it works? Adjust the speed of Dasher (in the bottom left corner of the interface) to a speed that you think is optimal.
4. Prepare a stopwatch (either your own or www.online-stopwatch.com/). Type out the following passage using Dasher (the first sentence of *Black Beauty* by Anna Sewell) letter for letter, i.e. without any errors.

```
The first place that I can well remember
was a large pleasant meadow with a pond
of clear water in it.
```

This paragraph contained 21 words. Compute your WPM.

5. Practice with Dasher for five minutes to try to improve your proficiency of the interface. Afterward, try typing the following sentence (paraphrased from the *Americans with Disabilities Act)* letter for letter, i.e. do not make mistakes. Use a stopwatch.

```
It is the purpose of the Americans with
Disabilities Act to provide a clear and
comprehensive national mandate for the
elimination of discrimination against
individuals with disabilities.
```

   This sentence contains 24 words. Compute your WPM. Did your time improve?

6. In the options, change the Alphabet to "More Alphabets…" → "Deutsch / German with limited punctuation". Try typing in the *Black Beauty* sentence again and compute your WPM. How was this different?
7. Change the alphabet back to "English with limited punctuation". What do you predict will happen if you are asked to type non-words? Use a stopwatch to calculate your WPM for the following text:

```
aRgfhE uIfsacm fdfqkk jfIOPL TrdIfd
```

8. Some experienced users of Dasher (often people with physical disabilities who cannot use a physical keyboard, but instead rely on mouse or head-tracker input) can achieve speeds of over 30 words per minute. The performance is achieved in part by the system's **language model**, which adjusts the sizes of letters based on the probability of the word. You should discuss the pros and cons of language models in your reflection on this lab activity.

Speech Recognition

Speech recognition might be useful for people who do not have the fine motor skills needed to use a keyboard. In this part of the lab, you will test out automatic speech recognizers typically used for web search and examine the limits of speech recognition.

1. Set up a speech recognizer on your computer or mobile device. This might include:
   - Siri (free) on an iPhone or iPad using the Notes application.
   - Google's speech recognizer on an Android smartphone, used as input to a text message or document.
   - Speech icon on the www.google.com search prompt (via a laptop and Google Chrome, which you may need to install).

Familiarize yourself with the speech interface. Try the phrase "Furiously sleep ideas green colorless." What was the result?

2. Try saying each of the words separately, e.g. "furiously", "sleep", and so on. Do you experience an improvement or degradation in performance?

3. Try saying “Massachusetts Institute of Technology.” Now, try “Maine Institute of Technology.” What are the results? Try additional single-syllable words and longer phrases and note the performance of the speech recognizer.
4. Try saying ` printf(“hello world\n”); ` and ` #include <cstdlib> `

Dictation Interfaces

This section will give you a sense of speech recognition interfaces for navigating a desktop environment and dictating a document.

1. In Windows 7, click on the Start menu, go to Control Panel, and click on “Ease of Access”.
2. Under “Speech Recognition”, click on “Start Speech Recognition.” Follow the wizard, if necessary, to ensure that your microphone is working (this should only be necessary for the first person to use the workstation.
3. Click on “Open the Speech Reference Card” to learn the different kinds of speech commands that can be used in Windows 7. Launch Microsoft Word or another word processor (e.g. Notepad or Wordpad)
4. Start the stopwatch and try dictating the *Black Beauty* sentence word for word, i.e. without any errors. Try doing this entirely without the use of the mouse or keyboard – you should be able to use speech commands, for example, to correct any errors. Compute your WPM.
5. Spend up to five minutes testing out different speech correction functions, including deleting words, changing the capitalization of a word, and spelling out words letter by letter. Start a stopwatch and try dictating the *Americans with Disabilities Act* sentence. Compute your WPM.

Alternative Keyboards

Alternative keyboards are designed to make it easier for individuals with certain kinds of fine motor impairments to use a keyboard. People who spend large amounts of time using a conventional keyboard may find it useful to try alternative keyboard layouts. Try one of the chorded keyboard and one of the two split keyboards.

1. Plug these keyboards into your computer via USB and note your initial reactions to them. Obtain your WPM rate using http://www.typingtest.com/.
2. Switch back to the laptop’s regular keyboard. Does it feel more comfortable or ergonomic than these alternative keyboard layouts?

Reflection

After completing the three exercises, write a brief reflection about what you learned. It should be roughly 1 to 2 pages long. To get you started, you might think about these dimensions:

- What kind of effort is required to learn how to use these alternative communication technologies effectively? How did this learning effort compare to the assistive technologies for blind or low-vision users in the previous lab?

- Once learned, how does the speed of access compare with regular keyboard use? How would this change for highly technical domains that use shorthand or jargon (e.g. programming, legal, medical) that falls outside of standard language models?
- What design improvements would you suggest to make these technologies more useful/efficient for assistive purposes?
- What kinds of impairments (physical or cognitive) might make it difficult for someone to use the technologies tested in this lab? As one example, watch this YouTube video at http://goo.gl/5teUU for insight into how people with cerebral palsy might have difficulty with some of the interfaces seen today.

Your written report should be submitted via Stellar, under the Alternative Text Input Lab.