So we're now beginning to make our complete study of rigid body motions about fixed axis.

Let's consider something like a bicycle wheel.

Here's the center of mass of the wheel.

And our bicycle wheel-- the center of mass has some velocity.

And here's ground.

And the reference frame is the ground frame.

Now if the bicycle wheel is rolling, then there will be some type of rotational motion of the wheel.

So you can imagine a point on the rim is rotating.

And so what we have here is a angular velocity of this bicycle, which we'll write like this, our vector omega.

And we'll use our right hand rule to establish that direction for omega.

And now in this reference frame, we have translational motion of the center of mass.

And we have rotational motion around the center of mass.

If we go to the center of mass reference frame-- so if you want just a little cartoon to show that, here's your observer.

And your observer is moving with VCM.

And so in that frame, the center of mass is at rest, and the only thing we have is rotation about the center of mass.

And so in this picture, our motivation will be that the total external force causes the center of mass to accelerate.

And that's how we can figure out the center of mass motion.

And in this picture, we no longer have to consider translational motion.

And what we'll study and learn to analyze is just pure rotation about the center of mass-- so torque will produce angular acceleration.

We can talk about the rotational energy about the center of mass.

And so we'll begin our analysis of rotational motion of translation and rotation by focusing our interest in the center of mass frame-- so we've just isolated the rotational motion.