Hands-free Text Entry using *Dasher* with an Eyetracker

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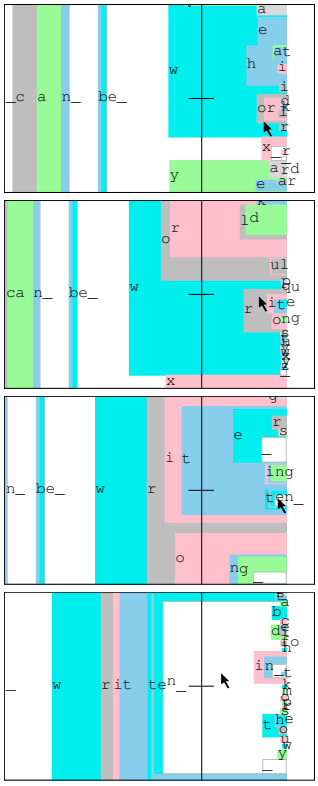
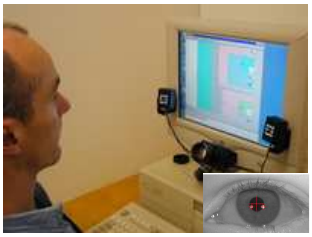
Dasher is a unique data-entry interface driven by continuous two-dimensional gestures, delivered, for example, via a mouse, touch screen, or eyetracker; the user writes by steering through a continuously expanding two-dimensional world containing alternative continuations of the text, arranged alphabetically. Dasher uses a language model to predict which letters might come next and makes those letters easier to write. The language model can be trained on example documents, and adapts to the user's language as he writes.



◁ Screenshots while the user writes '`any sentence can be written`'. The mouse controls the point that is zoomed towards.



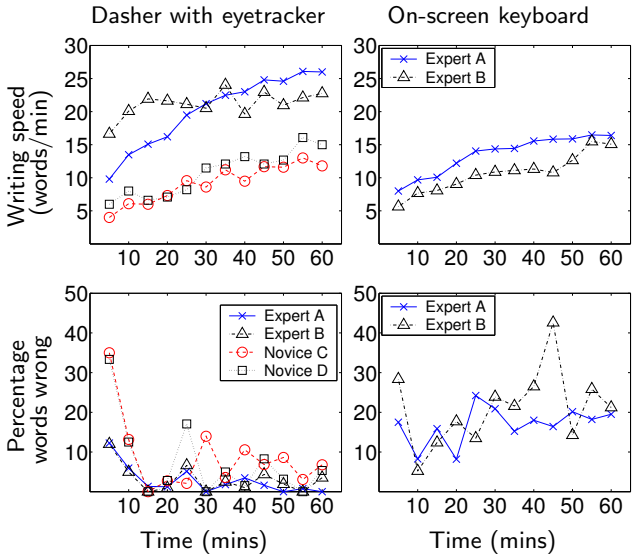
△ The eyetracker, which controls the mouse location. The user simply looks at the desired string.

In previous work (Ward *et al.*, 2000), we evaluated Dasher with a mouse as the input device and found an expert writing speed of about 34 words per minute. We also demonstrated that users of Dasher made fewer errors than when using a conventional keyboard.

Here we evaluate Dasher with EyeTech's Quick Glance eyetracker as the input. Four users took dictation: two novice users of Dasher and two experts. For comparison, two expert QWERTY users took dictation using the same eyetracker to control the WiViK on-screen keyboard. (We knew no QWERTY novices.) The writing speeds and error rates are shown as a function of practice time in the four graphs.

Dasher users could write at up to 25 words per minute after an hour of practice. On-screen keyboard users could write at only 15 words per minute after the same time. Moreover, the error rate when using the on-screen keyboard was five times that of Dasher.

Users who tried both systems reported that they found the on-screen keyboard more stressful for two reasons.



First, one feels uncertain whether an error has been made in the current word (the word-completion feature only works if no errors have been made); one can spot an error only by looking away from the keyboard. Second, at every character, one has to decide whether to use the word completion or to continue typing; looking in the word-completion area is a gamble since one cannot be sure that the required word will be there; finding the right completion requires a switch to a new mental activity.

In contrast, Dasher users can simultaneously see the last few characters they have written and the most probable options for the next few. And Dasher is a mode-free device: it makes no distinction between word-completion and ordinary writing.

Compared to an eyetracker and on-screen keyboard, Dasher is faster, more accurate, and more fun.

References

Ward, D. J., Blackwell, A. F., and MacKay, D. J. C. (2000) Dasher - A data entry interface using continuous gestures and language models. In *Proceedings of UIST 2000*, pp. 129–137.