

Mobile Touchscreen Text Entry

- Difficult to type on touchscreen keyboards.
- Keys usually smaller than finger tips.
- No tactile feedback.
- Error rate higher.
- WPM lower.



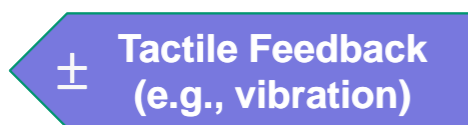
Apple iPhone

HTC Nexus One

Samsung Instinct

New Techniques

- 1) Delay-based,
- 2) Pressure-based.



The Idea

- List of less probable characters.
- Make these harder to input:
 - 1) Add time-out or delay.
 - 2) Make them harder to press.

Less Probable Characters

- Use digram frequencies:

$$\rho(C_n | C_{n-1}) = \frac{\rho(C_{n-1}, C_n)}{\rho(C_{n-1})}$$

C_n = n -th character.

ρ = probability of C_n 's appearance after C_{n-1} .

- Dictionary, grammar rules, ... can be used.

Pressure Sensing Workaround

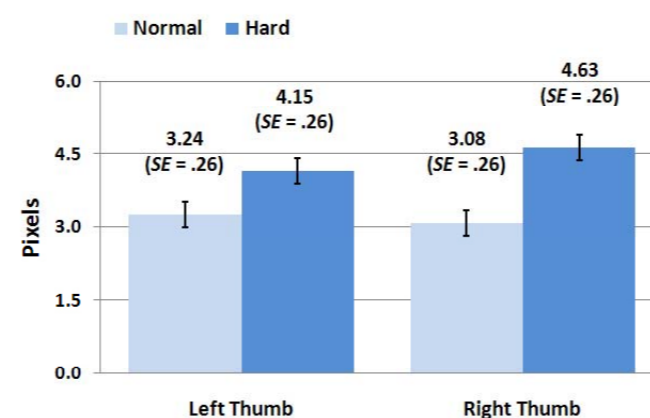
- Current touchscreen phones can't measure pressure.
- Touch centre moves with contact force.



Can we use this to detect pressure?

Pilot Study & Result

- Within-subjects:
3 Participants × 2 Sessions (*normal* & *hard* presses) × 2 Blocks (*left* & *right* thumb) × 26 Keys = 312 Presses.



- No significant effect of thumb orientation.
- Significant effect of pressure on centre movement.

Experiment

- Within-subjects, 6 × 6 balanced Latin square:
12 Participants
× 6 Sessions:
Tactile feedback **No** Regular, Delay, Pressure.
Tactile feedback **Yes** Regular, Delay, Pressure.
× 20 Phrases = 1440 Phrases.

Summary

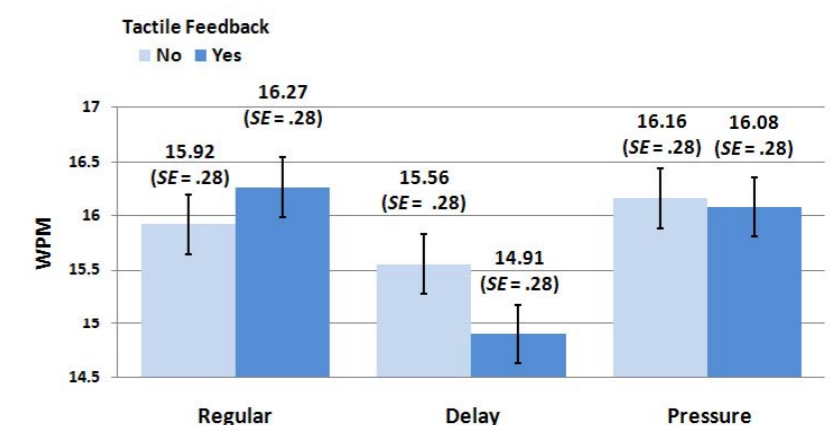
- New techniques improve performance.
- Regular with tactile & Pressure **faster**, Delay the **most accurate**.
- Adding tactile feedback **reduces** errors.

- Q New techniques better?
- Q Does tactile feedback increase performance?



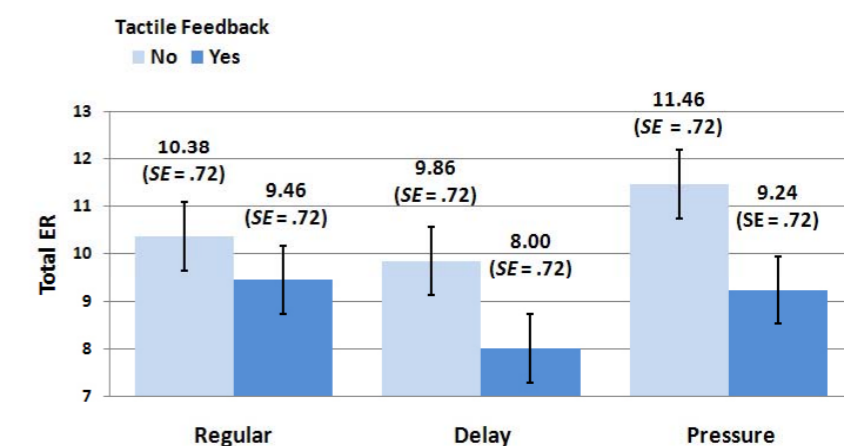
Results

WPM



- Significant effect of entry techniques.
- No significant effect of tactile feedback.

Total ER



- Significant effect of entry techniques.
- Significant effect of tactile feedback.