

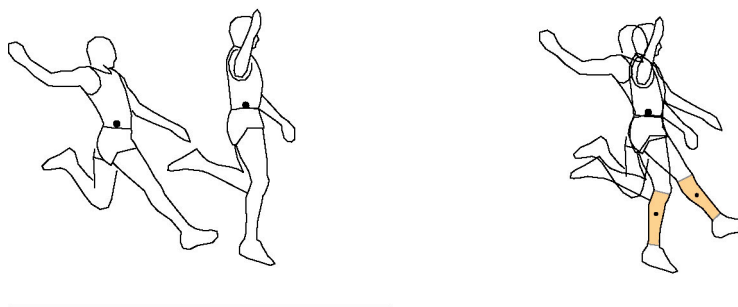
ANGULAR MOMENTUM OF A NON-RIGID SYSTEM

The human body is considered to be composed of rigid segments that rotate relative to each other.

Each segment has two angular momentum terms:

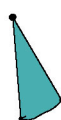
- **remote angular momentum**: associated with the motion of the segment's c.m. about whole body c.m.
- **local angular momentum**: associated with the motion of the segment about segment's own c.m.

angular momentum of the right shank



remote
angular momentum

local
angular momentum



local angular momentum = shank moment of inertia about own c.m. · shank angular velocity

remote angular momentum = shank mass · 2 · area swept per second

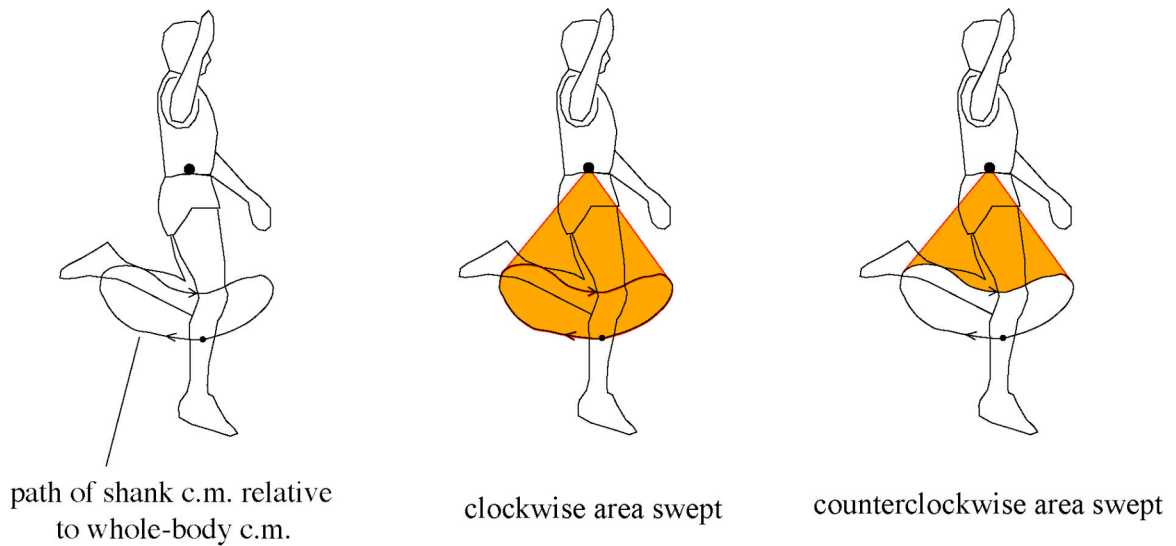
Local terms of angular momentum: usually much smaller than remote terms.



So the error is not large if we ignore the local terms.



Useful for qualitative analysis, because can use the remote terms to estimate the angular momentum of each segment:



The net area swept in a complete cycle is clockwise.

Clockwise areas: indicate angular momentum vector pointing into the blackboard.

Counterclockwise areas: indicate angular momentum vector pointing out from the blackboard toward us.