

# BLAST INSIGHTS & METRICS GUIDE

PLANE • CONNECTION • ROTATION



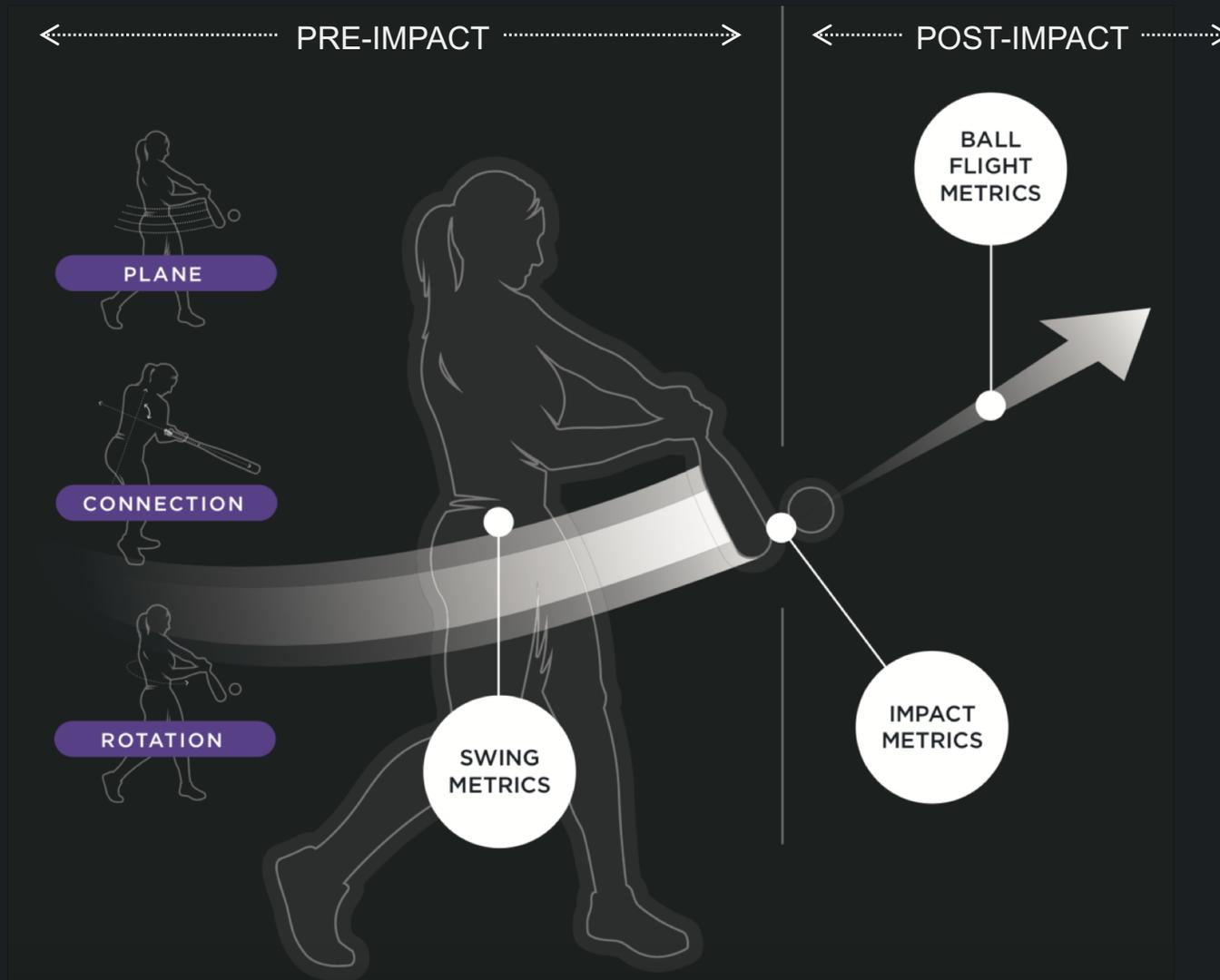
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**BLAST**

# PLANE • CONNECTION • ROTATION



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## SWING METRICS: IDEAL RANGES

On Plane Efficiency %	Rotational Acceleration	Early Connection	Connection at Impact
70% or Higher Range: 65% - 85%	Score above 50 for your level of play	90° (Perpendicular) Range: 80° - 105°	90° (Perpendicular) Range: 80° - 95°



### Connection Notes

- Ideal for Early Connection and Connection at Impact to be relatively the same. Up to a 15° difference between the two is acceptable, however generally the closer the better.
- It is generally ok for hitters to not be exactly 90°, especially if both of their connection metrics are the same.

# PLANE • CONNECTION • ROTATION

IMPACT METRICS: IDEAL RANGES

Level	Pro	College	Travel Ball 16U - 18U	High School Varsity	High School JV	Travel Ball 12U - 14U	Recreational
Bat Speed	57 - 63 MPH	57 - 66 MPH	51 - 61 MPH	51 - 61 MPH	42 - 56 MPH	38 - 52 MPH	32 - 46 MPH
Attack Angle	3° to 15°	2° to 15°	0° to 15°	0° to 15°	-2° to 15°	-2° to 15°	-2° to 15°
Vertical Bat Angle *	-10 to -40						
Time to Contact	0.15 - 0.18 seconds	0.15 - 0.18 seconds	0.16 - 0.19 seconds	0.16 - 0.19 seconds	0.16 - 0.22 seconds	0.16 - 0.22 seconds	0.18 - 0.25 seconds
Peak Hand Speed	18 - 20 MPH	18 - 21 MPH	16 - 20 MPH	16 - 20 MPH	14 - 22 MPH	13 - 21 MPH	10 - 18 MPH
Power kW	2.05 - 2.77 kilowatts	2.02 - 2.90 kilowatts	1.48 - 2.31 kilowatts	1.48 - 2.31 kilowatts	1.25 - 2.45 kilowatts	0.80 - 2.20 kilowatts	0.60 - 2.05 kilowatts

\* Pitch location specific



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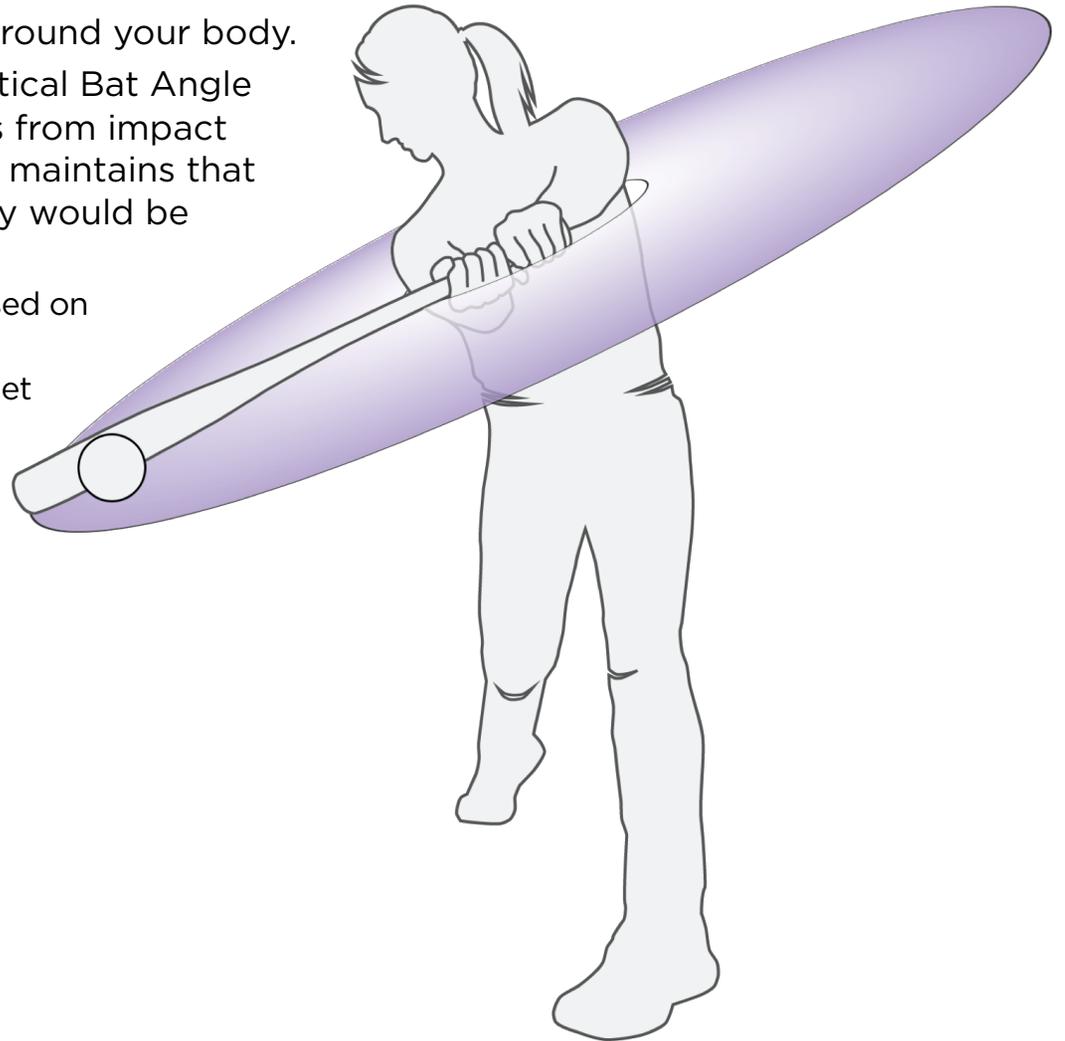




# SWING PLANE

## What is it?

- Think of the Swing Plane as an ellipse around your body.
  - The Swing Plane is defined by your Vertical Bat Angle at impact. The sensor works backwards from impact to create your Swing Plane. If the hitter maintains that Vertical Bat Angle the entire swing, they would be 100% On Plane.
1. Every swing has its own Swing Plane, based on the Vertical Bat Angle.
  2. A good way to think about plane is a fidget spinner. As you move the fidget spinner to hit different pitch locations, the Swing Plane changes.



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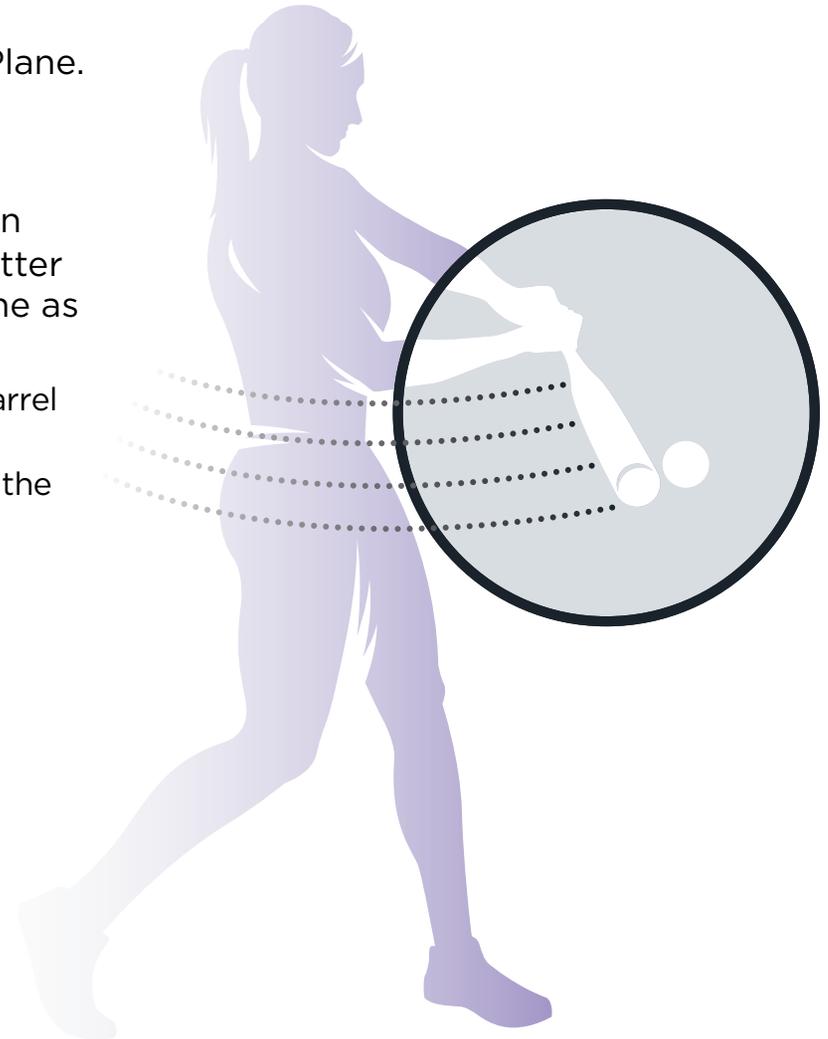
# ON PLANE EFFICIENCY %

## What is it?

- On Plane Efficiency Percentage (%) measures the percentage of your swing that was on the Swing Plane.

## Why is it important?

- An efficient swing gets On Plane early and stays on plane through contact. In an efficient swing, the hitter wants to build as much forward bat speed On Plane as possible, in the direction of the point of contact.
  1. Hitters that have good On Plane Efficiency, tend to barrel up more balls (have higher average Exit Velocities)
  2. Hitting the ball hard relates to bat speeds, but hitting the ball hard more often is about being On Plane.



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# ON PLANE EFFICIENCY %

On Plane Efficiency %	Cause(s)	Training Focus	Drills
<b>Metric Range: 70% or Above</b>	<ol style="list-style-type: none"> <li>Hitter gets the barrel on plane very early and deep in the swing path, optimizing acceleration of the barrel through the zone</li> <li>Gets connected early and stays connected to impact.</li> <li>Hitter is good at minimizing variability in the arm/wrist degrees of freedom (DOF).</li> </ol>	<ul style="list-style-type: none"> <li>Vary training environments</li> <li>Vary pitch types</li> <li>Challenge hitter on decision making</li> </ul>	<ul style="list-style-type: none"> <li><b>Bat on shoulder</b></li> <li><b>PVC Pipe</b></li> <li><b>Heavy bat</b></li> <li><b>Ball Constraint</b></li> <li><b>Turn to Contact</b></li> </ul>
<b>Metric Range: 60 - 70%</b>	<ol style="list-style-type: none"> <li>Some barrel manipulation with the wrist and hands throughout the swing, but rather consistent</li> <li>Early Connection is a little outside desired range. (85° - 105° is good range)</li> </ol>	<ul style="list-style-type: none"> <li>Look at early positioning of the barrel and wrists.</li> <li>Get connected early and stay connected through impact</li> <li>Focus on flattening out the wrist and eliminating extra wrist movement</li> </ul>	
<b>Metric Range: 59% and Below</b>	<ol style="list-style-type: none"> <li>Manipulates barrel with the wrist and hands.</li> <li>Bad Early Connection between body tilt and Vertical Bat Angle (Connection is &gt;110° or &lt; 81°)</li> <li>Early Connection is good, but manipulates bat or body during the swing causing disconnected at Impact.</li> </ol>	<ul style="list-style-type: none"> <li>Same as above, but addition emphasis on fixing a major swing flaw.</li> </ul>	

\* Chart depicts the On Plane Efficiency % metric (not the score)



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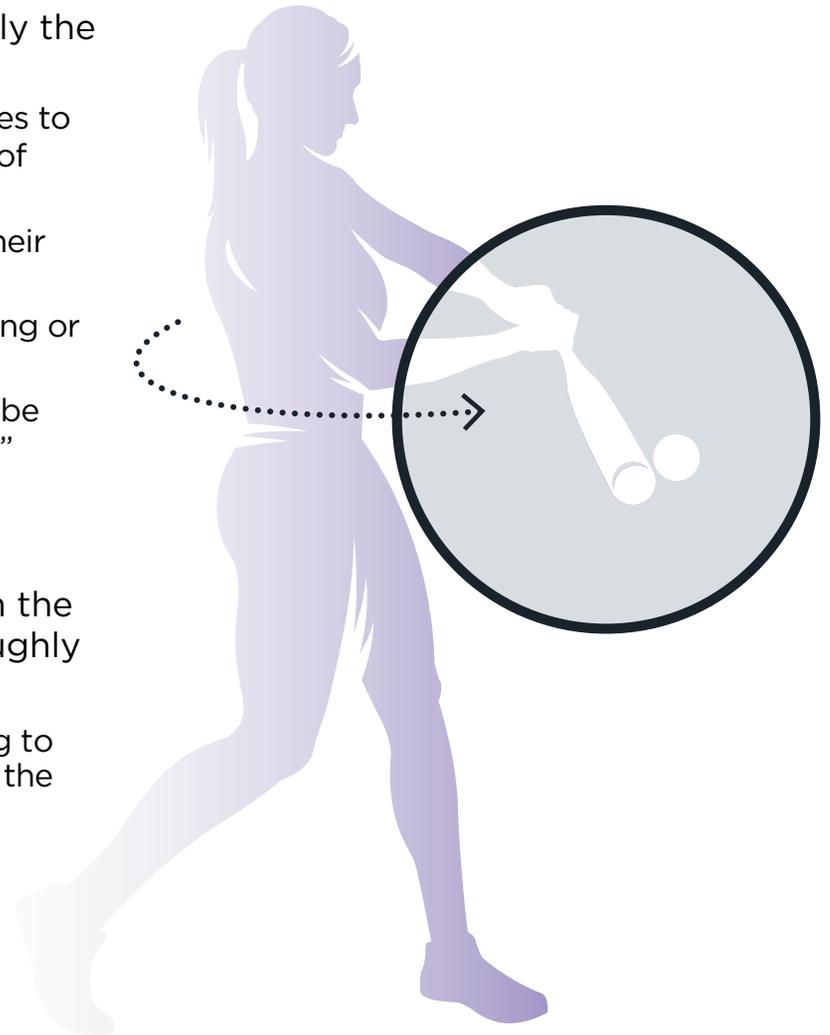
# ROTATIONAL ACCELERATION

## What is it?

- Rotational Acceleration is a measure of how quickly the hitter accelerates the bat into rotation.
  1. Hitters that sequence well and use their bigger muscles to accelerate the bat into the swing, have higher values of Rotational Acceleration
  2. Hitters that actively pull the bat into the swing with their hands have lower values of Rotational Acceleration.
  3. The swing ideally begins with the middle (core) rotating or starting the swing.
  4. A way to think about it is “hitters want their hands to be moving, but not because they are moving their hands”

## When is it measured?

- Rotational Acceleration is measured starting when the bat transitions from the load into rotation until roughly the time back elbow is slotted.
  1. Rotational Acceleration is measured early in the swing to capture information about the movement patterns of the athlete. It is also less susceptible to swing differences based on pitch location and type.



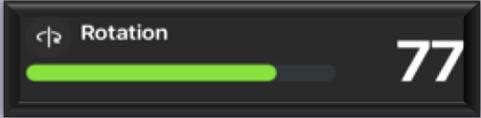
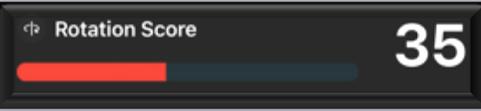
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# ROTATIONAL ACCELERATION

Rotation Score	Cause(s)	Training Focus	Drills
<p><b>Rotation Score: Green</b></p> 	<ol style="list-style-type: none"> <li>1) Good sequencing and movement patterns.</li> <li>2) Body starts the swing,</li> <li>3) Good Hip/shoulder separation</li> <li>4) Hands are passive early in the swing. Bigger muscles do the work. Hands are moving but hitter is not moving their hands.</li> </ol>	<ul style="list-style-type: none"> <li>• Keep consistency of good Rotational Acceleration</li> <li>• Vary training environments</li> <li>• Vary pitch types</li> <li>• Challenge hitter on decision making</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Trigger, trigger, fire</b></li> <li>• <b>Rhythm Drill</b></li> <li>• <b>Open Stance (45°)</b></li> </ul>
<p><b>Rotation Score: Yellow</b></p> 	<ol style="list-style-type: none"> <li>1) Average sequencing and movement patterns</li> <li>2) Block rotates, torso and hips go together</li> <li>3) Hands are somewhat active early, but not necessarily a major issue</li> </ol>	<ul style="list-style-type: none"> <li>• Load middle (core)</li> <li>• Maintain load</li> <li>• Passive hands early</li> <li>• Finish Rotation</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Step behind</b></li> <li>• <b>Heavy bat</b></li> <li>• <b>Impact bag, close distance</b></li> </ul>
<p><b>Rotation Score: Red</b></p> 	<ol style="list-style-type: none"> <li>1) Hand dominate swing</li> <li>2) Very active with hands early in the swing</li> <li>3) Actively pulls the bat into rotation with the hands</li> <li>4) Less than stellar sequencing and movement</li> </ol>	<ul style="list-style-type: none"> <li>• Load middle (core)</li> <li>• Passive hands early</li> <li>• Maintain load</li> <li>• Swing starts with body rotating</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Medicine ball routine</b></li> </ul>

\* Chart depicts Rotational Acceleration Scores which are based on athletes set level of play



# CONNECTION

## What is Connection?

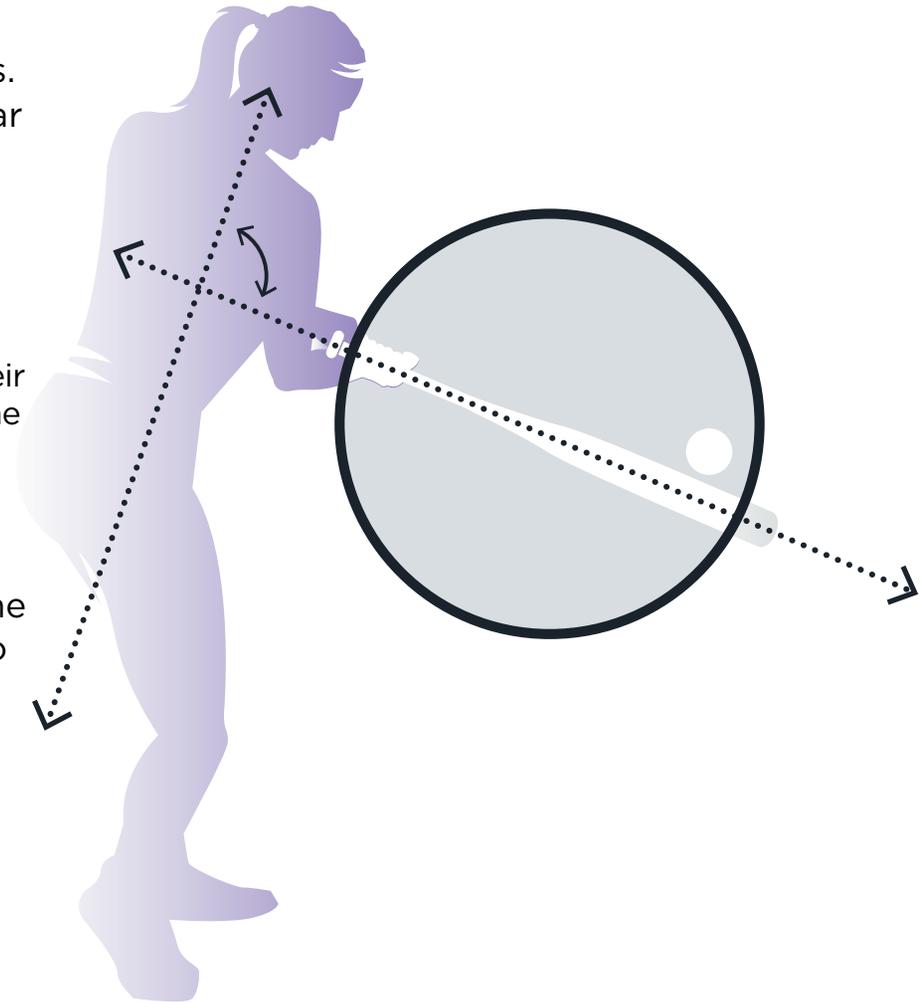
- Connection is a measure of the relationship between the hitter's body tilt and vertical bat angle, in degrees. Ideally this relationship is approximately perpendicular (90°) throughout the rotational portion of the swing.
  1. Hitters want to get connected and stay connected throughout the swing.
  2. Hitters want to maintain their connection for all pitch locations.
  3. Hitters want to adjust to different pitch locations with their body and posture as opposed to keeping their posture the same and using their hands to manipulate the barrel.

## When is Early Connection measured?

- Early Connection is measured just after the start of the downswing or when the bat transitions from load into rotation.

## When is Connection at Impact measured?

- Connection at Impact is measured at contact



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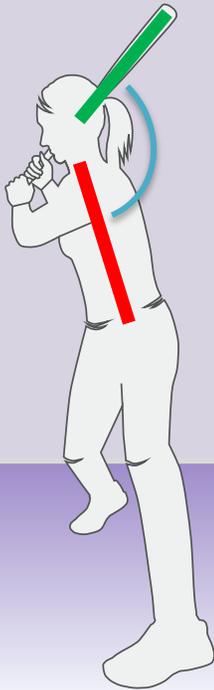
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# EARLY CONNECTION

Greater than 90 °



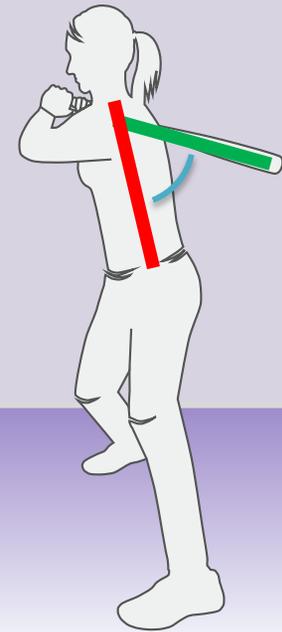
- Hitter is  $> 90^\circ$  as they begin to rotate.
- Hitter gets stuck in barrel tip.
- Steep into the swing plane.

90 °



- Hitter is at  $90^\circ$  as they begin to rotate. Making it easy to swing on-plane. (ellipse)
- Hitter just has to turn and rotate to contact. Stays on swing plane.

Less than 90 °



- Hitter is  $< 90^\circ$  as they begin to rotate or their body tilt becomes more steep throughout the swing.



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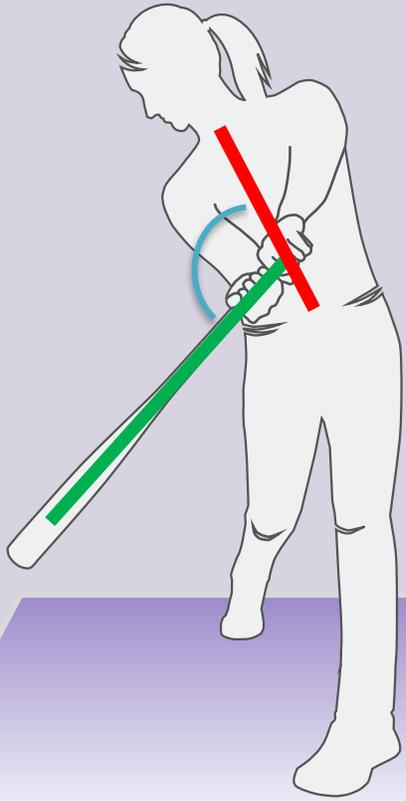
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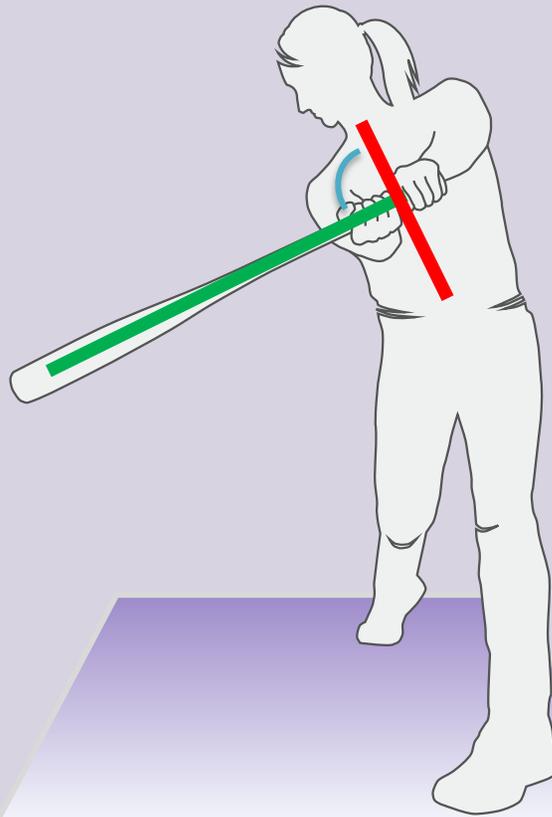


# CONNECTION AT IMPACT

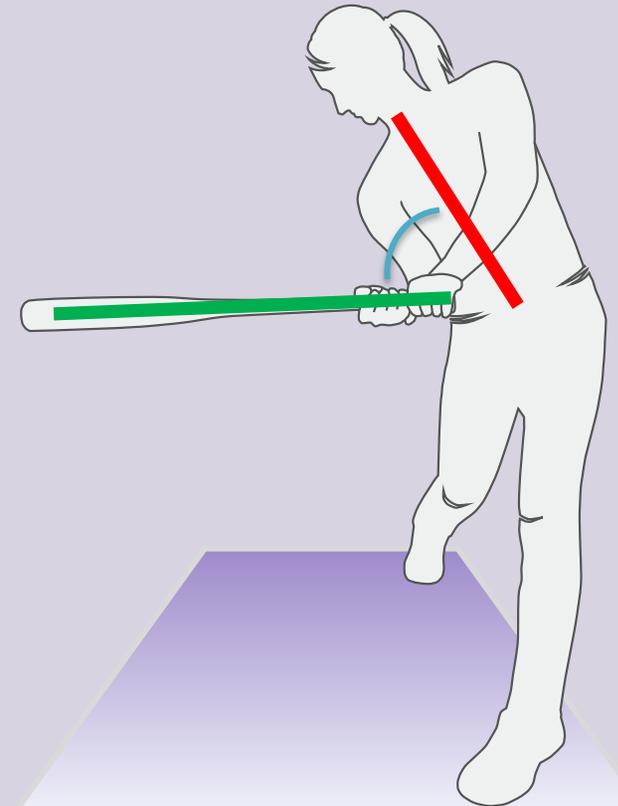
Greater than 90 °



90 °



Less than 90 °



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