Typing or speaking: Comparing text and voice answers to open questions on sensitive topics in smartphone surveys

Jan Karem Höhne[1] and Konstantin Gavras[2]
[1] DZHW, Leibniz University Hannover
[2] Nesto Software GmbH

Universidad San Francisco de Quito – Business School
Quito (Ecuador) – 13 November 2023

DZHW
Deutsches Zentrum für
Hochschul- und Wissenschaftsforschung

Digitalization and Research Potential I

- Global digitalization tendency.
  - *Increase in Internet use.* (Pew Research Center 2016, 2019a)
  - *Increase in smartphone use.* (Pew Research Center 2019b)
- New opportunities for researching (social) reality.
  - *People leave traces and produce data in digital spheres.* (Struminskaya et al. 2020)
- Transformation of social and behavioral sciences.
  - *New conferences: „BigSurv" and „Mobile Apps and Sensors in Surveys".*
  - *New journals: „Frontiers in Big Data" und „Journal of Computational Social Science".*

Digitalization and Research Potential II

- Increase of web-based surveys.
  - *Academia: ANES, CRONOS, EVS, GESIS Panel, GIP, GLES, HRS, LISS Panel etc.*
  - *Public/private sector: Facebook, Google, UNESCO, World Bank etc.*
- Increase of mobile device use in web-based surveys.
  - *Mobile-optimized layout as default.* (Revilla et al. 2016)
- Emergence of digital intersections.
  - *Ex ante data linkage (e.g., sensor data).* (Elevelt et al. 2021; Höhne & Schlosser 2019)
  - *Ex post data linkage (e.g., trace data).* (Pasek et al. 2020; Stier et al. 2020)

DZHW.

Devices in Web-based Surveys
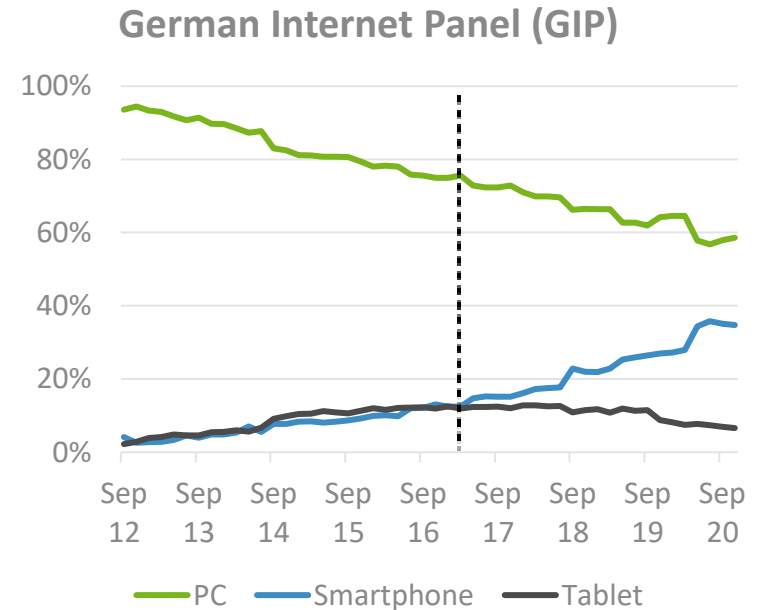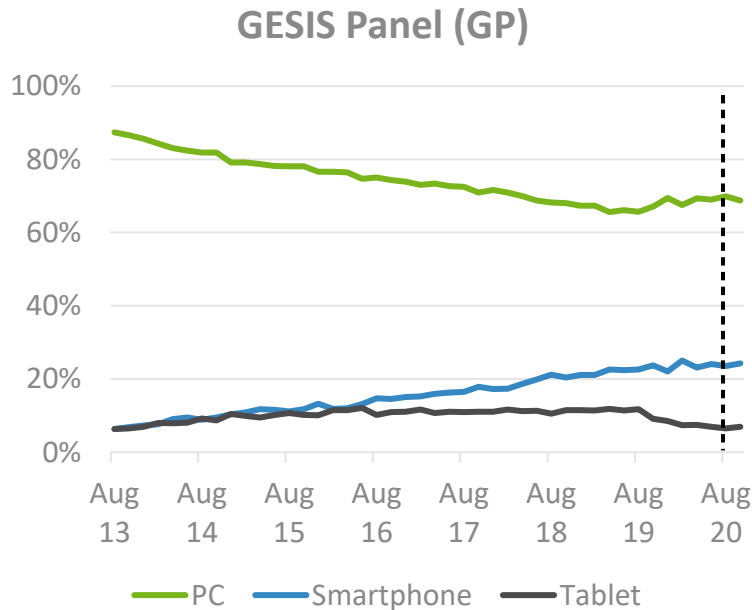
GP und GIP are prob-based online panels with six waves per year. Horizontal lines indicate the introduction of mobile-optimized layouts.
Own calculations with Gummer, Kummerow, Rettig, and Roßmann.

Smartphones and Voice Answers

- New communication channels because of smartphones.
  - *Linking established methods with technological innovations.*
- Voice answers to (open) questions.
  - *Closeness to daily conversation.* (Tourangeau et al. 2000)
  - *Rich information due to open narrations.* (Gavras & Höhne 2022; Gravras et al. 2022)
- Technological requirements of voice answers are met.
  - *Even in web-based surveys with large N.* (Gavras & Höhne 2020; Gavras et al. 2022; Revilla & Couper 2019; Revilla et al. 2020)
- General willingness for voice answers.
 - *Between 40% and 60%.* (Lenzner & Höhne 2022; Revilla et al. 2018)

Characteristics of Voice and Text Answers

- Voice answers to open questions.
    - *Follow affective on-line processing.* (Kim 2009; Lodge et al. 1995; Taber & Young 2013)
    - *Low respondent burden because of recording.*
    - *No retrospective editing of answers.*
- Text answers to open questions.
    - *Follow intentional memory-based processing.* (Taber & Young 2013; Tourangeau et al. 2000; Zaller & Feldman 1992)
    - *High respondent burden because of text entering.*
    - *Retrospective editing of answers.*

DZHW.

Research Questions

- Do voice and text answers differ in terms of …

  - *… dropouts? (RQ1)*

  - *… item-nonresponse? (RQ2)*

  - *… number of words? (RQ3)*

  - *… number of topics? (RQ4)*

  - *… sentiments? (RQ5)*

DZHW.

Method: Collecting Voice Answers

See https://github.com/JKHoehne/SVoice/tree/v1.0.0
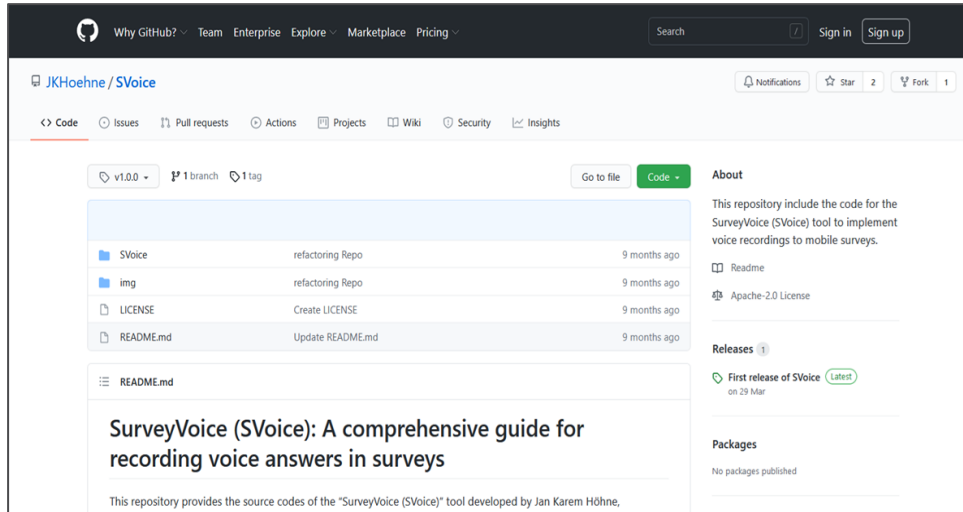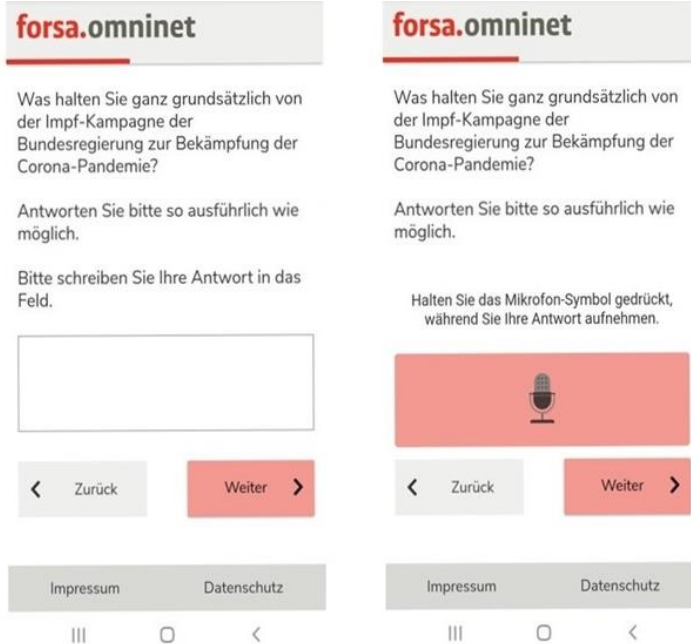
- SurveyVoice (SVoice) tool. (Höhne et al. 2021)
- Open-source: Apache-2.0 License.
- Code via GitHub.
- JavaScript, CSS, HTML, and PHP.
- Voice answers as .wav files.

Method: Study Design

- Between-subject design.
  - *Group 1: voice answers (n = 500).*
  - *Group 2: text answers (n = 501).*
- 4 questions on sensitive topics.
  - *Refugees, working women, media reporting, and vaccination campaign.*
- Text version left.
  - *No character limitation.*
- Voice Version right.
  - *No recording time limitation.*

Method: Sample Description

- Experiment conducted in the FORSA Omninet Panel in Germany in November 2021 (N = 1,001).

|	
Cross quotas:	*Age, gender, and education (3x2x3)*
Mean age:	*48 years*
Gender:	*50% females*
Education:	*30% lower secondary school*
	42% intermediate secondary school
	28% at least college preparatory secondary school

Chi-square tests reveal no significant differences between the two experimental groups with respect to age, gender, and education.

Method: Analytical Strategies

- Transcription of voice answers via Google Speech-to-Text API.
  - *About 15 hours voice answers (~5 GB).*
- RQ1: Determining the share of dropouts (comparing voice and text groups).
- RQ2: Determining the share of item-nonresponse (aggregated across all four voice and text questions).
- RQ3: Determining the number of words using `quanteda` (R). (Benoit et al. 2021)
- RQ4: Determining the number of topics using `stm` (R). (Roberts et al. 2014)
- RQ5: Determining sentiments using `SentiWS` (R). (Remus et al. 2010)

Results: Dropouts & Item-nonresponse

Dropouts (RQ1)

*p < 0.05. Z-test.

Item-nonresponse (RQ2)
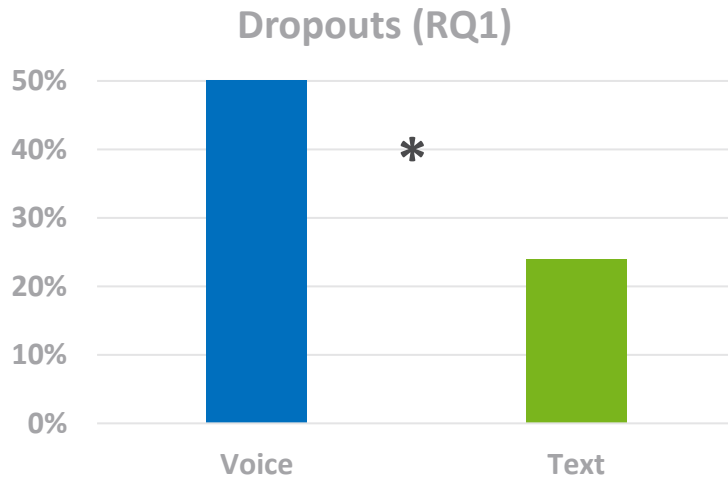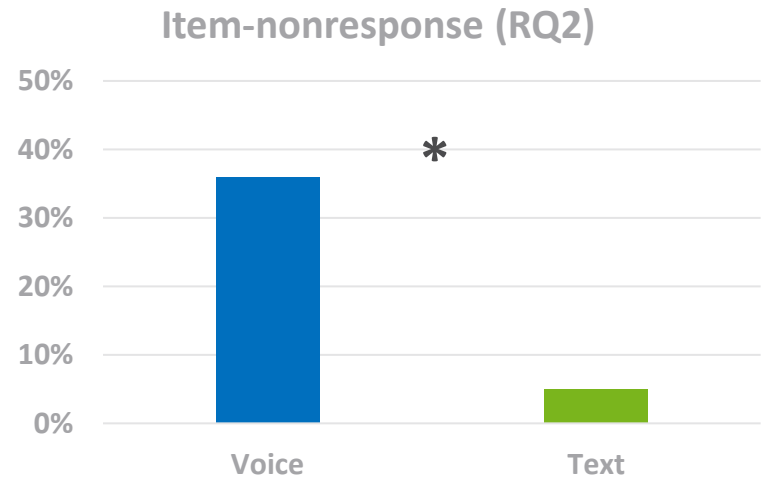
*p < 0.05. Z-test.

Results: Number of Words

Average Number of Words (RQ3)
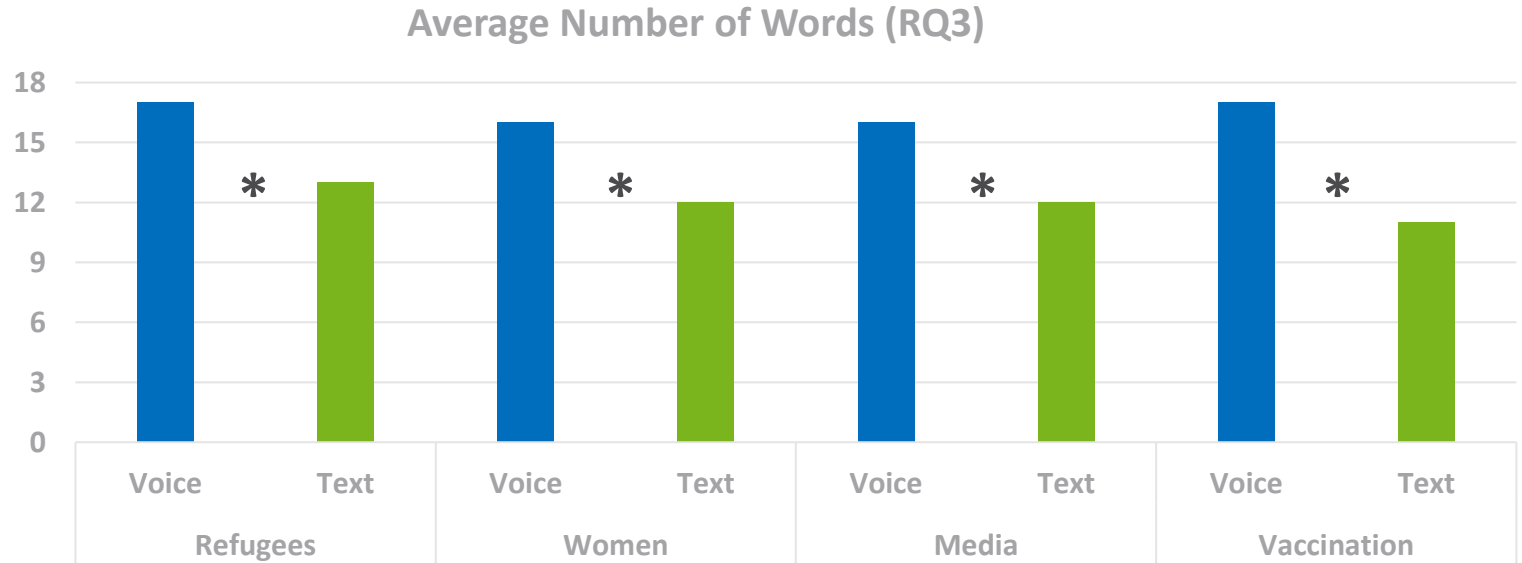
*p < 0.05. T-tests for independent groups.

Results: Topics

Average Number of Topics (RQ4)
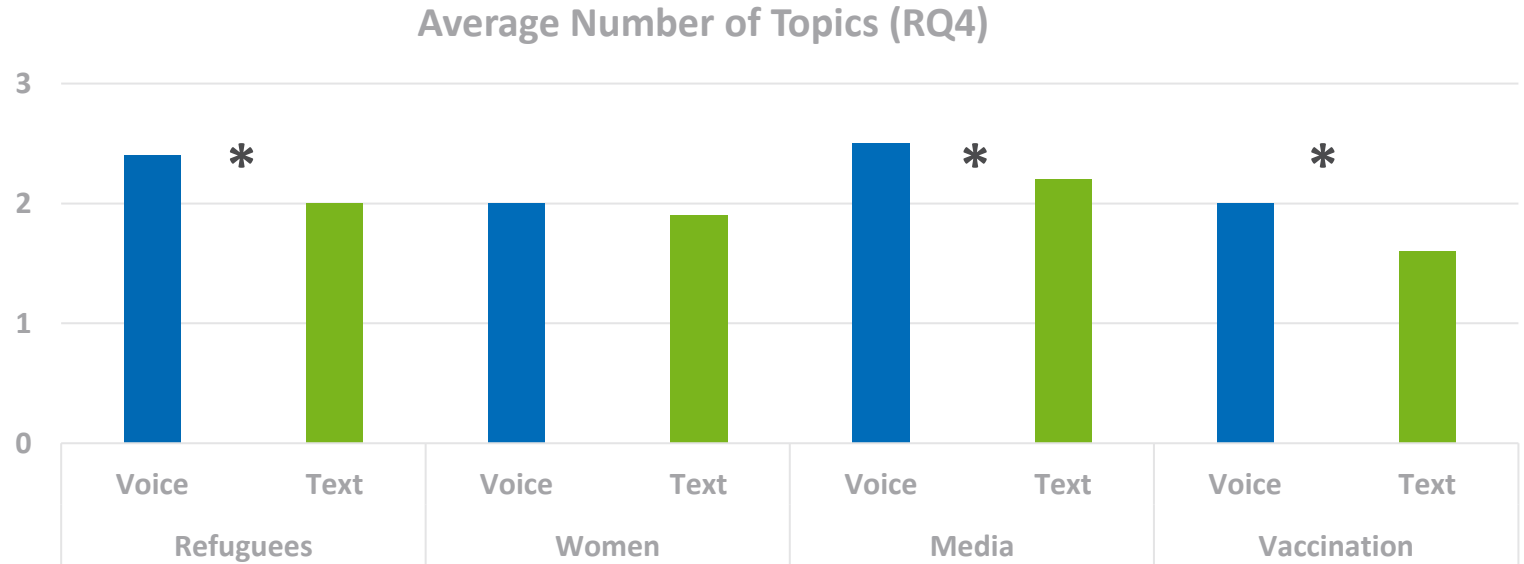
p < 0.05. T-tests for independent groups.

Results: Sentiments

Sentiment Ratio (RQ5)
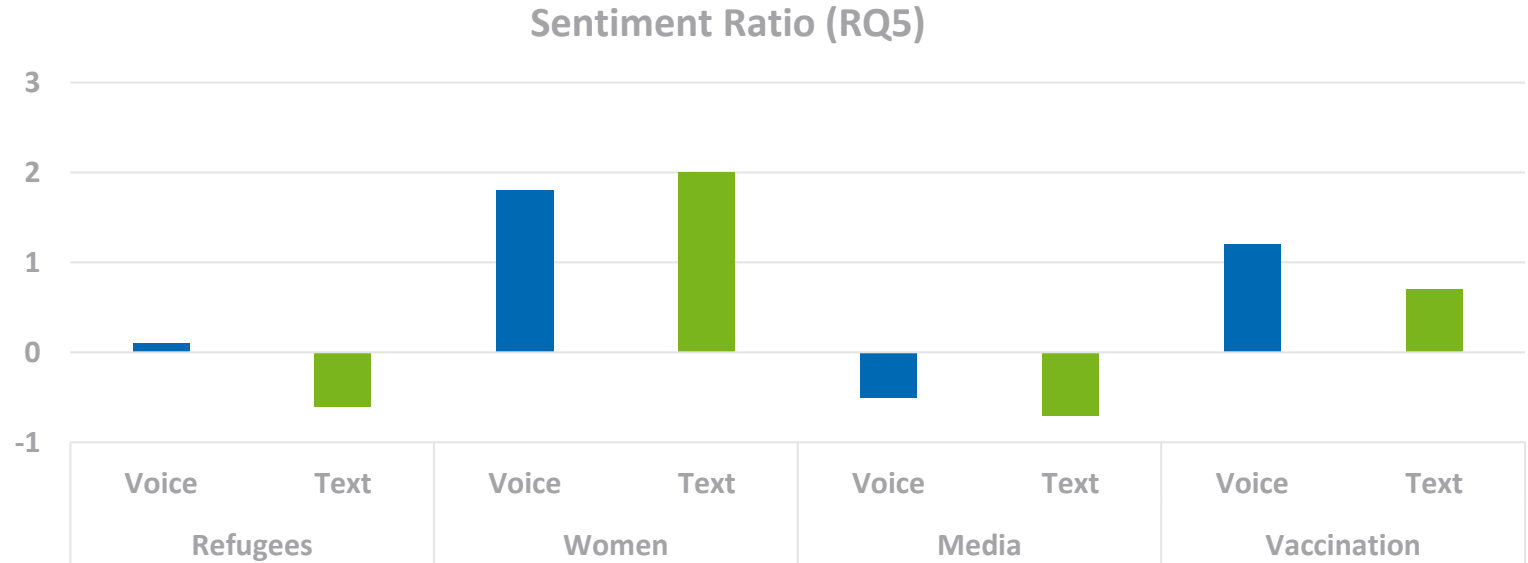
*p < 0.05. T-tests for independent groups.

Discussion and Conclusion

- Higher share of missing data in voice answers.
    - *Respondents may not be able and/or willing to provide voice answers.*
    - *Reduction through tailored incentivization and/or choice of answer format.*
- Higher number of words and topics in voice answers.
    - *Pointing to narrations, more information, and different cognitive processes.*
- No differences regarding sentiments.
    - *Voice answers are similarly robust against social desirability bias as their text counterparts.*
- Voice answers have great potential for social science research.
    - *Connectable to all research fields with survey data.*
    - ***BUT:** Share of missing data must be reduced!*

Mobile Apps and Sensors in Surveys (MASS)

Call for Papers
5th Mobile Apps and Sensors in Surveys (MASS) Workshop
https://massworkshop.org/

Organizing committee
Jan Karem Höhne (DZHW, Leibniz University Hannover), Florian Keusch (University of Mannheim), Peter Lugtig (Utrecht University), and Bella Struminskaya (Utrecht University)

Date
March 6-7, 2024

Location
Washington, DC (USA)

This time, the Mobile Apps and Sensors in Surveys (MASS) workshop takes place jointly with the Current Innovations in Probability-based Household Internet Panel Research (CIPHER; see https://dornsife.usc.edu/cesr/cipher-2024/) conference. CIPHER will be held from March 7-8, and presenters at either event are invited to attend both events.

- MASS takes place in Washington DC (US)
  - *From **March 6-7,2024***
  - *Together with CIPHER conference*
  - *Submission deadline is **December 1, 2023***

SCAN ME

Many thanks for your attention!

www.jkhoehne.eu
@jkhoehne

DZHW.

Literature I

- Benoit, K., Watanabe, K., Wang, H., Nulty, P., Obeng, A., Müller, S., Matsuo, A., Lowe, W., & Müller, C. (2018). quanteda: R package for quantitative analysis of tetxtual data. Available at https://cran.r-project.org/web/packages/quanteda/quanteda.pdf

- Elevelt, A., Bernasco, W., Lugtig. P., Ruiter, S., & Toepoel, V. (2021). Where you at? Using GPS locations in an electronic time use diary study to derive functional locations. Social Science Computer Review, 39, 509–526.

- Gavras, K., & Höhne, J.K. (2020). Evaluating political parties: Criterion validity of open questions with requests for text and voice answers. International Journal of Social Research Methodology, 25, 135–141.

- Gavras, K., Höhne, J.K., Blom, A., & Schoen, H. (2022). Innovating the collection of open-ended answers: The linguistic and content characteristics of written and oral answers to political attitude questions. Journal of the Royal Statistical Society (Series A). DOI: 10.1111/rssa.12807

- Höhne, J.K., Gavras, K., & Qureshi, D.D. (2021). SurveyVoice (SVoice): A comprehensive guide for collecting voice answers in surveys. Zenodo. DOI: 10.5281/zenodo.4644590

- Höhne, J.K., & Schlosser, S. (2019). SurveyMotion: What can we learn from sensor data about respondents' completion and response behavior in mobile web surveys? International Journal of Social Research Methodology, 22, 379–391.

- Kim, S.-Y. (2009). Online processing, memory-based processing, and an integrated model of candidate evaluation: A simulation-based empirical investigation. The Korean Journal of International Studies, 7, 99-123.

- Lenzner, T., & Höhne, J.K. (2021). Who is willing to use audio and voice inputs in smartphone surveys, and why? International Journal of Market Research. DOI: 10.1177/14707853221084213

Literature II

- Lodge, M., Steenbergen, M.R., & Brau, S. (1995). The responsive voter: Campaign information and the dynamics of candidate evaluation. American Political Science Review, 89, 309-326.

- Pasek, J., McClain, C.A., Newport, F., & Marken, S. (2020). Who's tweeting about the president? What big survey data can tell us about digital traces? Social Science Computer Review, 38, 633–650.

- PEW Research Center (2016). Smartphone ownership and internet usage continues to climb in emerging economies. Available at https://www.pewresearch.org/global/2016/02/22/smartphone-ownership-and-internet-usage-continues-to-climb-in-emerging-economies/

- PEW Research Center. (2019a). Across 39 countries, three-quarters say they use the internet. Available at https://www.pewresearch.org/global/2018/06/19/across-39-countries-three-quarters-say-they-use-the-internet/

- PEW Research Center (2019b). Smartphone ownership is growing rapidly around the world, but not always equally. Available at https://www.pewresearch.org/global/2019/02/05/smartphone-ownership-is-growing-rapidly-around-the-world-but-not-always-equally/

- Remus, R., Quasthoff, U., & Heyer, G. (2010). SentiWS - A publicly available German-language resource for sentiment analysis. In: Proceedings of the 7th International Conference on Language Ressources and Evaluation. Available at http://wortschatz.uni-leipzig.de/en/download/

- Revilla, M., & Couper, M. P. (2019). Improving the use of voice recording in a smartphone survey. Social Science Computer Review, 9, 1-20.

- Revilla, M., Couper, M. P., Bosch, O. J., & Asensio, M. (2020). Testing the use of voice input in a smartphone web survey. Social Science Computer Review, 38, 207–224.

Literature III

- Revilla, M., Couper, M. P., & Ochoa, C. (2018). Giving respondents voice? The feasibility of voice input for mobile web surveys. Survey Practice, 11, 1–8.

- Revilla, M., Toninelli, D., Ochoa, C., & Loewe, G. (2016). Do online access panels really need to allow and adapt surveys to mobile devices? Internet Research, 26, 1209–1227.

- Roberts, M.E., Stewart, B.M., & Tingle, D. (2014). stm: R package for structural topic models. Available at https://cran.r-project.org/web/packages/stm/vignettes/stmVignette.pdf

- Stier, S., Breuer, J., Siegers, P., & Thorson, K. (2020). Integrating survey data and digital trace data: Key issues in developing an emerging field. Social Science Computer Review, 38, 503–516.

- Struminskaya, B, Keusch, F., Lugtig, P. & Höhne, J.K. (2020). Augmenting surveys with data from sensors and apps: challenges and opportunities. Social Science Computer Review. DOI: 10.1177/0894439320979951

- Taber, C., & Young, E. (2013). Political information processing. In L. Huddy, D.O. Sears, & J.S. Levy (Eds.), The Oxford handbook of political psychology (pp. 525–558). Oxford: Oxford University Press.

- Tourangeau, R., Rips, L.J., & Rasinski, K. (2000). The psychology of survey response. Cambridge, UK: Cambridge University Press.

- Zaller, J., & Feldman, S. (1992). A simple theory of the survey response: Answering questions versus revealing preferences. American Journal of Political Science, 36, 579–616.

Appendix: Question Wordings

- Refugees: What do you think about the fact that refugees who have committed crimes in Germany are not always deported to their home countries?

- Working women: What do you think about the fact that women in Germany are increasingly choosing their careers over starting a family?

- Media reports: What do you think about the public criticism that media reports in Germany are exaggerated and politically controlled?

- Vaccination campaign: What do you think about the vaccination campaign of the German government to tackle the Corona pandemic?

DZHW.