



In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy
Yuliya Dzyuban

Will defend her prospectus

Walk and transit friendly Phoenix: a dream or a nightmare?
Relationships between design and thermal comfort in the hot and arid climate.

Abstract

Moderate physical activity, such as walking and biking, positively affects physical and mental health. Outdoor thermal comfort is an important prerequisite for incentivizing active lifestyle. Thus, extreme heat poses significant challenges for people who are outdoors by choice or necessity. Type and qualities of built infrastructure determines the intensity and duration of individual exposure to heat. As cities globally are shifting priorities towards non-motorized and public transit travel, more residents are expected to experience the city on their feet. Thus, physical conditions as well as psychological perception of the environment that affect thermal comfort will become paramount.

Phoenix, Arizona, is used as a case study to examine the effectiveness of current public transit and street infrastructure to reduce heat exposure and affect thermal comfort of walkers and public transit users. Phoenix will serve as a showcase study to present methodology and findings that can be useful for the cities of the Global South, and cities in temperate climates that may face similar climate challenges in the future due to global warming.

Phoenix has committed to public transit improvements in the Transportation 2050 plan and has recently adopted Complete Streets Policy. Proposed changes include mobility improvements and creating a safe and comfortable environment for non-motorized road participants. To understand what kind of improvements would benefit thermal comfort the most, we need to understand heat exposure at the finer spatial scales, explore whether current bus-shelter designs are adequate in mitigating heat-health effects, and comprehensively assess the impact of design on physical, psychological and behavioral aspects of thermal comfort.

This dissertation will explore how design of street and public transit infrastructure affects thermal comfort drawing from both the literature review and empirical studies.

First, I will review walkability literature and assess how urban design principles for walkability affect three aspects of thermal comfort and how to adapt walkability theory to hot and arid climates. Then, I will demonstrate empirical results of the summer study conducted at Phoenix bus stops. I will explore the physical conditions of bus-stop infrastructure and how thermal perceptions are influenced by design variations. Finally, I will present the methodology and results of walking interviews conducted during the Heat Walk in September 2018 as a model for studies on pedestrian heat perceptions.

Friday, February 22, 2019

3:00 PM

Wrigley Hall, Room 401

Faculty, students, and the public are invited.

Supervisory Committee:

Dr. Charles Redman (Chair)

Dr. David Hondula (member)

Dr. Paul Coseo (member)