

Exercises - Part 2

So when we're looking at exercises, there are different ways of how you would categorize them. Right? So one of the categories here is your pushing movements. So as the name suggests, what you would do here is the important aim here is to push or press the weight. So push or press the weight. Let's just write that down. Push or press the weight.

And when you're looking at pushing movements, you have vertical or horizontal. So these are based on direction. So you would have pushing movements, which include press the weight and have direction, vertical and horizontal push. So vertical push is pressing the weight in most scenarios overhead.

So that's your vertical push. And the movement is in your sagittal plane. So going back to functional anatomy, it's in the sagittal plane, which includes a vertical axis. So that's your vertical push. On the other hand, we have horizontal push.

So horizontal push is pressing the weight away from the chest. So bench press would be an amazing example of horizontal push. It could also be a push-up. So you're pushing against the ground, and it's a horizontal push as well. So the movement here occurs in the transverse plane.

So it's the horizontal axis, and you are looking at the transverse plane. So, just to remind you, you have sagittal plane, you have the frontal plane and you have the transverse plane. So that's where your movement is occurring. Now let's get deep into this. Before we get deep into that, let's understand the exercises for lower body movements.

So these are categorized based on lever involvement. Now you would have studied levers in module 4 when you go through the kinematics and the kinetics, and based on the lever involvement, you can categorize your lower body movements for your common exercises. So either they are hip dominant, so your hip plays an extremely important role like the hip hinge, hip thrust, which we'll be looking at in the next few slides. You also have knee dominant exercises, so your main or major lever here is around the knee. Or you would have, so dominant again, right knee dominant, or you would have your hip and knee combined.

So, if you have a look at these, you have exercises that are hip dominant, knee dominant or hip and knee both dominant. Let's look at a few examples and delve a little bit deep into them. So, let's start with dominant movement. So hip dominant movement, an example would be hip thrust. So as the name suggests, you thrust or you press upward.

So that's hip thrust. So an example of this would be your hip thrust exercises or your glute bridge exercises. So the major muscles in here are your hamstrings and glutes. Your plane of motion is the sagittal plane, so it's occurring in the sagittal plane. And some of the

coaching considerations here would be your shoulders are on the bench or any kind of support that you take from, and you drive through the hips.

So driving through the hips is your thrusting action. So driving through the hips is your thrusting action. So that's why it's hip thrust. You drive through the hips, which is nothing but extending your hips. So that's the major action over here is you're going in for a hip extension.

So that's the exercise. If you just quickly have a look at these, once we start doing this for each and every exercise, you can almost take this as sort of like a protocol. If you want to dissect the movement or understand the movement, again, it goes back to what's the movement. Right. So, of course, that's the exercise.

What is the major muscle or your plane of motion, which is your functional anatomy? Then you would have your coaching considerations. So that becomes your coaching science. So what things you would consider, what techniques you would consider. And when we move on to the next slide, you will look at some of the important considerations when you get into the phasing analysis. So all of these three fields are integrated.

And if you do that systematically or structure using a particular structure or this structure for your exercises, you would be able to break down any complex movement or analyze any complex movement. And you would know how to plan them as well as we've looked at in the previous considerations. So your coaching would be shoulders on the bench, driving through the hips, which is extension of the hips. Now for this, let's look at some of the other examples. Another example of hip dominant movement would be hip hinge.

So as we've looked at earlier, a hinge is nothing but like a hinge on the door. It's basically a hinge type of a movement. So it resembles a hinge on the door that helps you to open and close. So hip hinge example here would be the deadlift. Now in deadlift, your major muscles, again, functional anatomy, your major muscles would be the posterior chain or your major muscles of the back, lower back, right, or your pelvis, which is the glutes or glutes maximus, which is the important muscle and your hamstrings.

So major muscles here and the plane of motion would be your sagittal plane. So the hip hinge happens with minimal knee flexion. So whenever you're doing a deadlift, you don't want to flex your knees too much. So it happens with minimal knee flexion, right, and occurs in the sagittal plane. So you're coaching cues there.

So that becomes your coaching signs would be neutral spine. You will see that again and again, you're engaging your lats or your latissimus dorsi. And then once you activate them or engage them, you're hinging at the hips, right? So there's a hip hinge, that's your start position before bending the knees. You get into a hip hinge position, slightly bend the knees, and start the motion from there. Let's look at this in a little bit of detail, right? So

when we looked at the movement analysis that has your biomechanics as well, where we break down the skill into phasing and sub phasing.

Now what would that be for? That would be for your qualitative analysis, right? So qualitative analysis, you would break it down into phases and subphases. So what are the phases and subphases? Let's look at them. So the first phase would be the initiation phase. That's nothing but your start position. So that's nothing but your start position, right? So your start position would be feet wide apart.

So whatever your width is of the hip, so your feet width, hip width apart. You maintain a neutral spine, engage your core, right? So that's your start position. So make sure you engage your core. Again this would be to understand as we've previously discussed muscle activation, right? Quite important to get the desired results is to understand when to activate what muscles. So maintain neutral spine, engage your core.

Following the start position is actually the hinging phase, right? That's when your hinge occurs. So, hip hinge as we've looked at earlier with minimal knee flexion, in a controlled way we descend, right? You descend the bar. We've looked at earlier in functional movements; descend is your downward movement, right? So your downward movements, you're in a controlled manner, you're descending the bar with minimal knee flexion, followed by the actual lifting phase. So now that you have descended the bar with a hip hinge, you're in the hip hinge position, right? That's when you perform your hip extension, that is lift the bar while maintaining that neutral spine. So make sure when you're lifting the bar, and you come back to your normal position or your standing position, you're not having an arched back.

Again, revising your consideration, too much stress on the spine, so make sure there's neutral spine, you're not rounding it, neither are you arching it, right? So hip extension, lift the bar. Then again, when you're descending, right? There's a descending phase as well, is when you're keeping the bar down. Again in a lot of cases you would see weightlifters, powerlifters, any of these people training in the gym, it's quite important because you're going through a lot of heavy weight, right? When they're doing deadlifts, make sure it's controlled lowering, even though it's rapid, you're not just slamming the bar into the ground, might have injuries on your lower back as well. So it needs to be controlled lowering. Controlled lowering not necessarily means slowing down the lowering, it means that you have control over the lowering with whatever speed you're lowering the bar, right? So as you can see that we've divided the action again into the different phases, and if you can identify what exactly is the action occurring, what muscles are important for that action, you get a good insight into the movement, isn't it? So that's how we do the movement analysis, right? So the key variables when you look at through all of these phases would be the hip hinge mechanics.

So whenever you're analysing this, make sure that the hip hinge mechanics are right, there's neutral spine of course, so look at the posture, and you also often analyse the bar path trajectory, right? So that just depends on how is your bar travelling, how is the balance in control, how is the balance in coordination, right? How is the sequence, how is the segmental interaction? And unless and until all of these are performed well, you wouldn't go for a progression, right? So unless and until all of these are performed well, you wouldn't go for a progression. If these are not performed well, you would try and go for a regression, right? So reduce the weight, reduce the reps, right? See sometimes an athlete would be able to, or your client would be able to perform, say they're doing it with 10 kilos, but can go on only for three reps. Would you push them for 4 or 5 in a compromise technique? Probably not, right? So that's what you need to keep looking out for, are these key variables. Now in terms of the hip hinge, and we've spoken about this earlier, that when we look at the fundamental movement patterns or these exercises, they're often designed or are included in the training programs based on the sport that you play, right? Which is one of the considerations. So where would you find a hip hinge dominant sport, or where would it be important? So that's when you go in for needs analysis, which we've looked at in the previous few modules.

So it's quite important to develop hip power, where hip power is absolutely important, and your posterior chain strength is important, right? So examples of those to sport quickly would be weightlifting and sprinting. So for sprinting, you need those muscles around your pelvis, your lower body muscles which are quite keen. You need that hip power to explode through. It's an explosive activity, isn't it? And you also need your posterior chain to propel through. So, for sport like weightlifting and sprinting definitely would include good hip hinge movement in your training protocol.

And the coaching cues and considerations here would be around keep the bar close to the body, just quickly brushing through, maintain a neutral spine, you engage the core throughout the activity, right? Because that's a stabiliser, so your core here is your stabilising muscle or stabiliser, right? So you'd engage your core throughout and your teaching progressions would be you would have a hip hinge with a lighter weight or equipment. You could also start with, you know, those wooden sticks that you find in the gym. So you can start with them and then build on to the barbell or build on to the weights, right? And then do a kettlebell deadlift because it's independent, you can move on to that. And then you would actually go for a traditional deadlift which is your bar, right? Another important category is your knee dominant according to the lever. So we've looked at two examples of a hip dominant movement which is your hip thrust and your hip hinge.

Let's delve into knee dominant. So what's an example of a knee-dominant movement? Could be a single leg squat, right? Now do know that you have the hip involved as well but because it's unilateral you have, you know, single leg squat wherein the knee plays a crucial role because there's a lot of balance, coordination, control that's required. So again,

going through our protocol as we did for the last two exercises, major muscles would be your quadriceps because there's knee extension that's happening and of course your glutes and hamstrings as well, right? Because you're going into a hip extension as well. Right, so your major muscles would then be these, plane of action would be again sagittal plane, it occurs in the sagittal plane because it's flexion and extension. So any flexion extension movements happen in the sagittal plane. So in this side, if you look at the joint actions that are happening, so let's just put that there, joint actions happening are knee and hip flexion-extension, right? So that's what is happening.

So quickly moving on to the technique for the coaches, so coaching cues would be the non-working leg you'll have, you know, the leg would be extended or you would be standing straight, maintain good balance and control because it's a single leg squat, you would have weight in your hands, and you will have a controlled ascent and descent, so the controlled movement when you're performing it, right? So make sure all of these are working well when you're doing a single-leg squat. Another example of a knee-dominant exercise would be the lunge, right? We're all familiar with lunges, it's a very good and a common exercise, important to be included in pretty much every client, good for daily activities or your athletes performing different sports as well, right? So lunge is extremely important. Going through our protocol, major muscles would be quadriceps, glutes, and hamstrings, of course, and your core pretty much for most of these exercises that involve the lower body or your pelvic muscles would act as stabilizers, right? So glutes, hamstrings, quadriceps, and your core as stabilizers. Chain of action again would be sagittal plane as there's flexion and extension happening at the knee and the hip, right? Pretty quick. And coaching cues would be to step forward, so when you're stepping forward, you need to have good balance, you need to maintain good balance because you're doing that along with the weight, so you need a good stable trunk or you need good engagement of the core, so the trunk and the core are acting as your balancing or your stabilizers, whereas you're maintaining right-angled front knee, right? So your front knee is the one that's having the most effect.

Breaking this down into phases and sub-phases, so the same thing that we did for the deadlift, let's look at phases and sub-phases for the lunge. Initiation, which is nothing but our start, so our start position would be preparing for the lunge where we activate all of our stabilizing muscles, so activation of all the stabilizing muscles, which is your core. You also then have the descending phase because that's when we go down, so that's the downward movement, go into a forward step where there is controlled knee flexion, so there's controlled knee flexion happening. So what happens when you have a controlled knee flexion? You have eccentric contraction, so your quadriceps and your glutes that are your knee extensors go in for an eccentric contraction as you get into the descending phase, so there is controlled knee flexion there. So once you reach the lowest position, so your lowest position is now stationary, so once you've reached there, so that becomes your event

of interest, isn't it? Because you need to know what is happening at that point in time, so that's your event.

All of these are your phases, so full depth of the lunge, so make sure you're achieving the full depth of the lunge, again there's no point increasing weight or going on to lift heavier weight if you're not able to achieve the full depth for the lunge, right? And then there is balance and control while you're executing that movement, so you're activating your stabilizers, right? So that's the lowest position. And then from the lowest position, in that weighted position when you're ascending up, so you're moving up, that's the phase, you're returning to the start position, that is when your concentric contraction is happening at your quadriceps and glutes, right? Because they are your knee extenders, so your knee is extending, your hip is extending as well, so these are your major muscles that would help you to concentrically contract ascending up in the phase. So your key variables there would be to look at stride length, so whenever you're doing your lunge, make sure that you're not too fast stretched out, but also the length is not quite short, and the stride length would also depend on the variations, so if you're keeping one of your back foot on the bench or if you're keeping one of the front foot on the bench, the stride length would vary as well. So this is quite an important factor that you have good balance and control and at the same time have appropriate loading alignment, stride length is a quite important factor. You're also looking at the knee tracking over toes, you don't want to overload your ankle, so if your knee goes beyond the toes, you would be overloading your ankle joint, right? Because there's a lot of dorsiflexion happening there.

And then you would have your trunk stability, which is quite important, balance and coordination, that is maintaining your posture while you're doing the exercise. So that's the lunge movement analysis for you, so you see how every time that we've looked at now, every movement which is complex can be broken down into sub-phases, phases, events of interest, and you can scrutinize what exactly, what muscle is working and what's the action. Right, so some of the coaching considerations quickly for lunges in terms of the knee analysis, single leg stability, so any movement in sport that requires single leg stability or explosive movements both quite essential to have lunge, and you would find these in quite a lot of sport, right? So, say, for example, in badminton, you get into a lunge position, or in tennis you get into a lunge position, right? Or some variation of it or in basketball because you need to, you know, execute your jump from a single-leg position sometimes, right? So your single leg stability needs to be built up or soccer, again quite important because you are kicking with that single leg, right? So knees analysis, single-leg stability sport, coaching cues and consideration, quite quick, maintaining a neutral spine, you all know that by now. Again control, descent and ascent, ascent, sorry, right? So you're moving up and down in a controlled way, you ensure proper knee alignment and good posture, so your knee is tracking over the toes and there's proper alignment and also in order to progress you gradually do that with weight and complexity.

So you can have normal lunges and then weight them out and then, you know, have walking lunges as well. So the teaching progression here would be bodyweight lunges, so you would always start with them, and once you've got all of those key variables that you've looked at, then you would have forward lunges, you also have reverse lunges to build that balance and control using weights, walking lunges and then weighted lunges along with walking, right? So these are some of the teaching progressions that you can have a look at. Let's quickly dive into combined hip and knee movements. So we've looked at knee dominant and hip dominant. So what would be a good example of hip and knee dominant, right? A good example would be a box jump, right? So, box jump is a really good plyo exercise if you're looking at including any plyometric stuff, box jump is quite ideal.

Major muscles, again there would be the big muscles of your lower body, quadriceps, glutes, and hamstrings. Plane of motion would be sagittal plane, so it's a drill for you by now, you know, that we've established what's the anatomy, what's the plane of action, so we should be able to go through these pretty quickly. And in your coaching, just make sure because you're landing on the box from the ground, you know, from the flight phase, running onto the box, that there is absolute soft landing, isn't it? You don't want to thrust the ground, right? And then there's knee tracking over toes, again you're not going beyond because if you do go beyond, there's a tendency to fall. If your center of mass or your body is quite behind, so if your knees are not over your toes, then you have a tendency to fall back as well, right? So your landing technique is quite important. And of course you're engaging your hip and knee extensors during takeoff, right? So absolute crucial here is when you're taking off from the ground, you're utilizing those ground reaction forces, generating forces using those hip and knee extensors during your takeoff, right? So in terms of our examples, let's look at another one, which is your squat.

So we've looked at box jump where you go onto the box. This is the opposite squat where you squat into. So it's a hip, again, an example of a hip. Another example where you're hinging at the hip, right? So that's the squat. So the major muscles here would be your quadricep glutes and hamstrings again.

How do these each play a role? Let's look at them in the next slide, but for now, let's move on to the plane of action. Plane of action again is sagittal plane because there's flexion and extension happening at the knee and the hip, right? So that's what's happening at the hip. And coaching again would be absolutely crucial for squat is maintaining neutral spine. So a lot of the times, you can commonly observe in the gym that you have athletes or clients stacking on weights, you know, increasing a lot of weights, but compromising on your spine, right? Now you would have a lot of weightlifters that have a belt that helps them to gain that additional support from the lower back, right? But for an athlete, if you're trying to build it so that they can sustain longer with that type of a weight, probably not ideal to put that belt, probably not ideal to move to those weights.

Let's start questioning these things. Do they need to lift that heavy or do they need more reps, right? That's more important. So knee stacking over toes again, equal weight distribution over both feet, again, quite important. So you're having an equal good control of the barbell or of the weight on both the shoulders, both the feet, so that there is no loss of balance, right? So those are some of your coaching cues. Let's break the squat down into phases and sub-phases, right? So again, feet would be shoulder width apart, you're engaging your core muscles, so that's quite important. You don't want to have them too narrow, you don't want to have them too wide, but as when you're doing a wide-leg squat, you would have them wide, right? So, for a normal squat, your feet need to be shoulder width wide.

So that's our initiation. Now you're going down into the descending phase, again, quite controlled, decent, so you don't want to go down pretty quick. If you're doing velocity based training, wherein you're working on the explosiveness, then definitely you would have a controlled descent, but with a slightly higher speed, right? So that's what you would do in a velocity based training. Eccentric contraction of the quadriceps, that's what is happening, and gluteus maximus. So on the other end, because you're going into a hip flexion and knee flexion, the knee flexors and hip flexors, for example, your hammies, they would be your hamstrings, they would get you into a controlled descent position, wherein they'll be concentrically contracting. So when you reach the lowest position, make sure you achieve the depth of the squat.

Sometimes, the goal is to have a deep squat, sometimes it's just a quarter squat or a 90-degree squat. Make sure you know what the goal is, achieve the depth of the squat, right? So quite important. Before you move on to increasing weight. So if your athlete is just able to do a quarter squat, when you want them to do a 90 parallel squat, there's no point increasing the weight, isn't it? So let's achieve that full range of motion to get good effect of the exercise and make sure you're engaging your core as well along with your neutral spine during that depth. Once you've reached the lowest position, from there on, you start the ascending phase.

Most of the time you will be able to see that athletes and clients, again getting onto heavy weights, are able to get into that position, but after a few seconds, to come up from that position is quite difficult. What that would tell you is, your muscles, your prime movers that are concentrically contracting during that phase, which are your quadriceps and glutes, are probably weaker as compared to your hammies. So that's why they're not able to handle that load. So that's when you can get into understanding muscular balances or imbalances, right? So return into the start position. So before you move on to increasing your weight, you might want to work on these muscles so that they have adequate amount of strength for you to stack on more weight.

These are your phases and sub-phases, and that leads us into what are the key variables. So key variables there would be, again quite important, is your hip hinge mechanics, knees tracking over toes, overall posture, so your torso is not too leaning forward, and you're not even having your body weight put back, your center of mass is within the base of support as we've looked at in the fundamental movement, right? So that's your overall posture with good control and good lineage of the torso. You have good balance and stability during the movement. So quite important before we move on to any progressions or if there's a need for regression, make sure you're having a look at all of these key variables that inform you biomechanics of the movement, right? Now where would be the squat would, sorry, scrape that, let's do that again. So where would a squat be important, right? In what sport? Pretty much all sport because a squat is a squat is a squat.

There's no alternative for this exercise. It's an important exercise when it comes to working at your posterior chain, your lower body strength, power, explosive power, depending on what your goal is. So in terms of needs analysis, I would pretty much say all sport, but the aim here is to develop lower body strength and power. Examples of a few sport would be wrestling. They're quite often in that squat position, powerlifting, and also tennis. Again, they're moving in that lower-down squat position, right? So it's an important exercise for them.

Some of the coaching cues and considerations for when you are teaching squat would be maintain a neutral spine. We've looked at that, controlled ascent and descent. There's also maintaining appropriate knee alignment, right? Progression with weight and complexity. So that's pretty much there for every exercise, and teaching progressions in this would be, of course, there would be a body weight squat.

So you would start with that. Then you would move into a goblet squat. So goblet squat is one with a kettlebell. So that introduces little weight, right? Then you would get into a front squat. So front squat would be when you have the barbell across your chest, you would have that grip, and then you're going into a squat, right? So that helps you in terms of weight distribution. And then you move into a back squat, right? So that would be your progression.

And from back squat, then you can keep on adding weights. So you add weights, increase weights. So that would be your progression line. In terms of regression, of course, you can move back as in how your athlete would need it based on what timeline they are in your in their own training programs, right? So these are our consideration or coaching considerations for the squat.