The role of technological skills and privacy concerns in willingness to share smartphone sensor data

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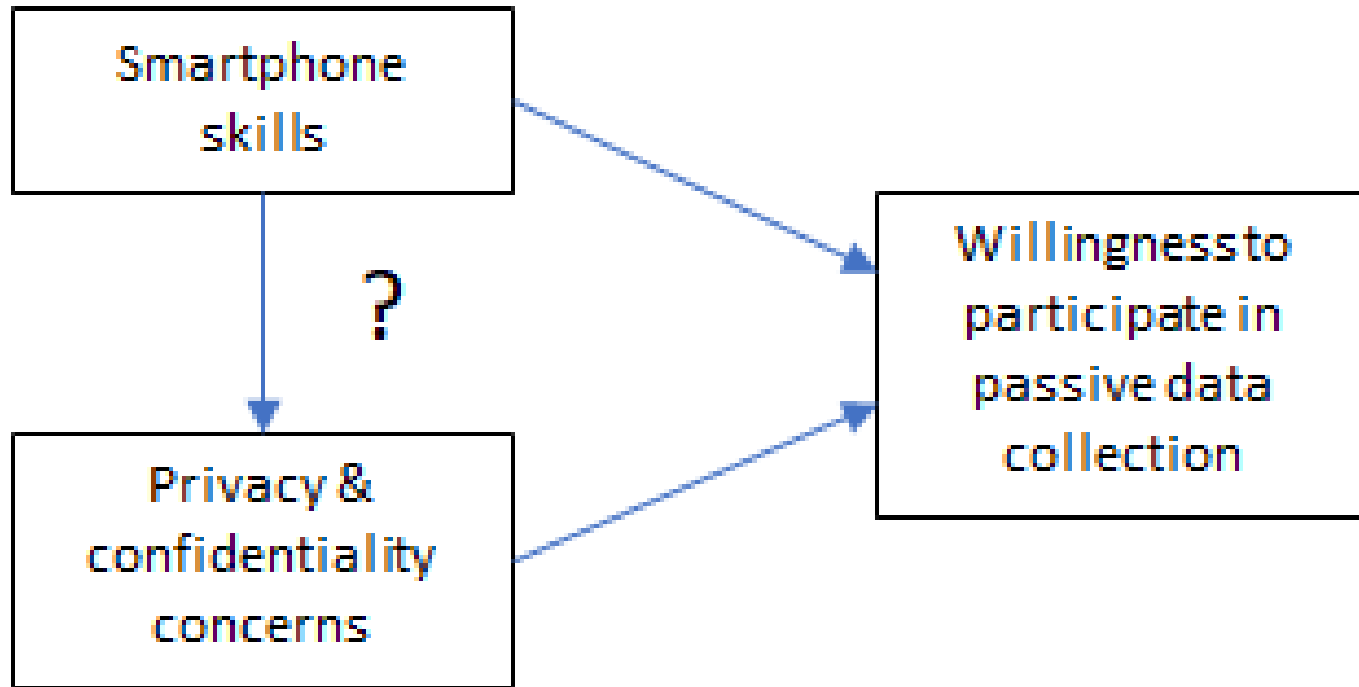Florian Keusch (University of Mannheim)

Background: Privacy concerns

- Main reason against participation (Revilla et al. 2018, Jäckle et al. 2019; Keusch et al. 2019, Struminskaya et al. 2021)

- Trust questionnaire gurantees anonymity – higher WTP (Revilla et al. 2018, Struminskaya et al. 2021); Higher WTP of others – higher own WTP (Struminskaya et al. 2021)

- Lower WTP if high security concerns (Keusch et al. 2019, Wenz et al. 2019)

- Higher WTP if R's trust that data will not be shared with others (Keusch et al. 2019)

- The more situations R's perceive as violations of privacy online (by banks, gov't, social media etc.) the lower WTP (Keusch et al. 2019)

- Not significant „get suspicious easily, important to live in secure surroundings" (Revilla et al. 2018), General privacy concern mixed results (n.s. Keusch et al. 2019, but sig. in Struminskaya et al. 2021)

Background: SP skills

- Over 40% claim lack of confidence in smartphone skills as reason against participation (Jäckle et al. 2019)

- Higher WTP if R's share content on Facebook, like sharing about private lives (Revilla et al. 2018)

- Not significant: self-rated skills (Keusch et al. 2019; Wenz et al. 2019; Struminskaya et al. 2021), frequency of device use (Keusch et al. 2019; Wenz et al. 2019)

- Higher WTP for higher intensity of use (Keusch et al. 2019; Wenz et al. 2019; Struminskaya et al. 2021)

- Lower WTP among frequent users if task requires downloading app, higher if task is active (Wenz et al. 2019)

Research gap: concerns vs. skills nexus

Research questions

- Does concern about participating in smartphone data collection differ by the type of data collected on a smartphone?

- Do concerns vary across subgroups of smartphone users with different levels of smartphone use habits?

- How do skills and concerns influence the willingness to collect sensor data?
  - How are general privacy concerns related to specific concerns?
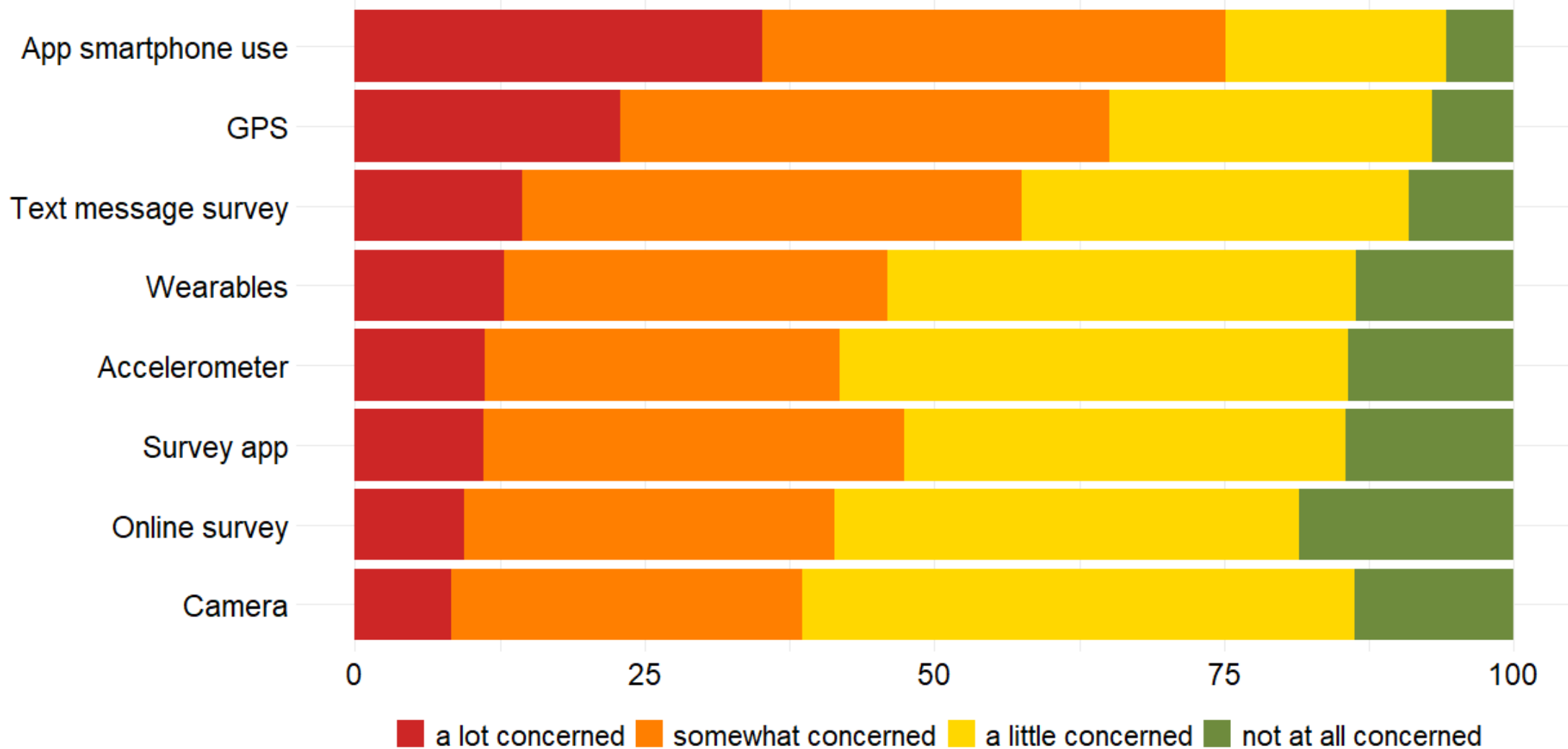 - How are general smartphone skills related to specific skills?

Data

- Probability-based online panel in the Netherlands (LISS Panel)

    - Wave 1
        2,817 smartphone users (AAPOR RR1 = 83.5%)
        March 2019
        Duration: about 6 min

    - Wave 2:
        2,537 smartphone users (AAPOR RR1 = 90.4%)
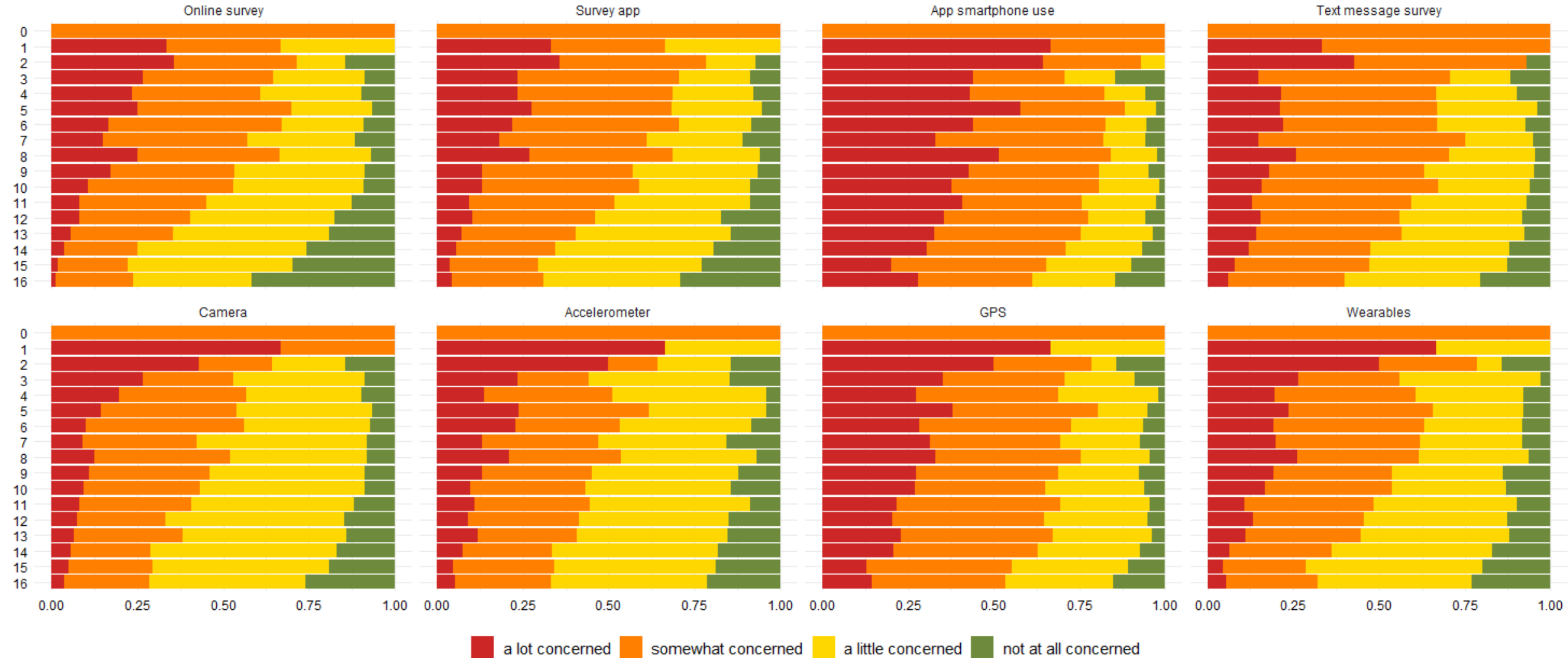   April 2019
        Duration: about 2 min

Concern & type of collected data

Concern by Type of Collected Data

LISS Panel

Concern and # of smartphone activities

General, specific skills and concerns & Influence on WTP

WTP measure

Please read the following idea for a study carefully.

Imagine that a **Dutch university** invites you to participate in a research study that includes using your smartphone to share your **GPS location**.

This is done by **downloading a research app**.

The data the research app collects from your smartphone will help the researchers to learn more about how people move and travel day-to-day.

The study will last for **one week** and you should **leave the research app installed** on your smartphone until the end of the study.

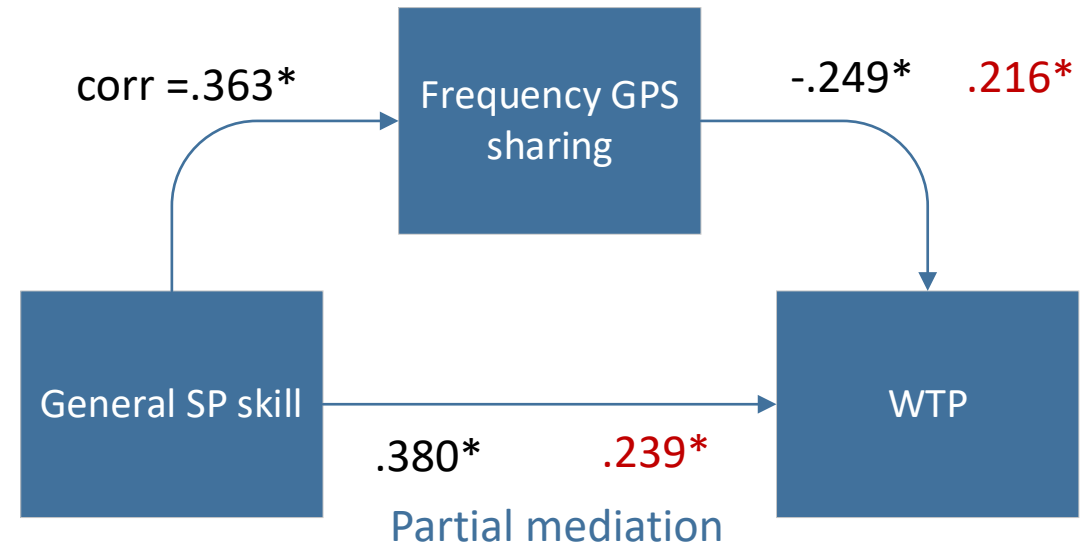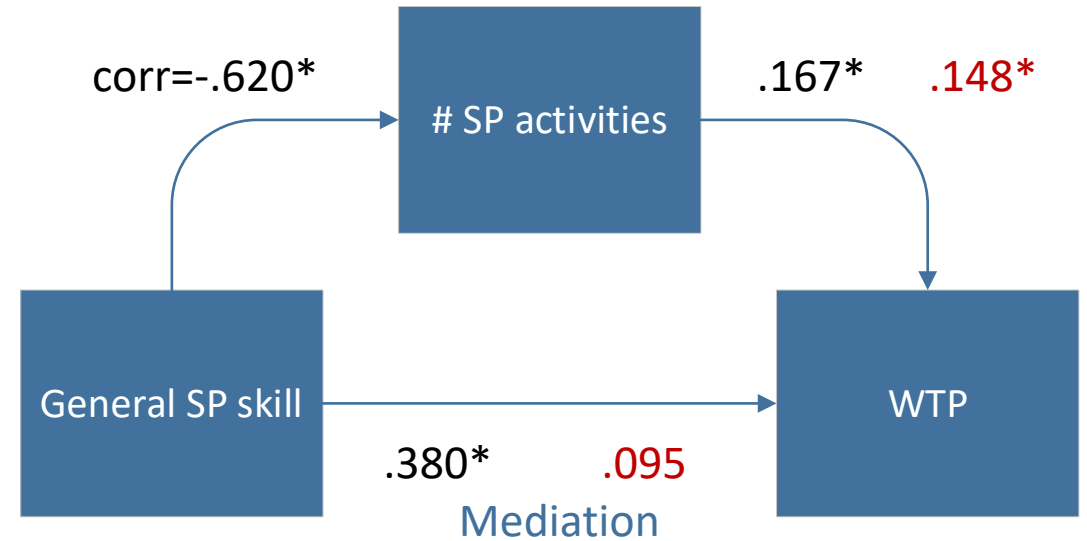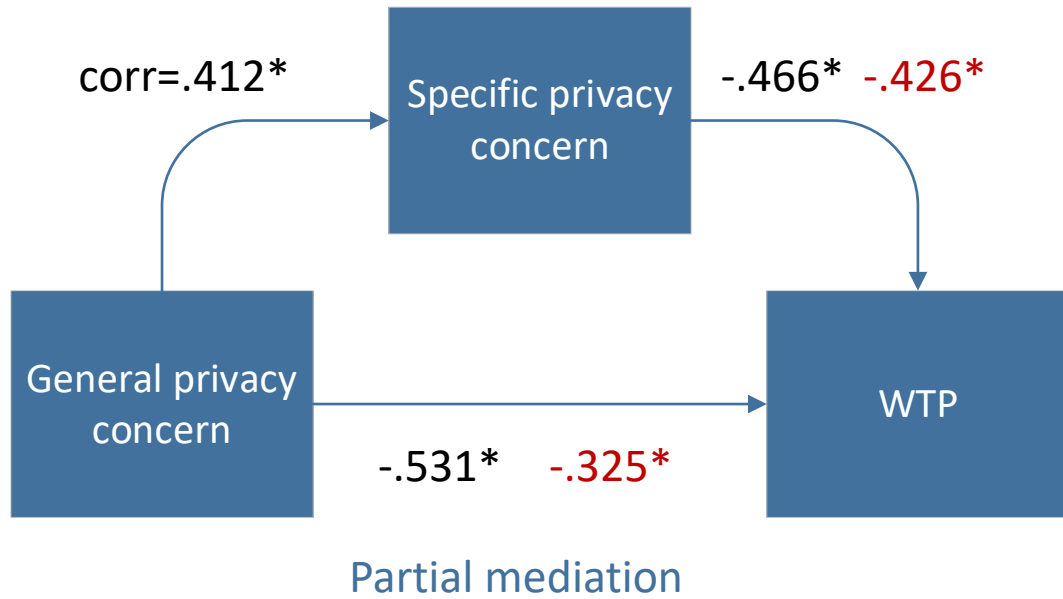You can **switch the research app on and off** during the study.

For downloading the app you will receive **10 Euros**.

Would you download the app? (Yes/ No)
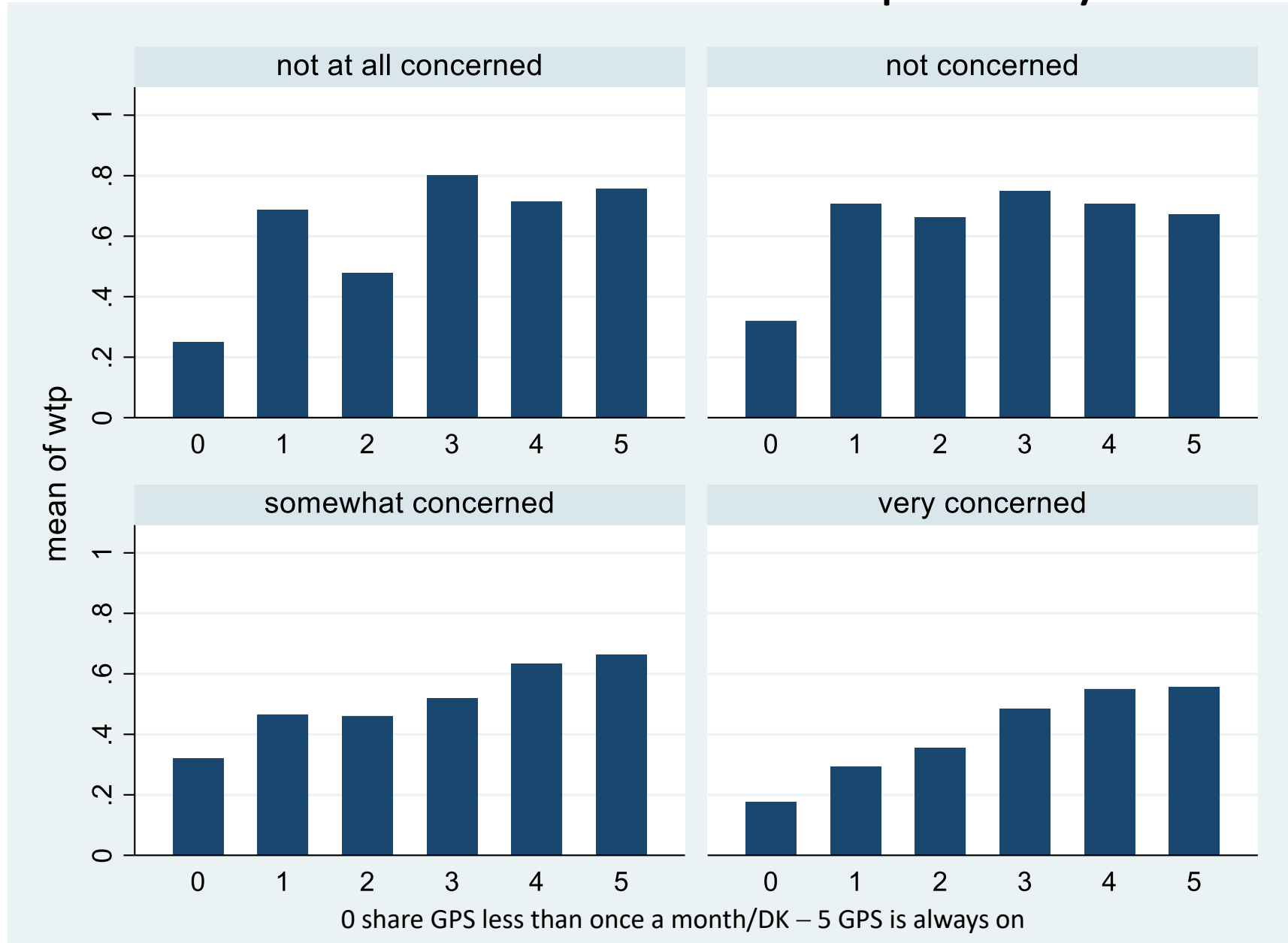
Skills measures

- How would you describe your skills as a smartphone user? (beginner – advanced, 5-pt.)

- Number of activities on a smartphone

- How often do you agree to share your location using GPS/location-aware apps on your smartphone?
(GPS location sharing is always on; Several times a day; About once a day; Several times a week; Several times a month; About once a month or less; Don't know)

Concerns, skills, & WTP

corr=-.620*   .167*   .148*

SP activities

General SP skill → WTP   .380*   .095

Mediation

corr=.412*

Specific privacy concern   -.466*   -.426*

General privacy concern → WTP   -.531*   -.325*

Partial mediation

corr =.363*   Frequency GPS sharing   -.249*   .216*

General SP skill → WTP   .380*   .239*

Partial mediation

corr = Spearman correlation; Logistic regression coefficients; *p<.001

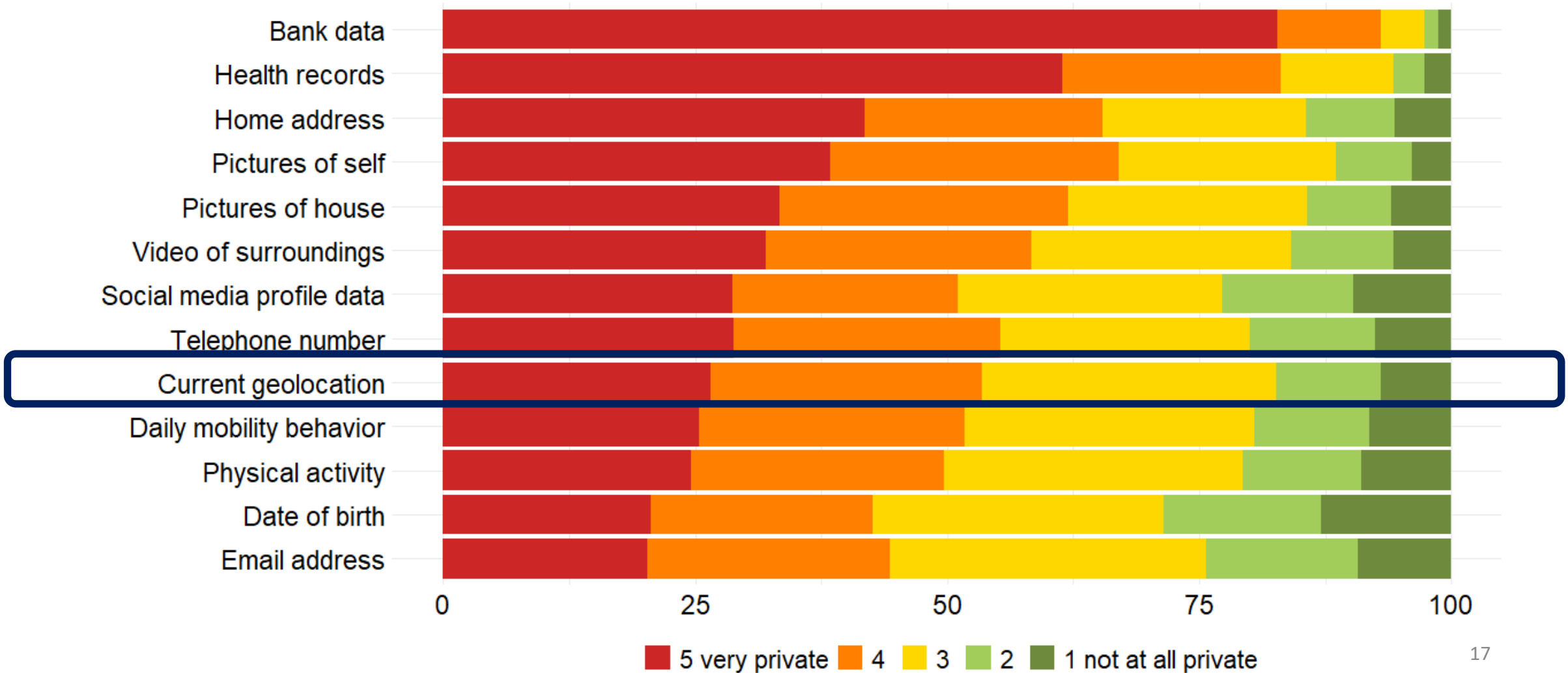# Interaction: concern & frequency of GPS sharing

0 share GPS less than once a month/DK − 5 GPS is always on

WTP, concerns, & previous behavior

WTP	
General privacy concern	-.334***
Specific GPS concern	-.606***
General SP skill	.010
# SP activities	.059*
Frequency sharing GPS	-.122
Concern GPS*Freq sharing GPS	.092**
Never downloaded research app	-.287
Downloaded research app	1.770***
# smart devices	.139*
Male	.097
Age	-.009**
Education: vocational	.355**
Education: higher	1.522**
Constant	1.522**

Logistic regression coefficients; n= 2,046; Pseudo R2 = .132

Concern & Information sensitivity measures

- In general, how concerned are you about your personal privacy? (not at all concerned, a little concerned, somewhat concerned, very concerned; Couper & Singer 2013)
- Please indicate how private do you feel the information is about the following (not at all – very, 5-pt., presented in randomized order)
  - My current geographic location
  - My daily mobility behavior
  - My physical activity (for example, how much I walk)
  - My bank data
  - My social media profile data (for example, Facebook)
  - Pictures of my house
  - Pictures of myself (selfies)
  - Video of my surroundings where I am at the moment
  - My health records
  - My date of birth
  - My home address
  - My telephone number
  - My email address
- + Specific concern measures

Context: perceived privacy of geolocation

LISS Panel

Legend: 5 very private | 4 | 3 | 2 | 1 not at all private
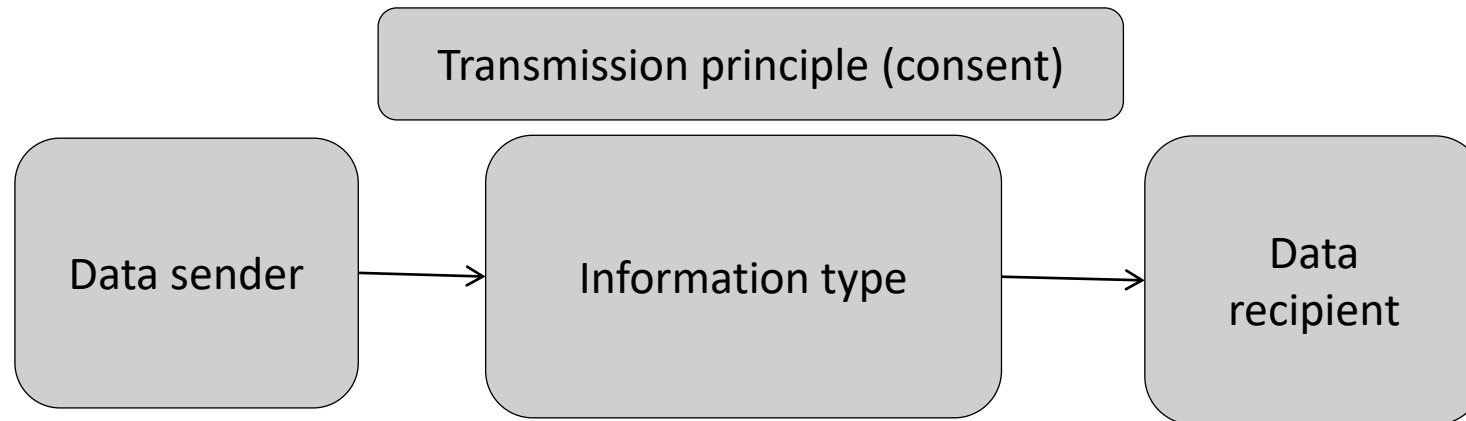
Summary

- Smartphone skills and privacy concerns are related
- Both general and specific privacy concerns influence WTP
- Behavioral measures of skill better than self-assessment for predicting WTP
- For the groups of more concerned, WTP seems to increase with increased specific skill (frequency of sharing)

In search of the theory on privacy concerns & skills nexus

Where to dig deeper?

- Assumptions about the ‚audience'
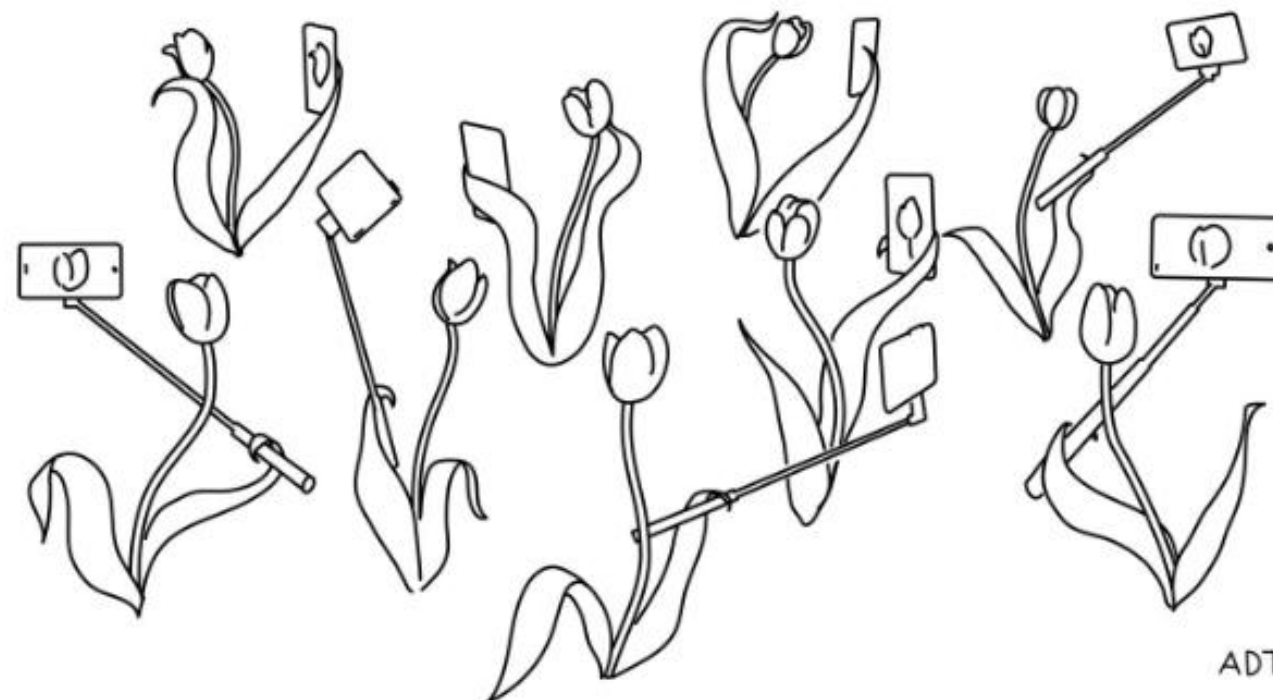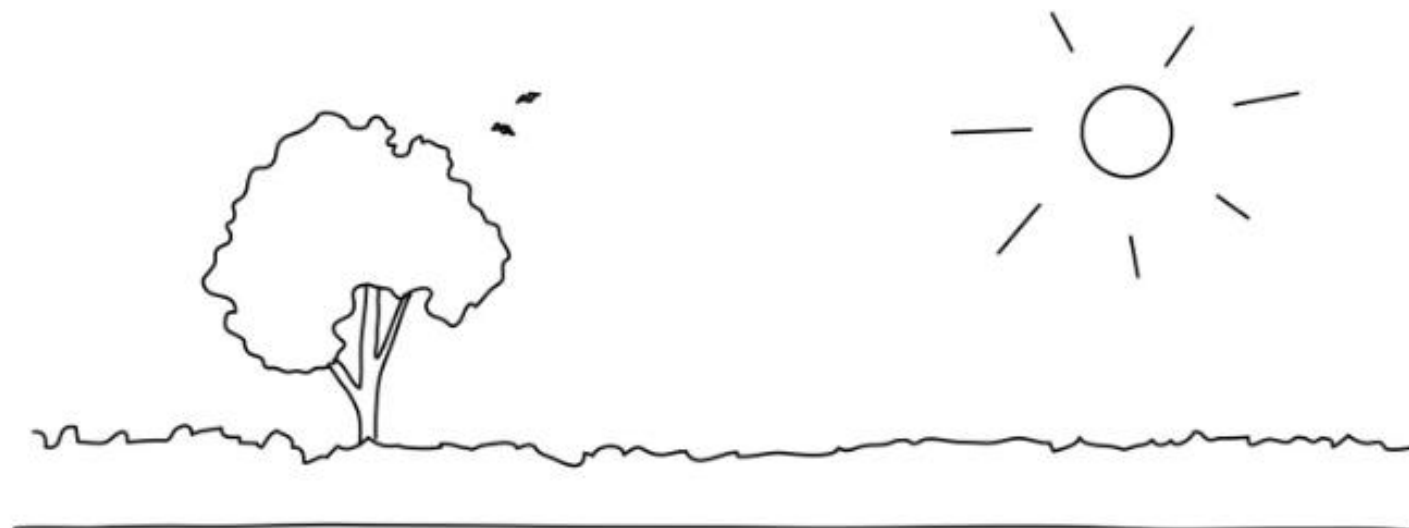- Implicit trust in the requesting entity

Nissenbaum 2009

Thank you!

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https://bellastrum.com

A.D. Thompson, The New Yorker