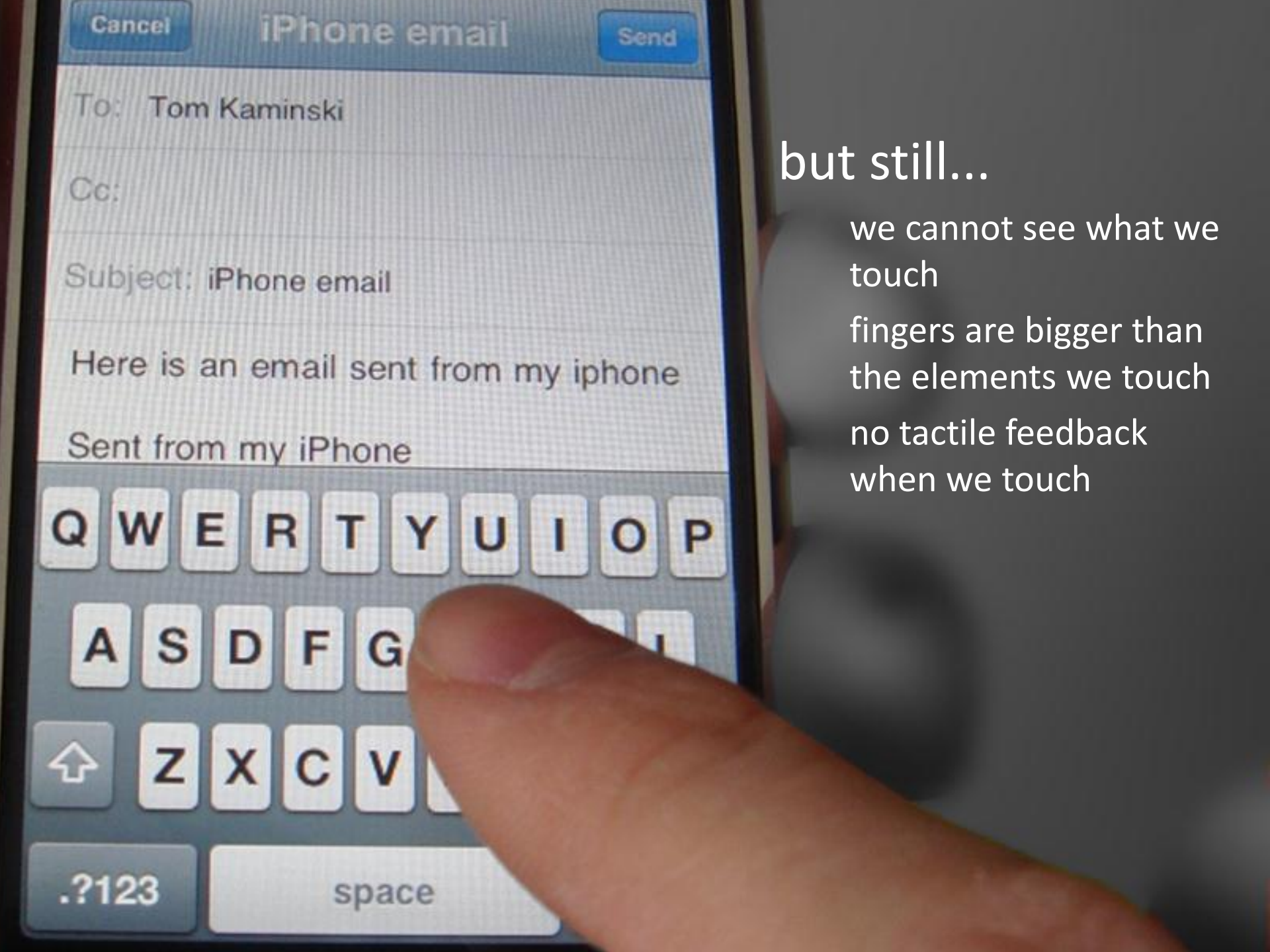
Observational and Experimental Investigation of Typing Behaviour using Virtual Keyboards on Mobile Devices

Niels Henze
University of Oldenburg → Stuttgart

Enrico Rukzio
University of Duisburg-Essen → Ulm

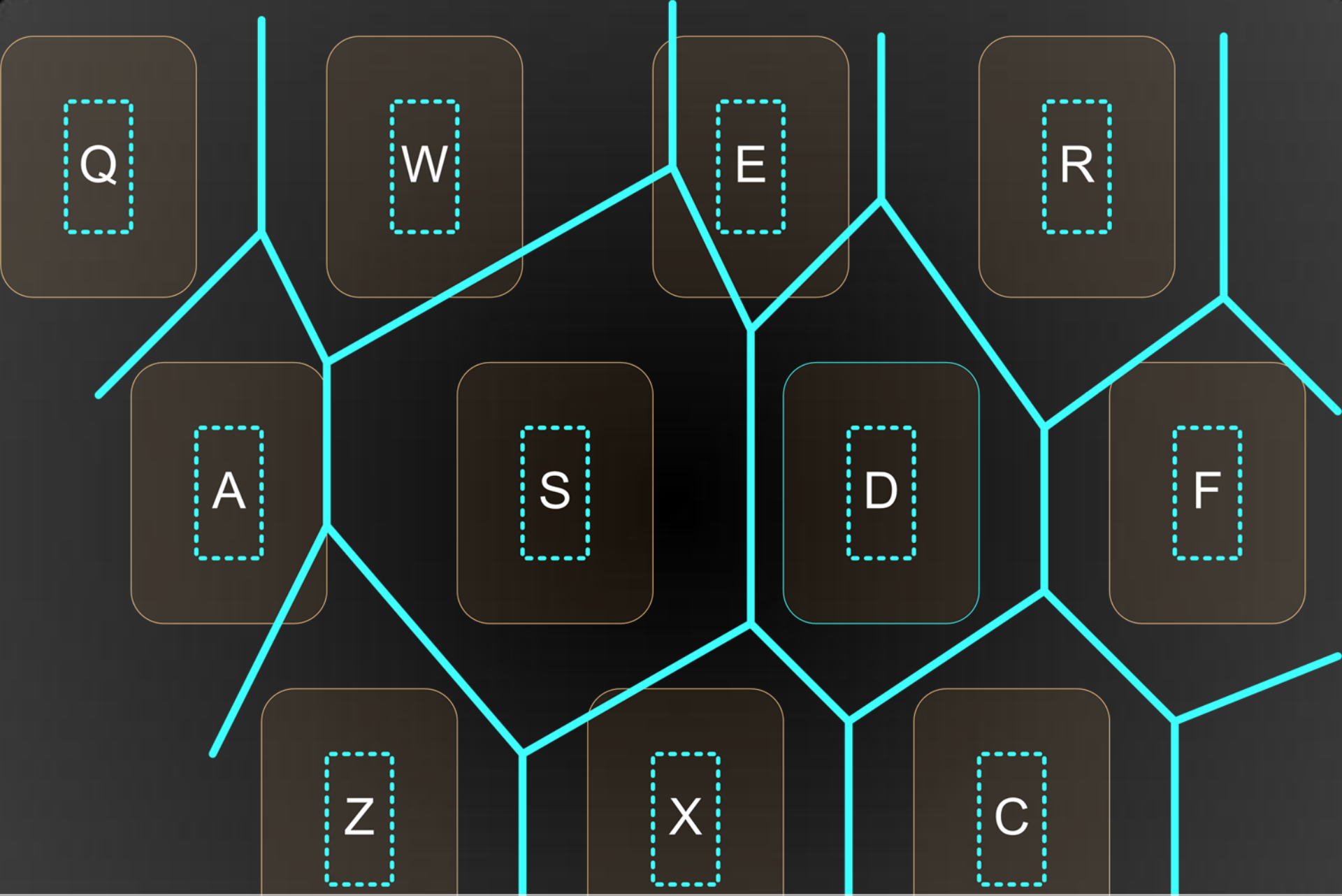
Susanne Boll
University of Oldenburg


‘ Touch me
How can it be
Believe me
The sun always shines
on my screen ’

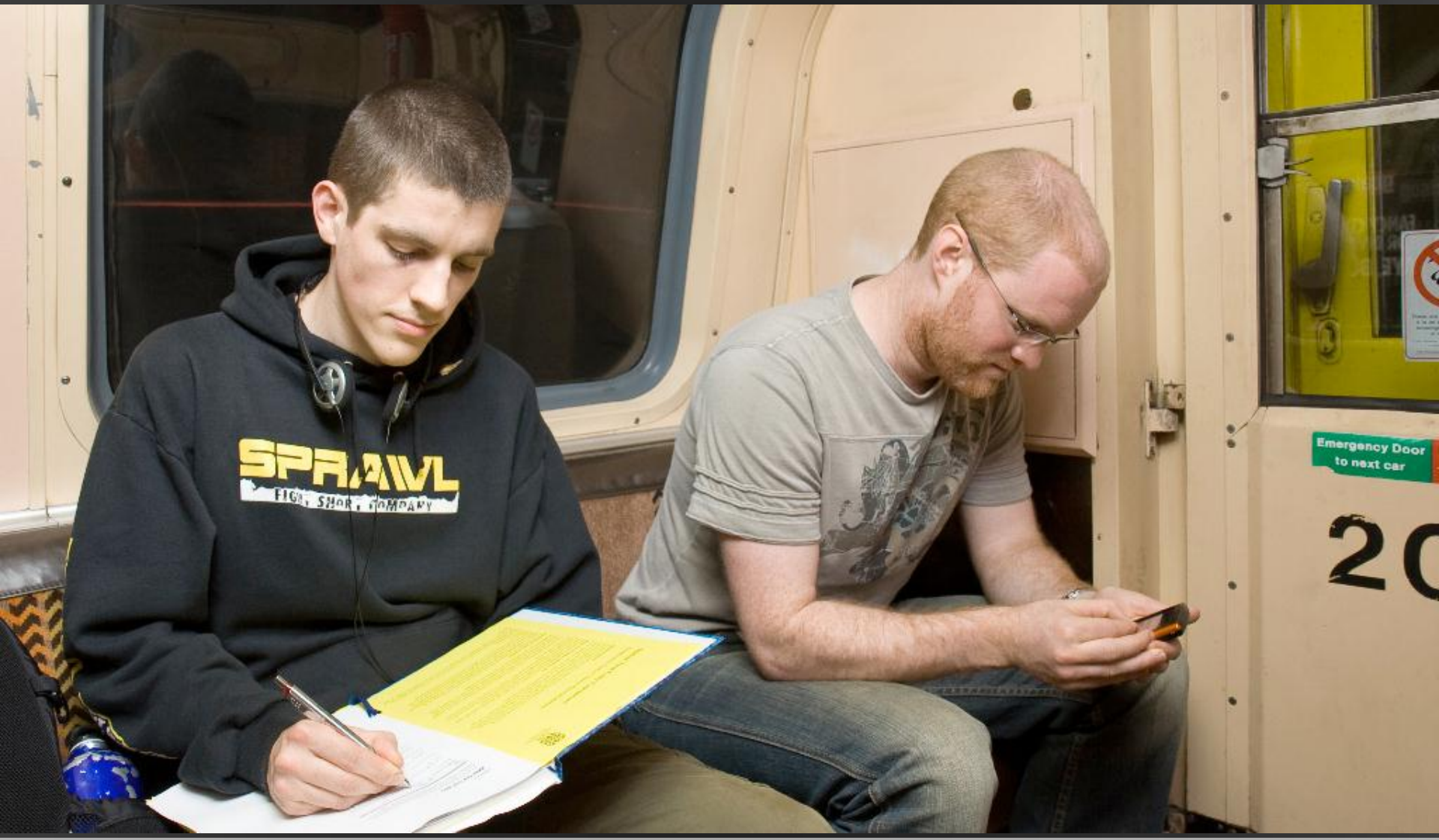


but still...

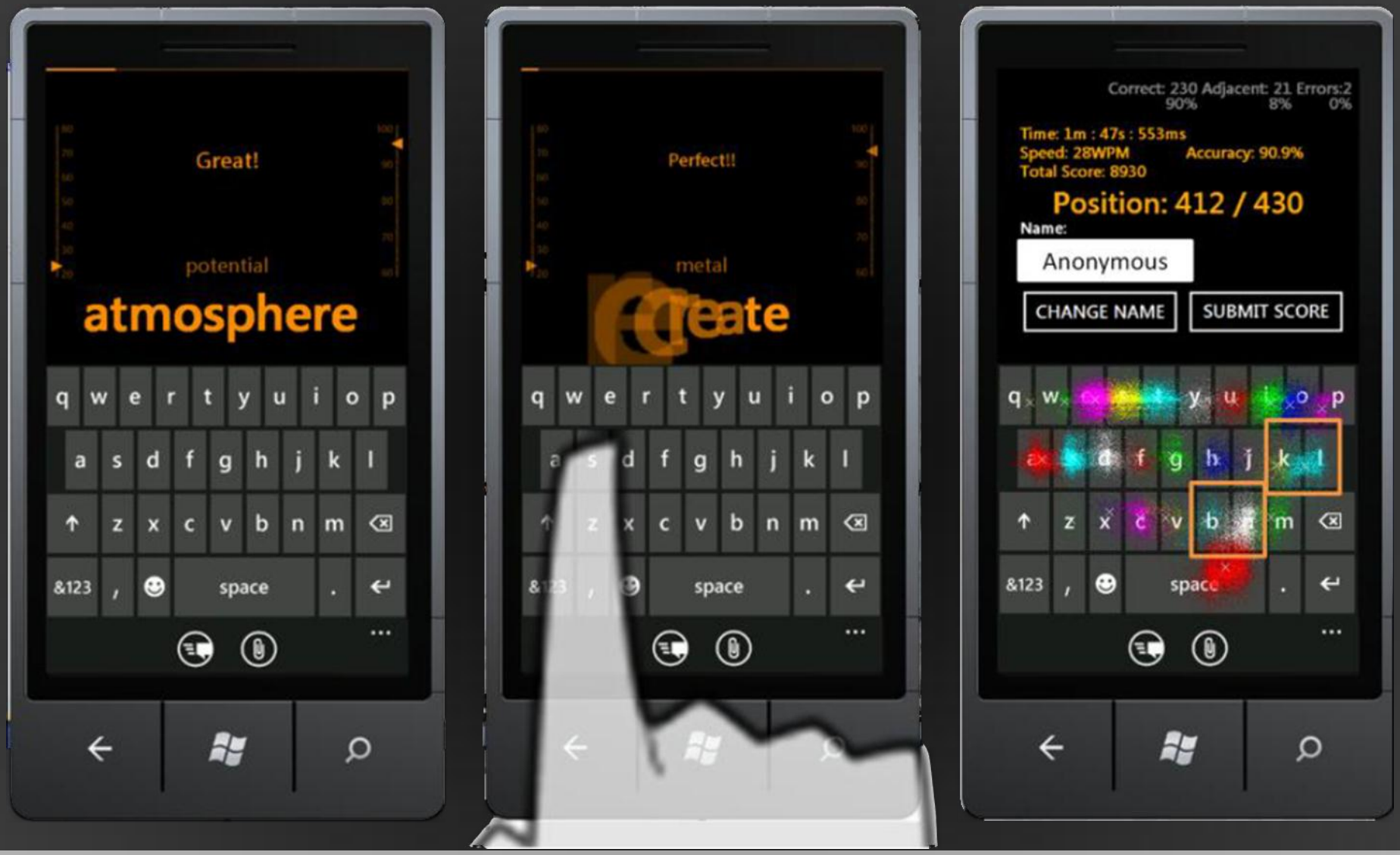
- we cannot see what we touch
- fingers are bigger than the elements we touch
- no tactile feedback when we touch



A. Gunawardana, T. Paek, C. Meek: Usability Guided Key-Target Resizing for Soft Keyboards. Proc. IUI, 2010.



E. Hoggan, S.A. Brewster, J. Johnston: Investigating the Effectiveness of Tactile Feedback for Mobile Touchscreens. Proc. CHI, 2008.

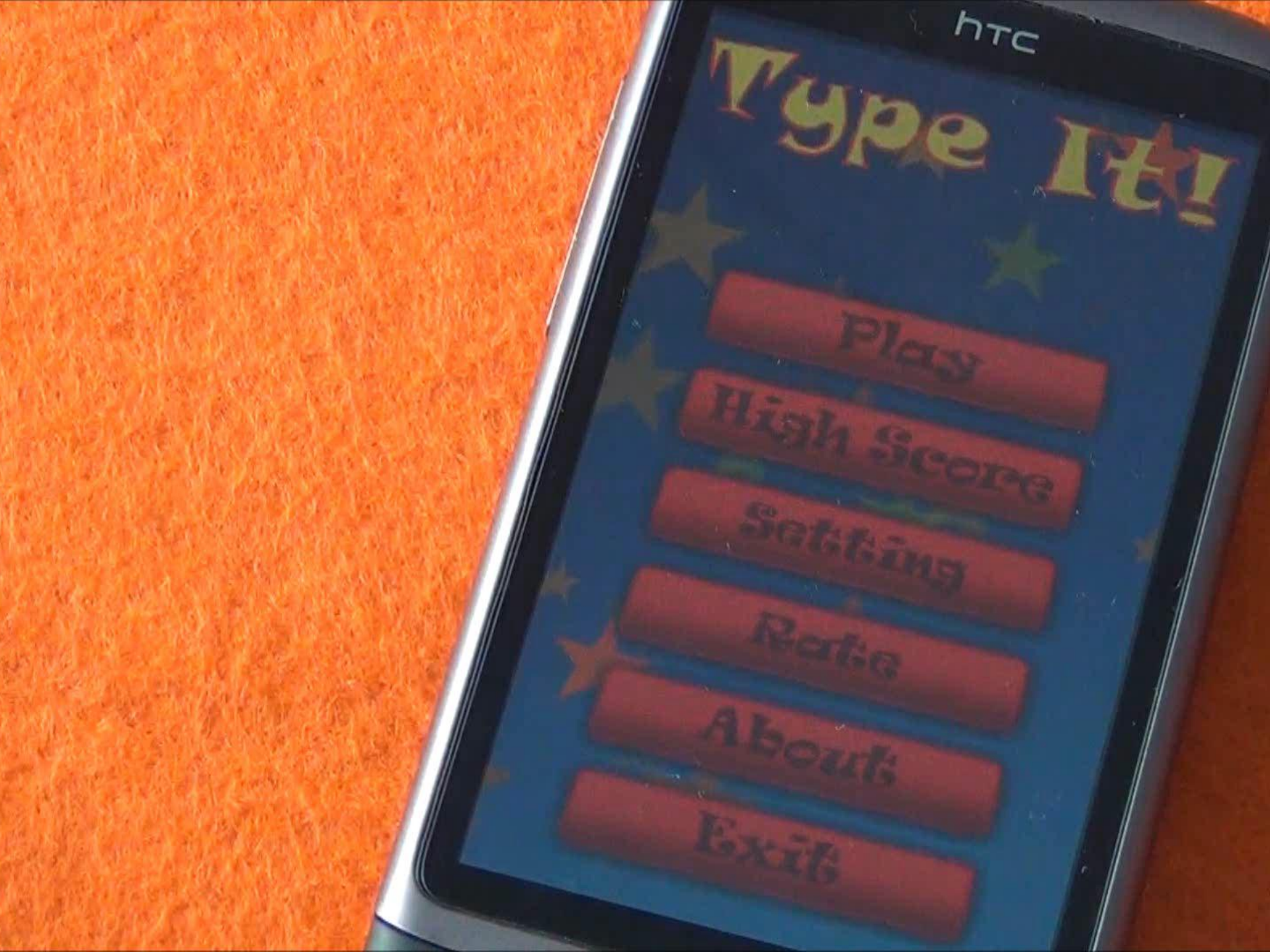


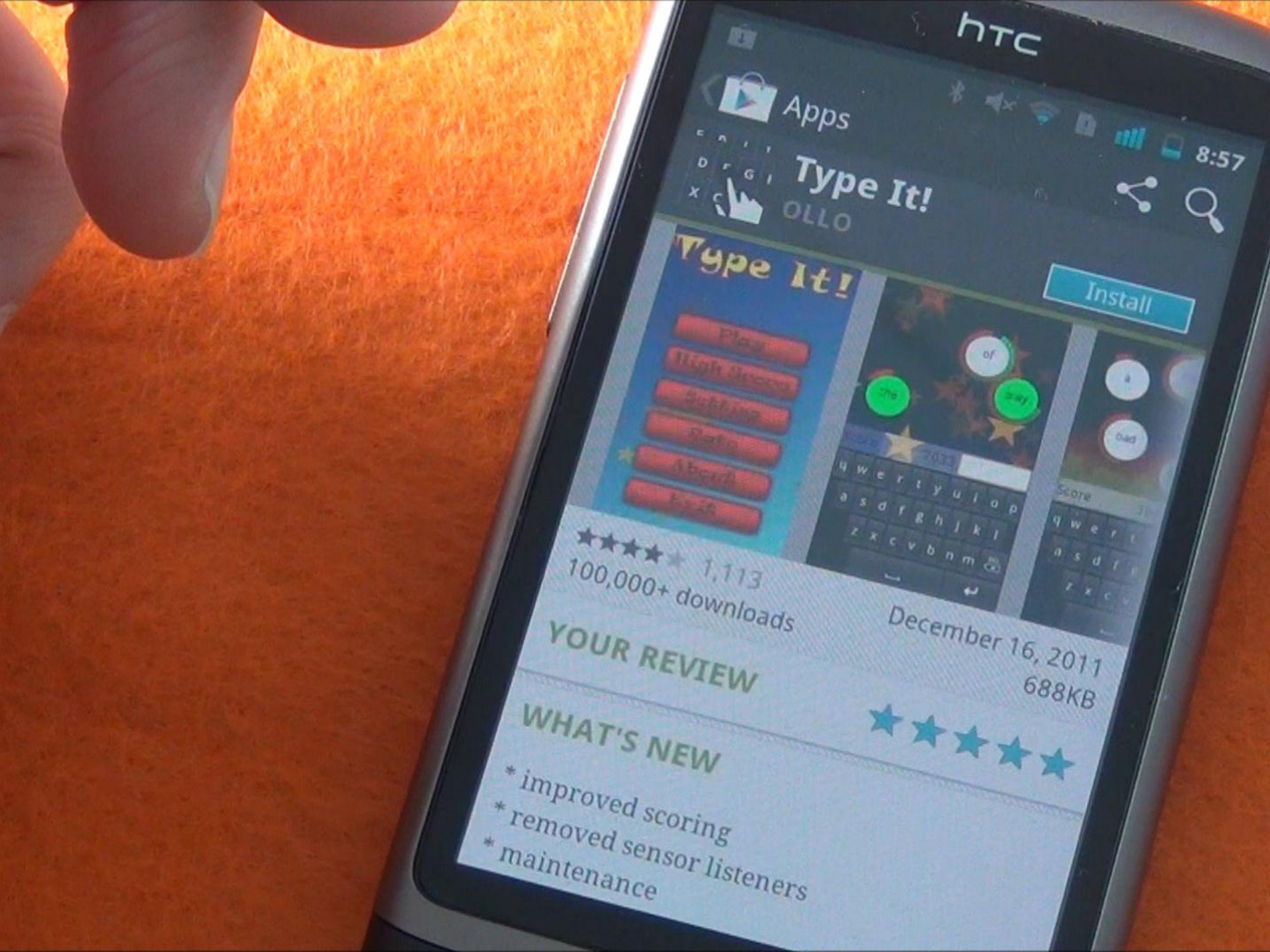
D- Rudchenko, T. Paek, E. Badger: Text Text Revolution - A Game that Improves Text Entry on Mobile Touchscreen Keyboards. Proc. Pervasive, 2011.

internal validity!

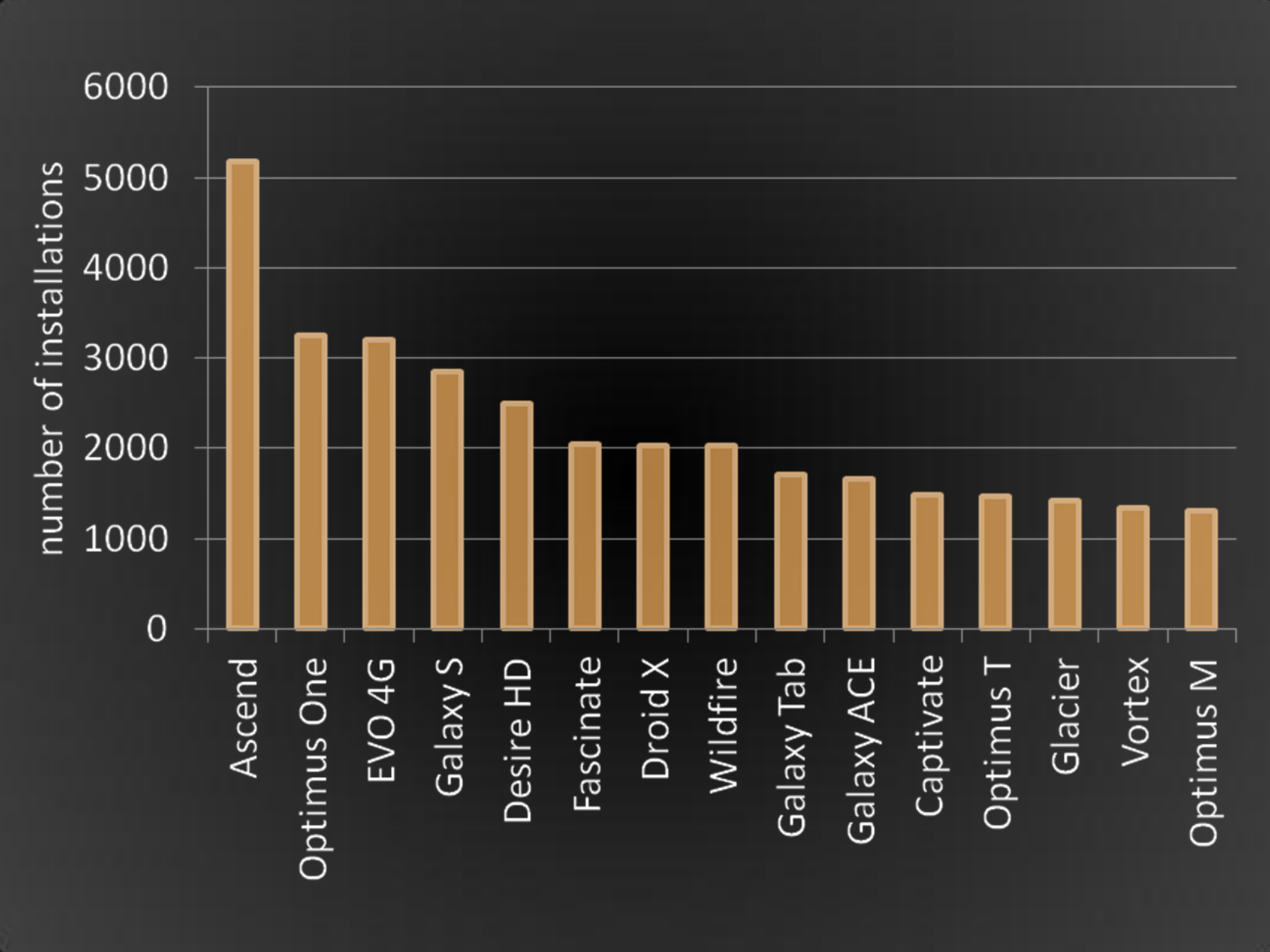
external validity?

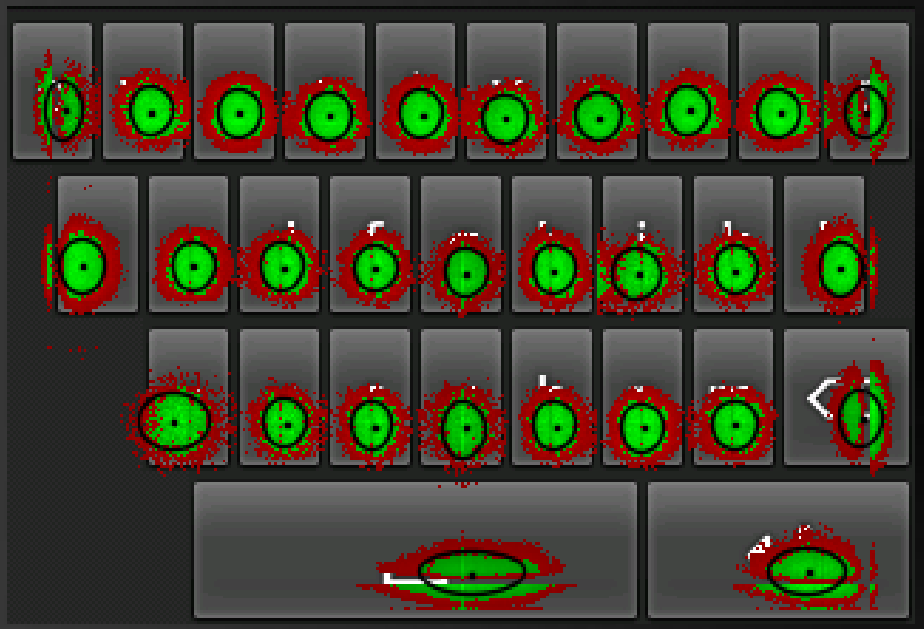

10 08
SAMSUNG
LYNX
htc
Cnolpad
MOTOROLA
LG
facebook


htc
Type It!
Play
High score
Setting
Rate
About
Exit

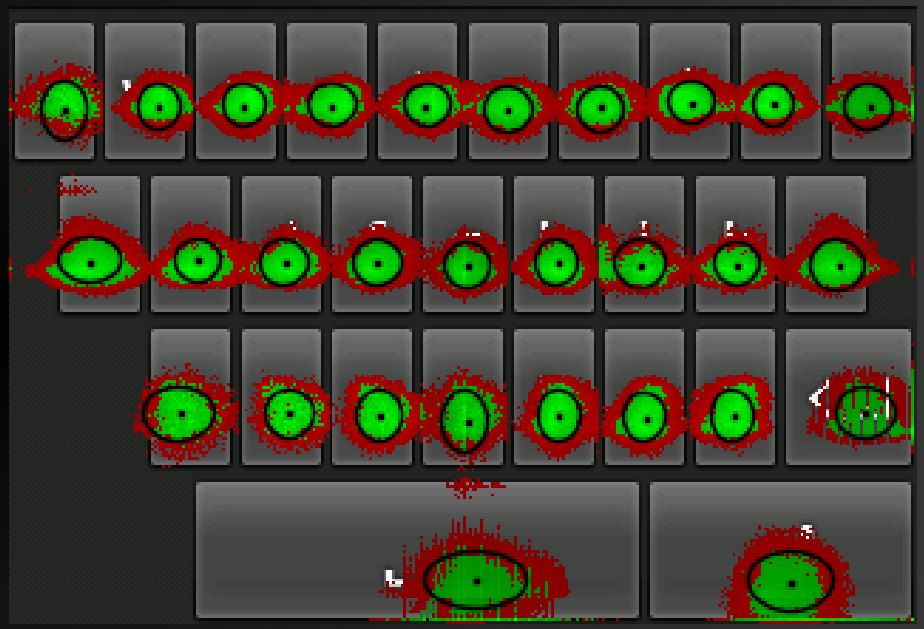

htc
Apps
8:57
Type It!
OLLO
Type It!
Install
1,113
100,000+ downloads
December 16, 2011
688KB
YOUR REVIEW
WHAT'S NEW
* improved scoring
* removed sensor listeners
* maintenance

72,945	installations
952,487	levels
47,770,625	keystrokes


number of installations
6000
5000
4000
3000
2000
1000
0
Ascend
Optimus One
EVO 4G
Galaxy S
Desire HD
Fascinate
Droid X
Wildfire
Galaxy Tab
Galaxy ACE
Captivate
Optimus T
Glacier
Vortex
Optimus M

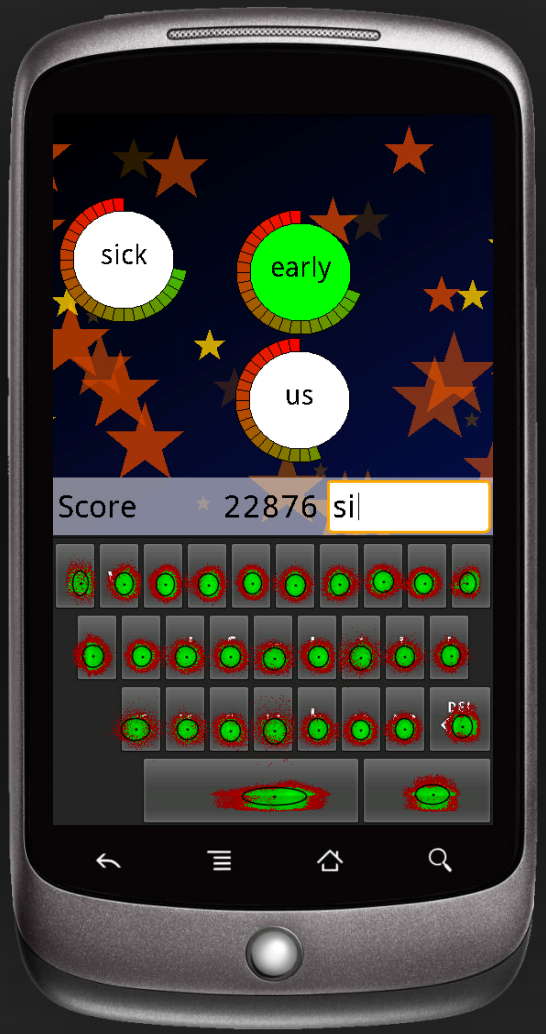


LG Optimus One 2,407,164 keystrokes

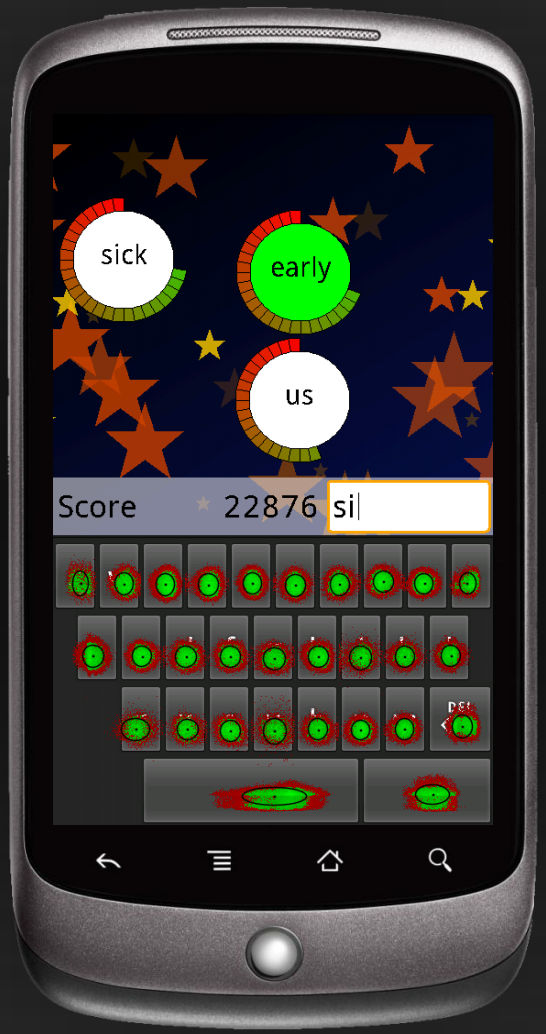


Huawei Ascend 4,589,967 keystrokes

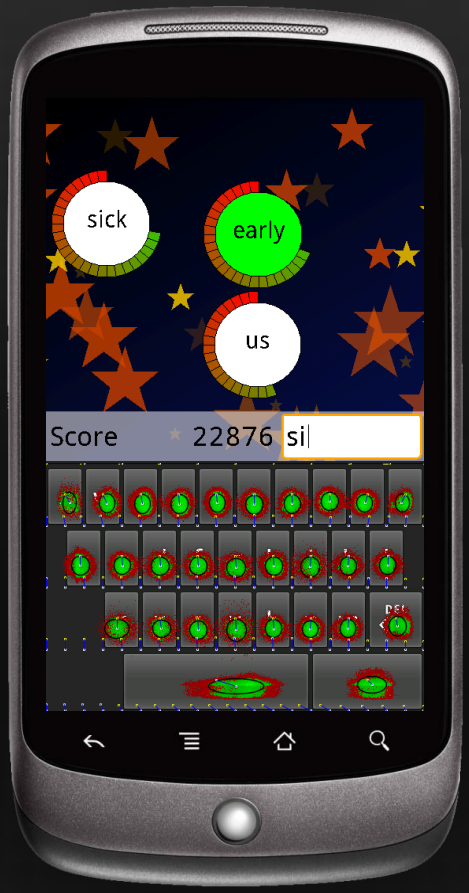
Samsung Galaxy S
3,242 installations
1,831,489 keystrokes



Samsung Galaxy S
3,242 installations
1,831,489 keystrokes

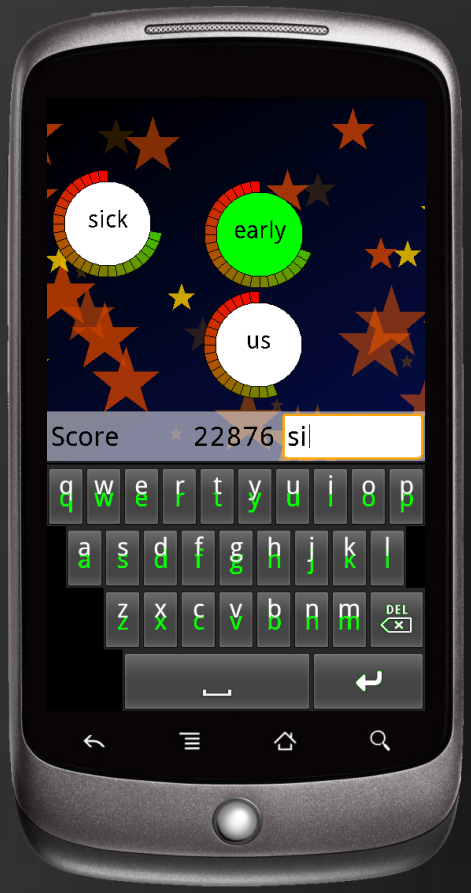


Samsu
3,242
1,831,



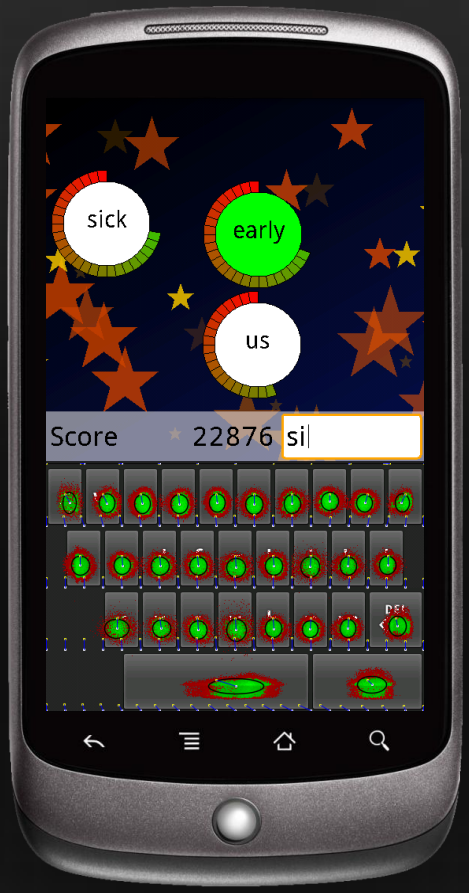
shift
touch positions

3 levels



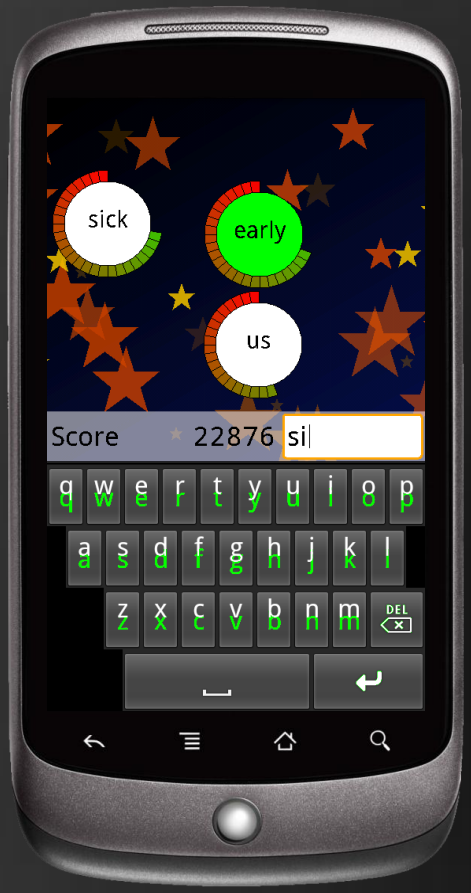
shift
key labels

2 levels



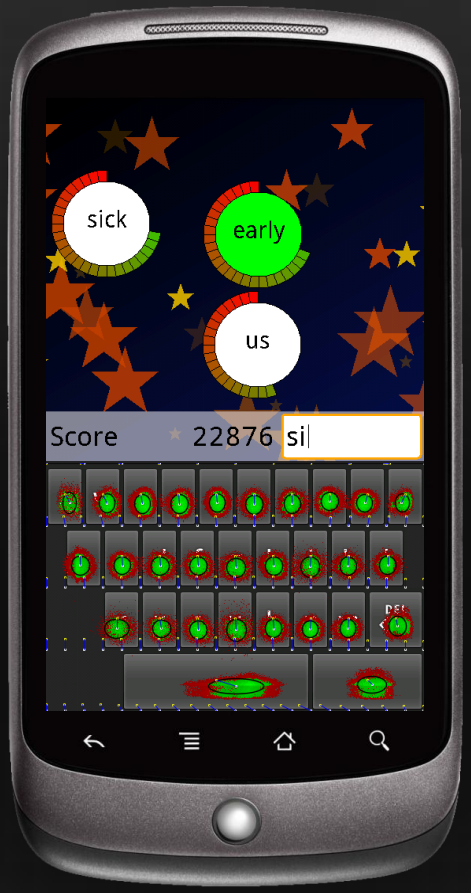
shift
touch positions

3 levels



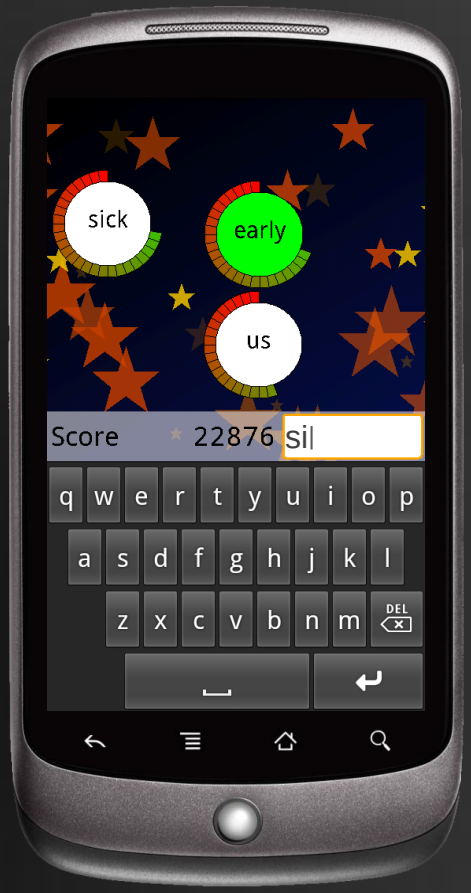
shift
key labels

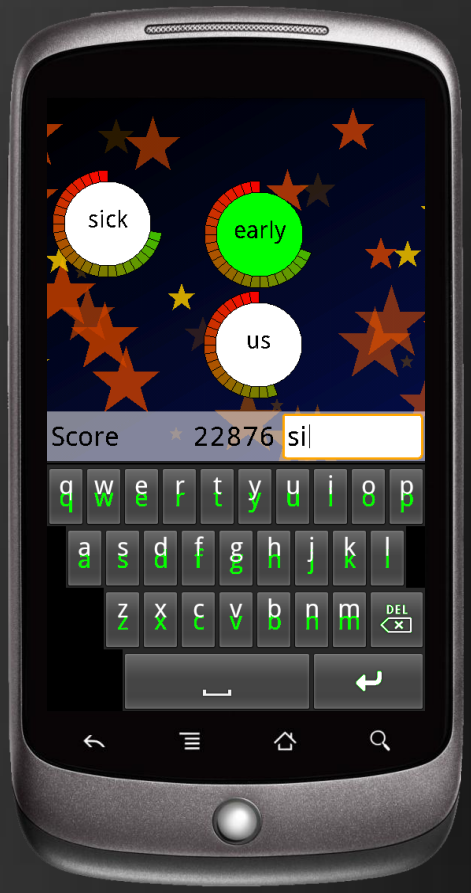
2 levels



shift
touch positions

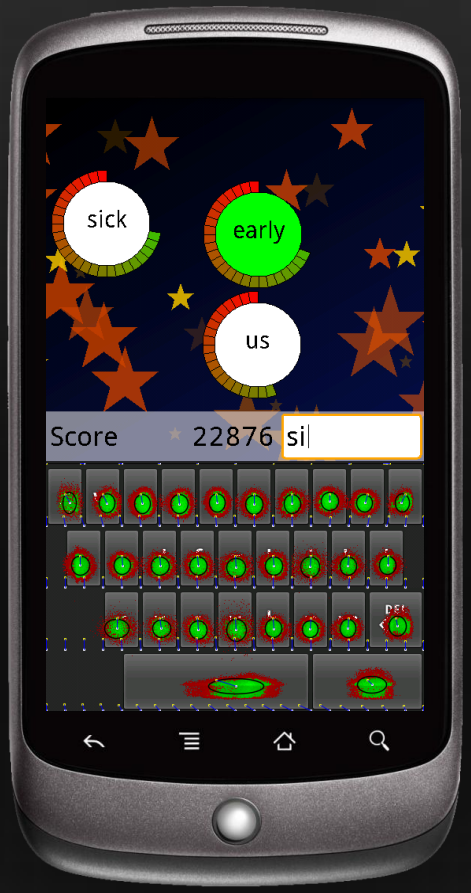
3 levels





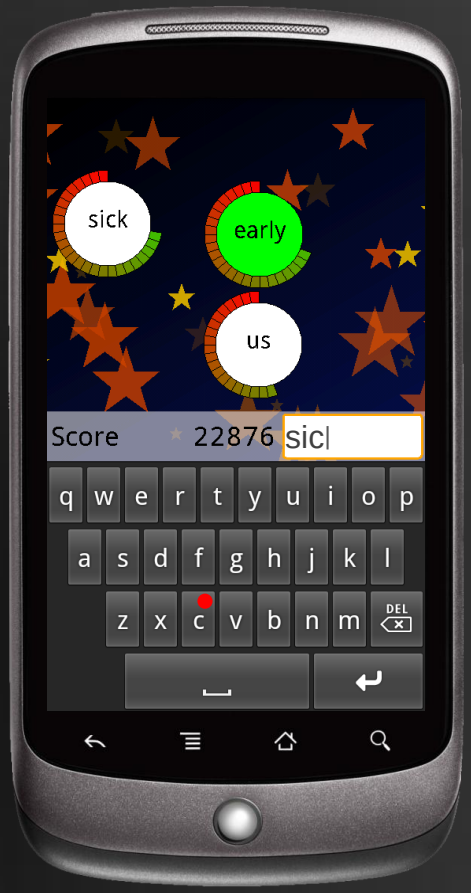
shift
key labels

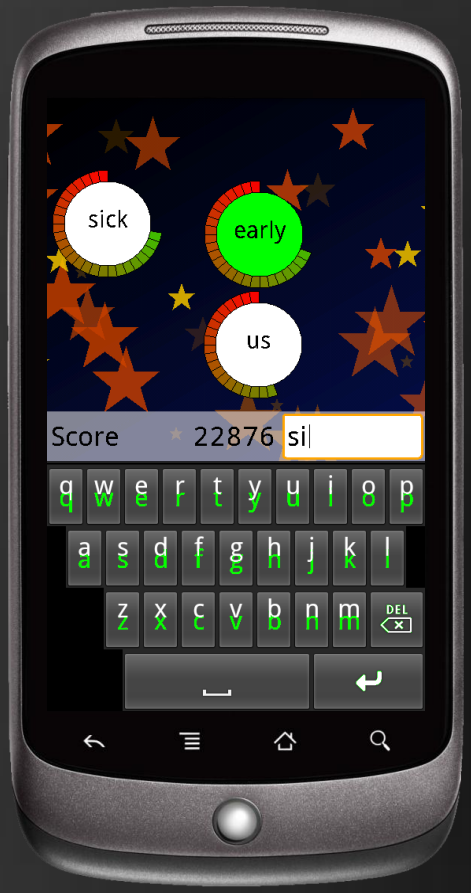
2 levels



shift
touch positions

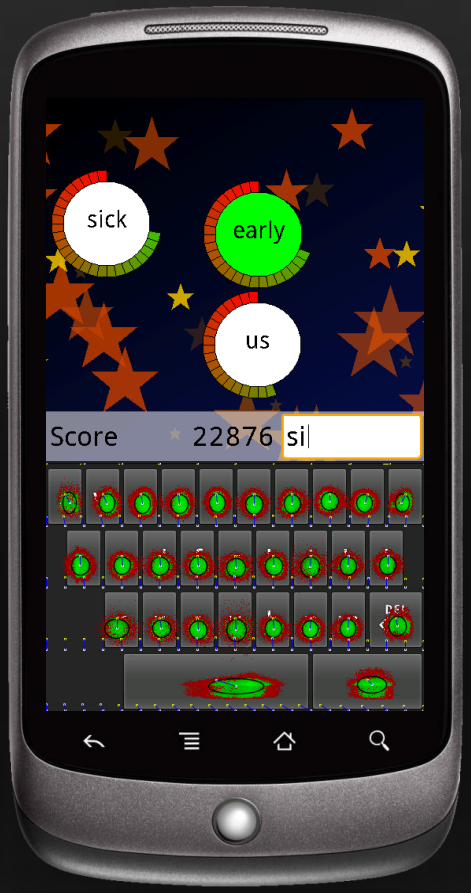
3 levels





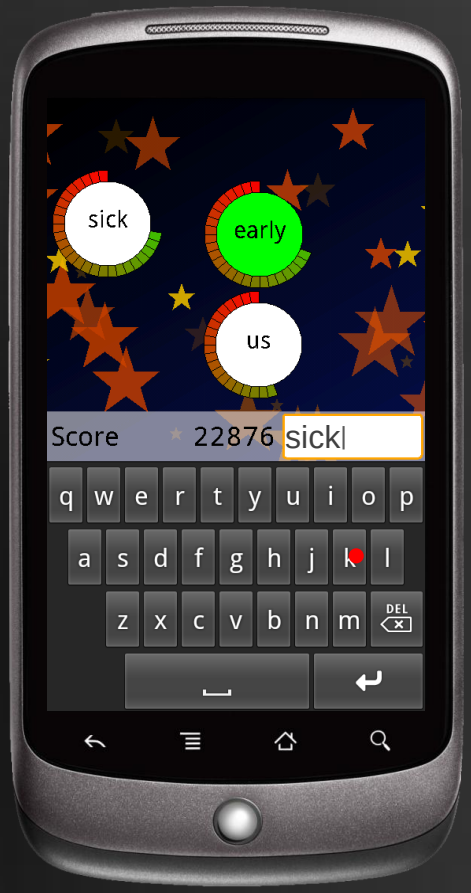
shift
key labels

2 levels



shift
touch positions

3 levels



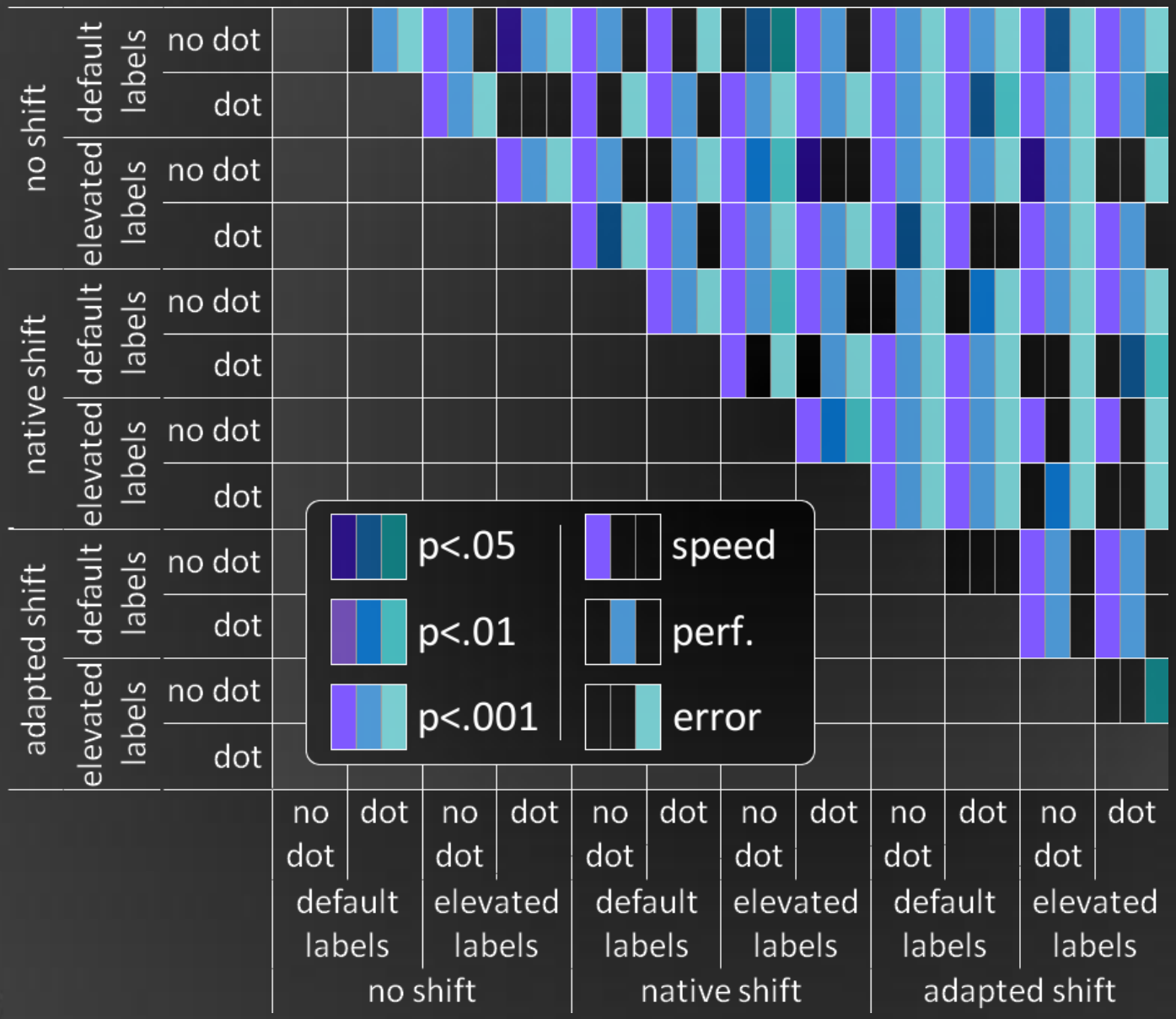
show
touched positions

2 levels

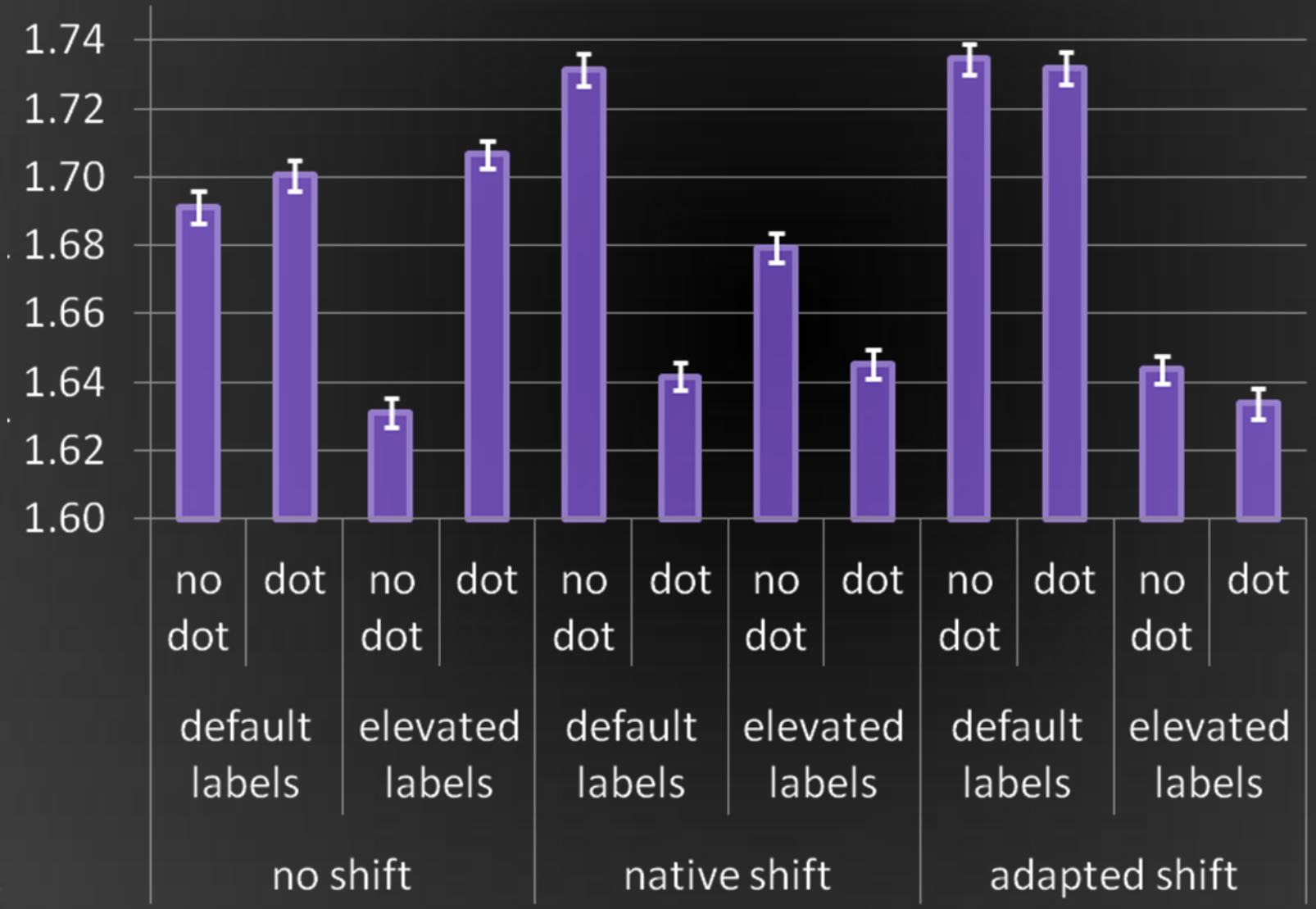
integrated all combinations
published an update of the game
conducted a full factorial experiment

13,013	installations
120,662	levels
6,603,659	keystrokes

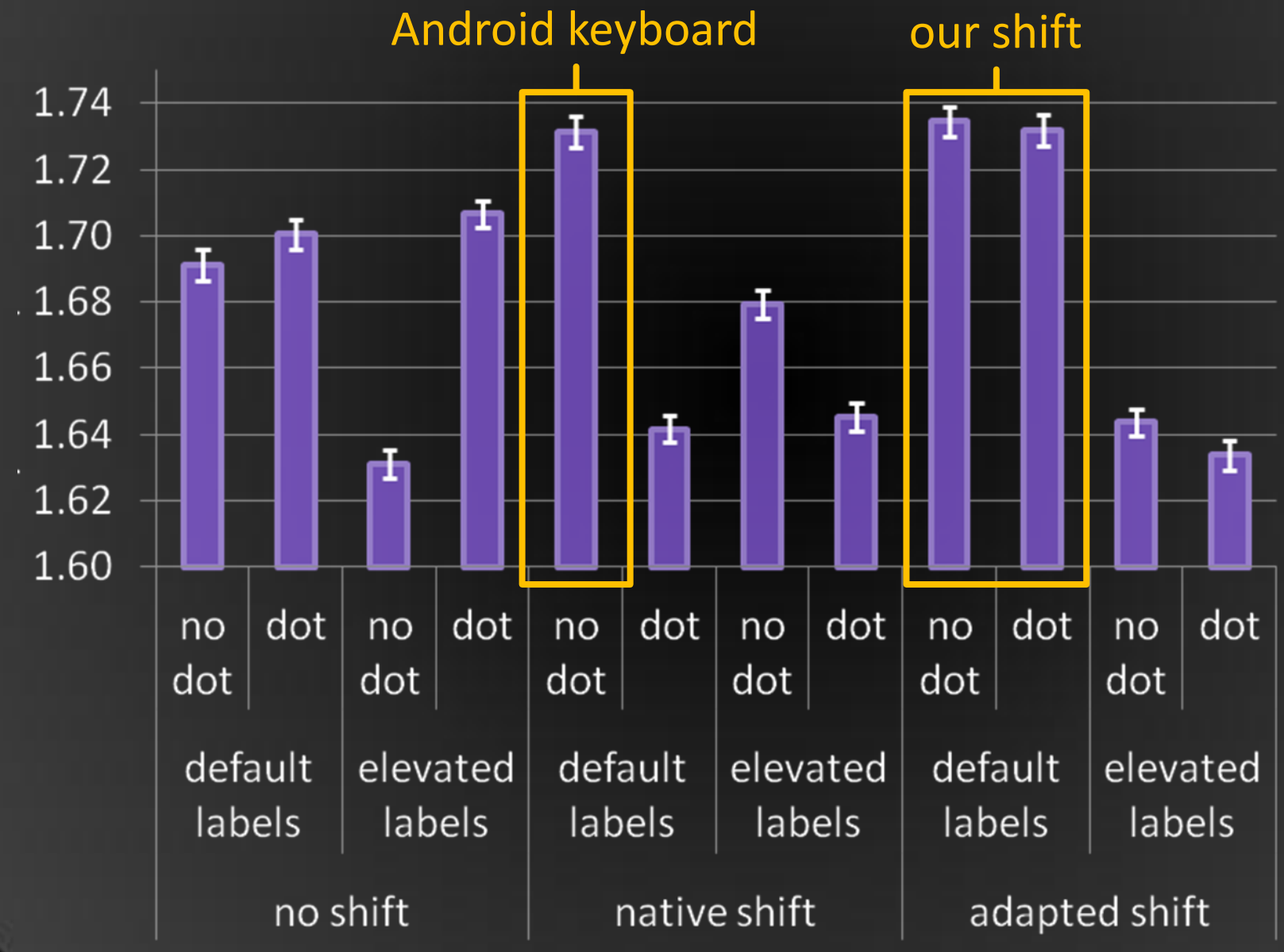
inferential statistics



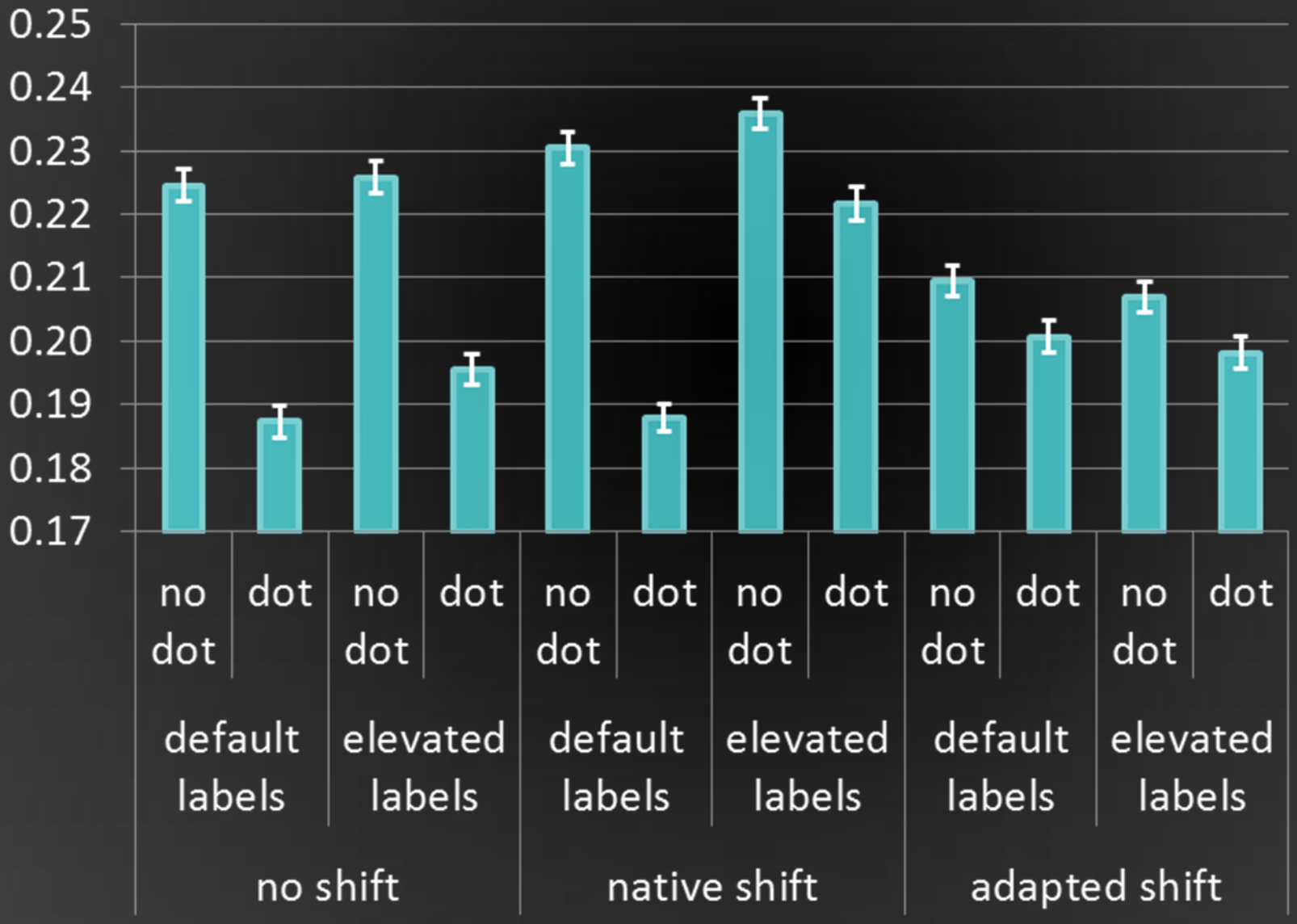
keystrokes per second



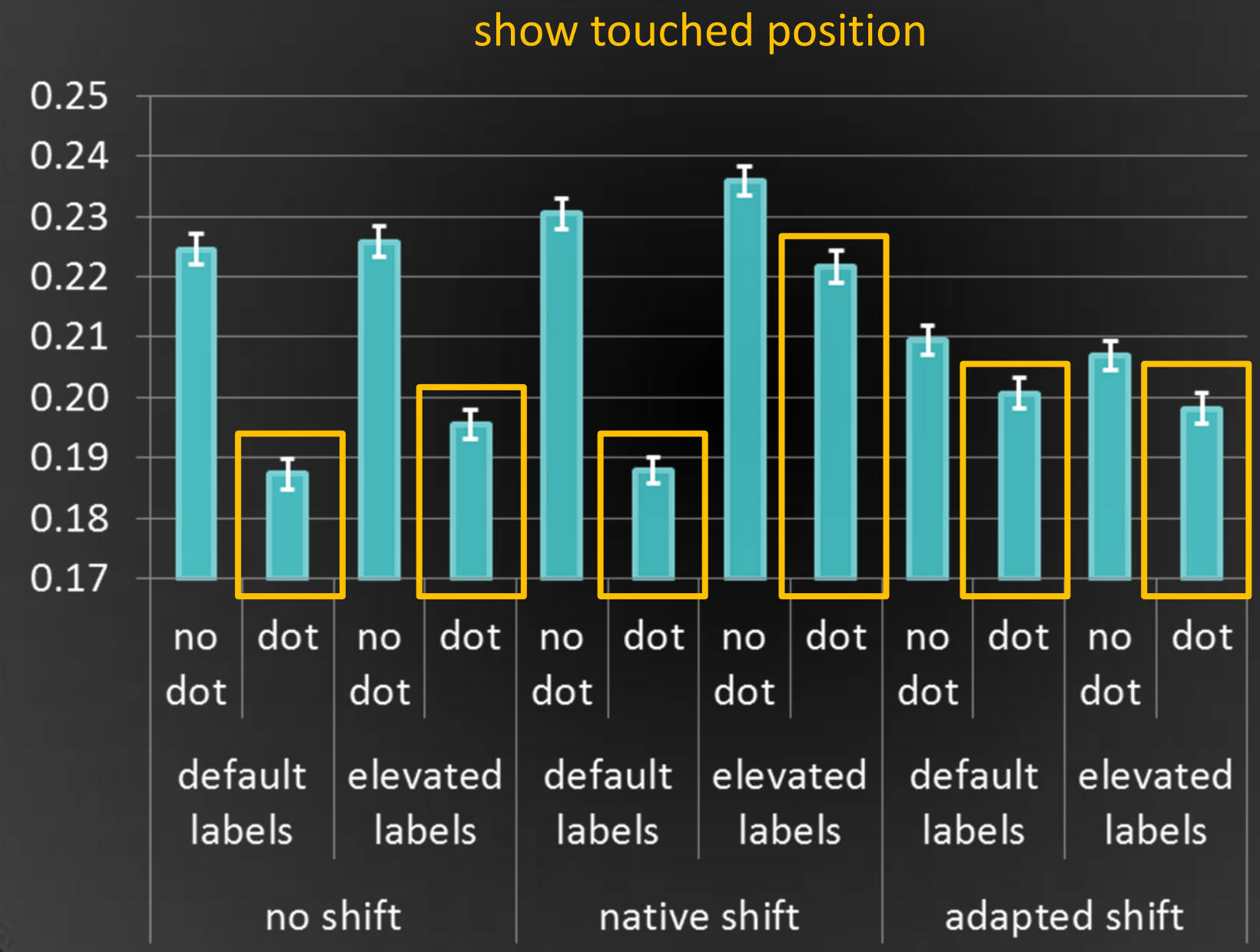
keystrokes per second

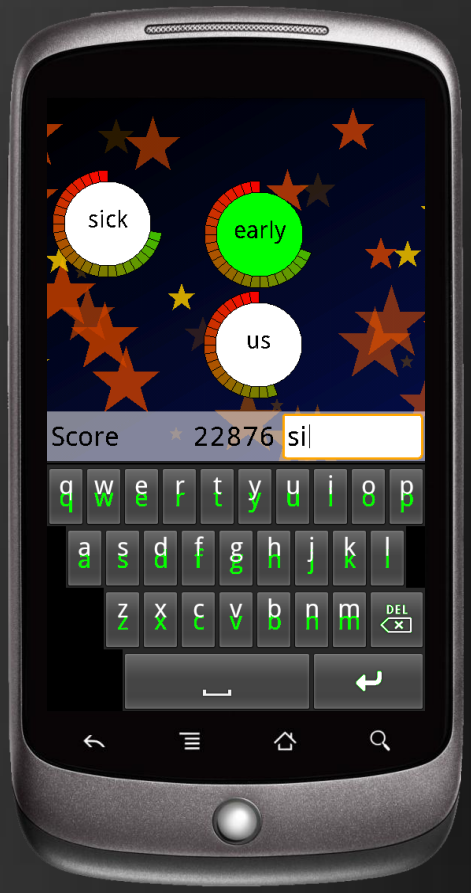


error rate

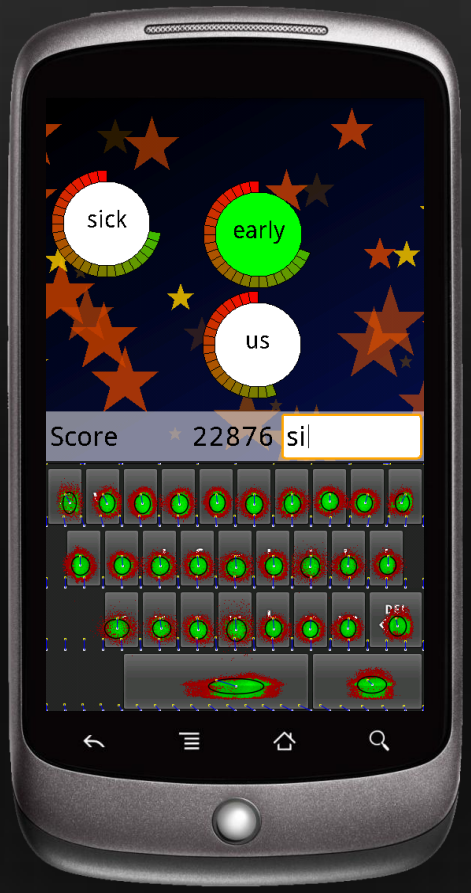

0.25
0.24
0.23
0.22
0.21
0.20
0.19
0.18
0.17
no dot
dot
no dot
dot
no dot
dot
no dot
dot
no dot
dot
no dot
dot
default labels
elevated labels
default labels
elevated labels
default labels
elevated labels
no shift
native shift
adapted shift

error rate

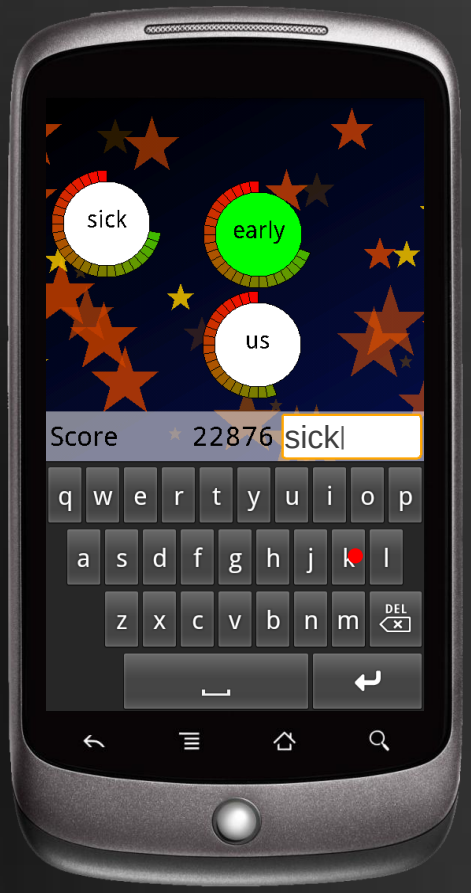

show touched position
0.25
0.24
0.23
0.22
0.21
0.20
0.19
0.18
0.17
no dot
dot
no dot
dot
no dot
dot
no dot
dot
no dot
dot
no dot
dot
default labels
elevated labels
default labels
elevated labels
default labels
elevated labels
no shift
native shift
adapted shift



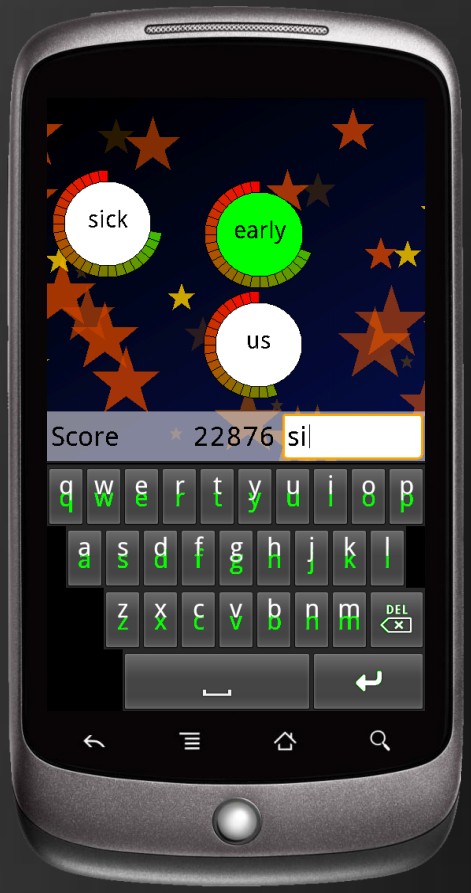
shift
key labels



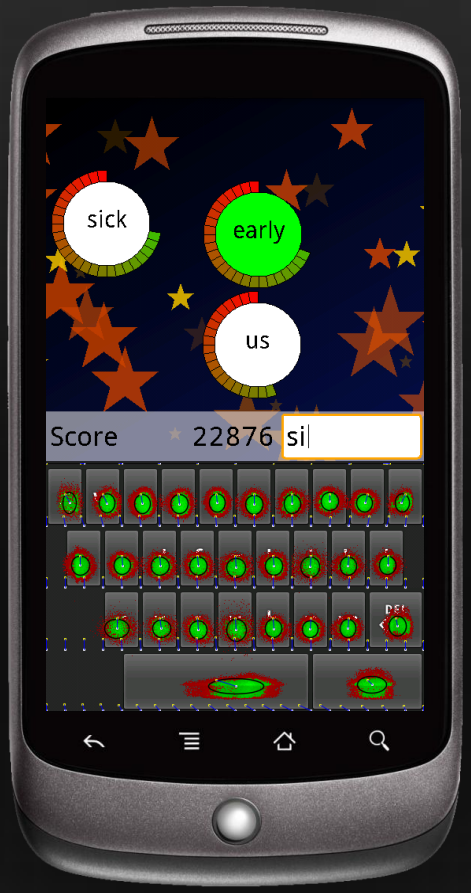
shift
touch positions



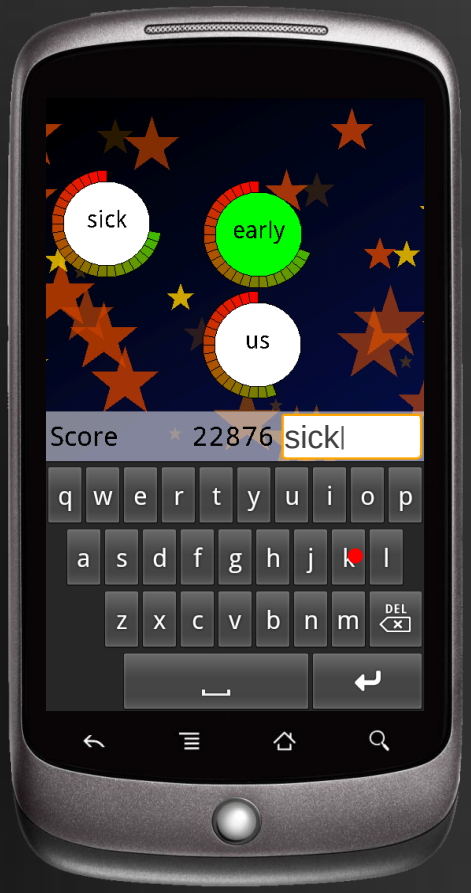
show
touched positions



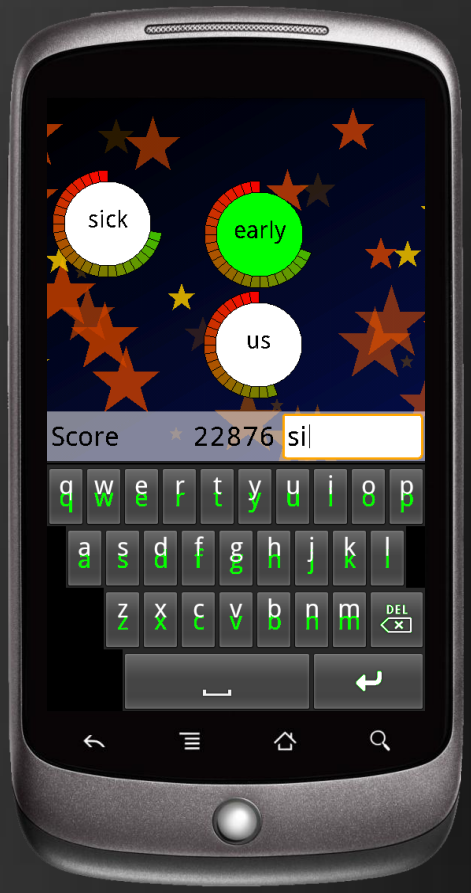
decreases speed
decreases performance
increases error rate



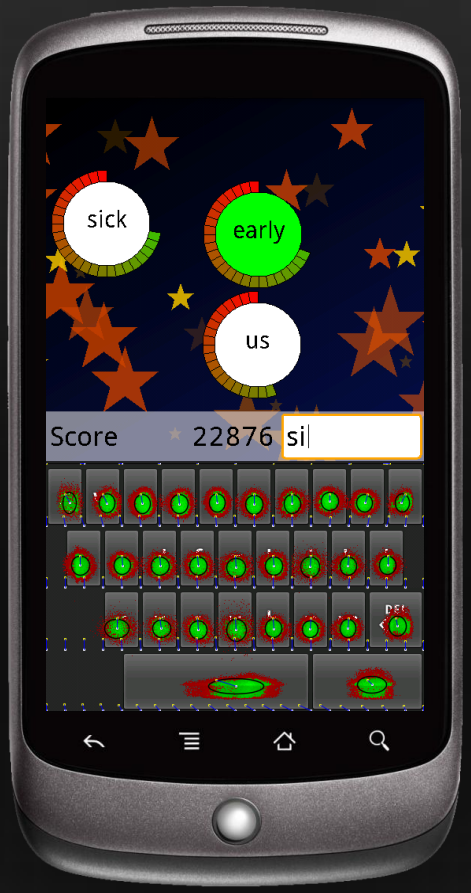
9% lower error rate
2% higher
performance



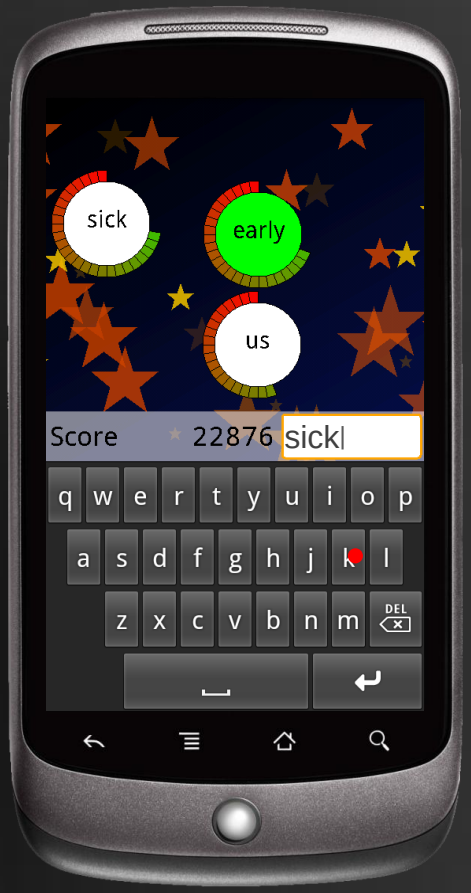
17% lower error rate
5% slower



bad idea



improvement
without costs



it depends

Summary

interactive task implemented in a game

typing data from 72,945 installations

derived potential improvements

compared in an experiment with 13,013 installations

Limitations

artificial task

know little about the players

know nothing about the context

manipulation has only a small effect

Contribution

study “in the wild” to build a model for an interactive task

large-scale mobile between-groups experiment

improve typing beyond specific devices, users, and contexts

Observational and Experimental Investigation of Typing Behaviour using Virtual Keyboards on Mobile Devices

Niels Henze
niels.henze@vis.uni-stuttgart.de
University of Oldenburg → Stuttgart

Enrico Rukzio
enrico.rukzio@uni-due.de
University of Duisburg-Essen → Ulm

Susanne Boll
susanne.boll@uni-oldenburg.de
University of Oldenburg

research in the large

Important dates:

25.05.12 Submission
29.06.12 Notification
23.07.12 Revised manuscript
21.09.12 Workshop in San Francisco!

http://large.mobilelifecentre.org