EdgeWrite: A Versatile Design for Accessible Text Entry

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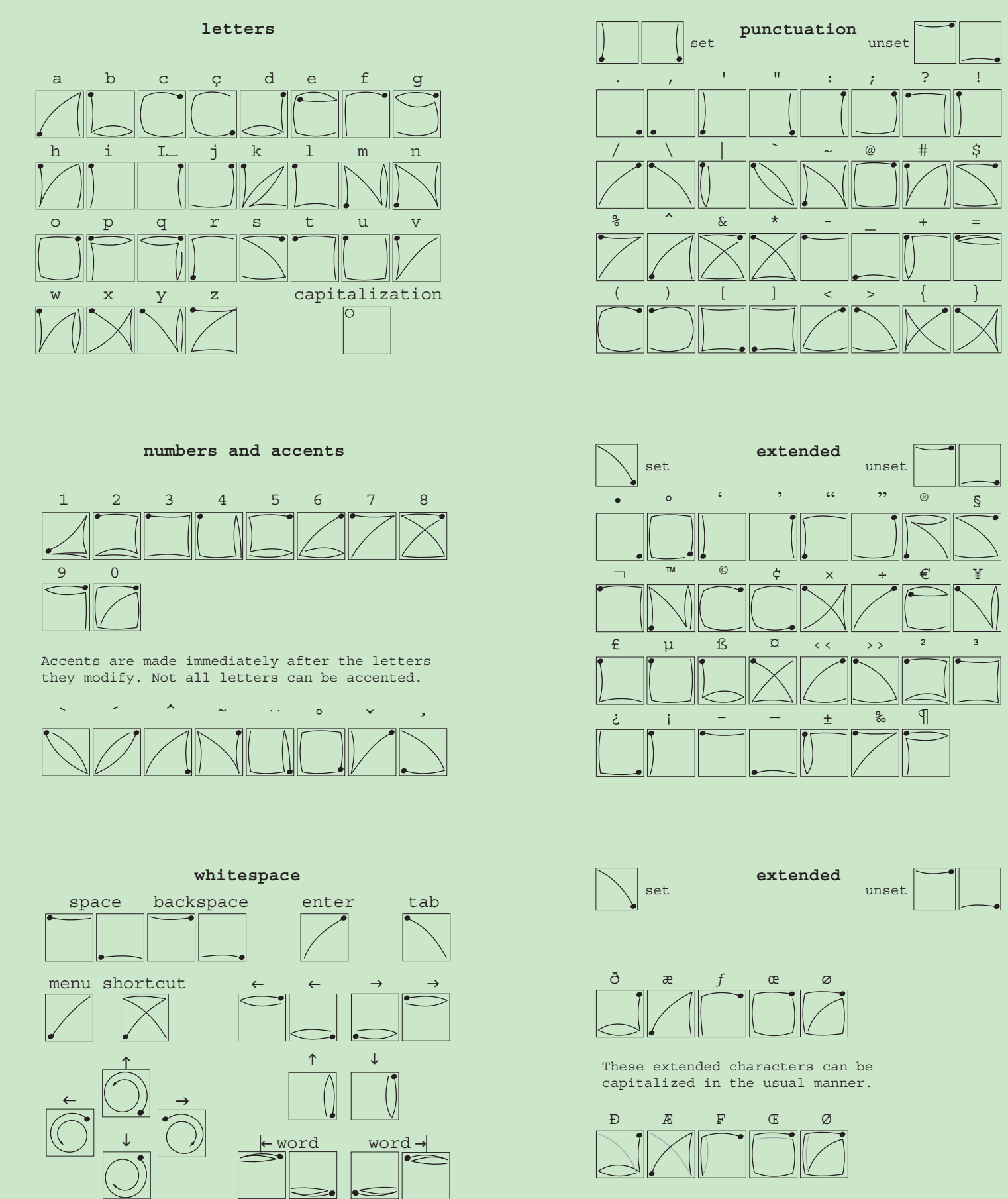
Overview

EdgeWrite is a versatile design for accessible text entry. It provides stability to users with motor impairments or under situational impairments caused by using mobile devices "on the go." EdgeWrite methods are gestural and can be done by feel. EdgeWrite characters mimic Roman letters, improving guessability and learnability. EdgeWrite is available on various devices for both handheld and desktop text entry.

Thesis

A versatile design for accessible text entry based on movement along edges and into corners can outperform predominant text entry methods on a variety of desktop and handheld computing devices when subject to motor or situational impairments.

Alphabet

All EdgeWrite versions use the same alphabet. Characters are defined by the order in which they hit corners within the EdgeWrite square.

EdgeWrite Alphabet, version 2.1.5 (C) 2005 Human-Computer Interaction Institute, Carnegie Mellon University

EdgeWrite with a PDA Stylus

Makes PDA text entry more accessible to people with motor impairments.

Characters are made by moving the stylus along the edges and into the corners of the EdgeWrite square. This provides stability to people with tremor or experiencing vibration.

Graffiti "d", misrecognized   EdgeWrite "d", recognized
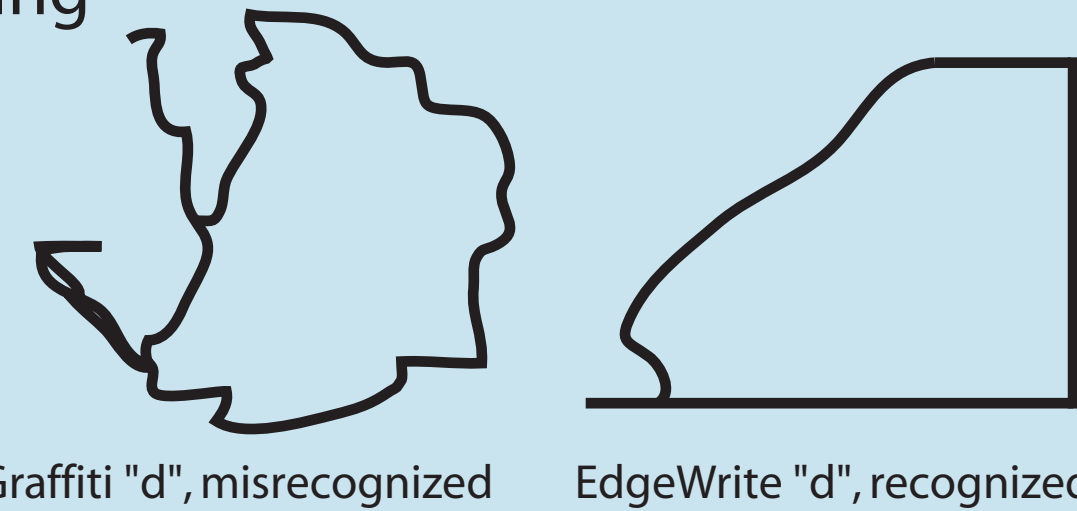
Results

Able-bodied novices were 18% more accurate than Graffiti after 15 minutes of practice (1.21 vs. 1.43 kspc, p<.05). There was no significant difference in speed (6.6 vs. 7.2 wpm, n.s.).
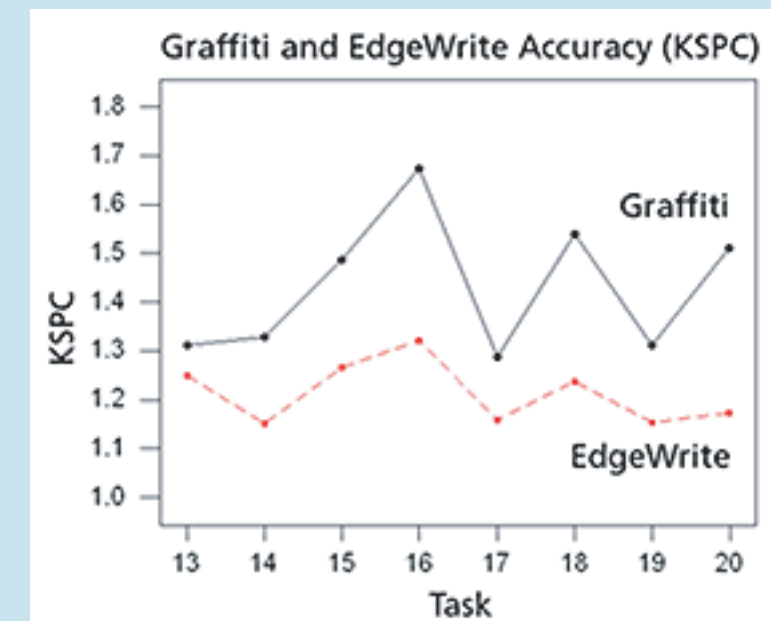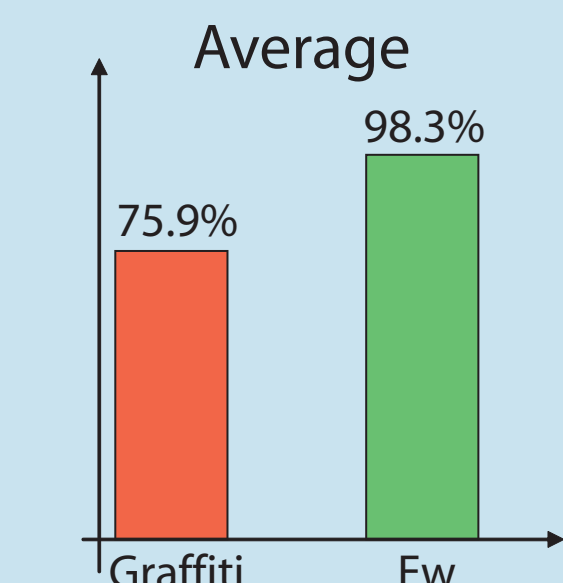
*Lower kspc is better (i.e. more accurate).

Users with motor impairments were 200-400% more accurate with EdgeWrite than with Graffiti in writing "a-z" and "0-9" 2 times for a total of 72 characters per user.

Example (Cerebral Palsy): "The dog is going fast"
Graffiti: "The g i gbsiangu% fast" (8 errors)
EdgeWrite: "The dog is going fast" (0 errors)

Parkinson's   MD
94.4% Ew   98.7% Ew
30.6% Graffiti 33.0% Graffiti

Spastic CP   CP
100.0% Ew   100.0% Ew
84.0% Graffiti 96.0% Graffiti
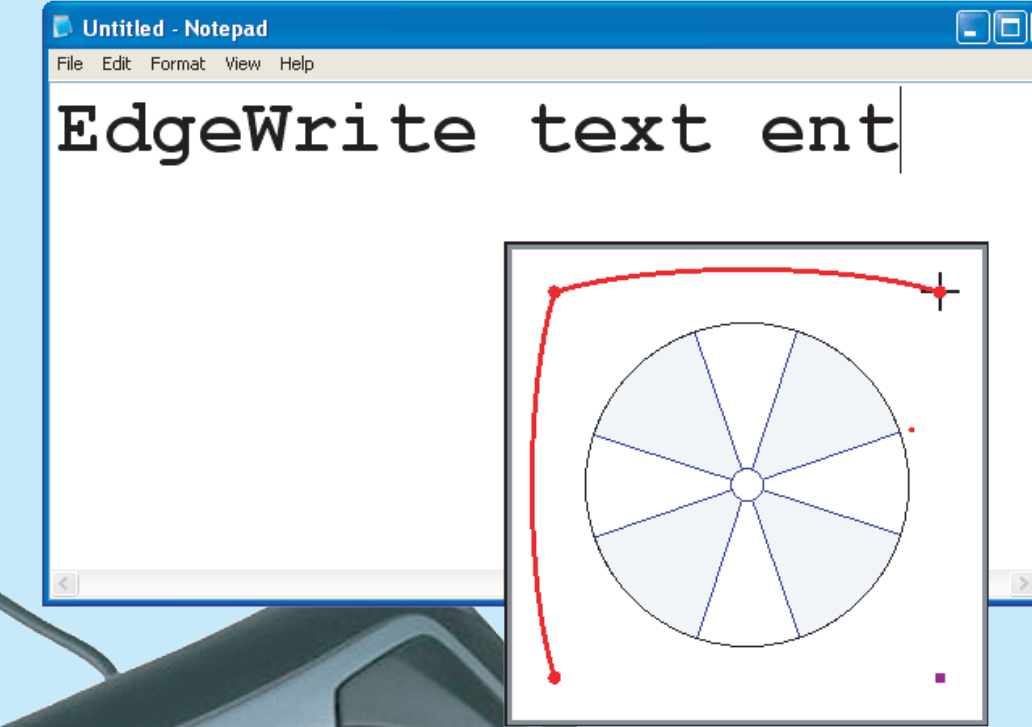
Average
75.9% Graffiti   98.3% Ew

EdgeWrite with a Desktop Trackball

Provides a gestural alternative for trackball users resigned to on-screen keyboards.

Trackball EdgeWrite is less visually intense and less tedious than an on-screen keyboard.

Instead of physical edges, Trackball Edge-Write relies on "pulsing" the ball at angles which indicate desired corners. This is a crossing task.
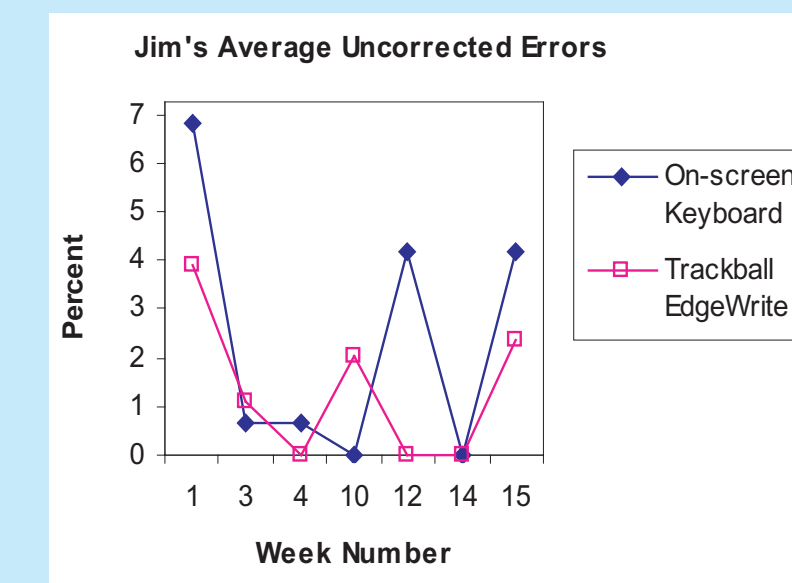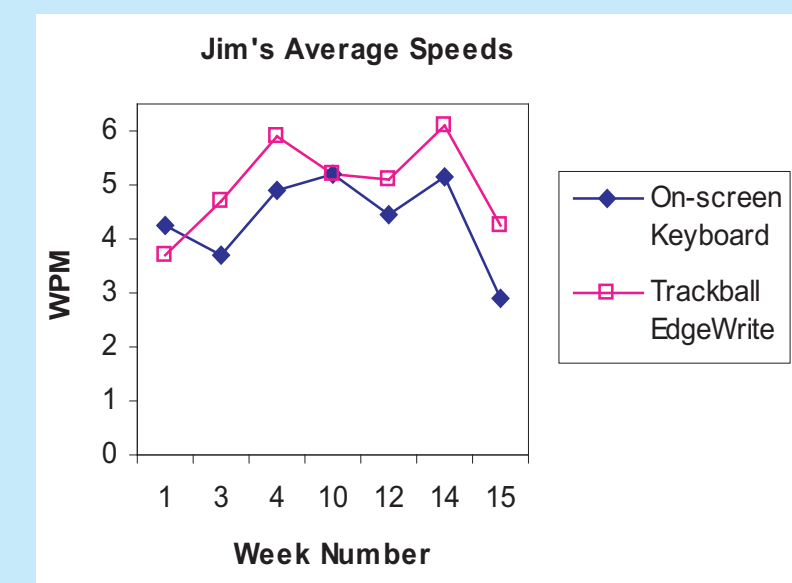
Results

Able-bodied users wrote at ~10 wpm and ~4% total errors after 45 minutes of practice. They were not trackball users.
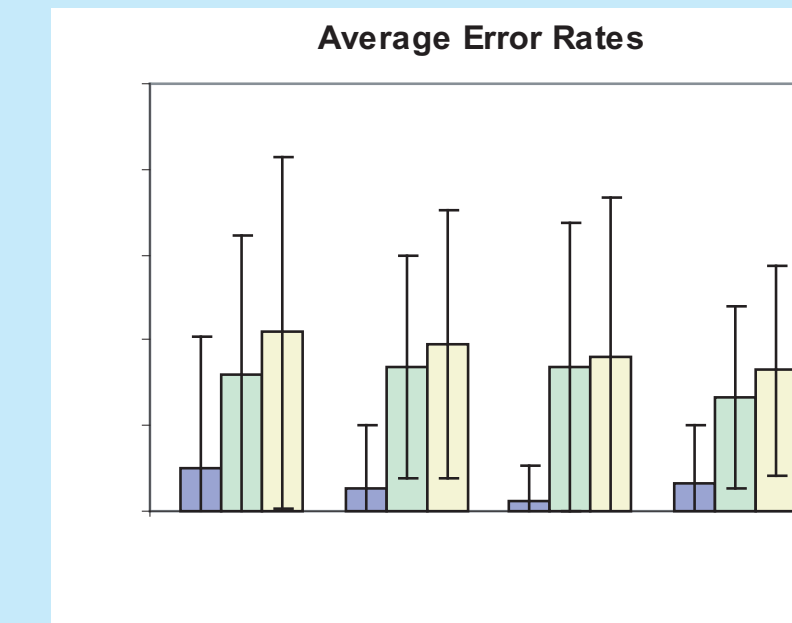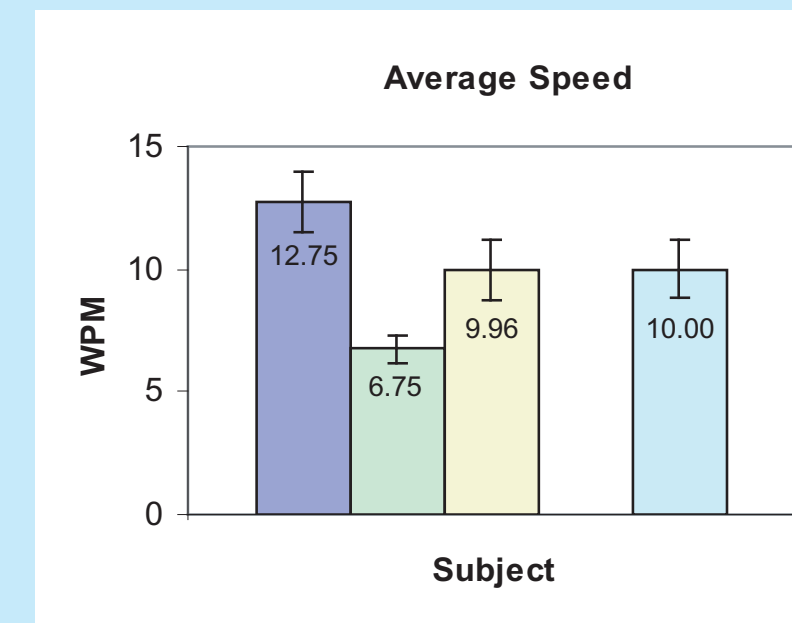
Sessions with a 15-year trackball user showed he was faster (5.0 vs. 4.3 wpm, p<.05) and left fewer errors on average (1.35% vs. 2.35%, n.s.) with Trackball EdgeWrite than with his preferred on-screen keyboard. He now uses EdgeWrite.
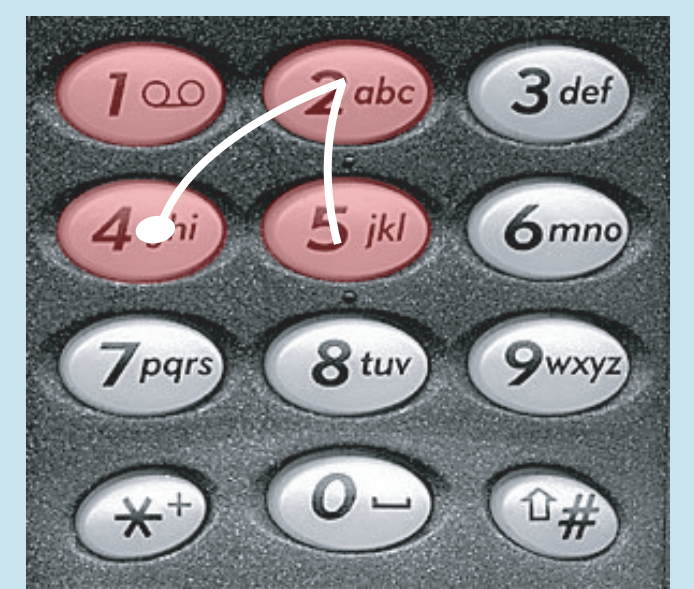
EdgeWrite on a Mobile Phone

Provides a gestural means of mobile phone text entry for able-bodied users "on the go," e.g., while walking. May be less dependent on visual attention than Multitap and/or T9.
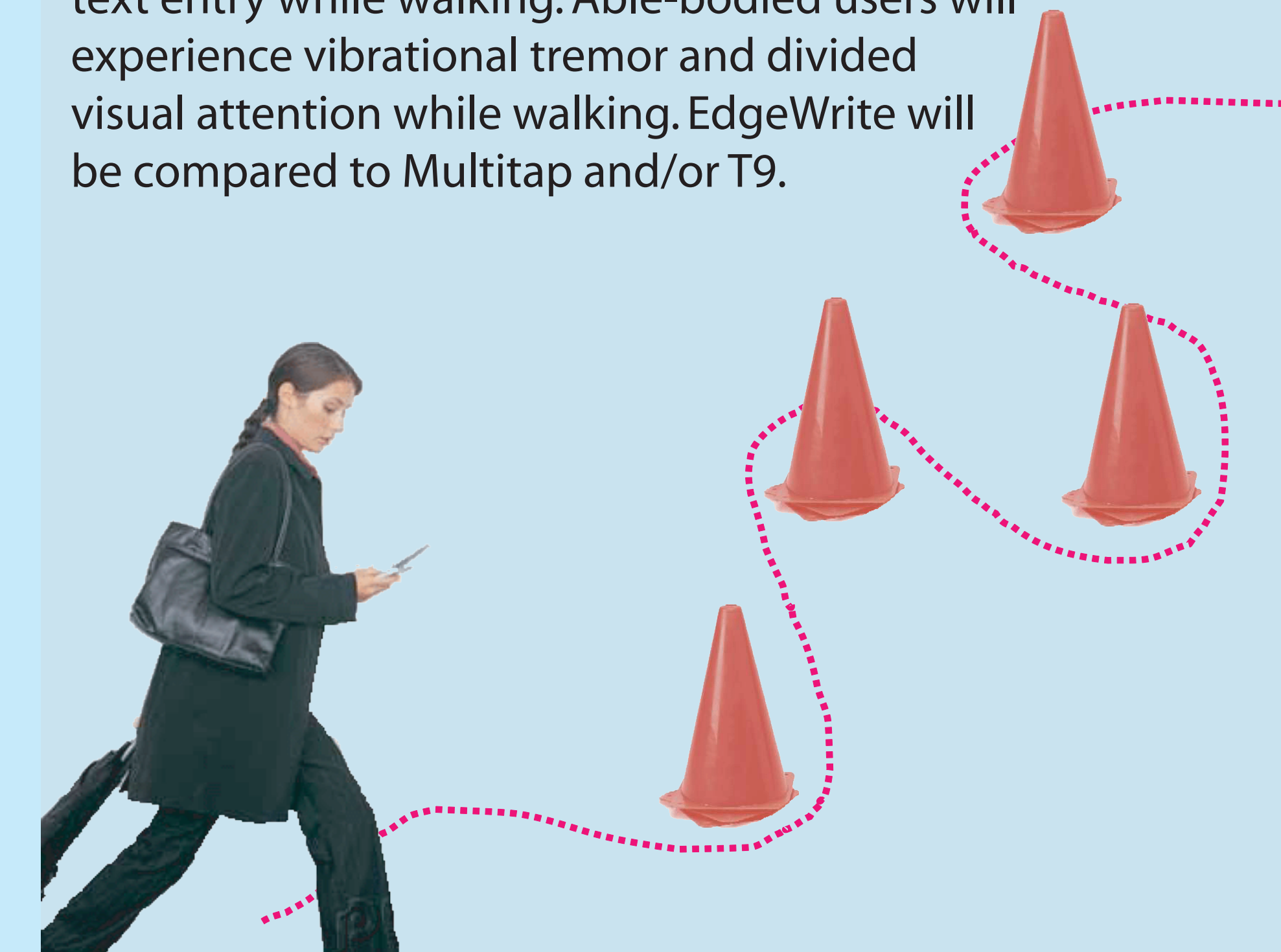
Two mobile phone versions:

Isometric joystick on the front or back of the phone.

Touch-sensitive buttons where the 1, 2, 4 and 5 keys serve as the EdgeWrite corners.

Evaluation

The mobile phone versions will be evaluated in a study of text entry while walking. Able-bodied users will experience vibrational tremor and divided visual attention while walking. EdgeWrite will be compared to Multitap and/or T9.

Other EdgeWrite Versions

Touchpad

StampPad

Four Keys

Wrist Watch

Game Joystick

Power Wheelchair Joystick

	Edges			Size			Position		Sensing	
	Physical	Virtual	None	Tiny	Small	Medium	Absolute	Relative	Continuous	Discrete
Lift	PDA Stylus Touchpad StampPad Wrist watch		Touch buttons?	PDA Stylus	StampPad Wrist watch Touch buttons?	Touchpad	PDA Stylus Touchpad StampPad Wrist watch Touch buttons?		PDA Stylus Touchpad StampPad Wrist watch	Touch buttons?
Snap-to-Center	Thumbstick Wheelchair				Thumbstick	Wheelchair	Thumbstick Wheelchair		Thumbstick Wheelchair	
Adaptive Timeout			Touch buttons Four keys		Touch buttons Four keys		Touch buttons Four keys			Touch buttons Four keys
Movement Ceases		Trackball Isometric joy	Wand?	Isometric joy		Trackball Wand?	Wand?	Trackball Isometric joy	Trackball Isometric joy Wand?	