



Restoring UE Reciprocal Performance in the Patterned Baseball Athlete

Boston Sports Medicine and Performance Group

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Patterns and Baseball

All the brain knows is patterns and all patterns know is the brain. This begins at birth with reflexive patterns and continues throughout life with skill development. Movement patterns (like throwing a baseball) not muscles are represented in the cortex (brain). Baseball players need the ability to properly integrate tri-planar movement first and foremost in order to maintain proper feedforward processing and reciprocation to improve performance and reduce the risk of patterned related injuries.

Wind Up

- Setting/Loading Phase
- Stride leg flexes to $\sim 90^\circ$
- Pelvis rotates toward throwing shoulder
- Minimal forces on body



Stride

- Moves front leg toward target
- Separates hand
- Stride length: $\sim 83\%$ of height
- Pathomechanics:
Every centimeter the foot lands open increases $3N$, which is nearly 15% increase in torque



Early Cocking

- Foot contact to initiation of trunk rotation
- Trunk/Pelvis Separation
- Early Cocking
 - Scapula Retracted
 - Humerus Abducted: 80-100°
 - HG: ER and Horizontal Abd
- Non throwing (Glove):
 - Scapula Protracts
 - Shoulder Internal Rotation
 - Elbow Extension



Late Cocking

- Pelvis continues to rotate towards target
- Thorax rotated contra laterally
- MER: $160-181^{\circ}$
- Internal Rotation
Torque: $100\text{Nm}=60\text{lb}$
weight hanging from hand



Acceleration

- MER to Ball Release
 - Scapular Protraction
 - HG-IR
 - HG-Horizontal Adduction
 - Elbow Extension
- Serratus Anterior/Pec Major strongly active
- Concentric: Subscapularis/Latissimus Dorsi
- Eccentric: Teres Minor/Infraspinatus



Follow Through

- Ball Release to completion of motion
- Eccentric posterior RC
- Dissipates energy reducing distraction forces



Reciprocation

To Give and.....



A New York Yankees pitcher in mid-throw, wearing a grey uniform with "NEW YORK" on the front and a blue cap with the "NY" logo. He is holding a baseball in his right hand, which is raised high. The background is a blurred blue stadium wall.

Reciprocation

to Receive.



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UE Pattern Integration

Right Handed Thrower

Stride-Cocking Phase

R) Trunk Rotation	Left Arm	Right Arm
Wrist	Flexion	Extension
Wrist	Pronation	Supination
Elbow	Extension	Flexion
Shoulder	Internal Rotation	External Rotation
Shoulder	Flexion	Extension
Scapula	Protraction	Retraction

**Supination
Extension**

Wrist

**Pronation
Flexion**



**External
Rotation**

Shoulder

**Internal
Rotation**





Elbow

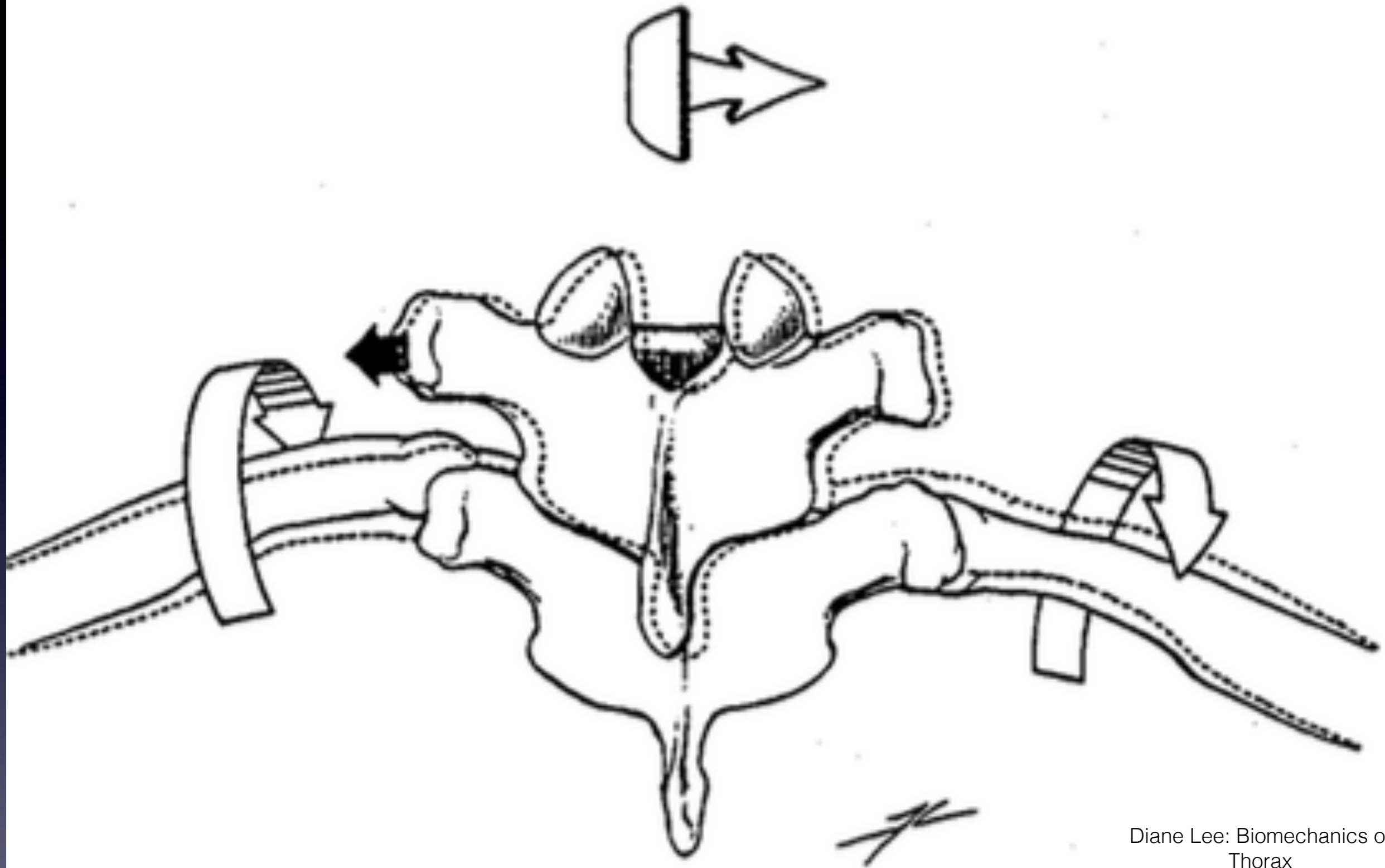
Flexion

Extension



**Stride-Cocking
Phase**

**UE
Reciprocation
Drives
Contralateral
Thoracic
Rotation**



Diane Lee: Biomechanics of
Thorax

Right Thoracic Rotation
Right Rib Cage External Rotation
Left Rib Cage Internal Rotation



**What's wrong
with this
picture?**



**Pronation
Flexion**

UE Pattern Integration

Right Handed Thrower

Acceleration-Follow Through Phase

L) Trunk Rotation	Left Arm	Right Arm
Wrist	Extension	Flexion
Wrist	Supination	Pronation
Elbow	Flexion	Extension
Shoulder	External Rotation	Internal Rotation
Shoulder	Extension	Flexion
Scapula	Retraction	Protraction



Wrist

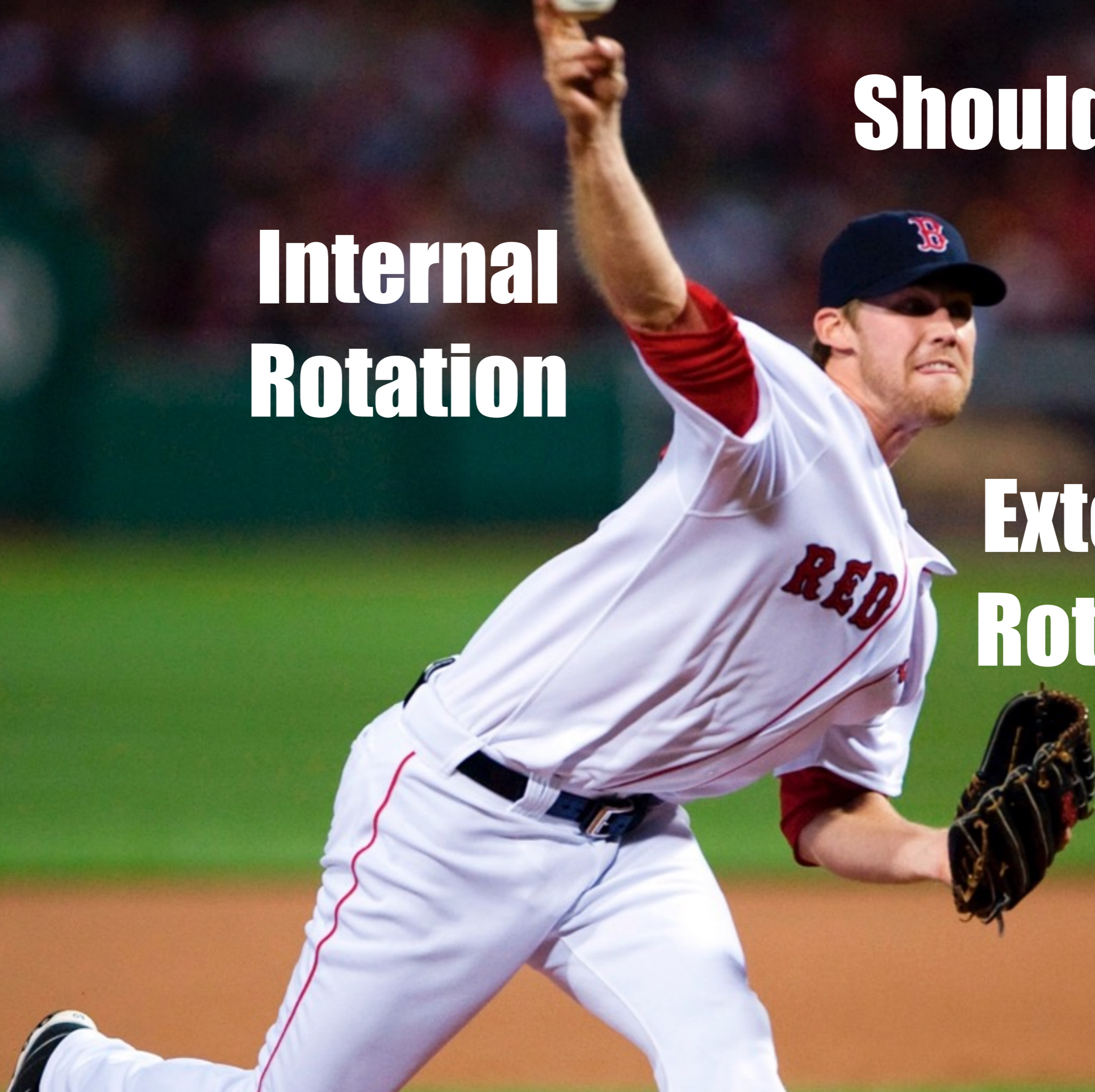
Pronation

Supination

Shoulder

**Internal
Rotation**

**External
Rotation**





Elbow

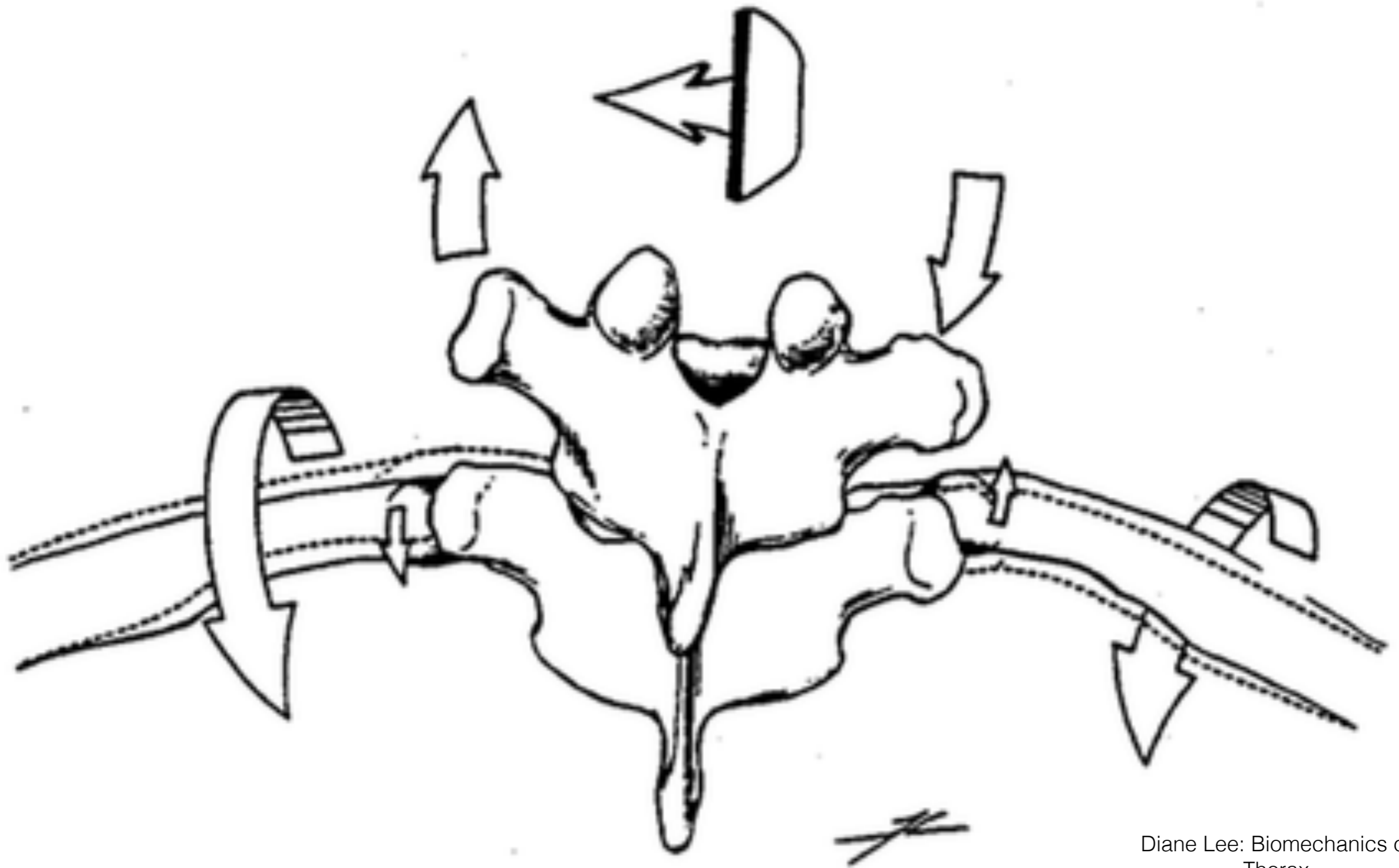
Extension

Flexion

Acceleration-Follow Through

**UE Reciprocation
Drives Ipsilateral
Trunk Rotation**



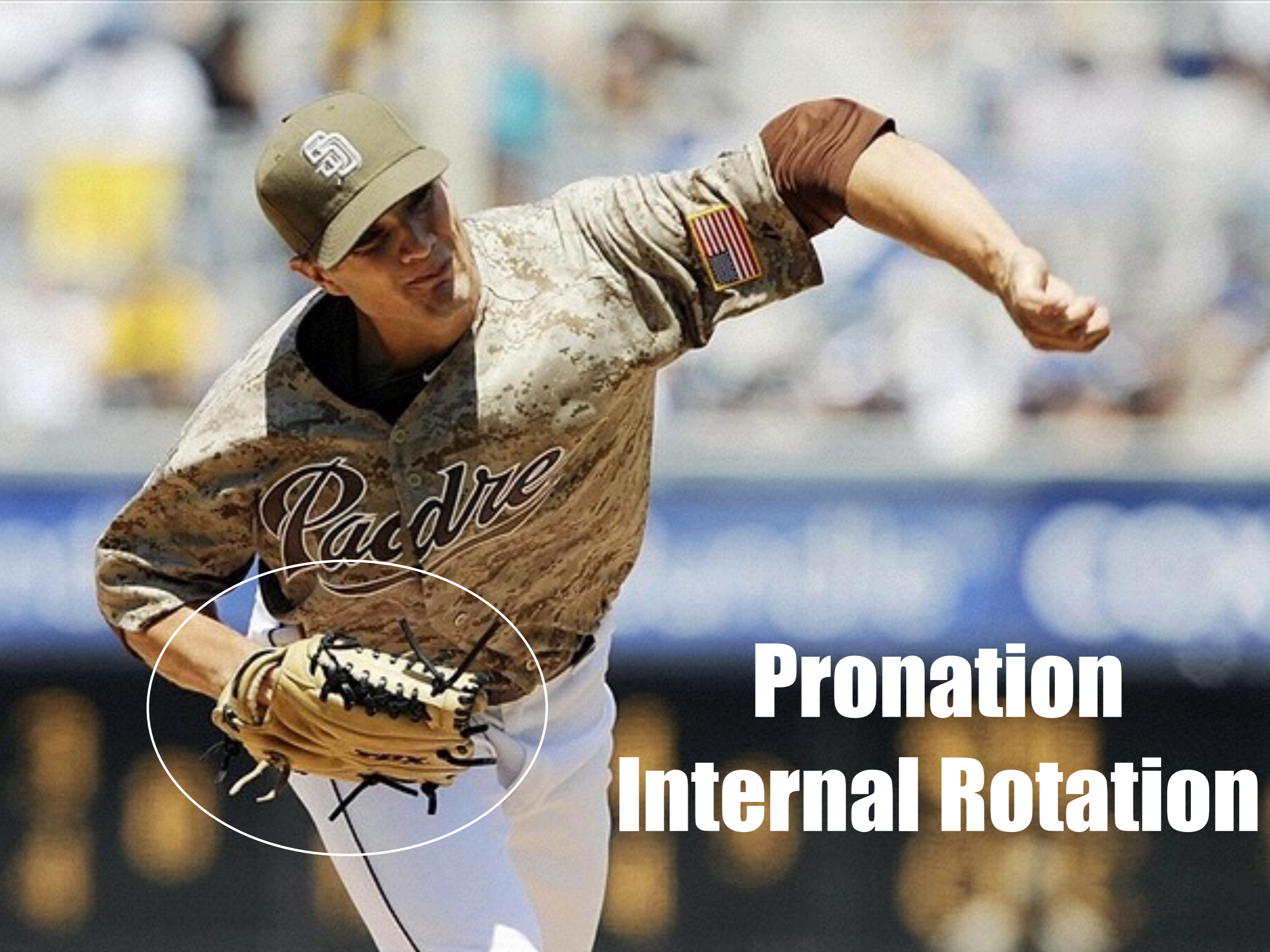


Diane Lee: Biomechanics of
Thorax

Left Thoracic Rotation
Left Rib Cage External Rotation
Right Rib Cage Internal Rotation



**What's wrong
with this
picture?**



Pronation
Internal Rotation

A San Diego Padres pitcher is captured in mid-throw on a baseball field. He is wearing a white uniform with "Padres" in blue script across the chest, a blue cap with the "SD" logo, and a black glove. His right arm is extended forward, releasing the ball, while his left arm is bent with the glove. The background shows a blurred crowd of spectators in stadium seating. A yellow banner with the text "were the" is visible behind the pitcher.

**How do I Integrate
Reciprocation into
my programs?**

#1 Priority



**Wrist Pronation
Elbow Extension
Shoulder Internal Rotation
Scapular Protraction**

**Wrist Supination
Elbow Flexion
Shoulder External Rotation
Scapular Retraction**

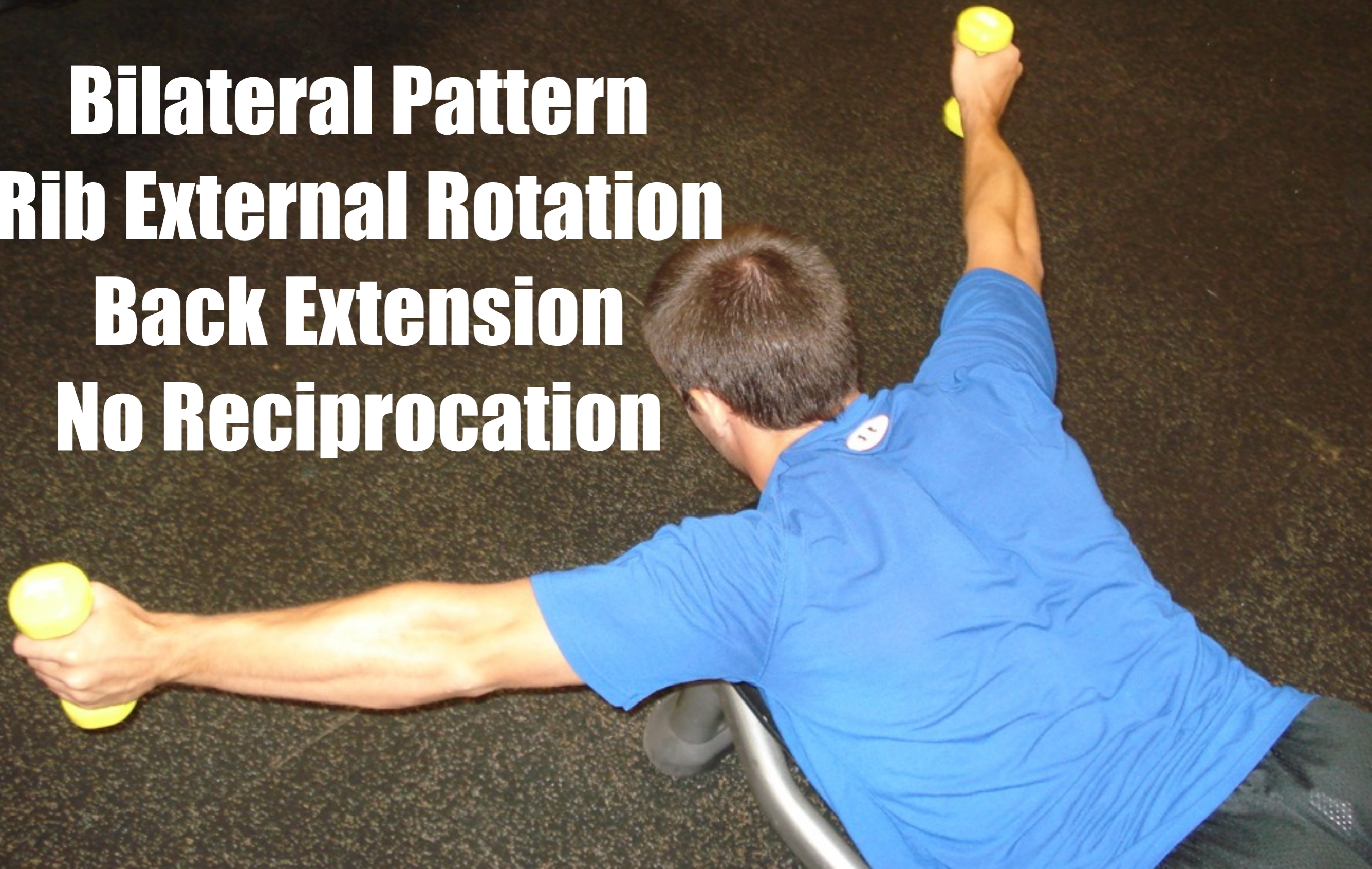
Teach proper movement patterns first!

It's Not Just Baseball



Prone Y's

Bilateral Pattern
Rib External Rotation
Back Extension
No Reciprocation

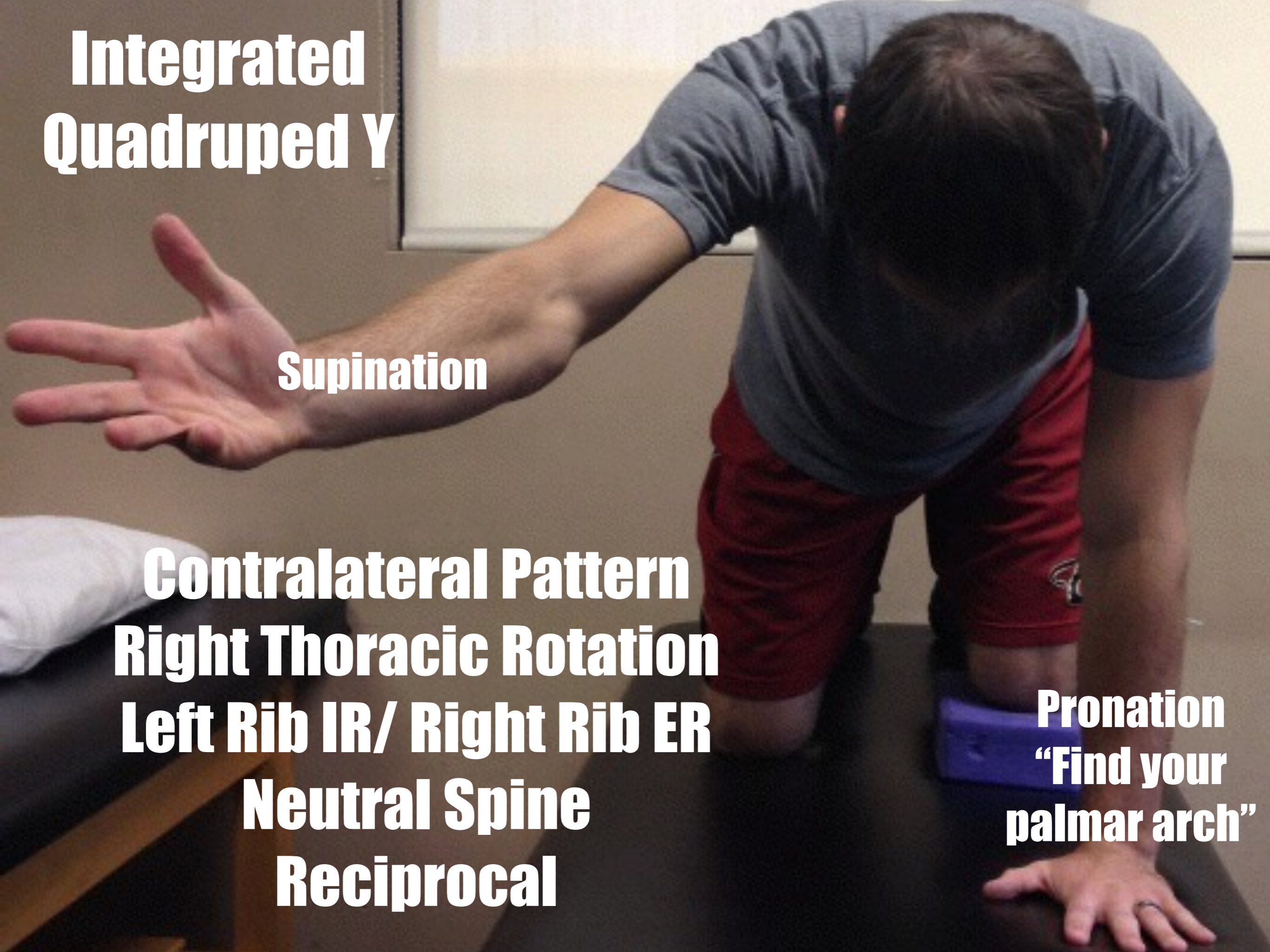


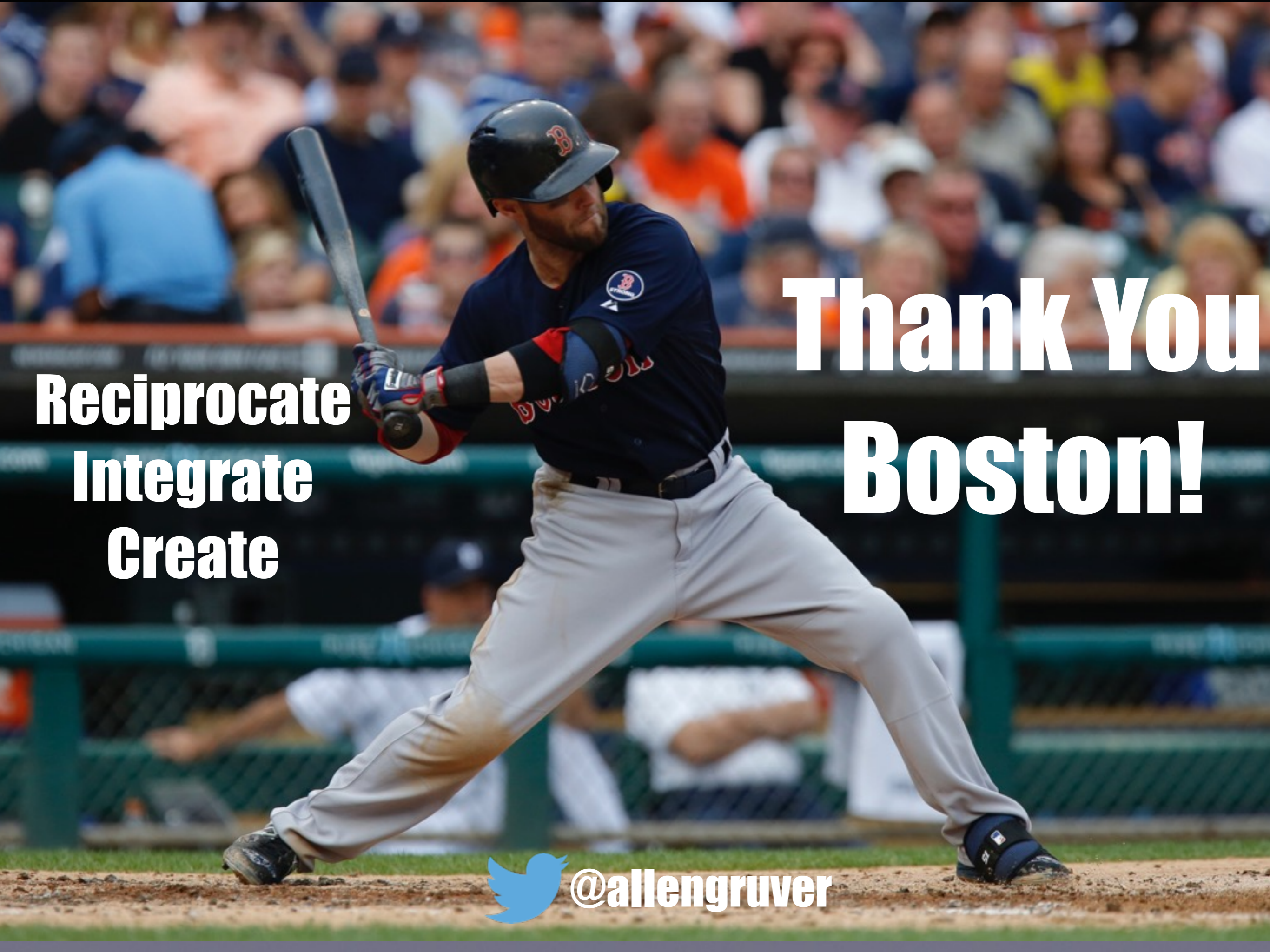
Integrated Quadruped Y

Supination

**Contralateral Pattern
Right Thoracic Rotation
Left Rib IR/ Right Rib ER
Neutral Spine
Reciprocal**

**Pronation
“Find your
palmar arch”**





**Reciprocate
Integrate
Create**

**Thank You
Boston!**

 **@allengruver**