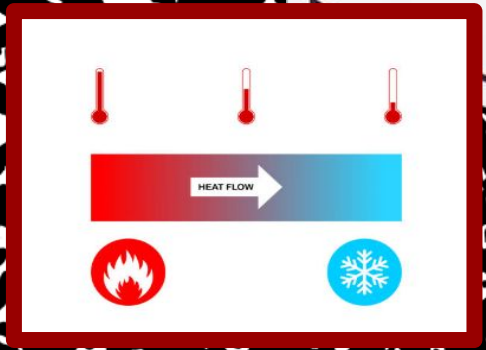
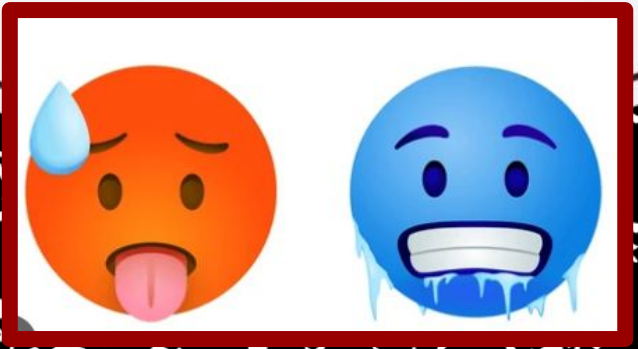
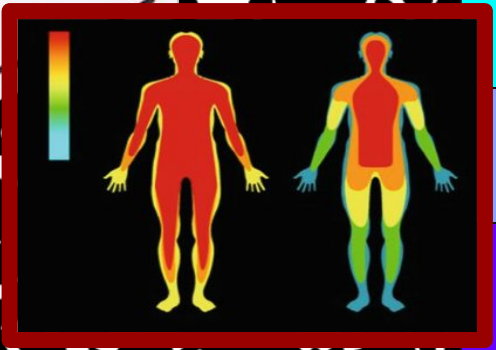
SCIENCE NOTEBOOK

A Closer Look At Conduction:

Do People Transfer Heat Differently?







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ABSTRACT

I chose this experiment because I wanted to find out if people have the same body heat or if everyone gives off different amounts of heat. I have noticed that some people feel warmer than others, so I wanted to test it.

In Round 1, we only measured the temperature of the water bottles before and after holding them for 5 minutes. The starting temperature of the untouched water bottles was 70.0°F for everyone. After testing, we realized our results were not as accurate as we wanted, so we improved our experiment.

In Round 2, we measured both our hand temperatures and the water bottle temperatures before starting. Then we held the water bottles for different amounts of time using timers. When each timer went off, we immediately measured the water temperature again.

In Round 2, the untouched water temperatures were: 70.8°F (me - 11yrs. old), 69.3°F (mom - 42 yrs. old), 69.4°F (Hector - 49 yrs. old), and 69.3°F (Jessica - 16 yrs. old). Our starting hand temperatures were: 91.0°F (me), 90.2°F (mom), 89.1°F (Hector), and 85.1°F (Jessica). After holding the bottles, the final water temperatures were: 72.4°F (me), 71.9°F (mom), 72.3°F (Hector), and 69.2°F (Jessica).

This experiment is in the category of Physical Science because it studies heat transfer. My results showed that different people transferred different amounts of heat to the water bottles. This helped me learn that people can release body heat at different rates.

QUESTION

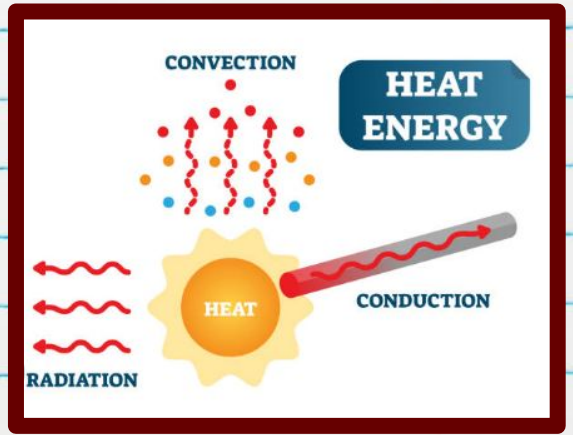
Do people transfer heat at different rates?

RESEARCH

Heat is energy that moves from a warmer object to a cooler object, which makes the cooler object warmer. There are three main ways heat can travel. The first is conduction, which happens when objects touch. The second is convection, which happens when heat moves through liquids or gases. The third is radiation, which travels in waves, like heat from the sun.

The human body works best at about 98.6°F. If the body temperature gets too high, the brain signals the body to sweat to help cool down. Things like barriers and reflective insulation can help slow down heat loss and keep heat from escaping.

Resources : NASA, kids health



HYPOTHESIS

I predict that older people will transfer less heat and younger people will transfer more heat. I think this because heat is a form of energy, and kids usually have more energy than adults. That is why I think kids will transfer more of their body heat to the water bottles.

MATERIALS

- 1 infrared thermometer
- 4 water bottles (aquafina 16.9 fl oz)
- 4 human test subjects
- 1 timer/clock (phone)
- 1 Pen and paper for data reporting

PROCEDURES

Round 1

- Gathered unopened identical water bottles with room-temperature water.
- Put initials of test subjects on caps to better identify each person's results
- Measured and recorded the starting water temperature.
- Did not measure hand temperatures.
- All four people started holding their water bottles at the same time.
- Set one timer for 5 minutes.
- When the timer went off, we measured the water bottle temperatures one at a time.
- Recorded the results.

Problems We Noticed in Round 1

- We did not measure hand temperature.
- We all used the same timer.
- We measured temperatures one at a time, so some bottles sat longer before being measured.
- We held the bottles in different places (top, middle, bottom).
- This may have caused less accurate results.

PROCEDURES

Round 2 (Improved Experiment)

- Test subjects took their assigned unopened water bottles with room-temperature water (same bottles from round 1).
- Measured and recorded the starting water temperature.
- Measured and recorded each person's hand temperature before starting.
- Each person held the bottle in their left hand and in the same position (bottom).
- Set individual 5 minute timers for each person.
- When each timer went off, we immediately measured that bottle's temperature.
- Recorded all results.

DATA & RESULTS

Round 1

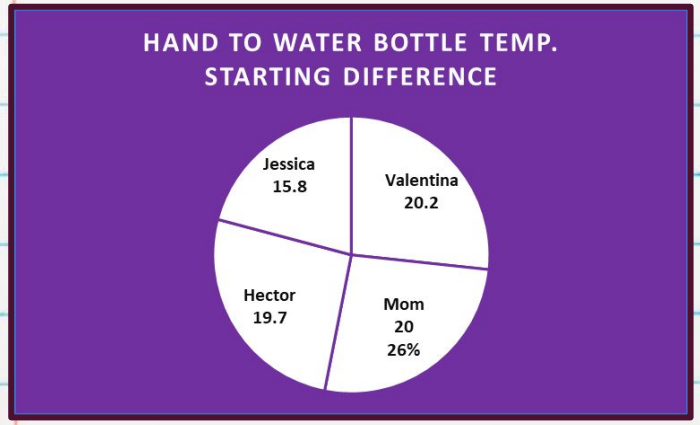
	Water bottle temp.: Untouched	Hand temp: Untouched	Water bottle temp: 5 min. held in any hand
Me 11 yrs. old	70.0 °F	Not measured	70.9 °F
Mom 42 yrs. old	70.0 °F	Not measured	70.9 °F
Hector 49 yrs. old	70.0 °F	Not measured	71.0 °F
Jessica 16 yrs. old	70.0 °F	Not measured	70.1 °F

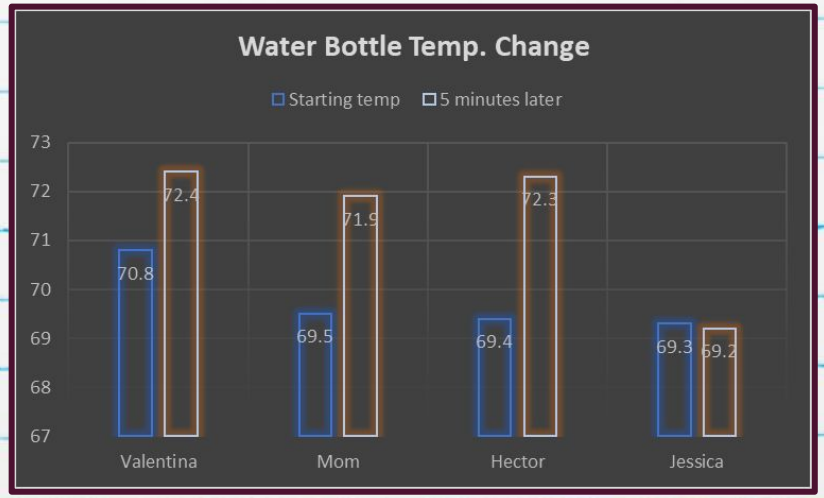
DATA & RESULTS

Round 2

	Water bottle temp.: Untouched	Hand temp: Untouched	Water bottle temp: 5 min. held in left hand
Me 11 yrs. old	70.8 °F	91.0 °F	72.4 °F
Mom 42 yrs. old	69.5 °F	90.2 °F	71.9 °F
Hector 49 yrs. old	69.4 °F	89.1 °F	72.3 °F
Jessica 16 yrs. old	69.3 °F	85.1 °F	69.2 °F

DATA & RESULTS FROM ROUND 2





The pie chart shows that the hand temperature did not have an impact on heat transfer results. The bar chart shows that the adults transferred the most heat.

DATA & RESULTS

In Round 1, we realized our experiment was not as accurate as it could be. We did not measure hand temperatures, and we all used the same 5 min. timer. Because we measured the bottles one by one, some bottles were sitting longer before being tested. This may have allowed them to lose heat and affected our results. We also held the bottles in different places, which could have changed how much heat was transferred.

In Round 2, we improved our experiment. We measured both hand temperature and water temperature before starting. We used separate timers so each bottle was measured right away. We also made sure everyone held the bottle in the same place. This made our results more accurate. During both rounds, Jessica did not always follow the exact same method as everyone else. She loosely held the bottle, rested it at times, and moved around more. I also moved around a lot in round one, which is one of the reasons we tested again. Because Jessica did not hold the bottle the same way throughout the experiment, her results were lower and more varied. This may have affected how much heat was transferred.

Our results showed that different people transferred different amounts of heat to the water bottles. Some bottles increased in temperature more than others. This shows that people can release body heat at different rates.

CONCLUSION

In conclusion, my hypothesis was wrong. The adults transferred more heat than the kids. I think this happened because adults are bigger than kids and may have more body heat, which could cause them to transfer more heat.

I also learned that to get accurate results, everyone has to follow the exact same procedure. If someone changes how they hold the bottle or moves around, it can affect the results. During my experiment, I saw that when one person did not follow the same method, their results became less accurate.

This experiment taught me that using the same method for everyone is very important in science. Scientists must control variables to make sure their results are accurate and fair. I learned that even small changes in the procedure can change the outcome.

Acknowledgments

I would like to thank my mom for helping me with my project and supporting me through the whole experiment.

Thank you to Hector and Jessica for being my test subjects and helping me collect data.

I would also like to thank Nina Trina for lending us the infrared thermometer so we could measure temperatures accurately.