Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

A bicycle with compliant training wheels, half way between a bicycle and a tricycle, is uncontrollable ANDY RUINA, Cornell University, Mechanical Engineering — We have built and tested a vehicle that can balance and steer like a bicycle, a tricycle, or anything in between. A *bricycle* is essentially a bicycle with springy training wheels. The stiffness of the training wheel suspension can be varied from infinite, when the bricycle is a tricycle, to zero, when it is a bicycle. One might expect a smooth transition from tricycle to bicycle as the stiffness is varied, in terms of handling, balance and feel. But the situation is more complicated. Rather, the controllability of a bicycle depends on gravity. Without gravity, lean and direction cannot be controlled independently. Springy training wheels effectively reduce or even negate gravity. Indeed, experiments with the bricycle show problems when the total effective gravity is about zero. People can then still balance easily but can no longer turn the brike. The theory and experiment show a qualitative difference between bicycles and tricycles. A difference that cannot be met halfway.

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Date submitted: 06 Nov 2013 Electronic form version 1.4