

# Situational Impairments During Mobile Interaction

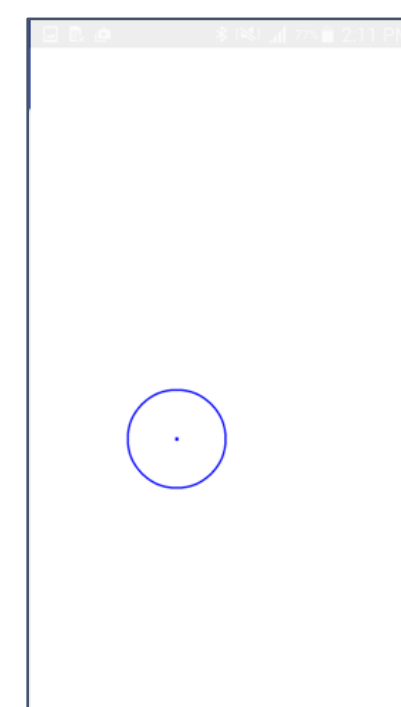
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## Motivation

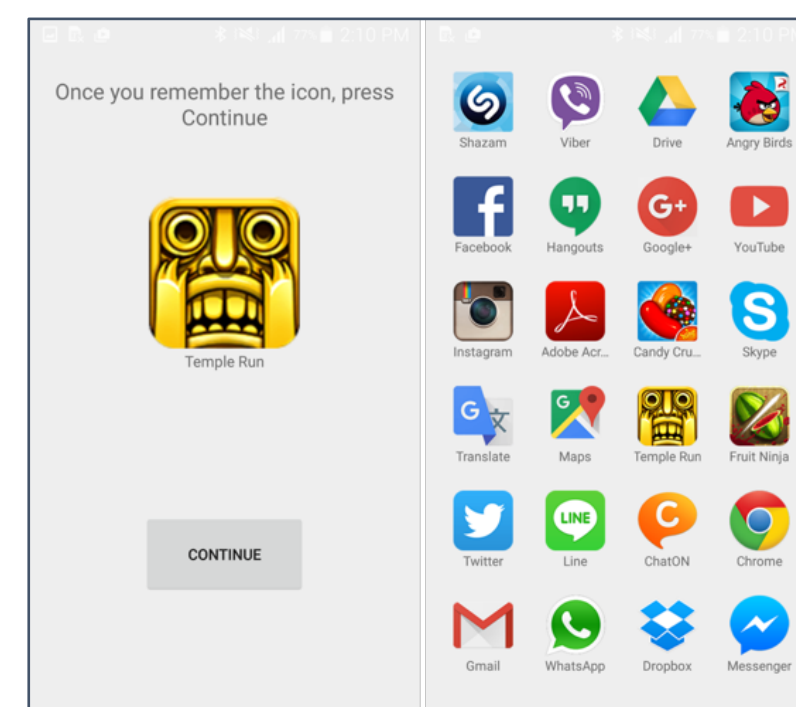
Previous work has highlighted how cold ambient temperature can cause people to become situationally impaired (physically and cognitively). In our work, we investigate the effect of acute cold exposure on vigilance and fine-motor movements during mobile interaction. We argue that a better understanding of situational impairments might increase our understanding of needs for improved accessibility and adaptive user interfaces [1].

## Methods

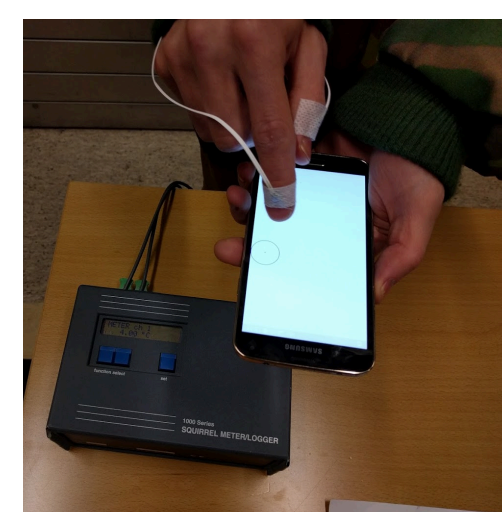
We considered two primary sets of human functions that govern how people interact with mobile devices: physical and cognitive. We measured physical performance with touch offset and time taken to press the target using TapCircle application. We measured cognitive performance with time taken to find an app icon using FindIcon application. We recorded finger temperature and smartphone battery temperature during the experiment.



TapCircle App



FindIcon App



Two-handed Interaction mode



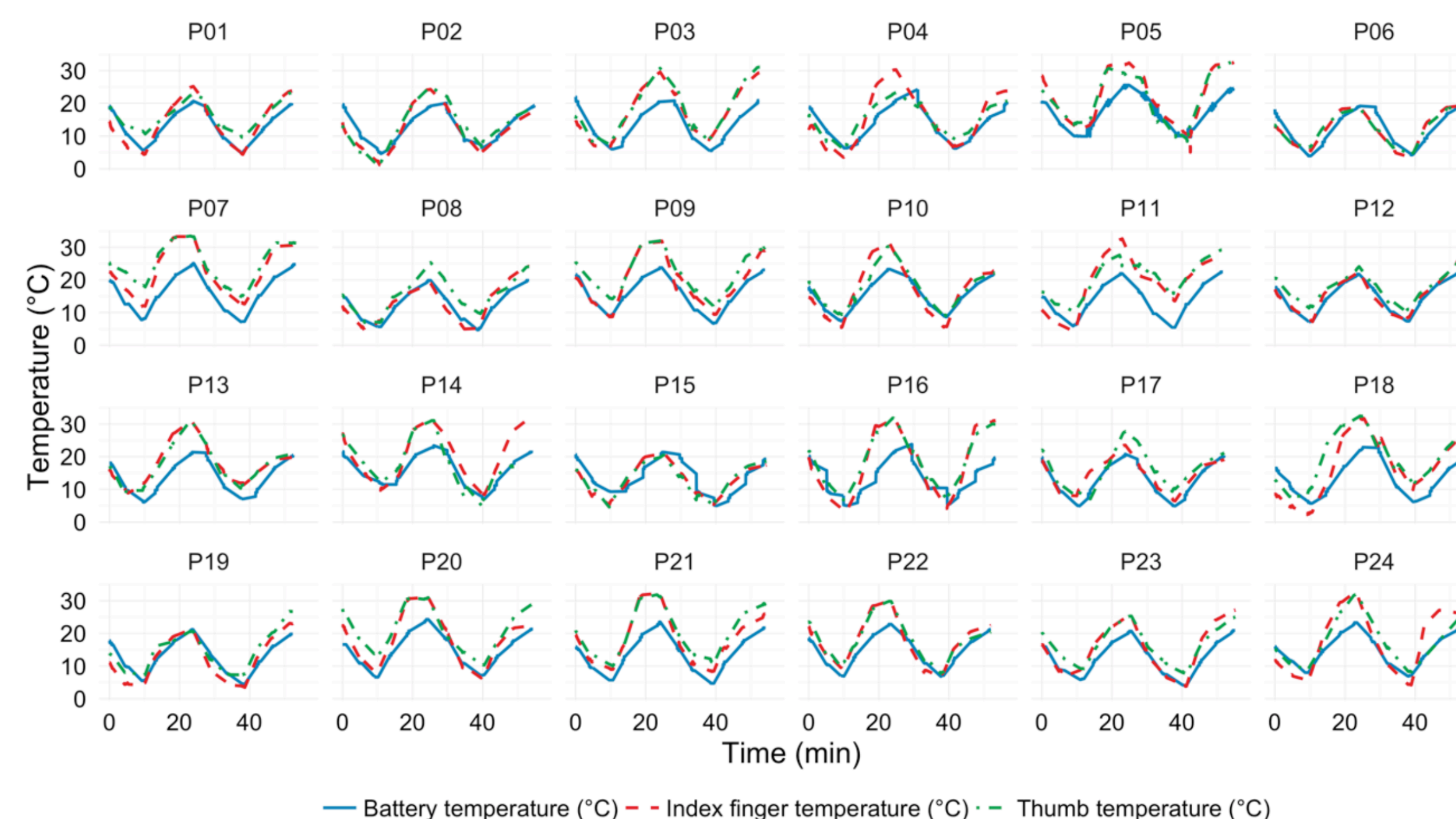
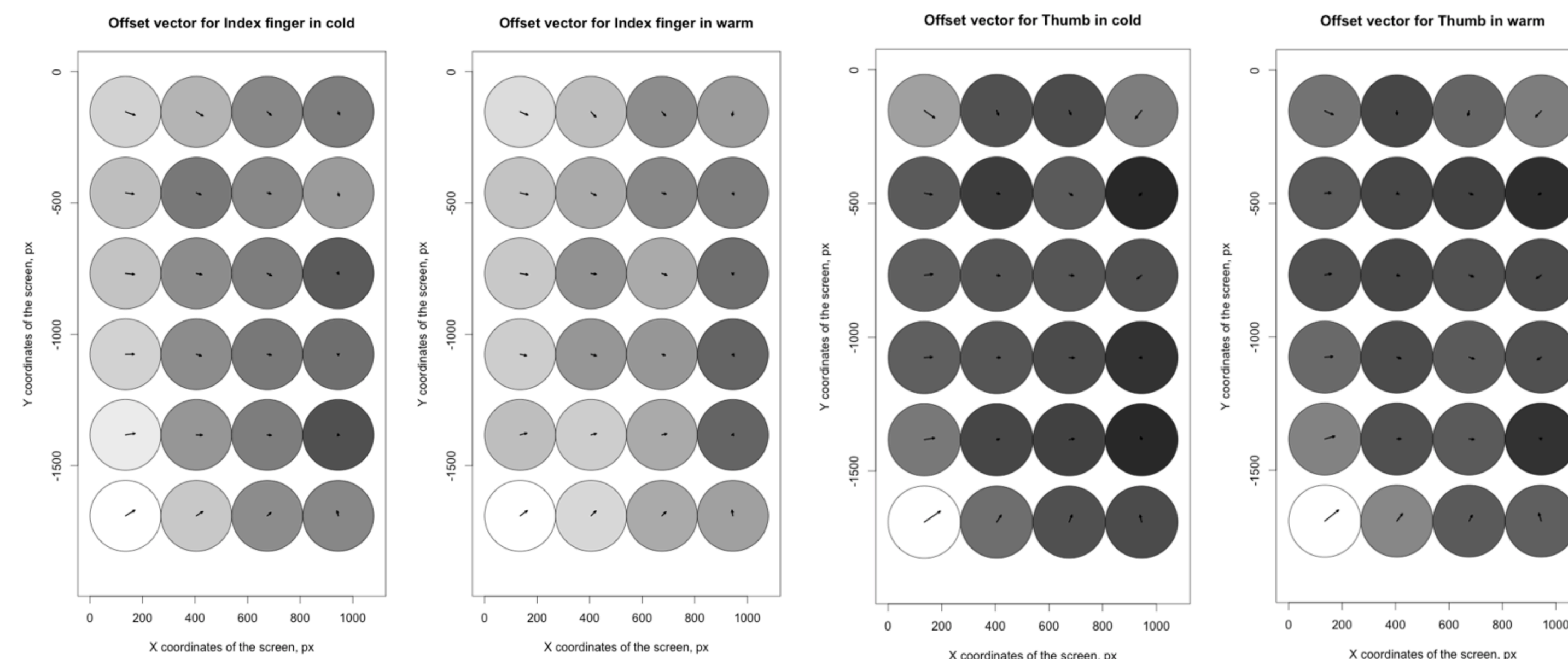
One-handed Interaction mode



Participant completing task in the cold chamber

## Results

- Participants took less time to tap the circles in the warm room than in the cold chamber.
- The offset was smaller in the warm room (vs. the cold room).
- The offset size was larger for one-handed (vs. two-handed).
- Participants were significantly slower in memorising an icon in the cold than in the warm room.
- A positive correlation was observed between participants' finger temperatures and the phone's battery temperature.



## Conclusion

- We found that in a cold environment the touch accuracy decreases, the target acquisition offset was significantly longer, and participants took significantly longer time to hit a target.
- We also found that there was a relationship between finger temperature and battery temperature, which implies that cold-induced situational impairments can be predicted using off-the-shelf smartphones.

## Future work

We intend to investigate the effect of other situational impairments on mobile interaction, such as



Ambient Noise



Cognitive load/ Stress



Visual Impairments

## References

[1] Jacob O. Wobbrock. 2006. The future of mobile device research in HCI. In *CHI 2006 workshop proceedings: what is the next generation of human-computer interaction*, 131-134.

