

Re: Swing and momentum

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Henning Makhholm wrote:

Scriptsit "Edward Green" <spamspamspam3@xxxxxxxxxxx>

Related playground question: how can a child standing in the middle of a turntable, not touching anything else, make it rotate?

Friction in the bearing allows it to transmit a small torque to the turntable. The child starts turning her torso with a torque that is small enough to be countered by the turntable, then suddenly reverses her rotation with a large torque in the opposite direction. The large torque overcomes the friction and the turntable begins to rotate.

I don't think that the trick will work a second time once the turntable does rotate. It depends on non-linearity of the friction.

Thank you for the answer, but not the answer I was looking for.

The child can make the turntable rotate even assuming a frictionless bearing, even have a time averaged non-zero rate of rotation, although he cannot put it into a steady state rotation. He does this by first twisting one way then twisting back, having altered his moment of inertia in the interim by extending or dropping his arms. The net result will be a repeatable re-orientation of turntable + child. Of course the net angular momentum, if zero at the first, must remain zero: the point is, deformable bodies can reorient in the absence of external torques.

You could say it was a trick question.

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