Video Lecture 9A (with slides) Planning a speed session and planning a strength session







Hello, and welcome to Video 9A of your series for Knowledge and Application of Personal Training

Hello, and welcome to Video Number 9A where we're going to be looking at Planning a Speed Session - and looking at Strength as well. We have put together these components of fitness in this order where we've talked about

- flexibility,
- cardiovascular
- planning a session,
- speed,
- and then we'll be looking at strength.

But their priorities might be in a different order.

And what do we mean by that? Well, we need efficient movement in our bodies, and we need to be able to coach our clients to move well. We need to have a baseline of fitness so that we can attain higher levels of performance, whether that be related to sports performance or life performance as well - being able to move quickly at speed, ensuring that we have a foundation of health and fitness to support this. If we don't effectively programme, if we don't put together the components in an appropriate way, then this is where injuries can occur and our clients will not attain the fitness goals, the lifestyle health- ambition goals that they set out with at the beginning.



So it's very important to have this awareness when building and developing and taking somebody on their journey. So - planning a speed session.

When we're looking at speed, if we're looking at the FITT principle - and this is not an exclusive rule that it must

be done in this way, but an example where we're looking to develop speed. We're perhaps looking to have three sessions a week at a very high intensity timeline of about 10 minutes. And the type of training you'll be doing: allowing acceleration sprints, including an appropriate cool down. This is a particular snapshot of a session.

Speed

Speed

Warm up: 10 minutes including stretches. Main session: (FITT principle) F - 3 times per week I - Very high T - 10 minutes T - Hollow & acceleration sprints Cool down: 10 minutes

including developmental stretches.



There are some high-level performing athletes who do three-hour speed sessions. Now what can we learn from them? Well, what they do, is they allow for lots of recovery. And if you cast your minds back to when we talked about cardiovascular systems and training the cardiovascular system, we need to be aware of performance time and recovery time to enable us to focus on that component of fitness. So you can't work on speed and develop speed unless you've got positive movement. You cannot work and develop speed unless you've got a baseline of cardiovascular health and performance as well. And also you then need to develop certain levels of strength to progress and further develop your speed play work. So all these components need to be put into order and you can start to see from how we constantly go and revisit the FITT principle, (frequency, intensity, time and type), that altering one of these elements will change the type of component of fitness that we are working on. So if you're thinking about making your clients faster, and obviously we talk about (and we initially will think about) running, but you may want to talk about arm movement and speed play with the hands. Hand-eye effective coordination as well to enable speed and sprinting. And how we then build that into a session or a programme and how we make it relevant to our clients, whether they be top sports performers, amateur sports performers, or people in general life to life.





Other methods of speed training:



Hollow sprints (2 sprints divided by a walking recovery period);

From standing; sprint for 10 metres

Walk for 10 metres, then stop From standing; sprint for 10 metres

Repeat the above 6-8 times

Ensure an appropriate warm up and cool down

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Acceleration sprints (rolling start to jogging, running, sprinting & maximal effort);

Jog towards the start line (rolling start)

Jog 10 metres

Run 10 metres

Sprint 10 metres

All out maximal sprint effort for 10 metres

Repeat the above 6-8 times

Ensure an appropriate warm up and cool down

The need for speed is appropriate. Being able to have that external stimulus of seeing something and being able to then move your body perhaps away from danger - stepping into a road and immediately seeing a car is coming and taking a quick step back. We have the balance, agility, strength within the ankles, knees and hips and the muscle action to enable good speed and movement that we could get out of the way of a moving vehicle quickly. This is just as an example of how we can make speed relevant.

Also, doing speed work with clients is a really good way of bringing some enjoyment to your PT sessions - something a little bit different. It doesn't have to be towards a particular goal or ambition. It's something that is looked at now (this type of intensity) - people look towards speed sessions as a means of getting attainment of fitness and health goals in a short period of time. Going for speed sessions and doing sprint works will get me fitter or drop more body fat than doing long endurance, continuous cardio work, where actually, they work together in a relationship with each other, not exclusively separate from one another.

So what do we mean by that? Well, you can start to bring in explosive movements, because often that's what life presents us with - different types of demands on the body. To react quickly, to do something quickly, run up the stairs in the house quickly, run up some flights of office stairs and be able to maintain a conversation when you're at the top - or recover quickly from breathlessness. So this is where we can build this in. And there are athletes, as I said before, who do three-hour sprint sessions. But building performance time, which is small periods of time, intervals of recovery to enable them to continuously do so. But if you haven't built that base-level fitness primarily, you're not going to have any advantages in your speed.

So look at your clients' needs, understand where they are in the journey and start to have a bit of a play with some of these ideas. Try and do some training yourself. Consider if you've been for a strength session a few days before, and then you're going to do your speed, how does your body feel? Are you getting the most out of the session? And these are some of the conversation points you can have with your clients to see whether you've programmed effectively. You might get through a particular training session, let's say a speed session. Let's say you're going to do a 40 minute speed session: 10 minutes warming up, 10 minutes performing, 10 minutes cooling down. By the end of it consider,

"Have I achieved what I wanted to? Have I had the necessary impact on my body that I wanted to? Have I performed to the levels?"

If you're tired and fatigued from previous scheduled training sessions, working on different components of fitness, you might have a conflict in your programming and you need to review that. It's good to experiment on your own and look at your own training and look at your own impacts, so you have that empathy when you're scheduling it with your client. Different people of different fitness abilities will be able to have more advanced scheduling of training sessions, working on different components of fitness. Then other clients: you may need more time being focused on base-level fitness before they advance.

And think about how you can adjust - and all the adjustments you can make - to time working, distance traveled, time recovery, and the types of movements that are taking place.

- Are you walking, into a run, into a sprint?
- Are you standing still from a static position into a full hundred percent sprint position?
- What's the difference?
- What's the impact on the body?
- What energy system does each one work on?
- How is that relevant and necessary for my client?

These are really good ways to start to incorporate speed and develop speed. And here again, in the slide below, you can see a little bit of an example of interval training, all focused towards speed. Variant of times and work done and recovery that is being allowed so he can have that top level performance.



SPEED

'Sprint interval' session with work: rest ratios of 1:3. Set 1: 10 second all out maximal effort sprint with a 30 second recovery. Set 2: 15 second all out maximal effort sprint

with a 45 second recovery. Set 3: 20 second all out maximal effort sprint

with a 60 second recovery. Set 4: 25 second all out maximal effort sprint

with a 1:15 minute recovery.

Set 5: 30 second all out maximal effort sprint with a 1:30 minute recovery.

Set 6: 35 second all out maximal effort sprint with a 1:45 minute recovery.

Set 7: 40 second all out maximal effort sprint with a 2-minute recovery.

Set 8: 45 second all out maximal effort sprint with a 2:15 minute recovery.

And so we go into strength.

Strength is defined as the ability of a given muscle or group of muscles to generate muscular force under specific conditions. And what do we actually mean by that? Well you may need to review and reflect on your own strength training. And this is something that we do quite a lot with ourselves and perhaps with our clients. Thinking about:

- How did we train in our twenties? Why did we train that way? How did we eat?
- How are we going to train and perform in our

forties, fifties and so on?

- Does the training need to change?
- Are our outlooks looking different?
- Why and how can I structure my training session

according to my needs?

So as part of that, when we're thinking about strength training: we're going to make relations back to flexibility, to speed and to cardiovascular fitness when talking about strength. When you think about the fundamental strength movements, basic patterns that you'll have to do, what type of resistance and strength are you going to be doing?

What is Strength?

Classically, strength is defined as the ability of a given muscle or group of muscles to generate muscular force under specific conditions (Siff, 1999).



Types of Strength Training

- Fundamental Strength Movements.
- Isometrics, Isotonics, Variable Resistance.
- Isokinetics, Eccentric
- Specific Strength Training.
- Hypertrophy, Strength, Speed-strength.
- Strength-endurance, endurance



Are you going to be working towards a fixed force, applying resistance with the likes of using bands, weights, kettlebells, cable machines, free weights. And what those difference are?

Are we looking at hypertrophy strength, speed strength play? And notice how they're set about different.

Strength endurance or just endurance as well.

Now, strength is one of those foundation components of fitness, where without strength, we will find other performances very difficult to do. If you're going for a run over four miles, over a mile, whatever distance it may be, your body needs to work efficiently to carry the body weight through those performances. So sure enough, if we're not working on our muscular strength with our training, are you working on hypertrophy? What impact is your pro's run having on your muscle density? If we're looking at avoiding injury and building strength, we need to look at flexibility and the efficiency in our movement to avoid injury and have top performance and ensure our body is working efficiently.

Having that base of cardiovascular fitness. If you monitor your pulse and heart rate when you're doing a cardiovascular flexibility speed session, and then monitor that when you're doing a strength session, you see there's differences, but there's also similarities. That by working on this component of fitness, it isn't exclusively only working on this and not in relationship to others. And the same when we work on different components of fitness: that just because it's strength or speed, you're not going to have impacts on cardiovascular respiratory health as well.

So where is all this going? Well, let's think about, what is the main goal of strength training? Is it just simply able to lift a bigger or heavier weight? If you could squat 120 kilograms, is just progressing and being able to squat 125, going to have a benefit on all components of fitness. Simply, the answer is no. Lots of people look at strength and they look at strength training as part of a programme. And the logical thing is that, "I need to lift more weight" -and we need to keep on lifting more weight.

There's so much more experimenting we can do. We can look at repetitions. We can look at types of movement that we're doing - from squats, front-loaded squats, rear squats. We can look at different weights of kettlebells, resistant bands. And if we come back here, can we do strength in all basic fundamental movements: squat, lift, pull, push, rotation, without any pain or discomfort? Can we apply that? If we're doing speed work, we'd be wanting to do some strength training to enable and support speed. We want to do strength training to enable and support endurance. A marathon runner will not be able to achieve their ambition simply going out and doing lots of runs. It needs to have a marriage with other components of fitness and other training techniques to support. Going back to my example, to get faster and be able to run faster doesn't mean that you need to be lifting a heavier number of weights.

So think about that when we're structuring. If an athlete, or if a person comes to me and says, "I can do a 5k run and I want to do it in a shorter period of time", I might be thinking about doing strength and speed work as part of an overarching package, to impact on cardiovascular fitness. And we can take these lessons and we can implement them at lots of different levels. So that's quite important just to consider: what is the purpose of the strength training? How are you going to monitor, progress and measure achievement? And is the monitoring and progressing relevant to the goals and ambitions of your client?

When we're looking at basic periodization principles of strength, we're looking at a high volume of training with low to medium loads to aid integrity, not only of muscle tissue, but ligaments, tendons, bone and joint capsules as well. So this is really important. And this comes into play when talking about doing strength training with young people also. And also (the terminology that's used) geriatric, elderly, senior-elderly people of the ages of 65 and over.

So when we're looking at that type of strength training, we need to understand. And when we talk about tendons, muscles, ligaments, their roles, their anatomy, how they get their blood supply and how they develop over time. We don't get fitter by training, we get fitter in recovery. We don't get stronger in training, we get stronger in recovery.

Basic Periodisation Principles (Bompa, 2001)

Anatomical Adaptation: Foundation on which the other phases of training are based. Progressive adaptation of an athlete's body. Higher volume of training with low to medium loads to aid integrity not only muscle tissue, but ligaments, tendons, bone, and joint capsules.



What current fitness level is your client at? What history of training do they have? How will this impact in the time it takes them to recover from a strength-training session, hypertrophy-training session? By applying resistance to a muscle, you're going to get tears in the muscle fibre. Synthesis need to take place, (protein synthesis needs to take place), where muscle fibres are repaired and as such then grow and develop. Tendons and muscles are the same connective tissue, they're the same element there. However, tendons have a smaller level of blood capillaries. So their ability to recover and get nutrients to recover is diminished. If we look at the basic anatomy of a bicep, at the top of the forearm there, the insertion point at the top of the clavicle and humerus, all the way down to the lower point. The belly of the muscle, (very red muscle fibres visible within anatomical pictures). And we know that the central belly of that muscle can get stronger and bigger and change dimensions from doing resistance-based training.

But it's connected to bones via tendons, which is the same continuous connective tissue from the belly of the muscle, through the tendon to the bone. Tendons, having fewer blood capillaries to them, we would surely say that they will develop at a slower rate than the belly of the muscle. Ligaments are rigid and do not respond immediately to flexibility and strength work needed to enable recovery.

So if an athlete or an individual weighs 60, 70 kilograms and goes for a run, the body is carrying that weight throughout that duration of cardiovascular performance and as such needs to have strength involved. Being able to move a body through a distance or motion within a certain pace of time requires speed and quality and efficiency of movement flexibility helping to support recovery as well. Being aware of these concepts and bringing them into a programme will enable your client to progress well, reduce significant delayed onset of muscle soreness (otherwise related to as DOMS) and have them progress well throughout their programme. Sometimes there's a little bit of a guessing game and you need to be talking to your client and you need to be testing your client when you're applying strength training to see how their body's responding and how you are going to support that continued development.

We have a strength continuum (see slide below) where we could actually go from muscular strength through to muscular endurance, managing different elements such as the number of repetitions, the weight that we're lifting and the number of sets as well.

And they can move from muscular endurance to muscular strength accordingly when you alter them. Let's look at One Rep Max (1RM). So when you perform one repetition with one maximum weight, what is that number? The idea obviously with One Rep Max, is that you shouldn't be able to do another repetition after doing your One Rep Max. If you can, you haven't done your One Rep Max. And working out a percentage of that, this is where we can get really focused on just trying to increase a number every time. But obviously if we look at One Rep Max and have a good estimate as to what our clients One Rep Max is having done the test, we can start to justify our programming. And we may look at the order of our training, whatever the goals and ambition of our client might be.

Strength continuum

ligh intensity	Low to moderate intensity
ery high resistances	Low to moderate resistances
>75% of 1 rep max	> 40-60% of 1 rep max
 Low repetitions (1 - 6) 	 High repetitions (15 - 25)

	1	100	Increased strength via enhanced neural drive
	2	95	(better recruitment of motor units)
	3	90	
	4		
	5	85	
	6		Increased strength plus some hypertrophy
	7	80	
	8	75	
	9		Best hypertrophy gains plus increases in both
A A A	10		strength and endurance
	11		
	12	70	
	13		Increased endurance plus some strength lower
	14		gains in hypertrophy
	15		5 5 7 7 5
	16	65	
	17		
	18		1
	19		1
	20	60	1
Perc	enta	ge	ot 1 RM
		0-	

We then link that to reps and repetitions, what type of weight they should be working on and the types of movements they should be doing. All movements with strength training should be done with intent. If you're lying on a bench and you're doing the bench press, as you press that bar away from your chest, it shouldn't be a smooth, slow movement. It should be lifted with intent, as if you're pushing somebody off your body. Not a short, sharp jerk movement, but a movement that is continuous for full range of motion, good performance, but lifted with intent. And that will have a real impact on your clients when you're training them.

Objective	Muscle strength	Muscle size	Muscle Tone	Muscular endurance	CV
Reps or duration	1-8	8-12	12-15	15-20	20 mins -
Recovery period	3-5 mins	1-2 mins	60-90 seconds	30 > seconds	N/A
Sets per exercise	3-5	3-5	2-3	2-3	1
Frequency per week	1-2 on each muscle group	1-2 on each muscle group	2-3 on each muscle group	2-3 on each muscle group	3

Meeting The Objectives

Thinking about what the objective of your client might be. We often talk about toning up and what does that mean to people? But if we're not looking for numerical strength, your client might say,

"I don't really mind about being able to bench press a higher number, but I want to tone. I want to be leaner. I want to look better."

There you have the difference between muscular strength, muscular size, muscular tone, doing weight training for muscular endurance or cardio-based aspects as well.

When you're thinking about doing programme design and when you're thinking about putting a strength session together, muscles work in pairs naturally. You have an agonistic and antagonistic muscle, where during a performance movement, as one muscle contracts, the other one will relax, enabling that movement to take place. So it's a good idea to train muscles in pairs. And it can help you with structuring to make sure you've covered all aspects of the body when you're training them.

Thinking about how we can enable good elements of being specific with our training, having that progression, having that overload as well to avoid reversibility, tedium and boredom. So what do we mean by that? Well, if you're going to be working on a strength session, it's good to have a good order so that we are safe. A lot of clients do core trunk work towards the end of their training session because we're going to be using that to support our body, whether we're training our legs and upper body.

Programme Design Rules

Work muscles in pairs to keep them balanced.

Muscles work in pairs so if one is worked more, then the body can become unbalanced.

Joints can move out of their correct place causing changes in posture and possibly pain.





Programme Design Rules

Pectoral and trapezius muscles Latissimus dorsi and deltoids Biceps and triceps Abdominals and erector spinae Quadriceps and hamstrings

Legs

Back Chest Shoulders Arms

Core

So leaving that to the end is a practice done by lots of PTs to ensure that we have safe, good movement - that we're not fatigued within the trunk of our body to enable us to do movements elsewhere.

And also, if you're worried about giving a good balanced programme to someone, you know if you train the quads to train the hamstrings, you're going to have a good impact and a good balanced impact on your client. When looking at strength training, when we're thinking about it, we need to look at the movement. We need to analyze how many numbers of joints are moving. If you think about the squat - from the ankle, to the knees, to the hips, the movements taking place, a lot of joints are moving. If you then have an upper body movement in conjunction with a squat, you've got even more.

How much balance is required? Remember when we're off balance, we lose strength output. By doing so we can develop our strength when we're off balance as well. But that increases the difficulty.

Do difficult exercises first

- Difficulty depends on:
 - Number of joints moving
 - More complex exercises will have two or more joints moving.
 - Amount of balance required.
 - More balance = more difficult and should be done first
 - Work the abdominals and lower back at the end of the session.
 - Core muscles keep body's posture.
 - If they get tired early in workout, risk of injury to spine is increased.



When we're looking at our adaptions to strength and muscular endurance training, we're looking at improving that neuron drive, muscular fibre recruitment, looking to recruit all elements of our body when we're training. And looking at improving our hormone response to our training as well. And that's why it's relevant for so many clients that we work with, no matter their age, no matter their hobbies, background. Strength work is a fundamental aspect of life performance and we need to look at that when we're working with our clients.



Adaptations to Muscular Strength & Endurance (MSE) Training

Adaptations to Muscular

Strength / Hypertrophy Training

- Improved neural drive/ muscle fibre recruitment (more efficient nervous system) results in greater strength.
- Heavy resistance training causes microscopic damage to actin and myosin filaments. Recovery results in muscle hypertrophy.
- Testosterone plays a major part in the recovery process.
- Best strength gains are made in first few weeks of a new resistance training session.
- Mainly concerned with fast twitch fibres.
- Improved PC energy system.

Adaptations to Muscular Endurance Training

- Mainly concerned with slow twitch fibres.
- Improved anaerobic/ lactic acid energy system.
- Increased size and number of mitochondria in the muscle cells.
- Increase in blood capillaries in and around the muscles.
- Hypertrophy is less pronounced due to slow twitch muscle fibres having a lower potential for hypertrophy.



Again, looking at the FITT principle (not an exclusive example for FITT), but when we're thinking about doing strength training with a balance of the components of fitness. Two times a week, looking at one set of 8 to 12 repetitions - 75% of the 8 to 12 maximum range that the client can do - so that they can have that overload, they can have that fatigue. Looking at that muscular endurance and looking at about 20 minutes training time. Again, just an example of how to split the parts of the body as part of an overall training programme. Looking at the different parts of the body and how that can be balanced to enable us to get progression and overload. But also we allow for effective recovery, where we could focus on different parts of the body - again, another example of how that can be done.



When thinking about power, which is different to strength.

We could think about strength as lifting a heavy object from the floor. Power is being able to move with high intensity. Being able to have that drive explosivity to what we do. I often like to think of the start of a sprint race. So you're at that start line, that explosive power to go from a static position to a running position. That's what we're looking for - that explosivity.

Looking at terminology, such as hypertrophy - that tearing of muscle fibres and the change in growth and size in muscle as well.

Muscular endurance - thinking about the exercises that we're looking at applying and doing with our clients. How we can provide resistance behind that and how we can manage that, depending upon time working, repetitions and sets that we're working with as well.

Split routines for specific needs

- Beginners: weight bearing activities (WBA) in one session (FITT for muscular fitness) Intermediate: split routines: Monday: Legs, shoulders & core Tuesday: Chest, back & arms Wednesday: Rest
- Legs, shoulders & core Chest, back & arms
 - Saturday & Sunday: Rest

- Tuesday:
- Wednesday:

- Saturday:
- Sunday:
- Chest Rest
- Shoulders & Triceps Legs

Back & Biceps



Split routines for specific needs Speed of movement for Muscular Strength & Muscular Endurance

- Advanced: split routines:
- Monday:
- Tuesday:
- Wednesday:
- Thursday:
- Friday:
- Saturday:
- Sunday:

- Legs & Stomach
 - Back & Biceps
 - Rest
 - Chest & Triceps
 - Shoulders & Stomach
 - Rest Rest
- 2 seconds concentric, 4 seconds eccentric.

Another example of looking between strength, power, hypertrophy, endurance - how we can change sets, reps and weights to impact on what component of fitness we're working on. So just looking at strength, if we move elements of the FITT principle around, we're going to work on different elements from strength to power, to hypertrophy. And then again, moving completely differently - if you're looking at endurance and cardiovascular fitness as well, you're going to be really changing the focus of your programme when you alter the FITT principle.

Power

 Multi-joint structural movements (Olympic type exercises) Eccentric actions not emphasized

- Performed early in Training Session
- High-Intensity (<10RM)
- Rarely more than 5 reps
- Moderate to long rest periods (>2m)
- Mod to High number of sets (4-10)

Hypertrophy

Large variety of exercises Large variety of exercise order Concentric and eccentric actions Moderate to High intensity (6 -12RM) Higher number of reps Short rest periods (<1.5m) High total number of sets/ muscle or group (>3)



Muscular Endurance

Choice of exercise needed for specific sport

Low intensity (12-20RM)

Moderate rest periods (2-3m) for long rep sets (>20) and short rest periods (45sec) for lower rep sets (12-19)

Moderate number of sets (2-3)



Variable	Strength	Power	Hypertrophy	Endurance
Load (% of 1 RM)	80 - 100	70 - 100	60 - 80	40 - 60
Repetitions per set	1 - 5	1 - 5	8 - 15	25 - 60
Sets per exercise	3 - 5	3 - 5	4 - 8	2 - 4
Rest between sets (mins)	2 - 6	2 - 6	2 - 5	1 -2
Duration (secs per set)	5 - 10	4 - 8	20 - 60	80 - 150
Speed per rep (% of max)	60 - 100	90 - 100	60 - 90	6 - 80
Training sessions per week	3 - 6	3 - 6	5 - 7	8 -14

Okay, we're going to stop there. And then if you want to join me in the Video 9B, I look forward to speaking to you on that one.

