Exercises - Part 3

Right, so we've looked at the lower body exercises and some of the common ones and they depend on the lever based on the main lever that's there. So we've looked at lower body exercises based on lever classifications, hip dominant, knee dominant, and hip and knee combined, and we've done some movement analysis. Let's look at horizontal pull. When it comes to the upper body, you can differentiate the exercises as we've looked at quite earlier into pull and push and into different directions of horizontal and vertical as well. So let's look at horizontal pull. So what would be an example of horizontal pull? It could be a row or, as you can call it, a seated row.

Seated row, a variation would be bent over row. So different variations of row. So that's when you are using your muscles of rhomboids, your upper back muscles, so secondly your deep layer muscle which is a rhomboid. You'd also be looking at traps or trapezius which go from your upper traps here to your down to your mid-backs, that's your trapezius muscle.

Pectoralis major, just quickly breathing through, that's a major chest muscle, so that's your anterior side, so that's pectoralis major and you also have your deltoids, right, which are on your upper arm. So these are the major muscles of the row. Plane of action would be transverse plane because you know you're doing you know horizontal pull, so horizontal pull happens in a transverse plane and some of the coaching cues there would be maintain a neutral spine. You can see how again maintaining a neutral spine becomes quite important even in the upper body exercises, so good posture, good spine, avoid rounding off of the shoulders, so make sure when you're doing a row you're not rounding off when you're leaving the weight. You're nice and neutral, right, and the pull needs to be controlled of course all throughout the full range of motion.

You would see a lot of the times your athletes or your clients leave weight midway, they don't go for the full extent of the movement or they don't go completely squeeze back or retract the scapula, right, so it's quite important that you go through the entire range of motion along with that weight to achieve the maximum out of the exercise. So breaking it down into the phases and sub phases, just let's have a look. So there's we are in this example looking at a bent over row, so don't be confused by why would there be a hip hinge, so that's a bent over row, right, so you hinge at the hips, that's your start position, you maintain a neutral spine, so that's your start position, right, and then you activate your core or your posterior chain muscles, so that's because you're in a hinge position, so that's what you would activate. Then would be the pulling phase, right, so that's when exactly the pulling happens in the horizontal direction, and what you're doing there is you're pulling the barbell towards the lower chest, right, so that's where you would be pulling it to the sternum, right, or you would do it with the dumbbell, right, so you would depending on what you're using for your row, so pulling the barbell in this case towards the chest, concentric action again of the rhomboids and traps that are situated on the posterior side, right, so that's posterior

and that is mid-back, so that's what you're that's what it is targeting, your mid-back and upper back, right, mostly the mid-back. So that's your pulling phase.

When you are lowering it down again, it is make sure a controlled descent. You can see how every time you're lowering the weight, which is moving more towards the gravity, right, you are having a controlled descent in that scenario, right, so you're not having it's quite important for injury prevention as well is the weight is lowered within a controlled manner. So your barbell is in a controlled descent, and of course these prime movers, so prime movers are the ones that have the concentric action are eccentrically contracting in this scenario, right, while lowering. And your key variables across these phases to look at is of course, your hip hinge mechanics; again, you can't have an arched back. You need to have a good neutral spine, and very important here as we've spoken even in the previous example, is your scapula motion, right, so you make sure that you're retracting your scapula well and you're achieving that full range of motion as you spoke about, no arch, right, and it is a controlled movement. So that's what we're looking at when we look at the movement analysis of a horizontal pull. The next classification here would be a vertical pull, so the direction here would change, so let's have a look quickly through our process of a vertical pull.

So an example would be, a classic example would be a pull-up, again whether you move in the upward direction or you push the weight in the upward direction, right, so, oh sorry, you pull the weight down in the downward direction, so that's your vertical pull, right, so your lat pull down is also a vertical pull, wherein you are pulling the weight down, right, so in a pull up, you are pulling the body up, so that's your vertical pull example. So major muscles here would be your lats, your latissimus dorsi, and then you would also have biceps brachii, which is your bicep muscle, your pectoralis major and your deltoids, these are all the major muscles that are acting up in the pullup. Plane of motion here is the frontal plane, so that's where it is happening, that's your frontal, so that's your frontal plane. Shoulder adduction is what's happening, and your elbows are flexing as well, so right, you're having an overhead shoulder adduction, right, so your shoulders are moving, you're adducting, and then your elbows are flexing as well, from an extension to a flexed position. So hence, the major muscles of shoulder adduction and elbow flexion.

So the coaching here would be extremely important to maintain neutral spine, and you pull through the entire range of motion, right, so that's what you're working on. Let's divide this movement into its phases and sub-phases, so initiation, which is your start position, you would start with a hang, so you'd grip onto the bar, grip again depending on whether you're progressing or regressing, so you would go for an extremely wide grip because that will not be good for your shoulder anatomy or loading on your shoulder joint. So from the hang position you're activating your core or your stabilizers, so that's what they're there for. And then you have your pulling phase, so from the hang, when you do an upward pull, make sure that your chin clears the bar, so that's your range of motion that you're working

through, and your concentric contraction is happening with your lats and your biceps brachii because that's when your elbows are flexing, and your shoulders are adducting, right, overhead adduction. So that's your pulling phase.

When you come down to the lowering phase, you're having a controlled descent, so you're getting back into the hang, so make sure again, it's very important. Otherwise, you go quickly into the hang position, not good for the shoulder socket or the shoulder joint, because there's a lot of body weight, so you move into it, it tests the laxity of the joint as well. And there is eccentric contraction happening of the prime movers, which are your lats and your biceps and brachii, right, so quite important. And your key variables to study again through these phases, like the horizontal pull, here because you're pushing a lot of weight, make sure you have enough grip strength, most of the times, athletes are not able to push through more repetitions of the pull-up because of grip strength. So it's quite important that you then include exercises that focus on developing grip strength or your wrist strength. So you work on those.

Also quite important here is the scapula motion, so as you move up and down, there's protraction, retraction, there's elevation, depression, all of those things happening in different amounts, so make sure that you have controlled scapula motion, and you are not rounding off, you're creating arch even in the upper back. So again, there's core stability, that's quite important. Elbow positioning and strength is important as well because your elbow is going through a different pathway, and that's carrying or propelling your body forward, sorry, upward. So it's quite important that you have all of these key variables mapped out before you move on to progressions. So, we've looked at vertical pull and horizontal pull, let's look at the push motion, so which is the horizontal push motion.

An example of which would be bench press, so with bench press you're pushing the weight away from the body whereas with the push-up you're lowering down. So both of them are horizontal press. Major muscles there would be pec major and your deltoids, that act mostly as your prime movers, whereas your lats and your triceps brachii while performing the mean action are your eccentric or your antagonist muscles. So that's what you're getting into because when you're moving away in terms of a push-up, that's when your triceps brachii gets activated and that's because you're performing an elbow extension. So with major muscles your plane of action here is your transverse plane, it's all happening in the transverse plane, and you are getting into shoulder, when you're doing bench press you're adducting your shoulders as well and at the same time there is elbow extension.

So that's what is happening when you're moving down into the push-up position you're of course abducting it and getting back into the adducted position. So quite important that you understand what movement is happening, and based on that movement what muscles are important for that particular movement. And then you get into how do we develop them, how to develop the strength, what's the rep, what's the intensity. So the coaching

cues again here would be a maintained neutral spine, quite important specifically during bench press, and then you get into a controlled pull, sorry that should be controlled push, my bad, and through the extended range of motion or the full range of motion. Breaking these down quickly into phases, so we get down into the lowering phase that is where you are lowering down the bar, so bar to the chest, make sure you're not hitting on the chest or thrusting on the chest, quite important right.

So you have a controlled descent, again there's eccentric contraction in that scenario of the prime movers of this movement, whereas in the next stage where is your lowest position which is your EOI or your event of interest, bar is to the chest and you activate all your stabilisers. So all your stabilising muscles, your rotator cuffs and all of the traps and everything, they get activated and they are the ones that are holding the weight. From then on, when you go on to the lifting phase, there is concentric contraction of your shoulder adductors and your triceps precyi, and deltoid as well, primarily anterior part of the deltoid, so anterior deltoid. So that's when you're pressing the bar, that's when the lifting piece is happening. The key variables here to look at would be, again grip, strength and width, quite important for your progression and regression protocols.

Grip strength again in case of low wrist strength, you would have issues pushing the bar or holding the bar as well, of course maintaining balance as well. And quite important in these scenarios, when you're doing a horizontal push, if you're doing it with the barbell, there would be tendencies where if your one limb has more strength than the other limb, it would be compensating. So, in cases where you would want to train on equal strength, try doing bench press with unilateral, sorry bilateral weights, so independent weights, which is your dumbbells. If you're doing it with dumbbells, you would know if your one hand or one limb is weaker than the other, and then you can train it accordingly. So make sure you incorporate those into the workout as well.

And of course you would look at elbow stability and the path of the elbows, so you can track it, and scapular motion again quite important, retraction and the retraction path, and this core stability as well, quite important that you have good core stability. Now that we've looked at horizontal pull and push, and horizontal push, the last one that remains is the vertical push. An example of that would be your shoulder press, so you're pressing the weight overhead, or in a vertical direction, major muscles there, again would be the deltoids, specifically the anterior one, and triceps and mid one as well, so middle deltoids as well. Triceps brachii because you're getting into elbow extension, so that's your movement that's happening, and lats and rhomboids as well because you're pressing the weight up. In terms of the plane of motion, it happens in the frontal plane, you're going in for a shoulder overhead adduction, and elbow extension as well, so you're extending your shoulders, and you're going in for adduction.

So quick way, I don't know if you've covered that in module 2, but if you're confused between adduction and abduction, a good way to remember it is if you're adding, so adduction has the word add, so if you're adding to the body, right, or close to the body, that becomes adduction, whereas if you're moving away from the body, which is abducting, that is moving away, right, so in shoulder press, you're moving close to the body, so that's shoulder overhead adduction and elbow extension. In terms of the coaching, the cues that you're looking at is maintain neutral spine, again a controlled push through full range of motion. Taking these down into our template, so phases and sub-phases, you would have a lifting phase. If you want to move through these exercise without knowing the answers, I would suggest pause on this slide, go on through the protocol, and it would be a good practice for you to understand how do we break it down, and then you can of course come back and have a look at the answers, right, or join the conversation. So lifting phase would then have push weight overhead, there would be concentric contraction, so your prime movers are your deltoids and tricep because you're going in for a knee, sorry, elbow extension and shoulder adduction, right, so that's your lifting phase, and from your lifting phase, you get down into the lowering phase, right, so when you're lowering down the weight, controlled descent of the weight, and then there's eccentric contraction of the same prime movers that get into the, so for the elbow flexion, these are your eccentric contractors.

And the key variables in this scenario would be again grip strength and width, quite important for progression, and then your elbow path, quite important again, we've discussed this quite by now, and your scapular motion stability as well, quite important because you're elevating and depressing the scapular, that's the motion. Now that we've looked at, you know, some of the movements that are categorized by dominancies, so whether it's lever dominant or whether it's direction dominant, there are some exercises that can be categorized into directional, right, so for example, rotation. So rotation can happen in your transverse plane, so purely in your transverse plane, or you can also have diagonal rotation, so let's look at some examples for rotational exercises and your diagonal rotational exercises, movement analysis for those before we conclude on this module, right. So for rotation, the example would be a med ball throw, so if you're doing a medicine ball throw, just for the confusion, if there is, that is medicine ball throw, so you, you would have been aware of what a medicine ball is, it's basically a weighted ball, you know, coated with some kind of a rubber or plastic material that's used for, or used to develop explosive strength, right, and that's why they're quite key in plyometric workouts. So example would be medicine ball throws, your major muscles in this scenario would be your obliques, your rotator cuffs, right, and your rectus abdominis, which is your core muscle, and your latissimus dorsi, right, which is your fan shaped muscle.

So these four are your major muscles when you're doing a medicine ball throw, the plane of action would be your transverse plane, so rotation always happens in the T plane, which

is your transverse plane. The coaching cues here would be, it's quite important when you're doing any kind of rotation, or if your sporting skill has rotation, it's always important to look at how the different segments are coordinated, how the force is transferred and generated, right, and what's the sequential way, right, so for sequential activation of muscle, you need to have a proper sequence of segmental interaction, right, so that is quite important, right. So the coaching cues would have good coordinated and sequential activation of muscles through segmental interaction. Now breaking this down into phases and sub-phases for the medicine ball, it would, medicine ball throw would be, first would be the mind up phase, right, so you would take the ball and you would wind up, what would you do in that scenario, you would have the weight away from the target, right, so you would take it away from the target, which gets the obliques into a pre-stretch, so your obliques are your diagonal muscles, right, so diagonal core muscles, so you get them into a pre-stretch, so you're loading on the elastic energy, and then that's in the wind up phase, and your rotator cuff muscles as well, because you're holding the ball, right, and you're moving away, and once you get down into the throwing or the execution phase, there is a rapid rotation, so you're building all this pre-stretch energy in your obliques, and then you're getting it into the throw, which is towards the target, right, so that's when the concentric contraction is happening to generate the force, right, so that's your throwing phase. And then after you've thrown, you decelerate back again, so either you decelerate if the exercise involves some kind of a catch back again of the medicine ball, or you just decelerate back, right, there is eccentric contraction happening, and make sure that's a controlled movement as well, right, and we've already looked at the fundamental movements and the mechanisms or the considerations for a good catch, right, so in order to reduce the impact on the hand, you would have some kind of a pathway for it, or a shape for it, right, so that's your deceleration phase.

And what would be the key variables in this scenario? You would, in rotation, always, apart from sequential kinetics and kinematics, you would look at hip and shoulder separation, right, so how does the hip separate from the shoulder and the kinematics of that, both of which could be studied with 3D motion analysis, as we've looked at even in the fundamental movements module, and you can look at the quality using the video cameras as well, right, so that's where you would do your qualitative analysis. So you would look at how is the hip, so you would always start with the hip, and then it transfers onto the shoulder so that timing or that separation angle is quite important to know, right, and then you have a stable trunk and core, and you also track the arm and the hand pathways, so you don't want it too far away from the body, you don't want it too close to the body, you have an optimal arm and hand length through which the medicine ball part travels. So let's look at one of the last categories for this module in terms of categorizing the exercises, which is the diagonal rotation, as the name suggests, as opposed to a pure rotation, this would be diagonal in its form, right, so it's a diagonal rotation. So where would you find these? Let's look at an example, so a classic example of this would be a wood chop, right, so as the

name suggests, it's mimicking the action of chopping the wood, so that is how you could chop, a performer would chop, or that would be how you would diagonally rotate your body, right, so both of these would have different considerations. So major muscles here again would be your obliques and rectus abdominis, it's extremely important exercise for your obliques because they would have both these directions, so the fiber directions would be in these two, as these two arrows have been shown, so obliques would be your prime movers and your rectus abdominis as well.

The plane of motion would be two in this scenario because it's an oblique action, so it would be transverse plane, so the rotation is happening in the transverse plane, plus it's also happening in the sagittal plane as well, so that's your diagonal rotation. And the coaching cues for this would be to maintain a neutral spine; again, you don't want to have arched back, right, or any kind of rounding. And quite important here is to have controlled and coordinated activation because you're going to have lots of different muscles, and the muscle is multi-planar as well, which is across both planes, you would need that good segmental, you know, interaction and also good coordination of the different muscles that are activating during this movement. Breaking it down into sub-phases, you would have the start position of a wood chop is to activate your stabilizers, you would have the weight pulled away from the pulley if you're doing it using a pulley machine, and you would activate your core, all of your stabilizers, so that's your start position, right. From there on, you get onto the chopping phase, right, so that is exactly where your diagonal rotation is happening.

So that is when you perform a diagonal chop. Now if you're chopping that way or you're moving the other way, depending on where would you station your weight, that's concentric contraction happening of the obliques and the rectus abdominis, so that's your actual main phase or your chopping phase. And then the other one would be to return back to normal, right, so that's your return phase, so in terms of, you know, getting the handle back to its start position, there is controlled eccentric contraction. Now again, if you are working on eccentric loading or eccentric contraction, make sure that that is controlled, and you're able to handle as much weight to get it back to that start position, right, so no snapping. Key variables for this exercise would be to have a look at the stance and foot position, you need to be at an optimal distance from your cable, not too close, not too far, so you can have maximum output from this exercise.

There's also torso rotation that's happening, so again, that is quite important as a variable to look at, that you're able to rotate through well and through a good range of motion, so that's controlled torso rotation. And you would also track your arm trajectory, so again, not too far away, not too close, you're at an optimal distance from the weight from the pulley to be able to get maximum out of the exercise. So now that we've looked at all of these exercises, done some movement analysis, we've dived deep into functional anatomy, looking at planes, type of muscle action, the major muscles that have been used, primary

movers, antagonists, stabilizers, their role, you can see how we've been applying all of these principles, right, to exercises as well. And the next module, you will be looking at how do we then apply these to the sport. So, hopefully, this module has given you a bit of a fair idea into designing exercise programs.

Of course, to look into exactly what exercise do you prescribe, details of your repetitions, intensity, load, progression, and regression, you would have to delve deep into the programming side of things. So there would be another module, which is the strength and conditioning, if you want to have a look at, that dives deep into this, right. So, for a quick summary, we looked at exercise, it is a planned, structured, and repeated physical activity performed to enhance or maintain your physical fitness and overall health, we're quite aware of that. And well-rounded training programs, we've looked at what those considerations are for well-rounded training programs that help in the overall development of the athlete, right. So they enhance their physical capabilities, skill in the context of their specific sport as well, right.

And we've looked at different categories of the exercise. So how do we categorize the exercise based on actions, push and pull, direction would be vertical, horizontal, and rotational and lever involvement, which would be hip and knee dominant. So hopefully this module has provided you with an insight into how do we design exercise programs, what are some of the considerations for different individuals, for your different clients from a human movement principle point of view. And also the other way around, how do you apply human movement science principles to exercises. Thank you.