A Paired-Comparison Listening Test for Collecting Voice Likability Scores

Laura Fernández Gallardo

Quality and Usability Lab, Technische Universität Berlin, Germany

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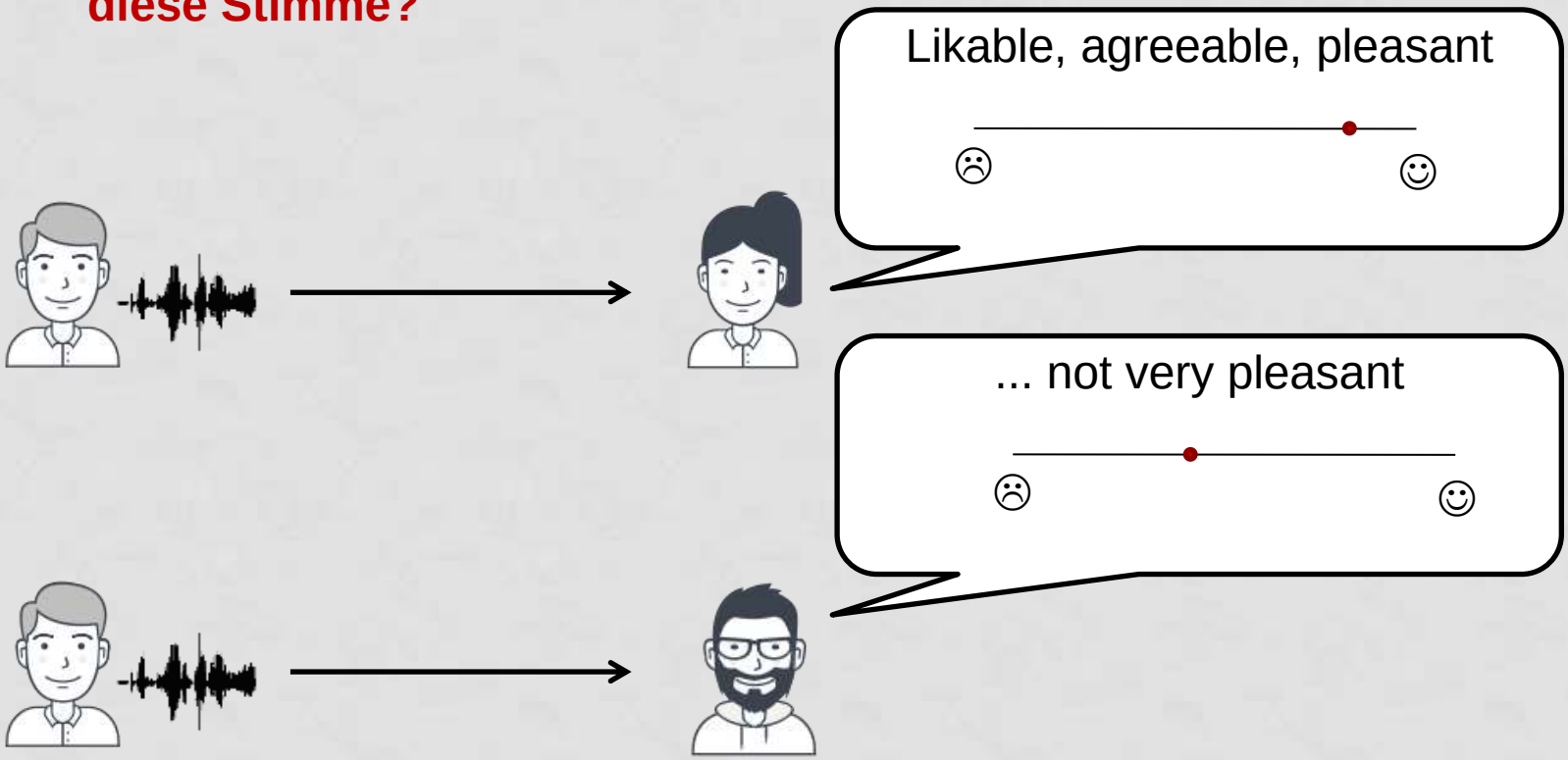
Wie sympathisch finden Sie diese Stimme?



Welche Stimme finden Sie sympathischer?

Outline

- Motivation
- Speech stimuli and listening test
- Preference choice analyses
  - Paired-comparison test: Consistency checks
  - Direct scaling test: Consistency checks
  - Scaling listeners' preference
- Contrasting the test approaches
- Conclusions

Motivation

- Likert scale: disagreement between raters

- We propose: paired-comparison listening test
- Apply the Bradley-Terry-Luce (BTL) model to derive a ratio scale of preference

- Goals:
  - 1. To ascertain whether the BTL model can be fit to listeners' paired comparisons of voice likability
  - 2. To contrast the paired-comparison test with the direct scaling test in [3]

[3] L. Fernández Gallardo and B. Weiss, "Speech Likability and Personality-based Social Relations: A Round-Robin Analysis over Communication Channels," in Interspeech, 2016.

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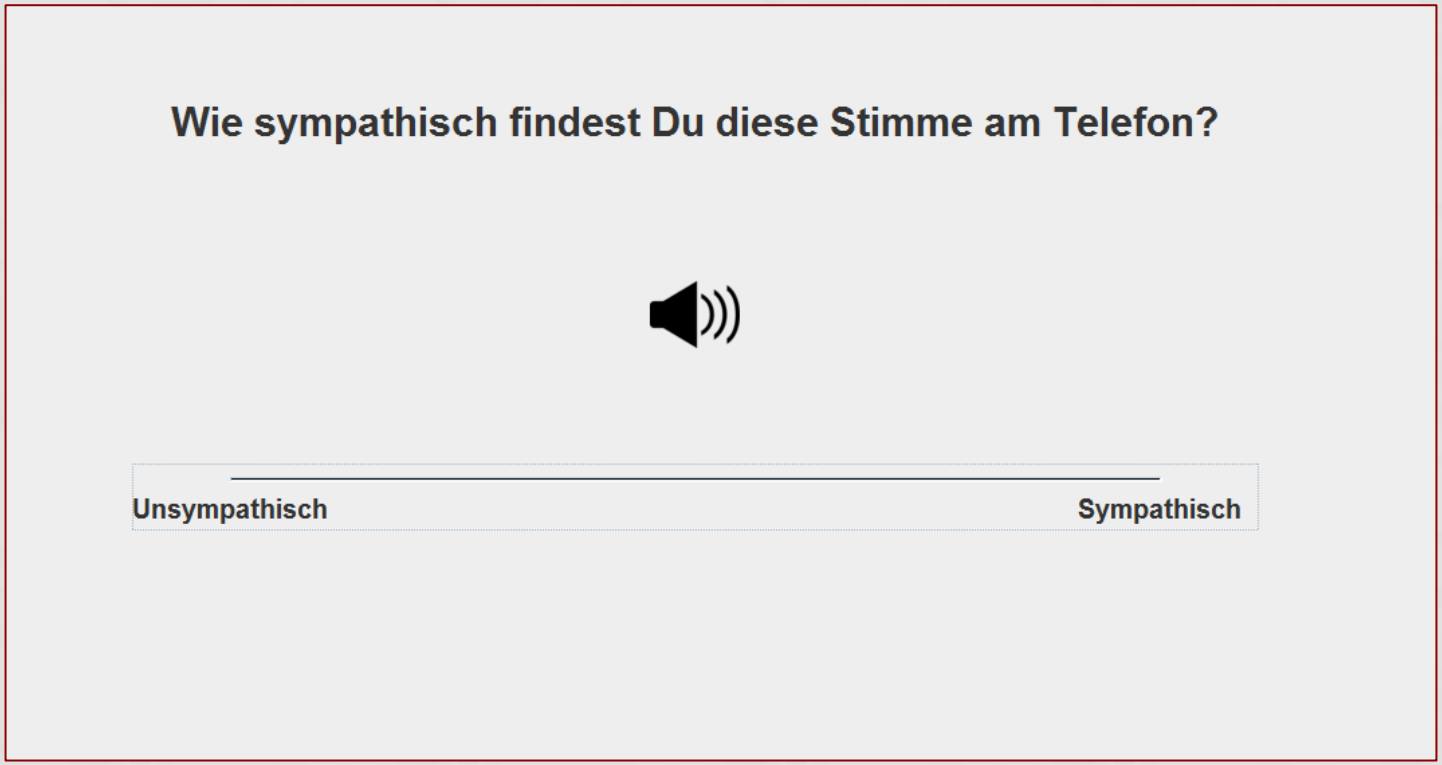
Speech stimuli

[22] L. Fernández Gallardo, "Recording a High-Quality German Speech Database for the Study of Speaker Personality and Likability," accepted in 12. Tagung Phonetik und Phonologie im deutschprachigen Raum, 2016.

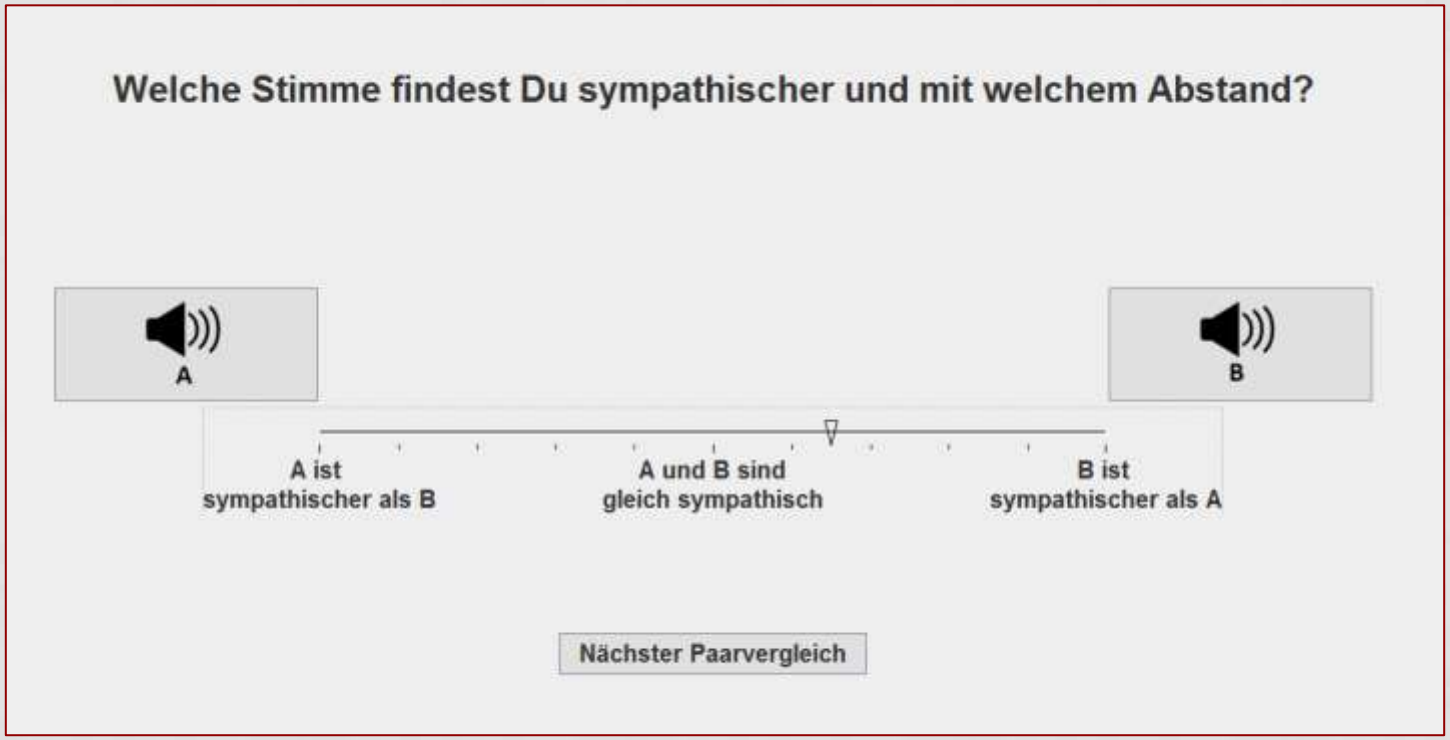
Listening test

- [3] L. Fernández Gallardo and B. Weiss, "Speech Likability and Personality-based Social Relations: A Round-Robin Analysis over Communication Channels," in Interspeech, 2016.



Listening test

- Paired-comparison listening test



Listening test

- Direct scaling test [3]
  - Stimuli: "Ich würde auf die SMS gern verzichten und meine Frei-Minuten dafür erhöhen“
  - 15 stimuli from male speakers rated by 15 female listeners
- Paired-comparison listening test
  - $\binom{15}{2} = 105$ pairs presented in the test, randomly
  - Unchanged:
    - male speakers
    - female listeners (13 out of 15)
    - speech material (wideband)
    - headphones
    - test room

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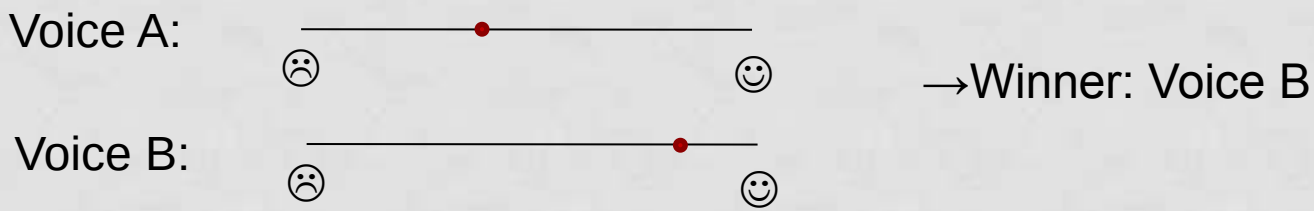
Consistency checks

- Consistency of responses for each rater individually
  - average Kendall's coefficient of consistence $\zeta = 0.78$ (range: 0.63–0.93)
  - all ζ > chance value ($p < .001$) → participants did not make their choices at random
- Agreement amongst raters
  - Kendall's coefficient of agreement u
  - u = 0.19 (range: -0.08–1)
- Checking stochastic transitivity properties
  - If x > y and y > z, a transitivity is violated if z > x
  - The transitivity violations found can be attributed to randomness (no systematic) →The BTL model can be fit

Consistency checks

- Simulated paired-comparison data from the direct scaling test



- All participants were consistent
- Low agreement amongst raters
- No systematic transitivity violations

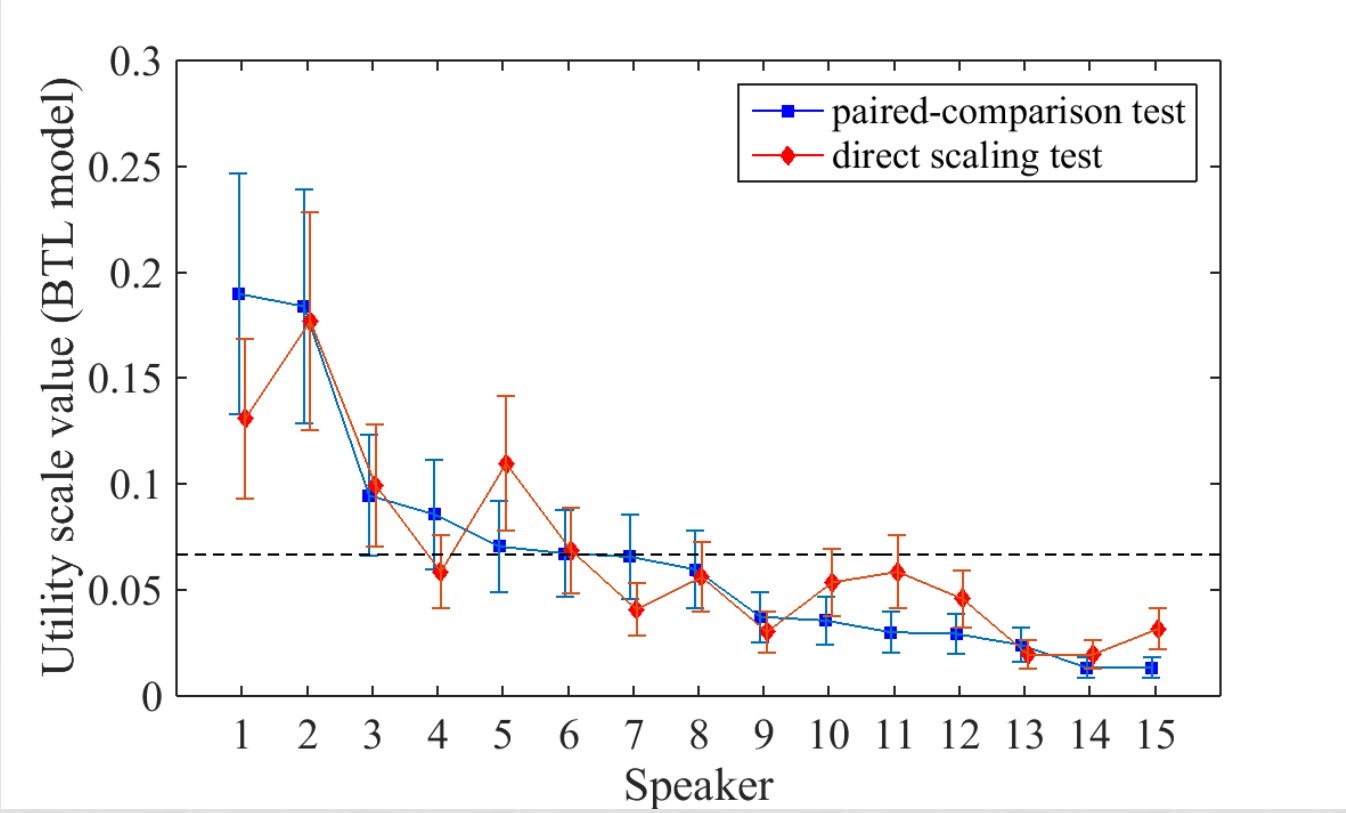
Consistency checks

- Transitivity violations and Kendall's coefficient of agreement

Test	Paired-comparison	Direct scaling
Weak stochastic transitivity	10	8
Moderate stochastic transitivity	28	18
Strong stochastic transitivity	134	127
Kendall’s u	0.19	0.11

Scaling listeners' preference

- Ratio scale preferences estimated by the BTL model



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Contrasting the test approaches

- Strong and significant correlations between the score series
  - pair-comparison *u*
  - simulated pair-comparison *u‘*
  - mean likability [3]

	u	*u‘*	[3]
u			
u‘	$R^2 = 0.90$		
[3]	$R^2 = 0.81$	$R^2 = 0.91$	

Contrasting the test approaches

- Direct scaling and the paired-comparison tests provide very similar likability scores
- Higher agreement between raters and greater discriminability have been found for the paired-comparison test with respect to the direct scaling test
- The number of pairs in the test $\binom{N}{2}$ grows quadratically (Q(N2)) with the number of voices N to be scaled

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Conclusions

- A paired-comparison listening test
  - for collecting subjective voice likability ratings
  - contrasted to the direct scaling test in [3]
- The BTL probabilistic choice model could be successfully applied and ratio scale preference measures were derived
  - paired-comparison constitutes a reliable method
  - enables simple comparative judgments
- Contrasting paired-comparison and direct scaling tests
  - results highly correlated
  - paired-comparison leads to a somewhat higher agreement between raters and greater discriminability
  - considerable number of pairs in the paired-comparison test $\binom{N}{2}$!
  - direct scaling tests may be therefore preferred despite the detriment to raters' agreement

Thank you for your attention!

Laura Fernández Gallardo, Ph.D.
laura.fernandezgallardo@tu-berlin.de

Questions?

Laura Fernández Gallardo, Ph.D.
laura.fernandezgallardo@tu-berlin.de