Journal of Interdisciplinary Science Topics

Slapping Someone Into Next Week

James Pierce, Jon Cogle, Jake Cox
The Centre for Interdisciplinary Science, University of Leicester
01/02/2013

Abstract
This paper exams the science behind the phrase 'Slapping someone into next week' and provides an estimate of the conditions necessary and feasibility of performing such an act.

Introduction
The threat of 'slapping someone into next week' is well used in popular culture in both film and television. Used as a way of threatening someone with a strike of such force as to bend the laws of Physics. However we investigate whether such a feat of strength could be possible and what conditions would be needed.

We provide an answer to this problem by considering Einstein's theory of special relativity. One of the postulates of this theory is that the laws which govern physical systems are measured and perceived equally for two systems at rest relative to each other[1]. When two systems are moving at different velocities to each other, they observe differences in measurements between themselves and the other system.

This postulate can be applied to our problem, if we consider the attacker and the victim as our two systems, the attacker needs to impart such a velocity to the victim that they experience one week of time relative to the attacker. The difference between the observed passage of time for both people is known as a Lorentz Transformation[2].

Theory
There are various steps in the calculations to solve this problem, the main two which concern the Lorentz Transformations are to find the ratio between the two observed time changes and to determine at what the victim would have to be moving relative to the attacker. The ratio of the measured times is known as the Gamma Factor and is given by[3]:

$$\Delta t_{victim} = \gamma \Delta t_{attacker}$$

Once we have this value we find the relative velocity *v* which would cause this gamma factor. This is found using[3]:

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Finding the necessary force required to accelerate a person to that speed is found by first finding the acceleration caused by this velocity:

$$v = u + at$$

Rearranged assuming initial velocity of *0*:

$$a = \frac{v}{t}$$

This value for *a* is then put into Newton's second law to find the force imparted onto the victim:

$$F = ma$$

These equations are then run back to find the velocity that the hand must be travelling in order to create such a force.

A number of reasonable assumptions are made to provide an answer to the question:

- The victim experiences $6.05\times10^5 seconds$ (1 week) to the attacker's *1 second.*

- Both people weigh 80kg and the attackers hand weighs 500g.
- That the victim's body is resistant to the enormous forces and accelerations involved.

Conclusion

From the values we assumed, we found that the victim would have to be travelling at 99.9% the speed of light. In order to convey that kind of speed to them, the attackers hand would have to be travelling in the order of hundreds of times the speed of light, $5.31\times10^{10} ms^{-1}$ to be precise. This value is clearly beyond the realms of possibility as the speed of light is considered a universal speed limit.

Realistically, assuming even the fastest punch were to land, the victim is unlikely to travel through any real difference in time in relation to the attacker. We re-calculated the time difference with a more realistic striking velocity of $10ms^{-1}$. Applying this realistic value, the difference in time is in the order of 10^{-18}- 10^{-21}*seconds.* This report would therefore suggest a more apt and accurate phrase, following real world calculations to be, "I'm going to slap you into the next femto second".

References

[1] http://www.fourmilab.ch/etexts/einstein/specrel/www/
[2] http://hyperphysics.phy-astr.gsu.edu/hbase/relativ/ltrans.html
[3] Tipler, P.A. & Mosca, G. (2008) Physics For Scientists and Engineers, 6th Ed. Freeman