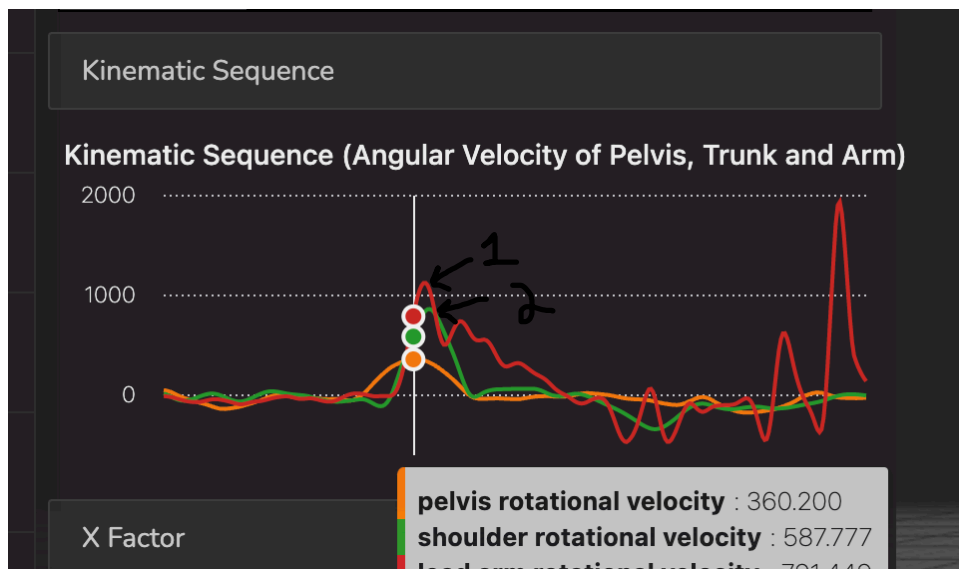




Chad Miller
KINEMATIC SEQUENCING
www.SluggerScience.com

The sequencing portion of Chad's swing analysis completed today was found to be in the order of Hips, Hands, Shoulders. Ideally, the kinematic sequence should be in the order of Hips, Shoulders, Hands in order to generate maximum power output and consistent barrel contact.

While the hands fired before the shoulders, it was only slightly as seen in the picture below. This is evident due to the peak of the red line (Hands) reaching maximum velocity before the green line (Shoulders). (Red Graph is hand velocity, Green line is shoulder rotational velocity).



While this is close to the ideal kinematic sequencing, the slight sequencing imbalance when Chad's hands hit peak velocity before the shoulders correlated to a deceleration of the hands before contact of the baseball. Given that Chad would have been in proper sequencing, you can see in the graph that peak hand speed would have been reached upon impact of the baseball.

HIPS

The hip sequencing throughout the captures and analyzed video were great in terms of engaging the lower-half to "unlock" the next phase of the swing which would be the upper-half.

SHOULDERS

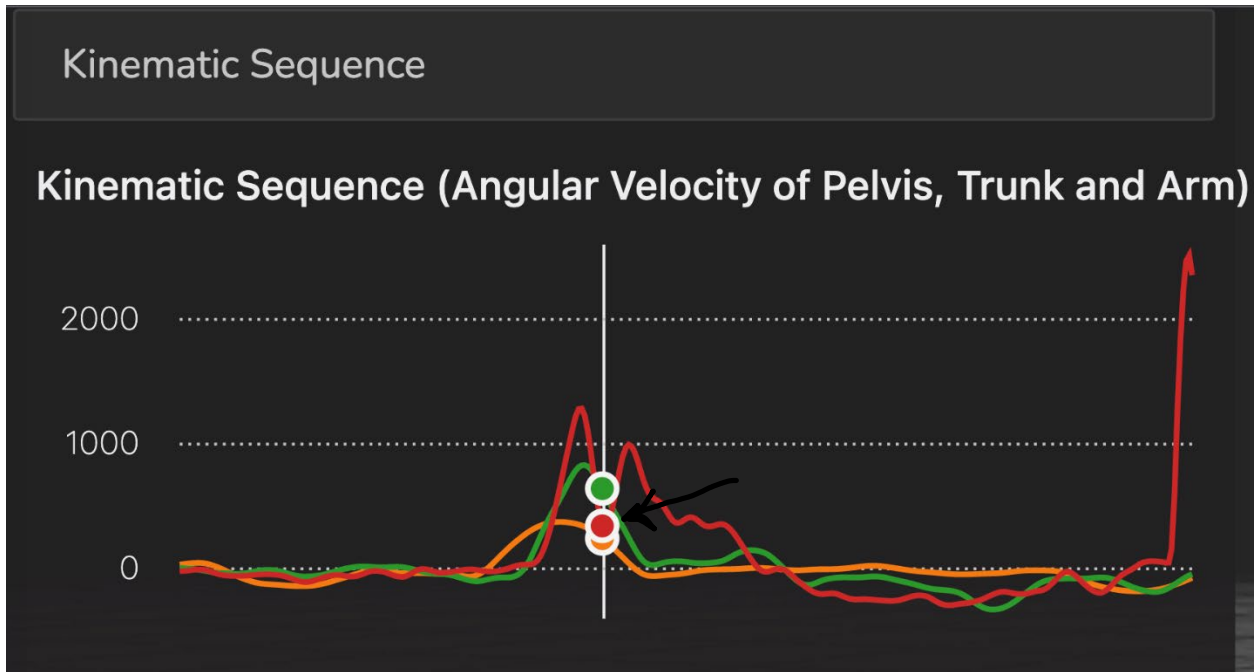
Shoulder-turn for Chad is spot-on in terms of how efficiently he is able to rotate around the center axis of his body. However, the shoulders do lag behind the hands just slightly (in terms of proper kinematic sequencing) which can lead to future issues with handling velocity on the inner half. This can (but not always) result in an increase in flares to the opposite field (as a RHH) on inside pitches.

HANDS

The hand portion of the kinematic sequencing can go with the aforementioned information about the shoulders. In this situation Chad's sequence should involve, the hands should reach peak acceleration where the shoulders do in the picture above (arrow 1 and arrow 2 should be swapped, these are the peak velocities of hands and shoulders).

AT IMPACT

At contact of the baseball you can tell that the hand speed is roughly 2/3 of the maximum generated velocity during the beginning of the initial movement (seen below).



Below is a paired image of the graph pictured above alongside the 3-D rendering and actual video clip from this moment in the swing.

Data will not automatically update, please refresh the browser: cmd + r or ctrl + r to load new content.

- Athletes
- Sessions
- Videos
- Visualizer
- Analytics
- Reports

Sessions henry davis 09/20/2022 Session 3

Analytics
 Shoulders
 Pelvis
 Arms
 Legs

Kinematic Sequence

Kinematic Sequence (Angular Velocity of Pelvis, Trunk and Arm)

X Factor

X-Factor (Pelvis-Shoulder Separation Angle in Degrees)

Tue, 20 Sep 2022 16:02:56 GMT

00:00 00:01 00:02 00:03 00:04 00:05 00:06 00:07 00:08

Video Source

secondary camera

The arrow drawn above is the exact moment of contact within the swing, the correlating graph shows that the hands are in the deceleration phase of the swing. When reverting back to the earlier statement regarding the slight kinematic sequencing imbalance, if Henry were to have fired his shoulders to peak velocity before the hands reached peak velocity, this would have resulted in greater hand acceleration upon, and through, contact of the baseball.

CONCLUSION

Henry has phenomenal mechanics and natural talent as a Baseball player, but through this analysis there have been discoveries that can lead to greater success through proper sequencing. The raw power generated from Henry's swing is seen through the angular velocity readings, but there is still more power to be generated, as well as consistency when handling pitches in any part of the zone.

Throughout winter workouts, there are many things that can be done to help with this finding of the deceleration of the hands prior to impact. These can be thoroughly worked through with resistance bat training and extended inside pitch tee drills (requiring proper sequencing to make barrel contact).

Sluggo Science | x | RAPID - Athlete | x | louisville slugger | x | 2022 Meta PWR | x | steven kraus bas | x | Prep Baseball Rej | x | Jack Corcoran ba | x | tommy corcoran | x | +

← → ↻ 🏠 https://rapid-sports.com/athlete/1949/session/results 🔍 🏠 📄 📄 📄 📄 📄 📄

TEST RESULTS

Foot Type Symmetry (Barefoot) 4 Stage Mobility

Left Foot: Forefoot Valgus

Description: Force: Peak force load in the rearfoot medial and medial central segments with little pressure in the midfoot or forefoot. Muscle Activation: Posterior medial kinetic chain. Structure: A condition in which the rear of the foot tends to curve outwards at the ankle joint. Those with rearfoot valgus usually need to strengthen the foot invertors and may need instep supports or orthoses if participating in sports.

Diagnosis: Foot Type

Details: Athlete: Forefoot Valgus (Forefoot Pronation) in athletes is characterized by the collapsing of the body under gravity that can be observed by flattened arches, bent knees, internally rotated femurs, anterior pelvic tilt, spinal flexion, protracted shoulder blades and flexion of the cervical spine. Pronation forces work with gravity and therefore a lot of energy is required to overcome the concentric forces that they exert. Pronation also creates storage of elastic energy allowing individuals to perform powerful movements such as sprinting and jumping when needed. Problems with pronation would resemble thoracic kyphosis, lumbar lordosis, forward flexed head, rounded shoulders, flat footedness and increased valgus (collapse) at the knees.

Right Foot: Forefoot Valgus

Description: Force: Peak force load in the rearfoot medial and medial central segments with little pressure in the midfoot or forefoot. Muscle Activation: Posterior medial kinetic chain. Structure: A condition in which the rear of the foot tends to curve outwards at the ankle joint. Those with rearfoot valgus usually need to strengthen the foot invertors and may need instep supports or orthoses if participating in sports.

Diagnosis: Foot Type

Details: Athlete: Forefoot Valgus (Forefoot Pronation) in athletes is characterized by the collapsing of the body under gravity that can be observed by flattened arches, bent knees, internally rotated femurs, anterior pelvic tilt, spinal flexion, protracted shoulder blades and flexion of the cervical spine. Pronation forces work with gravity and therefore a lot of energy is required to overcome the concentric forces that they exert. Pronation also creates storage of elastic energy allowing individuals to perform powerful movements such as sprinting and jumping when needed. Problems with pronation would resemble thoracic kyphosis, lumbar lordosis, forward flexed head, rounded shoulders, flat footedness and increased valgus (collapse) at the knees.

Recommended Areas of Concentration

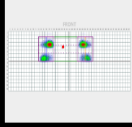
- Posterior Lower Leg

ADD

Press the BEGIN EXERCISE button when ready.

TEST AGAIN BEGIN EXERCISE SAVE AS PDF...

Athlete Name: Davis, Henry
Athlete ID: FacilityDavis01
Date of Report: 10/08/2022
Category: Foot Type



Baseline

Pressure Distribution CoP%

Ideal Range 50/50

54/46

Left/Right

Ideal Range 60/40 to 70/30

63% 64%

38% 36%

Baseline Results

DATE	L/R	LEFT F/R	RIGHT F/R	PATH LENGTH (cm)	NOTE
9/20/22, 11:29 AM	54/46	63/38	64/36	4	Initial Visit

Course of Action

- Calf Hamstring Stretch (Strap) *
- Foot Hold (Band) *
- Foot Inversion (Ball) *
- Hip Abduction (Band) *
- Toe Stretch - Extension *

Athlete Notes Add Note

Note	Date	By
No records available.		

41°F Clear

11:41 PM 10/8/2022

Foot Profile and Biomechanical Analysis

Foot Profile: Right Foot - Valgus Left Foot: Valgus

Henry is an extremely strong individual that displayed exceptional power throughout the course of his swing. He has exceptional power to the right center gap due to his tremendous upper body strength. That opposite field power is rooted with his Valgus backside foot profile. This means that his pinky toe is somewhat elevated causing him to have a weight distribution forward in his stance

Typically, players with rear foot Valgus are pushed forward and will struggle to properly stack in their load and engage their Glute to trap the Kinetic energy. However, Henry does a very good job utilizing the ground in his back leg. His main issue is on his front foot as he tends to supinate (roll over) due to his left leg being slightly longer than his right. This will pull his barrel out of the zone of contact early and reduce on his kinetic energy transfer and time of bat to ball connection.

Hip Mobility - Right Hip: Fail Left: Pass

In addition to having a Valgus right foot profile his left leg is also longer than his right leg. This also serves as a block on his front side which does not allow for full functionality of his front side (left) hip and take advantage of his complete power output. With Chad's amazing top half strength if he can learn to utilize his hips in a more efficient manner his 103 mph exit velo could be consistently 110 mph very easily.

Balance and Direction: Drifts towards the plate at Load

As Chad goes through his load and lands he tends to drift towards the plate. On the biofeedback sequence of the evaluation, he consistency drifted into the plate 1 ¼ inch at stride. When coupled with his front leg length issue and his Valgus front foot his heat map and power will be generated on the middle to outer third of the plate. If he can become more neutral in his stride and reduce his drift toward the plate he will be able to attack more middle to inner half pitches and gain more extension by not cutting himself off at stride. Due to this point to compensate for this characteristic a bat with a more robust taper ratio has been assigned to Henry due to the drift and elevated and high vertical rise inner half fastballs could be a weakness.

Kinematic Sequence: High Shoulder Velocity with Below Average Peak Hip Velocity

Chad has a very solid Kinematic Sequence in that his Hip, Shoulder, Hands Sequence is very timely and in the proper order of operations. He does a very good job with his X-Factor (Hip-Shoulder Separation). However, Chad does an amazing job with acceleration, but he slows the barrel down right before contact and then reaccelerates at contact. If he were to stay consistent one could believe that his power output and exit velocity could increase.

Internal and External Rotational/ Grip Strength Output -

Right Internal Rotation: 62.3 Left External Rotation: 55.9

Right Grip Strength: 165 Left Grip Strength: 151

Wrist Mobility – Right: Pass Left: Pass

Pronation/ Supination – Pronation: Right – Fail Left - Pass

Chad has displayed an above average internal rotation score with his right hand scoring 62.3 psi and his left hand external rotation score of 55.9 psi. Typically, these players are pull dominant hitters that will be very quick to get their barrels in and out of the zone of contact. However, with the combination of Chad's Valgus foot profile, hip function, plate side drift, and kinematic sequence his swing tends to be more of an inside out swing path. Chad displayed a very wide range of motion for supination. However, his pronation on his right wrist was a bit stiff. This could also contribute to his opposite field power and not being as mobile with top hand roll.



Scientific Bat Fitting Report
Chad Miller

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Scientific Bat Fitting Measurables

Projected Optimized Average Bat Speed: 110 mph

Measurable	Personal Output	Score	MLB Ave	Variance
Vertical	32	4.8	26 inches	
Grip Strength	R – 165 L – 151	R- 4.4 L – 4.7	R – 125 L - 120	R – 40 L - 31
Raw Exit Velocity	96	4.8	89 mph	7 mph
Exit Velocity	103	4.6	96 mph	7 mph
Arm Length	R – 31 L – 31 1/8	R – 4.3 L – 4.3	R – 30 1/4” L – 30 1/8”	R – .75 L - 1
Hand Size	R – 3.5 L – 3.6	R – 4.8 L – 4.9	R – 3.25” L – 3.16”	R – .25 L – .44
Internal Rotation	R – 62.3 L – NA	R – 4.4 L - NA	R – 42.6 L – 41.8	R – 19.7 L – 28.5
External Rotation	R – NA L – 55.9	R – 4.9 L – 4.9	R – 38.4 L – 37.6	R – 17.7 L – 18.3
Hip Mobility	R – 4.3 L – 2.3	R – 4.8 L – 4.3	R - 4.1” L – 4.0”	R - .2 L - 2
Radial Deviation	R - 22 Degrees L – 23 Degrees	R – 4.7 L – 4.8	R - 22 Degrees L- 22 Degrees	R – E L – 1 Degree

Recommended Bat Model

Primary Bat: HD1 Length: 34 inches Weight 32 oz.

Model	Barrel	Mid Barrel	Center	15”	Mid Handle	12”	Handle	Knob	Taper Ratio	LSHSC
HD1	2.495	2.3	1.784	1.24	1.196	1.080	.93	2.07	1.15	4.4



Recommendations

1. Ground Force Pressure Mat Program
 - a. Load Dry Drills on Pressure Mat (Front Land Focus)
 - b. Kinematic Sequence Dry Series
 - c. Kinematic Waterbag Drill Series
 - d. Resistance Bat Mat Drill
 - e. Heavy Ball Mat Drill

2. Hip Mobility Series
 - a. See Strength and Conditioning (Flexibility)
 - b. Quarter Turn Drill Series
 - c. Bosu Ball Series

3. Breathing Program (Please See Attached Programming)

4. Neurocognitive Functional Program (Please See Attached Programming)



Questions

Evaluation

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