Time Dilation vs. Length Contraction

- Time intervals between same two events :

  Consider only those intervals which occur at one point in rest frame "on train".

  – Δt_o is in the reference frame at rest, "on train". **"proper time"**

  – Δt is measured between same two events in reference frame in which train is moving, using clock that isn't moving, "on ground", in that frame.

$$\Delta t_0 = \Delta t \sqrt{1 - \frac{v^2}{c^2}}$$

$\Delta t > \Delta t_o$

Time seems longer from "outside"

- Length intervals of same object:

  – L_0 is in reference frame where object is at rest **"proper length"**

  – L is length of moving object measured using ruler that is not moving.

$$L = L_0 \sqrt{1 - \frac{v^2}{c^2}}$$

$L_o > L$

Length seems shorter from "outside"