

AERIAL AND TERRESTRIAL MOTOR PREFERENCES

Spring *or Sink*

Two athletes can throw the same velocity with deliveries that share almost nothing, because they are running different engines. One rebounds off the ground. The other sinks into it and pushes. Coaching either one toward the other costs velocity and usually gets blamed on effort.

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Most of what gets diagnosed as a lower half fault is a **different engine being asked to run the wrong way**.

Some athletes generate movement by rebounding: weight forward on the feet, fast leg lift, almost no back knee bend, and a controlled loss of balance toward the plate. Others generate it by sinking: weight back toward the heels, slow low leg lift, an immediate deep bend in the back leg, and the ability to pause in the load without losing anything. Both are complete solutions. Neither is a broken version of the other. And nearly every cue in this sport is written for one of them.

The two engines

Side by side, through the phases where they diverge most.

AERIAL AND TERRESTRIAL, PHASE BY PHASE		
PHASE	AERIAL – THE SPRING	TERRESTRIAL – THE SINK
Weight at setup	Forward, toward the balls of the feet. Ready to rebound.	Back, toward the heels. Ready to load.
Leg lift	Fast and high, with no pause . Stopping at the top costs him the elastic energy he was going to use.	Slower and lower, and he can pause without losing anything, because his power does not depend on a bounce.
Back knee	Bends very little. The leg behaves like a spring rather than a piston.	Bends quickly and deeply to drop the centre of gravity. The lower limb works like a pulley system.

PHASE	AERIAL — THE SPRING	TERRESTRIAL — THE SINK
Where the power comes from	The back side chain and the shoulders, which initiate the movement.	The front side chain and the big leg muscles, with the hips and pelvis generating.
What starts it	Shoulders lead. The upper body initiates and the lower body follows.	Hips lead from the back foot. The lower body starts it and the upper body follows.
Balance	Manages a controlled forward loss of balance . That is the mechanism, not a fault.	Stays over the base and drives. Loss of balance is a fault for him.
Centre of mass in the stride	Stays more over the back leg through the movement.	Transfers forward rapidly once the front foot plants.
Back foot at landing	Less pronounced. The drive phase is shorter by design.	Heel based, with pronounced angles through the back foot.
Tempo	Naturally quick. Slowing him down removes the rebound.	Naturally deliberate. Rushing him removes the load.

The other axes

Aerial and terrestrial is the one people know. Three more predict things that get coached just as hard.

AXIS 02 One piece or spiral A unit turner closes the hips significantly during loading, because he has less trunk rotation available. A spiral turner closes them less and runs more separation. This directly predicts a pitcher's natural separation number, which is the most chased figure in the sport.	AXIS 03 Front side or back side Which chain he expresses power through. Determines which cues land and which lifts he actually looks strong in. Terrestrial pairs with the front side, aerial with the back side.	AXIS 04 Palm down or palm up A natural rotation bias at release. Treated as an expression of preference rather than a technique choice, and it predicts which secondary pitch comes easily: changeup and sinker one way, slider and sweeper the other.
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What it predicts, and what gets coached anyway

The practical value of the framework is that it names things people routinely try to standardise.

COMMON INSTRUCTIONS AND WHO THEY ARE WRONG FOR		
THE INSTRUCTION	FINE FOR	COSTLY FOR
"Get more load in the back leg"	Terrestrial. That is his engine.	Aerial. He barely bends the back knee by design, and adding depth removes the rebound he throws with.

THE INSTRUCTION	FINE FOR	COSTLY FOR
"Pause at the top and gather"	Terrestrial. He can pause without losing anything.	Aerial. The pause spends the elastic energy the movement depends on.
"Slow down, you are rushing"	Almost nobody. Tempo is usually a preference.	Aerial. Quick is the mechanism, not the mistake.
"Stay balanced, do not drift"	Terrestrial. Balance loss genuinely is a fault for him.	Aerial. A controlled forward loss of balance is how he generates.
"Get more separation"	Spiral turners with room to use.	One piece turners. The rotation is not available, so it gets supplied by the low back instead.
"Drive with your legs"	Terrestrial, whose lower body initiates.	Aerial, whose shoulders initiate. The instruction reverses his sequence.

The tell that you are coaching across someone

He tries, it looks worse, he goes back to it the moment attention moves elsewhere, and the change never survives a competitive outing. That pattern gets read as a discipline problem remarkably often. It is more usually an athlete rejecting a solution his body does not organise around.

A change that fits the athlete tends to feel easy quickly. A change that fights him needs constant reinforcement and disappears under pressure.

Reading it, without pretending it is a test

There is no validated screen here. What follows is observation, and it is worth treating as a hypothesis rather than a result.

WATCH The top of the leg lift Does he pause there comfortably, or does stopping visibly cost him? A pause that drains him is the clearest single indicator you will get.	WATCH How much the back knee bends Deep and immediate, or barely at all. This is the most visible difference between the two and it is stable across an athlete's career.	WATCH Where his weight sits at setup Heels or forefoot. Film from the side before he moves at all.
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WATCH What moves first Shoulders or hips. Frame by frame at the start of the delivery, and it is easier to see from behind than from the side.	ASK Which lifts feel natural Hinges, sleds and lateral drives versus squats, jumps and reactive work. An athlete who is strong but never seems to express it in one category is telling you something.	ASK What he did as a kid Sprinter or jumper, and which sports felt easy. Preference shows up long before pitching does.
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Coaching each one

AERIAL

Protect the rebound

His power comes from elastic return and a quick, uninterrupted movement. The job is to keep that intact while fixing whatever is genuinely broken.

- **Do not add a pause** or ask for depth in the back leg
- Weight room: **jumps, bounds, drop jumps, reactive work**. He will express power there
- Quick tempo is his default. Build a second gear if you want one, do not replace the first
- Watch that a short ground phase is genuine rebound rather than a lost connection. Those look similar and are not

TERRESTRIAL

Protect the load

His power comes from sinking into the back hip and driving. The job is to keep the loading phase intact and make sure it is a real load rather than a hike.

- **Do not rush him**. The deliberate tempo is the mechanism
- Weight room: **hinges, sled work, lateral drives, heavy split squats**
- Check that the back knee bend comes with a genuine shift over the leg, not a pelvis hike
- A slow tempo becomes a liability only when it is also identical every pitch

What this framework does not excuse

The failure mode of any preference model is that it becomes a reason not to fix anything. Four hard limits.

LIMIT 01 A measured load flag Size adjusted elbow load at or above the high risk band is a number, not a style. Preference does not make it acceptable, and no motor profile predicts an athlete should carry more stress for the same output.	LIMIT 02 A range deficit with an injury link A five degree hip rotation asymmetry predicted back and abdominal injuries across 258 professional player seasons. That is a screen finding with published consequences, not a preference.	LIMIT 03 A fault that got worse Preference is stable. If something changed this season, it changed for a reason, and the reason is usually injury, fatigue or a coaching intervention rather than how he is built.
LIMIT 04 Anything you have not measured The most common misuse: labelling an athlete, then explaining every finding through the label. Assign the profile after the screens, not before, and let a measurement override it whenever the two disagree.		

Where the evidence actually stands

This is a coaching framework, not settled science

Everything above comes from a practitioner model with limited peer reviewed validation. It has nothing like the standing behind elbow varus torque, stride length, or the hip rotation and injury association. Nobody has published a validated screen for assigning an athlete to a profile, and the categories themselves have not been independently tested at the level the kinetic findings have.

So the honest use is as a **hypothesis generator**. When a pitcher resists a change that should obviously help him, or when a correct looking adjustment never survives competition, preference is a plausible explanation worth considering. That is genuinely useful and it is also the whole claim.

What the framework gets right, and what makes it worth including here despite the evidence gap, is the caution: **coaching an athlete against how he natively organises movement is a real mechanism for avoidable injury**. That much is consistent with everything else in this library, which is why the same warning appears in half these documents from other directions.

Where this sits in the library

It is the reason several other documents hedge

Means, Not Score argues that separation is a means rather than a target, and one piece turners are the clearest case of why. *Fast or Slow* notes that some athletes do not have a slow gear and some do not have a fast one, which is this axis. *False Load* flags that fast springy athletes may carry some pelvic elevation as part of their rhythm. *Who Should Drop* treats arm slot as partly an expression rather than a choice.

And *Deficiency or Adaptation* makes the same argument in general terms: a compensation that is downstream of how an athlete is built is not a fault waiting to be corrected. This document is the specific version of that claim for the lower half.

Sources

The motor preference material is practitioner literature. The constraints on its use come from the peer reviewed work listed alongside it.

- ActionTypes — Are you an aerial or a terrestrial pitcher
- ActionTypes — Injury prevention and performance enhancement: cracking the code of motor preferences
- Driveline — A Different Model for Cueing Pitching Mechanics, on individual movement solutions
- Driveline — Pitching Assessments and Changing Mechanics
- Skilled pitching is not less joint variability but better structured joint variability, SportRxiv
- Decreased Hip Internal Rotation Increases the Risk of Back and Abdominal Muscle Injuries, 258 player seasons
- Fleisig et al. — Kinematic Parameters Associated With Elbow Varus Torque in Elite Adult Baseball Pitchers
- The Effect of Trunk and Lower Body Mechanics on Fastball Velocity, SportRxiv

Assign the profile after the screens, never before, and let a measurement win whenever the two disagree.