

# Joystick Text Entry with Date Stamp, Selection Keyboard, and EdgeWrite

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## Date Stamp



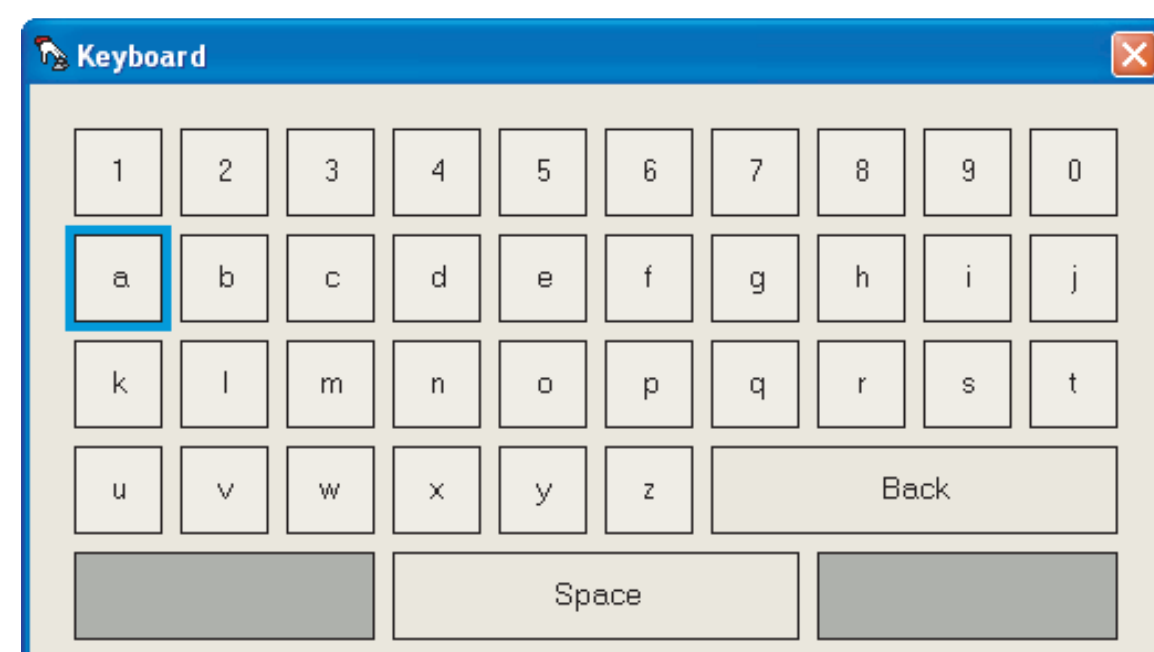
Date Stamp is often used on high-score screens of arcade games. Sequence used in study: [space] [a..z] [0..9] (repeat)

Joystick Movement	Action
Up or Down	Cycles the current character forward (a→z) or backward (z→a).
Right	Commits the current character and initializes a new one with "a"
Left	Deletes the character to the left and initializes the stamp with that character

## Selection Keyboard



Selection Keyboard is an on-screen keyboard with which a user moves a selector up, down, left, or right and presses a joystick button to enter the selected letter.

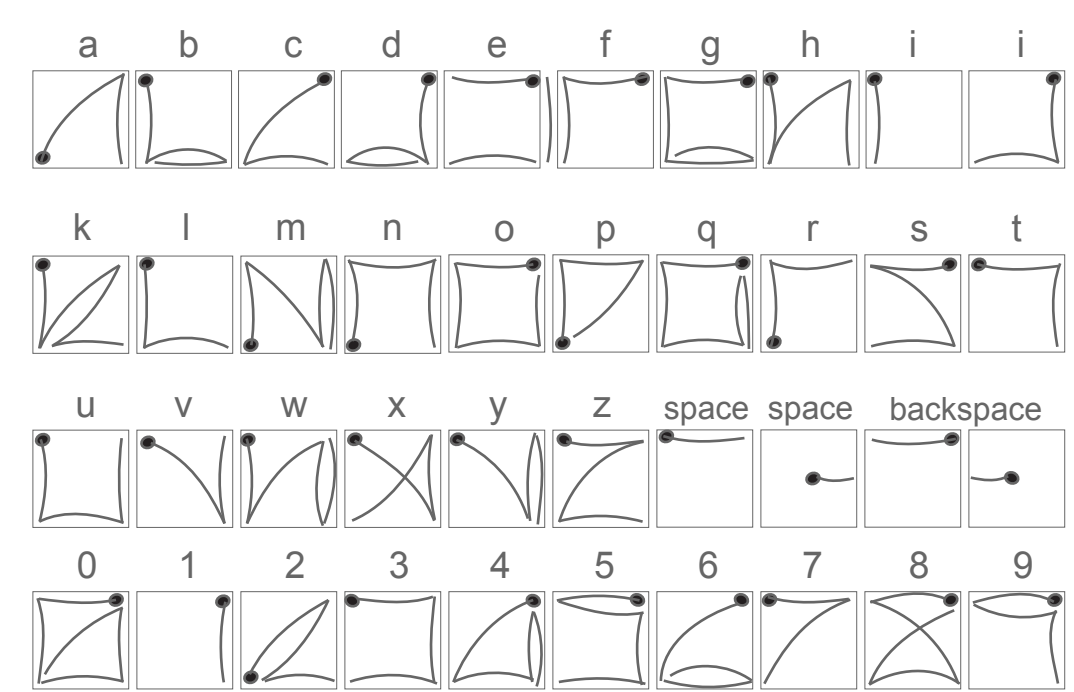


Our selection keyboard was based on three selection keyboards from Microsoft's Xbox. In this figure, the selector is positioned over the letter "a."

## EdgeWrite

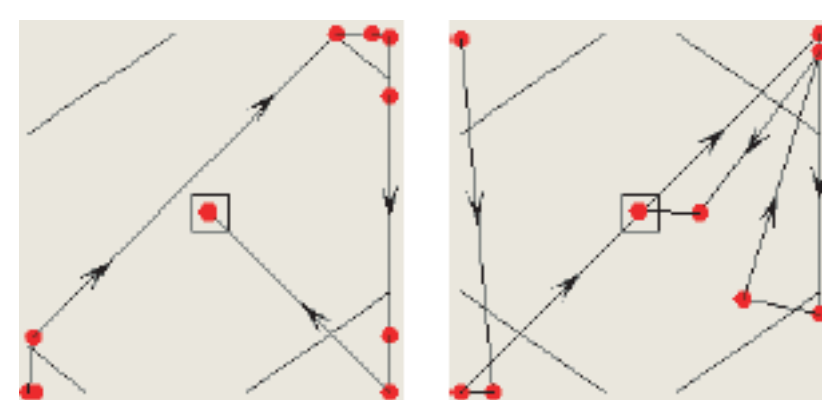


EdgeWrite was invented to help people with motor impairments to enter text with a stylus on a PDA. Recognition depends on the order in which the corners of the square are hit.



The EdgeWrite alphabet used for joystick text entry. Alternate forms exist for most characters (not shown). The bowing of line segments is only illustrative and does not depict actual movement, which is in straight lines.

A clean trace of "a" (left) and a sloppy but recognized trace of "w" (right). The "a" starts in the bottom-left; the "w" starts in the top-left.



Our study compares three joystick text entry methods. Compared to two prevalent selection-based methods, Date Stamp and Selection Keyboard, the gestural method EdgeWrite leaves fewer errors in less time.

## EXPERIMENT

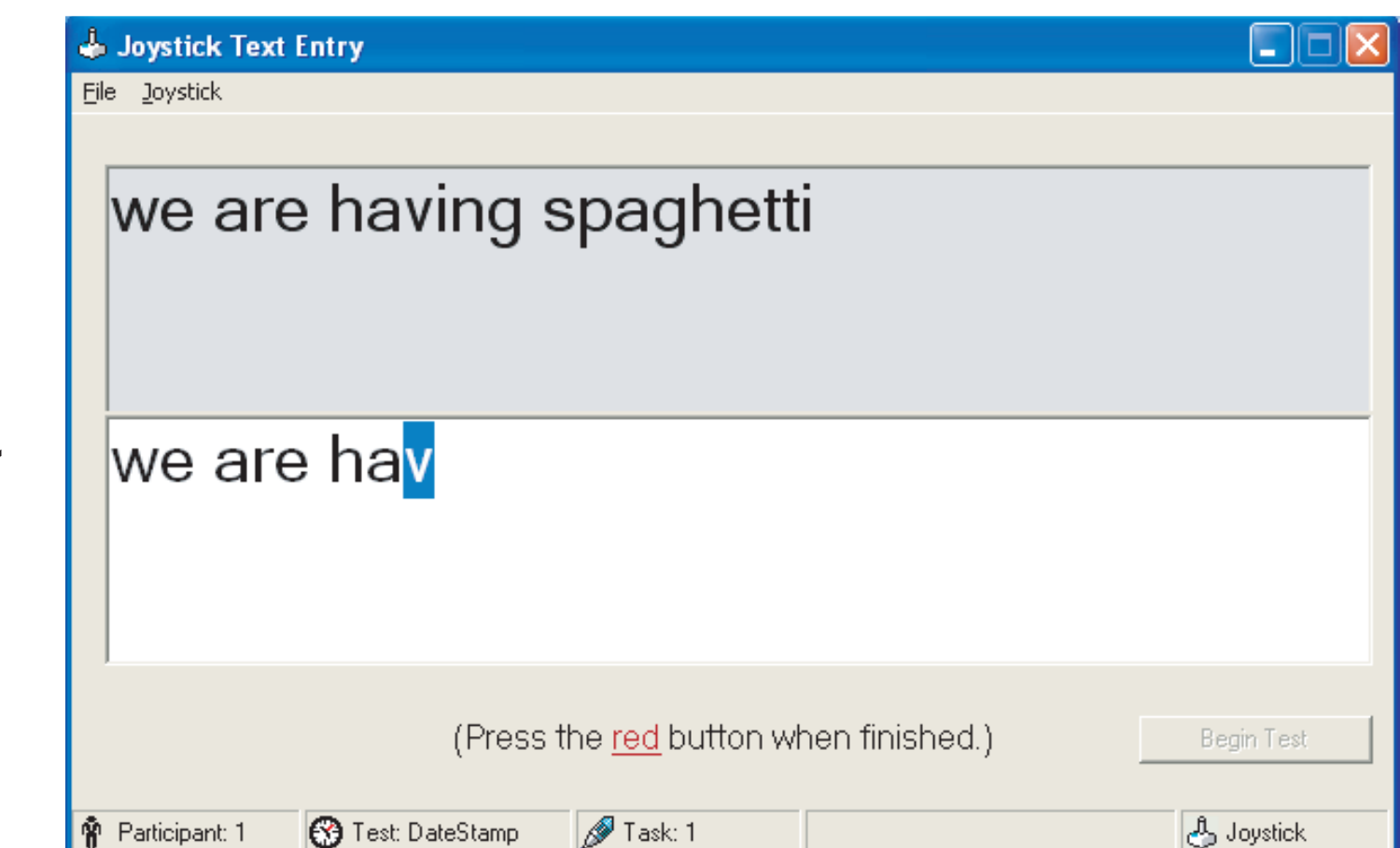
For details, see: Wobbrock, J.O., Myers, B.A., and Aung, H.H. "Writing with a Joystick: A Comparison of Date Stamp, Selection Keyboard, and EdgeWrite." Proceedings of Graphics Interface (GI '04). Canadian Human-Computer Communications Society. London, Ontario, May 2004, 1-8.

	Type of method	No screen real estate required	Can use without looking	Immediate Usability
Date Stamp	Selection	✗	✗	✓
Selection Keyboard	Selection	✗	✗	✓
EdgeWrite	Gestural	✓	✓	✗

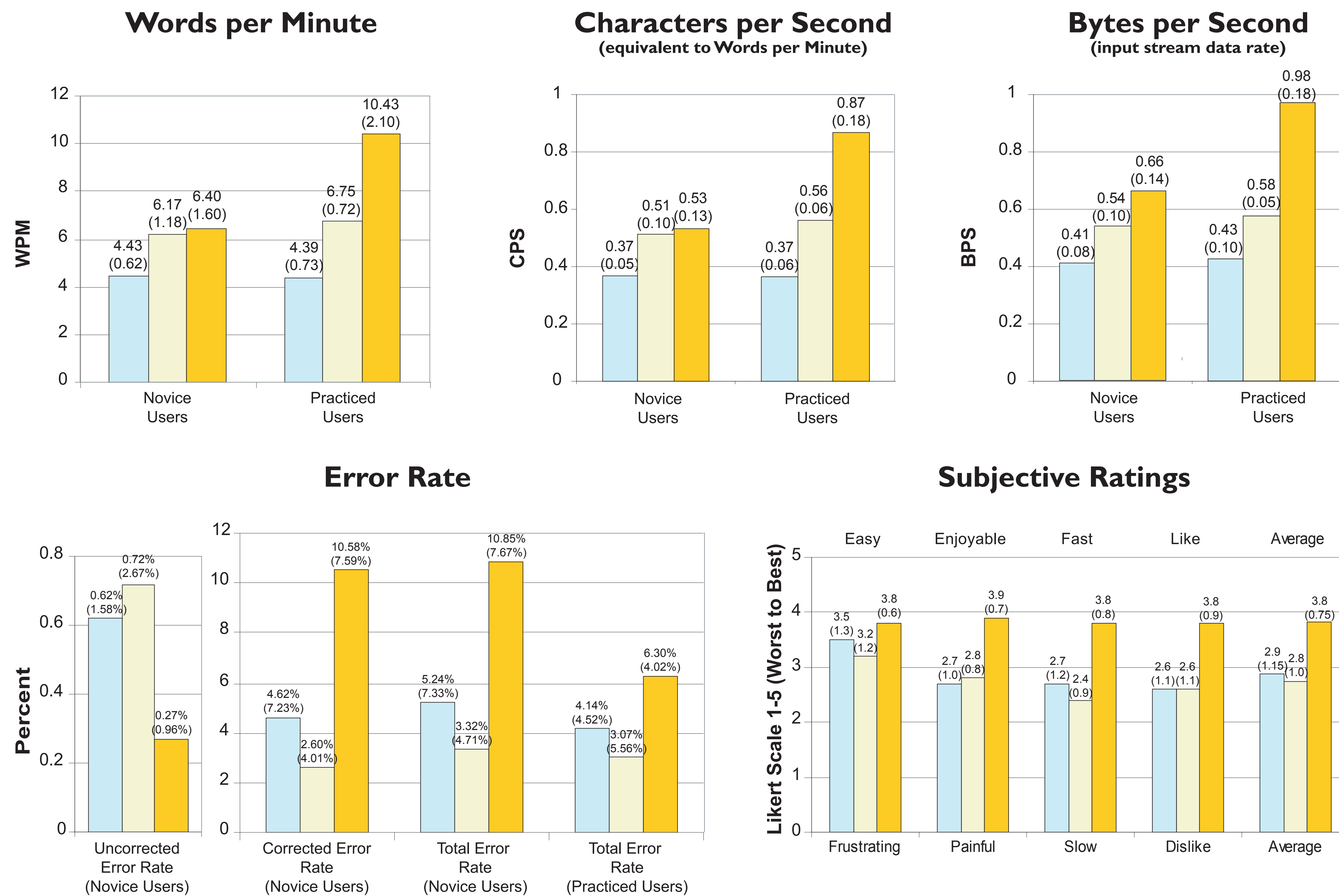


The Saitek P2500 Rumble Force Pad.

The text entry suite. The target phrase is shown at the top and the user's input is shown below it.



## RESULTS



Legend: Mean (StdDev)    Date Stamp    Selection Keyboard    EdgeWrite

## CONCLUSIONS

After 15 minutes of practice, novices produced significantly more accurate phrases with EdgeWrite than with the other methods ( $p < .05$ ), and did so in less time ( $p < .05$ ).

Novices thought EdgeWrite was fastest and Selection Keyboard was slowest, even though Date Stamp was slowest. Subjects also felt Selection Keyboard was the most frustrating, and liked EdgeWrite best overall ( $p < .05$ ).

Novices are able to learn EdgeWrite with 15 minutes of practice, after which they are able to enter text faster ( $p < .05$ ) and with more accurate results ( $p < .05$ ) than by using Date Stamp or Selection Keyboard.

The speeds of practiced users also point to EdgeWrite's potential. The fastest practiced user wrote at 12.61 WPM, which was comparable to some stylus Graffiti speeds.

The EdgeWrite input technique is well-suited to meet the challenges of joystick text entry because of its:

- Fitts' Law benefits
- Physical stability
- Mnemonic characters