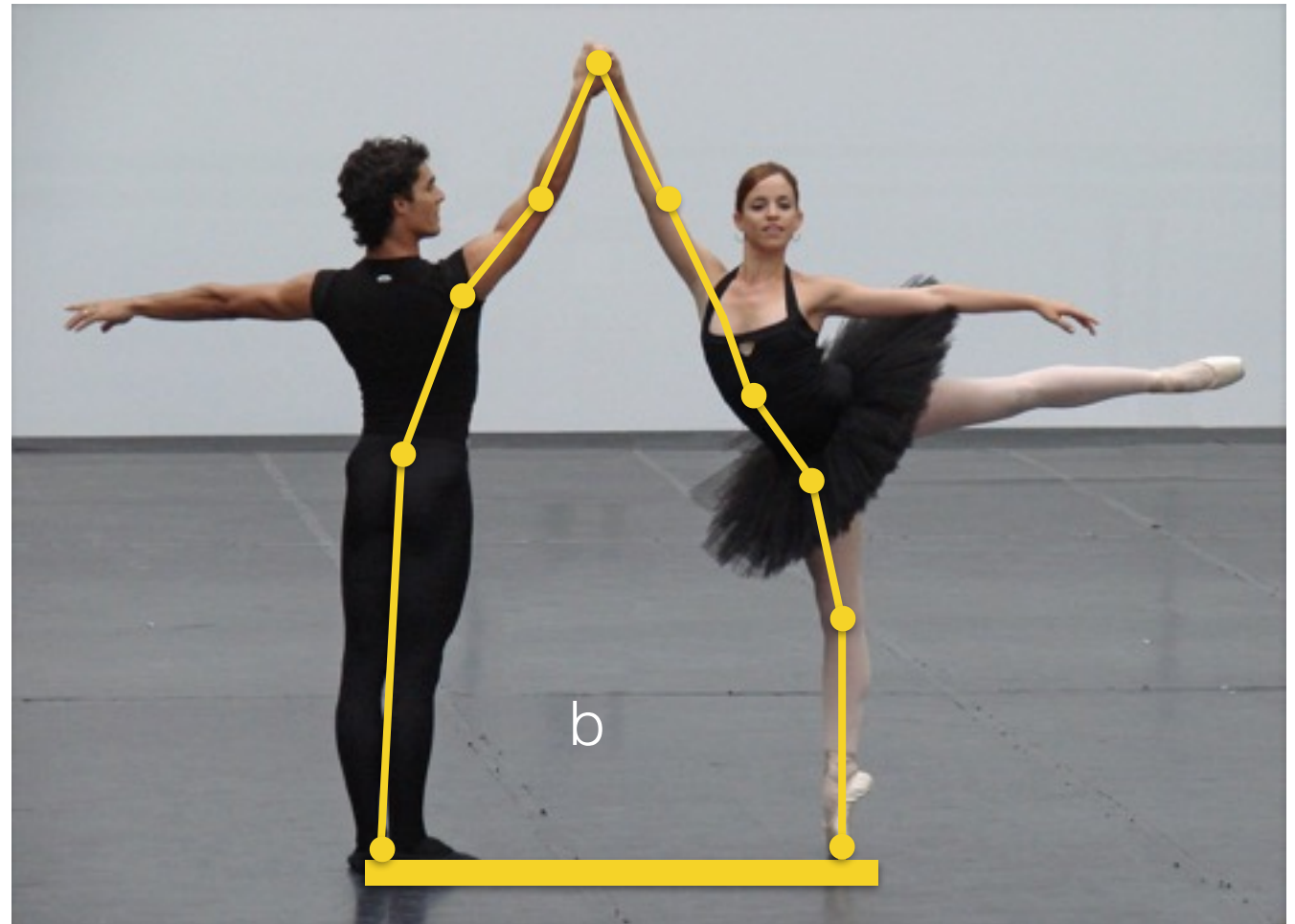
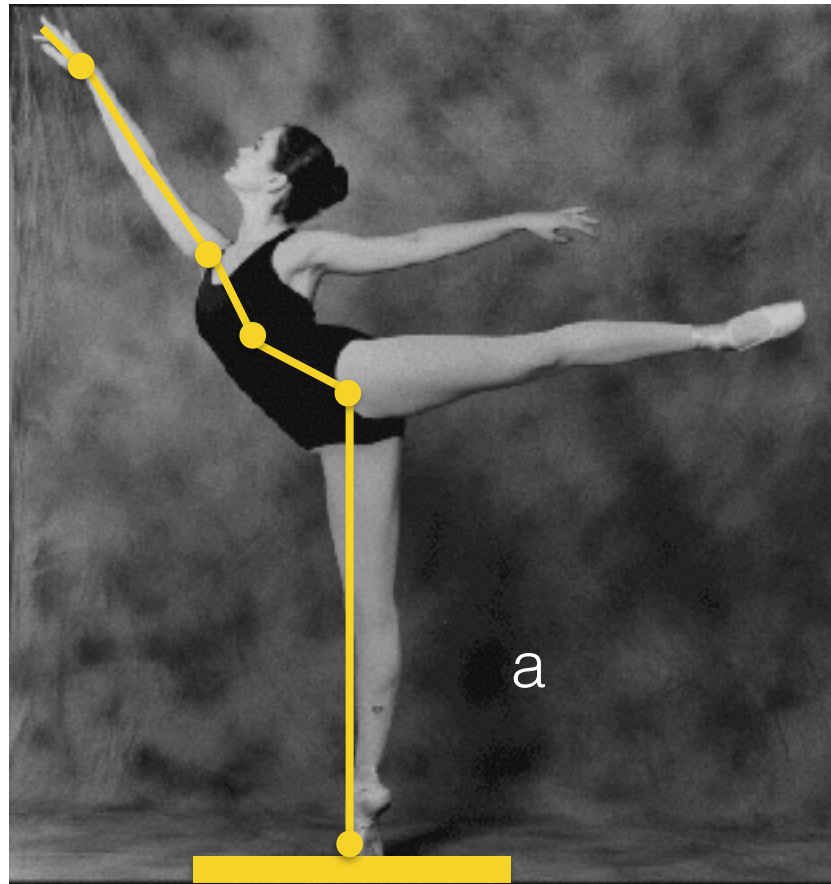


Introduction to mechanisms



This week: links, joint types, degrees of freedom, mobility, Grashof criterion

Next week: details of linkage analysis.

Disney animatronics linkages software in the news

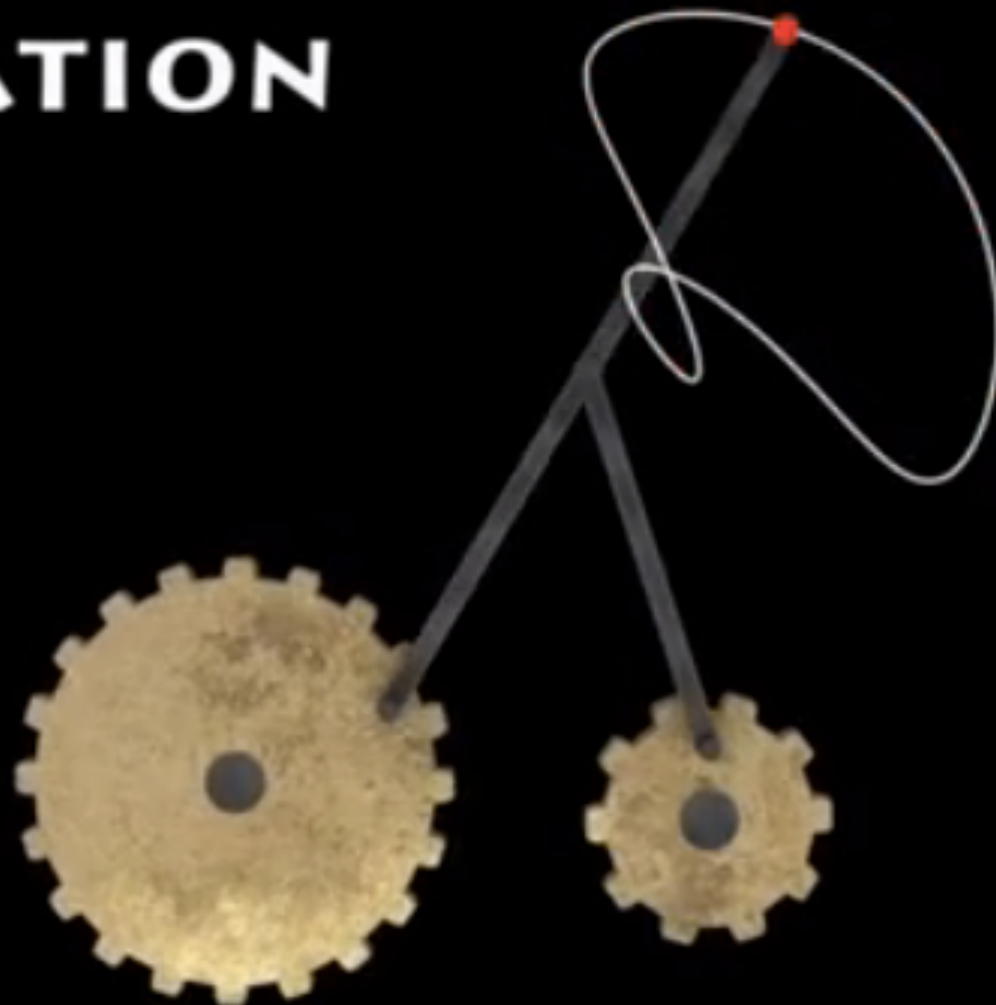
article: <http://machinedesign.com/cad/new-role-kinematics-software-defining-mechanized-dinosaurs>

video: http://www.youtube.com/watch?feature=player_embedded&v=DfznnKUwywQ

paper: <http://www.disneyresearch.com/wp-content/uploads/CDMC.pdf>

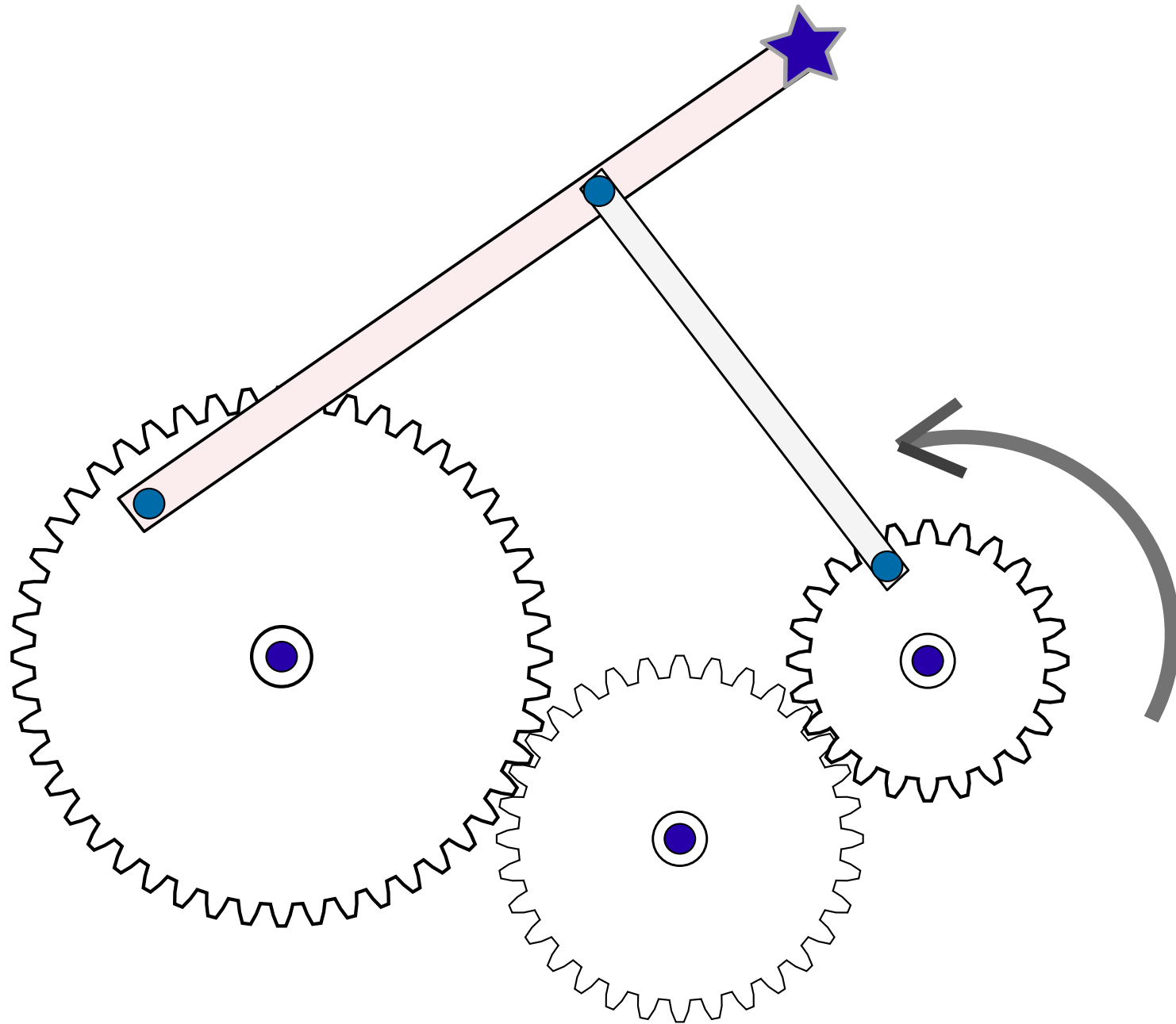
What is actually going on?

PARAMETER SPACE EXPLORATION

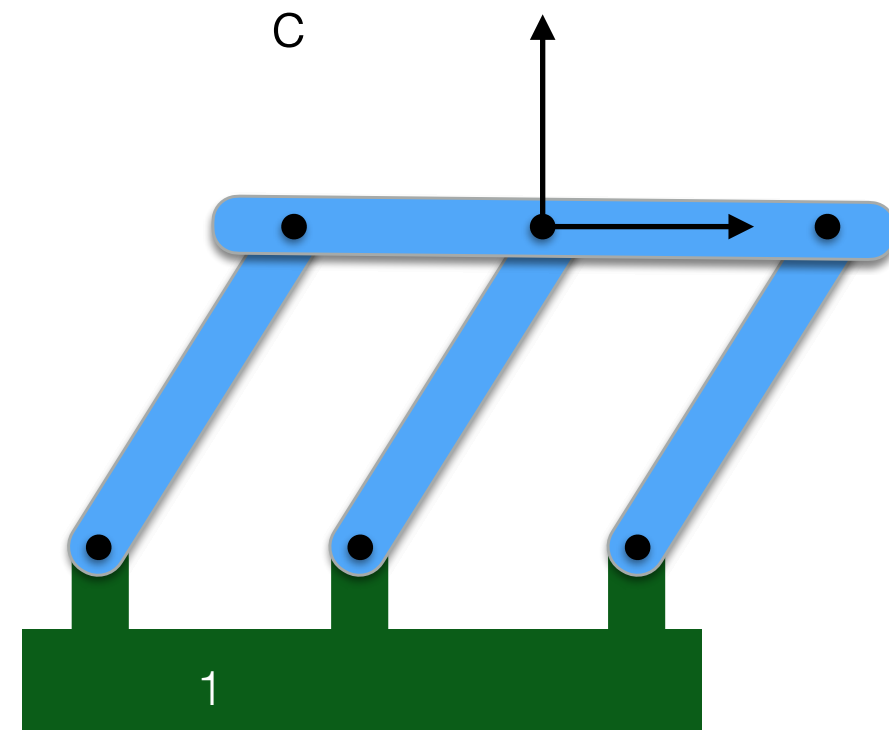
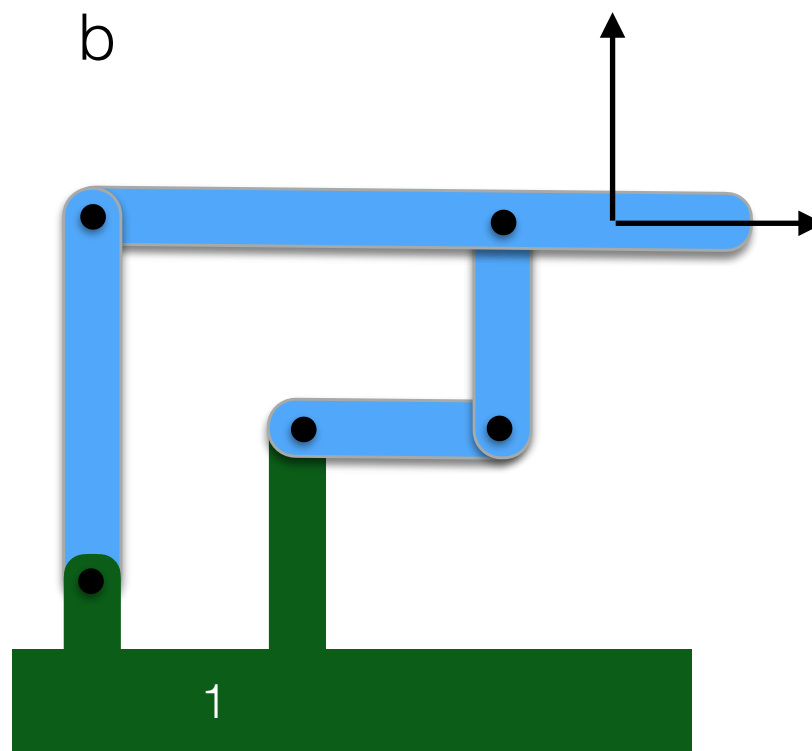
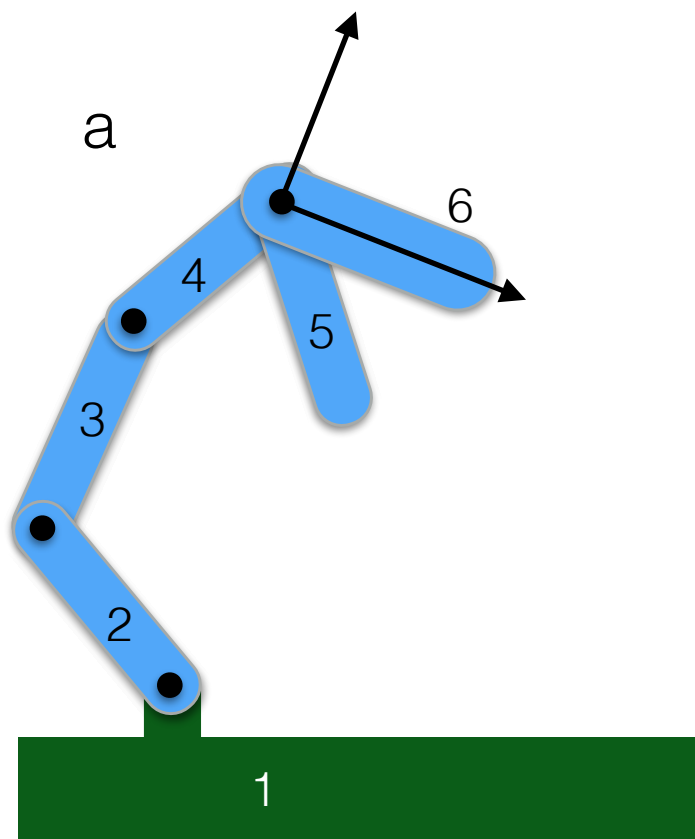


A DATABASE OF REPRESENTATIVE CURVES
IS GENERATED BY SAMPLING THE PARAMETER SPACE

What is actually going on?

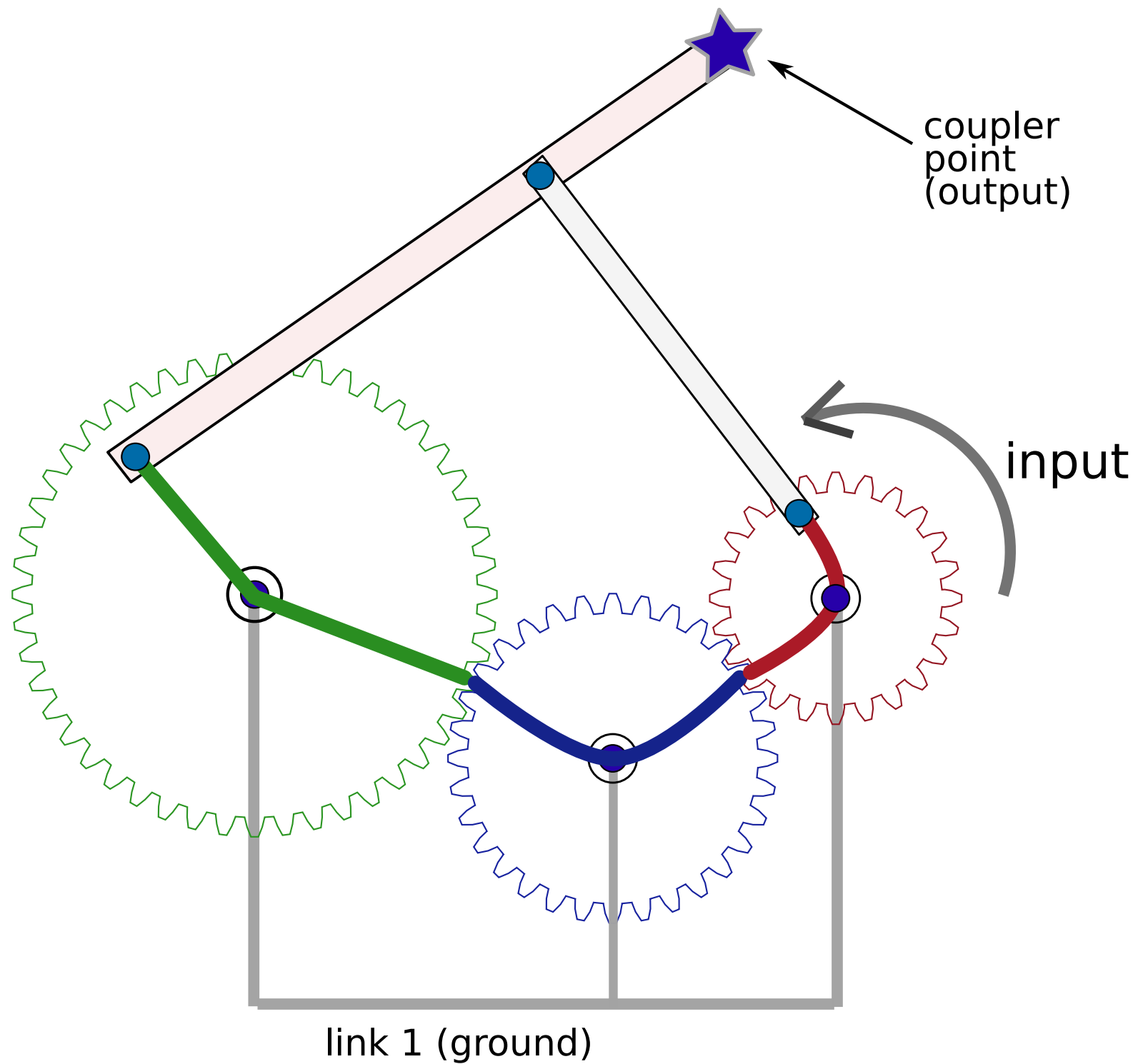


=> motivation to learn about Degrees of Freedom (DOF),
joint types, mobility, Gruebler's formula



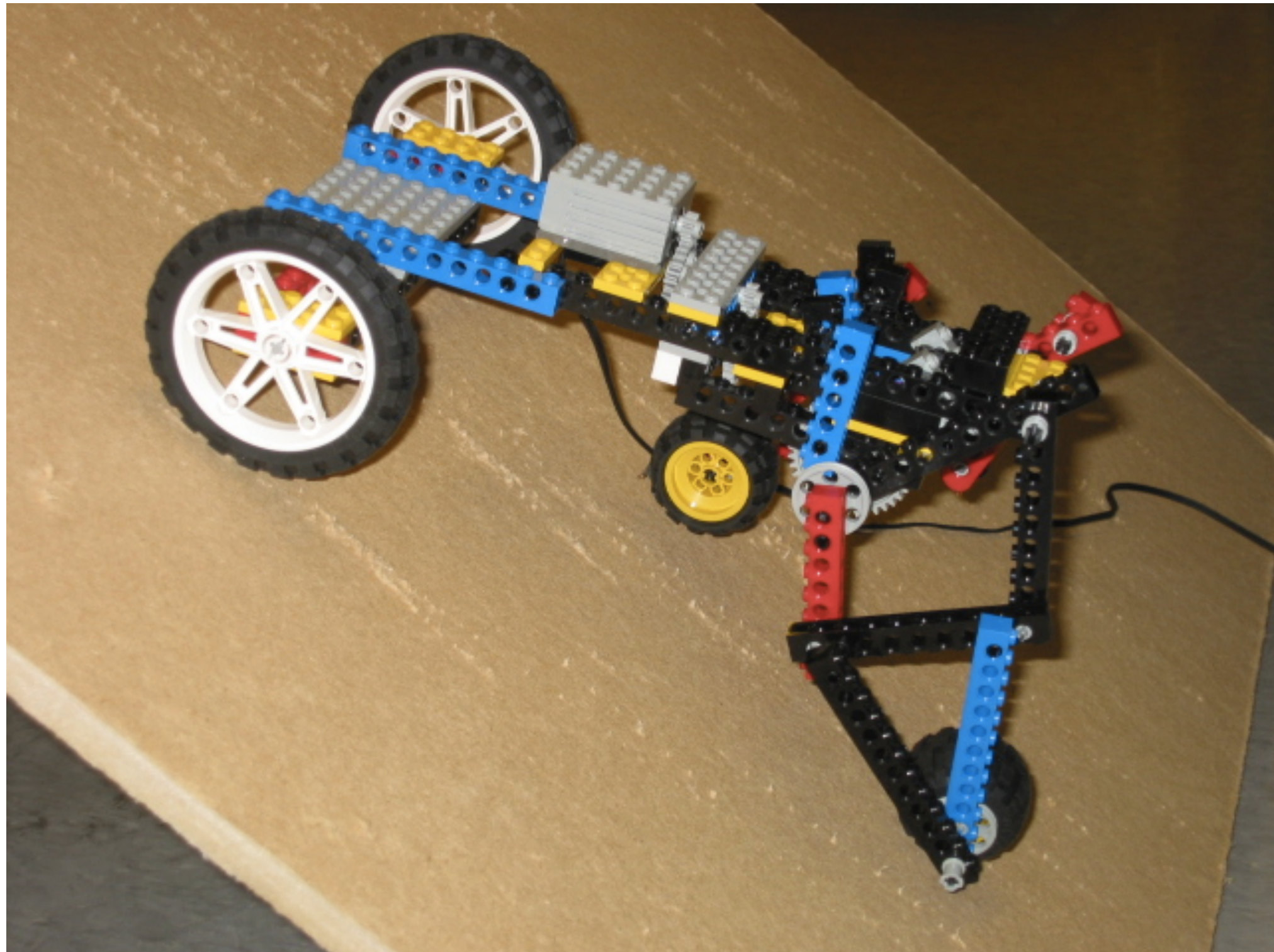
Mobility = ?

N =
f1 =
f2 =

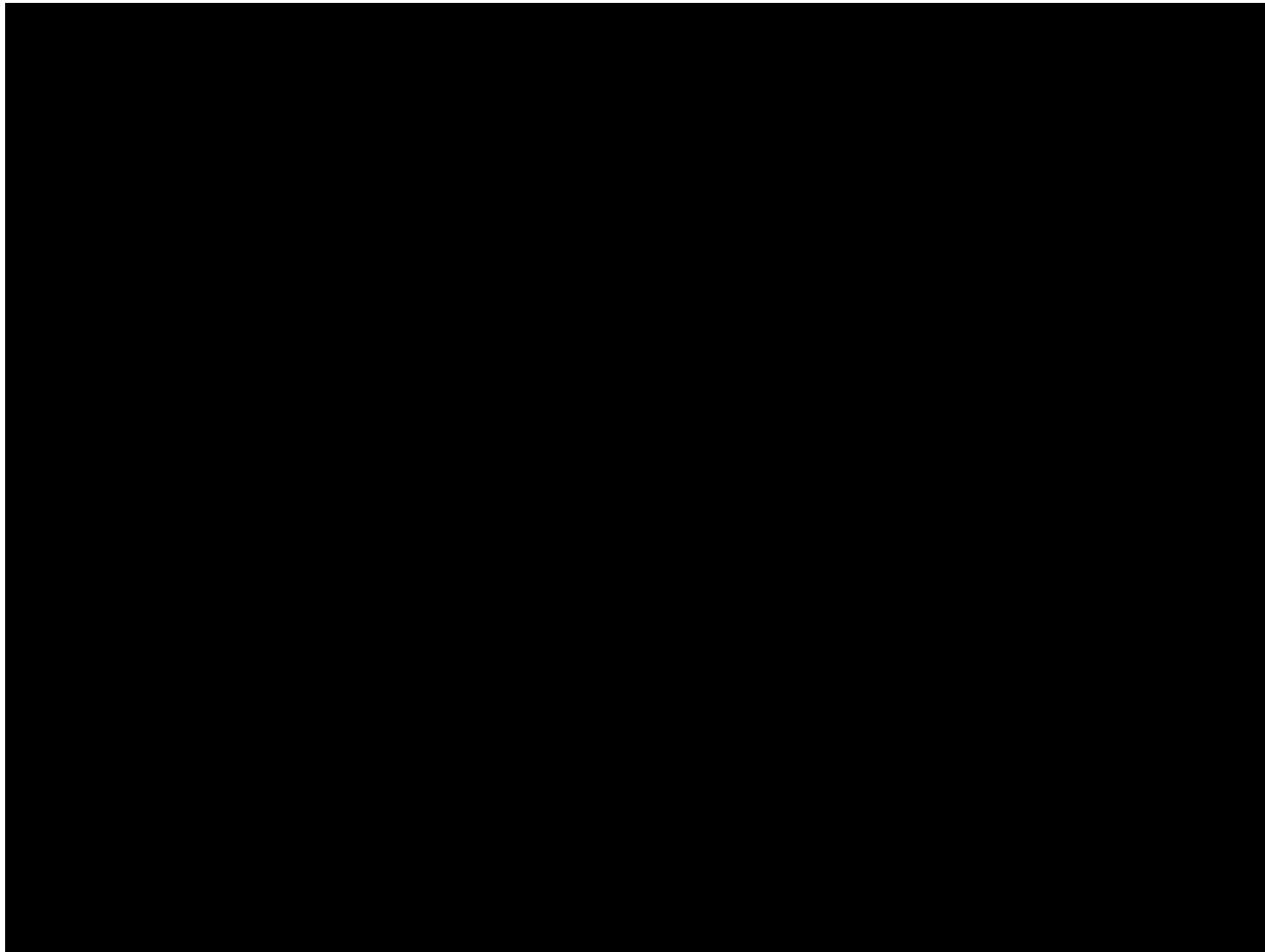


Gruebler's formula: $M = 3(N-1) - 2f_1 - f_2$

Four-Bar Mechanisms

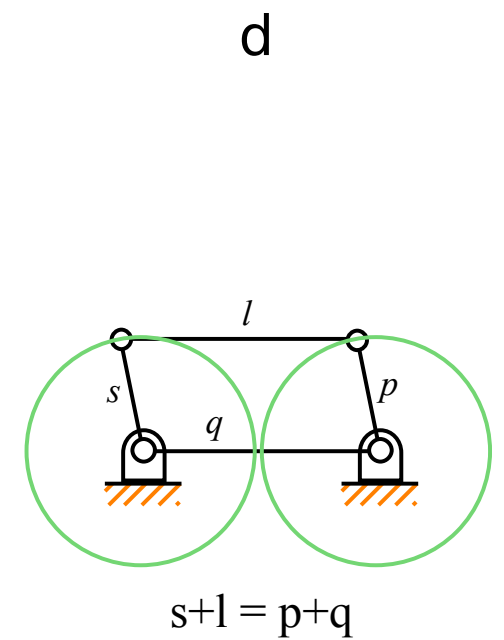
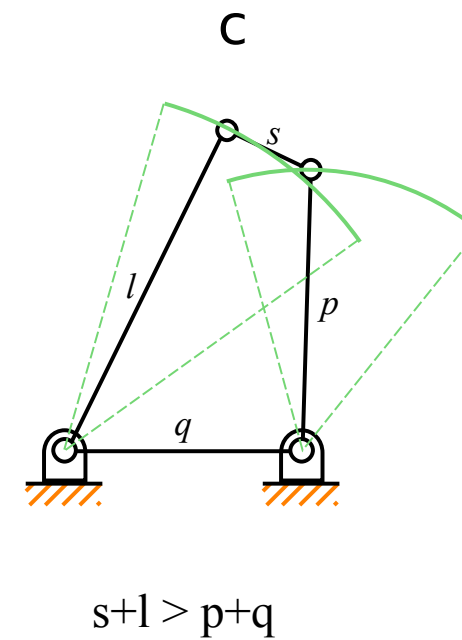
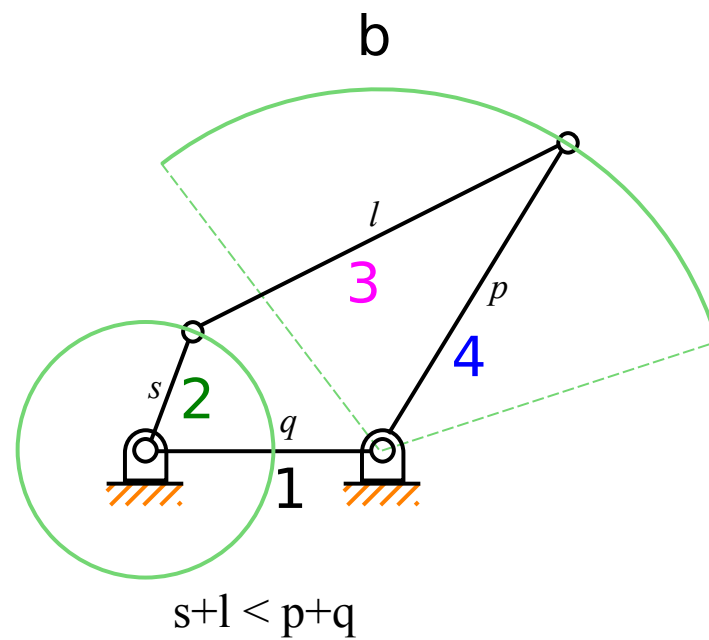
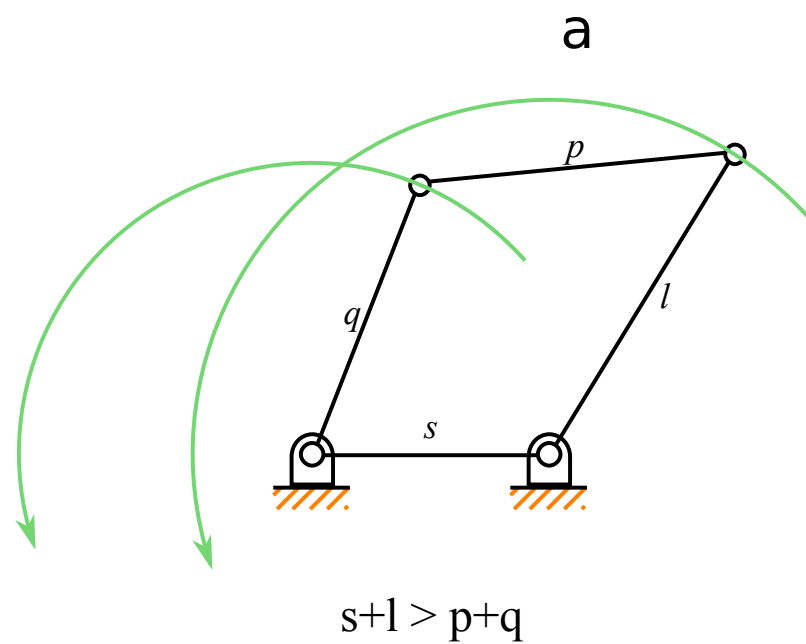


Four-Bar Mechanisms

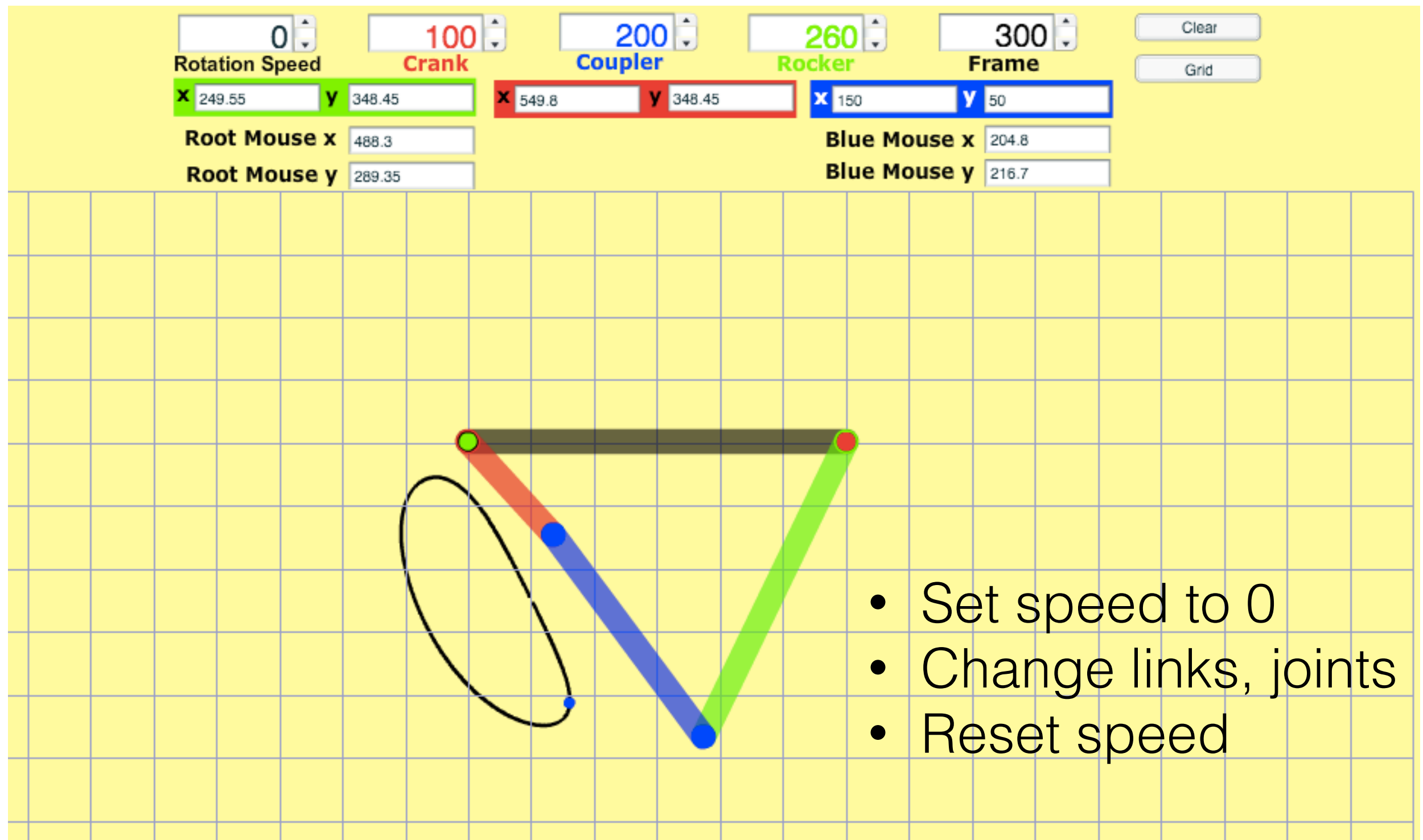


Grashof

shortest + longest < sum of the others



<http://www.mekanizmalar.com/fourbar.html>



Resources

Linkage Links page started on Canvas:

- interesting linkage examples
- linkage simulation software
- linkage analysis and design tools

This page is editable by the entire class.
Please add discoveries!

For example:

<http://mechanicaldesign101.com/2015/05/01/walking-machines/>

<https://www.youtube.com/watch?v=SMnC25YPcHs>

Final Project...

In previous years we have created:

turtles

lemurs

sloths

hippogriffs

elephant seals

rabbits

ducks

horses

dinosaurs

dragons

alligators (low+high walk)

beetles...

What totally new thing will we do for 2016?

The answer is:

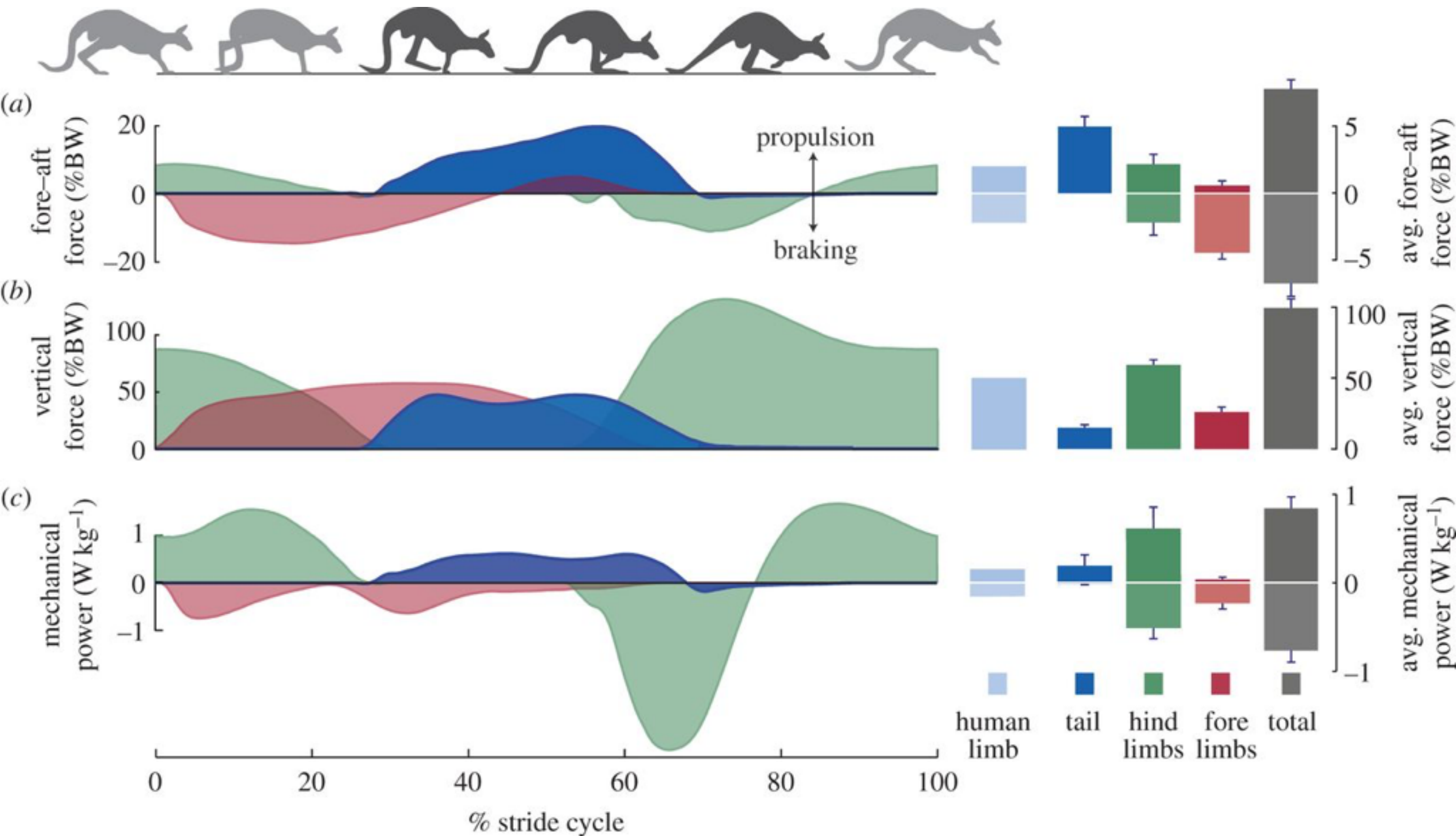
5

as in

pentapedal

New York Times July 2014 video

Force and power from each leg over the one stride:



For more details

<http://www.nytimes.com/2014/07/28/science/for-kangaroos-tail-becomes-a-fifth-leg.html>

S. O'Connor *et al.*, "The kangaroo's tail propels and powers pentapedal locomotion,"

<http://rsbl.royalsocietypublishing.org/content/10/7/20140381>