Influence of urban climate on perception responses in soundwalks: case study Aachen

Margret Sibylle Engel[1,2], Janina Fels[1] and Christoph Schneider[2]
Medical Acoustics Group[1]
Institute of Technical Acoustics
Department of Geography[2]
RWTH Aachen University

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Perceptual construct of soundscape

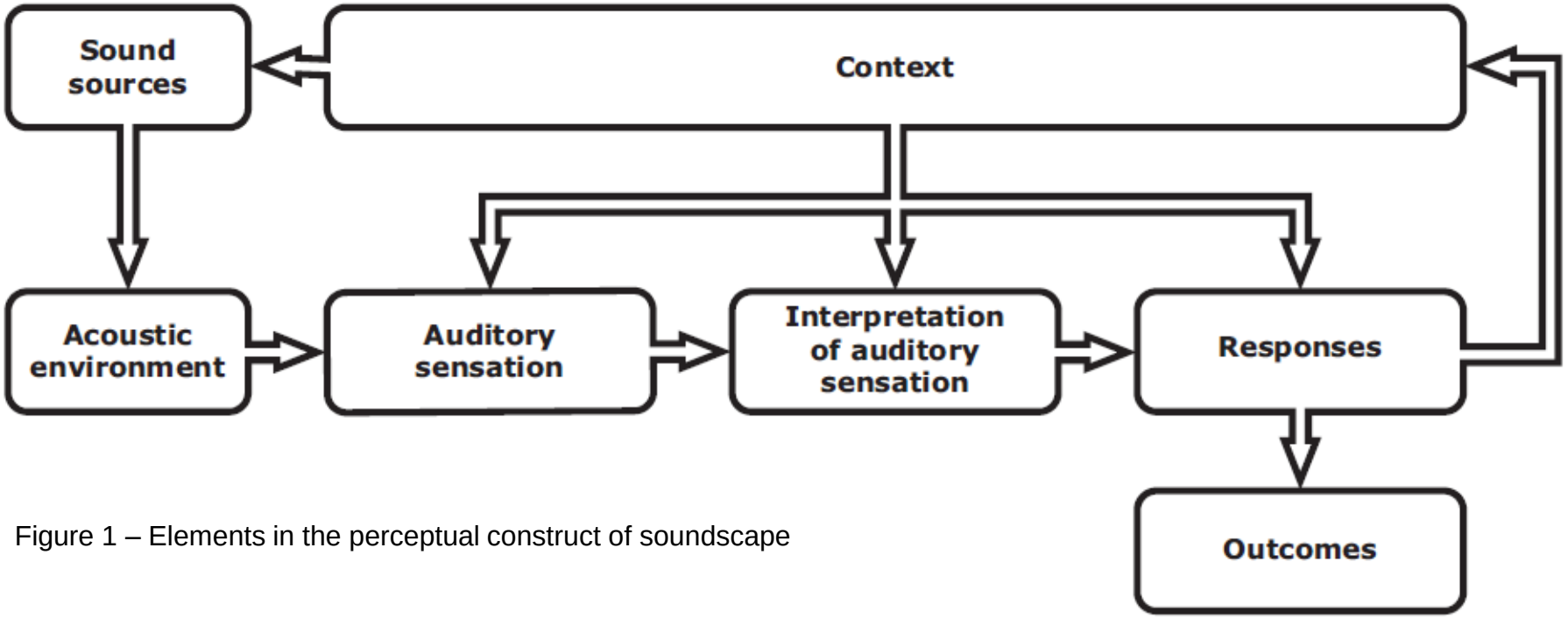


Figure 1 – Elements in the perceptual construct of soundscape

- Definition: “Acoustic environment as perceived or experienced and/or understood by a person or people, in context”.

(ISO/FDIS 12913-1: 2014)

Aim

To evaluate the influence of urban climate in affecting perception of environment by examining the following aspects:

- Visual
- Acoustical
- Meteorological
- Cultural

Methods

"(…) any study which does not use *triangulation*, that is, a combination of several differing investigative methods, cannot be considered a complete Soundscape study."

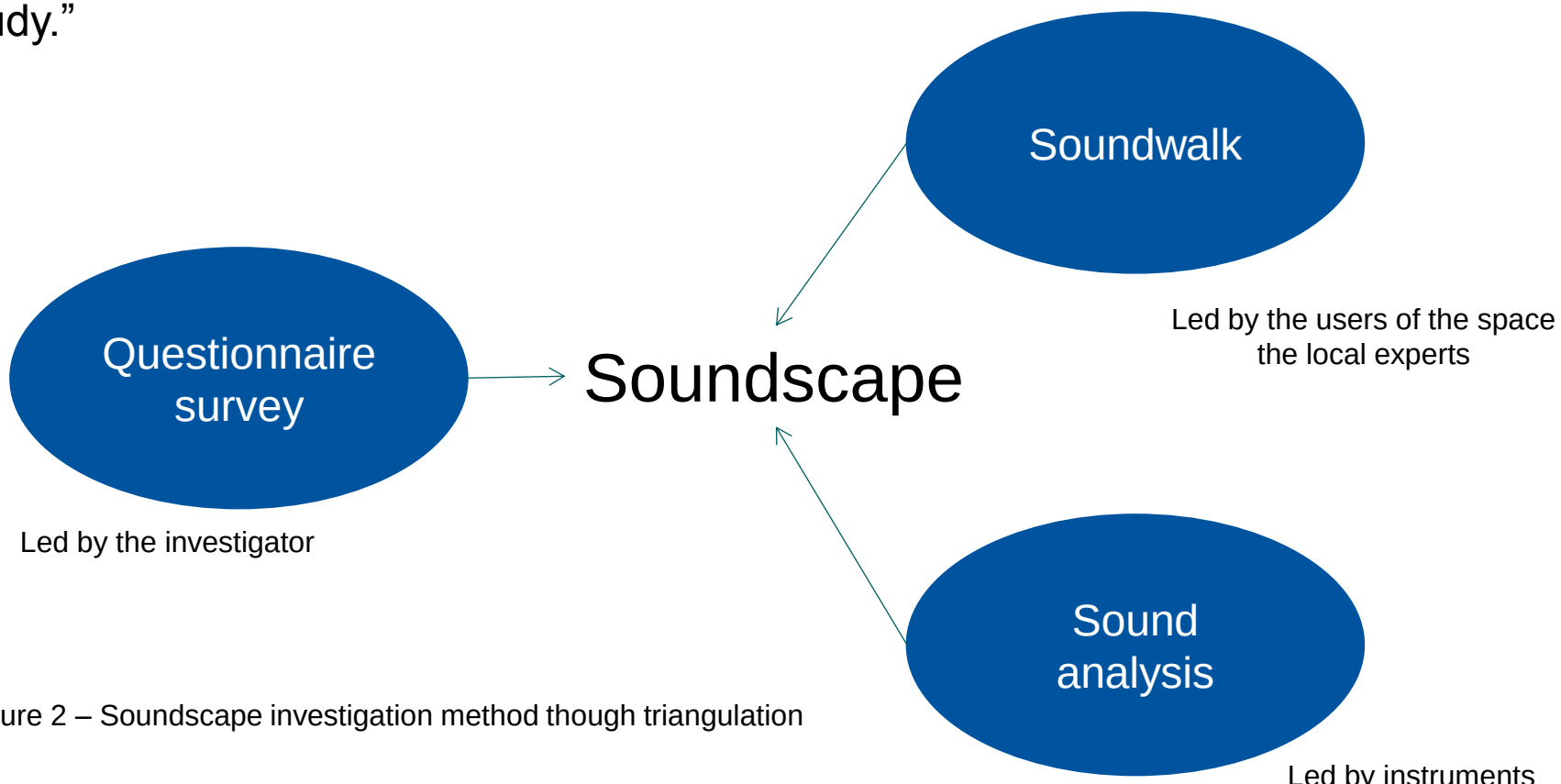


Figure 2 – Soundscape investigation method though triangulation

(adapted by NWIP ISO 12913-2:2014)

Methods

Mesurements methods to evaluate soundscapes:

- Soundwalks (at least samples of 3 minutes at each site);
- Questionnaires (with close questions – scale and open questions);
- Interviews (to understand better the acoustical perception of the participant – qualitative information);
- Recordings (with binaural measurement technologies, to record sound in an aurally-accurate way).

(NWIP ISO 12913-2:2014)

Figure 3 – Participant filling out a questionnaire

Figure 4 – Acoustic and weather measurementes

Study Area

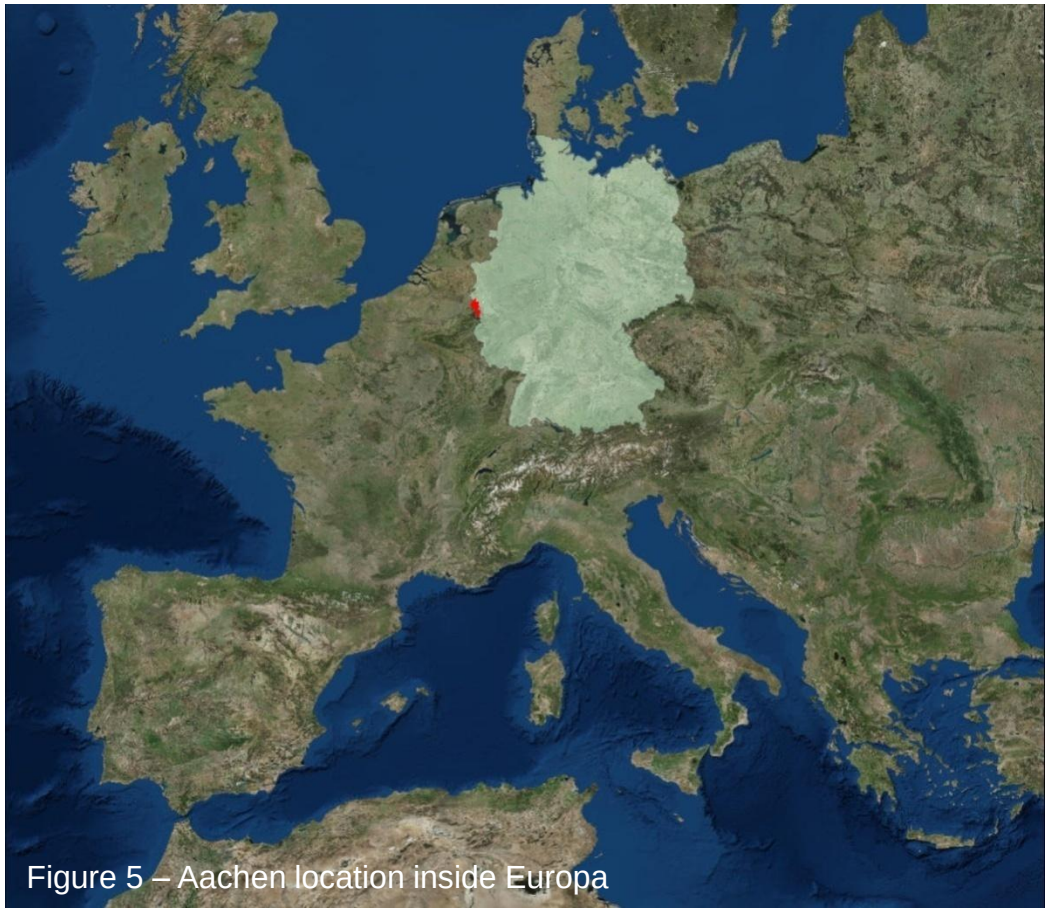


Figure 5 – Aachen location inside Europa

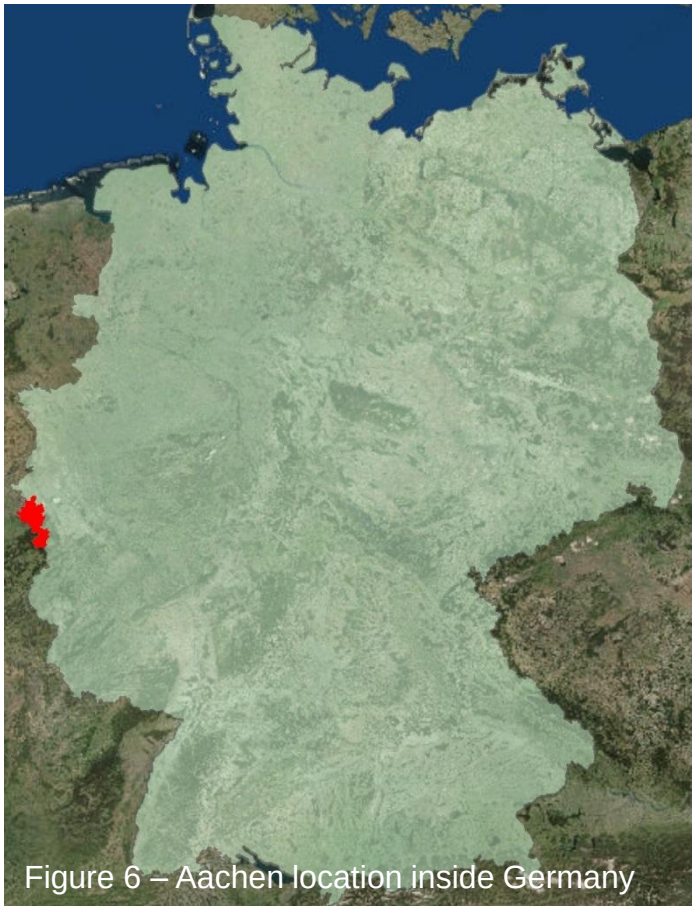
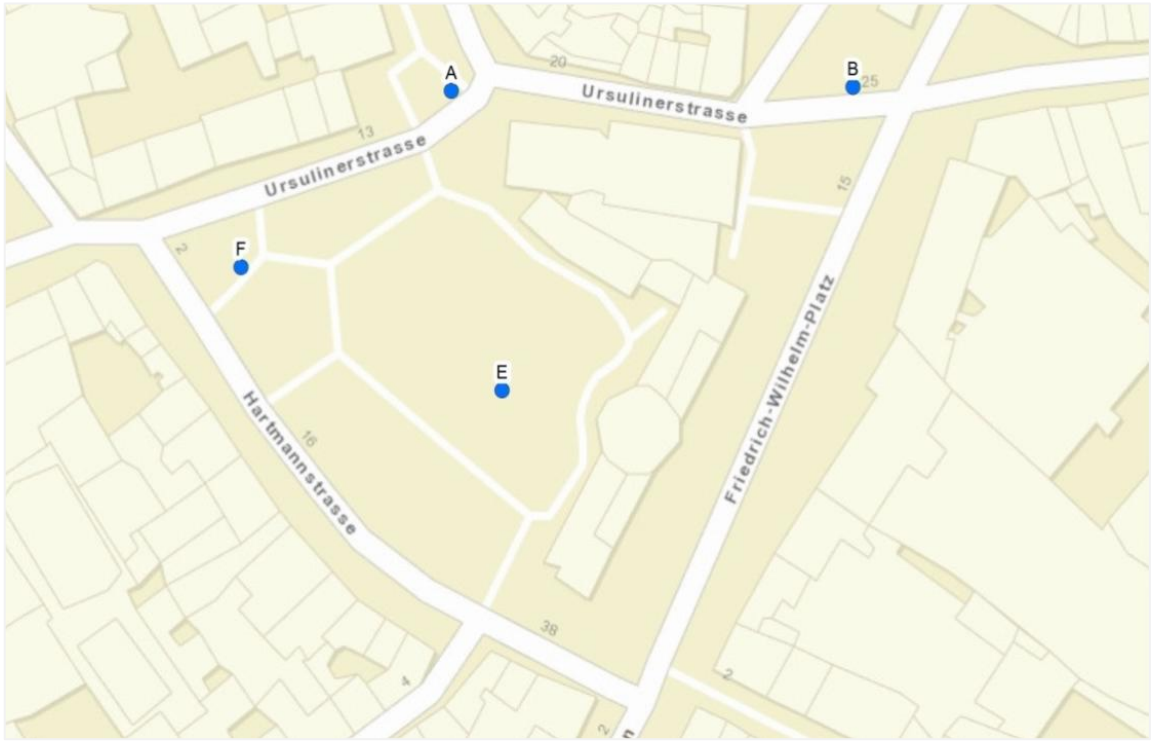


Figure 6 – Aachen location inside Germany

Study Area



- 1 soundwalk route must include three evaluation points
- 24 soundwalk routes possibilities (9 routes made)
- 44 participants
- 132 acoustic samples and evaluated points (perception)

Figure 7 – Elisenbrunnen

Instrumentation

1. Sennheiser KE-3 microphones
2. Sennheiser KE-4 microphone
3. Zoom-H6 multitrack recording device
4. Humidity / Temperature sensor Testo 625
5. Anemometer Windmaster 2 Pro

Questionnaire Design

- Semi-structured questionnaire (with open and closed questions);
- 85 questions (9 were used on this study):
  - 1 demographic information (nationality)
  - 6 weather perception (temperature, sun heat, humidity, wind speed, wind speed comfort, weather in general)
  - 1 landscape perception “What do you think of the current location? ”
  - 1 acoustical perception (background noise in the place)

Questionnaire Design

- Statistical analysis: Spearman Correlation Coefficient (ρ), Pearson Chi-squared (χ^2), Cramer's Association Measure.

- IBM SPSS Statistics 22

Results and Discussion

Monitored weather conditions vs perceived weather conditions
Spearman Correlations (ρ)

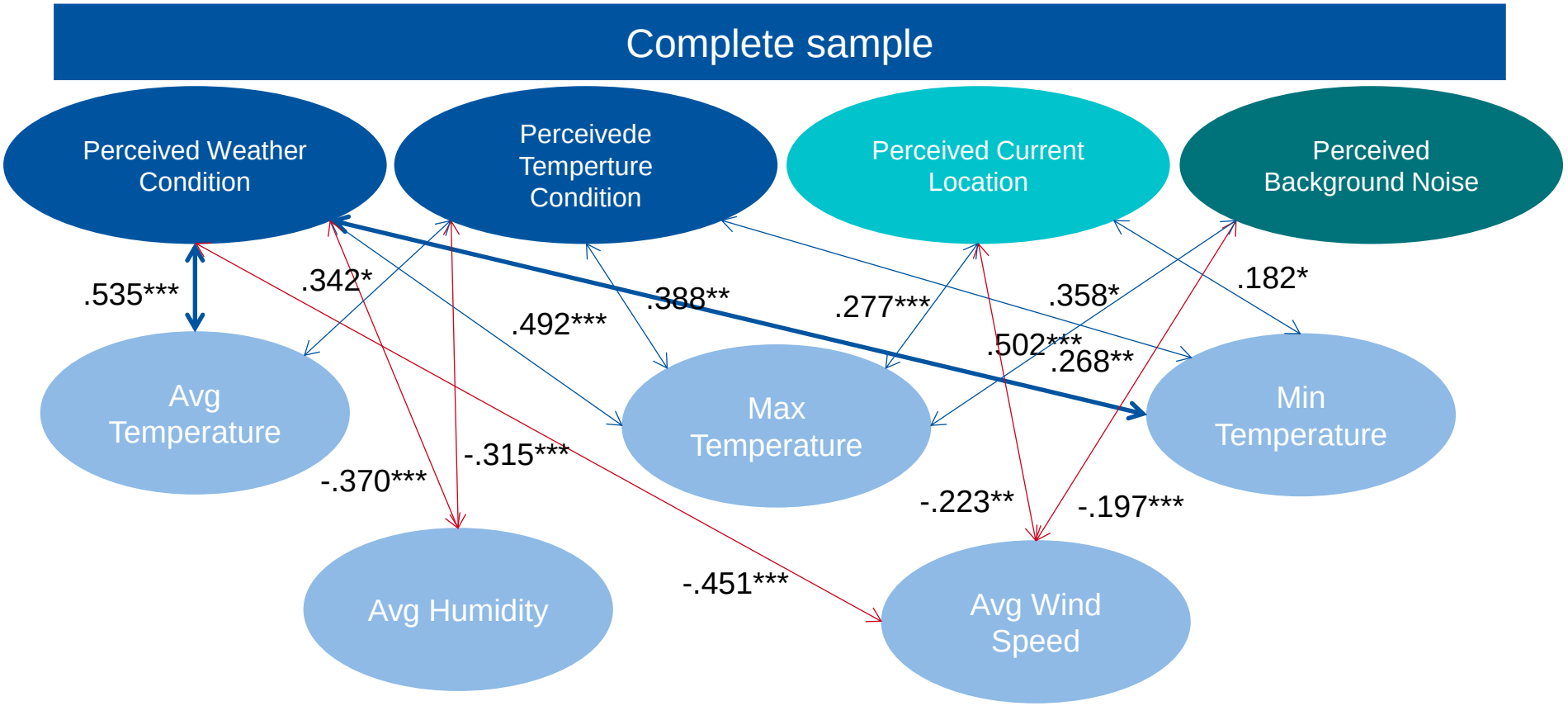
Complete sample

Negative Perception: rather uncomfortable to very uncomfortable

Positive Perception: rather comfortable to very comfortable

Results and Discussion

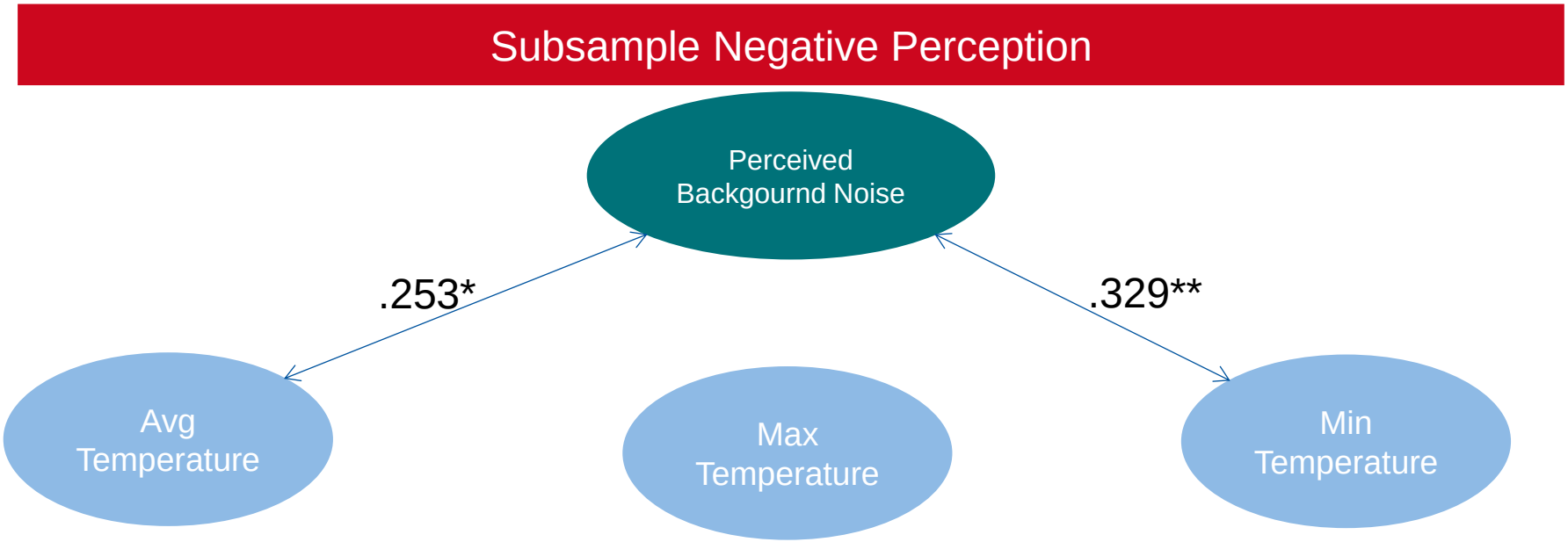
Monitored weather conditions vs perceived weather, visual and acoustical conditions
Spearman Correlations (ρ)



Legend: (<0.4) weak correlation; (>0.4 to <0.5) moderate correlation; (> 0.5) strong correlation, (*) p<.05, (**) p<.01, (***) p<.001.

Results and Discussion

Monitored weather conditions vs perceived acoustical conditions
Spearman Correlations (ρ)



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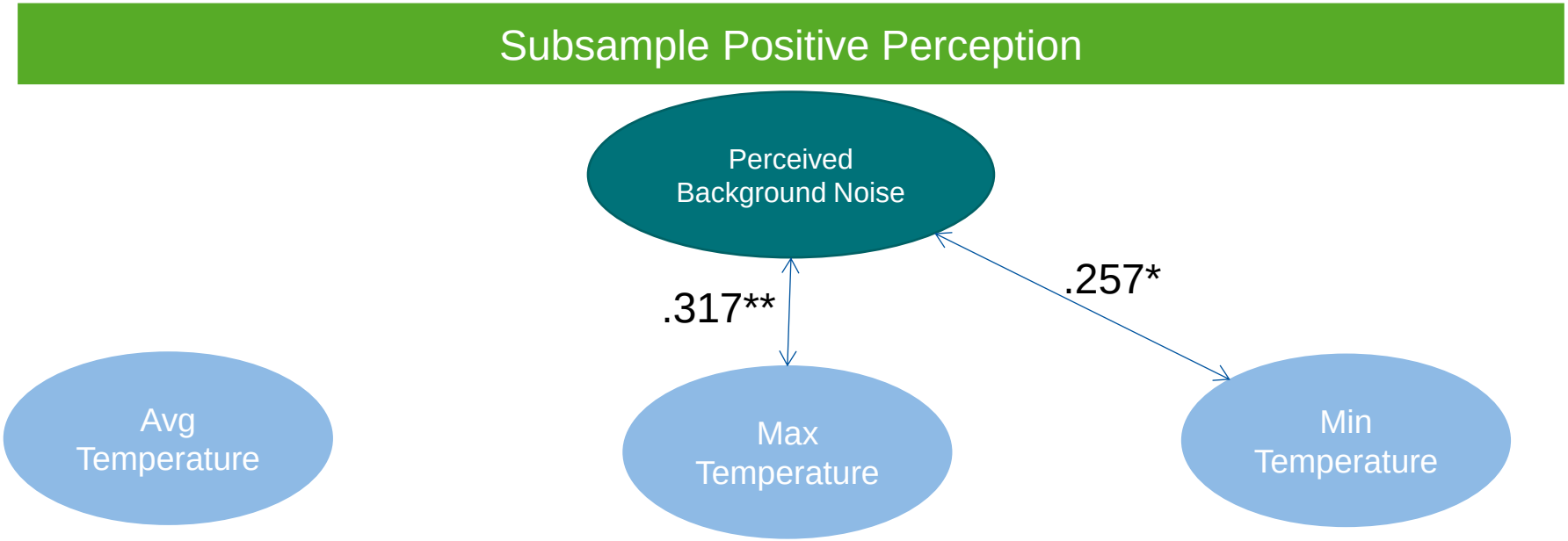
Results and Discussion

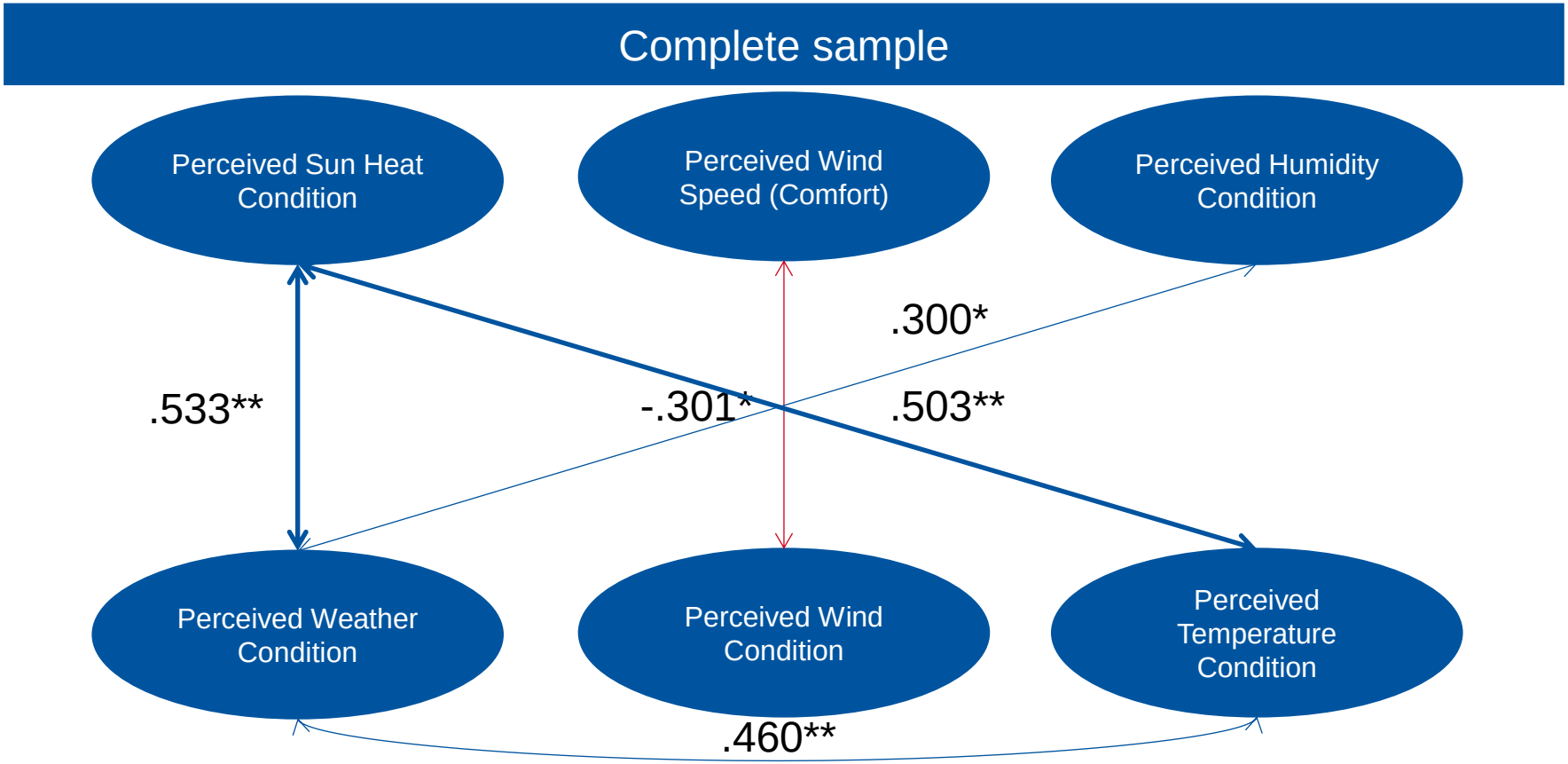
Monitored weather conditions vs perceived acoustical conditions
Spearman Correlations (ρ)



Legend: (<0.4) weak correlation; (>0.4 to <0.5) moderate correlation; (> 0.5) strong correlation, (*) p<.05, (**) p<.01, (***) p<.001.

Results and Discussion

Perceived weather conditions vs perceived weather conditions
Spearman Correlations (ρ)

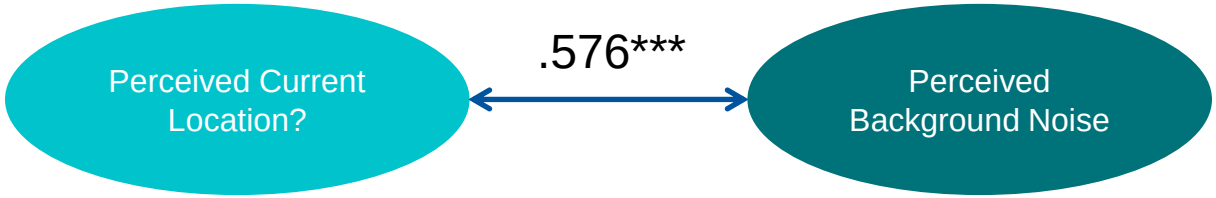


Legend: (<0.4) weak correlation; (>0.4 to <0.5) moderate correlation; (> 0.5) strong correlation, (*) p<.05, (**) p<.01, (***) p<.001.

Results and Discussion

Perceived visual condition vs perceived acoustical condition
Spearman Correlations (ρ)

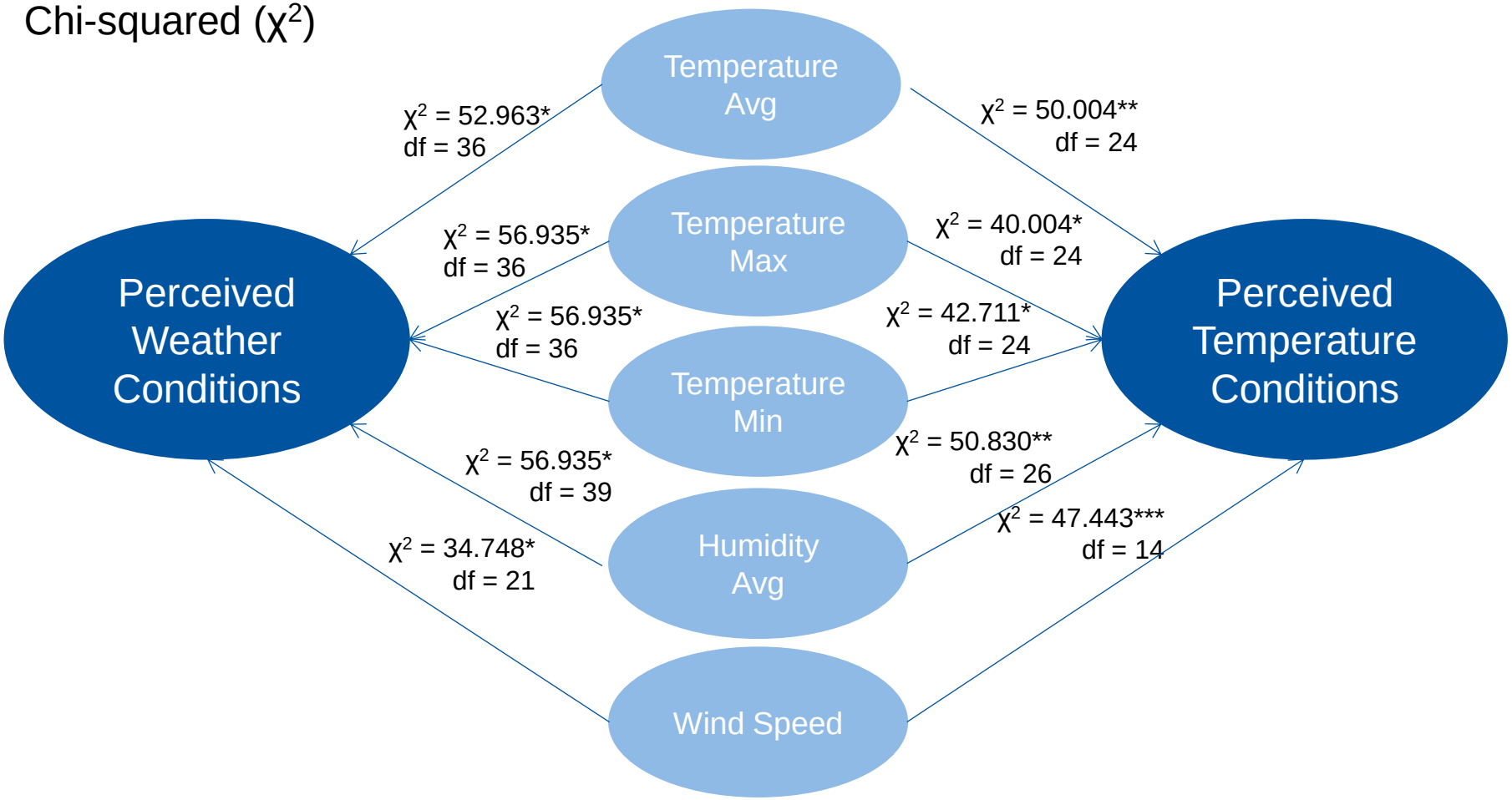
Complete sample



Legend: (<0.4) weak correlation; (>0.4 to <0.5) moderate correlation; (> 0.5) strong correlation, (*) p<.05, (**) p<.01, (***) p<.001.

Results and Discussion

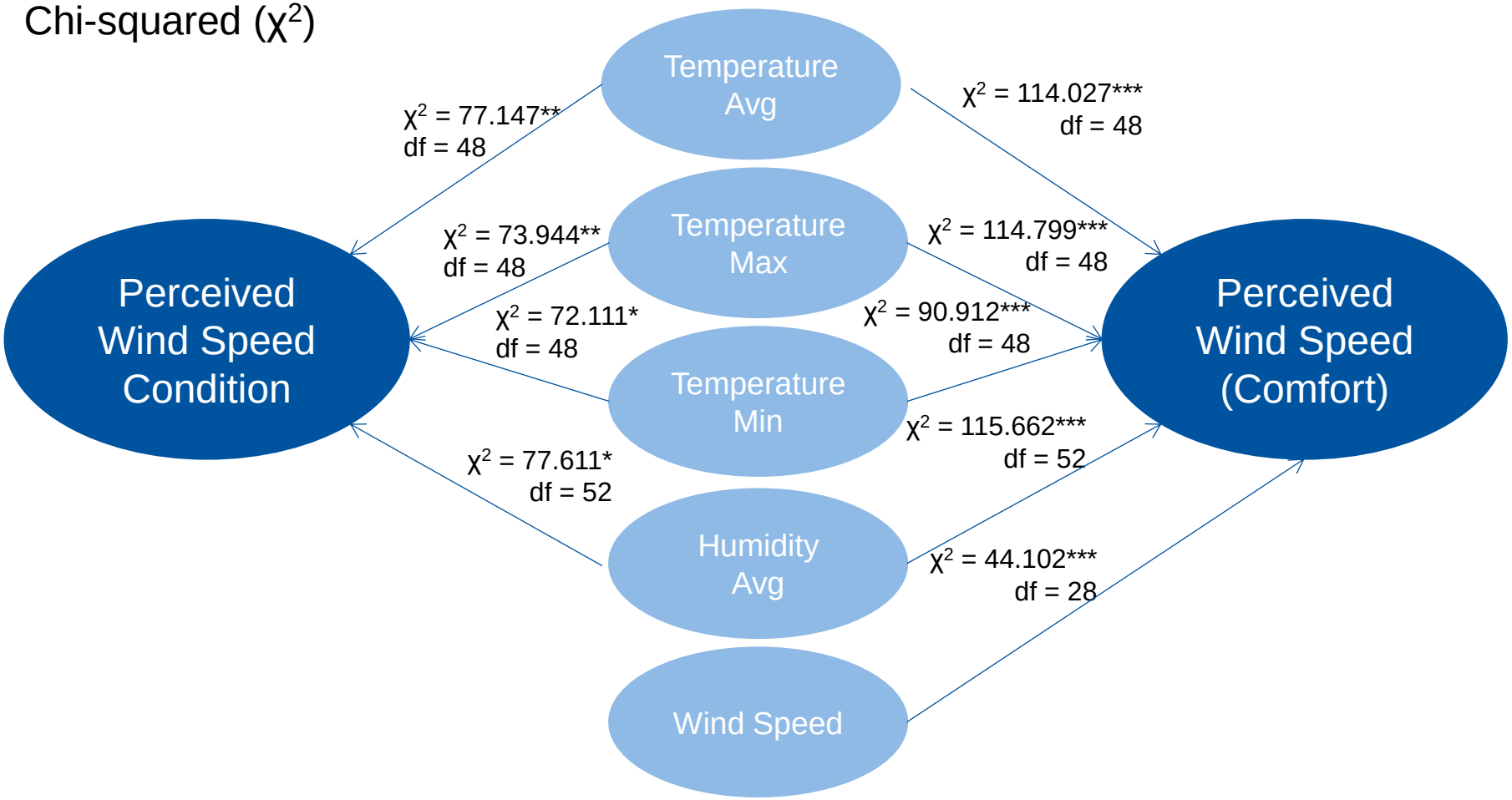
Monitored weather conditions vs perceived weather conditions
Chi-squared (χ^2)



Legend: (*) p<.05, (**) p<.01, (***) p<.001.

Results and Discussion

Monitored weather conditions vs perceived weather conditions
Chi-squared (χ^2)



Legend: (*) p<.05, (**) p<.01, (***) p<.001.

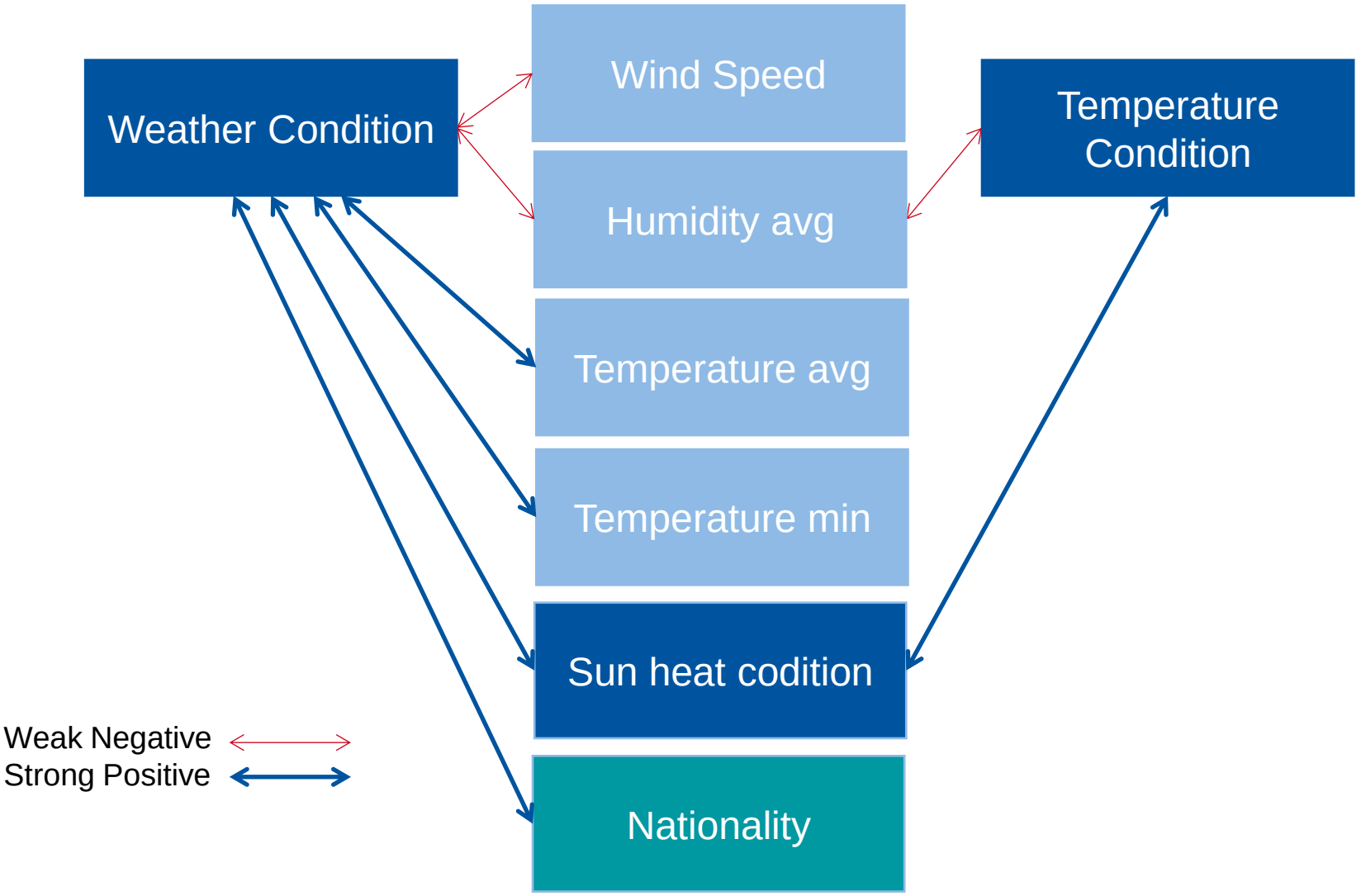
Results and Discussion

Cultural aspect vs perceived weather conditions
Chi-squared (χ^2) and Cramer's V (φ_c)

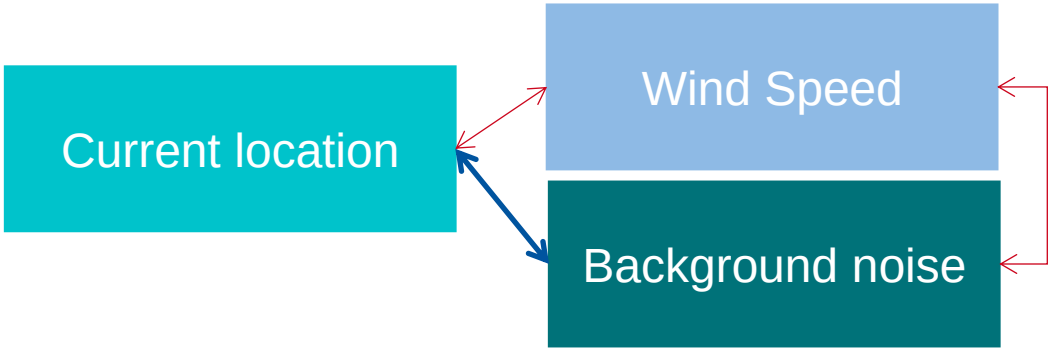
- The sample was composed by 34 Germans, three Chileans, two Brazilians, one Syrian, one South Korean, one Finnish, one Croatian and one Chinese

Legend: For Cramer's V (<0.4) weak correlation; (>0.4 to <0.5) moderate correlation; (> 0.5) strong correlation, (*) p<.05, (**) p<.01, (***) p<.001.

Conclusion


Weather Condition
Wind Speed
Humidity avg
Temperature avg
Temperature min
Sun heat codition
Nationality
Temperature Condition
Weak Negative
Strong Positive

Conclusion



Weak Negative
Strong Positive

Thank you
for your attention

Margret Sibylle Engel
Research Assistant for Medical Acoustics
Institute of Technical Acoustics
RWTH Aachen University
Kopernikusstraße 5
52074 Aachen
Germany
margret.engel@akustik.rwth-aachen.de

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