

A 4-WEEK INTRO TO
**WEIGHTED BALL
TRAINING**

BEN BREWSTER



TREADATHLETICS
SPORTS PERFORMANCE

A young man with short, light-colored hair is shown from the chest up, wearing a grey t-shirt. He is looking back over his right shoulder towards the camera. The background is a dark, textured wall.

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Published

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“Everything works. Some things work better than others. Nothing works forever.”

Why I Wrote This Guide

When it comes to throwing programs and attempting to gain velocity, I’ve been around the block more than a few times. I’ve tried long tossing on an arc, only long tossing on a line, not long tossing at all, holds, wrist-weights, pulldowns, only throwing from my knees, only throwing from 60 feet, constraint drills, backwards chaining, towel drills, connection balls, velo belts, medicine ball patterning work, and everything in between. Over 15 years (and going from throwing in the low 70s to upper 90’s), I’ve learned a lot about what does and doesn’t work.

What I’ve learned is essentially what is reflected in the quote above: **everything has its place, in the right context and for the right guy.** That’s why most cues or drills exist and get passed on in the first place – they worked for *somebody, at some point in time.*

The problem arises when coaches take it a dangerous step further: because it worked for *one* athlete or scenario, it’s the way every athlete in every scenario should do things.

This is not only a logical fallacy, but also risky territory to wander down by assuming that all athletes should, or even can, throw, train or prepare the same as one another.

Indeed, through data collection and experience, certain trends will emerge as relatively constant principles, but coaches must be just as careful to avoid assuming they have it figured out (especially with athletes who are “stuck”). I know we, at Tread Athletics, are just scratching the surface of putting this puzzle called throwing together.

So why did I write this intro guide?

I wanted to put out a resource that **gives athletes a way to individualize their throwing routines** – on their own, just as we custom-write these routines for our in-person and remote athletes. This isn't a “plug and play” routine where you close your eyes, cross your fingers, pray to the baseball gods and hope velocity gains magically fall from the sky.

This also isn't a sneaky sales funnel where I try to upsell you 20 different products before giving you any real value.

I want you to read. I want you to think. I want you to understand why you're doing what you're doing, and I want you to test within your own mechanics and routines what works best for you.

These drills and recommendations aren't the only way to do things. They have changed over time and will continue to evolve in the future as myself and our team continue learning. And some (or all) of them might not be the best fit for you. But if you're lost and in need of direction, this is an excellent place to begin.

What to expect

This guide will walk you through constructing a 4-week throwing program, start-to-finish; to get you responsibly built up to speed for higher intensity velocity training phases in the months to come.

Ideally, this program should happen at the start of your off-season, although we have included an in-season throwing routine as well.

This **is not a 4-week quick fix or a hyper-aggressive velo program** where you'll be run-and-gunning everything from 2 ounce to 2-pound balls on day 1, although I can point you to a few programs out there if that's your thing. Quick fixes are few and far between, and it generally takes time to find the right blend of drills, arm care, recovery, volume and intensity to optimize what you're doing from a throwing standpoint. It also takes time to condition your arm to high intensity throwing.

This guide is also not meant to be used as a rehab throwing program – which generally require significantly more individualization and oversight depending on the scope of the injury.

With all the housekeeping out of the way, lets dive in.

“There are many paths to the top of the mountain, but the view is always the same.”

The Essentials of An Effective Throwing Program

Like I mentioned, there is no one “right” way to get results with a throwing program – but the effective ones tend to have certain commonalities between them.

These are the principles, or essentials, that we’ve come to rely on in producing results with our athletes.

Can some athletes get results by skipping a warm-up, not doing any drill-work, having no progression and avoiding their arm care? Of course - but that doesn’t mean it’s the best course of action over time or when implemented at scale with dozens (or in Tread’s case: thousands) of players.

That said, here are the essentials, as I see it:

- A warm-up and activation phase
- Preparatory drill-work (generally utilizing backwards chaining)
- Catch play / long toss (with a partner)
- A recovery / arm care routine
- Uses progression, periodization and autoregulation principles

When you understand the principles, you’ll begin to understand why not all of our athletes utilize long toss or weighted balls.

You’ll see why not all of them throw plyos, and understand better why some of them have very minimal post-throwing recovery routines while others have more extensive ones.

You're here for the program, but you're also here to learn. So let's get into the nitty gritty of each of these components, and we'll begin planning out your routine in the following chapter.

Warm-Up and Activation



Most of us are familiar with the importance of some sort of general warm-up phase, but let's take the time to briefly touch on the goals of a proper warm-up, in no particular order:

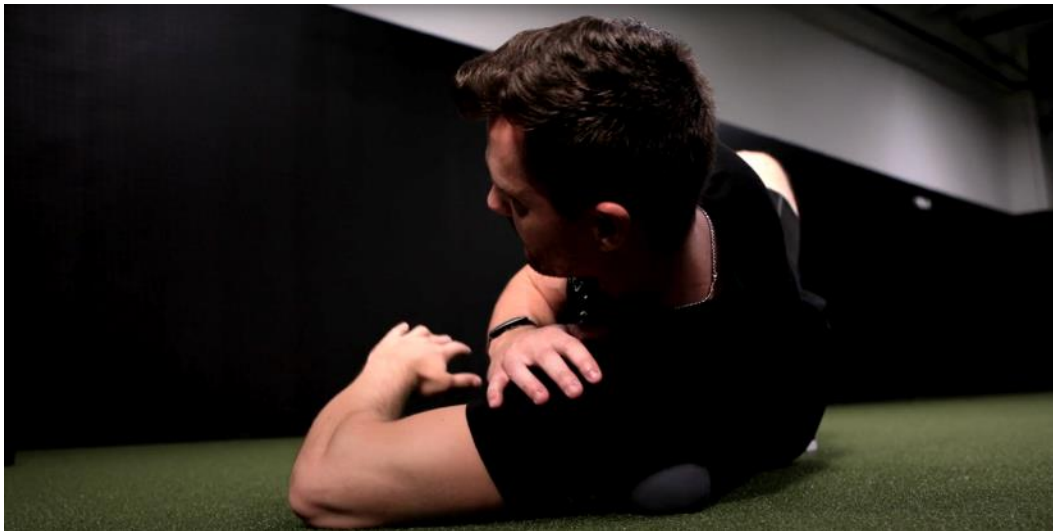
1. Increase core body temperature / blood flow

A good dynamic warm-up, at the *very* least, raises core body temperature and increases blood flow to your working muscles. This happens via a process called the vascular shunt mechanism. As the heart pumps faster and blood vessels dilate, more blood goes to the working muscles to provide oxygen and other nutrients for muscle contraction, and less blood is sent to other body organs.

This blood flow increases muscle temperature, which enhances performance in several ways. First, the hemoglobin in our blood releases oxygen more readily at higher temperatures and a higher temperature also assists with faster muscle contraction and relaxation.

Finally, nerve transmission and muscle metabolism is increased, enhancing muscle efficiency and performance. It doesn't have to be complicated – but getting a light sweat going before throwing (or training in general) is a good bet.

2. Prepare the soft tissues



A good warm-up improves tissue extensibility/pliability – which is essentially how easily your muscles can lengthen.

Soft tissue includes fascia, a continuous, web-like connective tissue that runs throughout the entire body. Of particular interest is that fascia envelopes and connects individual muscles and muscle fibers.

While some fascia is designed to be rigid to transmit force (i.e. tendons), other fascia is designed to be able to slide and stretch (like the superficial fascia under your skin), allowing for coordinated, unrestricted movement.

Densified and dehydrated fascia that has lost its ability to slide (over time, as a result of faulty movement, or from a prior injury) will inhibit free joint

movement and restrict a muscle's ability to lengthen *and* shorten.

Soft tissue modalities aren't about permanently lengthening a shortened muscle but instead are about "un-gluing" areas with dense fascial adhesions, allowing for immediately cleaner and less restricted movement.

Improving fascial quality may or may not lead to a measurable increase in range of motion – but again, that isn't really the point, it's about cleaning up the quality of movement within that range.

Research has demonstrated that myofascial manipulation releases a chemical called hyaluronic acid, which acts as a sort of "lubricant" to soften the fascia and improve its sliding and function – including the ability of the myofascia to not just lengthen but also contract!¹

Ever used a voodoo floss band on your elbow, or rolled out a particularly dense and painful spot on your shoulder and noticed that it seemed to move like butter immediately afterwards? That's the idea behind this principle, but applied with a bit more specificity, intent and purpose.

3. Central nervous system arousal

Your central nervous system (CNS) consists of your brain and spinal cord, and it controls and coordinates activity in every part of your body.

What's interesting is the CNS always exists in a certain state of arousal – on the one extreme is the "rest-and-digest" or parasympathetic state. You'll recognize this as the state you're in after eating a large meal, or just before bed.

During this mode, our bodies release a whole host of hormones to store nutrients, slow the heart rate and increase intestinal activity.

On the other hand, you have the "fight-or-flight" or sympathetic, state, which is our bodies' way of priming for immediate physical activity.

¹ See Luigi Stecco's [Fascial Manipulation](#) for more information

This is characterized by a rush of hormones (like cortisol, epinephrine and norepinephrine) that lead to the release of stored nutrients for energy, an increased heart rate and increased muscle tension.

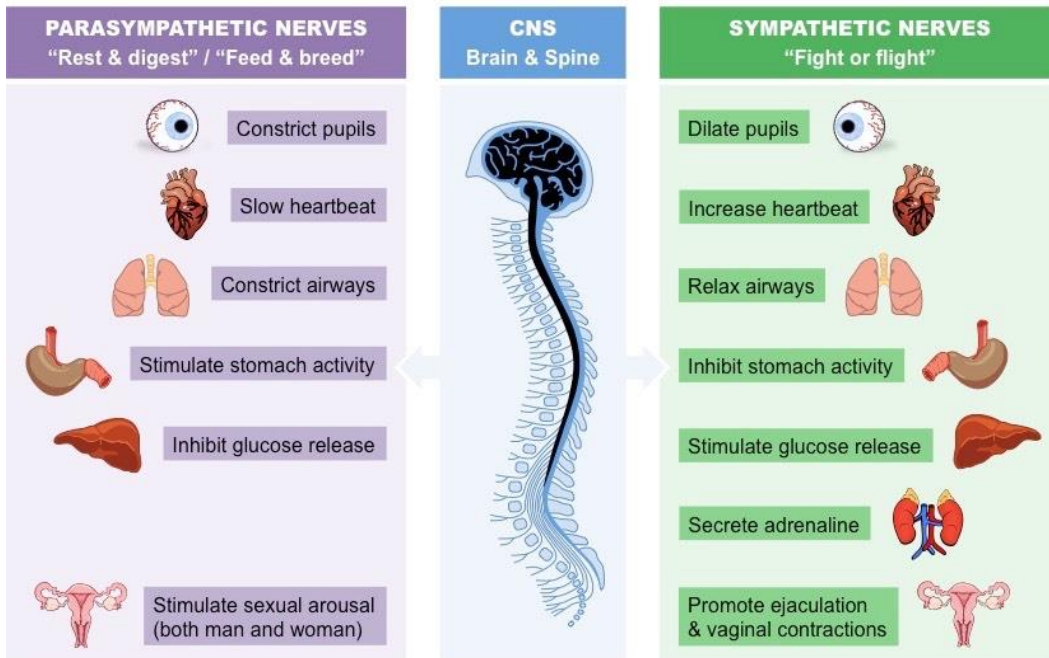


Figure 1: Sympathetic vs. Parasympathetic Nervous System

A good warm-up therefore isn't just about relaxing massage work and a light dynamic warm-up, it should also have a neurological priming component to excite the nervous system – like bounds, sprints, hops, jumps or medicine ball throws.

These plyometric activities require very dense neural charges to be sent through the CNS, and act to excite the nervous system.

Pump up music and caffeine are other common ways athletes will manipulate the CNS to amplify this effect - just be aware that there is such a thing as *too much* arousal for certain skill-based activities (like throwing a baseball) versus other less skill-driven activities (like powerlifting) where max excitation is desirable. In addition, not every day warrants the same level of

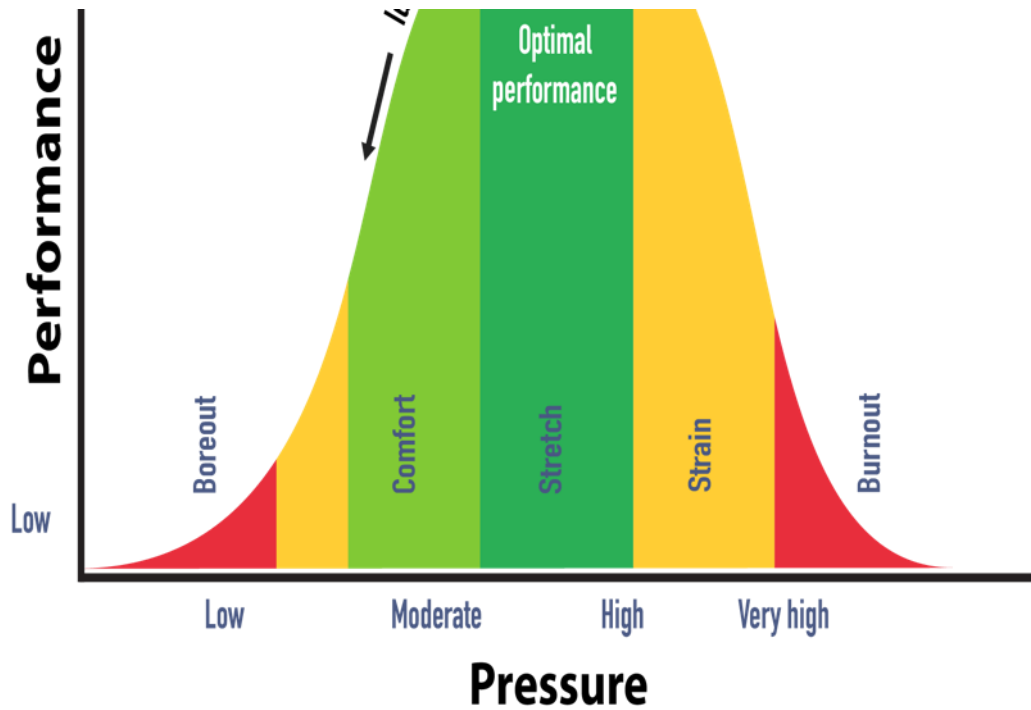


Figure 2: The bell curve of arousal

arousal – a recovery throwing day vs. a game day for instance.

Case in point: you shouldn't be jacked up and shaking for a recovery-throwing day, but you also shouldn't be half asleep either. Got it? Good.

4. Address individual-specific movement restrictions

While this ties in to preparing the soft tissue, it isn't exactly the same thing. At Tread, we believe that an athlete should have an idea of where his movement is lacking, and utilize the warm-up as a time to address these various deficiencies. Maybe he's severely lacking in his ability to retract and posteriorly tilt the scapula during the throw, so this becomes an opportune time to target that restriction.

In this case, improving that position isn't just improving the ability of the muscles that posteriorly tilt the scapula (serratus anterior, low trap) to contract in an end-range shortened position; it's also making sure the antagonists (pec minor, subclavius) are able to sufficiently lengthen to accommodate that position.

In this example, you therefore might do "lengthening" or "stretching" drills



Figure 3: The pec minor – and one of several techniques to improve its function.

for the front side, and "shortening" or "strengthening" drills for the backside.

As part of the warm-up, the goal isn't to fatigue yourself, so think of it more as "activation" of those fibers in a deficient joint position.

There's a lot that goes into this, and you will need a thorough assessment to get the most out of this piece, but here's an example routine for an athlete who can't get into a scap loaded position during the throw:



An example of the scap load position – by a guy who threw 102 in high school. ([Source](#))

Problem:

Scap can't fully retract/posteriorly tilt, humerus can't fully horizontally abduct):

Solution:

- Soft tissue release for the pec major / pec minor
- Active stretching of the pec major / pec minor (isometric holds in both directions at end range)
- End range scap holds – 'Y's, 'T's and 'L's
- Shoulder Controlled Articular Rotations (CARs)

With dozens of potential movement restrictions, this is really going to be specific to your body and what was uncovered during your movement screen.

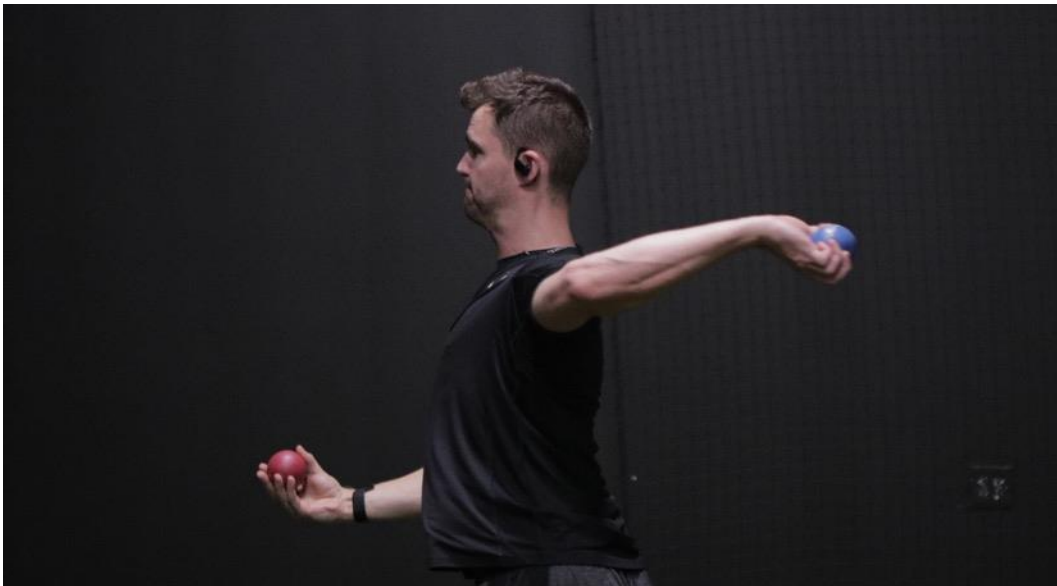
It's also arguably one of the most important parts of any program, because **your body isn't going to move how you're asking it to on the mound if you're fundamentally lacking in that joint's range of motion and function.**

There are entire books written on corrective exercise, so just realize this: it

matters.

And the more years of throwing and training that you've accumulated on your body, the more it matters to know what you're up against and [have a plan of action](#).

Backwards chaining



This section could very easily be called “drill-work” or “mechanical patterning,” but I decided to be as specific as possible in describing this approach to improving mechanics using drill work.

Backwards chaining is a motor learning technique, popularized in the baseball world (as far as I can tell) by Paul Nyman in the late 90's / early 2000's.

The technique essentially acknowledges that changing complex motor patterns (like throwing a baseball) is difficult, but can be changed over time by deconstructing the movement into chunks (drills), and by working on those chunks from back to front, rather than front to back.

In other words, backwards-chaining addresses the end of the throw first (i.e. torso rotation, ball release, follow through), and then adds in each preceding

chunk or drill from there (leg lift, hand break, etc.).

Now, there are arguments for forwards chaining as well – and I’ll admit that a flawed first half of the throw can make it extremely difficult to finish properly, no matter how good you become at arm action drills.

Nonetheless, I have found that, in general, backwards chaining is an effective concept.

I’ll go through exactly what these chunks are, how we break them down, and how to determine which drills to use in the backwards-chaining chapter.

Catch play / long toss (to a partner)



Throwing programs that solely focus on throwing into a wall or net for extended periods of time at best tend to create a longer game-transfer period down the road, and at worst can lead to unintended bad mechanical habits forming.

Never throwing to a partner, with a baseball, gets athletes very far removed from what we’re actually trying to improve – the skill of pitching.

For example, long toss into a net is [not at all the same thing](#) as long tossing outside to a partner – I’m not just talking about the immediate velocity and

spin feedback of seeing how far the ball traveled and whether it cut or ran, but the specificity of having an actual target, which requires your body to organize itself differently to accomplish the task.

That being said, everybody does not have to long toss max distance on an arc – and neither does every pitcher need to only throw from 60 feet, 6 inches. Both approaches, as well as the many options in between, can be beneficial.

We'll get into determining what option is best for you later on.

Recovery / arm care routine



I've never been a huge believer in needing to throw a ton of volume at the elbow and shoulder immediately after it just sustained a big workload in a game or intense throwing session.

But is there ever a great time to train the smaller stabilizer muscles of the shoulder girdle? We certainly don't want to induce excess fatigue *pre throwing*, before we ask those muscles to be able to function optimally.

Furthermore, there's a fine line between training and recovery work.

A gentle bike ride may qualify as recovery work for sore legs, but 30 intense minutes of cycling on the stationary bike may only make the problem worse, improving blood flow but also creating further muscle damage and fatigue.

This is why I don't particularly see the point in performing 3 sets of 10 reps, across 10 different exercises *pre and post* throwing. It's way too much volume, and just calling it "recovery" doesn't mean that it is.

Arm care exercises are necessary, but if we're limited to lighter "activation" and "stimulation" exercises pre-throwing, when do we do the real strengthening work?

The way I see it, you've got two options:

1. Do 100% of your arm care work post throwing.

This can work if you keep the volume down, but I don't like overly zealous post-throwing routines for the reasons above. Still, many athletes would rather knock it out while they're already warmed up and in throwing mode, so this makes it an appealing option.

2. Sprinkle your arm care work in during training sessions.

Personally, this is what I do. Resting in between sets of squats? Alternate sets



Arm care doesn't have to fall in the post-throwing window

with posterior cuff work. Nothing to do after sets of rows? Go hit some serratus anterior work.

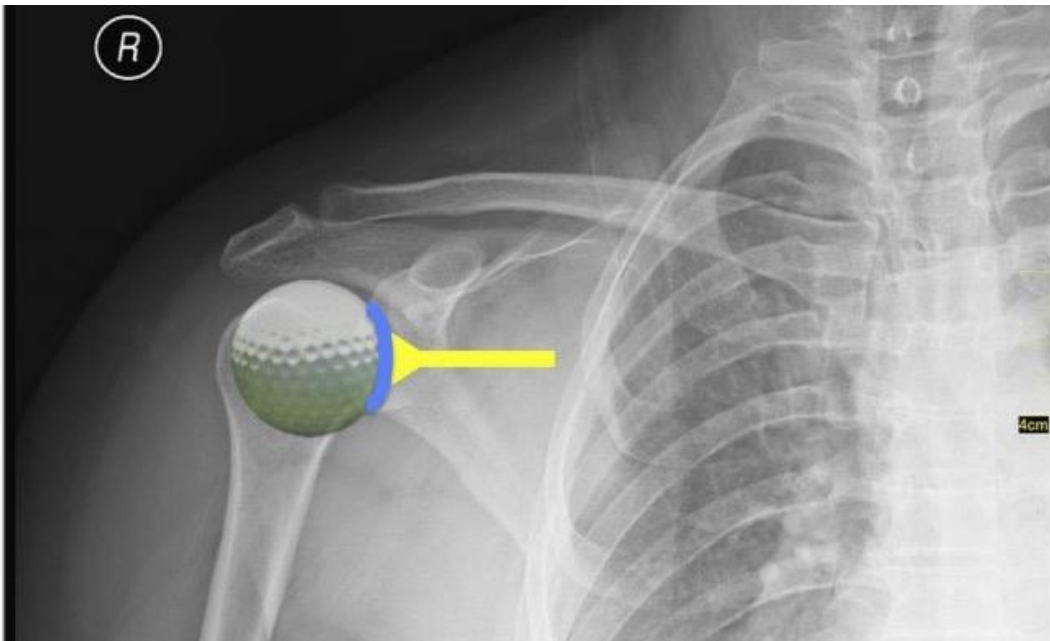
I don't see any downside to this approach either, because you're still strengthening and improving these muscles and patterns over time. To me, it largely comes down to preference.

So what are the major components of a good arm care program? Here's what just about every pitcher could use more of:

1. Posterior cuff strength

The teres minor, supraspinatus and infraspinatus all play a role in dynamic stability of the shoulder during overhead actions, and this is particularly important the harder you throw and stronger your accelerators get, as studies have shown that the *ratio* between isometric strength of the external rotators in relation to the internal rotators of the shoulder is a key [predictor of injury](#). So strengthen that rotator cuff!

Note: form is extremely important on any cuff drills – the point isn't to lift more weight per se, it's to keep the humeral head (golf ball) in the socket



(tee) and load *that* movement through a full range of motion. Training the

Think of the head of the humerus as a golf ball that must stay on the tee during throwing, lifting and arm care exercises. ([Source](#))

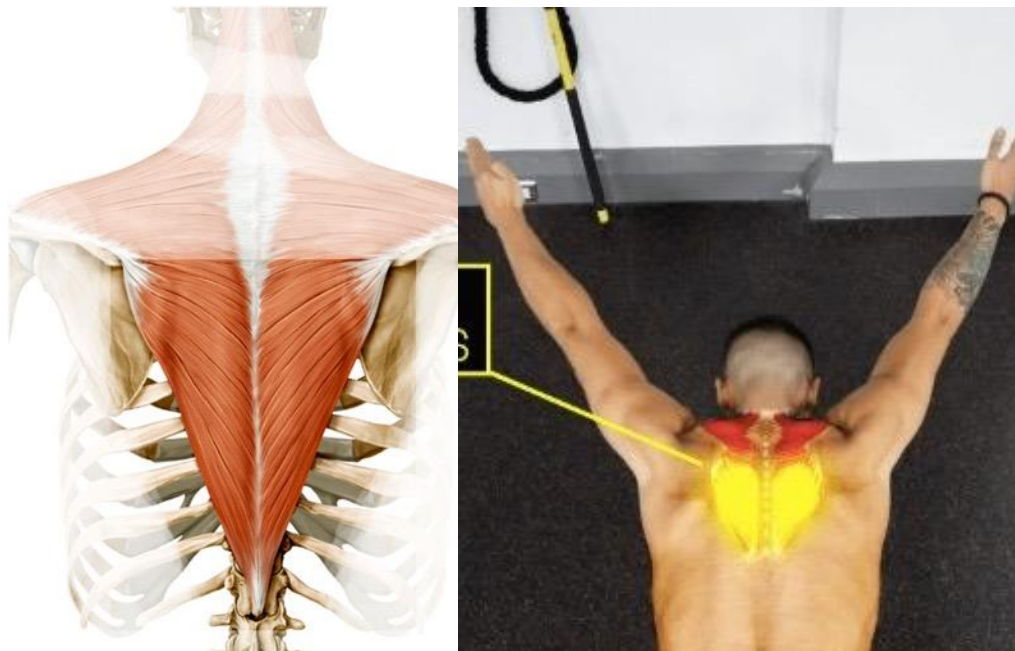
cuff is equally as much about training control of the shoulder in the socket as it is about increasing strength of these muscles.

Think about the ball rotating in the socket when doing these drills – jerking, hiking the shoulder or other compensations completely defeat the purpose of what you’re trying to achieve with these drills and may actually predispose you to injury by grooving faulty patterns.

2. Lower trapezius recruitment / scapular posterior tilt

The lower trap works in concert with the serratus anterior to help the scap tilt backwards and upwardly rotate. Though it is still part of the trapezius muscle, its action is quite different from the middle and upper traps. It doesn’t get a lot of love by many coaches, but it plays a very important role for scapular stability and allowing clean layback to occur.

When I say clean layback, I’m referring to this posterior tilt reducing or preventing shoulder impingement by clearing room for the humerus to externally rotate within the joint.



A look at the orientation of the lower trap muscle fibers. ([source](#))

When the scap doesn’t tilt properly, that layback happens within a more

closed-off space. Because this space, called the subacromial space, is already a very claustrophobic area with lots of tendons and nerves running through it, we want to keep as much room here as possible during the throw.

Prone Y raises, face pulls and TRX Y raises are good examples of lower trap exercises. You'll notice they all take place at or above 90 degrees of shoulder abduction, in order to load the line of the lower trap fibers most effectively.

3. Scapular / cuff co-contraction and timing



Can you coordinate and fire all of these muscles together and with proper timing as opposed to just isolating them in simple exercises?

The job of these muscles is to stabilize the scapula against the ribcage and maintain centration of the shoulder in the socket during dynamic overhead movement.

The timing and coordination of these muscles matter – so most pitchers would do well to add in a general stabilization exercises like the shoulder tube, bodyblade, or partner [rhythmic stabilizations](#).

The latter is my favorite option, because it forces the cuff and scapular muscles to respond to an unpredictable external force. Plus, it's far less fatiguing than the first two options because it's more of a motor control exercise than a strength/endurance one.

4. Middle trapezius recruitment / scapular retraction



Reverse flies target the middle trapezius and rear delts. ([Source](#))

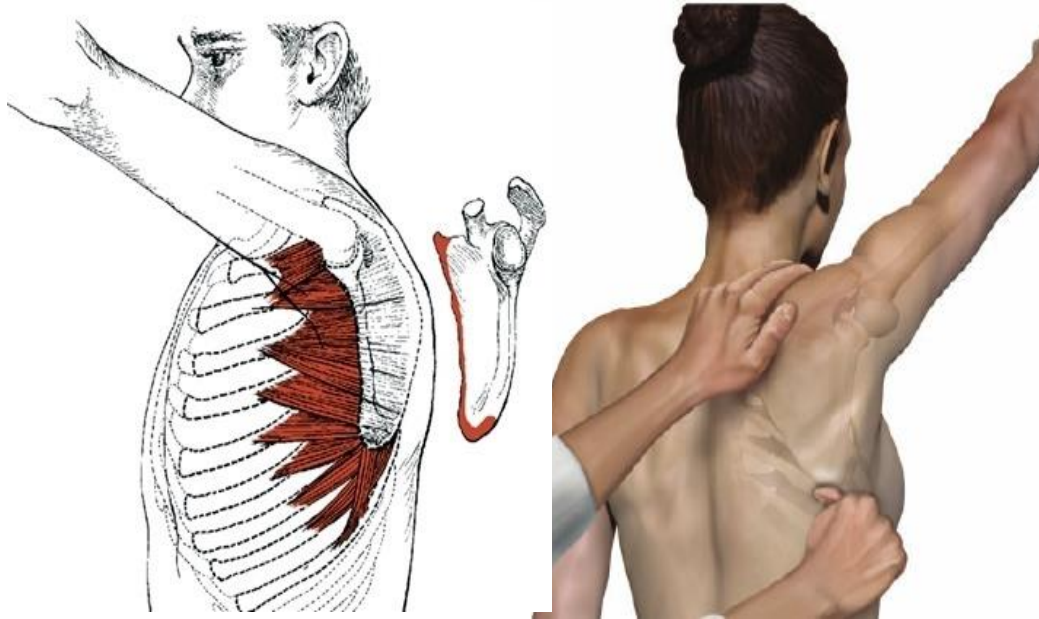
As the arm flips up at landing behind the torso (a position originally coined “scap loading” by Paul Nyman), the throwing scap is fully retracted with the thoracic spine extending as well to create a stretch through the chest and abdominals.

This position occurs just prior to torso rotation, where the arm will be driven into violent layback – so the ability of the middle trap to help control the scapula in this shortened and retracted position is important.

T raises, band pull-aparts and reverse flies all target the middle trap.

5. Serratus anterior recruitment / scapular upward rotation

The serratus anterior stabilizes the scapula flush against the rib cage during



A look at the anatomy and function of the serratus anterior muscle. ([Source](#))

overhead movement, which is important for providing a stable base for the throw to occur (a pitcher's shoulder internally rotates at 7000-9000 degrees per second, making it the fastest movement in all of sports).

Furthermore, the serratus anterior is involved in upwardly rotating, posteriorly tilting and protracting the scapula during the throw – all necessary actions for the scapula to be able to do in order for the shoulder to stay centered in the socket during the throw.

Wall slides, scap push-ups, yoga push-ups and bear crawls all target this muscle effectively, among many others.

Progression / periodization / autoregulation

This isn't the final step in your throwing program per se, but it's an overarching theme that every athlete should understand when it comes to effective throwing programs.

Progression

Unlike lifting, your throwing workload won't necessarily continue getting more *difficult* over time past a certain point. Otherwise, you'd eventually be throwing 150 or 200 pitches per start, or 50 to 100 throws in a velocity training session – that's not the type of progression I'm talking about.

Instead, I'm talking about the progression into high intensity throwing in the first place.

Weighted balls, long toss and velocity training in general has with it an inherent risk over lower effort, lower intensity throwing programs. The point is that **even responsible velocity training is still a major stressor on the body** – so let's not increase the risk any more than it already is.

For a healthy pitcher who did not end the previous season with any nagging injuries, dead arm or other concerns, I've found that a 4 week on-ramp is plenty of time to ease into throwing, ending the month fully prepared to throw hard. The following month will then function to build up a pitcher's workloads at full intensity.

Periodization

Periodization is just a big word that means your training, (or throwing in this case) should be planned out, having higher intensity days, moderate intensity days and lower intensity days laid out in a logical way to maximize your ability to recover.

It also means that things are planned out over time, for instance planned deloads from throwing after high volume periods, or planned peaking periods aimed to prepare you for an important event, like a showcase or tryout.

This of course means that your throwing should evolve and adjust over the course of the early off-season, off-season, pre-season and obviously in-season, as the goals of each phase are different.

Autoregulation

Sometimes, things don't go as planned.

Your arm is still hanging after a start when it's time for your mid-week bullpen.

You're excessively fatigued from staying up all night to study for a final, or your arm has a weird ache in it after pushing a little too hard on your lift the day before.

What do you do? Do you power through the fatigue, aches or pains? Or do you push that bullpen back until Thursday and live to see another day?

Autoregulation essentially means to *listen to your arm*. But it can be more broadly applied to training as well to say: *listen to your body*.

There are entire training systems built around this concept – how to match the workload to the recovery state of the athlete, but in my opinion this doesn't need to be made any more complex than listening to your arm.

Don't be afraid to communicate to a coach that you're sore, drop a high intensity day to a recovery day, or push a velo session back a week.

Even the best throwing program is just an educated guess aimed at matching the workload to what your arm and body will likely have to give – but it isn't and can't ever be perfect.

Learning when to push and when to back off is the essence of autoregulation, and an overarching theme to any successful throwing program.

“Adapt what is useful, reject what is useless, and add what is specifically your own.”

Customizing Your Drill Work With Backwards Chaining

You’ll do your drill-work after your warm-up routine and before your catch play / long toss routine.

This is meant as a place to focus on your mechanics, *not* a time to add in a crazy amount of high intensity throwing/volume.

For a sample drill-work routine, see the attached spreadsheet that came with this guide. Note: the following are not the only drills that can be effective - just a sampling of some of my favorites up to this point.

As far as how to do the following drills, you can either a) do them with soft weighted balls thrown into a wall/net ([Plyocare](#) / TAP balls both work), b) hard weighted baseballs thrown into a net, or c) hard weighted balls thrown to a partner in catch play.

Whatever version of drill work you choose to do, the focus should be on patterning more efficient movement, not necessarily on blowing it out.

Specific ball weight recommendations are outlined in the spreadsheet.

Why use weighted balls / plyos for drill work?

As far as why weighted balls are beneficial for this drillwork, the short answer is that slightly heavier balls provide very loud and substantial “proprioceptive” feedback to your arm about where it is in space, and helps smooth over inefficiencies in the patterns by increasing your awareness of any lags, pauses or inefficiencies. You’ll be using slightly heavier balls than a baseball for most of this lower intensity drill-work.

While heavier balls work well for improving the arm path at lower intensities, lighter balls work well for addressing raw arm speed and “whip” at higher intensities, once your arm path has improved.

Stronger, slower twitch athletes often need to learn to relax and avoid muscling their arm into release, which is where underweight balls shine.

You don’t want to go *so heavy* that you can’t flow and relax into the throw (we only use balls heavier than 1lb in very specific scenarios), and you don’t want to go so light that you lose any carryover to throwing a 5 oz. baseball (we don’t use anything under a 3 oz. ball either).



When the ball gets too heavy (1kg shown here), many athletes lose the ability to relax, instead pushing into release. Learn more [here](#).

How do you apply backwards chaining to this drill work?

So now that we know backwards chaining involves breaking the delivery down into chunks and (generally) practicing these chunks in a back to front order, what are these chunks? And more specifically, how do you customize them to fit your delivery and maximally transfer to your patterns?

That's the point of this chapter, to explain each chunk, supply one or more drills for each, and equip you with some general guidelines for choosing which drill or variation is most likely to fit your scenario.

Level 1: Relax and pull into release while rotating around the spine

This first piece may be the most important part of the throw to master. Although these are really three chunks in one, I don't believe you can divorce them from each other in the throw. Let's break them down.

Relax

"Relax" means to relax into layback of the shoulder during torso rotation.

Relaxing into layback allows the scapula to trace a full range of motion up the spine and allows the arm to stay in the plane of the shoulders during torso rotation versus creeping forward and "pushing" into ball release.

Layback doesn't just happen at the shoulder (glenohumeral joint), counter to what most people assume. A significant portion of layback comes from the scapula being able to posteriorly tilt (in Javelin this is called the scapular "dig") to accommodate true ball in socket rotation without impingement occurring.



The scapula tilts backwards during torso rotation to contribute to clean shoulder layback. This is called scapular "dig" in Javelin. ([Source](#))

Excess tension into layback, especially in the muscles that oppose posterior tilt (subclavius, pec minor/major) may lead to or exacerbate impingement symptoms, or lead to a pushing action into release.

Pull into release

Elite throwers don't push into ball release; they "pull," utilizing the large and powerful pecs and the lats to fire the arm from behind the torso into horizontal adduction and internal rotation.

One of the successful cues we've used with our throwers is to *feel the pec stretch*, and *pull* from there. This stacks well with the relax cue and helps keep the elbow from creeping too far forward during torso rotation while making sure to cue acceleration from the most powerful accelerators in the upper body. Learn more [here](#).

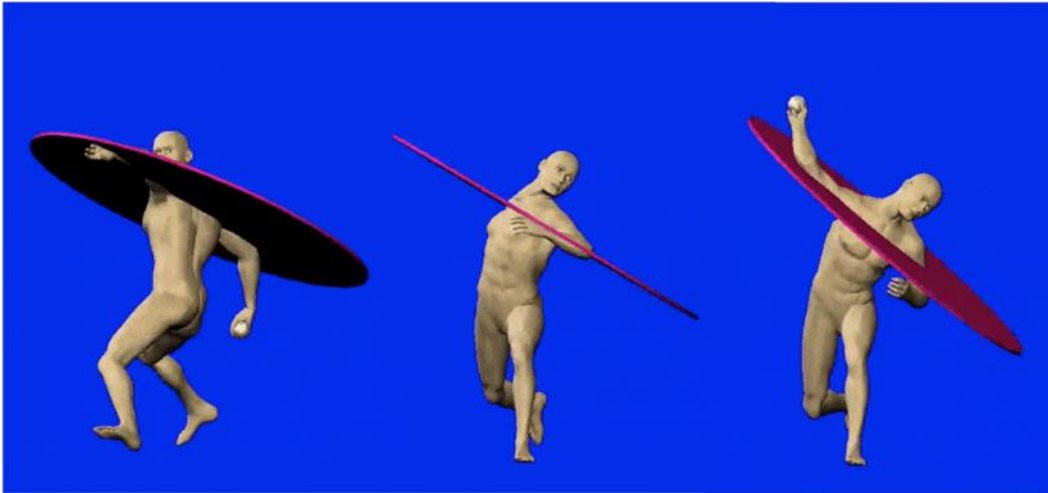


Pulling into release keeps the elbow from shooting in front of the line of the shoulders during torso rotation. ([Source](#))

Rotate around the spine

One thing that Paul Nyman, the grandfather of modern pitching velocity development, noticed over 20 years ago in his studies of elite throwers was that they made very efficient use of rotation.

This rotation happened in a very specific way: *perpendicular to the spinal angle*. We intuitively know this: 3 o'clock sidearm throwers tend to have a straight vertical spinal angle: their rotation is therefore happening perpendicular to the spinal angle. $\frac{3}{4}$ throwers likewise maintain a similar relationship between the angle of the spine and their arm slot.



Torso rotation happens perpendicular to the spinal angle. “Match the rotation to the arm slot”
(Source: SETPRO)

Most relevant, perhaps, is understanding the common compensation that happens when pitchers fail to rotate around the spine: they get linear and forward flex into ball release.

Poorly designed cues like “pull the lamp shade” or drills like the classic Towel Drill that encourage a linear follow through can exacerbate this issue.

Also worth noting, is that the arm must stay in this plane during torso rotation, which is just another way of saying, “match the arm slot with the shoulder angle.”

Can you imagine Pedro Martinez rotating violently east-west but trying to keep a high arm slot? Or Andy Pettite with his north-south rotation trying to dip his arm to a sidearm slot?

These are extreme examples, but the reality is that many athletes do struggle to keep the arm in plane. Learn more [here](#).

Now that we understand the first chunk: what drills should you do to fix it?

Drill choice #1: [Lasso Drill](#)



The first option to groove this pattern is called a “lasso” drill², where you isolate the throwing pattern starting from your approximate landing position.

In it’s most simple form, the lasso drill puts you in an efficient landing position and lets you isolate the end of the throw – relax the arm, rotate the torso, and pull into release.

How to Perform:

Start in your landing position, with the front foot cheating open towards the target, the throwing arm up and in line with the shoulders and the front shoulder closed to the target. Rotate and throw through the target.

This drill is one of our most commonly prescribed drills, and is particularly useful for athletes who have some sort of breakdown that occurs at or just prior to landing. Such flaws include, but are not limited to:

- The arm being late at landing (insufficient ER at landing)
- The torso being open at landing
- The stride direction being off at landing
- The front foot being angled too far open/closed at landing
- The throwing elbow pushing forward or hiking during torso rotation

² The ‘Lasso’ Drill seems to have originated from Baseball Development Group in Toronto, although there are some differences in how we coach/implement the movement.

- The torso forward flexing into release vs. rotating around the spine
- The lead leg not stabilizing and extending as the torso rotates

As you can see, the Lasso drill works on cleaning up *a lot* of things at once, and, even better, it does so with such a simple movement that it's fairly hard to screw up.

In most cases, the problem isn't performing the lasso drill wrong (if it is, it can be easily coached because of the static nature of the drill), it's figuring out how to pattern this into the rest of your drill work. More on that to come.

Important cues:

- Close off the front shoulder, keeping the arm up.
- As torso rotation begins, allow the scap to lag slightly behind. Another way to think about this is to get a big chest as you rotate.
- Rotate through your arm slot – you can also think about “replacing your front shoulder with your throwing shoulder.”
- Throw through the target, roughly head-high. Don't yank or spike it.
- Because the arm has been left behind and is in plane, you may feel like you're “pulling” into ball release if you're normally a “pusher.” Heavier weight balls will accentuate this feeling.

Learn more about the Lasso Drill [here](#).

Drill choice #2: Ten Toes (abbreviated arm action)

The second option to groove this pattern is called a “ten toes” drill, which is geared towards isolating the arm action and upper half rotation.

How to Perform:

Take a wide stance facing your target (all ten toes pointing towards the target). This version is abbreviated, meaning that rather than starting with your hands together and going through the entire arm path, you'll start with your arm up and just isolate the *relax*, *pull* and *rotation* around the spine aspects when you throw.

When throwers struggle with pushing the ball, muscling up or getting linear with their torso rotation, starting here helps isolate the problem, and once

we can get them doing it properly in this scenario we can begin adding in more moving parts.

Important cues:

- Close off the front shoulder, keeping the arm up.
- As torso rotation begins, allow the scap to lag slightly behind.
- Rotate through your arm slot – you can also think about “replacing your front shoulder with your throwing shoulder.”
- Throw through the target, roughly head-high. Don’t yank or spike it.

Check out our instructional video [here](#).

Drill choice #3: [Pivot Pickoffs \(abbreviated arm action\)](#)

The third option was originally called a Marshall after Dr. Mike Marshall, and was later rebranded as a “Pivot Pickoff.”

Whatever you call it, it’s still an upper half isolation drill that can be used to address phase 1 of the backwards chaining progression.

How to Perform:

Start sideways to your target with your throwing arm closest to the target, and begin with the throwing arm at 90 degrees of elbow flexion and up in a vertical position.

Turn towards the target, fully close off the front shoulder, and complete the throw. The same cues apply from here as with the ten-toes drill.

Important cues:

- Close off the front shoulder, keeping the arm up.
- If you can’t close off the front shoulder due to mobility limitations, cheat the starting stance 45 degrees open.
- As torso rotation begins, allow the scap to lag slightly behind.
- Rotate through your arm slot, pulling down late with the arm to finish the throw.
- Throw through the target, roughly head-high. Don’t spike it.

Check out our instructional video [here](#).

Which option is right for me?

While you can experiment with all three drills to see which feels most comfortable, here are my thoughts.

- The ten-toes drill works well for overly linear, pushy throwers. Because of the starting stance, the brace leg is out to the side. This encourages more of a side-to-side rotational release.

By contrast, the pivot pickoff has the brace leg out in front of the throw, which creates more north-south rotation in the throw and may be more appropriate for throwers who fly open early with the front side and get too rotational side-to-side.

- The pivot pickoff requires pretty excellent thoracic and hip mobility to get into position and close off the upper half. Athletes who are still working on improving their mobility should likely stick to the ten-toes drill or modify their stance on pivot picks to get into proper positions prior to torso rotation.
- You can't really go wrong with the lasso drill – it's a favorite for teaching guys how to relax and rotate on time, with the added benefit of being an excellent lead leg blocking drill as well!

Because of the simplicity of the drill, if an athlete is struggling with the position, it can generally be easily tweaked by the coach otherwise this gives us a strong signal that there is a mobility limitation involved.

Level 2: Full hand break and counter rotation

Some athletes can ignore level #1 and jump right to this step, but I've found that starting with a full hand break just adds another layer of complexity at the beginning of the learning process for many throwers.

To avoid rehashing the first section, understand that the premise from landing on is the same (relax, rotate in plane and pull into release).

With level 2 **we're backtracking one additional step** into the throw by adding in the hand break, making sure the arm gets up and back at landing, and ensuring that the front shoulder gets closed off prior to initiating torso rotation.

From there, all the same cues apply.

Drill choice #1: [Ten-toes \(full arm action\)](#)

How to Perform:

This version of the ten-toes drill has the same setup as the abbreviated version, with the important distinction that you will now begin with the hands starting together at the spot that is most comfortable for you (keep it constant with where you come "set" from your delivery).

The rest of the drill stays the same: break the hands, close off the front shoulder, rotate and throw without the feet moving.

As you learn this drill, the most important piece of advice I can give is to start with "slow-mo" throws.

Because this is a sequencing drill, we really want to make sure the relationship between the arm action and the torso rotation is crisp, so when first learning this drill I recommend to go through the arm path at about 20% speed.

Athletes who struggle with this can even do it in front of a mirror at first without a ball. The point is to trace your arm path and make sure the arm is

up and back *before* you fire the shoulders – especially important for athletes who struggle with a late arm at landing or [early torso rotation](#).

Once this is comfortable (usually after 10 or 20 “slow-mo” throws), resume your drill-work at regular speed.

Check out our instructional video [here](#).

Important cues:

- Close off the front shoulder and allow the arm to spiral up before firing the torso
- Work through your starting throws at slow speed, then build tempo/intensity

Drill choice #2: [Pivot Pickoffs / Marshalls \(full arm action\)](#)



How to Perform:

This drill variation is identical to the abbreviated Pivot Pickoffs / Marshalls with the exception that you will start with the hands together and go through a full hand break as you close off the torso.

This is, in my opinion, a drill that can do more harm than good if it is cued or coached improperly. As you’ll see in our instructional video, we don’t cue over supination, massive swimming of the glove arm, etc. because in our mind, the goal is to take this pattern and *transfer it* to other drills and ultimately to your pitching delivery.

I'm *not* a fan of utilizing cues or patterns on this drill that have absolutely zero resemblance to what *your* arm action or glove side looks like in games.

Use some common sense and ask yourself: *is this a pattern that I'm able to replicate or feel in my other drills, or am I just doing this because I saw somebody online do it this way?*

If you're going to do any arm action drill, you should be replicating an arm path and an arm action that feels natural for *you*, transfers to other drills, and exists somewhere in the history of elite MLB throwers.

Don't get caught up in doing a drill *exactly* as someone else does a drill – you'll need to figure out how to customize each drill to your own movement and mechanics to really optimize the transferability.

Important cues:

- Close off the front shoulder and allow the arm to spiral up before firing the torso
- Work through your starting throws at slow speed, then build tempo/intensity
- Don't overthink the drill. Avoid over cueing supination, swinging open the glove arm, etc.
- Maintain a smooth and fluid arm action that resembles the goal arm action for your full delivery.

Check out our instructional video [here](#) for more information.

Which option is right for me?

The same rules apply – if you chose ten-toes for step 1, stick with them for step 2 and vice versa. Once you've mastered the abbreviated versions of either drill, you can decide to skip that version and jump right into the full arm action version. The abbreviated versions are just here because they make excellent teaching tools for initially learning these drills and movements, but they aren't necessary for everyone.

Level 3: Pelvic rotation and front leg bracing

The first two levels effectively isolate the entire upper half from the waist up. What's the next logical, manageable chunk that we can add in from here?

In my opinion, it's just adjusting one variable: changing the foot position to a pseudo-throwing stance without adding in additional variables like back leg drive, momentum or any other moving parts that can be screwed up.

Adding in hip rotation (pelvic loading/unloading) is actually quite a large jump, because it requires coordination and timing between the upper and lower halves, requires an understanding of how to rotate vs. lunge off the back leg, and requires the front leg to brace and extend in response to the required rotation.

That's a lot of things to potentially screw up (without even adding in a leg lift, linear move or momentum yet), so let's go through exactly what this chunk is working on (and why) one at a time:

Rotate the back hip/knee down into landing

Pitching is, fundamentally, a rotational movement.

Yes, there is a linear component during the linear (drive) phase of the throwing delivery, but pitching largely comes down to being able to transfer and sequence *rotational* energy from the ground, through the lower half and into the trunk, arm, wrist, fingers and ball.

How does that energy work its way from the ground reaction forces on the back leg into the upper half among the most efficient throwers?

Is it a "car crash" where the back leg violently extends followed by a violent front leg block that catapults the upper half forwards?

A careful analysis of the hardest throwers reveals that this linear view of the lower half simply fails to hold up to scrutiny.

The car crash analogy is incomplete – as it implies a *linear* lateral jump/push off the back leg, followed by a *linear* slamming into the front leg, followed by a *linear* catapulting of the torso and arm into release.

In contrast, high velocity throwers are able to convert the linear energy of their forward move into a ***rotational uncoiling*** down into the ground – creating a *tornado of energy* (originating from the center of the body) that unwinds through the pelvis, torso, shoulder, elbow, wrist, fingers and ball.

This is why hard throwers appear to be landing so gently and transfer energy so effortlessly.

This is why the vast majority of the very hardest throwers *don't* violently push/triple extend into landing, but instead corkscrew their pelvis (and along with it, the rear knee) down into the ground.

But how does this corkscrew happen? Is it forced?

As someone who isn't a physical freak (but has still thrown upper 90's sidearm), I can say with some degree of certainty that forcing hip rotation is *not* the best way to transfer that energy from the ground into the fingertips.

Sitting into the back hip/glute/heel as the pitcher moves down the mound builds linear momentum and preserves a strong, stable posture from which to unload out of. When the back hip runs out of room in this loaded hinge (although it can be earlier) there is a *release* of stored energy that allows the pelvis to rotate ahead of the torso and upper body. This rotation of the pelvis brings with it the back hip and knee.³

This has the effect of the back knee appearing to “drive down” into the ground, even though it is the pelvis (NOT the knee or hip) that drives this motion.

³ This is based on our current best understanding of the kinetic chain. We will update this explanation/hypothesis if further information comes to light regarding the primary/secondary drivers of the pelvic unload.

Coordinate and time hip rotation with upper half

This rear hip rotation must not only happen, but happen with proper timing relative to the upper half. This means the ability to hold the thoracic spine and front shoulder closed as long as possible until hips have fully rotated in order to create a stretch through the trunk and be able to rotate and apply force to the ball over a larger range of motion.

While hip/shoulder separation isn't the *only* thing that matters, this sequencing is extremely important to be able to segment the body and create the whip-like effect.

Block/brace with the front leg

The ability to block with the front leg gives the rest of the body something to throw against.

The front leg should be pulled into extension as the hips clear, rather than trying to push the front leg into extension via the quadriceps. In my experience, the front leg can be improved indirectly by addressing the first two components of this chunk.

Poor timing and coordination of the back hip relative to the upper half makes it nearly impossible to display good front leg blocking.

If all of that was a bit complicated, don't worry.

I simplify this all down in the drill explanation videos so that you can understand what the goal of each movement is.

In short, this chunk is all about helping you learn to use your hips to rotate, and getting that energy to spiral its way into the arm.

Drill Choice #1: [The "Rhythm" Rocker Drill](#)

This drill is not about throwing max effort, and doesn't need to be done at high intensity to gain benefit.

It's a smoothness and sequencing drill. Although I've broken the pattern down into steps to explain the goals, it should be one seamlessly connected [flow of energy](#) from start to finish.

How to Perform:

The rhythm rocker starts the athlete in a split stance, with the front foot facing the target and the rear foot either facing towards the target or even with the rubber. Turn the pelvis to load over the back leg to create a rotational tension, then allow the pelvis to relax and pop open while keeping the shoulders closed.

At landing, the shoulders should be level with the ground and the throwing forearm should be vertical. From here, the cues are the same as in the ten-toes and pivot pickoff drills – relax and pull into release while rotating around the spine.

Capture the pattern and feel how the back hip connects to the upper half – you'll add intensity and a back leg drive in the next drill progression.

Important cues:

- Initiate with a slight rock back onto the back leg, but avoid getting overly wide with your starting stance.
- Close off the front shoulder.
- Coordinate the back hip rotation with the upper half – holding the upper half closed as the pelvis turns and the back knee “drives” down to the ground.
- Keep the shoulders level to get downhill.
- As torso rotation begins, allow the scap to lag slightly behind.
- Rotate through your arm slot, pulling down late with the arm to finish the throw.
- Throw through the target, roughly head-high. Don't spike it.

Check out our instructional video [here](#) for more information.

Drill Choice #2: [Ten Toes Drill \(Full Hip Turn\)](#)

This drill is very similar to the rhythm rocker in that we're just looking to add



in one key variable: pelvic loading/unloading (without worrying about the linear move yet).

How to Perform:

The setup is the same as the earlier Ten-toes variation, but the goal is now to allow the hips and feet to free up, driving the throw from the lower half, rather than from the torso.

Try to feel that tornado of energy work its way up from the ground into the arm.

Our instructional video can be found [here](#).

Which option is right for me?

There is no right answer here – play with both and see which drill helps you feel the pelvic load and helps you get as much of that rotational power into the arm as possible.

You won't necessarily throw super hard out of either drill because of the lack of a linear component (which is the point), but they will still feel highly efficient when you nail the sequencing of the drills – like your arm is being pulled into release by the positions created from the hips and torso.

Level 4: Introducing the linear move

We discussed above how the throwing motion is primarily rotational, but there is still a necessary linear component. Let's add this in now, in a controlled way that helps the athlete understand how this linear momentum / move from the back side flows into the rotational action they just patterned.

Drill Selection: [The Step-Back Slide Step](#)

At Tread, we spent a good bit of time trying to figure out how to bridge these stationary rotational drills into the linear move by adding as few variables at a time as possible.

We finally settled on the step-back slide-step as a way to encourage this linear move which takes away the need to sync and coordinate a leg lift into the throw at this point.

It's helpful when addressing movement to have a number of tools in your toolbox because athletes don't always pick up the movement as readily as you would like.

Being able to break down the chunks even further can therefore help isolate the piece that you're working on.

I'm a big fan of the step-back (in general) because it helps you feel the lateral engagement of the back leg due to the nature of the backwards step which loads up the lateral ankle, knee and hip.

With the initial step back, it's much easier to then understand what muscles to utilize in the concentric when you've already pre-loaded them in the initial eccentric (step back).

With the slide-step, we've taken away the leg lift to keep things simple. Some don't need this regression and can move right on to level 5 drills.

How to Perform:

Initiate the drill with a moderate sized backwards step, and execute a throw towards the target. Don't overcomplicate the movement.

The throw should feel like it “unfolds” from the back leg as that energy is reversed through the ground and into the lower half/pelvis/torso.

Check out our instructional video [here](#).

Alternate Drill Selection: Hinge Feels Drills



If an athlete still struggles with the linear move, we often add in “feels” drills to work on and isolate this move further. Two of our current favorite are the [Sliding Hinge Drill](#) and the [Kettlebell Feels Drill](#).

You can watch their respective instructional videos to learn more about how to perform each drill and how they are able to reinforce/isolate the feeling of a stable linear move.

Level 5: Progressing the linear move



While level #4 introduces a linear move, the next step is to learn how to add some aggressiveness to this linear (and ultimately rotational) move.

It's important to understand first and foremost what the “drive” component of the lower half is and isn't.

It's not primarily hip or knee extension, although those happen. Instead it's driven by hip abduction – think about standing on one leg and raising your opposite leg out to the side as far as it will go.

What do you feel? You should feel it in the outer hip and glute min/med. This is *the fundamental action* of the drive phase, not lunging off of the quads and powerfully extending through the glutes and calves.

Knowing this, one important piece of information stands out: properly timing when to use this valuable hip abduction.

A common problem exists when a pitchers' first move is to push the hips forward and lean back during their first move, which gives away all their available hip abduction before they can even begin to drive towards the target.

The best you can do from this position is fall towards the target or desperately lunge outwards, landing in an uphill throwing position. Neither of which is a recipe for maximum velocity.

Hard throwers shift their weight forwards during leg lift, which saves up their hip range of motion to be used, powerfully, during the linear move.

The following drills all work to prevent this problem from happening and get into a proper linear move by making sure the weight is shifted in front of the back leg when this phase begins.

Drill Choice #1: The Dynamic Rocker Drill

Because of the wide starting stance, the rocker drill gets the center of mass out in front of the back leg. But, unlike the rhythm rocker drill, we add in a full leg lift during the weight shift, allowing the front leg to come off the ground.

This increases the complexity but also the specificity of the drill to help it better transfer to the mound.

How to Perform:

Take a wide starting stance, approximately as long as your stride. Shift your weight into your back side using your normal delivery leg lift, and throw from there.

From here, the athlete is set up into a much more advantageous position to move forward from. With a wider starting stance, a more aggressive weight shift and being allowed to lift the leg, this drill should have with it a more aggressive linear move off the back leg.

Important cues:

- Coordinate the back hip rotation with the upper half – holding the upper half closed as the back knee rotates down to the ground.
- Close off the front shoulder, while getting the arm up.
- Get the shoulders level at landing.
- As torso rotation begins, allow the scap to lag slightly behind.
- Rotate through your arm slot, pulling down late with the arm to finish the throw.

- Throw through the target, roughly head-high. Don't spike it.

Check out our instructional video [here](#).

Drill Choice #2: [The “Bauer” Drill](#)



Another, even more dynamic drill to set up these positions is one I originally saw presented by pitching coach Ken Knutson, who called it the “Bauer drill,” because it was something he observed Trevor Bauer perform while with Cleveland.

How to Perform:

To perform, step away from your target with your glove side leg, and upon planting, replace that foot with the throwing side leg, and turn and fire from that position.

I love this drill, because it not only encourages a proper weight shift and get guys to understand what a good drive position feels like, but it takes a lot of the thinking out of the equation.

It reinforces being athletic, which is an often overlooked piece of the equation for pitchers. All of the other cues still apply from the previous drills.

Check out our instructional video [here](#).

Which drill is right for me?

I would recommend trying both drills and observing which feels the most fluid and connected to you, as well as taking a look at some of the objective results (for example, how hard can you throw at 70% perceived effort out of each drill – if one is significantly higher, that one is probably syncing up your delivery better).

The Bauer drill will likely work for pitchers that have some coil or counter rotation in their delivery, while the rocker drill may work best for pitchers who don't coil as much.

But these are just general observations: I like both drills. In either one you should be able to feel the rear glute load up (the “hinge”) and move forward via hip abduction while staying connected to the ground/rubber through the back heel as long as possible.

Stick with the one that works best, I'm just giving you options!

Level 6a: Add specificity (pitchers only)



The final step to transferring these patterns is to blend it into something equivalent to or almost identical to your game delivery. As a pitcher, this means either throwing out of the wind-up or the stretch.

You've actually got four options here, and I'd encourage you to play with all of them to see what helps you feel the most fluid and powerful:

Choice #1: Standard Wind-Up

Self explanatory – throw out of your wind-up delivery.

Choice #2: Standard Stretch

Also self explanatory – throw from the stretch and aim to reinforce the patterning from your other drill work.

Choice #3: [Step-Back Delivery](#)

This drill is similar to a rocker drill, and is the progression from the step-back slide step.

How to Perform:

Come set, then before you lift your leg to begin the motion, step *back* a half step, plant your back foot, and begin the throw from there.

You'll feel your weight further out on your front foot when you lift your leg, which can help with feeling a good weight shift during your first move.

The step-back delivery can really help provide some tactile feedback in the back leg for throwers who struggle to feel their outer hip load up during the throw.

Stepping back loads the glute, so it becomes much easier to feel it working for athletes who can't normally get into their back side properly.

Important cues:

- Don't overthink it. Imagine you're pitching, but they changed the rules so you need to step backwards to start your delivery.
- Don't rush. Allow the throw to build. If you feel like you're falling when you lift your leg, you are probably rushing.

Check out our instructional video [here](#).

Choice #4: [Walking Wind Ups](#)



This drill is essentially the opposite of the step-back drill, instead adding forward momentum to the throw.

How to Perform:

Step into your regular wind-up delivery from behind, then lift and throw. While this can make it hard for athletes to feel the back leg working, it does have the benefit of being a dynamic and more athletic feeling drill for many pitchers to sync in the lower half.

Check out our instructional video [here](#).

Level 6b: Add specificity (position players only)

For position players, level #6 adds specificity in the form of your position-specific throw.

Catchers: [Throw-Down](#)



This is a throw-down to second base. Work to transition the same feelings and positions from the earlier plyo drills into your standard throwdown mechanics.

Infielders: [Backhand-and-Fire](#)

This is a backhand, turn-and-fire throw from the hole. You can add one shuffle if you like.

Outfielders: [Crow-Hop](#)

This is a one-step crow-hop and throw. Avoid long running pulldowns and try to maintain this abbreviated footwork, as this is about blending the throwing patterns from your prior drillwork to the mechanics you'll be using in game for a strong throw.

“An exercise or drill is only as good or bad as its application.”

Customizing Your Catch-Play / Long Toss

You’ve got a pre catch-play drill work routine now, where you’ll work your way all the way through your delivery from back to front, finishing with your own position-specific motion.

But this isn’t the most specific we can get – primarily because you were just focusing on those patterns with variable weighted balls/plyos and throwing into a wall or net.

Let’s add a target and a regulation baseball to the mix and see if those patterns can still transfer.

Notice how we continue to add **as few variables as possible at each step**, in order for the athlete’s system to more readily grasp the mechanical changes.

While I firmly believe that baseball players – and pitchers in particular – need to regularly practice their sport’s skill of throwing baseballs to humans, it doesn’t have to come in the form of max distance long toss.

Some may call me old fashioned⁴, but I don’t think we can hack our way around that necessity by just throwing balls into nets or walls or command trainers all off-season and expect it to magically transfer to games without any hiccups.

What is the point of long toss?

The purpose of long toss is to work to reinforce good mechanical patterns, build the arm up to a higher throwing tolerance and improve velocity via immediate feedback.

⁴ Literally nobody has ever called me that.

Every throw has both the immediate distance feedback as well as immediate command feedback (you can see whether the ball ran or cut relative to your target 250 or 300+ feet away).

By working on being smooth and efficient on the first phase of long toss, paired with the immediate feedback after each throw, long toss serves as an excellent way to improve patterns over time, for most throwers and in most circumstances.

This does not mean that it will always lead to improvements, and you should still have a plan about what you're working on as you begin any long toss program – just long tossing without a plan is unlikely to fix major timing or mechanical flaws on its own.

I'm also not as big of a fan of indoor long toss, as I discuss in [this video](#).

Who shouldn't do long toss?

Long toss tends to reward and reinforce high(er) spin efficiency, high(er) arm slot, high(er) vertical break and high(er) spin rate throws – many athletes learn that a slightly higher arm slot and staying behind the ball for longer will lead to further distances on their long toss, all else equal.

This is probably a good thing for most throwers, but certain pitchers aren't going to benefit as much from it, or it may be downright counterproductive.

The four cases in which I'd be especially cautious with or possibly downright avoid long toss are:

1. For sidearm or submarine throwers

Long tossing encourages throwing with higher slots, and this just doesn't blend well with the low slot and heavy sink/run that most submarine throwers rely on to be successful.

Note: I still have many low arm slot throwers work on an over-the-top “show” pitch, so consider long tossing if you also have a high arm slot fastball in your arsenal that you’re looking to improve.

2. For pitchers who rely on low vertical break / high horizontal break / sinkers

Try throwing a nasty sinker from 200 feet away and it won’t make it to the target.

This is the same reason I don’t like the age-old teaching of throwing changeups from 90 to 120 feet; if the ball gets there, it wasn’t a very good changeup.

Ever seen Pedro Martinez’ changeup? Yeah, a good one bounces at about 65 feet. Similarly, long toss may flatten out your sinker movement because it reinforces and rewards higher spin rates and better backspin in order to hit your target from increasing distances.

3. For pitchers who have trouble getting downhill

Long tossing max distance requires throwing uphill on an arc, a position that can transfer downhill for most pitchers, provided they follow their long toss up on the way in with pulldowns or downhill throwing.

However, for pitchers who are working to reverse a low elbow or excessive uphill shoulder tilt towards second based at landing, I’ve repeatedly seen that long toss can make this problem worse.

4. If you have a bad history with long toss.

Look, I can’t sit here and tell you that long tossing maximum distance works for everyone, in every situation, for forever. The hardest I’ve *ever* thrown (96-98 in bullpens) I was not long tossing and didn’t throw past 90 feet through my entire elbow rehab leading up to that point.

I also had periods in my career where long toss got me significant gains. The furthest I've ever long tossed (380 feet from a slide step) was at the same time that I was only able to throw 88-92 off the mound.

While there are general correlations, long toss transfer is not black and white. So listen and observe what works. If you know it hasn't worked for you in the past, don't do it just because I suggest it here.

If any of these scenarios describe you, I recommend doing your catch play out to somewhere between 60 and 120 feet, based on preference, and progress this throwing program off of your perceived intensity rather than using distance as your guide. You may prefer to work out even further on a line (180 or 200 feet, for example), but that's entirely your call. The more you rely on fastball movement as a pitcher, the more I feel you risk flattening that out as you back up further and further.

In college I saw 5'8" Marcus Stroman long toss to 400 feet before a start and carve us at 94-96 miles per hour. It worked for him.

A couple years later, in spring training, I witnessed Chris Sale casually toss out to 120 feet before a scrimmage start and strike out 13 in 5 innings cruising 96-98. That worked for him.

My point is this: use these guidelines as a starting point but understand that you'll have to find what works for you.

There's no way around that.

How do you properly perform long toss?

Footwork

You may use crow-hop footwork OR throw out of your wind-up/stretch delivery when long tossing. There is not necessarily a right or wrong way. Some people prefer only crow-hopping or vice versa, while some prefer to throw out of their delivery until they get past 90, 120 or 200 feet.

When I long toss, I have always personally preferred to throw out of my stretch delivery or a key mechanical drill until I have to begin putting significant effort into the throws, at which point I transition into a crow-hop footwork. This is up to you to experiment with for yourself.

Extension Phase

Spend a few minutes working back from 30 to 60 feet. Take your time. This is a good spot to insert one or two mechanical drills that you may be working on (yes I know you already did them in plyos – it's optional). Keep the effort minimal and use these throws to feel loose, get your arm warm and be athletic. If you've never seen [Marcus Stroman warm-up](#), this is a good guy to learn from.

Spend ~3-5 minutes at about 60-90 feet before beginning to back it up into your further throwing. Start to feel your back leg initiating your delivery, and keep the effort minimal from your arm.

Back up about 10 feet every 2-3 throws that you make (this number is not set in stone). Keep minimal effort in the arm, stay loose and try to ride the back side/heel to supply the power for your throws while keeping the head and torso back/stacked over the pelvis as long as you can. The arm should float and whip through from the lower half.

Max Distance

Only once reaching sufficient distances should you begin actively bringing your arm into the throw (this is a **BIG** key). The focus should always be on using the body to throw while allowing the arm to whip through quickly and freely.

Get as far out as you can while feeling like you're throwing the ball with your lower half before you allow the arm to join the party. This should be at least 50 or 60% of your maximum distance.

I would sometimes get out to 270+ feet and still feel little to no active effort from my arm. That's when I knew I had 360+ feet in me that day. The arm

will be there when you add it in, the real key is squeezing everything out of the rest of your body before you allow it to come in.

Once you reach your max distance for the day, stay there for between 5 to 10 throws based on how you feel. No need to stay at max distance or 40 throws and beat up your arm. Long toss is a drill – so think about it more from that perspective and less from a tissue conditioning perspective. Get out and get back in. You can always add more volume in the future if you’re feeling too fresh and too recovered.

Max Velocity (mph)	Max Distance +/- 20 feet	Throwing Intensity (%) and Corresponding Distance (ft)										
		50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
65-69	210	105	116	126	137	147	158	168	179	189	200	210
70-74	240	120	132	144	156	168	180	192	204	216	228	240
75-79	260	130	143	156	169	182	195	208	221	234	247	260
80-84	280	140	154	168	182	196	210	224	238	252	266	280
85-89	300	150	165	180	195	210	225	240	255	270	285	300
90-94	330	165	182	198	215	231	248	264	281	297	314	330
95-99	360	180	198	216	234	252	270	288	306	324	342	360
100+	410	205	226	246	267	287	308	328	349	369	390	410

Use the chart below to help determine your approximate maximum long toss distance based upon your current velocity, and the percentages/corresponding distances you will be using. For example, if you’re generally topping at 89 off the mound, your first day of on ramping at 50% intensity might be around 150 feet.

Pull-down Phase (if applicable)

Once you finish the extension phase, begin moving in about 20-30 feet per throw until you get to 60-90 feet. Generally, pull-downs will use a crow-hop footwork, although some individuals (myself included) prefer to throw out of the wind-up/stretch.

The key, as popularized by Alan Jaeger, is to take the feeling from the max throws and “compress” those arced throws down on a line as you come in. Stay fluid and loose, working on easy arm speed. These throws should not be forced.

The number and intensity of pull-down throws will vary greatly based on where you’re at in your throwing program (in-season, off-season, on-ramping, etc) and how your arm is feeling on a given day. Generally, between

5 and 10 pull-downs is sufficient. After this, it's time for command work, if applicable.

Command work



The goal of command work is (obviously) to take the patterns and intensity from your Plyocare drills, long toss and pulldowns and channel that into usable velocity within the strike zone.

Of course, we also want to stay sharp with off-speed pitches too, so don't forget about them. Command work is pretty straightforward, and includes flat ground, short box or full-length bullpen work.

Command Work Keys

- Command work can mean flat grounds, short boxes (55ft pens), or full length bullpen work, and may also include pitch-design work.
- Command work is generally done from 55 to 60 feet, with partner squatting in a catcher's stance. Bonus points if you use a portable pitching rubber, throw down a portable plate in front of your partner and/or have a stand-in hitter.
- Number of throws, type of pitch, intensity, etc. will vary greatly based on where you're at in your throwing program and how your arm is feeling on a given day. Generally, between 10 and 25 throws is sufficient. If you

absolutely cannot find a partner to catch you, using a command trainer is a viable option, but won't quite replace throwing to a real human.

- Be aware of how your arm is recovering and don't overdo any flat grounds added into your throwing. This is a common place where pitchers will begin to overdo it and accumulate excess volume on the arm.

Putting It All Together

Let's take everything you've learned and construct your throwing routine, warm-up, schedule, and post-throwing recovery routine.

1. Select 4-6 throwing drills

A quick look at the throwing drills we covered (with video links). Select 4 to 6 of them.

Drill Level	Purpose	Option #1		Option #2
Level 1	Relax / pull / rotate	Lasso Drill	Or	Ten-toes (abbreviated), Pivot Pickoffs (abbreviated)
Level 2	Hand break / counter rot.	Ten-toes (full arm action)	Or	Pivot Pickoffs (full arm action)
Level 3	Pelvic load / lead leg block	Rhythm Rocker	Or	Ten-toes (full hip turn)
Level 4	Linear move (regression)	Step-Back Slide Step	Or	Sliding Hinge Drill, Kettlebell Feels Drill
Level 5	Linear move (progression)	Turn & Fire 'Bauer' Drill	Or	Dynamic Rocker Drill
Level 6a	Sport specific (pitchers)	Stretch / Windup (full delivery)	Or	Step-Back Delivery, Walking Wind-Ups
Level 6b	Sport specific (position player)	Throw-down (Catchers)	Or	Backhand & Fire (Infield), One-Step Crow Hop (OF)

My Drills:

Level 1: _____ Level 4: _____

Level 2: _____ Level 5: _____

Level 3: _____ Level 6: _____

2. Plyo Routines

You will be performing your drill work in one of three ways:

- With Plyocare balls** (we recommend Driveline's Plyos) thrown into a wall/net from 15-30 feet away.⁵
- With hard weighted baseballs** (4-9 oz.) thrown into a net from 15-30 feet away or a partner from 45-75 feet away.
- With 5oz baseball only**, thrown into a net from 15-30 feet away or a partner from 45-75 feet away.

My Plyo Routines

Half Plyos

Lvl 1: _____
 Lvl 2: _____
 Lvl 3: _____
 Lvl 4: _____

Weights: plyos	Weights: WBs	Reps	Sets	%
Blue/Red	9oz/7oz	8-10 each	1	40-60%
Blue/Red	9oz/7oz	8-10 each	1	40-60%
Blue/Red	9oz/7oz	3-5 each	1	50-70%
Red/Yellow	Red/Yellow	3-5 each	1	50-70%

Full Plyos 'A' (heavy)

Lvl 1: _____
 Lvl 2: _____
 Lvl 3: _____
 Lvl 4: _____
 Lvl 5: _____
 Lvl 6: _____
 Lvl 7: _____

Blue/Red	9oz/7oz	8-10 each	1	50-70%
Blue/Red	9oz/7oz	8-10 each	1	50-70%
Blue/Red	9oz/7oz	3-5 each	1	50-70%
Red/Yellow	Red/Yellow	3-5 each	1	60-75%
Red/Yellow	7oz/5oz	3-5 each	1	60-75%
Red/Yellow	7oz/5oz	3-5 each	1	65-80%
Red/Yellow	7oz/5oz	3-5 each	1	65-80%

Full Plyos 'B' (light)

Lvl 1: _____
 Lvl 2: _____
 Lvl 3: _____
 Lvl 4: _____
 Lvl 5: _____
 Lvl 6: _____
 Lvl 7: _____

Blue/Red	9oz/7oz	8-10 each	1	50-70%
Blue/Red	9oz/7oz	8-10 each	1	50-70%
Blue/Red/Yellow	9oz/7oz/5oz	3-5 each	1	50-70%
Red/Yellow/Grey	7oz/5oz/4oz	3-5 each	1	70-85%
Red/Yellow/Grey	7oz/5oz/4oz	3-5 each	1	70-85%
Yellow/Grey	5oz/4oz	3-5 each	1	70-85%
Yellow/Grey	5oz/4oz	3-5 each	1	70-85%

Full Plyos 'C' (mound)

*Same as full plyos 'B', but perform drills 3 thru 6 off of the mound.

⁵ This is our recommended option, but we find that some athletes perform better using Hard WB's, throwing into a net from further away, or prefer to only throw a 5oz ball. We match the preference to the athlete while still working on these drills.

3. Long Toss Preference

You will be performing your catch play/long toss in one of 3 ways (select one):

- With no distance limit.** Standard Jaeger-style long toss where you will work out on an arc to the noted distance or % of your max distance.⁶
- On a line (no distance limit).** Work out to the noted % effort on a line, backing up only as long as you avoid putting arc on the throw.
- On a line (120 foot cap).** Stay on a line, working up to the noted % effort and stay within 120 feet in your long toss/catch play.

Example: if the schedule says work out to 50% effort and your preference is “no distance limit” – you would work out to approximately 50% of your projected max long toss distance.

Let’s say you don’t know your max long toss distance, but you throw 84-87 mph. Using the chart on page 65, you project this distance to be around 300 feet, so you plan to throw to 50% of that, or 150 feet for the day.

Got it? Good.

⁶ This is our recommended option, but we find that some players perform better by keeping their throws on a line or capping the distance to avoid reinforcing certain mechanical flaws. This is discussed on pages 61-63.

1. Sample Pre-Throwing Warm Up

You'll be performing this routine prior to your drill work and long toss/catch play for the day. This is **just a sample warm-up** and is not set in stone.

SOFT TISSUE WORK

Spend 5-7 minutes, prioritizing your tighter, more painful areas.

- [Double tennis ball \(rhomboids\)](#)
- [Lax/tennis ball \(glutes\)](#)
- [Lax/tennis ball \(posterior cuff\)](#)
- Lax ball ([calves](#) and [arches](#))
- [Roller \(thoracic spine\)](#)
- Roller / barbell ([quad](#), [adductors](#), [hamstrings](#))

CORRECTIVE WORK

This will be highly variable depending on where your deficiencies are and is just a sample for an athlete with restrictions in his t-spine, pecs and lats.

- [Pec Barbell Smash](#) x3-5 min
- [Pec Myofascial Stretch](#) 2x:30 sec
- [Side Lying Rotation - Scapular Plane](#) 2x10
- [Locked Lumbar Rotations](#) 2x10
- [Bench T-Spine Mobilization](#) 2x10
- [Wall Slide w/ OH Shrug and Liftoff](#) 2x10
- [Recommendations for Lat Dominance](#)
- [Lat hangs](#) 2x5 breaths
- [Lat Myofascial Stretch](#) 2x:30 sec
- [Wall Tricep Stretch](#) 2x:30 sec

DYNAMIC WARM-UP

Build to a light sweat while improving mobility – should take under 5-7 min.

- [Lateral Lunge with OH Reach](#) x10 yds
- [Walking Leg Kicks \(Frankensteins\)](#) x10 yds
- [1 Arm 1 Leg RDL w/ Reach](#) x10 reps
- [Back to Wall Shoulder Flexion](#) x10 reps
- [Sliding Pec Stretch w/ Roller](#) x10 reps
- [Lunge Elbow Tuck w/ Rotation](#) x10 yds
- [Supine Bridge with Reach](#) x10 each
- [Side Shuffle w/ Arm Swing](#) x10 yds each
- [A-Skips](#) x10 yds
- [Repeat Lateral Bounds](#) x10 yds each

THROWING-SPECIFIC

- [Voodoo Floss Band \(elbow\)](#) x1 set
- [Dead Arm Swings](#) 1x10 each
- [I-Bands or Crossover Symmetry](#) x10 each
- [1kg Drop-Catch Routine](#) x10 each
- [1kg Reverse Throws](#) 2x10
- [Shoulder Tube](#) 1x:10 each

2. Post Throwing Routine

I've included two sample post-throwing routines - one higher-intensity aimed at improving strength, and one lower volume/intensity routine. These are not set in stone and "arm care" can really be performed at any point during the week as long as you get it in.

DAY A (Monday & Friday)

This is your "heavier" strengthening day. You may be pushing to a moderate burn on these movements but *always* maintain strict form.

- [Half-kneeling band / cable ER \(scapular plane\): 2-3x6 reps](#)
- [Bottoms Up KB Waiter Walk \(scap plane\): 2-3x30 sec](#)
- [Supine Rhythmic Stabilizations OR Shoulder Tube: 2-3x20 sec](#)
- [One arm prone YTL series OR Band Y Raise: 2-3x10 reps](#)
- [Single Arm Band Face Pull OR Band T Raise: 2-3x10 reps](#)
- [6-Way Forearm Circuit: 1-2x20 reps each](#)

DAY B (Wednesday & Saturday)

This is your "lighter" routine. Don't push to fatigue – this routine is about "greasing the groove" and pushing blood flow to these areas for a recovery emphasis.

- [Side-Lying External Rotation @ 30 degrees abduction](#)
- [Reverse Bear Crawls](#)
- [½ Kneeling KB Press w/ Rhythmic Stabilizations OR Shoulder Tube](#)
- [Alternating Y Press w/ ISO Hold](#)
- [6-Way Band Pull Apart](#)

OPTIONAL

Here are several additional post-throwing options to consider. Learn more [here](#).

- [Voodoo Floss Band \(elbow/shoulder\)](#)
- [Marc Pro \(total arm flush\) x 20-30 min](#)
- [Dry Sauna x 20 minutes](#)
- [The Arm Care App](#)

Sample Schedule #1 – 4 Week On Ramp

High Intensity Day	Moderate Intensity Day	Lower Intensity Day
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Notes: we recommend throwing out of your specific drills in catch play / long toss until you reach ~ 60 feet. This helps transfer your plyo patterns to a partner with a baseball.

On Ramp Week 1	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Warm Up	Full Dynamic + Correctives	-	Full Dynamic + Correctives	-	Full Dynamic + Correctives	-	-
Plyocare Drills	Half Plyos - 1 set to 50% intensity	-	Half Plyos - 1 to 2 sets to 50% intensity	-	Half Plyos - 1 to 2 sets to 60% intensity	-	-
Throwing/ Long Toss	Extension Long Toss to 50% of Max	-	Extension Long Toss to 55% of Max	-	Extension Long Toss to 60% of Max	-	-
Velo/ Command	-	-	-	-	-	-	-
Arm Recovery	Full recovery routine	-	Full recovery routine	-	Full recovery routine	-	-

On Ramp Week 2	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Warm Up	Full Dynamic + Correctives	-	Full Dynamic + Correctives	-	Full Dynamic + Correctives	Full Dynamic + Correctives	-
Plyocare Drills	Half Plyos - 1 to 2 sets to 60% intensity	-	Full Plyos 'A' - 1 to 2 sets to 60% intensity	-	Full Plyos 'A' - 1 to 2 sets to 65% intensity	Half Plyos - 1 to 2 sets to comfort	-
Throwing/ Long Toss	Extension Long Toss to 65% of Max	-	Extension Long Toss to 70% of Max	-	Extension Long Toss to 75% of Max	Light catch play (optional)	-
Velo/ Command	-	-	-	-	-	-	-
Arm Recovery	Full recovery routine	-	Full recovery routine	-	Full recovery routine	Full recovery routine	-

On Ramp Week 3	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Warm Up	Full Dynamic + Correctives	-	Full Dynamic + Correctives	-	Full Dynamic + Correctives	Full Dynamic + Correctives	-
Plyocare Drills	Full Plyos 'A' - 1 to 2 sets to 70% intensity	-	Full Plyos 'A' - 1 to 2 sets to 75% intensity	-	Full Plyos 'A' - 1 to 2 sets to 75% intensity	Half Plyos - 1 set to comfort	-
Throwing/ Long Toss	Extension Long Toss to 75% of Max	(Optional - Light dynamic warm up & catch play)	Extension Long Toss to 80% of Max	(Optional - Light dynamic warm up & catch play)	Extension Long Toss to 85% of Max	Light catch play (optional)	-
Velo/ Command	Optional 5oz Flat Ground	-	Optional 5oz Flat Ground	-	-	-	-
Arm Recovery	Full recovery routine	-	Full recovery routine	-	Full recovery routine	Full recovery routine	-

On Ramp Week 4	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Warm Up	Full Dynamic + Correctives	-	Full Dynamic + Correctives	-	Full Dynamic + Correctives	Full Dynamic + Correctives	-
Plyocare Drills	Full Plyos 'B' - 1 set to 80% intensity	-	Full Plyos 'B' - 1 to 2 sets to 80% intensity	-	Full Plyos 'B' - 1 set to 80% intensity	Half Plyos - 1 to 2 sets to comfort	-
Throwing/ Long Toss	Extension Long Toss to 85%+ of Max	(Optional - Light dynamic warm up & catch play)	Extension Long Toss to 90%+ of Max	(Optional - Light dynamic warm up & catch play)	Extension Long Toss to Comfort	Light catch play (optional)	-
Velo/ Command	5 oz. pulldowns at 90%	-	Optional 5oz Flat Ground	-	5 oz. pulldowns at 100%	-	-
Arm Recovery	Full recovery routine	-	Full recovery routine	-	Full recovery routine	Full recovery routine	-

Sample Schedule #2 – In-Season Routine

High Intensity Day	Moderate Intensity Day	Lower Intensity Day
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Notes: we recommend throwing out of your specific drills in catch play / long toss until you reach ~ 60 feet. This helps transfer your plyo patterns to a partner with a baseball.

7 Day Rotation	Day 0: Pitch	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Warm Up	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Warm-Up
Pre-Game Plyos	Full Plyos to Comfort (1 set up to 75% effort)	-	Half Plyos - 1 or 2 sets to comfort	Full Plyos 'B' - 1 or 2 sets to comfort	Full Plyos to Comfort (1 set up to 75% effort)	Half Plyos - 1 or 2 sets to comfort	-
Pre-Game Throwing	Long Toss to comfort + light pulldowns	-	Extension Long Toss to 90-120 ft for ~10 min	Throw to 60 feet for 5-10 min	Extension Long Toss to Comfort	Throw to 60 feet for 5-10 min	Extension Long Toss to 90-120 ft for ~10 min
Game/Bullpen	Pitch	-	-	-	Command bullpen @75%, 25p all pitches	-	Optional flat ground @50%
Post Game	Speed/Conditioning	Lower Body (hard)	Upper Body (hard)	Speed/Conditioning	Lower Body (light)	Upper Body (light)	-

6 Day Rotation	Day 0: Pitch	Day 1	Day 2	Day 3	Day 4	Day 5	-
Warm Up	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	-
Pre-Game Plyos	Full Plyos to Comfort (1 set up to 75% effort)	-	Full Plyos 'B' - 1 or 2 sets to comfort	Full Plyos to Comfort (1 set up to 75% effort)	Half Plyos - 1 or 2 sets to comfort	-	-
Pre-Game Throwing	Long Toss to comfort + light pulldowns	Throw to comfort (optional)	Extension Long Toss to 90-120 ft for ~10 min	Extension Long Toss to Comfort	Throw to 60 feet for 5-10 min	Extension Long Toss to 90-120 ft for ~10 min	-
Game/Bullpen	Pitch	-	-	Command bullpen @75%, 25p all pitches	-	Optional flat ground @50%	-
Post Game	Speed/Conditioning	Upper & Lower (hard)	Speed/Conditioning	Lower Body (light)	Upper Body (light)	-	-

5 Day Rotation	Day 0: Pitch	Day 1	Day 2	Day 3	Day 4	-	-
Warm Up	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	-	-
Pre-Game Plyos	Full Plyos to Comfort (1 set up to 75% effort)	-	Full Plyos 'B' - 1 or 2 sets to comfort	Full Plyos to Comfort (1 set up to 75% effort)	Half Plyos - 1 or 2 sets to comfort	-	-
Pre-Game Throwing	Long Toss to comfort + light pulldowns	Throw to comfort (optional)	Extension Long Toss to 90-120 ft for ~10 min	Extension Long Toss to Comfort	Throw to 60 feet for 5-10 min	-	-
Game/Bullpen	Pitch	-	-	Command bullpen @75%, 25p all pitches	-	-	-
Post Game	Conditioning + Lower (hard)	Upper Body (hard)	Speed/Conditioning	Upper & Lower (light)	-	-	-

Bullpen Pitcher	Hot - Definitely Pitching	Hot - Possibly Pitching	Off - Hot Tomorrow	Off - Pitched yesterday	Off - rest day before and after	-	-
Warm Up	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	Full Dynamic + Correctives	-	-
Pre-Game Plyos	-	Choice Plyos - 1 set to comfort	Choice Plyos - 1 set to comfort	-	Full Plyos 'B' - 1 or 2 sets to comfort	-	-
Pre-Game Throwing	Throw to 60 feet for 5-10 min	Throw to comfort	Throw to comfort	Throw to comfort (optional)	Extension Long Toss to Comfort	-	-
Game/Bullpen	Pitch	Optional 10p touch/feel flatground	-	-	Touch and feel 55ft command bullpen 15-20p	-	-
Post Game	Upper & Lower (hard)	If pitch, Upper & Lower (hard)	Speed/Conditioning	Speed/Conditioning	Upper & Lower (light)	-	-

Frequently Asked Questions

Are weighted balls dangerous?

This, in my estimation, is no different than asking “are deadlifts and squats dangerous?” Can you get injured performing a deadlift? Yes. Is that injury risk elevated if you account for form, age, training experience, proper loading, proper progression, coaching and deloads? Absolutely not.

But from the outside, it would be very easy to notice that overzealous athletes who started deadlifting or squatting heavy sometimes suffer back or knee injuries and make blanket statements that “deadlifts are bad for your back” or “squats are bad for your knees.”

Never mind the fact that properly performed, coached and progressed deadlifts and squats can actually be powerful injury preventers for your back and knees – that’s too nuanced a way of thinking. It’s far easier to paint a black and white picture that a certain exercise or modality is “always good” or “always bad.”

So how does this relate to weighted balls?

You must understand that it isn’t the fact that you throw a 4 or a 6-ounce ball that raises injury risk (a standard baseball is 5 ounces), it’s the fact that many coaches and athletes see these high intensity programs as a “quick fix” for velocity, and progress through them

- Without addressing mechanical flaws
- Without addressing movement issues
- Without warming up
- Without having built a strength base
- Without even being old enough to shave
- Without listening to their arms
- Without an on ramping period
- Without a sensible progression

- Without adjusting their workouts to accommodate the most stressful periods of throwing
- Without a plan for transitioning these throws to their game mechanics or to throwing strikes

I'll be the first to admit, there *are* some programs out there that are flat out irresponsible even if athletes do follow them perfectly.

One program I've seen recommends doing running pulldowns with everything from 2 pound to 2 ounce balls on DAY 1 (!?!) and running that routine *three* days per week. This is ~~quite literally begging the baseball gods to expose the weakest link in your arm~~ a far cry from the conservative approach that we take.

Here's our basic philosophy on weighted balls

- They are a tool – one puzzle piece that can help with velocity development.
- They are most useful for improving patterning – their biggest benefit is perhaps during sub maximal throwing and drill work.
- High intent throwing accounts for a relatively small piece of the progress our athletes make – maybe 2-3 miles per hour. You won't just strengthen or brute force your arm to 95 mph if your patterns are crap, no matter how many throws you do or how many times you tell your arm to “adapt or die.”
- More max effort throws won't generally get you *more* velocity. Our high intensity phases usually only have 15 or 20 high effort throws, twice per week, and that's [working out](#) pretty well.
- The further you get from a 5 oz. regulation ball, the harder time you'll have with direct velocity carryover – while heavy balls work well for low effort patterning, all of our testing is in the 3 oz. to 7 oz. range. We don't test 1lb or 2 lb balls, and 2 oz. balls are off the table as well.
- Athletes must be on-ramped, have a strength base and be free of any red flag mechanical or movement issues before being put on a max effort-throwing program that includes weighted balls.
- We have not observed an increase in injuries with weighted balls using this conservative approach, but all high effort throwing, including 5oz-only programs, carry an elevated degree of injury risk.

Hopefully this helps clarify our stance – it’s a nuanced topic, and as you can see, it’s not as simple as saying weighted balls are or aren’t dangerous.

Any tool can be dangerous if put in the wrong hands.

How to know if you’re ready for max effort throwing?

If you aren’t coming off of any major injuries, surgery, etc. then plan for a four-week on ramping period to gradually expose your arm to full speed stresses by the final day of that month.

Normal soreness is okay, especially in the meat of the posterior cuff, bicep and forearm. Listen to your arm and back off if your arm is telling you to.

Pinches, persistent aches and shooting, tingling or sharp pains are not okay. Don’t push through those.

If your arm is recovering session to session and tolerating the loads you’re putting it through, then you should be confident that your arm is ready by the tail end of this 4-week progression.

The *one exception* to this is a newly transitioned position player who is taking up pitching full-time. These guys seem to get hurt at an alarming frequency when they jump into the workloads of full-time pitchers on normal on-ramping timeframes.

I’d recommend doubling or tripling the on-ramping period if you’re picking up pitching for the first time as a career position player.

What to do when I hit a plateau?

You’re going to run into plateaus in your throwing. This is inevitable, despite the miraculously quick gains that certain “gurus” may promise.

Oftentimes, big breakthroughs happen after weeks or sometimes months of persisting through them. The most important thing is to not start massively changing everything that has been working for you in the past.

I don't have a simple answer for what to do when you hit a plateau because it could be any multitude of factors, and this is where having an experienced coach to troubleshoot with is important.

It could be something as simple as needing a deload, adjusting your training volume in the weight room, insufficient nutrition, sleep or recovery.

Or it could be a nuanced mechanical issue or joint restriction that's limiting your ability to display your maximum velocity.

Brainstorming through plateaus is our [bread and butter](#), and where we provide the large bulk of our value to our in-house and remote athletes.

What is the carry-over from pulldowns to mound velocity?

There is a big range based on the type of pull-down footwork you have, how efficient you are at this footwork, and how well you use your lower half off the mound.

If your pulldowns jump up 10 mph in one off-season, just realize that part of this gain will be your body learning how to better sequence and coordinate the pulldown / crow hop footwork.

Pulldowns are useful as an over speed stimulus for the arm, but there isn't usually a 1:1 correlation between pulldown velocity gain and mound velocity gain.

This is one reason I always personally did my pulldowns and long toss just throwing out of the stretch or with a one step crow hop (vs. a 50 foot run-up). If I improved my numbers, I knew 100% my numbers out of the stretch and subsequently the mound were improving as well.

My one step crow hops were usually ~2 to 3 mph harder untrained, and 5 to 7 mph harder than my mound velocities after I had time to improve the footwork. This 2 to 7 mph gap is pretty standard across the board.

Do I have to do drills from all 6 phases of the throw?

No. The goal of this 6-phase progression is to sufficiently break the throw into manageable chunks that can be attacked in sequence. But the ultimate goal with drill work is to reduce it down to a minimum effective dose.

You should be doing less drill work throws and less drills over time as you hone in on your most efficient patterns and eliminate the regressions you simply don't need.

Phase 1 (relax/pull/rotate) and Phase 4 (linear move – regression) are generally the first drills we eliminate because they are regressions of Phase 2 and Phase 5 drills respectively.

Once you own the pattern, you won't need generally need work at every micro step of the delivery to maintain those patterns.

How do I long toss if I can't find a field or a partner?

Long toss should be performed outside to a partner (recommended), but you may also long toss outside solo w/ a bucket of balls or indoors into a net, though this tends to not be nearly as effective.

Can I throw plyos into a net instead of a wall?

Yes. This is a fine alternative if it's all you have access to. Otherwise, a wall provides nice auditory feedback. If you're cutting the ball, also consider backing up 15-30 ft from the target.

Why don't you use the black plyo ball?

We experimented with the 2kg ball over many athletes and commonly see pushing, lagging arm actions or guys complaining of arm discomfort, leading us to cut this ball out of our standard routine.

Should I throw before or after lifting?

If possible, always throw before lifting, as you'll be in a fresher state. Throwing fatigued isn't recommended, as research has shown regularly throwing through fatigue increases injury risk.

Do I have to use Driveline Plyo balls?

Plyos can be done with Driveline plyos (recommended), TAP plyo balls, or weighted baseballs thrown into a net from 15-30 feet away. Green plyo ~2lbs, Blue ~1lb, Red ~7.5 oz, Yellow ~5 oz, Gray ~3.5 oz.

Why isn't there a ton of post throwing arm care?

We don't believe in fatiguing the arm immediately after throwing. Much of your arm care is built in to your training during the week. You'll still be doing plenty of cuff, serratus and scap work!

What footwork should I use for pulldowns?

This is largely preferential based upon what fits best with your mechanics. Run and guns, turn and burns and one-step crow hops are all used depending on what feels most comfortable and elicits the best results for the specific athlete.

Where To Go From Here

If you've made it to the end of this, you're the type of athlete we love to hear from. Curious. Detail-oriented. Driven. Accountable. This is the culture we have created with the 1500+ players and 27 draft picks that we have had through our remote coaching.

We want to hear from you, so here's the deal: shoot us an email to contact@treadathletics.com and as a thank you, I'll send you a coupon for **\$20 off my e-book *Building the 95 MPH Body***.

That's it.

After doing so, you'll also have the chance to schedule a call with our team to discuss your throwing, specific situation and goals moving forward. No strings attached (seriously!)

Before I go, let me just say thank you.

I'm pumped you made it to the end of this guide – we put a lot of time and effort into creating this type of content (and refrained from charging for this against the advice of many), so if you feel this information would be valuable to other athletes, share your thoughts on social media and tag us in your post!

Here's to reaching your potential,

A handwritten signature in black ink that reads "Ben Brewster". The signature is fluid and cursive, with the first name "Ben" and last name "Brewster" clearly distinguishable.

Ben Brewster, BSc, CSCS
Co-founder of Tread Athletics

Thanks for Reading!

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