

GRAPH THAT!

by Jack Weyland

Let's discuss some weather related questions today.

1. Which will keep you drier, running through the rain or walking?

On your way out of a concert, you notice it's raining. You can either run or walk to your car. Which one is best ?

When you run, you are encountering more rain drops per minute than if you were walking. Why? Because the front of your coat is "bumping" into more raindrops than if you were walking. But, of course, if you're running, you're in the rain for a shorter time. Which to choose?

Thomas Peterson and Trevor Wallis of the National Climatic Data Center reported on an experiment they did to decide which is best. The meteorological journal *Weather* summarized their results (<http://help.teamsnap.com>): "One rainy day the two men donned identical sweat suits and hats, which they'd weighed before the test. For added accuracy, they wore plastic garbage bags underneath their sweat suits to keep their underclothes from wicking away any water. They then set out through the downpour on a 100-meter course. Wallis ran; Peterson walked.

"When they finished, the men weighed their clothes again to find out how much water they'd soaked up. Peterson (the walker) had absorbed about seven and a half ounces, while Wallis (the runner) sopped up only four and a half."

So, there you have it. Running to your car will keep you drier than walking.

2. People often tell us to wear a hat in cold weather, reminding us that we lose almost fifty percent of our body heat through our head. Is this true?

According to Vreeman and Carroll at the Indiana University of Medicine, the statement about heat loss from our heads “may have originated from an old Army study in which scientists put subjects in arctic survival suits (but no hats) and measured their heat loss in extremely cold temperatures. Because their heads were the only part of the subjects’ bodies exposed to the cold, about half the heat they lost from their bodies was lost through their heads.” (From “Festive Medical Myths” at www.bmj.com)

The rate at which heat is lost from our bodies in cold weather depends on how much surface area is exposed and also on how much insulation there is between parts of our body and the cold. For example, if these studies had been done with the subjects wearing swimming suits, the heat loss from other parts of their bodies would have been about ninety percent. However, if you’re dressed for the cold, wearing a hat will definitely reduce heat loss from your body.

3. What does the term wind chill factor actually mean?

Somebody once told me, “Last night the wind chill factor got down to 15 degrees below zero. No wonder my car wouldn’t start this morning.” The night before the outside temperature had dipped down to 10 degrees above zero. Was he right or wrong in blaming the wind chill factor on his car not starting?

You already understand the basic idea behind the concept of wind chill. When you’re enjoying a piping hot bowl of soup, what do you do? You bring the

spoon up to your lips and you blow.

In the process of holding a spoonful of hot soup near your lips, some of the air near the spoon gets slightly warmer than it was. That causes the soup in the spoon to get slightly cooler. As you blow the warmed-up air away from the spoon, it is replaced by cooler air, which warms up and then is blown away. This process causes the soup to get cooler.

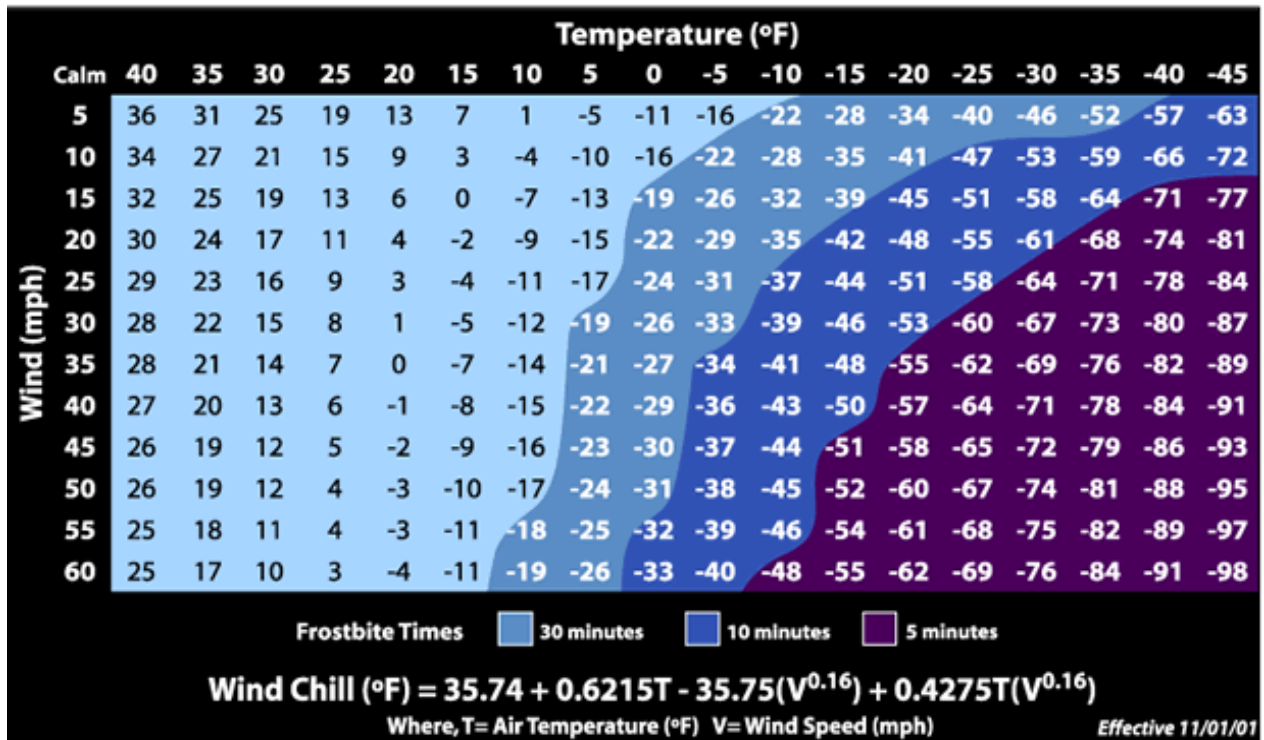
That's the same with heat loss in the winter when you're outside in the cold. The faster the wind blows across your face, the more rapidly your face loses heat.

The first experiments to determine wind chill effects were carried out in Antarctica in 1939. Human subjects were exposed to various wind speeds and temperatures to find out how long it took before exposed parts of the body turned white.

Today the result of these experiments is summarized by a simple chart.
(provided by the National Weather Service)



NWS Windchill Chart



For example, if the actual temperature is 10 degrees above zero and the wind is blowing 30 miles per hour, the heat loss from your face will be the same as if there were no wind and the actual temperature was 12 degrees below zero.

Why was my friend wrong when he blamed his car's not starting to the wind chill factor? Because the wind chill factor is not a real temperature. It does not apply to inanimate objects. The engine of a car left outside all night will eventually cool down to whatever the outside temperature is. Whether the car starts or not, does not depend on the wind chill factor.

The wind chill factor is real in the sense that your face will experience the same heat loss rate at 5 degrees with a 30 mile per hour wind as it will at minus 19 degrees with no wind. It will “feel” as cold to your face in either condition.

4. How come when you’re walking toward the wind, it is harder to breathe?

The act of breathing involves increasing the size of the lungs by means of the diaphragm. This increase in size causes the pressure of the air in your lungs to fall below atmospheric pressure. Since the lungs are connected to the outside through the windpipe, air moves from the higher atmospheric pressure outside to the lower pressure of the expanded lungs.

In other words, air moves into your lungs when we breathe because the pressure in our lungs is less than the pressure of the outside air. The greater the difference in pressure between the lungs and the outside, the more easily air moves into your lungs.

Suppose we suddenly walk into a blast of wind. Since moving air tends to have a lower pressure than air that is not moving, the wind tends to reduce the pressure difference between the outside and your lungs. Since a pressure difference is what fills your lungs with air, it will seem harder to breathe.

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