

# Making sense of Einstein's Relativity

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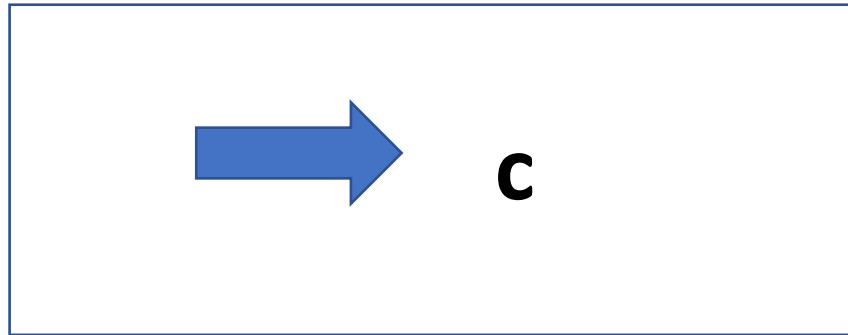
**October 2019**

As per previous talk: I pointed out that the usual translation from German into English for Einstein's 1905 paper on special relativity- is a mistranslation.

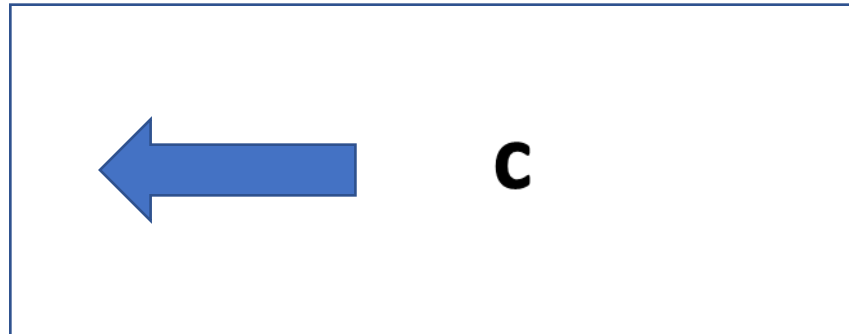
Now moving on to try to make sense of Einstein's relativity.

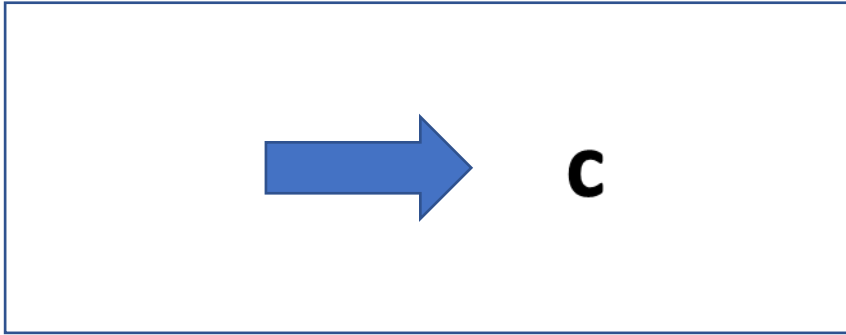
**Einstein did not use the terms one-way  
lightspeed and two-way lightspeed. But  
looking at his paper he should have used  
these terms. So, now trying to make  
sense of his paper based on those  
concepts. (n.b. dealing with lightspeed in  
vacuum) Going from Newtonian physics:**

**Consider a Box (that's not moving) with light bouncing between the two walls of the box:  
first light goes one way with speed  $c$**

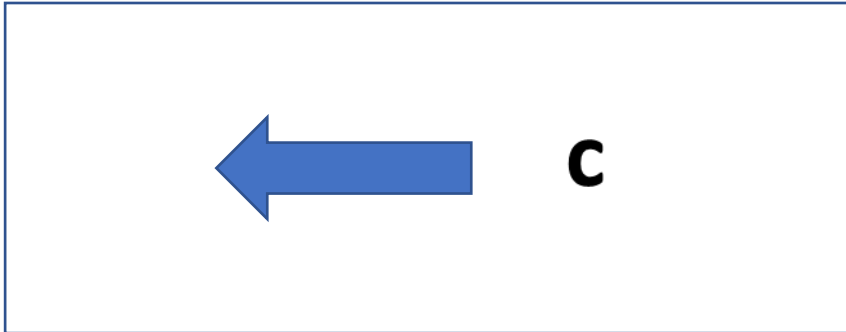


**Then light goes the other way: with speed  $c$**



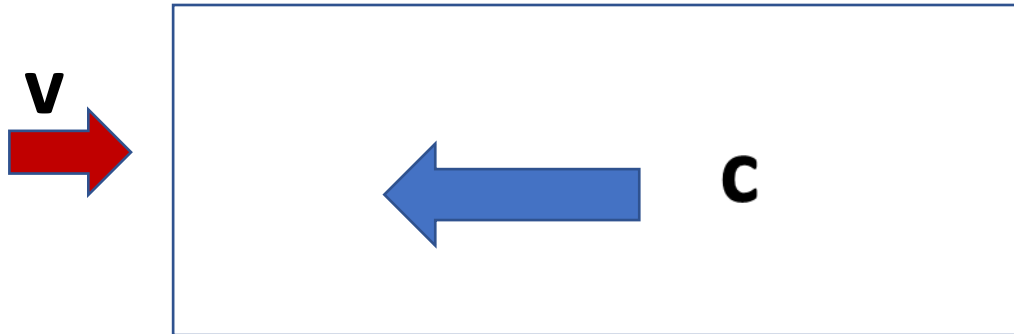
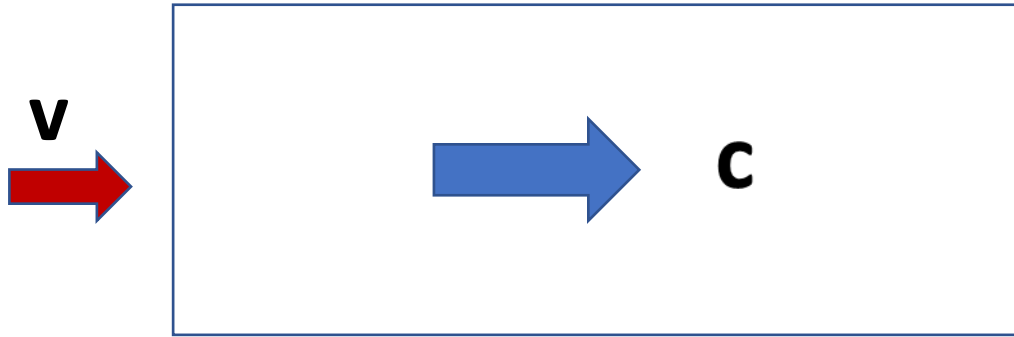


**speed back and forth =  
 $(c+c)/2 = c$   
(magnitudes)**



**Two-way lightspeed = c  
One-way lightspeed = c**

**Now for the Box moving-**



**Box moving with speed  $v$ :**  
**Speed one-way is  $c-v$**   
**Speed the other one-way is  $c+v$**

**Thus both ways speed**  
 **$= (c-v + c+v)/2 = c$**

**Two-way lightspeed =  $c$**   
**But One-way lightspeed is  $c-v$  and**  
 **$c+v$**

**This all by Newtonian physics**

**usual translation of Einstein's 1905 paper states:**

**In agreement with experience we further assume the quantity**

$$\frac{2AB}{t'_A - t_A} = c,$$

**to be a universal constant—the velocity of light in empty space.**

**Now the German word translates either into speed OR velocity, and I think it better to use word “speed”**



So, will be:

In agreement with experience we further assume the quantity

$$\frac{2AB}{t'_A - t_A} = c,$$

to be a universal constant—the **SPEED** of light in empty space.

Now have to bring in the one-way lightspeed versus two-way lightspeed issue:

Is talking about light going from A to B and then going back to A:

Light leaves A at time:  $t_A$

Light returns to A at time:  $t'_A$

So, total time of journey is:  $t'_A - t_A$

Thus two-way lightspeed is:

$$\frac{2AB}{t'_A - t_A} = c,$$

**There has been a mistranslation in the usual English version of Einstein's 1905 paper as pointed out in:**

**“Mistranslation of a Passage in Einstein's Original Paper on Relativity”**

**American Journal of Physics 31, 398 (1963);**

**<https://doi.org/10.1119/1.1969543> Charles Scribner Jr.**

**The issue boils down to the German word “nun” versus “nur”**

**The German :**

**Die letztere Zeit kann nun definiert werden, indem man durch Definition festsetzt, daß die „Zeit“, welche das Licht braucht, um von A nach B zu gelangen, gleich ist der „Zeit“, welche es braucht, um von B nach A zu gelangen.**

**The German :**

**Die letztere Zeit kann nun definiert werden, indem man durch Definition festsetzt, daß die „Zeit“, welche das Licht braucht, um von A nach B zu gelangen, gleich ist der „Zeit“, welche es braucht, um von B nach A zu gelangen.**

**The German word “nun” got mistranslated as “nur”**

**So, translates as:**

**“The latter time can now be defined by defining by definition that the "time" the light takes to travel from A to B is equal to the "time" it takes to get from B to A .”**

**So, translates as:**

**“The latter time can now be defined by defining by definition that the "time" the light takes to travel from A to B is equal to the "time" it takes to get from B to A .”**

**There is nothing about having to compulsory define the time this way.**

**So, therefore it is optional to define the time this way.**

**It is called Einstein-Poincare clock synchronization.**

**Clocks can be synchronized other ways, but Einstein wants clocks to be synchronized this way (at least he wants that in his 1905 paper).**

**So, by the Einstein synchronization the clocks are synchronized so that one way lightspeed =c.**

**There is a general issue : if have two clocks then how do we synchronize them to go at the same rate.**

**And Einstein answers it by this synchronization as to how he wants the clocks synchronized.**

**i.e. Clocks are synchronized so that they have one-way lightspeed =c.**

**Now contrast this to Newton:**



**Both Newton and Einstein have two-way lightspeed =  $c$ .**

**Newton has one way lightspeeds as  $c-v$  and  $c+v$ , and when  $v>0$  have  $c-v<c$  and  $c+v>c$**

**Einstein has it synchronized that one-way lightspeed is  $c$ .**

**i.e. replaces  $c-v$  and  $c+v$  by  $c$ .**

**When  $v=0$ ,  $c-v$  and  $c+v$  do equal  $c$**

**But when  $v>0$ ,  $c-v$  and  $c+v$  do not equal  $c$**

**Consider  $v=c$  :**

**Then  $c-v = c-c = 0$**

**And  $c+v = c+c = 2c$**

**Einstein wants it to be  $c$ , so imposing  $0=2c=c$**

**$0=1=2$**

**Which is nonsense**

**But when  $v \ll c$**

**Then  $c-v$  approximately equals  $c$**

**And  $c+v$  approximately equals  $c$**

**i.e. if  $v = 0.0001c$**

**Then  $c-0.0001c = 0.9999c$  and that's approximately  $c$**

**Similarly  $c+0.0001c = 1.0001c$  and that's approximately equal to  $c$**

**So, Einstein's synchronization is making an approximation, can deal with things when  $v \ll c$ , and when  $v$  gets too large then the approximation is no longer adequate.**

**So, that's how one-way and two-way lightspeeds are connected from Newton to Einstein.**

**Einstein is dealing with an approximation of treating them all as equal to  $c$  for low speeds  $v \ll c$ .**

**There are a lot of other problems in relativity, but what I have highlighted in this talk is one of the main problems.**

**(1) Einstein been mistranslated and misrepresented etc.**

**(2) Einstein did not deal with things in a clear way even when (1) is taken into account**

**(3) He was dealing with an approximation**

**Thankyou**

**The End**

**c.RJAnderton19October2019**