

Re: SR cannot determine Contraction

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- *From:* Tom Roberts <tjroberts137@xxxxxxxxxxxxxx>
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Dono wrote:

There is a large class of thought experiments (the pole in the barn being one of them) that rely on the misguided idea that length contraction allows larger objects (like the pole) to fit inside smaller enclosures (like the barn) as a byproduct of rapid relative motion. This is not the case.

I assume you intend "smaller" and "larger" to refer to objects' PROPER length, along the axis of their relative motion.

Then you are wrong. The "pole and barn" gedanken is valid. Let me phrase it without any accelerations — a pole of length $2L$ can fit inside a barn of length L , if it is moving faster than $0.866c$ relative to the barn, in this way: With pre-arranged timing in the barn frame, one could start with the front door closed and the rear door open, and then close the rear door before opening the front door — so in the barn frame both doors can be closed with the pole inside (opening and closing must be VERY fast (:-)). In the pole frame, the front door opens before the rear door closes, and the pole is never wholly inside the barn (which appears to be shorter than the pole to the pole observer). This example is every bit as much a demonstration of the relativity of simultaneity as it is of length contraction.

Yes, a boost is merely a rotation in the X - T plane. But rotations have experimental consequences — try carrying a 20 foot ladder through a door that is 3 feet wide and 7 feet tall, and you'll see this. That is a spatial rotation, not a boost, but they are equivalent as far as this goes.

Dono also said:

if you close both doors simultaneously in the barn frame, you have trapped the pole inside the barn. This can only happen if the pole has become physically shorter than the barn.

This is confusing, if not wrong — you are using a PUN on "physically". Yes, the pole itself is unchanged by measurements performed in the barn frame, or doors closing, etc. But the PHYSICAL relationship between front end of pole and front door, and the PHYSICAL relationship between rear end of pole and rear door, can be such that in the barn frame the pole fits in between the two closed doors for a (very) brief interval of time. At least in a gedanken.

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Consider these two spatially-separated events:

A) front door opens with front end of pole still inside barn

B) rear door closes with rear end of pole already inside barn

It is possible, given the conditions of the gedanken, for B to precede A in the barn frame; in the pole frame A precedes B.

Dono also said:

the only way the pole
would fit inside the barn is if the pole got compressed.

This is not true. The way the pole can fit into the barn when moving rapidly is that the time-ordering of spatially-separated events is frame dependent: in the barn frame B precedes A, but in the pole frame A precedes B. There's no need for the pole to be "compressed".

As I have often said around here, attempting to argue via exhaustive enumeration nearly always fails. It did for you in this case.

Tom Roberts

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