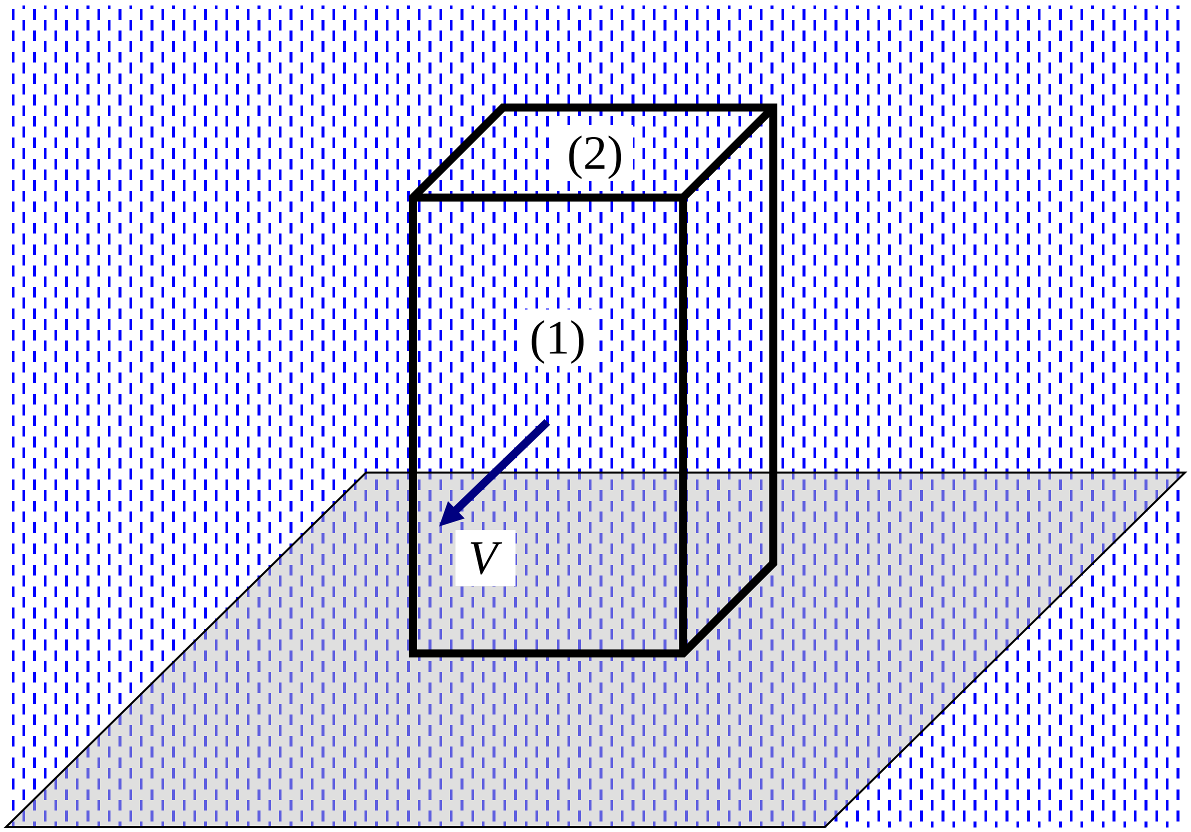
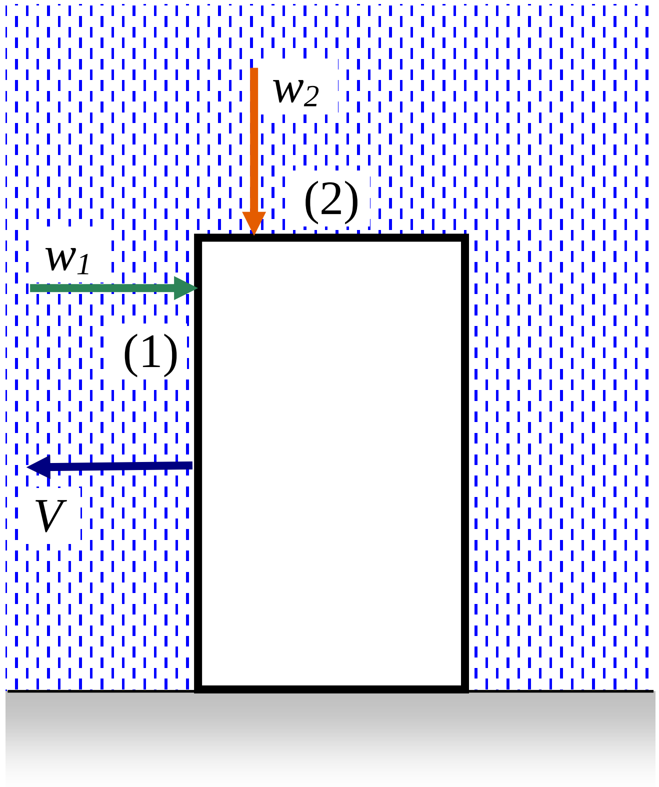
Is running better than walking to keep dry in the rain?

Model the person as an upright rectangular box moving through the rain at speed V as shown. The surface (1) represents the front of the person and the surface (2) represents the top of the person.



The figure below shows a side view of the set up. Assume that the rain is falling straight down.



Let w_1 be the rate of rain impingement on the front of the person (given as volume of water per second). Let w_2 be the rate of rain impingement on the top of the person (given as volume of water per second).

If the person is standing still $w_1 = 0$. If the person is moving then $w_1 \neq 0$. The faster the person moves (at greater speed V) the greater is w_1.

The rate w_2 is always the same whether the person moves or not.

The rate w_1 is proportional to V. Mathematically this means that $w_1 = aV$, where a is a constant.

Let's say the person has to travel a distance d through the rain. We have to determine if this person should walk or run. The total amount (volume) of water that impinges on the front of the person as he/she travels the distance d is equal to $A_1 = w_1T$, where T is the total time (in seconds) it takes for the person to travel the distance d to their destination

Now, $T = d/V$, therefore $A_1 = w_1(d/V) = aV(d/V) = ad$, which is constant. Now, the total amount of water impinging on the person is $A_1 + A_2$, where A_2 is the amount (volume) of water impinging on the top of the person, and $A_2 = w_2T$. Since A_1 is constant, then to minimize getting wet we must minimize A_2. Since w_2 is always the same no matter what V is, then to minimize A_2 we must minimize the time T spent in the rain. Therefore to minimize getting wet the person must run as fast as he/she can to their destination.