

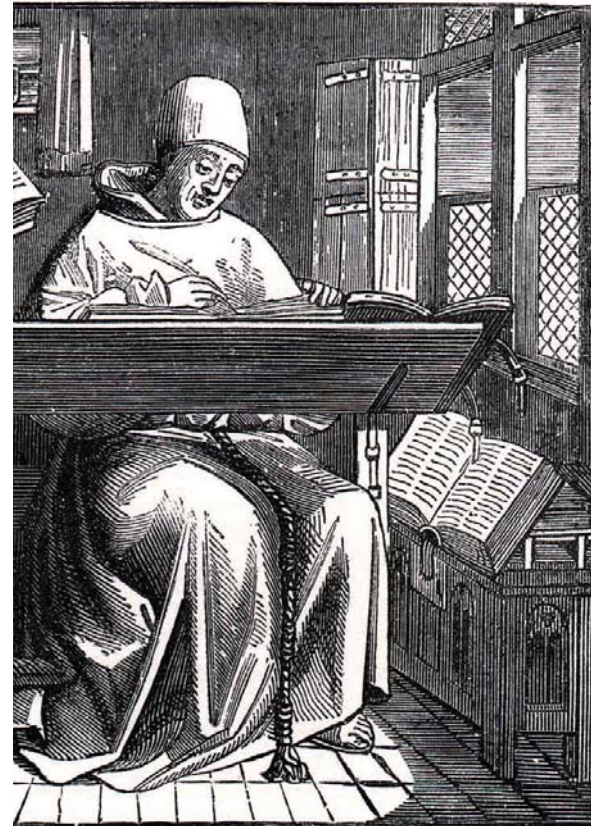


*Solution principles for*  
Next-Generation Text Entry  
Summary

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# Principles of intelligent text entry

1. Letters simplified to line marks
2. Common word stems compressed into simple line marks or dots
3. Common word stems identified by word frequency analysis of the book of psalms

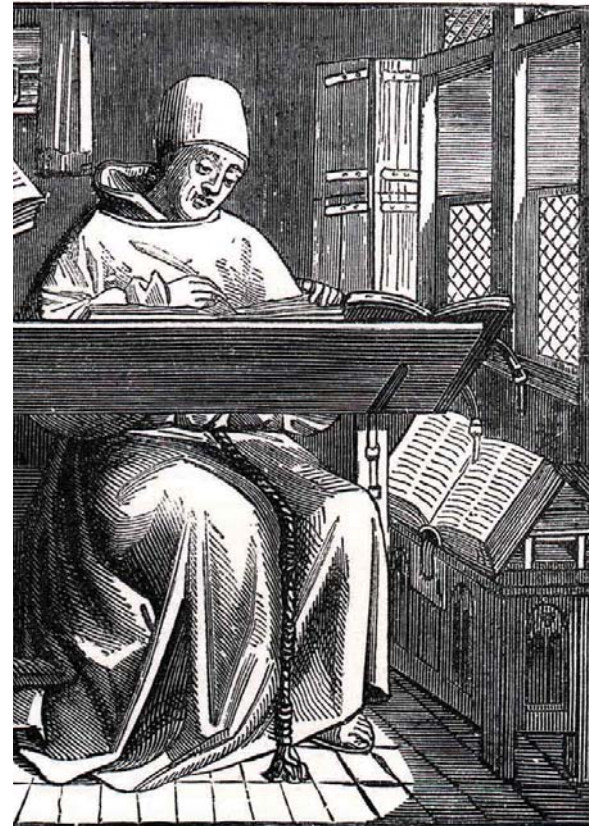


MONK AT WORK. (From *Lacroix*.)

Kristensson, P.O. 2009. Five challenges for intelligent text entry methods. *AI Magazine* **30**(4): 85-94.

# Principles of intelligent text entry

- In other words:
  1. Optimise speed by minimising the amount of information users have to articulate
  2. Exploit redundancies in natural languages by creating a language model



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# Hey, Professor Touchscreen, keep your fingers off our Qwerty keyboards

There aren't many inventions from the 19th century that remain in daily use across the world.

con-  
fus-  
per-  
me-  
so-  
us-  
Qw-

Ever since it was first produced in 1873, we have stuck with it. First on clunky, mechanical typewriters with their pleasing chika-chip-cha-chip-DING-ziiiiiiip, then with electronic word processors and computers. Even now, touchscreen smartphones and iPads all



composer), developed in the Thirties. Crucially, this version allows your fingers

s and  
hand  
a  
oes  
The  
on  
n  
speed

Why do nearly all text entry methods fail?



The typewriter keyboard was designed to stop keys jamming

their funky new KALQ board, which has all the vowels

order. But this meant that the mechanical levers, attached

that would cause snapped fingers with a Qwerty board.

And if it's supersonic typing you are after, you should have seen the old stenographers at work at the Old Bailey, who used strange machines that worked like pianos - they struck chords

ALAMY

# Mainstream mobile text entry methods

Graffiti



Multi-tap and predictive text



Touchscreen keyboards



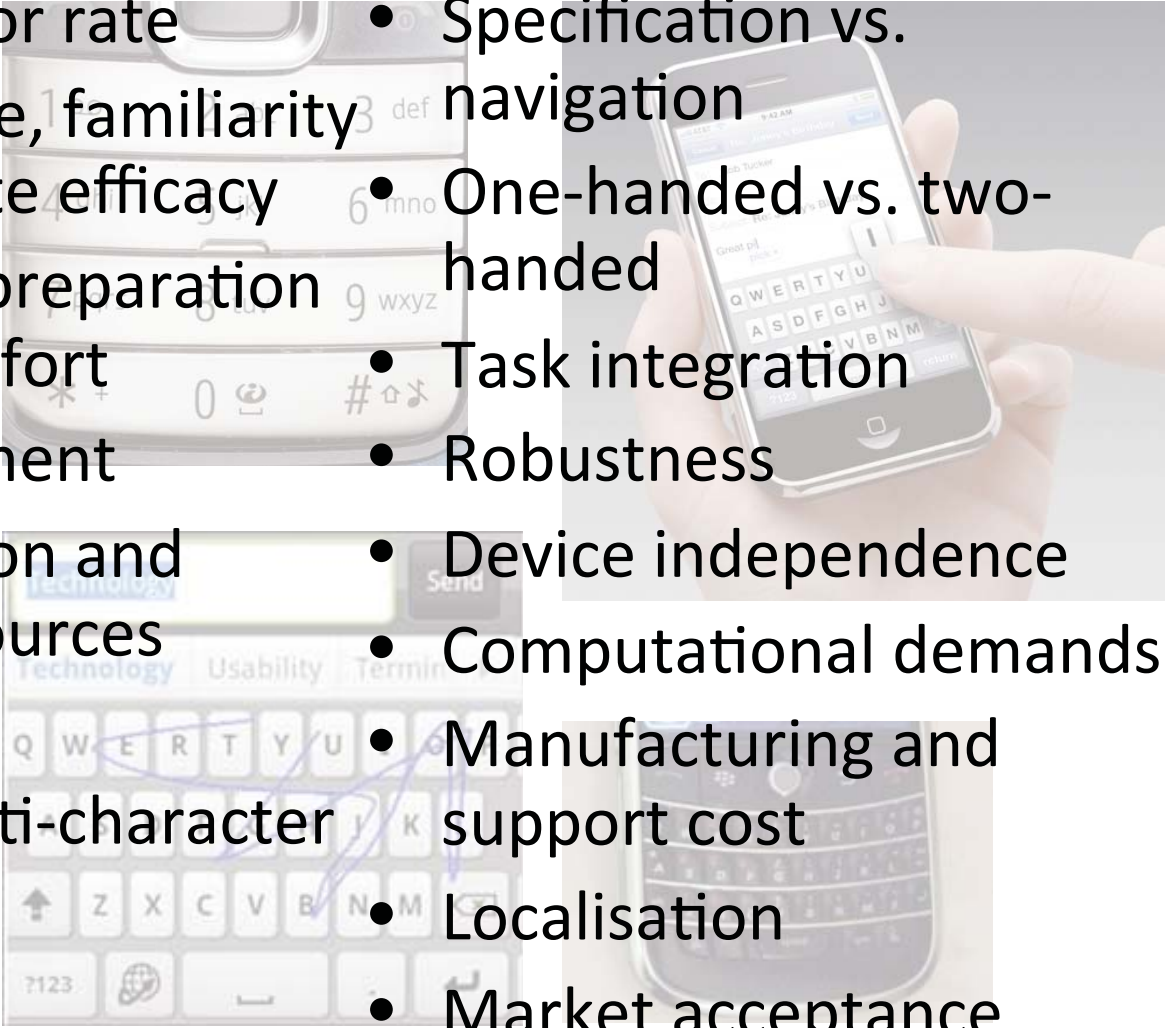
Gesture keyboards



Physical thumb keyboards



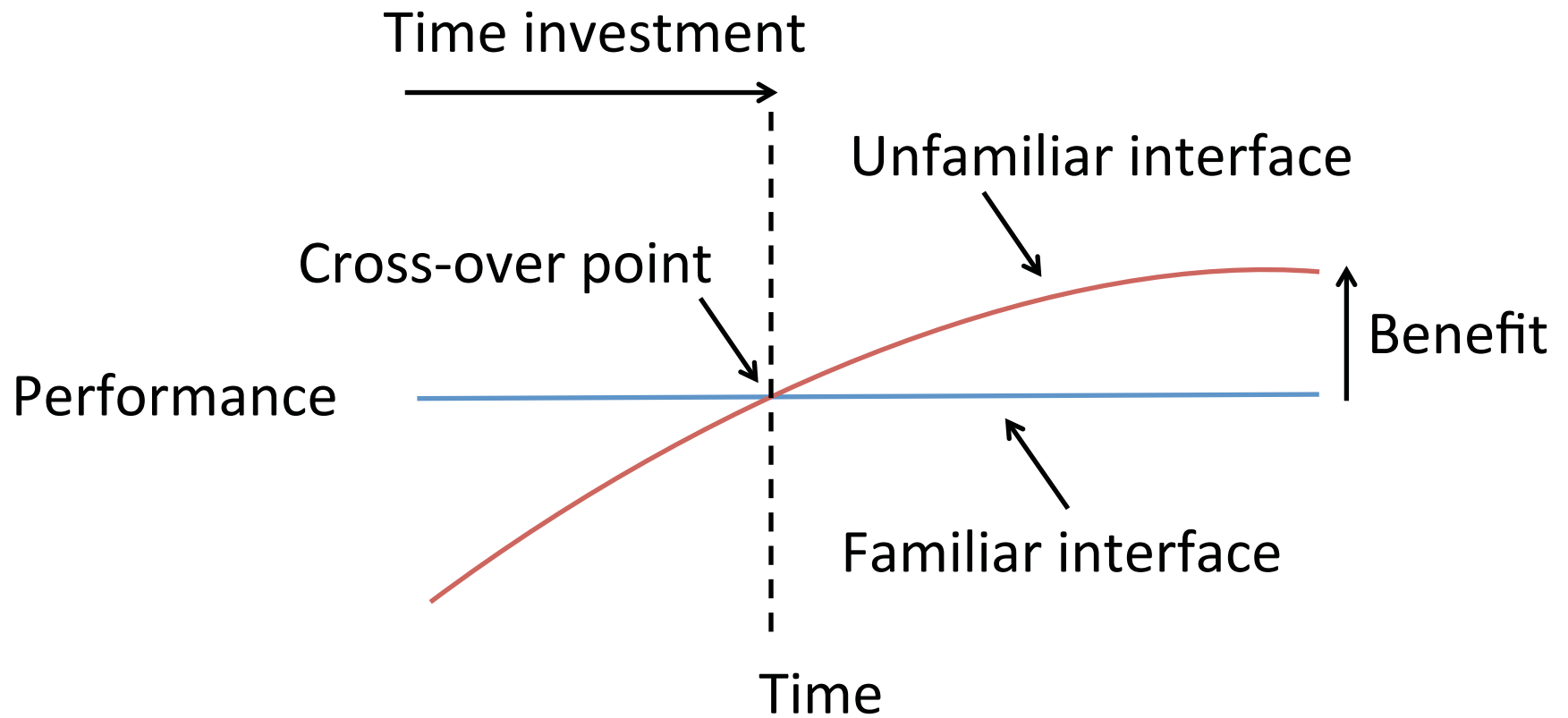
# Mainstream mobile text entry methods

- Entry and error rate
  - Learning curve, familiarity and immediate efficacy
  - Form factor, preparation time and comfort
  - User engagement
  - Visual attention and cognitive resources
  - Privacy
  - Single vs. multi-character entry
  - Specification vs. navigation
  - One-handed vs. two-handed
  - Task integration
  - Robustness
  - Device independence
  - Computational demands
  - Manufacturing and support cost
  - Localisation
  - Market acceptance
- 

# Mainstream mobile text entry methods

- Entry and error rate
  - Learning curve, familiarity and immediate efficacy
  - Specification vs. navigation
  - One handed vs. two
  - Single vs. multi-character entry
  - Support cost
  - Localisation
  - Market acceptance
- **High effective entry rate**
    - Among the fastest of their generation
  - **High familiarity and high immediate efficacy**
    - Either extremely easy-to-learn or very similar to existing technology (or both)

# The cross-over point





# Solution principles

- From closed to open-loop
  - Avoid the need for a visual feedback loop
- Continuous novice-to-expert transition
  - Avoid explicit learning
- Path dependency
  - Avoid redesigning the interaction layer
- Flexibility
  - Enable users to compose and edit in a variety of styles without explicit mode switching
- Efficiency
  - Let users' creativity be the bottle-neck

# Conclusions

- A text entry method likely to be adopted by users is probably similar to existing solutions and at least as fast
- It is still possible to make progress by focussing on supporting few behavioural principles:
  - From closed to open-loop
  - Continuous novice-to-expert transition
  - Path dependency
  - Flexibility
  - Efficiency