

# Typing isn't all fingers, it's thumbs

Per Ola Kristensson on how KALQ could soon be replacing QWERTY

The QWERTY keyboard we have installed on our laptops, phones and tablets was designed more than 140 years ago. It was invented to solve a common problem: the tendency of the keys on mechanical typewriters to jam.

A typewriter in the 1860s worked like a piano: when a key was pressed, a hammer fell down and made an imprint on the paper. If nearby keys were hit in close succession, there was a risk the hammers got stuck. The QWERTY layout minimized this risk by distributing frequent letter-key pairs to the left and right hand side of the typewriter.

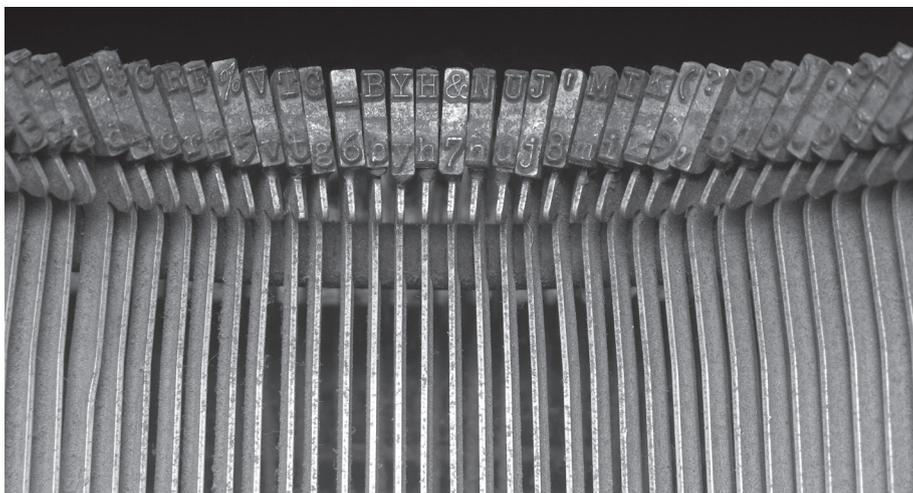
Ten-finger touch typing was invented years after the design of QWERTY. However, by sheer coincident the key distribution turned out to be efficient for ten-finger touch-typing. While QWERTY certainly can be improved, for most users it is not worth the effort to learn another keyboard layout for touch-typing.

Given users' familiarity, a natural solution to the text input problem on mobile phones and tablets was to transplant QWERTY to touchscreen devices. However, while it is reasonably efficient for ten-finger touch-typing on full-sized keyboards, it is not for two-thumb typing on touchscreen tablets and large mobile phones.

To find out how much QWERTY could be improved for thumb typing we set out to design a new keyboard layout. Our new keyboard layout, KALQ, used three different strategies to improve thumb typing.

The first strategy was to change the grip. We empirically investigated six different possible grips and identified the most ergonomic and efficient suitable for thumb typing. The anatomical constraints of the thumb when using this particular grip was then factored in when designing the overall shape of the layout.

The second strategy was to design around the use of both thumbs. When one thumb is selecting a key the second



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*The QWERTY keyboard was designed to prevent a typewriter's hammers jamming*

thumb should not be idle. Instead, it should already be making its way to the next key. Although QWERTY attempts to distribute frequent letter key pairs to the left and right hand side of the keyboard, there is a difference between intent and outcome. Several common words in English such as 'on', 'see' and 'you' have to be typed with a single thumb on QWERTY. In KALQ, we have ensured the division of work between the thumbs is almost equal.

The third strategy was to reduce the distance thumbs needed to travel. Each thumb should only need to move a minimal amount. We used optimization algorithms to search for a keyboard layout that simultaneously minimized thumb-travel distance and maximized alternation of the thumbs.

As a test, we had participants typing with both a QWERTY and a KALQ

layout. After eight hours of practice the participants typed faster using KALQ and by the end of the experiment, they typed on average 34 per cent faster using KALQ.

Will KALQ then succeed in becoming the keyboard layout of choice for thumb typing? It is certainly true that several previous attempts to replace QWERTY have failed. The reasons behind QWERTY's ability to prevail have been hotly debated among economists and psychologists throughout the years.

However, two factors might improve the odds for KALQ. First, in contrast to physical keyboards, touchscreens allow users to switch to a new keyboard layout without any cost. Second, app stores enable users to download an app that replaces their existing qwerty layout with KALQ.

For those reasons, it might finally be possible to overcome what some researchers have called 'the curse of the QWERTY'—at least for thumb typing.

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*The official KALQ keyboard app can be downloaded from Google Play*

