Reading subtitles across devices:

A study into the differences in reading patterns of people watching subtitled videos on smartphone, tablet and computer screen

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About the study

- Reading across devices
  – part of the HBBTV4ALL project
  (Universitat Autònoma de Barcelona)
- Reading subtitles on three devices:
  - Monitor (22-inch LCD, 1920x1200)
  - iPad Air
  - iPhone (4S)

HBB4all
Connected TV Accessibility

http://www.hbb4all.eu/

Previous eyetracking studies on mobile devices
(Al-Showarah et al. 2014)

- Influence of age on use of mobile devices
  - the elderly have difficulties with processing information and browsing smartphone interfaces across all screen sizes
- Influence of screen size of mobile devices
  - the smaller the screen – the worse the performance, irrespectively of age

Study design

- 3x2 design
  - 3 devices:
    - iPhone
    - iPad
    - monitor
  - 2 languages:
    - English
    - Norwegian

- Subtitle watching experience
  - Comprehension
  - Reading patterns
  - Preferences

Study material

- English film
  - "Joining the dots",
    dir. Pablo Romero Fresco (2012)
  - 3 x 3 min. video

- Norwegian film
  - "Headhunters",
    dir. Morten Tyldum (2011)
  - 3 x 3 min. videos
- Polish interlingual subtitles displayed at 15 cps

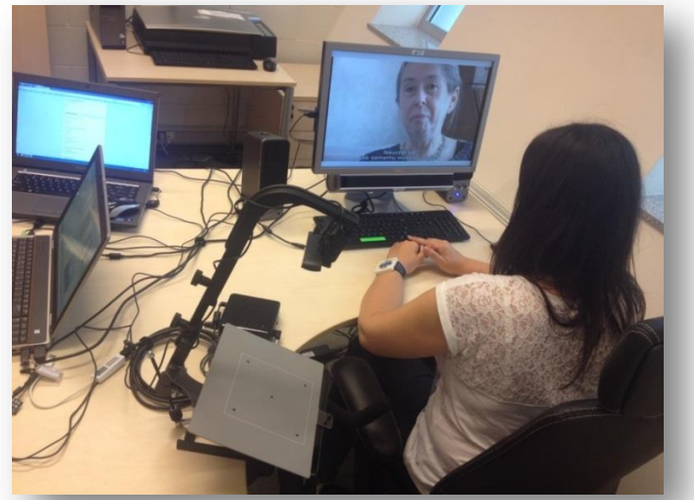
Eyetracking

- SMI Red (250 Hz)
  - Monitor
- Tobii X2 (30Hz)
  - iPhone
  - iPad

- Eyetracking measures
  - Number of fixations
  - Fixation duration
- Fixation threshold: 80 ms

Procedure

- Informed consent
- Videos in counterbalanced order
  - Calibration before each clip
  - 10 multiple choice comprehension questions after each clip
    - 5 on subtitle content (text only)
    - 5 on visual aspects
- Demographic and preference survey
- Total duration: ca. 45 minutes

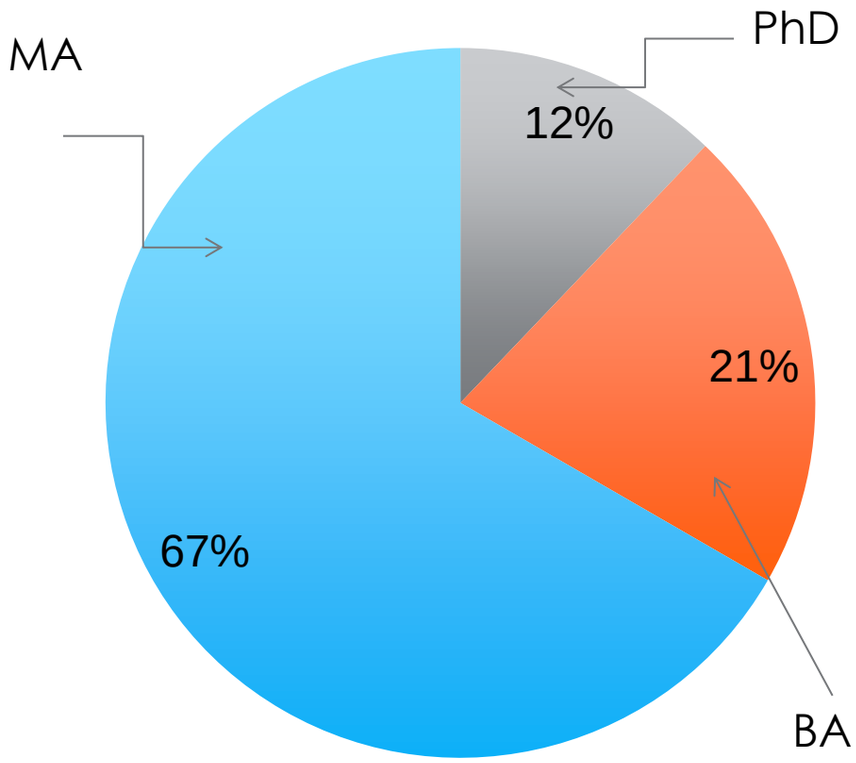


Participants

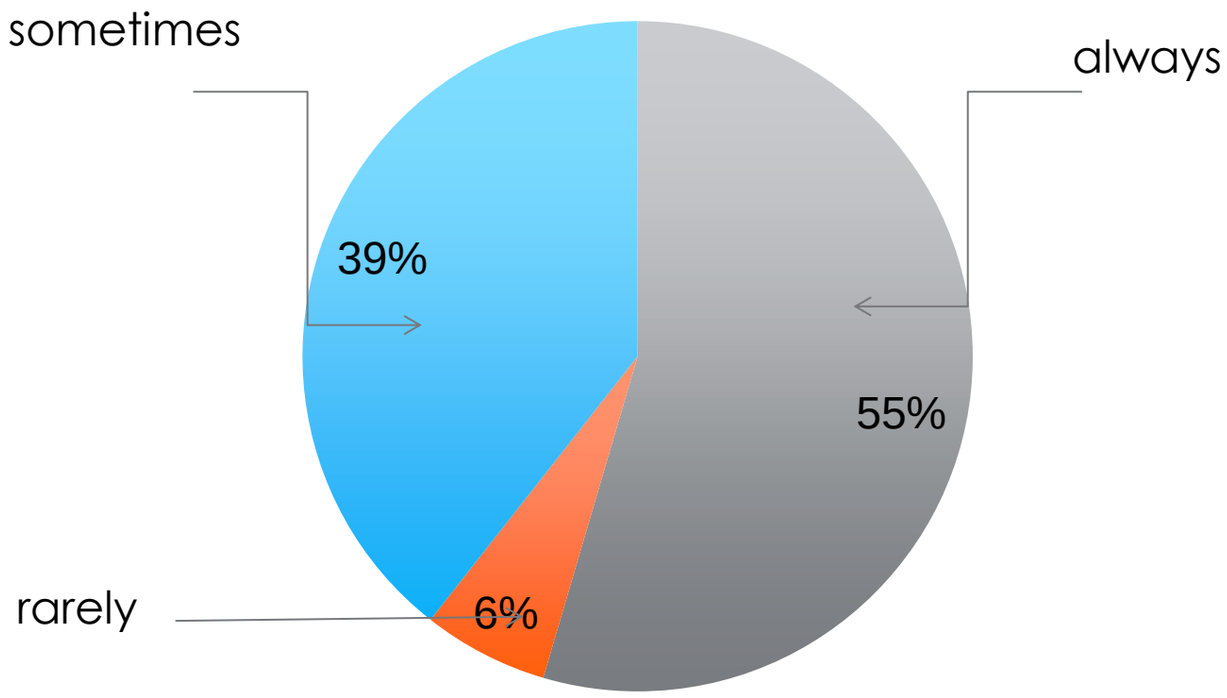
- 33 people aged 20-35
  - Mean age: 24 (SD=3,4)
  - 8 men, 25 women
- Declared proficiency on 1-10 scale (1 – no knowledge, 10 – proficiency)
  - English: **8.79** (SD=1.19)
  - Norwegian: **1.36** (SD=0.55)

Participants' background

Education

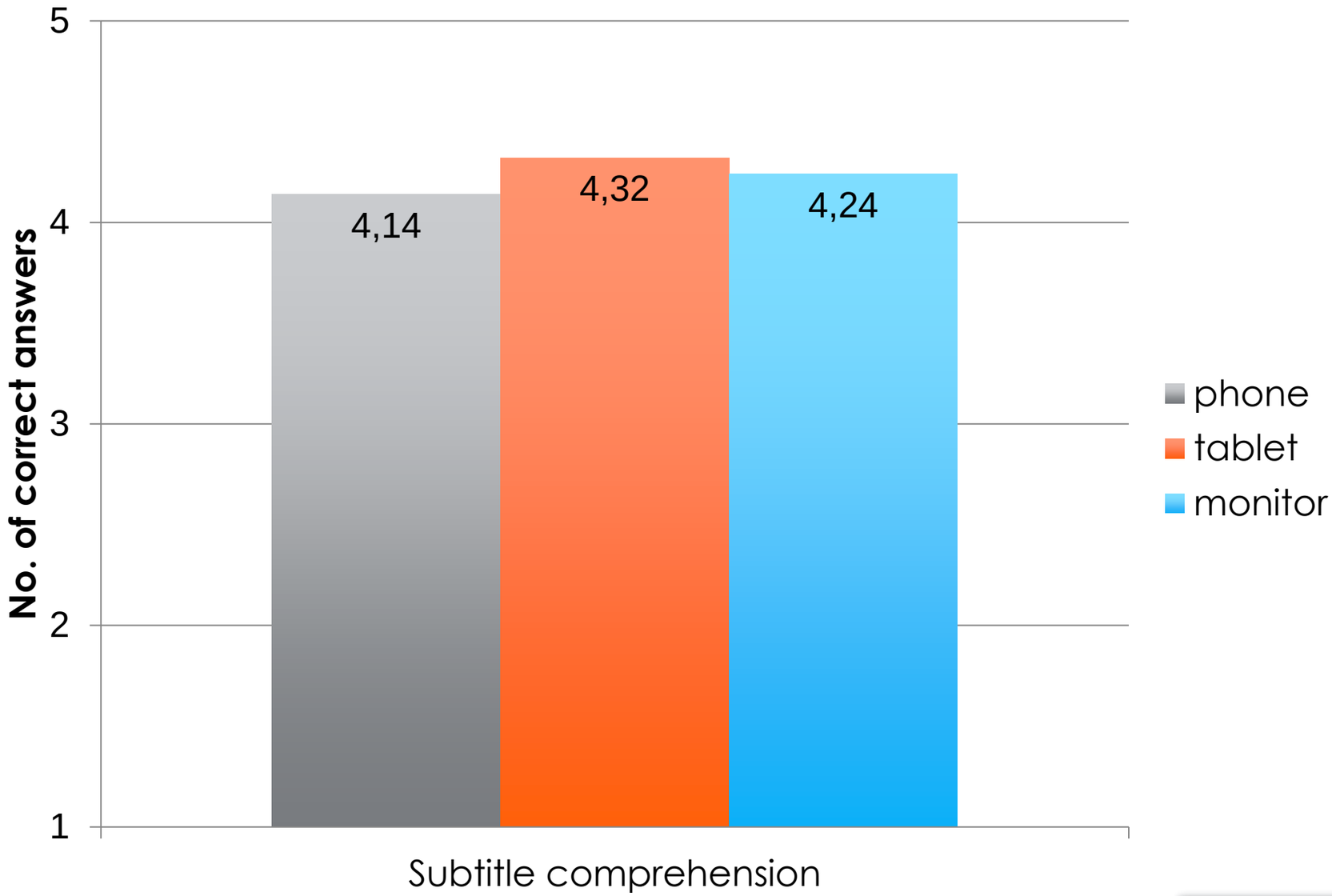


How often do you watch foreign films with subtitles?



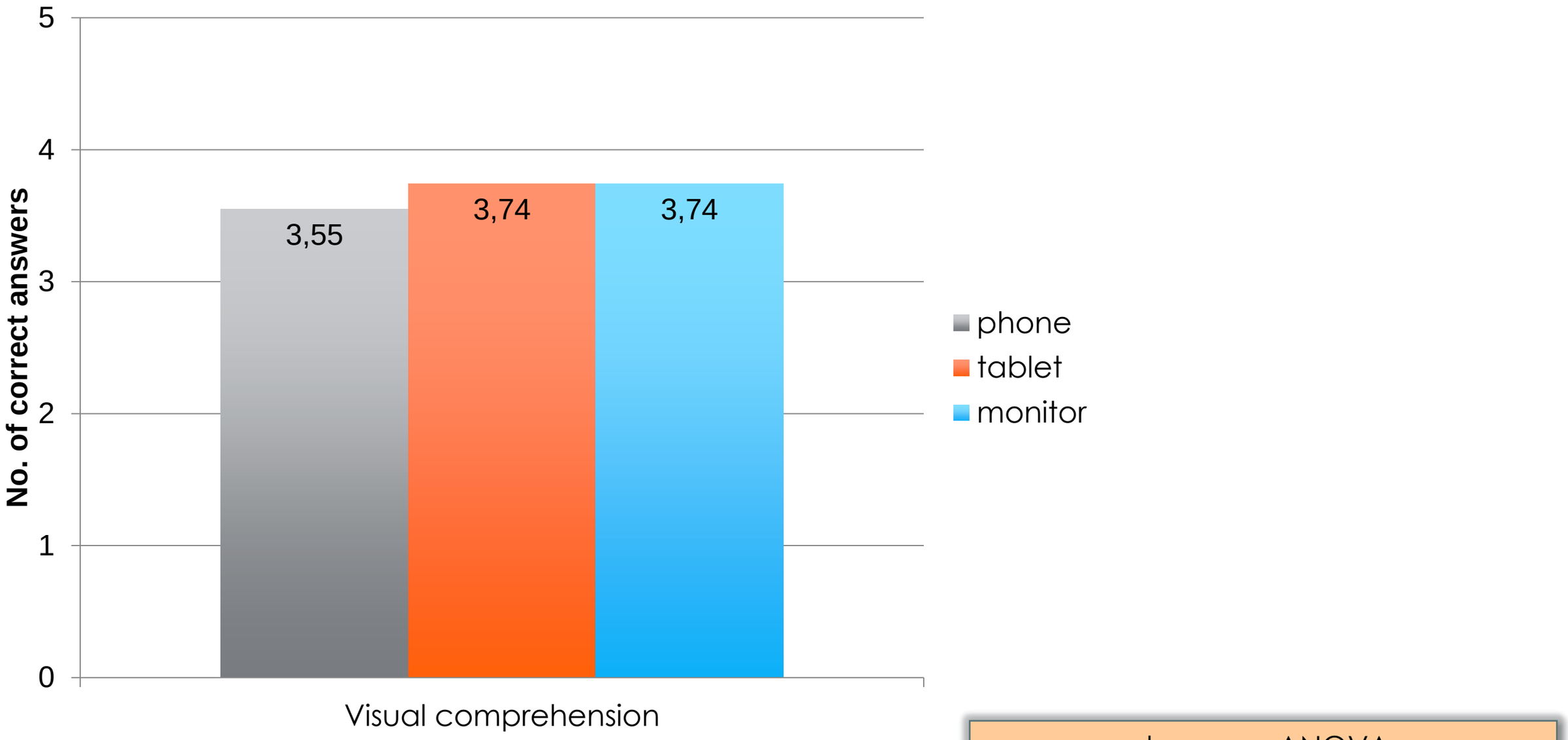
Comprehension results

Comprehension – textual



two-way ANOVA
(variables: device & language)
device: **p=0.4471**

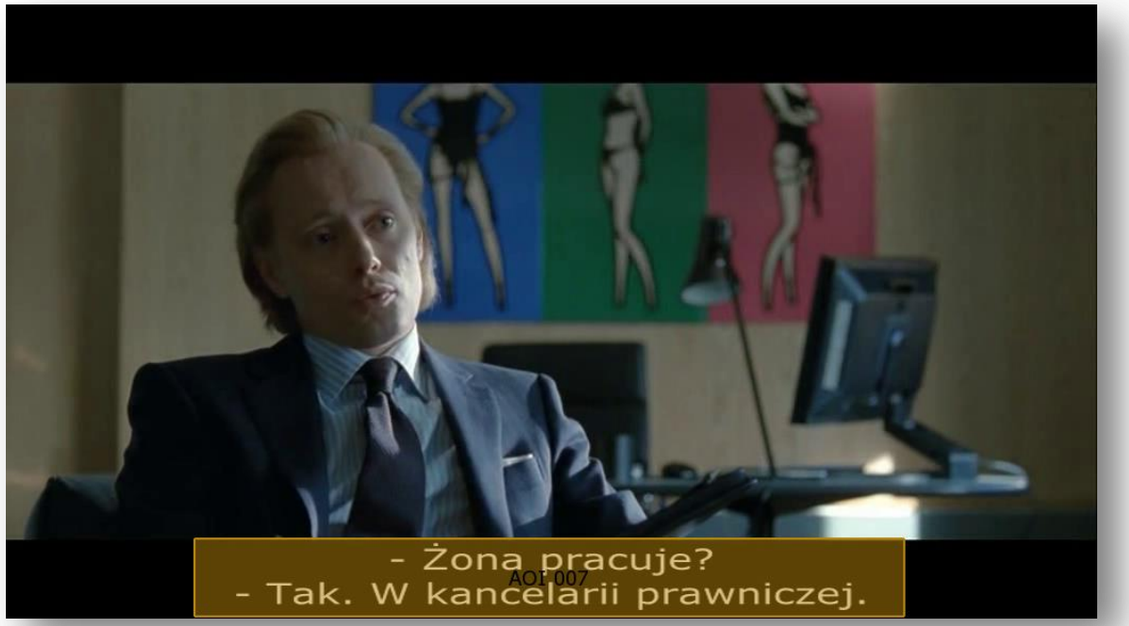
Comprehension – visual



two-way ANOVA
(Variables: device & language)
Device: **p=0.4917**

Eyetracking results

Areas of interest on each subtitle



Fixation count per device

	No. of fixations per subtitle	SD
iPhone	5.28	1.95
iPad	6.13	2.26
monitor	5.65	1.94

two-way ANOVA
(variables: device & language)
Device: ***p*=.0647**

Bonferroni correction
The only significant difference:
between iPhone and iPad (***p*=.0592**)

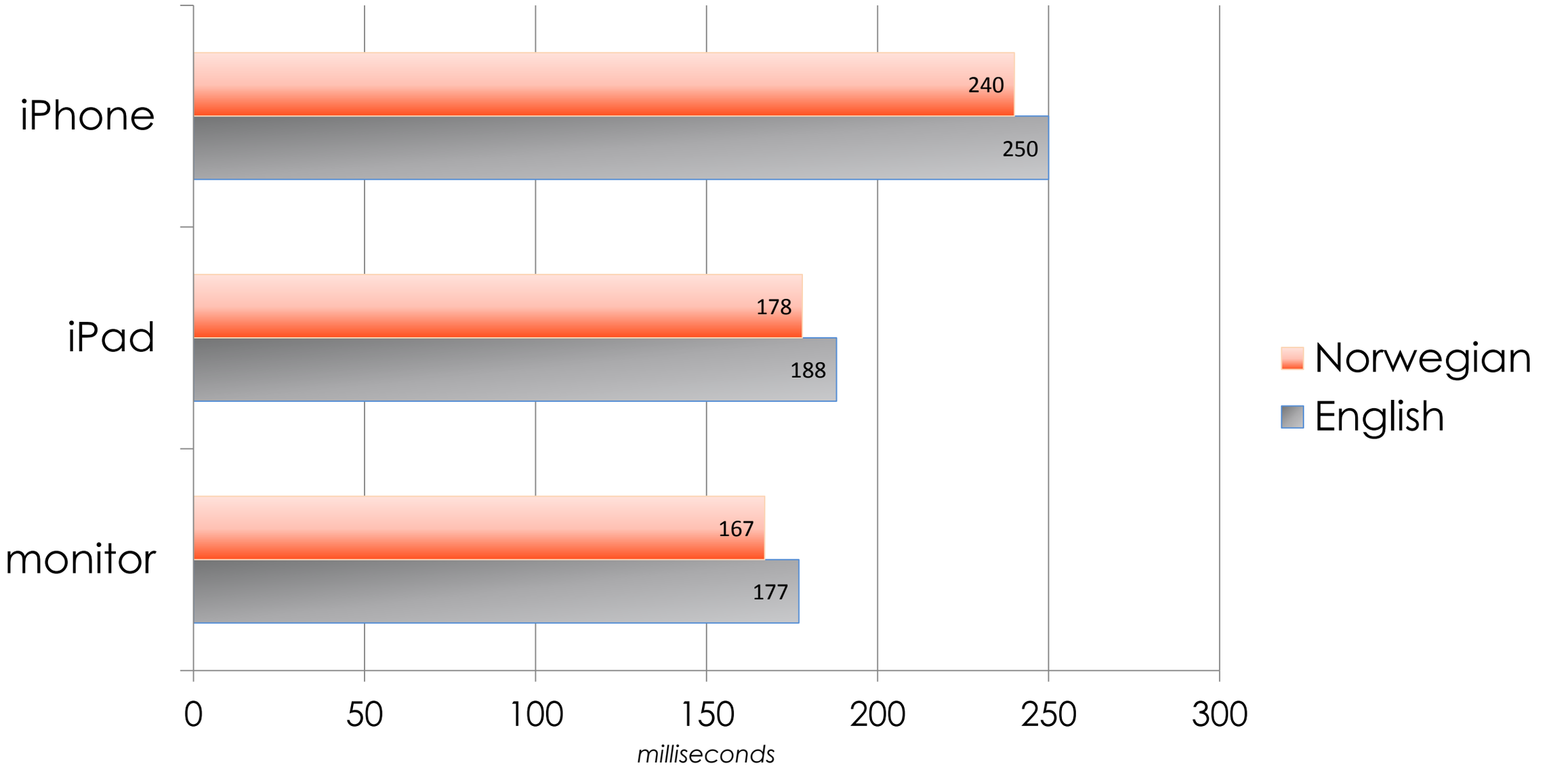
Mean fixation duration per device

	Fixation duration	SD
iPhone	250 ms	43.14
iPad	183 ms	20.73
monitor	172 ms	44.59

two-way ANOVA
(Variables: device & language)
Device: ***p*=.000**

Bonferroni correction:
iPhone vs. iPad & iPhone vs. monitor (*p*=.000)
iPad and monitor (*p*=.1173)

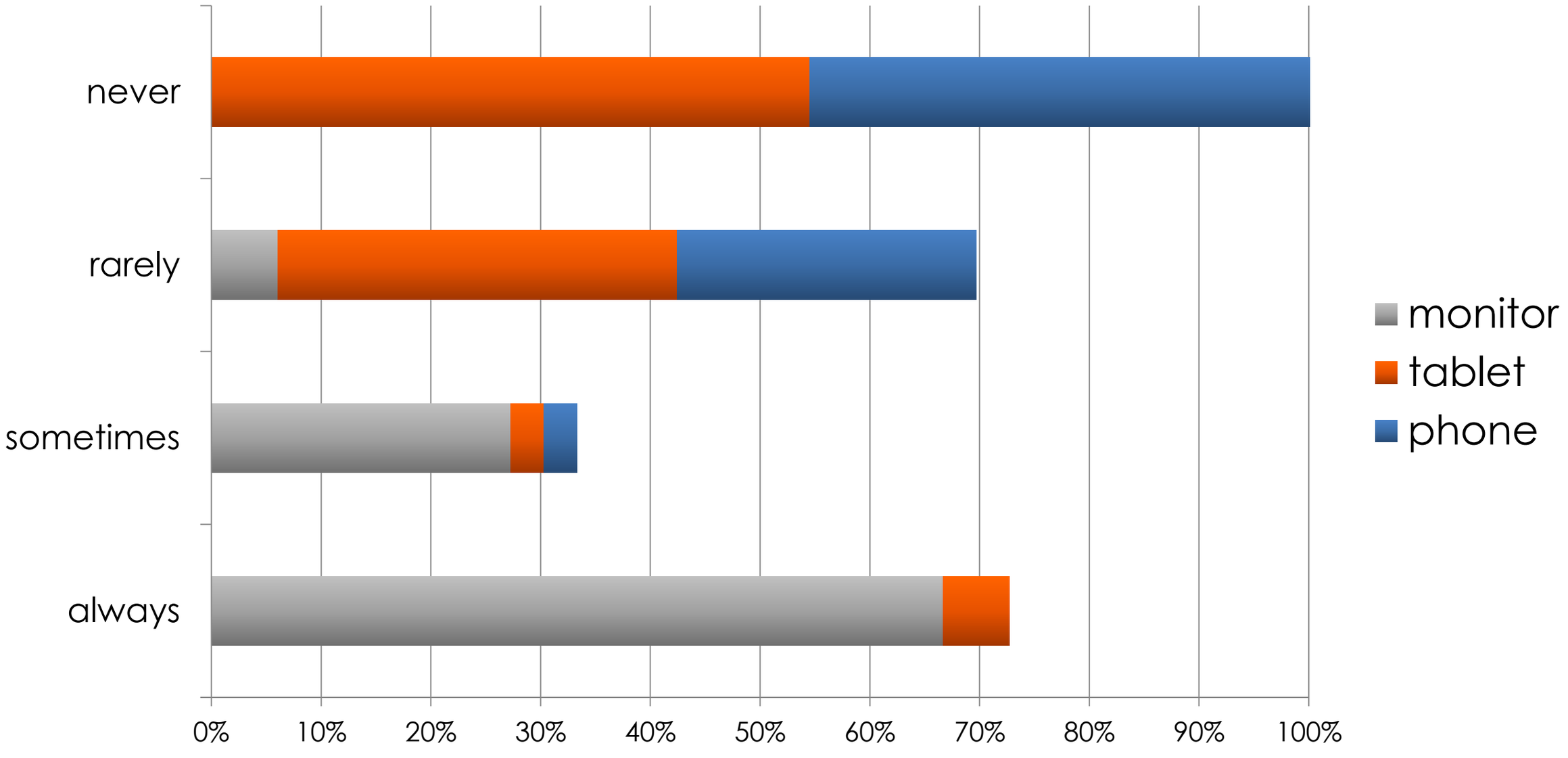
Mean fixation duration by device and language



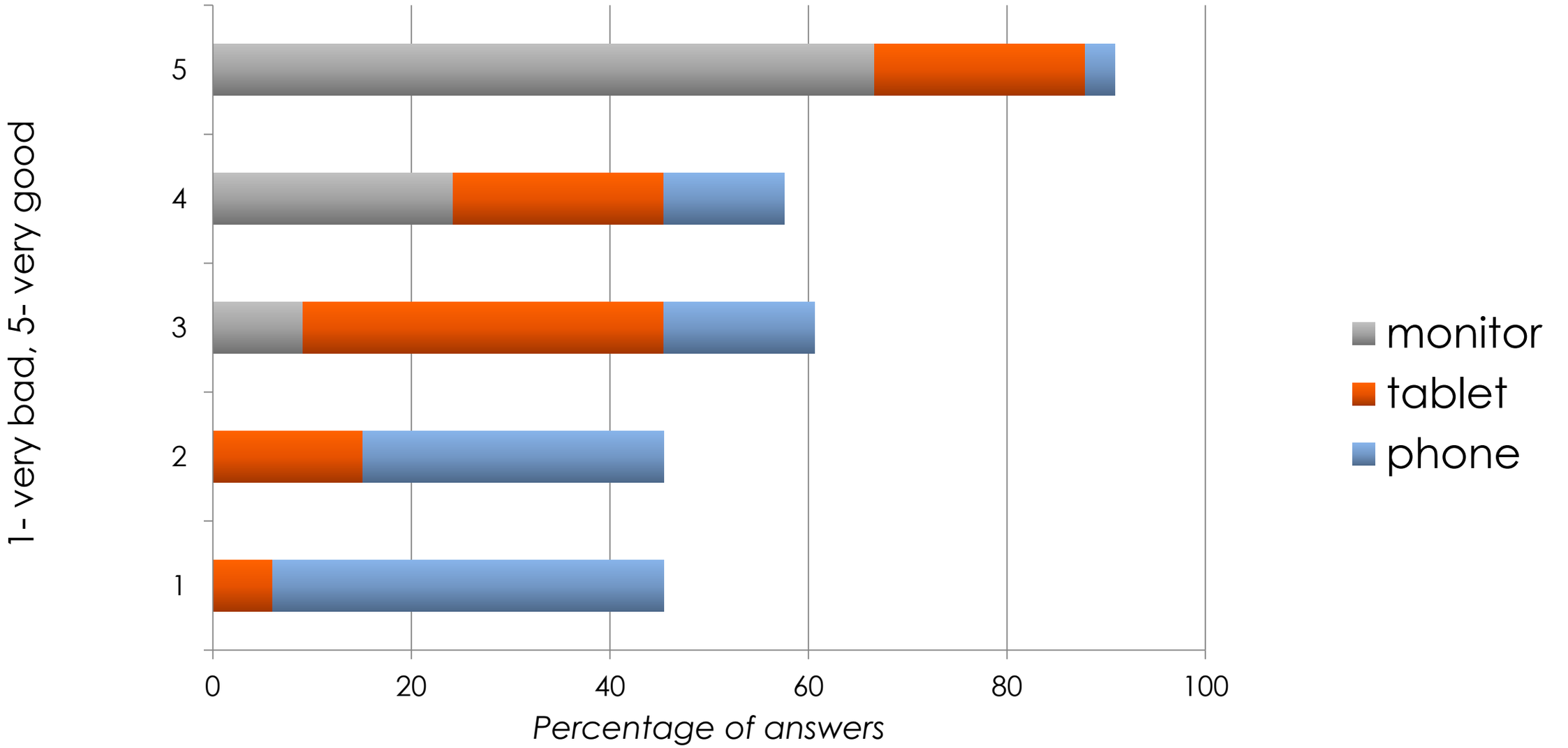
two-way ANOVA
(Variables: device & language)
Device: ***p*=.0256**

Preferences

How often do you watch subtitled videos on these devices?



The comfort of watching subtitled videos by device



Conclusions

- iPhone – the worst device to watch subtitled videos
  - Lowest comprehension results
  - Longest mean fixation duration
  - Fewest fixations – less reading
  - Nobody's preferred device
- Habits inform preferences – other participants?
- Longer mean fixation duration in English than in Norwegian clips
  - Parallel processing of visual and audio content
  - Higher cognitive effort, but more rewarding (higher comprehension scores in English)
- Testing across eyetrackers…

So what…?

HBB 4 all

Connected TV Accessibility

HBBTV (hybrid broadcast broadband)
= digital broadcasting + Internet
+ mobile devices

Smartphones
– secondary devices only with subtitles?

Contact

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