Cool Campus: shade and surface temperature

A proposed paired-measurement study, illustrated with four invented temperature pairs. Surface temperature is the outcome; ambient air temperature is not measured.

FICTIONAL TEACHING EXAMPLE · NO MEASURED FINDINGS

Question and comparison

At the same campus location and observation time, how does exposed surface temperature differ from a shaded patch of the same material? The descriptive quantity is exposed minus shaded temperature, in °C.

Proposed field protocol

Pair the same surface material at each location. Use one instrument procedure and record time, shade, distance, surface condition and weather. Repeat within each visit and on several days. Retain readings and calibration notes. This protocol is proposed; the demo values were not measured.

Worked synthetic dataset

Exposed / shaded (°C): courtyard 36 / 31; walkway 34 / 30; library 33 / 29; garden 32 / 28. Differences: 5, 4, 4, 4 °C. Their equally weighted mean is (5 + 4 + 4 + 4) / 4 = 4.25 °C. The PDF appendix and interactive app show the same pairs.

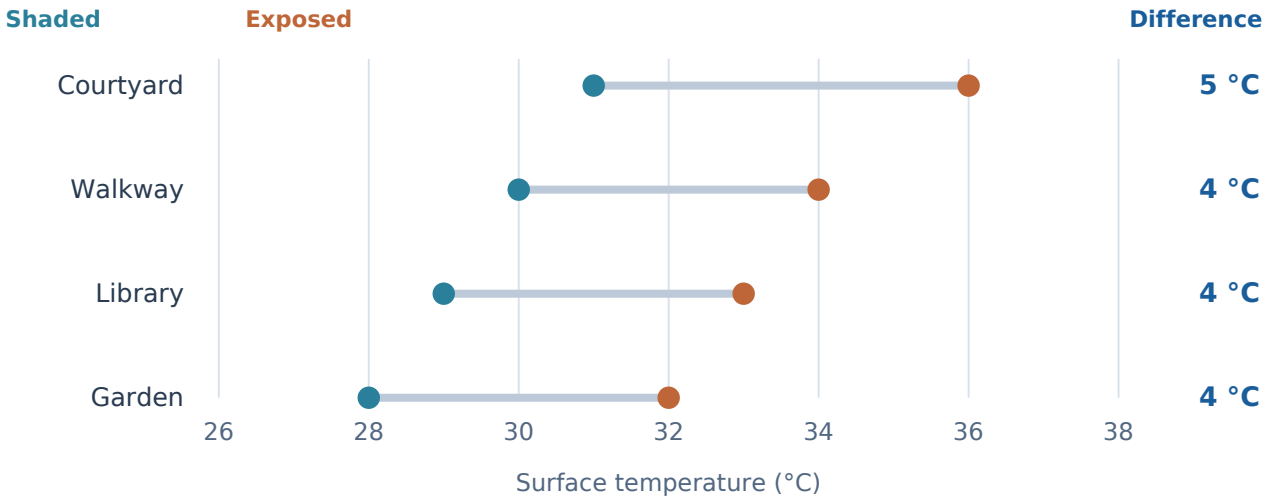
Interpretation and next experiment

The invented pairs illustrate a calculation, not a cooling effect or an air-temperature reduction. They provide no uncertainty estimate or causal evidence. In a real study, repeat matched measurements and document material, moisture and weather before comparing conditions.

Data and reproducibility

Four synthetic surface-temperature pairs

Four synthetic surface-temperature pairs



Values used in the example

Site	Exposed (°C)	Shaded (°C)	Difference (°C)
Courtyard	36	31	5
Walkway	34	30	4
Library	33	29	4
Garden	32	28	4

Mean paired difference = (5 + 4 + 4 + 4) / 4 = 4.25 °C

Invented values for a worked comparison. The mean describes these four pairs only; it is not an air-temperature estimate or a measured cooling effect.

Background reading · not the source of the example values

U.S. EPA · Measuring Heat Islands

www.epa.gov/heatislands/measuring-heat-islands