Keyboard Layouts: From QWERTY to Dvorak*

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May 24, 2003

*Slides available from http://behdad.org/presentation/dvorak/

History - QWERTY

- Christopher L. Sholes started his typewriter in 1867.
- Remington shipped its first typewriter based on Sholes design.
- The Sholes layout revised by Remington is known as QWERTY.
- From 1874 to 1881 it was the only commercially available typewriter.
- Shift keys and numerals where added to the layout, but the letters never changed after.

History - Dvorak

- In the 1920's and 30s, August Dvorak and William Dealey designed the *simplified* keyboard, based on a research on old designs and hand philosophy and function.

- Dvorak typists began to sweep typing speed contests two years later, and they have held most typing records ever since.

- Tacoma schools in the 1930s, showed that children learned Dvorak typing in one- third the time required to attain the same standard with QWERTY typing.

- During World War II, US Navy a shortage of trained typists. Retraining QWERTY typists to Dvorak, increase their typing accuracy by 68 percent and their speed by 74 percent. The Navy ordered thousands of Dvorak typewriters. Treasury Department vetoed the Navy purchase order.

History - Dvorak (continued)

- Dvorak became the American Standard Keyboard in 1965.
- US Bureau of Standards said: "There is little need to demonstrate further the superiority of the Dvorak keyboard in experimental tests. Plenty of well documented evidence exists".
- August Dvorak died in 1975, a bitter man: "I'm tired of trying to do something worthwhile for the human race", he complained. "They simply don't want to change!"
- Around 1990, still very few have heard about Dvorak.

O Typewriter! Quit Your Torture!

- Try typing with a QWERTY keyboard these words: *fact*, *agree*, *grass*, *regard*, *greatest*, and *exaggerated*. Now try *opinion*, *million*, *minimum*, and *monopoly*.

- It was designed far before touch-typing was common.

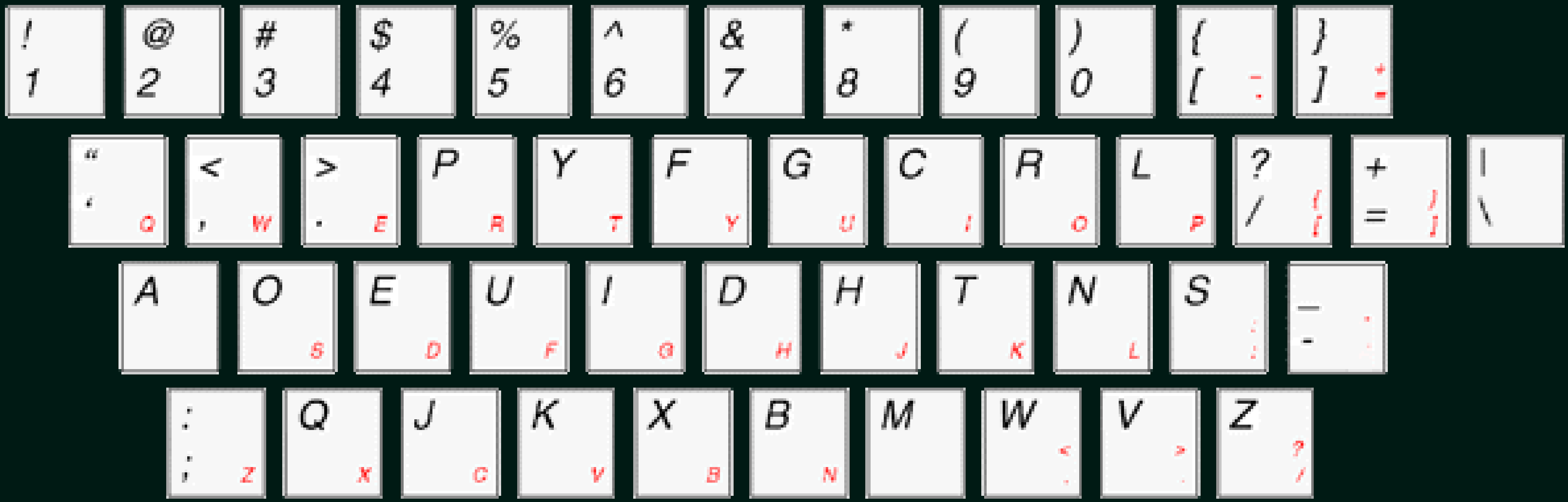
- The most commonly used letters are scattered as widely as possible over the keyboard, to avoid jamming: E, T, and O on the top row; A and H on the home row; N on the bottom row.

- Rammington replaced R in the top row, for commercial purposes!

Philosophy Behind Dvorak

- Designed for touch-typing.
- Common letters are placed on the home row, to minimize finger movement.
- Vowels are put on the left hand, consonants on the right, to maximize hand alternation.
- When typing common digraphs with finger on the same hand, the fingers are moved from outer fingers to the inner ones.
- Weaker fingers are assigned less frequent letters.
- Jumps from top row to bottom row are minimized.

Dvorak Keyboard Layout



Pros and Cons of Dvorak

- **Learning:** Dvorak is much easier to learn than QWERTY, especially for new typists.

- **Speed:** With careful training, it seems most QWERTY typists can switch to Dvorak and regain their old speed in about a month. After that, it's all gravy.

- **Accuracy:** In QWERTY, the most frequently mistyped words are short, common, and easy to spell; many are only two or three letters long. Dvorak has typing "daemons" too, but they tend to be longer and harder to spell.

- **Comfort:** The Dvorak keymap is carefully adapted to the English language. Dvorak has alleviated some people's repetitive-stress injury (RSI) symptoms

Pros and Cons of Dvorak (continued)

- **Compatibility:** This is where QWERTY wins! You need to switch back to QWERTY if you:
  - move from computer to computer all day.
  - use a *dumb* video display terminal (VDT) connected to a host.
  - program in un-English languages like Unix shell commands.
  - depend on software's keyboard commands (as in vi or emacs) that you know by their positions, not their letters.
  - must use one of the few really shoddy programs that ignore the system keymap, and you don't want or can't find a hard-wired Dvorak keyboard.

  Fortunately, switching back to QWERTY is really easy.

Numbers!

- On QWERTY, the typing frequency is distributed among three rows as **52%** on top row, 32% home row, and 16% bottom row. On Dvorak it is 22% on top row, **70%** home row, and 8% bottom row.

- On QWERTY, there are only 300 english words that can be typed by the home keys (without any finger movement), on Dvorak it is around 5000. It makes Dvorak typing tutorials less boring.

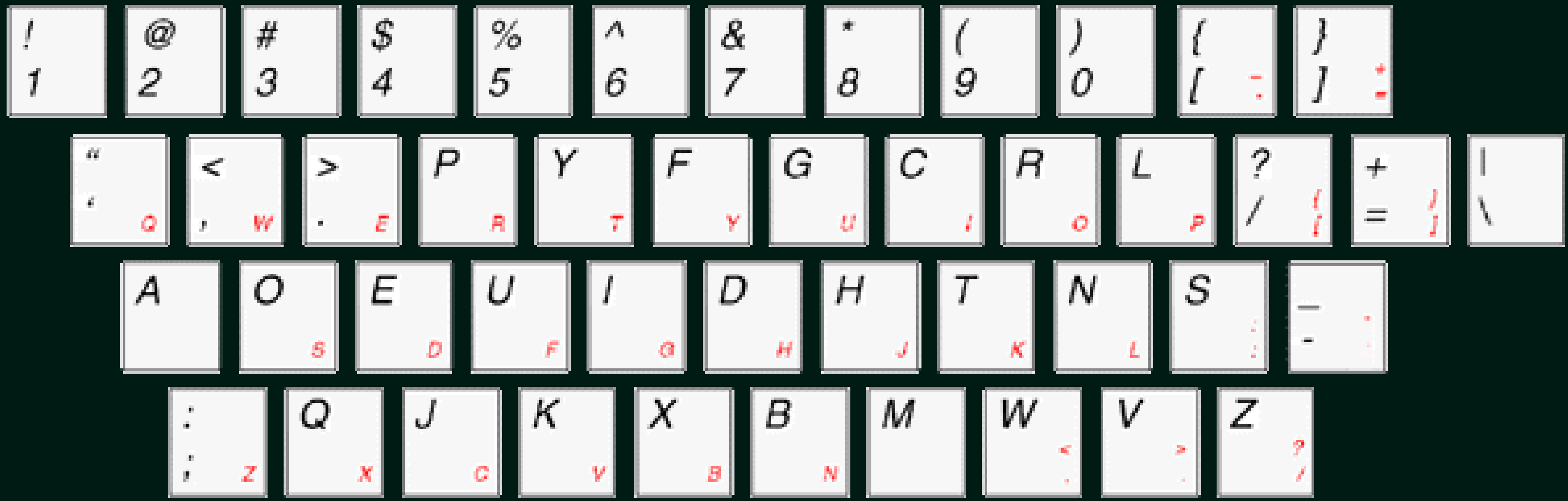
- On QWERTY, fingers travel 16 to 20 miles to do the day's typing; on Dvorak, fingers need only travel 1 mile to the same work!

Numbers! (continued)

- With a small dictionary found on Macs, here is a comparison of the total words that can be typed with different sets of keys:

	QWERTY	**ABCD**	**Dvorak**
more is better			
Home-row-only	49	40	618
Top-two-rows-only	5810	6977	10448
fewer is better			
Left-hand-only	687	1183	58
Right-hand-only	101	49	29
Off-home-row-only	1138	596	15

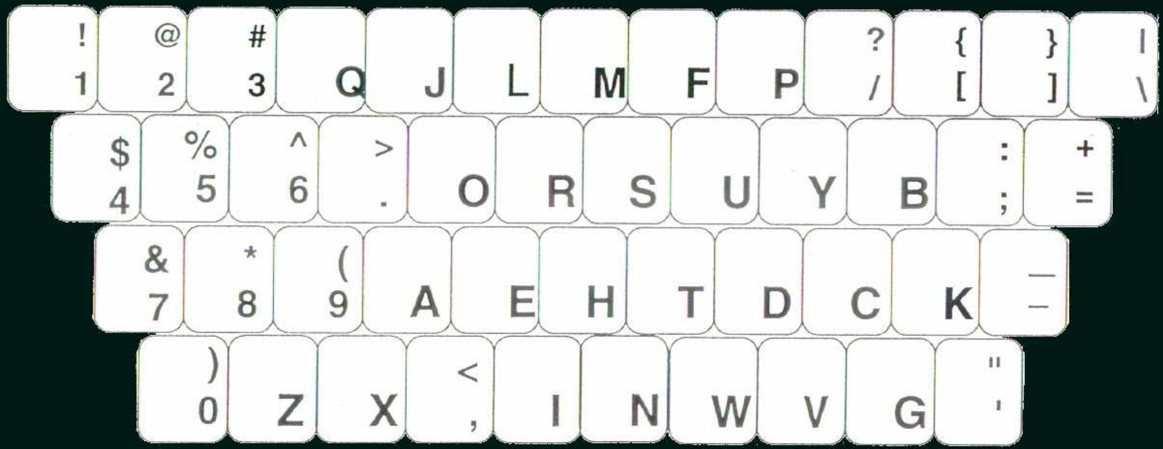
Dvorak Keyboard Layout



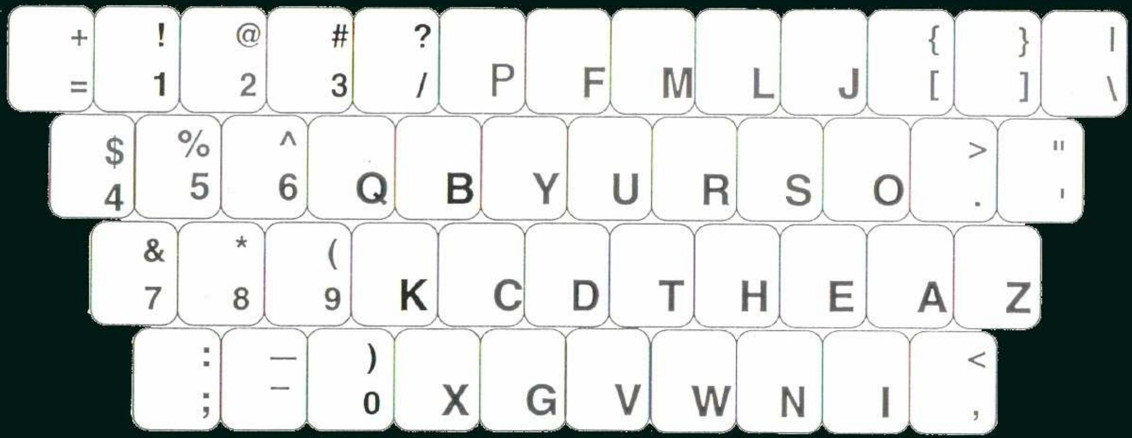
Dvorak Variations

- There were a few variations of the Dvorak layout.
- After Dvorak became an ANSI standard, the letter positions never changed after.
- There are still a few replacements of punctuations, like the bracket creep.
- Dr. Dvorak's patent only specified the letters and eight punctuation marks.
- In Typewriting Behavior, Dr. Dvorak even published an optimized arrangement of the numerals (7531902468)!

Dvorak Keyboard for Disabled People



One Hand Right



One Hand Left

Switching to Dvorak

- Software switch: Almost all operating systems support Dvorak without any extra drivers.
- Relabel or rearrange your keycaps.
- Get a hard-wired Dvorak keyboard.

Non-English Dvorak Efforts

- Non-English languages often use special characters and diacritical marks that almost never appear in English. English Dvorak keyboard layouts do not support these language features as readily as a language-specific layout, if at all.

- While it seems likely that the benefits of Dvorak make it superior to QWERTY-derived layouts for many languages, the fact remains that it was designed for English-language typists. Others would probably benefit even further from a layout similarly optimized for their own language.

Design Dvorak Philosophy Layouts

- **Minimum hack:** Rearrange your QWERTY-derived national-language layout by moving each key from its more-or-less QWERTY position to the corresponding Dvorak position.

- **A little better:** Make sure vowels, vowel-like consonants (like Y), common punctuation, and least-used consonants are on the left side of the keyboard.

- **Even better:** Try to get most-used letters on the home row. Next best is the upper row or the middle of the lower row. Least good is the outer ends of the lower row.

Design Dvorak Philosophy Layouts (continued)

- **Getting there:** Study the language and list the most common digraphs (two-letter combinations) and trigraphs (three-letter combinations). Make sure these are easy to type. Avoid same-hand digraphs that jump between the bottom and top rows. Try to avoid immediately-adjacent digraphs on the same hand. When same-hand digraphs are necessary, try to favor combinations that roll from the outer fingers towards the middle of the keyboard.

- **The real thing:** Get a copy of Dvorak's *Typewriting Behavior* and really study it. Don't just go by a half-baked list of tips written by some jerk who skimmed the book in a hurry two years ago. Get a grant and a gaggle of grad students and submit the resulting thesis to your national standards organization.

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