

A photograph of a baseball player in a white uniform swinging a bat on a field. The player is wearing a dark cap and is captured in the middle of a powerful swing. The background is a blurred crowd of spectators in a stadium.

## LJYB Player Development

# HITTING

*“The natural hitter has  
worked longer and harder  
than any player out on the  
field.”  
– Ted Williams*

January 2010

# Key Points

- 1) The science of hitting has evolved significantly over the last 30 years in terms of understanding the physics and biomechanics behind a high-level swing.
- 2) The hitting cues you heard growing up, which may include “watch the ball hit the bat,” “keep your elbow up,” “swing down on the ball” can be counter-productive to developing a high-level swing.
- 3) The key to hitting for power is bat speed. There are some universal biomechanical traits of a high-level swing that can be learned to improve bat speed.
- 4) A big difference between an inexperienced swing and a high-level swing is the amount of power/torque/energy generated in the legs and core.
- 5) There are four key phases of a swing: stance, load, separation, and connection.
- 6) Research suggests it takes over 1000 repetitions to begin burning muscle memory. As such, getting better at an activity like hitting is a marathon not a sprint.

## 4 Key Parts of the Swing - #1 Stance

- From youth baseball to the major leagues, this is the part of the swing that differs the most from player to player.
- If there is a commonality, it is that the stance is a position where the player feels comfortable, engaged, and can see the pitcher/ball well.
- For the emerging youth player, the goal should be to simplify the swing as much as possible. This not only minimizes what can go wrong, but also places the focus on learning the most important components of a high-level swing.
- As such, we recommend starting the youngest youth players pre-swing stance in as close to the “load/separation phase” as possible. (more on this later)
- Note that such a “loaded stance” goes against such often heard coaching phrases as “keep your back elbow up.”

# Stance Examples

To the right are the stances of arguably the four best hitters of this decade and among the best of all-time:

- Albert Pujols
- Barry Bonds
- Manny Ramirez
- Alex Rodriguez

While they have varying arm and leg positions, all are engaged and show an intent focus on the ball.



## 4 Key Parts of the Swing - #2 Load Phase

- Weight usually shifts from balanced to a “loading” into the back hip.
- This is usually done through either pick-up of front leg, shifting front leg back, or weight shift back with front foot still on ground. Some hitters will start with weight already back.
- Load phase tends to finish with knees even more bent, weight on back hip, hands roughly inline with armpits, front forearm tends to become more parallel to ground, back elbow begins to “slot” (i.e. drop) – with arms forming close to 90 degree angle or “the box.” Note that the bat generally does not have a lot of movement in this phase.
- This load phase readies the body for the biomechanics of implementing the equivalent in physics of both an extension spring and a torsion spring to maximize energy in the swing.

## Load Examples

To the right are the same four hitters in the “load” part of their swing:

- Albert Pujols
- Barry Bonds
- Manny Ramirez
- Alex Rodriguez

They all have at least the front heel come up, with Pujols just raising the front heel; Bonds slides the front foot back with the heel up, and Ramirez and Rodriguez pick up their front leg quite high. All of them not only load their back hip, but they also begin the backward rotation in their upper body.



## 4 Key Parts of the Swing - #3 Separation Phase

- The goal in this phase is to maximize the kinetic energy that can be generated through both extension (thinking of stretching a rubber band) and torque (think of twisting a rubber band).
- This is done through aggressive separation of upper and lower body both in linear movement (stepping forward as hands move back) and also rotational movement (upper-body twisting back and lower body beginning to rotate forward).
- This separation phase finishes with maximum counter-rotation between upper and lower body. The front arm also straightens as hands push back while lower-half and trunk shift forward. The bat moves to more parallel with ground.
- Front foot and knee should have opened close to 45 degrees and hips should be opening towards pitcher. Weight should be aggressively shifting from “loaded” back hip towards center, where axis for rotation is established by heel being driven into ground.

# Separation Examples

To the right are the same four hitters in the separation phase of their swing:

- Albert Pujols
- Barry Bonds
- Manny Ramirez
- Alex Rodriguez

Note the linear separation and rotational separation. The front leg and weight move aggressively forward from load position, while hands either move back or stay back. Rotational separation can be seen with front foot, front knee and hips all opening to pitcher, while top-half remains closed. This extension and torque provides energy (i.e. bat speed) in connection phase of swing.



## 4 Key Parts of the Swing - #4 Connection Phase

- This is the actual “swing.” The potential energy generated through both extension and torque is released like a spring. In addition, aggressive rotation with hips, and aggressive pull with arms, adds to the swing force to generate maximum bat speed.
- The goal of the lower half of the body is to establish a fulcrum (to stop the linear movement) and an axis of rotation to release torque energy (established through heel of lead foot up through center of body).
- The fulcrum (front leg) is aggressively driven in the ground, to create a tilted axis – i.e. the “power slant.” This not only gets bat on plane with the upward slant of pitch, but also allows use of strongest muscles in chest with swing. Forward force of arm swing is countered by power-slant, creating dynamic balance point.
- Rotation is maximized by using ground force to turn hips, by violently straightening front leg, which thrusts front hip to the back. Back knee hinges down to maximize rotation. This is the dynamic balance point which allows essentially no weight to be on back leg during max effort of the swing.
- Upper body’s goal is to “catch-up” to violent rotation of lower half -- get arms and bat connected to rotating axis by POC (point of contact).

## Connection Examples

To the right are the same four hitters very close to the POC (point of contact) in the connection phase:

- Albert Pujols
- Barry Bonds
- Manny Ramirez
- Alex Rodriguez

All show a power slant, with front leg acting both as fulcrum and axis for rotation. There is very little weight on the back foot. The hips are open to the pitcher, with the top-half having “caught up.” Note the significant amount of force that is evident in even these still images.



## Developing the Youth Swing



Recommend starting developing hitter in combination of load/separation phase. Front leg should be on ground at stride length, with weight on ball of foot. Front arm should be fairly parallel to ground. Back elbow should be slotted (i.e. down), with bat fairly flat. This eliminates all pre-swing movement (and thus, things that can go wrong) prior to connection phase (i.e. swing).

Hitter drives front heel into ground, establishing axis of rotation. Front leg straightens while back leg hinges. Goal is to rotate as fast as possible - creating torque - by shoving front hip to the back. Upper body goal is to connect with lower body rotation by POC (point of contact). Note that hips are fully open, with firm front side (i.e. power slant).

If the hitter has developed a firm axis of rotation, they should be able to hold stance after the swing. If they move or fall down, it means a solid axis of rotation has not occurred. The harder the swing, the more post-POC rotation will occur, although it is worth trying to develop muscle memory for as much post-POC rotation as possible. The goal should be to see the hitter's number on the back from this angle.

**Once the muscle memory is "burned in" for the connection phase part of the swing, the hitter can then move towards the more advanced 4-phase swing of: 1) unique stance, 2) load, 3) separation, 4) connection.**

