New qualitative methods to explore thermal perception in urban spaces

WAGENINGEN UNIVERSITY
WAGENINGEN UR

Dr. Dipl. Ing. MA (AA) Sanda Lenzholzer
Dipl. Ing. Wiebke Klemm

Dr. MArch MSc Carolina Vasilikou

University of Kent

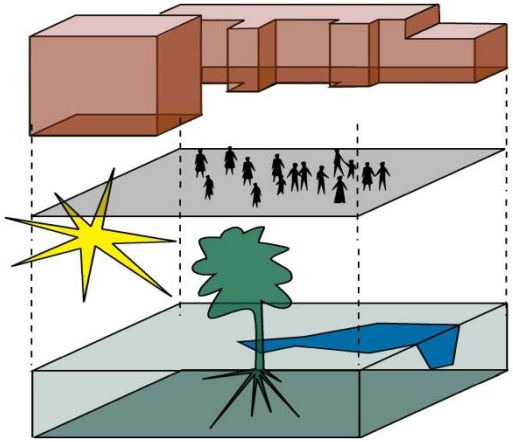
Summary

1. Why do we need novel qualitative methods?
2. Types of required qualitative methods
3. ‘Genealogy’ and examples of interviews
4. ‘Genealogy’ and examples of ‘mental mapping’
5. ‘Genealogy’ and examples of ‘sensewalks’
6. Conclusions

1.Why do we need novel qualitative methods?

“Thus both laboratory and field evidence, as well as everyday observations, establish that expressions of human thermal states cannot be encompassed adequately by physiological parameters alone.” (Andris Auliciems 1981 p. 144

1.Why do we need novel qualitative methods?



Investigating thermal perception in the spatial environment

Kinetics and perception:
1. standing still
2. in motion

Communication of perception:
1. verbal
2. drawings/ maps

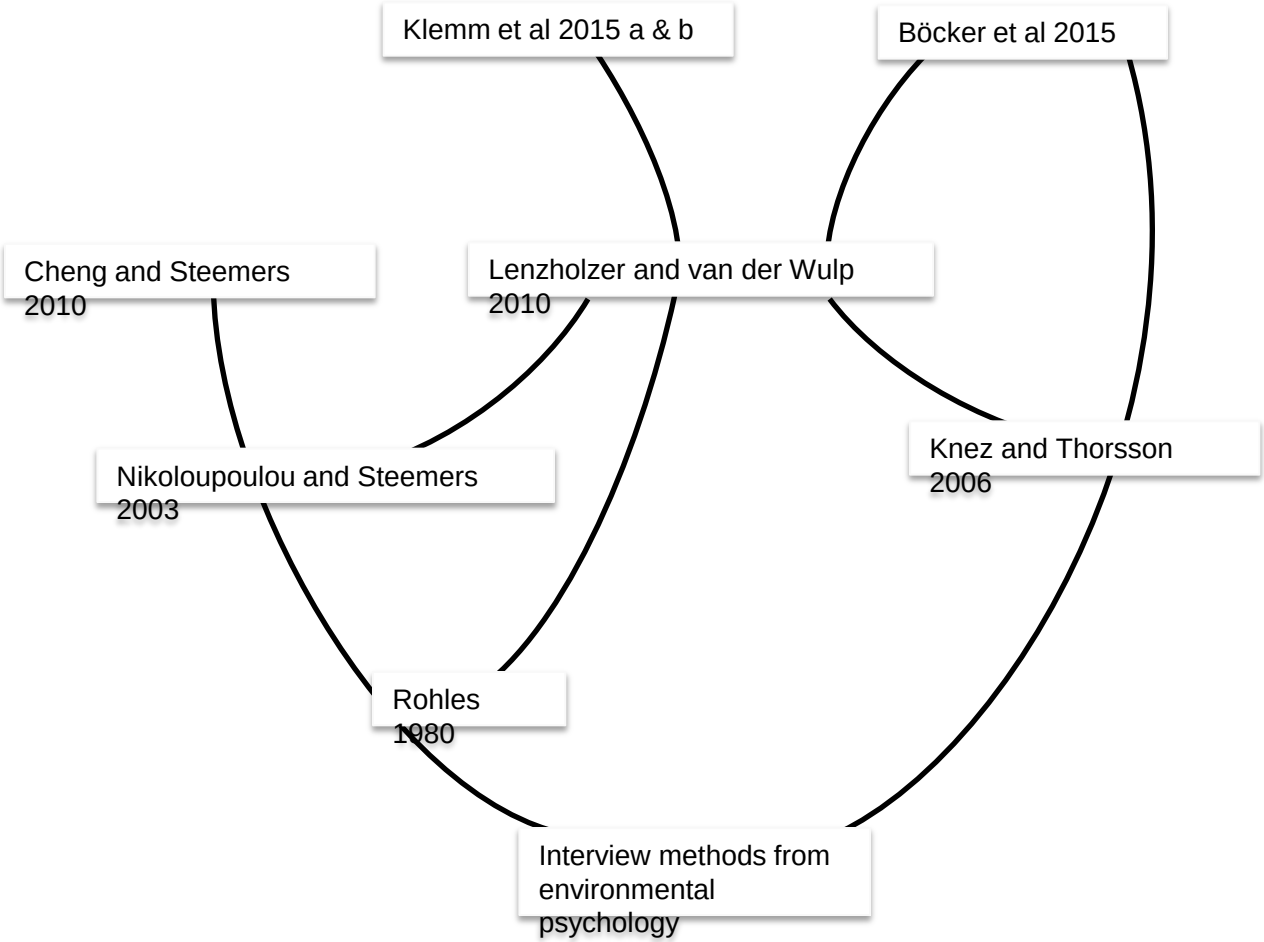
2. Types of required qualitative methods

kinetics / *Mode of communication*	*still*	*in motion*
verbal	interviews	sensewalks
visual	mental or cognitive maps	

Other relevant parameters:

- Scale of perceived environment
- Short-term (momentary) and long-term thermal perception

3. ‘Genealogy’ and examples of interviews



Interviews relating thermal and spatial perception

3. ‘Genealogy’ and examples of interviews

Hypothesis: “thermal discomfort can be influenced by the use of materials with a “cold” appearance”

Tests of Between-Subjects Effects

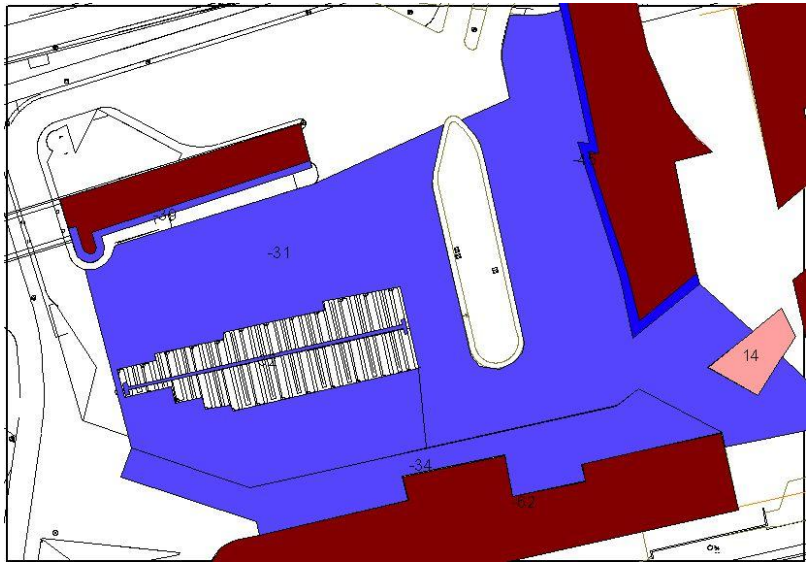
Dependent Variable: diffcomf

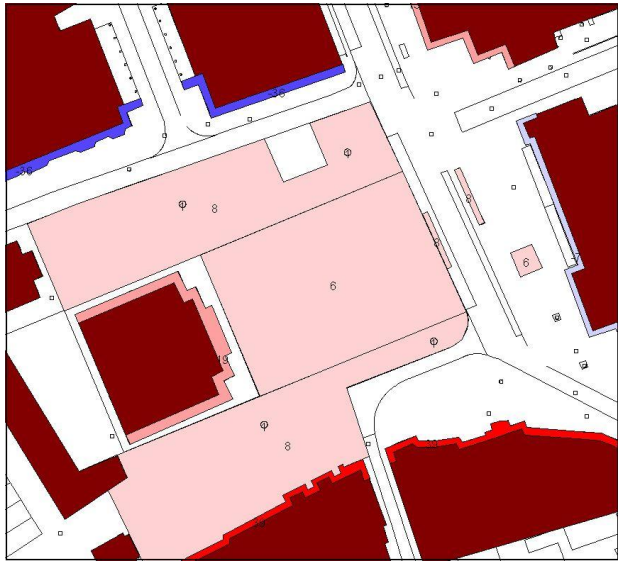
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	74.853	5	14.971	1.749	0.123
Intercept	259.473	1	259.473	30.322	0.000
matcw	66.795	1	66.795	7.806	0.006
plein	4.268	2	2.134	0.249	0.779
matcw * plein	6.625	2	3.313	0.387	0.679
Error	2,815.344	329	8.557		
Total	3,375.000	335			
Corrected Total	2,890.197	334			

a. R Squared = .026 (Adjusted R Squared = .011)

Long-term thermal perception in relation to material use

3. ‘Genealogy’ and examples of interviews

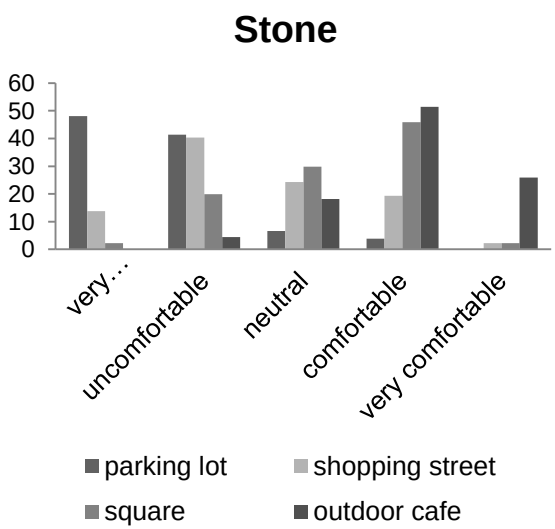


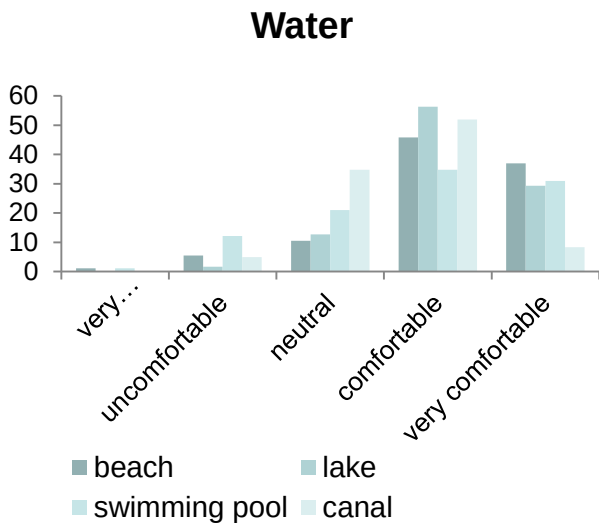


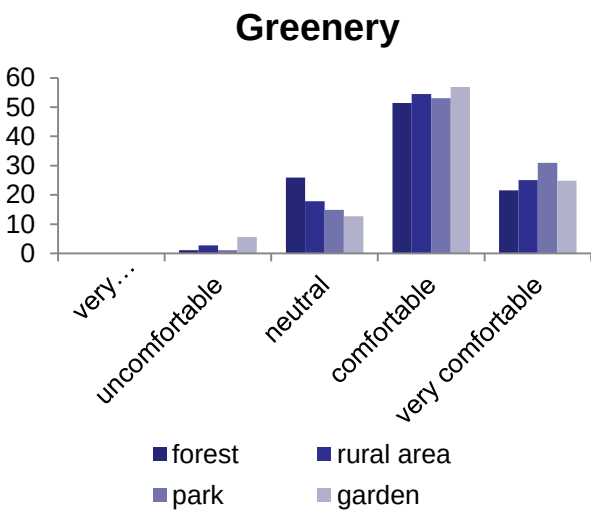
Translating verbal interview information into maps

3. ‘Genealogy’ and examples of interviews

How thermally (dis)comfortable would you feel on a hot summer day in one of the following urban spaces?



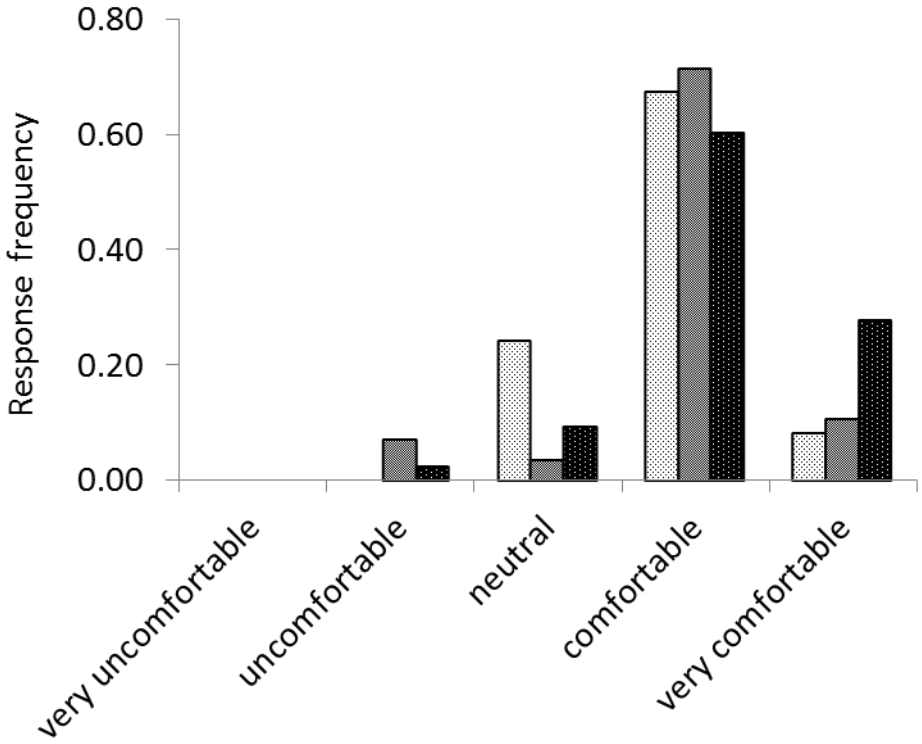




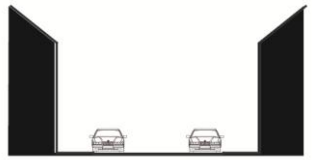
Long-term thermal perception in different urban environments

3. ‘Genealogy’ and examples of interviews

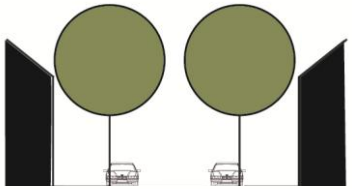
How do you experience the microclimate at this moment in this street?



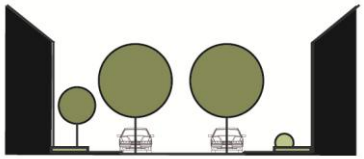
Streets without greenery



Streets with trees



Streets with trees combined with front gardens

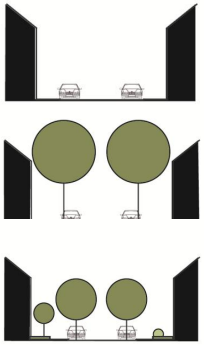


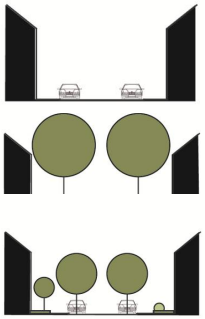
Short-term thermal perception in different urban environments

WAGENINGEN UNIVERSITY
WAGENINGEN UR
Dr. Dipl. Ing. MA (AA) Sanda Lenzholzer
Dipl. Ing. Wiebke Klemm
Dr. MArch MSc Carolina Vasilikou
University of Kent

3. ‘Genealogy’ and examples of interviews

Measurement data overview





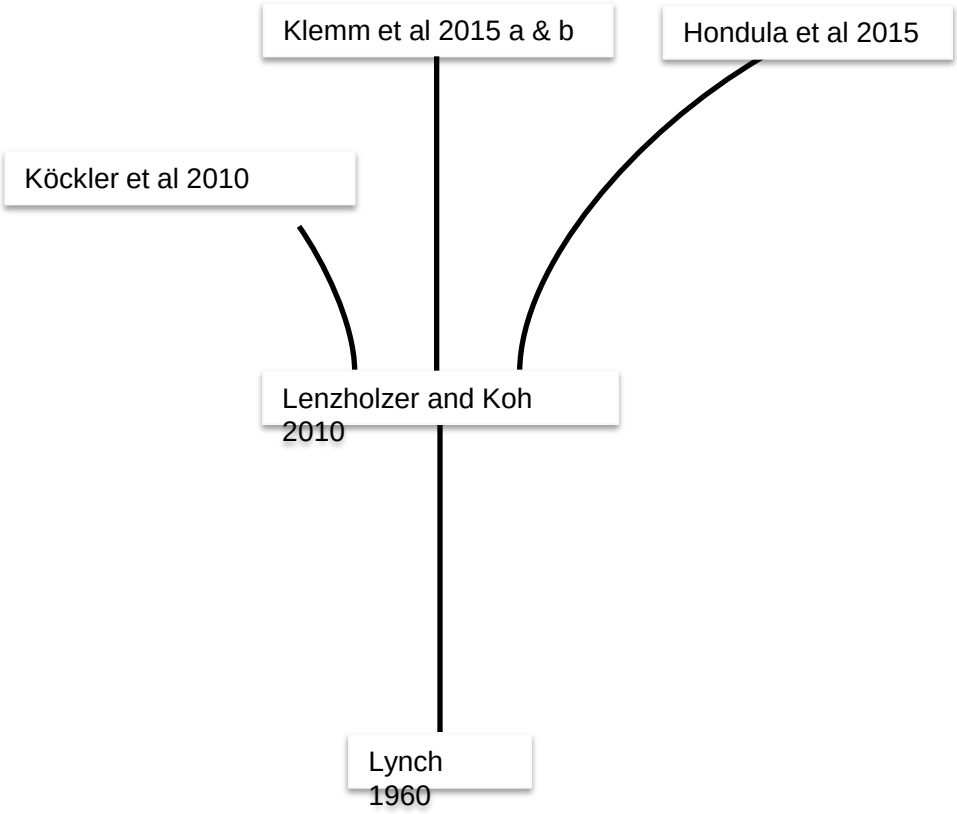
Ta	ΔTa	SD
Street type 1	0.00	0.25
Street type 2	0.03	0.34
Street type 3	0.00	0.28
Tmrt	ΔTmrt	SDall days
Street type 1	0.00	1.45
Street type 2	-3.72	1.49
Street type 3	-2.16	1.46

Air temperature

Mean radiant temperature

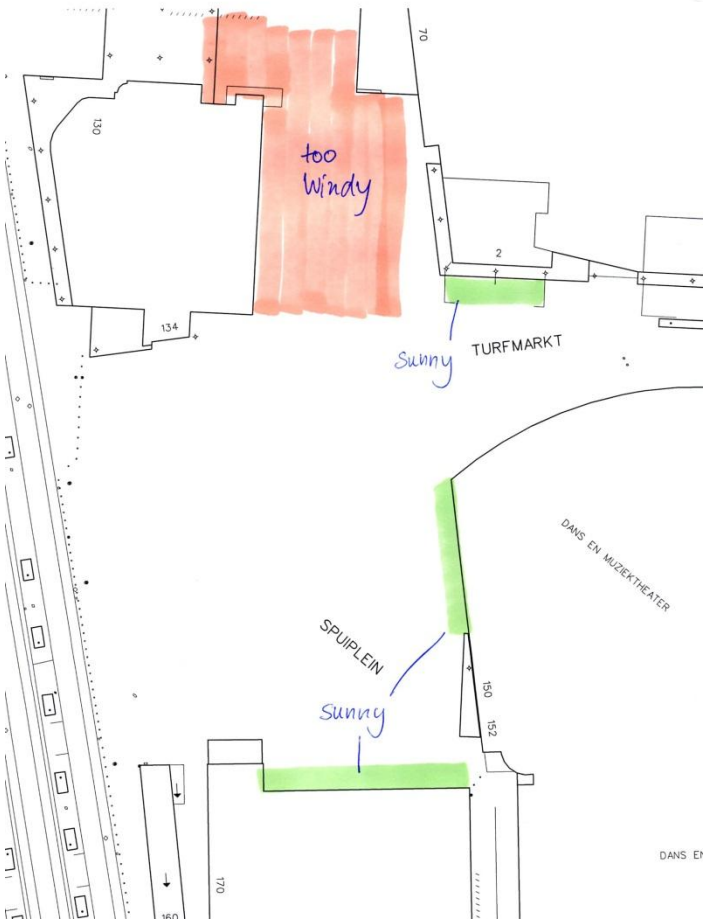
Comparison with measurement data

4.‘Genealogy’ and examples of ‘mental mapping’



Mental maps relating thermal and spatial perception

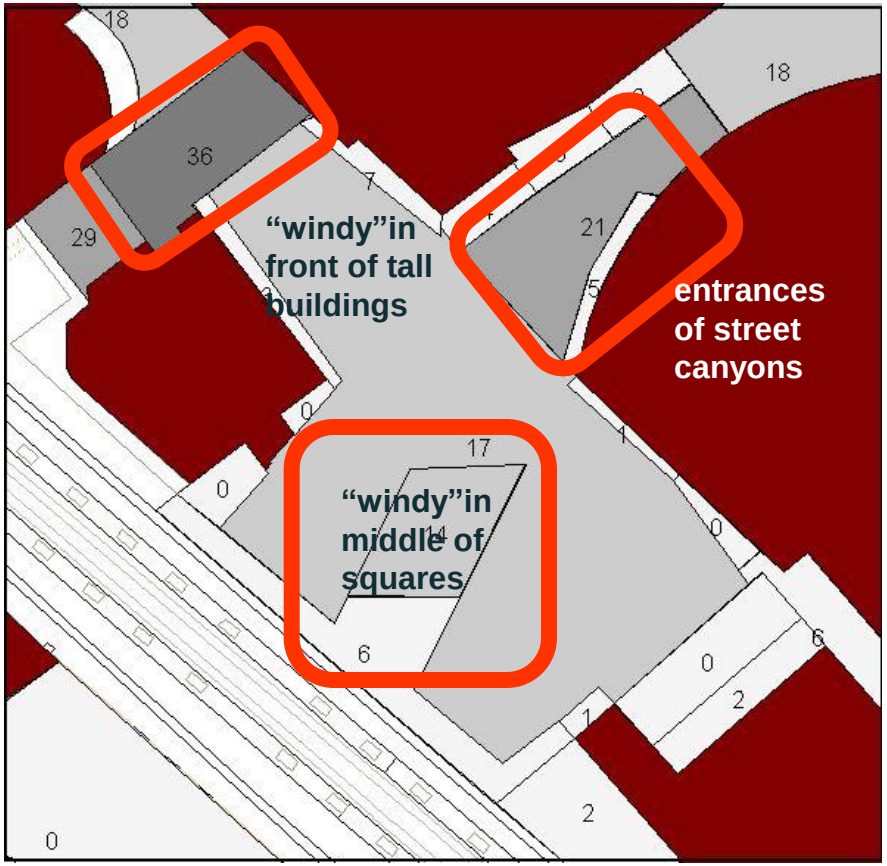
4.‘Genealogy’ and examples of ‘mental mapping’



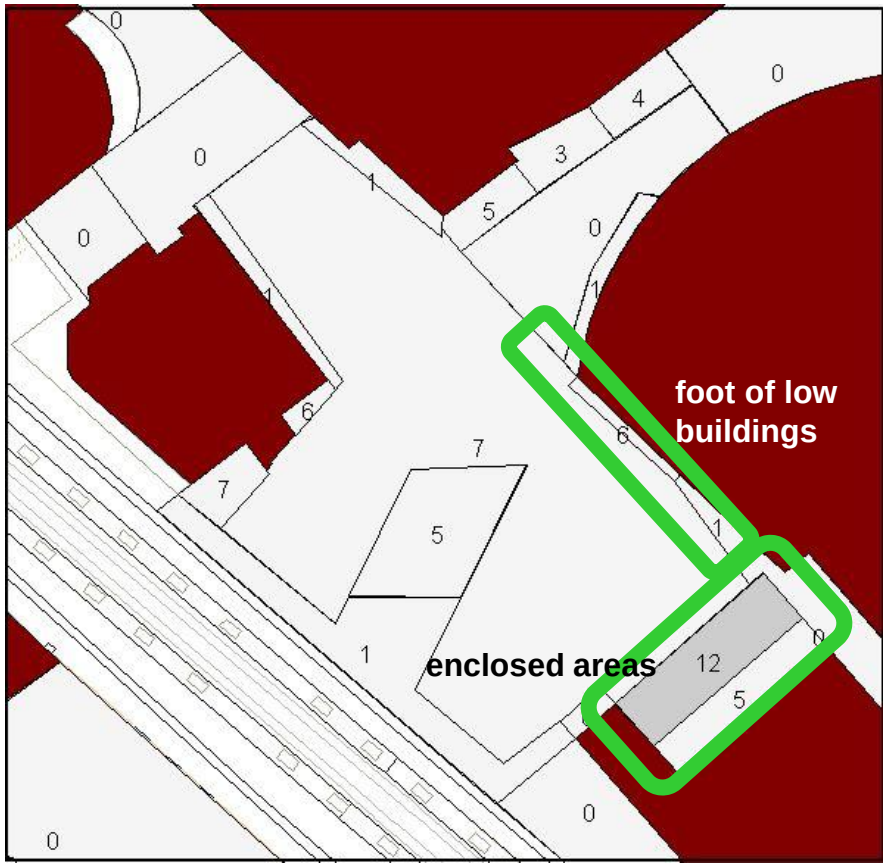
Individual mental thermal map, example the Hague

4.‘Genealogy’ and examples of ‘mental mapping’

experience “wind discomfort”



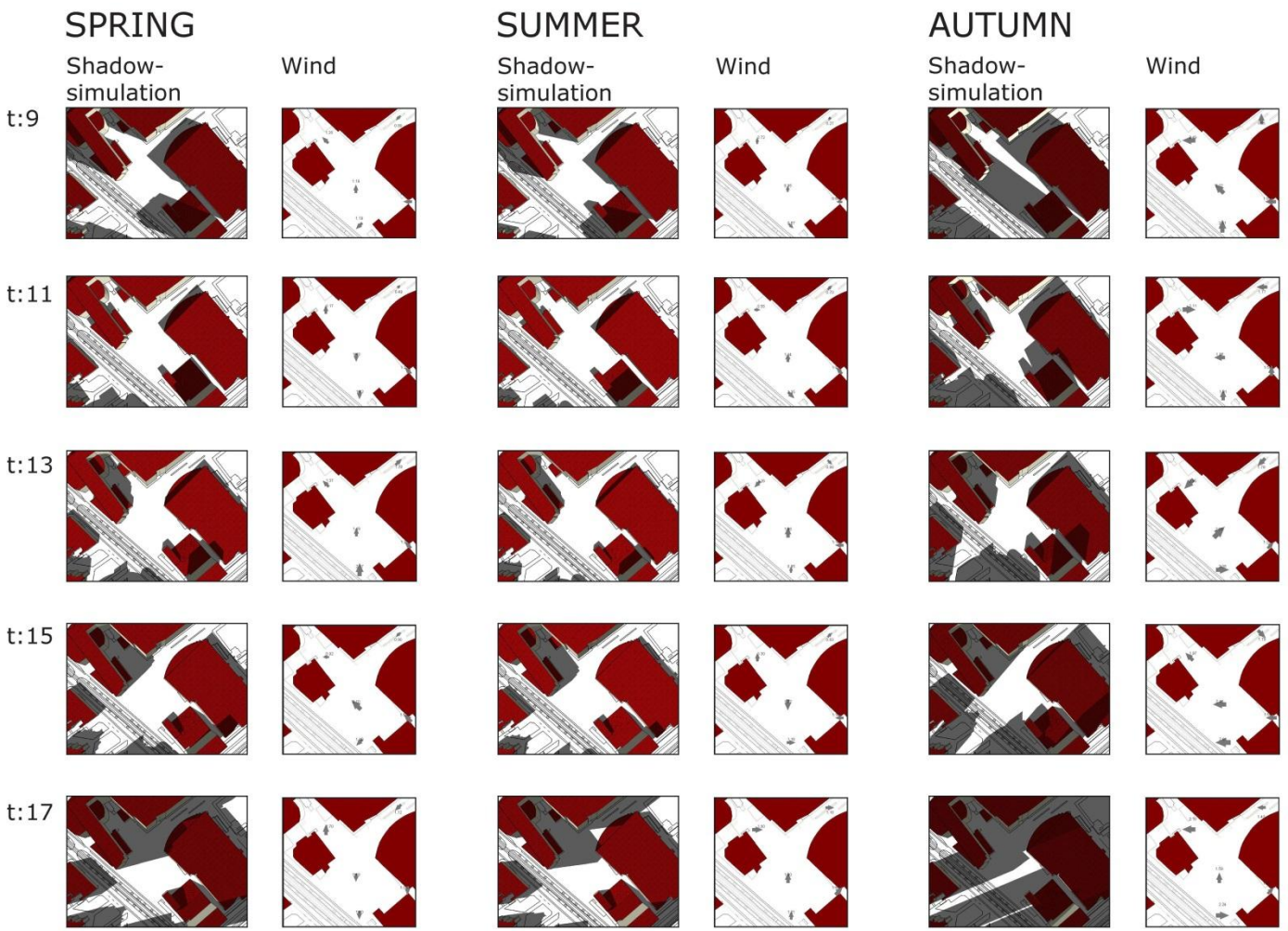
experience “ sun comfort”



Collective thermal maps per themes, example the Hague

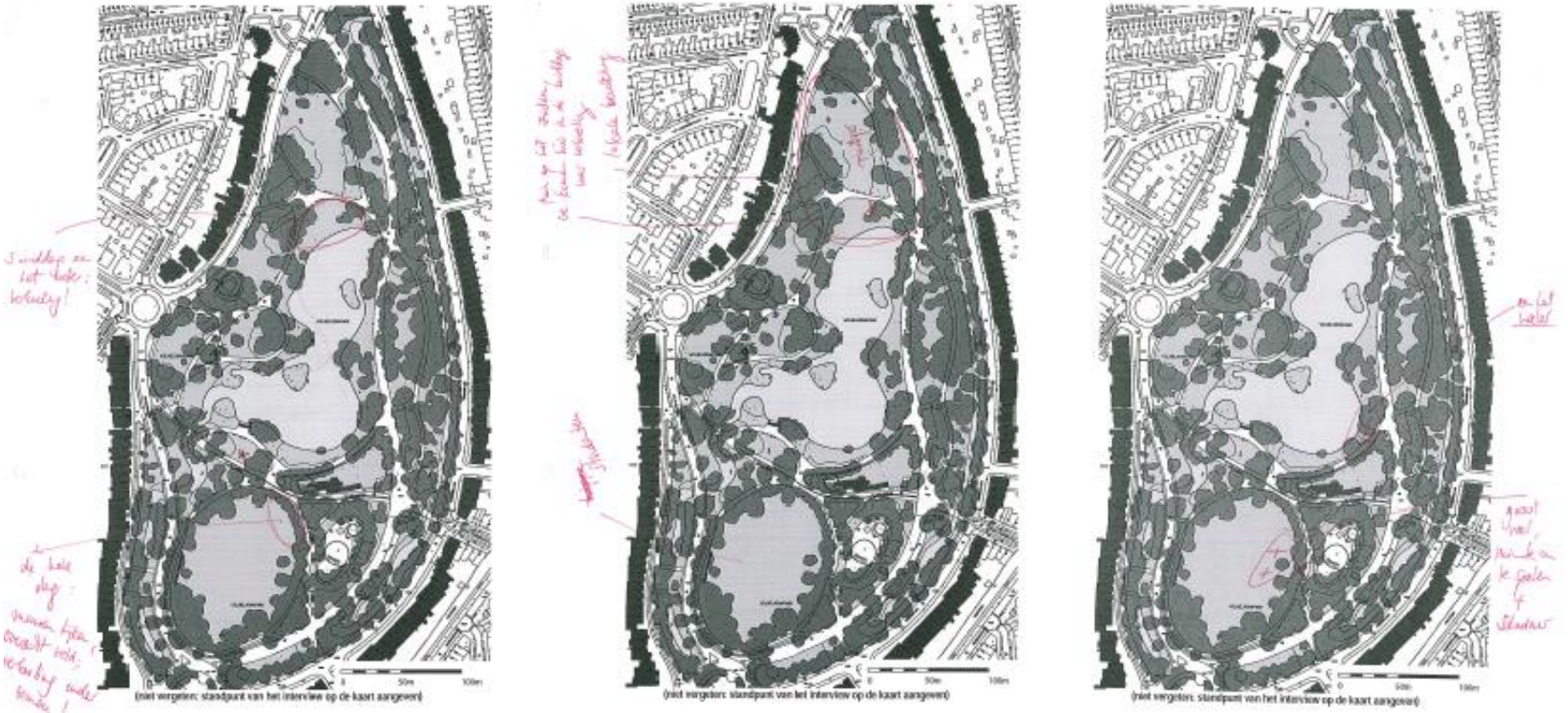
WAGENINGEN UNIVERSITY
WAGENINGEN UR
Dr. Dipl. Ing. MA (AA) Sanda Lenzholzer
Dipl. Ing. Wiebke Klemm
Dr. MArch MSc Carolina Vasilikou
University of Kent

4.‘Genealogy’ and examples of ‘mental mapping’



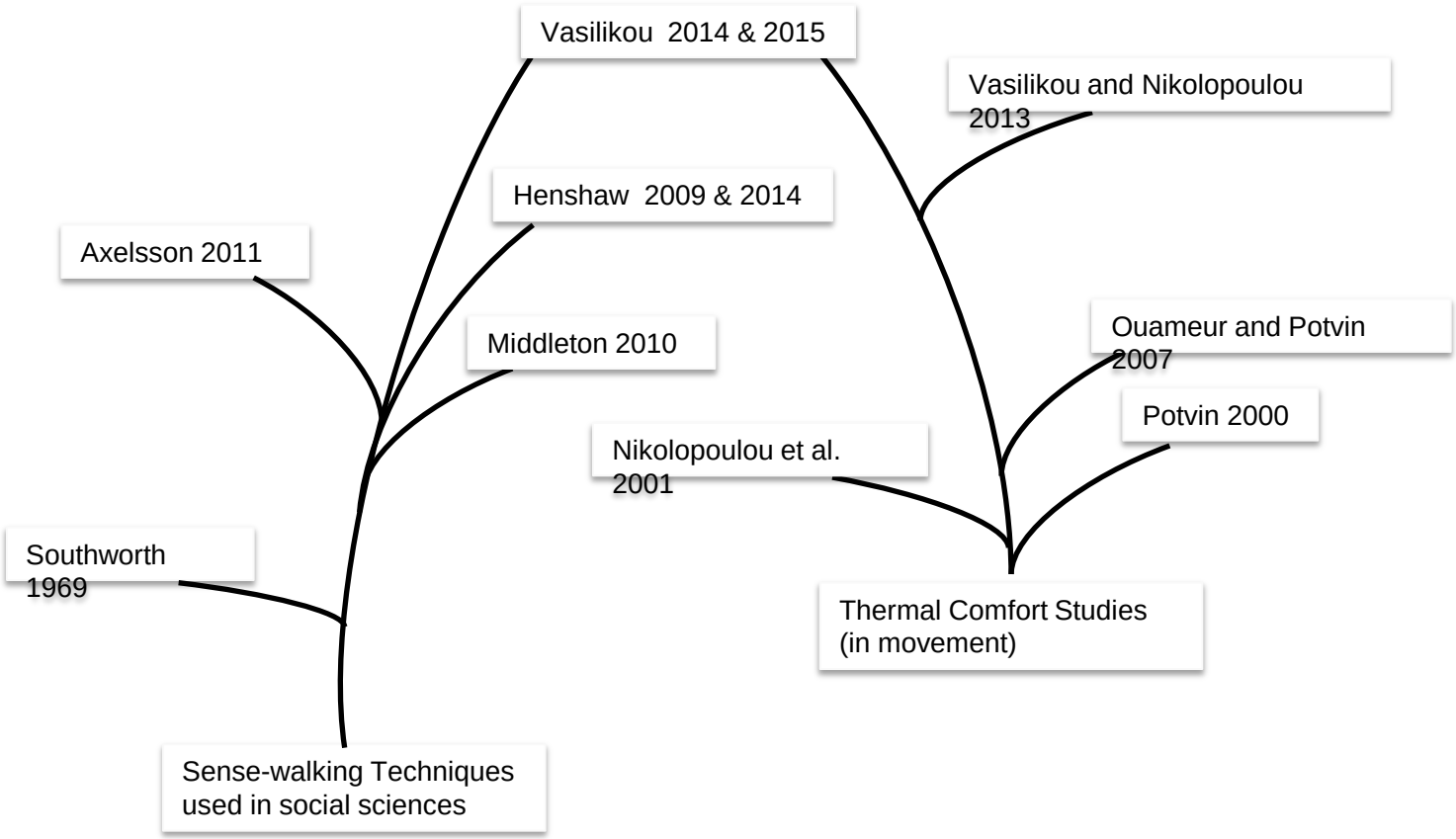
Measurement results for comparison

4.‘Genealogy’ and examples of ‘mental mapping’



Individual mental thermal maps, example Utrecht

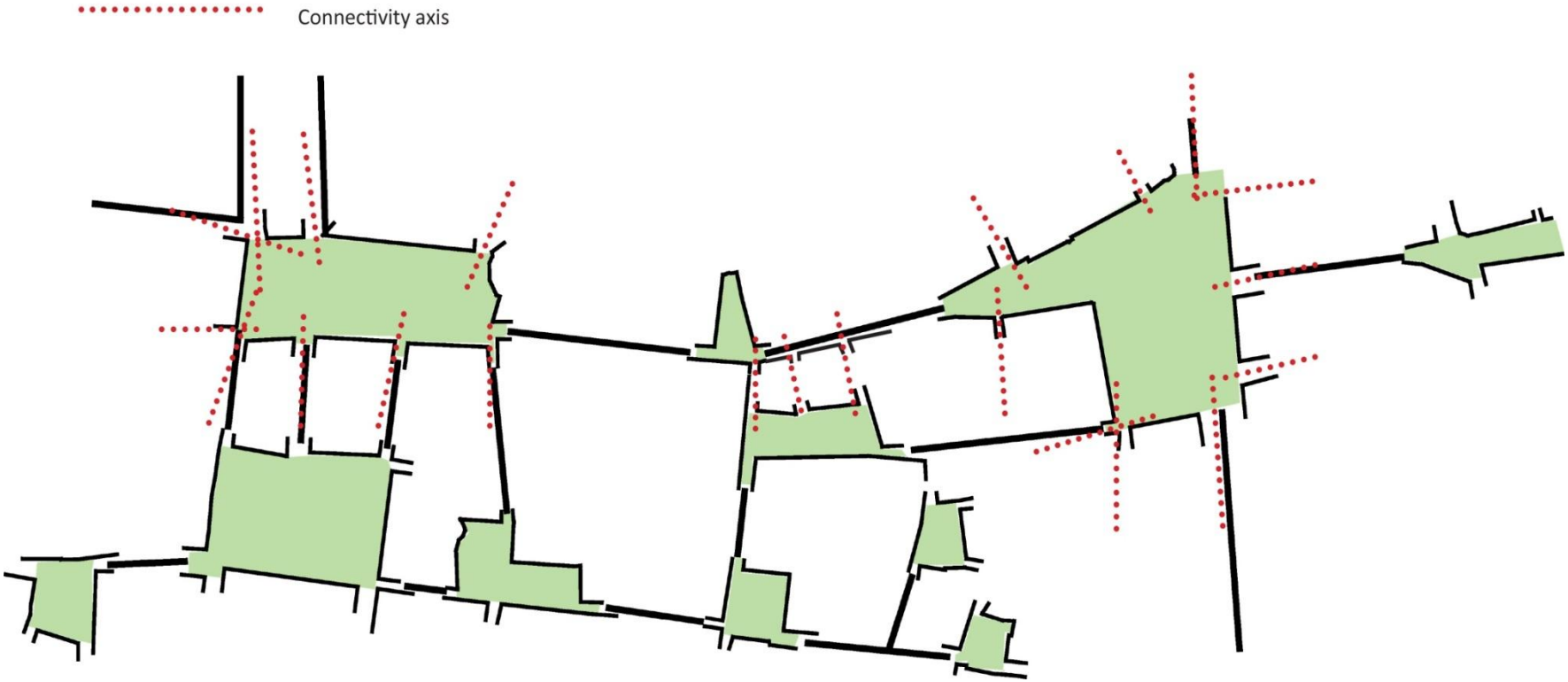
5. ‘Genealogy’ and examples of ‘sensewalks’



Thermal walks relating thermal and spatial perception

5. ‘Genealogy’ and examples of ‘sensewalks’

Spatial sequences in Rome



Thermal Walks used as design tool for interconnected urban spaces

WAGENINGEN UNIVERSITY
WAGENINGEN UR

Dr. Dipl. Ing. MA (AA) Sanda Lenzholzer
Dipl. Ing. Wiebke Klemm

Dr. MArch MSc Carolina Vasilikou

University of Kent

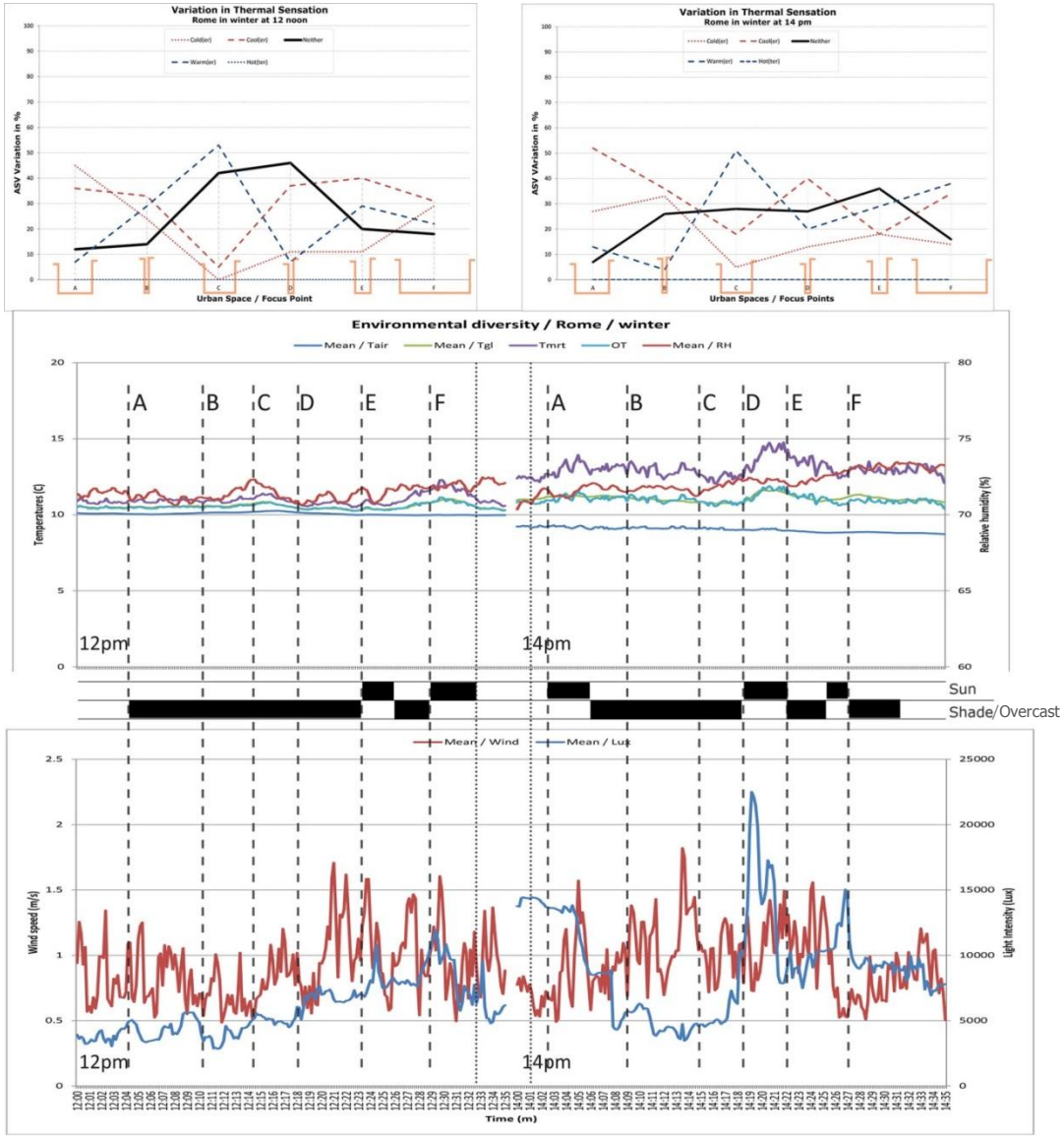
5. ‘Genealogy’ and examples of ‘sensewalks’

Longitudinal study of thermal perception in movement using measurements and questionnaire

Thermal Walk in Rome during summer 2012

5. ‘Genealogy’ and examples of ‘sensewalks’

Rome, 2013



Thermal Walk: linking measurement, spatial data and thermal perception

6. Conclusions

1. The results of the qualitative methods generally show a good match with measurement data, and provide extra information on experience of the designed environment which cannot be gained by measurements

2. The new qualitative methods yield results that are the basis of design guidelines for climate responsive urban and landscape design

3. Since the urban environment cannot be changed very quickly, inquiries into the long-term thermal perception are directly useful to guide urban design , whereas inquiries on short-term experience need to be based on longitudinal studies to yield meaningful design guidelines

4. When design guidelines for sojourn spaces are needed, mental map methods are most useful

5. When design guidelines are needed for interconnected urban spaces for people in movement, thermal walks are the most useful method

6. Interviews provide results that are spatially less specific and thus

WAGENINGEN UNIVERSITY
WAGENINGEN UR

Dr. Dipl. Ing. MA (AA) Sanda Lenzholzer
Dipl. Ing. Wiebke Klemm

Dr. MArch MSc Carolina Vasilikou

University of Kent