

Re: Relativity question

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From: Schoenfeld (schoenfeld1_at_gmail.com)

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Neil – Salem, MA USA wrote:

- > *"John Smith" <no@way.net> wrote in message*
- > *news:d1dh35\$9t5\$1@rainier.uits.indiana.edu...*
- > > *If me moving away from the earth is the same thing as the earth*
- moving*
- > > *away from me why then does time slow down for me but not for*
- earthlings?*
- > > *Many thanks.*
- >
- > *Before I give you my two cents on this question, let me first give*
- you my*
- > *disclaimer: I am far from being even half way competent on the*
- subject of*
- > *relativity. That said, this is the simple answer I was given*
- concerning*
- > *this apparent paradox. The space traveler who leaves Earth and*
- travels at*
- > *velocities approaching the speed of light and then returns to Earth*
- will*
- > *indeed have aged less than those on Earth because of the acceleration*

- > *involved in his trip (accelerating away from the Earth, turning*
- around, and*
- > *decelerating when he arrives back at Earth).*

The "present" of an observer in an inertial frame is the set of simultaneous events measured by the observer in that frame. When an observer switches frames, the "present" also switches. Mathematically, the present is a 3d plane in Minkowski space (simultaneity plane) and acceleration by the traveller causes the traveller to smoothly switch frames which rotates the simultaneity plane by some angle. After the u–turn finishes the travellers "present" matches up with earths "future" thus when he arrives the earth will appeared to have rapidly aged. The only frames capable of rotating an observers present to match up with Earths past are superluminal ones, which are strictly prohibited in SR.

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- > *Speaking of dilations of time, there was a humorous story in the news years*
- > *ago when, after a NASA space mission, the astronauts submitted a bill to*
- > *NASA for overtime. Someone calculated that the astronauts had aged more*
- > *than those on Earth, perhaps because time runs slower on the surface of the*
- > *Earth (due to the gravity of Earth) than it does in outer space.*