

# Data Definitions Guide

*Note: Instructions on how to interpret radar plots are on the last page.*

## Athleticism

**Grip Strength (N):** A measure of forearm strength

in Newtons (N). Higher numbers are preferred. Highly correlated with full-body strength.

*In radar plot:* Grip.L = left-hand grip strength; Grip.R = right-hand grip strength

Age	Good		Great	
	Left	Right	Left	Right
15	544	569	620	653
17	593	615	650	675

**Seated chest pass (cm):** A measure of upper-body power and strength. Measured in centimeters (cm). Higher numbers are preferred.

*In radar plot:* MB.Chest.Pass

Age	Good	Great
15	580	629
17	615	668

**Rotational toss (hitting side) (cm):** A measure of rotational ('turning') power and strength. Measured in centimeters (cm). Higher numbers are preferred. Highly correlated with bat speed. Targets the athlete's ability to use force from the ground up in a coordinated, sequential way (i.e., hips, then torso, then shoulders, then hands).

*In radar plot:* MB.Rot.Toss

Age	Good	Great
15	1049	1137
17	1120	1217

## Jump Ability

**CMJ (cm):** *Counter-Movement Jump*. A measure of lower-body power (not strength), in centimeters jumped (cm). Higher numbers are preferred.

*In radar plot:* CMJ

Age	Good	Great
15	50.52 cm	55.91 cm
17	50.74 cm	56.89 cm

**RSI (Hop Test):** *Reactive Strength Index*. This is calculated by dividing the flight time ('time in the air') by the ground contact time ('time touching the force plates'). A high RSI number means the athlete is very plyometric, or 'springy'. Higher values are preferred.

*Exercise tip:* Adding [power skips](#) to warm-up can help improve this metric.

*In radar plot:* RSI

Age	Good	Great
15	0.743	0.998
17	1.398	1.695

**Broad Jump (cm):** A measure of lower-body strength, in centimeters jumped (cm). Higher numbers are preferred.

*In radar plot:* Broad.Jump

Age	Good	Great
15	250	270
17	272	287

**Lateral Bound (cm):** A measure of lower-body strength in the transverse (i.e., 'sideways') plane. Highly correlated with an athlete's *potential* for throwing velocity – a long lateral bound suggests the athlete can generate lots of sideways force from the lower body, which *in theory* can translate to high throwing velocity. Higher numbers are preferred.

*Tip:* compare your Lateral Bound score to your MB Chest Pass score in the radar plot. Then check the interpretation table below:

		Lateral Bound	
		Low	High
MB Chest Pass	Low	Increase strength	High throwing velocity potential, limited by upper-body ability
	High	You might rely more on your arm to throw, instead of using your legs/full body. Increase your lower-body strength in the sideways plane(*) and work on sequencing.	If your throwing velocity is low, it is likely due to inefficient mechanics. Work on sequencing.

(\*) *Tip:* increase strength in the sideways plane by doing [lateral lunges](#). Once you have mastered the lateral lunge, you can progress to a [landmine lateral lunge with a step](#). (Continues on next page)

*In radar plot:* Lat.Bound

Age	Good	Great
15	216	230
17	226	239

## **Speed and Agility**

**10-yard (s):** A measure of acceleration. How quickly can you get out of the batter's box? Lower numbers are preferred.

*In radar plot: 10Y*

<b>Age</b>	<b>Good</b>	<b>Great</b>
<b>15</b>	1.729	1.651
<b>17</b>	1.649	1.578

**30-yard (s):** A measure of top-end speed. How fast can you run? Lower numbers are preferred.

*In radar plot: 30Y*

<b>Age</b>	<b>Good</b>	<b>Great</b>
<b>15</b>	4.078	3.896
<b>17</b>	3.911	3.758

**5-10-5 (s):** A measure of agility. How quickly can you change direction? Lower numbers are preferred. Correlated with fielding range (how much ground you can cover in the infield/outfield).

*In radar plot: AGIL*

<b>Age</b>	<b>Good</b>	<b>Great</b>
<b>15</b>	4.943	4.748
<b>17</b>	4.736	4.551

## Vision Assessment (15U only)

**Table 1.** List and description of the visuo-motor variables.

<b>Variable</b>	<b>Description</b>
Visual acuity	Measures the clearness to distinguish letters in a Snellen chart at 20 ft
Visual clarity	Measures the clearness to distinguish shapes and the details of objects in a screen at 10 ft according to a staircase procedure
Contrast sensitivity	Measures how well subject can detect difference in contrast
Depth perception	Assess the ability to see in three dimensions and to judge the distance of objects
Near-far quickness	Assess the number of near and far targets that can be correctly reported in a time interval
Reaction time	Measures the average reaction time to visual stimuli
Perceptual span	Measures the ability to recognize and recreate visual patterns
Multiple object tracking	Measures the ability to track multiple objects at once

## Hitting

**Max Exit Velocity (mph):** If there is a large difference between the average and max exit velocity, this could be a sign that the swing has some 'holes' (i.e., areas with low contact ability).

Age	Good	Great
15	83.94	93.03
17	90.73	94.85

**Average Exit Velocity (mph):** on any given pitch, about how hard can we expect the ball to be hit?

Age	Good	Great
15	58.65	73.33
17	83.24	88.17

**Max Distance (ft):**

Age	Good	Great
15	263.81	333.65
17	321.34	353.32

**GB%:** *Ground Ball percentage.* Number of all hits with a launch angle under 9 degrees divided by total hits. Lower numbers are preferred.

Good	Great
15%	<5%

**LD%:** *Line Drive percentage.* Number of all hits with a launch angle between 9 and 25 degrees divided by total hits. Higher numbers are preferred.

Good	Great
43.57%	>62.21%

**FB%:** *Fly Ball percentage.* Number of all hits with a launch angle above 25 degrees divided by total hits. Lower numbers are preferred.

Good	Great
27.41%	<5%

**Barrel %:** Number of fair hits, with a launch angle between 6 and 32 degrees, and an exit velocity higher than 77 mph, divided by total hits. This profile of batted ball is highly related to extra-base hits, which are the most valuable type of hit.

Good	Great
64.84%	85.82%

## Pitching

**Max Fastball Velocity:** fastest pitch thrown. Measured in miles per hour (mph).

Age	Good	Great
15	80.2	84.3
17	90.1	93.2

**Average Fastball Velocity:** ideally, within 2-3 mph of max fastball velocity.

Age	Good	Great
15	78.5	81.2
17	88.4	91.3

**Fastball Spin Rate/True Spin/Spin Efficiency %:** The higher the spin rate, the more vertical break (illusion of the ‘rising’ fastball) there will be. For four-seam fastballs, the spin rate and true spin should be almost identical, and ideally higher than 2250 rpm. This leads to a spin efficiency (true spin divided by total spin) of near 100%. Anything less than 97-98% spin efficiency on a four-seam fastball indicates that some of the spin is being ‘lost’ to sideways movement (or ‘cutting’ the fastball). This also means that the max and average velocity are being negatively impacted. Cutters can be effective pitches, but it is important to consider them in context of the rest of the arsenal.

If you are curious about your arsenal (‘mix’), and how to improve it, please contact me (email is at the bottom of this page).

**Range/Average Changeup Velocity:** ideally, 5-8 mph less than max fastball velocity. More than 8 mph difference makes it too easy for hitters to re-adjust; less than 5 mph difference will simply appear like a slightly slower fastball, so no hitter adjustment is required. Evaluate your own changeup (if you throw one) accordingly.

**Curveball/Slider Average Velocity/Range:** highly variable. Consider velocity in the context of movement and spin. See table below:

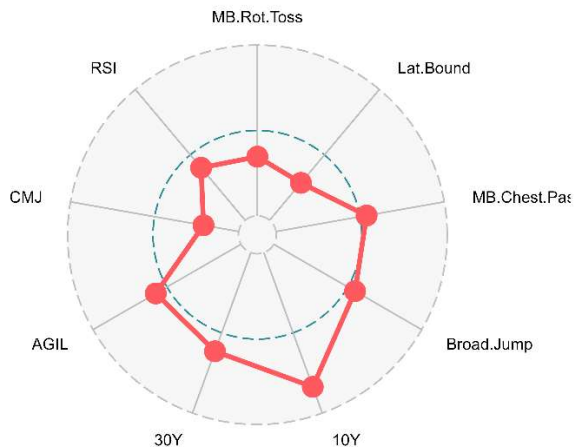
Grip	Classification	Velo Range	Movement Profile		Spin Profile	
			Vertical	Horiz.	Rate	Eff. %
Curveball	“Hard”	76-79	-12.5	~0	2250+	80%+
	“Loopy”	69-72	-24.5	-8		
Slider	“Hard”	76-79	~0	-12.5		19-33%
	“Loopy”	68-73	-8	-24.5		

**Zone%:** Number of pitches in the strike zone, divided by total pitches of that type. An optimal range is 55% to 60%.

## How to Interpret Radar Plots

Radar plots are a fast way to identify areas of strength and areas that require improvement, across multiple metrics. The better your performance in a given area, the farther away from the centre the point will be. This is true even for metrics like running speed. High sprinting *performance* is visualized with a dot far away from the centre – meaning you had a fast (low) *time*.

The dashed blue line represents “average” performance. To interpret the radar plot below:



The athlete in question has **below average performance** in the following:

- Counter-Movement Jump
- Lateral Bound
- MB Rotational Toss

The athlete has **around average performance** in the following:

- Reactive Strength Index (slightly below average)
- MB Chest Pass
- Broad Jump
- 5-10-5 Agility
- 30-yard sprint (slightly above average)

The athlete has **very good/great performance** in the 10-yard sprint.

Taken together, we can conclude:

The athlete needs to improve performance in the frontal (sideways) and transverse (spinning/rotational) planes of motion. The performance in the 10-yard sprint is promising; building on this acceleration ability with agility training would be a great next step. Working on the frontal plane (lateral bound), and then coupling this training with full-body throwing coordination, could lead to significant throwing velocity increases over time.