

Increase Power Using a double-pendulum Swing

Swinging a softball bat is a process that is not easy to describe in words since the actions of all the various body segments that make it up are so complex. I would like to help simplify the understanding of creating power by introducing of all things a subject from the science of physics... the double-pendulum.

If we split the swing into two facets:

1. body/arms action,
2. Hands/wrists action.

We can now refer to each of the swing facets as pendulum #1 and pendulum #2 respectively.

So, exactly what is a pendulum?

Webster:

“A body suspended from a fixed support so that it swings freely back and forth under the influence of gravity or another type of force”.

We can now discuss the power swing in terms of two separate but joined pendulums. The action of body/forearms and the Hands/wrists can now be considered as a two segmented action that acts much like a double-pendulum in physics.

A double-pendulum is simply two single pendulums joined end-to-end in a continuous motion which is referred to as the double-pendulum effect. The double-pendulum effect has been written about extensively in other sports such as golf and the game of tennis.

The arms extending from the hitter's shoulders with the hands holding the bat is the green triangular which is our bat carriage or pendulum #1 (see figure 1). This bat carriage serves as the fixed support that allows the bat to swing back and forth and transitioning to pendulum #2 in delivering the bat to the ball.

The softball swing gets its double-pendulum characteristic from first the batter's hips, shoulders, torso and arms all moving via a weight transfer in the direction of the incoming pitch which is sometimes called the first order of bat speed.

During this first stage of the swing (pendulum #1) the wrists will remain in a fully cocked or loaded position maintaining bat lag the whole time. The first pendulum then slows down allowing its energy build up to be transferred to the second pendulum (hands/wrists) which in turn delivers all the built up energy to the bat in striking the ball.

I don't want to get too heavy into physics terminology regarding the forces at work here but it might be helpful to look at centripetal force and centrifugal force during the double-pendulum action as those two terms are tossed about in conversation on hitting.

Centripetal force is the inward force that makes the bat follow a curved path and is always perpendicular to the velocity of the bat as it moves forward to strike the ball. By holding on tight to the bat at all times centripetal force is working and accelerating through rotational mechanics.

On the other hand, centrifugal force is an apparent force (e.g. "not real") and is a consequence of centripetal force but it appears to the naked eye to be accelerating the bat-head but is not. Centrifugal force is a reactionary force to a centripetal force. A body undergoing curved motion, such as circular motion, constantly accelerates toward the axis of rotation.

If you were to actually let go of the bat with your hands while swinging it would launch out on to the field. Since you are no longer holding on to the bat and applying centripetal inward force the bat will no longer continue to accelerate and will eventually strike the ground with a zero velocity. So, continue to always swing hard through the hitting area so as not to slowdown the bat before contact.

Having a double-pendulum in your swing mechanics supports the need for bat lag in creating maximum power. Both pendulums must work in sync or the swing will break down. I contend that to be an effective hitter in the game of senior softball the double pendulum must part of the hitter's mechanics. The important thing to collect from this article is the visual that is created using this swing technique and then implementing it into your swing (see figure 1).

You can view the double pendulum phenomena in an animation on YouTube MIT Dept. of Physics. Watching the video demo in the interval of 00:50 secs to the 01:05 second mark is best for our purposes.

Link: <http://video.mit.edu/watch/double-pendulum-6392/>

Happy hitting...

Art Eversole (Senior Softball Contributor)

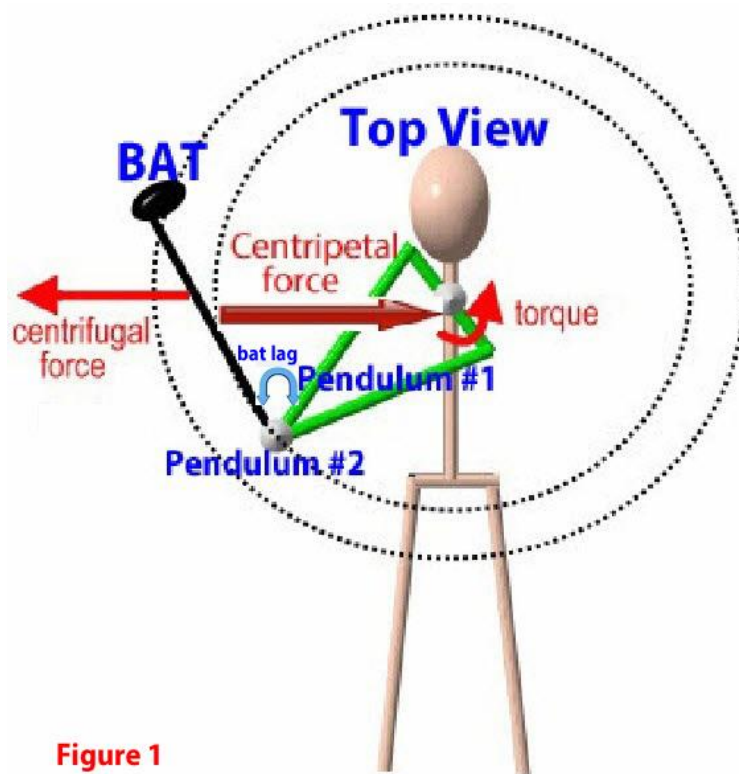


Figure 1