Effects of operating electronic devices while cycling

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Dual task performance

› Mobile phone
  • Calling
  • Texting
    • Use of Smartphone-Touchscreen!
› Listening to music
Divided attention
Use of mobile phone

› Effects: handheld, handsfree
Differences

- 2 vs 4 wheels (control)
- Auditory information
- speed
Observations

› Calling: 2.2%
› Texting: 0.6%
› Music: 7.7%
› Talking: 2.3%
› Just cycling: 86.6%
› Different: 0.5%

> 2000 cyclists observed (video)
Anno 2008
Three experiments
1e: Calling, texting, music

› Control 2, two hands on handlebar
› Control 1, one hand
› Calling (easy task) [\ [+2: 2,4,6,8,\ldots]]
› Calling (demanding task) [\ [-7: 846, 839, 832,\ldots]]
› Send text message [lang zal ze leven...]
› MP3, listening to music
Measurements

› Speed
› Location in cycle path
› Swerving
› Mental effort rating
› Peripheral detection performance
Speed

![Graph showing Speed comparison between Control (2), Control (1), Phone Easy, Phone Difficult, Phone Texting, and MP3.]
Position on cyclepath ("strip")

MP3
Texting
Phone, difficult
Phone, easy
Control (1)
Control (2)
Swerving: no. strip changes

- Control (2)
- Control (1)
- Phone Easy
- Phone Difficult
- Phone Texting
- MP3
Peripheral detection

![Bar chart showing peripheral detection percentages for different conditions: Control (2), Control (1), Phone Easy, Phone Difficult, Phone Texting, MP3. The chart displays the percentage of peripheral detection for each condition, with each bar divided into segments representing different levels of detection (0, 1, 2).](image-url)
Calling & texting

- Slower speed
- Detection
- Lateral control
- Increased mental effort

- Largest effect: texting
Study 2: Music & Handsfree calling
Conditions

› Two **Control** conditions (1, 2 hands)
› Two **Phone** conditions; handheld and handsfree demanding task  [-7: 834,...]
› **Music** conditions: ...
Music conditions

- **M1** one earbud (left ear)
- **M2N** two earbuds – normal
- **M2V** two earbuds – high volume 89 dB
- **M2T** two earbuds – high tempo 180 bpm
- **M2IE** two earbuds – in-ear

- **Normal** = 74 dB, 120 bpm (beats/minute)
Speed
Mental Effort rating
17 participants missed this signal!!
Study 3: Touchscreens, Gaming and more...
Conditions

› Control-conditions
› Phone, handheld (HH)
› Cycle companion, task (CC)
› Texting conditions: ...
Texting conditions

- TC  Texting, conventional phone
- TT  Texting, touchscreen phone
- TTM Texting, touchscreen phone + Music
- GT  Gaming
Speed

Secondary tasks
Lane position (distance to curb)

- Right:
  - C2
  - C1
  - TC
  - TT
  - TTM
  - GT
  - HH
  - CC

- Left:
  - C2
  - C1
  - TC
  - TT
  - TTM
  - GT
  - HH
  - CC
Swerving
Music and calling

› Large effect for *calling* (speed, lat. pos., periphery)
› Larger effect for texting
› Even larger effect for texting on a touch screen phone
› Advantage Handsfree calling limited
› (German law)
› In-earbuds = literally earplugs
Thanks for listening

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References:


