



## A DISCUSSION ON THE RELATIVITY OF SIMULTANEITY

Xinghong Wang

Center for Theology and Philosophy Studies, Chancelada Emill Brunner World University;  
Miami, Florida, United States of America

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### Abstract:

This article studies the situations when 2 beams of lasers are emitted from each end of a rod to the middle point of the rod when the rod is static or moving. When observers are located in different places, whether the 2 beams of light reach the middle point at the same time can be unsure. This could previously be explained by “The relativity of simultaneity”. But we can connect the incident whether the 2 beams of light reach the middle point simultaneously with a physical result. Then we will find whether this physical result happens or not should never be determined by where the observer is located, so whether the 2 beams of light reach middle point at the same time should not be unsure. Thus “The relativity of simultaneity” is not a valid theory and theory of relativity is problematic.

**Key Words:** Simultaneity; The Relativity of Simultaneity; Special Relativity & Theory of Relativity

### Main Text:

“The relativity of simultaneity” is often used to explain problems related with the theory of relativity and regarded as a correct theory. However, many examples can be raised to disprove it. For example, the following discussion is one of them. There is a rod as shown in Figure 1. Point A and Point C are located at each end of the rod and point B is in the middle of the rod. Point D is a point outside of the rod. Both the rod and the point D are not moving, keeping static. There is a clock and a laser emitter on point A, and the laser emitter emits one beam (which lasts very short period of time) of laser to point B every second according to the clock. There is another synchronized clock and another laser emitter on point C, and this laser emitter also emits one beam (which also lasts very short period of time) of laser to point B every second according to the clock on point C. Because point B is located in the middle of the rod, and the rod and point D are both static, thus, for the observers who are either on the rod or on point D, apparently 2 beams of laser will arrive at point B at the same time after each second. And we put an equipment on point B. For this equipment, if it receives 2 beams of laser at the same time, the energy it receives will be big enough to trigger a reaction (to switch on a light bulb, for example). If the 2 beams of laser are not received at the same time, the received energy will not be big enough to trigger any reaction. Thus we can know that no matter where the observer is located, he can see reactions being triggered at each second.

To sum up:

According to the observer on the rod: reactions triggered.

According to the observer on the point D: reactions triggered.

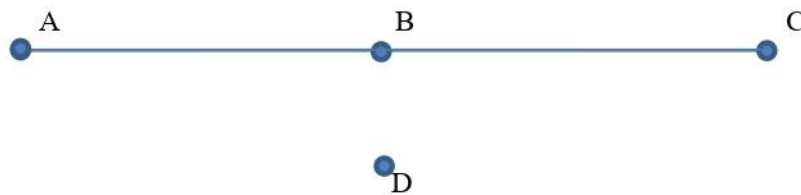


Figure 1:  $T_0$  (Rod Being Static)

Then, we accelerate the rod and keep point D static, as shown by Figure 2.

Now we can find that for the observer on the rod, he sees reactions being triggered at each second. Because, according to theory of relativity, light speed to him is always the same and, no matter how much length shrinks or time dilates due to the acceleration of the rod, the observer on the rod feels no difference at all.

But for the observer on point D, it will be different. He, according to theory of relativity, will see that the laser beam emitted from point C arrives at point B earlier than the laser beam emitted from point A. Thus the 2 beams of laser doesn't arrive at point B at the same time, so the energy received by equipment located on point B is not sufficient to trigger the reaction. Therefore, for the observer located on point D, there is no reaction happening.

To sum up:

According to the observer on the rod: reactions triggered.

According to the observer on the point D: reactions NOT triggered.

This can probably be explained by the theory of “The relativity of simultaneity”. However, whether there is a reaction or not is a physical result, it should never depend on who is observing or where the observer is located or whether the observer is moving. Thus “The relativity of simultaneity” should not be a valid theory and the theory of relativity should be problematic.

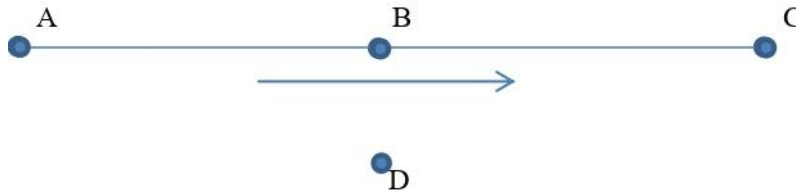


Figure 2:  $T_1$  (Rod Being Accelerated)

To further continue the discussion, we then stop accelerating the rod, so the rod will move at constant velocity and we still keep point D static, as shown by Figure 3.

Now we can find that for the observer on the rod, he still sees reactions being triggered at each second. Because, according to theory of relativity, light speed to him is still always the same and, no matter how much length shrinks or time dilates due to the velocity of the rod, the observer on the rod feels no difference at all.

But for the observer on point D, it will be different. He, according to theory of relativity, will see that the laser beam emitted from point C arrives at point B earlier than the laser beam emitted from point A. Thus the 2 beams of laser doesn't arrive at point B at the same time, so the energy received by equipment located on point B is not sufficient to trigger the reaction. Therefore, for the observer located on point D, there is no reaction happening. It should be mentioned that when the clocks on point A and point C, according to special relativity, slow down compared with a clock on point D because of the speed of the rod, they slow down for the same rate. Thus, according to the observer on point D, laser emitters located on point A and on point C always simultaneously emit beams of laser to the direction of point B. Because point B is moving, the 2 beams of laser from point A and point C will not arrive at point B simultaneously according to observer on point D. Hence, no reaction.

To sum up:

According to the observer on the rod: reactions triggered.

According to the observer on the point D: reactions NOT triggered.

This can, again, possibly be explained by the theory of “The relativity of simultaneity”. However, again, whether there is a reaction or not is a physical result, so it should never depend on who is observing or where the observer is located or whether the observer is moving. Thus, again, “The relativity of simultaneity” should not be a valid theory and the theory of relativity should be problematic.

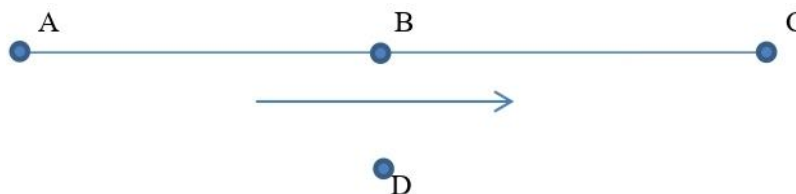


Figure 3:  $T_2$  (Rod Moving at Constant Speed)

**Conclusions:**

- “The relativity of simultaneity” is not a valid theory.
- Theory of relativity should be problematic.

**References:**

1. Xinghong Wang, “A Discussion about Special Relativity”, International Journal of Scientific Research and Modern Education, Volume 6, Issue 1, Page Number 4-7, 2021.