

Basic Tasks in HCI

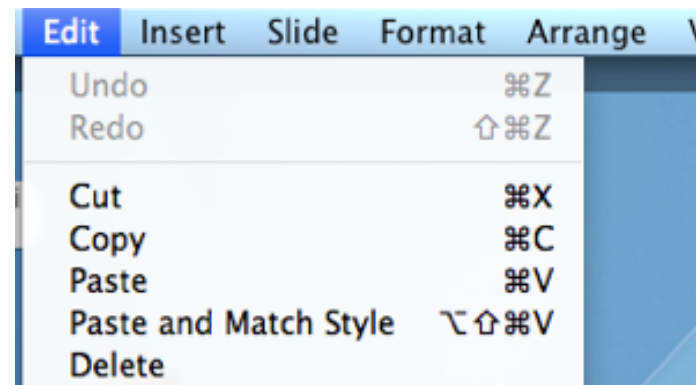
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Pointing



Text entry



commands



iPad 2



iPhone



iPod touch



iPod nano



iPod shuffle



iPod classic



MacBook Air



MacBook Pro



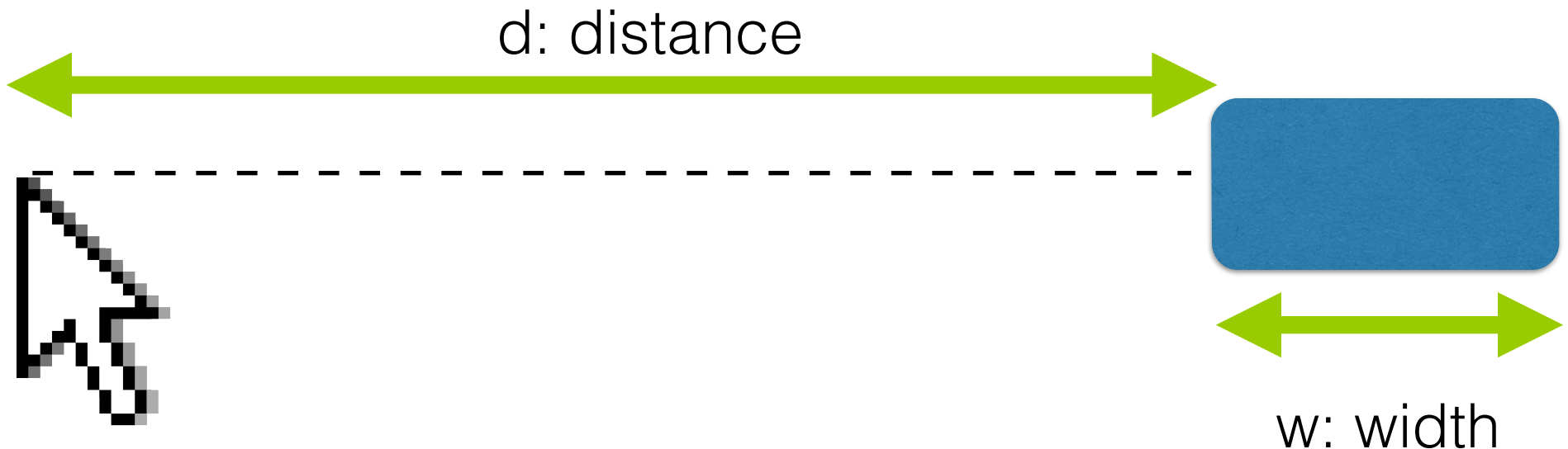
iMac



Pointing

30s Brainstorming

How to predict **selection time**?
Which **variables**? which **formula**?



$$T = a + b \log_2(d/w + 1)$$

Motor System: Fitts' Law

- Directed movement as an information processing task
 - Not limited by muscles, but by ability to process sensory input

- Index of difficulty (ID)

- $ID = \log_2(D / W + 1)$

- $MT = a + b * ID$

- Paul Fitts' original experiments

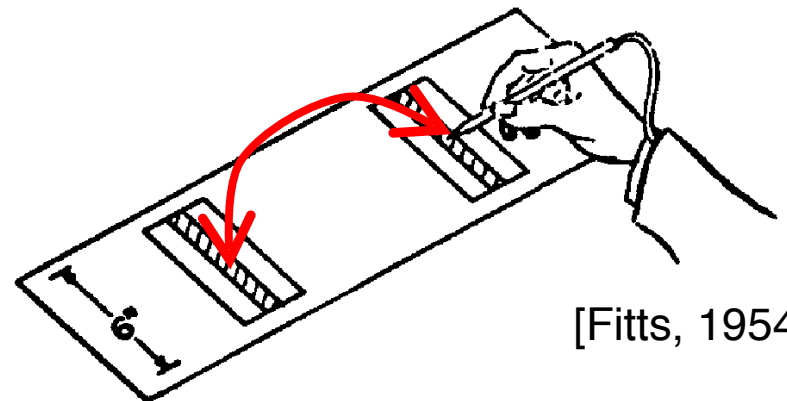
- Tapping, disk, and pin transfer

- Influenced by Shannon's information theory $C = B \log_2((S+N) / N)$

- Robust performance model

- Originally 1-D movements

- Applies to 2-D movements

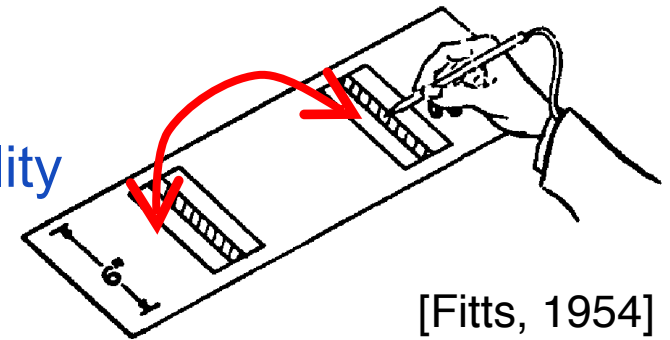


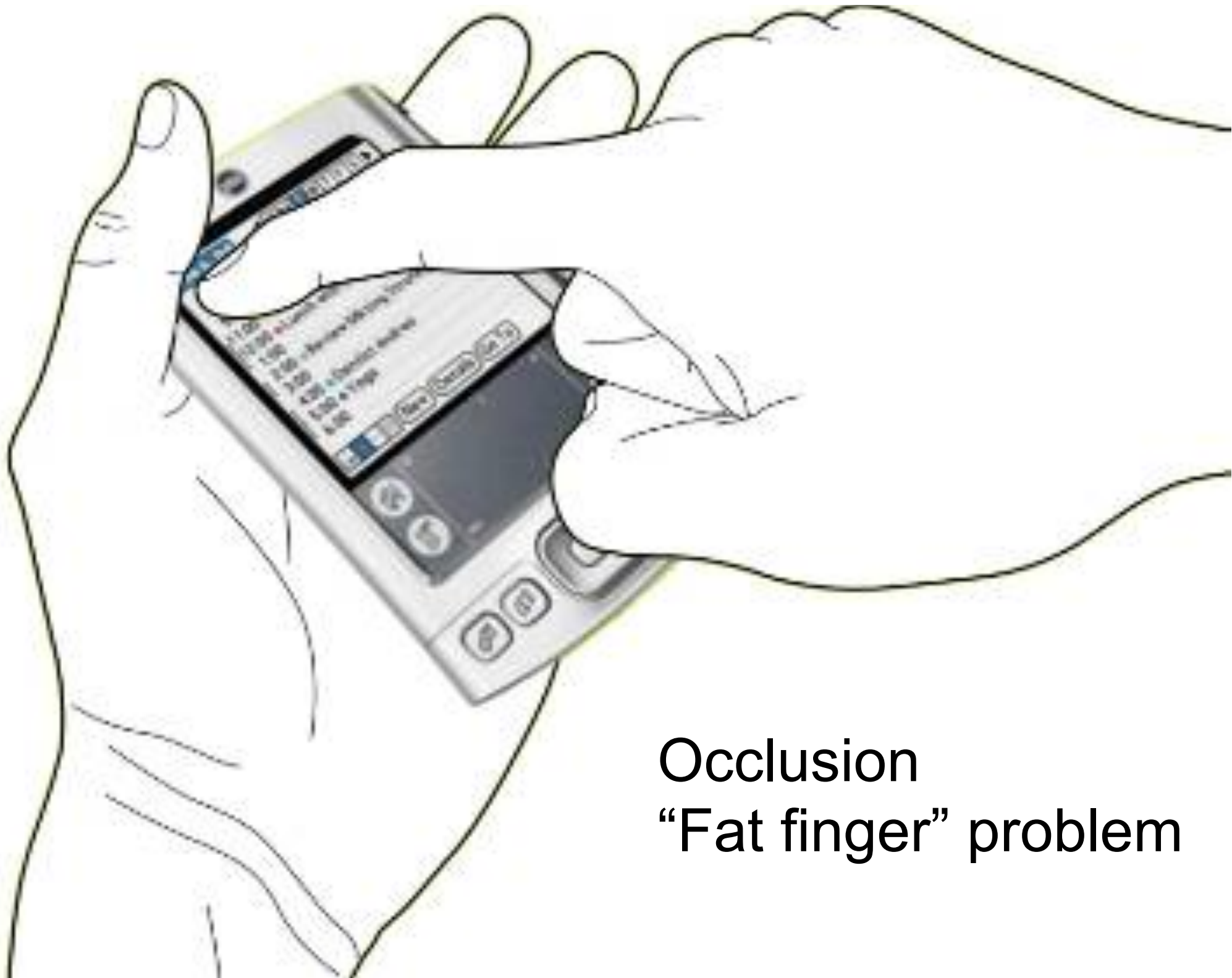
[Fitts, 1954]



Index of Performance or Throughput

- Fitts' thesis
 - Fixed information-transmission capacity of the motor system
- Tradeoff between speed and accuracy
 - cf. handwriting
 - Relates amplitude, movement speed, variability
- Movement generates information
 - ID = information (number of bits) required to specify movement (amplitude within given tolerance)
- Index of performance
 - $IP = ID / MT$ [bits / sec]



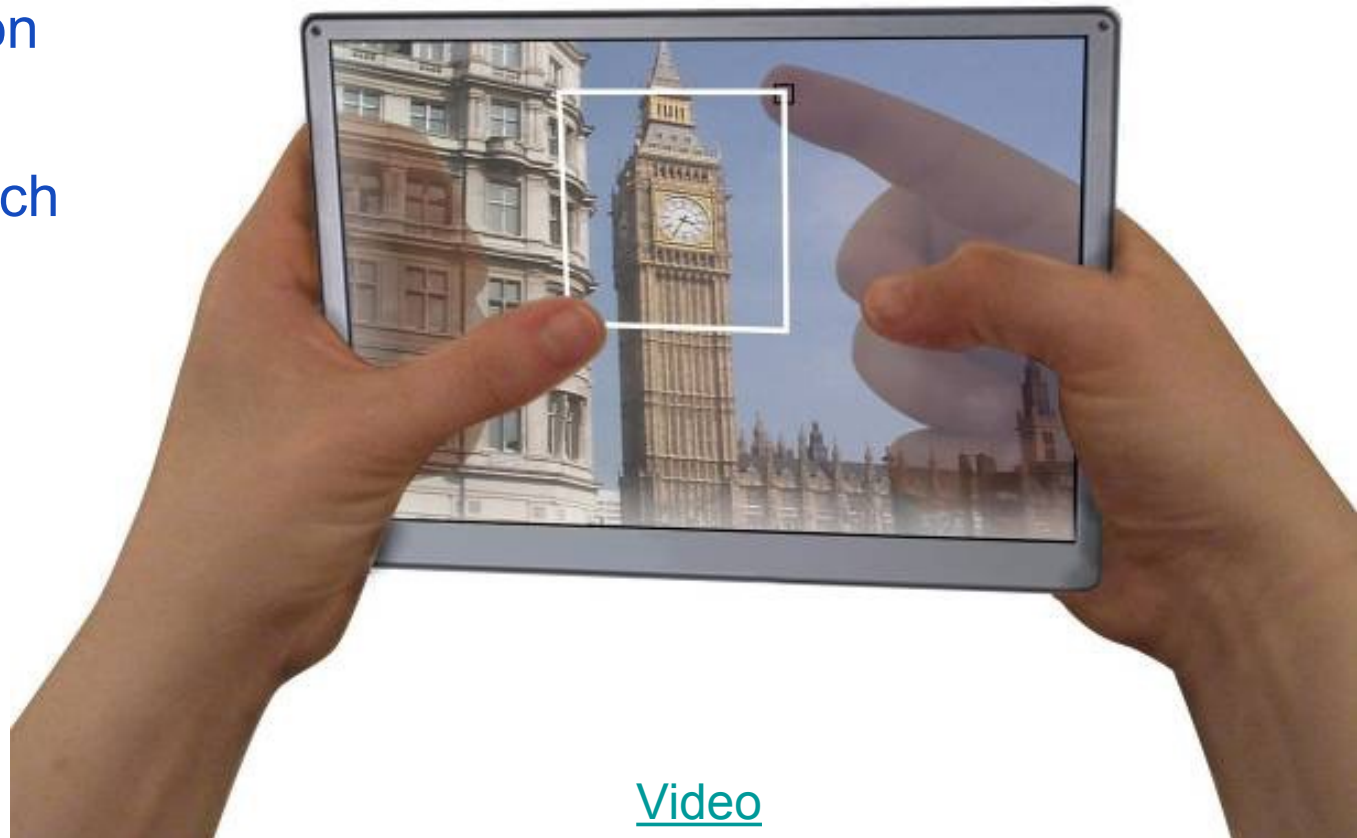


Occlusion
“Fat finger” problem

LucidTouch

Wigdor, Forlines, Baudisch, Barnwell,
Shen: *LucidTouch: A See-Through Mobile
Device*. UIST'07.

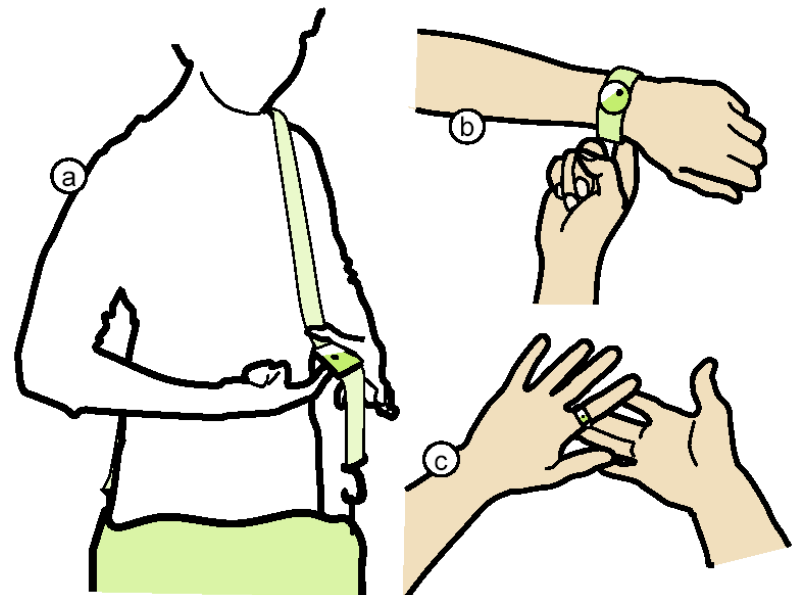
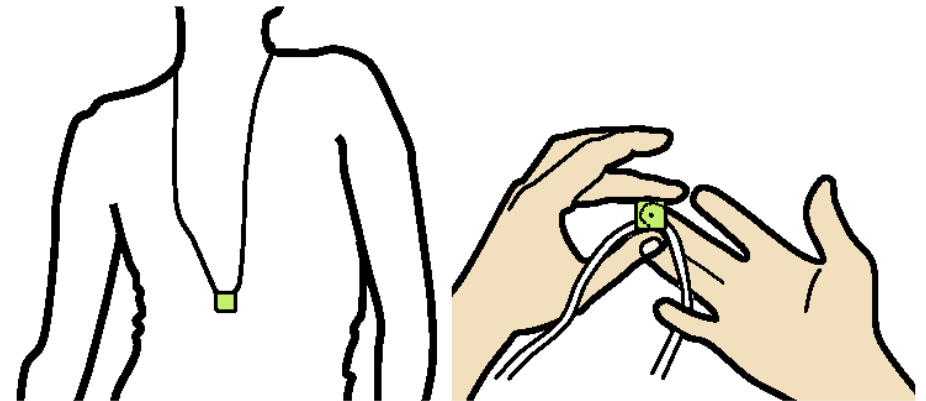
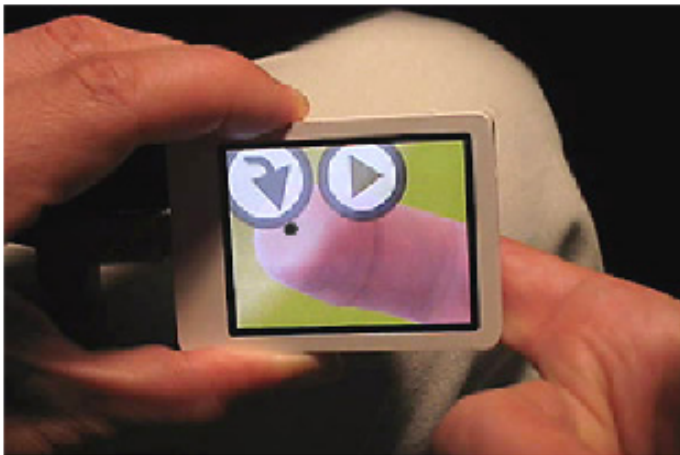
- Behind-the-device multitouch input
- Pseudo transparency
 - Enabling back of the device pointing
 - 3 states + visual feedback
= land-on selection
- Form-factor
 - Enabling multi-touch
with all ten fingers



Video

Back-of-Device Interaction Works for Very Small Screens

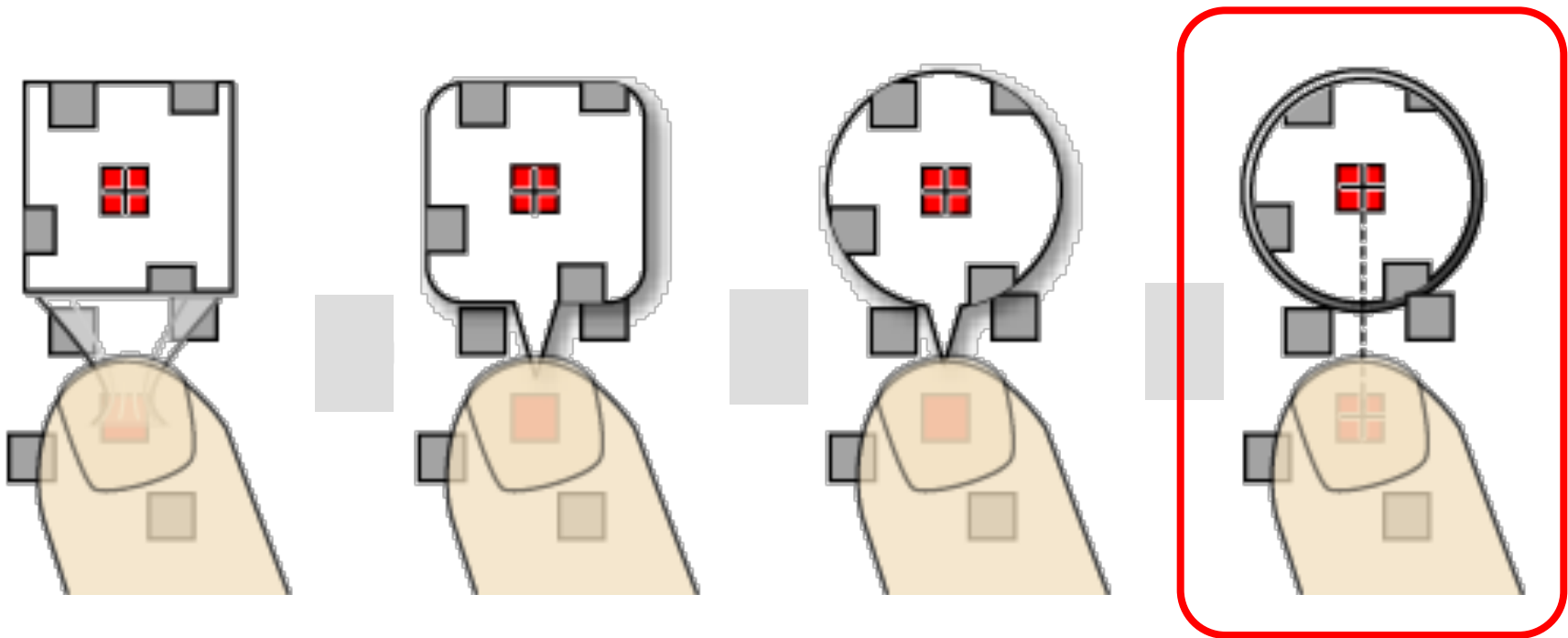
- Jewelry, watches, etc.
- Pseudo transparency
 - Capacitive touch pad
 - Clickable touch pad



Baudisch, Chu: *Back-of-Device Interaction Allows Creating Very Small Touch Devices*. CHI'09.

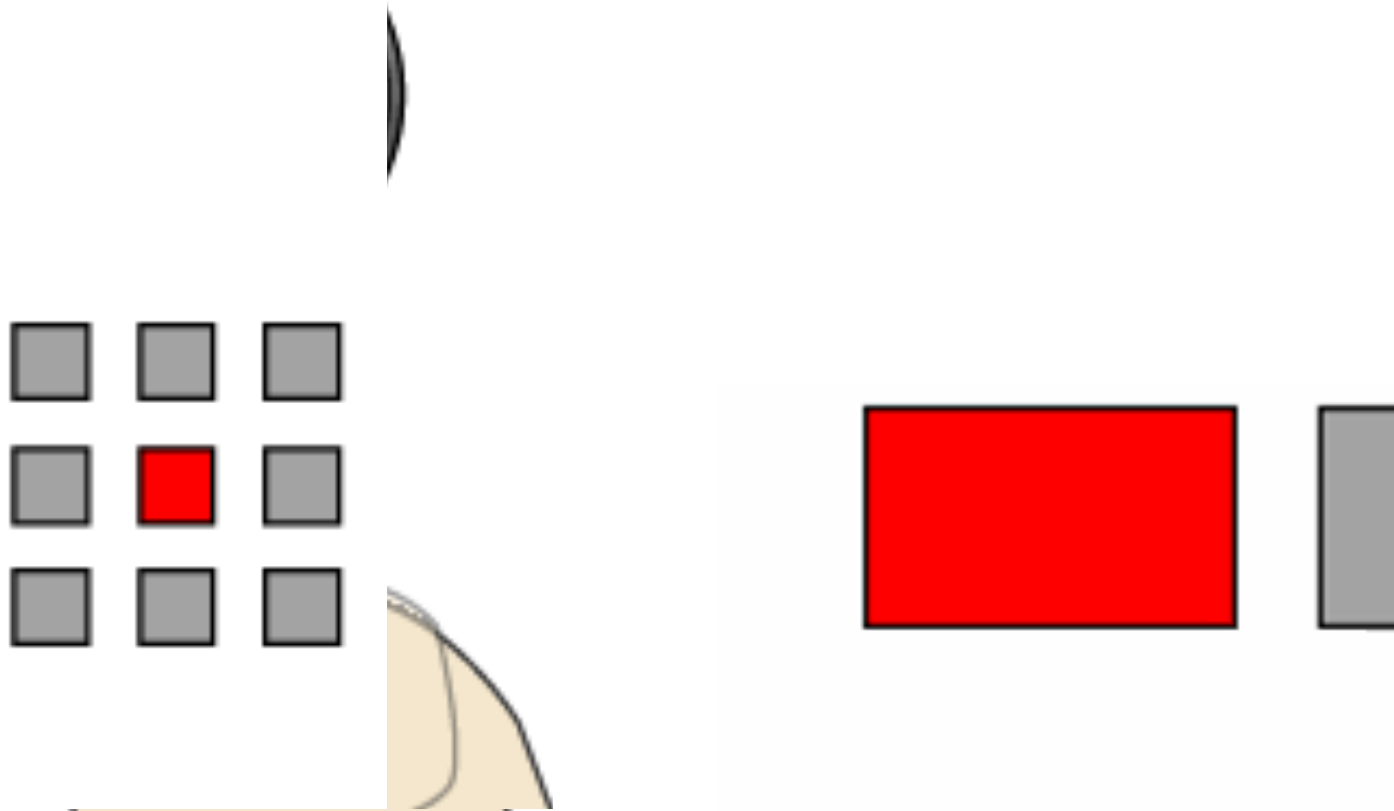
Shift Callout (Vogel & Baudisch, 2007)

- Only shift callout
- Enough context around target
- 26mm circular shape → occluded area under finger



Source: Patrick Baudisch

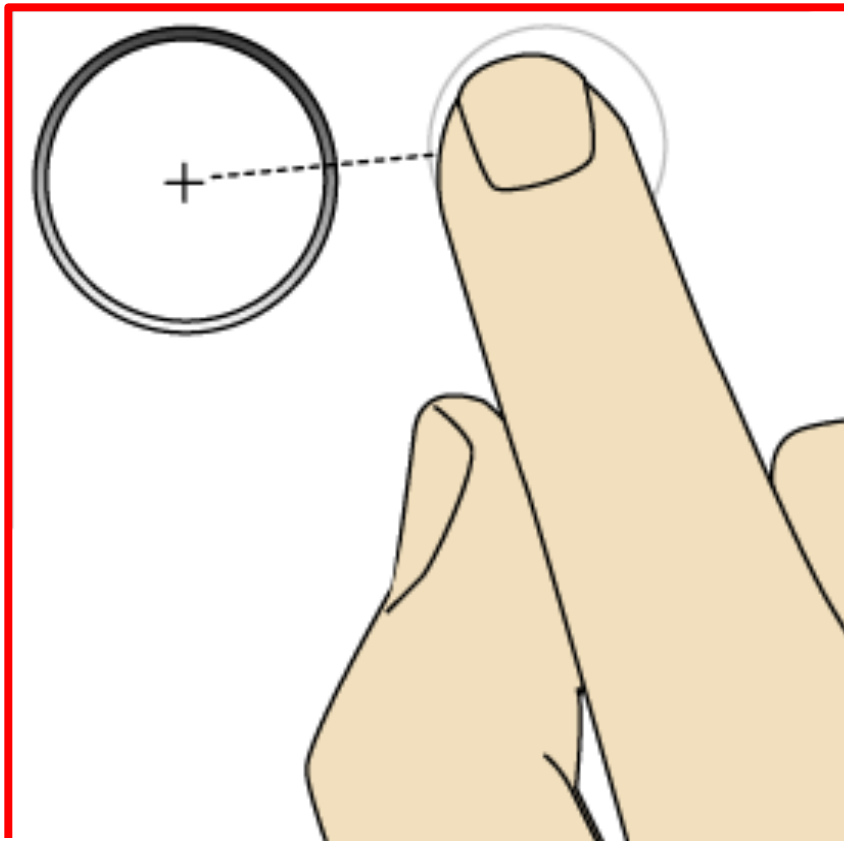
Shift Needed Only for Small Targets



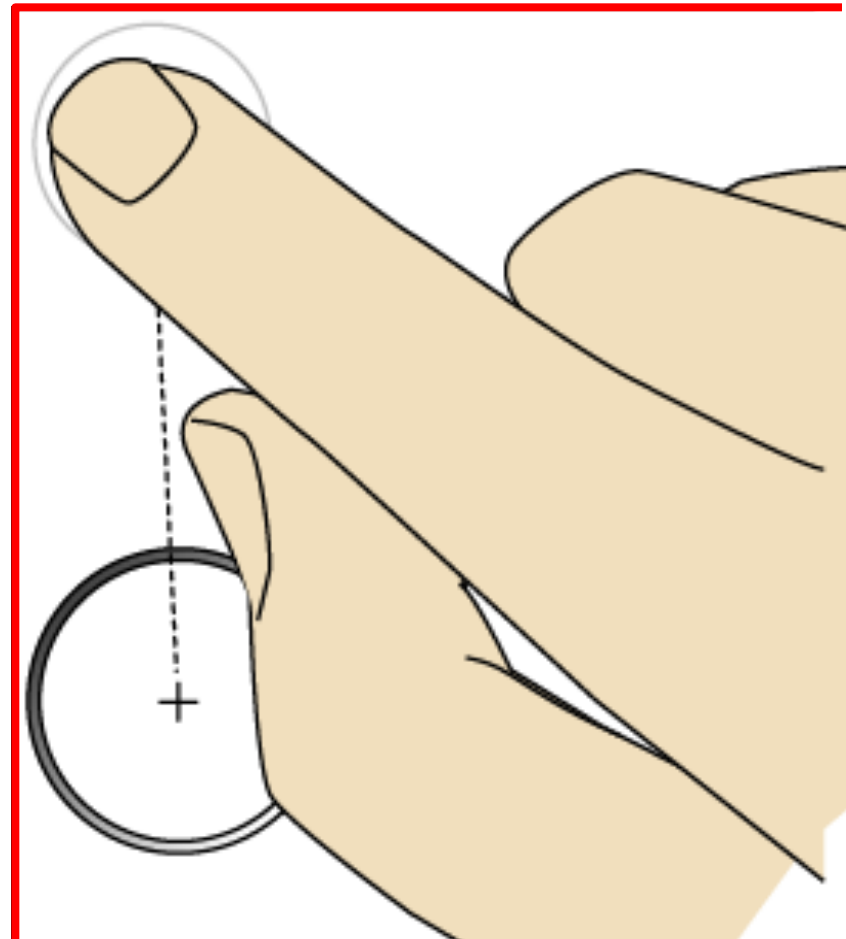
no offset, click on the target itself

Source: Patrick Baudisch

Corners and Edges



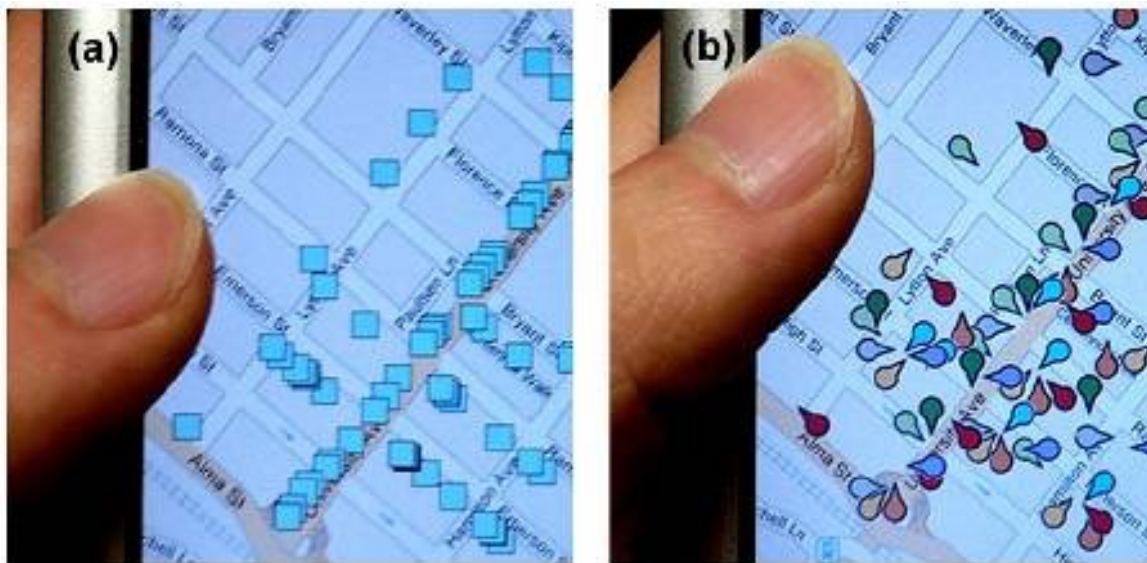
callout can go anywhere, no edge problems



Source: Patrick Baudisch

Escape: A Target Selection Technique Using Visually-cued Gestures

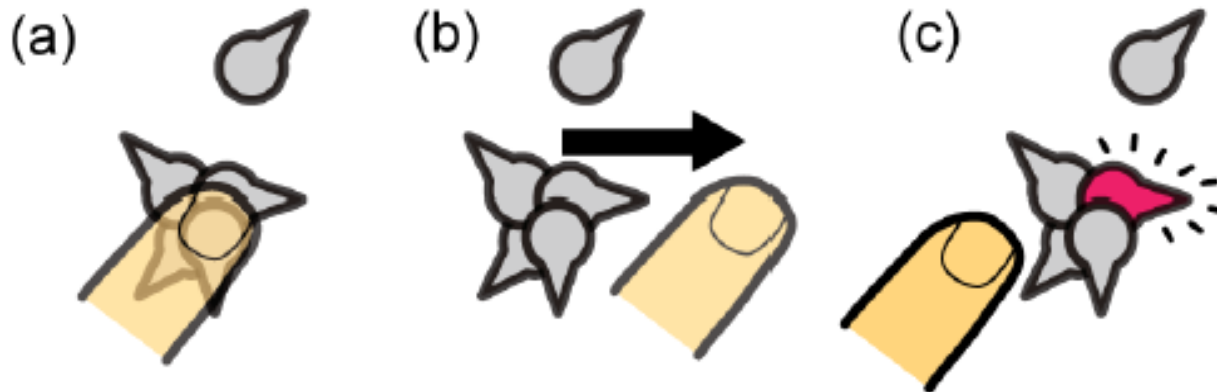
- **Problem:** Selecting a target on a touch-screen that is surrounded by other selectable objects
- **Solution:** The icons in “Escape” indicate directions. A finger tap followed by a movement in this direction enables disambiguation.



Yatani, Partridge, Newman: Escape: A Target Selection Technique Using Visually-cued Gestures, CHI 2008

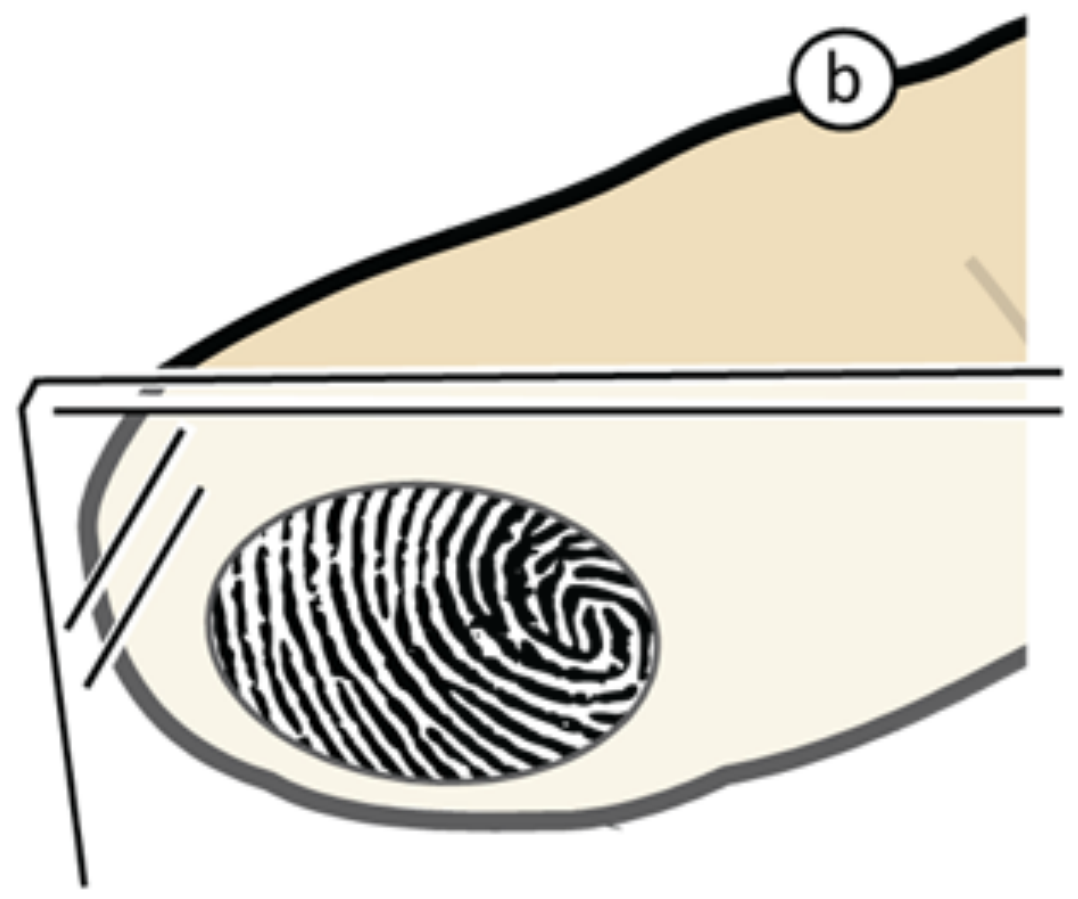
Escape: A Target Selection Technique Using Visually-cued Gestures

- The icons in “Escape” indicate directions. A finger tap followed by a movement in this direction enables disambiguation.



- Can handle 2.3 icons per square centimeter
- Find an assignment that separates gestures
 - Similar to graph coloring → NP-complete
 - “Escape” uses heuristic algorithm

<http://www.youtube.com/watch?v=x3NeZswKkKw>





results

results

