# The Barn and Pole Paradox

D L Mentz —
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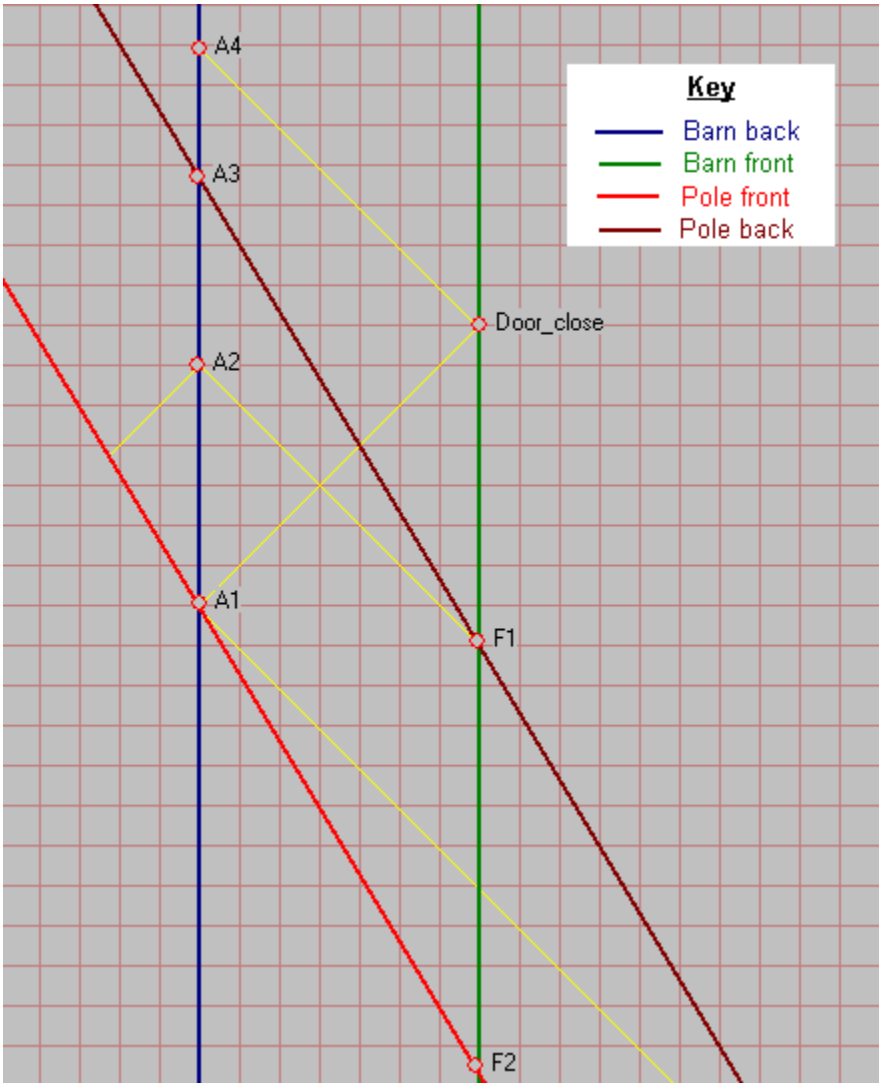
## 1. Pole and Barn




The diagram is from the rest frame of the barn. The pole approaches the barn from the right with velocity $0.6c$ ( $1/\gamma = 0.80$ ). The lengths of the barn and pole are 7 and 8 units respectively. There is one observer, who is located at the back-end of the barn. The Lorentz contracted length of the pole is $8/\gamma$, i.e. 6.4 units. The paradox arises because the pole and barn observers will disagree about whether the back of the pole in in barn when the door closes. This is easily resolved by taking into account the propagation delay of the door closing signal.

However a more interesting question is whether the pole can ever be entirely in the barn. Clearly this will not be the case in the pole frame.

The observer experiences the sequence of events A1 to A4. The order of these events is invariant, except under time-reversal which we exclude.

1. A1 The front of the pole reaches the back of the barn and prods the observer. A light signal is sent to the front of the barn. The observer sees the back of the pole to be some distance away still ( this is the light ray coming from the bottom right to the event A1).

2. A2 The observer sees the back of the pole enter the barn. At this time ( using the eyes in the back of the head ) the front of the pole is seen to be well out of the barn.

3. A3 The observer sees the door closing.

4. A4 The observer sees back of the pole exit the barn.

It seems from this that the pole is never seen by the barn observer to be wholly in the barn. This contradicts the coordinate picture which indicates that the pole is inside the barn for a short time.

I conjecture that the pole will be in the barn for $(L_{barn} - L_{pole}/\gamma)/v$ (provided $L_{barn} > L_{pole}/\gamma$) which works out to 1 in this setup, which agrees with the interval between events F1 and A1 on the diagram. I intend to try a proof of this later.

## 2. **Conclusions ?**

There is no doubt that the quantity $L_{pole}/\gamma$ enters the picture, but it appears to be unobservable from the barn frame. This raises the question - can it be seen by any observer ?

I don't think any observer ever will because, if this observer did see the pole entirely in the barn, then his account of the incident would differ from the pole observers. So maybe the propagation delay has come to the rescue again and prevents this happening.

The theory uses a quantity which if observed would lead to a paradox - i.e. the different accounts of the same events. I'm not sure what the ontological status of such a quantity is.

Is this another example of relativistic 'censoring' ?

There is some support for the one-length interpretation but I'm still unsure.