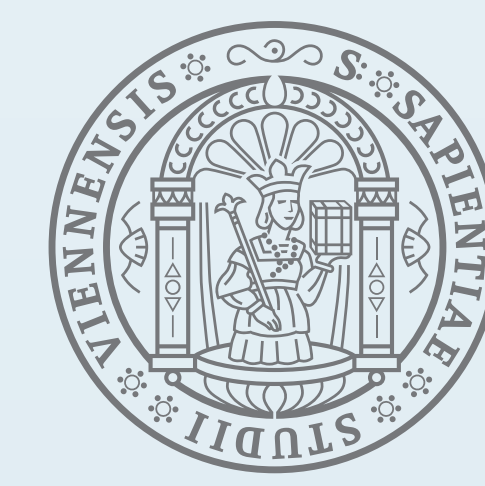


Errare Mobile Est: Studying the Influence of Mobile Context and Stress on Typing Errors in the Field



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Motivation and Research Question

- Users increasingly communicate with their mobile devices on the go
- They have to pay attention to varying contexts outdoors
- Limited mental resources force them to multitask → potential for stress
- Limited attention can lead to errors
- Research Question: Which kinds of contextual factors do influence the occurrence of mobile typing errors? Which role does stress play?**

Field Study

Study Setup

- Builds on **exploratory field study with similar design** [1]
- Semi-realistic field study** setup with fixed route including commute-like contexts (*tramway station, taking the tramway, walking on sidewalk* – see Fig. 1)
- Realistic **chat communication** was emulated by a chat-bot, which sent series of 16 standardized messages over instant messenger Telegram
- Participants were recruited over university courses



Fig. 1: The route participants had to take

Technical Setup

- CoConUT sensor collection app** measured GPS (location, speed, accuracy) and other sensors (QR code for download below)
- Bluetooth chest belt** connected to CoConUT and recorded heart rate in a non-intrusive way
- As indicator for stress, **RMSSD (root-mean square of successive differences of time spans between heart beats in milliseconds)** was calculated as HRV (*heart rate variability*) measure
- Modified software keyboard** logged every key press for calculation of **typing slips** (number of backspace presses in relation to number of all pressed software buttons)

Results

- 44 participants** (35m / 9f) took about 15 ± 1.8 minutes to complete the outdoor part
- Single phases had the following durations: Station 1: 162 ± 76 sec, Tram 1: 192 ± 35 sec, Station 2: 212 ± 137 sec, Tram 2: 201 ± 41 sec, Walking: 520 ± 57 sec
- Only about 50% realized they were communicating with a bot, 27.3% were unsure and 22.7% did not realize

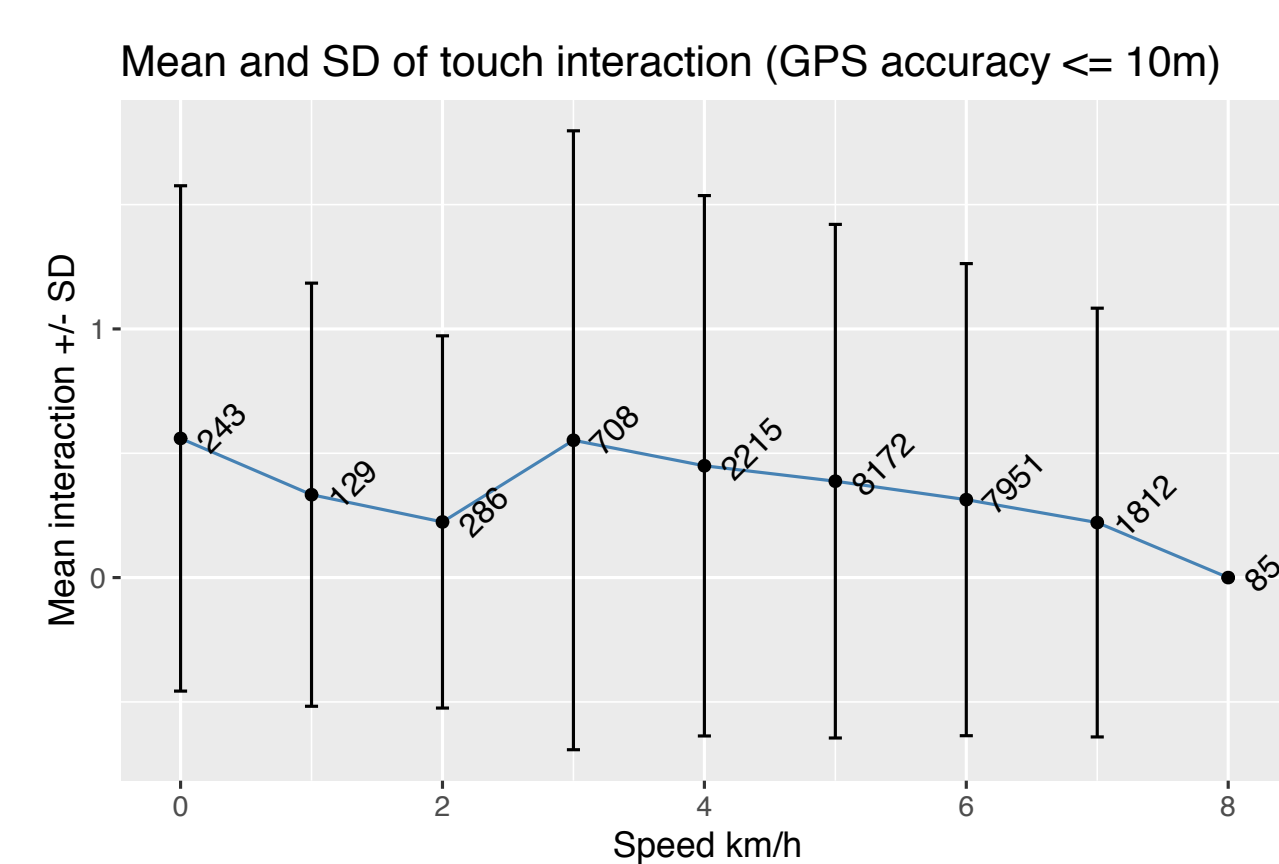


Fig. 2: Mean and sd of screen touch interactions per second over walking speed for the *Walking* phase. The numbers of touches for each speed are specified in the graph

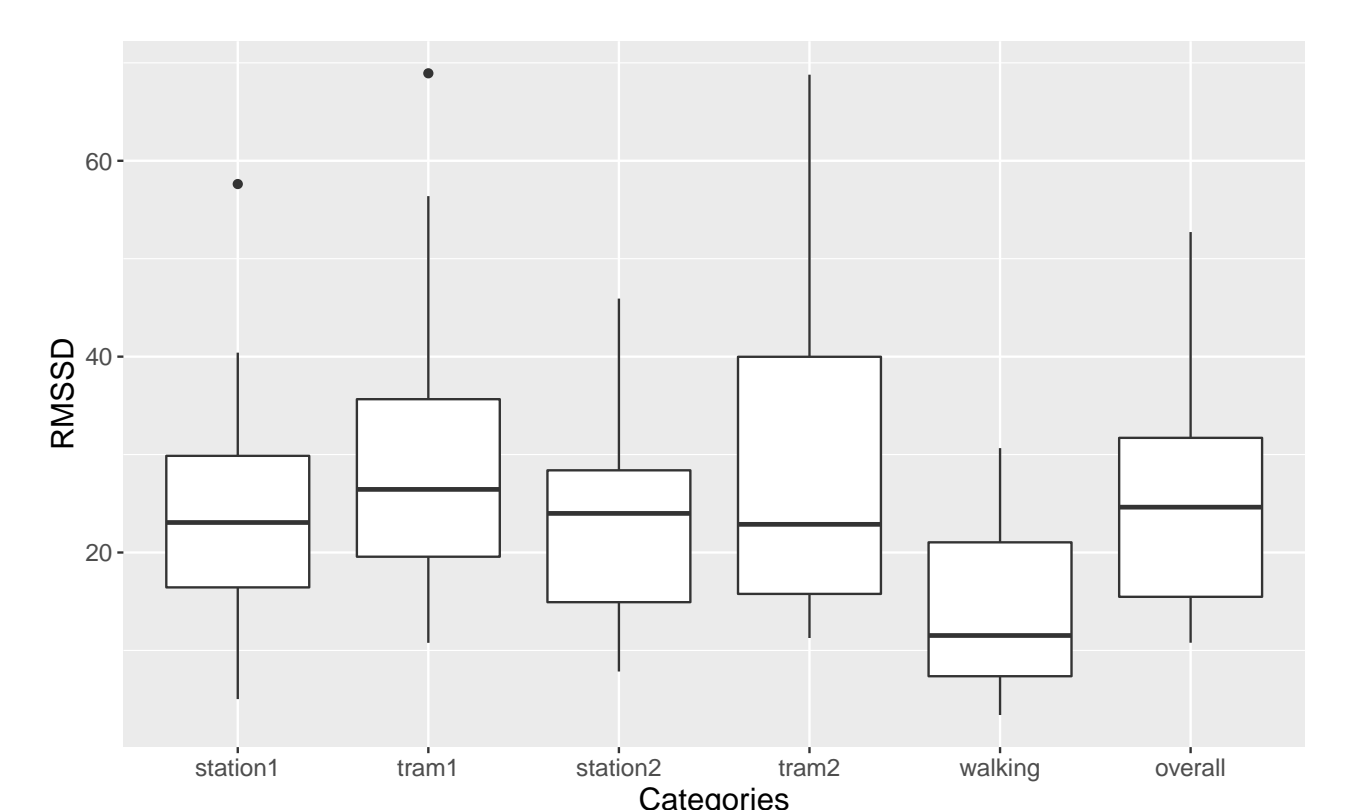


Fig. 3: RMSSD values per category. As reference, users aged 20-29 have an average RMSSD value of approximately 43 ± 19 [2]

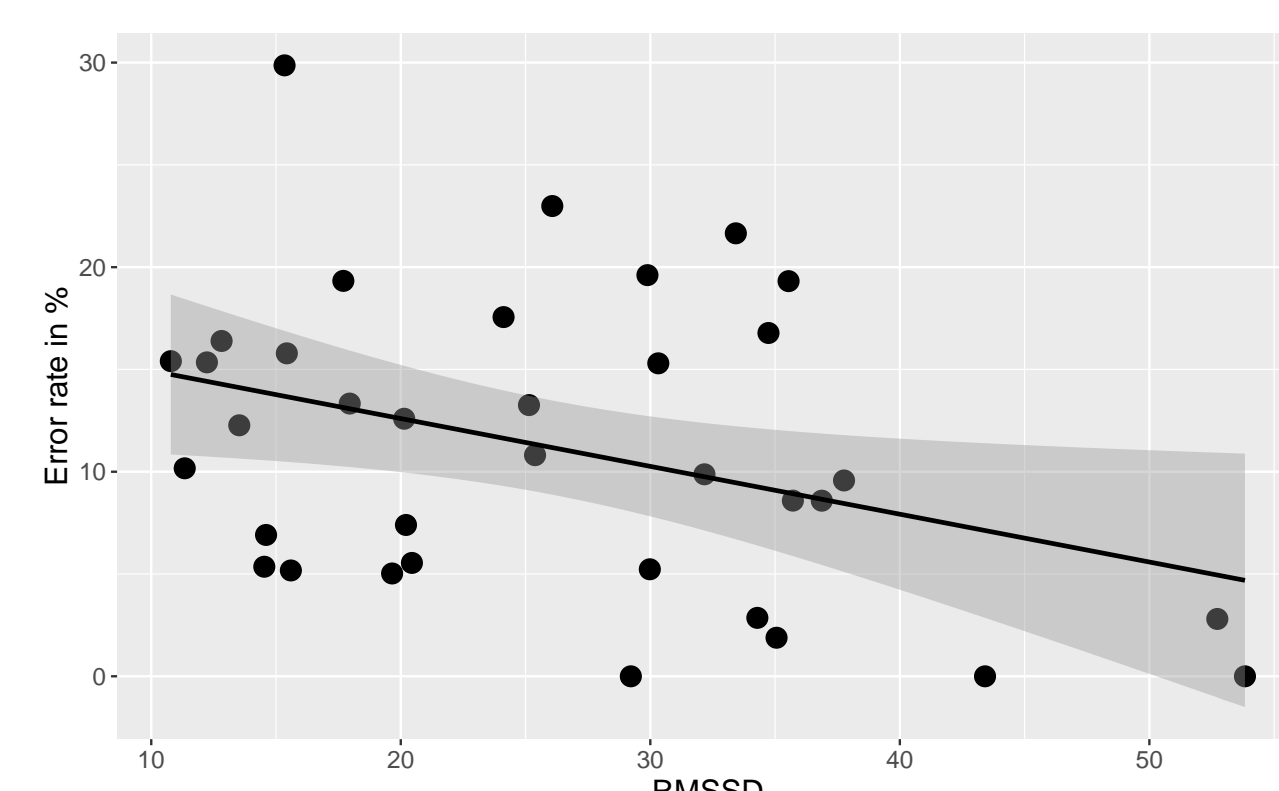


Fig. 4: Error rate in relation to RMSSD value per participant for the whole experiment

Category	mean	sd	median
Station	9.13	7.16	6.67
Tramway	12.04	9.30	10.64
Walking	10.55	8.91	11.30

Tab. 1: Mean, sd and median of error rates in percent for different parts of the route

Contributions

- Users do not slow down to type on their smartphones during walking** (see Fig. 2), **although walking stresses them** (see Fig. 3)
- Typing during walking did not significantly raise the error ratio above the other categories** (see Tab. 1)
- Users that are more stressed tend to cause more typing errors** (see Fig. 4)

Further Information



Homepage of the COSY (Collaborative Systems) Research Group



Download the CoConUT sensing app for Android

[1]: S. Schröder, J. Hirschl, and P. Reichl: "Exploring the Interplay of Context and Interaction in the Field". In: *2018 Tenth International Conference on Quality of Multimedia Experience (QoMEX)*. IEEE. 2018, pp. 1–6.

[2]: K. Umetani, D.H. Singer, R. McCraty M. Atkinson: "Twenty-four hour time domain heart rate variability and heart rate: relations to age and gender over nine decades". In: *Journal of the American College of Cardiology*. 1998, 31(3), pp. 593-601.