

This post came from a group called Supertraining.

Paul Rogers is the Strength and Conditioning Coach for the Australian National Sprint Cycling Team. Enjoy!

Australian track cyclists more or less dominated the Athens Olympics track program with six gold medals. Here is a unique view from the strength and conditioning coach. My apologies if the following has been posted previously. It is doing the rounds of some bike forums, so some may have already seen it. There's no name on it and that's how I came upon it, but the guy's name is no secret.

Just a few points of interest. Ryan Bayley, mentioned below, won the Athens individual sprint gold. Check out the last paragraph for some insights into the last thread on 'endurance paradox'. Note the squat and jump data. My oh my!

"I am currently the Strength and Conditioning Coach for the Australian National Sprint Cycling Team and have been for about five years. I am also the Strength Scientist for the South Australian Sports Institute in Adelaide, Australia, where the National Sprint Program is based. In addition, for "fun", I help coach a group of developmental sprint cyclists, which form the core of our SA State Sprint team and half of whom are now in the Top 10 sprinters in Australia, which would make them National champions in all but a handful of countries and, when I get time, I roll around the track myself.

Some points (for free):

1. We don't keep any secrets from anyone, including the Poms, the Frogs, Ze Germans or the Yanks. In fact, people just generally don't believe what we tell them, disagree or their programs (or minds) are too set in concrete to change. We invite other top riders to train with us and they get faster, but they go home and do the same old thing. The Head Coach, support staff and I are happy to tell anyone and everyone what we do. We usually just don't get time to sit around on chat rooms or make social chit chat on E-mail, let alone write a book.

What Charlie Walsh and Gary West used to do with our sprinters when they were the Head Coaches was state of the art at the time and they are both great coaches. You will not find anyone in Australian Cycling who will question that or say a word against what they did at the time, but times have changed and those methods are not quite enough to consistently hit the top spots now, although you can still be troublesome internationally if you've got natural speed. The top speeds have gone to a new level and to reach that level, you have to specialize your sprint riders more. I'm sure if Charlie and Westy were still coaching the Oz team, they wouldn't be doing exactly the same things they were doing ten years ago. They are too smart for that.

Most of what we do is based on methods and research that have been around for decades

but have not been applied to cycling. It has mostly been used in athletics and we have copied a lot from that and what the French and Germans have done at various times. The Brits were formerly coached by our current Head Track Coach, so they do a lot of similar things too. What the Dutch are doing now, I'm not sure, but they were mostly all speed skaters before they were top cyclists, so maybe there's something in that.

2. We are constantly trying new things and changing what we do, so what we do this year will be different to what we did last year and so on. Australia is a small country and is competing with some real powerhouses in terms of talent pools, resources and money that we can't even dream of matching, so we have to be a step ahead or we're not in the race.

3. What sprinters did 10 years ago is completely different to what most of the top sprinters are doing now. The critical factors that determine success or failure have changed. Tactics have changed and the tournament formats have changed. Training that would win 10 years ago is generally not as successful today, but every dog has his or her day and some old-school trainers still come out on top now and again, but it is happening less and less.

4. Our philosophy is simple. Most events are speed endurance. To win you need to go faster for longer than the other guy or gal. Some riders are better at faster, some are better at longer, but they generally need a bit of both. To have speed endurance, first you need speed. If you can't ride 5.0 for a flying 100m, you won't ride 10.1 for a 200m. Speed is hard to train and takes a long time. Endurance is easy by comparison and we just chuck that on at the end. To get up to speed, you need acceleration and that means power. Power is a combination of strength and speed. The speed part you get on the track, the strength you get in the gym. Low cadence power (0-120rpm or so) we can train in the gym too, but high cadence power (120-200rpm) is too fast to do in the gym and you generally need to be chasing a maniac on a motorbike (e.g., our Head Coach) down the bank to increase that. Or at least, someone faster than you to break the wind so you can go overspeed.

5. Aerobic Capacity (VO₂max, AT) is the base for enduros, strength is the base for sprinters. We do three gym sessions and two track sessions for most of the year. Road is just for recovery, to keep them a little bit lean and to keep the sprinters out of the pub and out of trouble. It is generally a max of 2hrs, but mostly only 1 and is very easy – talking the whole time.

6. When strength is the focus, we don't care what numbers they pump out on track, just what they lift. When power or speed is the focus, we back the gym off (2/wk and easier sessions) so we can get the numbers we want on the track (3-4/wk). Generally, half the year is spent focused on strength and half on power and speed (roughly - depends on competitive calendar) although we always train a bit of everything, it's just the proportion of each that changes. The strength work is not all done in one block. We cycle through strength, power and speed at least twice per year.

7. Gym is generally 3-4sets of 3 max lower body strength or power lifts-early in the

phase, two strength and one power, later, two power and one strength. I don't use cleans, jerks or snatches with our current riders. They are too technical for maximal efforts unless you have years of experience. We do one bilateral strength lift each session for "core" strength (Squat, Deadlift, Romanian Deadlift) - usually lower back is the limiting factor not legs and this is the only reason I use these lifts – for back strength in standing starts. The rest of the lifts are unilateral. How many feet do you push each pedal with at one time? If you train bilaterally you get stronger bilaterally and unilateral strength lags behind. If you train unilaterally, you get stronger unilaterally. It's a neural thing.

Single-leg Press is our bread and butter. Different foot and hip positions for different phases of pedal stroke, standing, seated, etc. I use high speed video to match joint angles and velocities for each rider. We mainly do it ballistically for power - throw the sled as far as you can – at different percentages of max to match up to different muscle contraction velocities for different phases of the acceleration (different cadences). We do a lot of single-leg plyos on boxes, stairs, bunjee sleds, etc during speed phases. Strength and power gains are extremely specific and do not necessarily transfer well. When Ryan Bayley beat Sean Eadie in the Commonwealth Games sprint final in 2002, Sean was tripling 250kg for a parallel back squat and Ryan was tripling 120kg. On single-leg press, they were much closer (20kg) and so was the racing.

Single-leg squats (front and back) and deadlifts usually make up the third exercise and are as much for pelvic stability as strength. I'm going to try single-leg pulls and cleans this year, but these will not be our primary power exercises - more of a preparation for the work before Beijing. We have done SL squats, deadlifts and pulls for years now and the riders are pretty stable. An example of numbers - our best single-leg squat figures are 3@165kg on each leg (just over 360lbs). The weakest of the girls (who just entered the squad this year) is 3 @ 80kg on each leg, but she only weighs about 50kg. Two riders have done the 165kg so far. We have riders who can do sets of standing hops onto 1m+ boxes. The lowest is for one of the girls and is a 70cm box for sets of 8 each leg.

8. Upper body, we do two exercise per session (a push and a pull in the same plane of movement, different each day) in general prep and two per week in specific prep (both pulls) so they can keep hold of the handlebars in standing starts. The girls are starting to push themselves off the bike, their legs are so strong (around 3 @ 250kg on each leg for the girls and up to 350kg for the guys on SLP). Abs and core, we do two per session - one mainly flexion, one mainly extension. Some have rotational or lateral components, but not isometric holds or pilates mumbo jumbo. If their "core stability" is poor, they wouldn't be able to squat on one leg. Lying on the ground and waving your legs in the air doesn't transfer to the bike. That might annoy the physio's and guru's who make money out of Swiss balls and all that stuff, but I tried it for three years in 20 different sports and it didn't make any difference to performance or injury rates. They get really good at balancing on a ball, but there's no Olympic event for that. It doesn't transfer to the sport. Fix their technical problems in the actual technique (soapbox time is now over).

9. A Gym session lasts about 2.5-3 hours for 6 or 7 exercises, a maximum of 33 sets including 12 warm-ups sets, so that's about one set every six minutes or more on average.

We don't set maximum rests, just minimums. If they need longer to get their heads in gear, they take it. Ryan Bayley is the slowest trainer in the world. Lucky he's so bloody fast, they'll pay my bill to sit there and talk about muscle cars and heavy metal music. Reps are a maximum of 6 for strength, and 4 - 15 for power (less for high percentages- 60-70% max, more for low percentages - 20%, or BW for plyos) Total contraction time for a set (not counting hang time in the air) is around 6-8s max - phosphate energy system all the way. Minimum of 2 min rest, but that is never in danger. Only the phosphate energy system can deliver energy fast enough for maximal work and you've got about 8s max.

10. On the track they take about 3 hours for 3 or 4 efforts including half hour warm-up routine - same as pre-race warm-up. Warm-up, change gears, roll-up, effort, roll down 20-30min rest, roll-up, effort, etc. Lot's more rest. Rest usually consists of sitting on their arses, paying out on each other, drinking Coca Cola (sponsorship please - the Coke bill is killing us) and the occasional chocolate cake. This is especially good when there is a joint sprinter/enduro training session. (Enduros don't get any cake - they're too paranoid about body fat). In general prep phase, the sprinters ride to track and gym (15-20min easy each way) and in spec prep, they drive. Each track effort is no longer than about 15s and usually less than 10s. Again, mainly phosphate system.

11. The one thing we do that most coaches can't cop is this. If you don't make the target times or loads on the first effort or set, you warm down and go home. You aren't fresh enough to train at a level that will make you improve. If you do a PB, you warm down and go home. If you are on fire that much you can blow yourself to pieces in a couple of sets or efforts and it will take weeks to dig you out of the hole you put yourself in, so whatever it is, if you PB, you stop and come back next time. This philosophy takes everyone a while to accept, but it works. When we don't follow the rules, if we let someone pump out a series of PBs in one session, they are almost invariably wrecked for weeks afterwards and we never get close to quality training during that time. Sometimes, you can see it coming, but sometimes it just comes out of the blue. When it does, warm down, go home. Sometimes, at lower levels you can get away with it, but the better you get, the more capacity you have to exceed your normal limits, the more this becomes important. Enduros don't need to do this. Everything is submaximal.

12. In general prep, the sprinters might do 2 x 1hr easy aerobic/coffee rides per week and an easier recovery ride on days off (unless they're too fat, then they might do 2hrs and less chocolate cake). This year, we are doing a total of six aerobic development rides (over Christmas – fat time). In spec prep, they just do the recovery rides.

13. We generally always do track after gym. Gym in mornings (8:30am-11/12) track in the arvo (2:30/3pm-5:30/6pm). If the gym session is too hard, it will bugger them for track. As I said, for about half the year, we don't care. For the other half, I water down the gym so the track work is 100%. There is some short term potentiation from doing some maximal strength or power efforts but the research is not clear on time frames since everyone does something different. This is one thing we are looking at. If we do two maximal power ergo tests (6s with 4-5min recovery), the second one is always much

better. The same has been shown with some contrast-loading studies on squats and plyos, etc., but an equal number of studies have shown no effect. The time courses and stimuli are always different though, so it's hard to compare. I think there's something in it so if you find something that works for you, go with it. The exception is start sessions. We never do standing starts after gym. If we do, they are always crap sessions.

14. Coming up to the major comp for the year (Worlds or Olympics), we slot in a speed endurance block. This involves the addition of some longer sustained efforts or sets of short efforts with low recovery once or twice per week, usually one on an ergo and one on the track. This increases the muscles ability to buffer hydrogen ions from the anaerobic glycolysis energy pathway that you have to rely on when the phosphates run out and increases the enzyme capacity of that pathway as well, so it can run at a higher level. Adaptation is relatively fast and 6-8wks will usually give a massive increase in this capacity.

15. Here's the logic. Volume is a speed killer. It doesn't matter what you do, if you do a lot, it will make you slower. The protein in your muscles (myosin heavy chain isoforms for those who know their molecular biology) will change to a slower, more endurance friendly type if you do too much volume. This is individually variable, but two sessions every day of anything will make you slower as will lots of aerobic work. You might still be fast for an enduro, but in sprinter terms, you're still slow.

Going slow makes you slow. If you want to be able to go faster, then going at less than maximal speed generally won't do it. If it does, then you weren't operating at 100% before. That's OK. Most people can't switch everything on. You have to practice it. It takes years to reach your 100% level even without any actual physiological improvement. Most sprint events require sustained power output at cadences over 160rpm. If you don't practice this, you won't get good at it. Most people will spend all their bickies just getting up to 160rpm on a decent gear, so to train maximally at that level, you have to get up to 160rpm without using up your phosphate stores. That's where the motor bike comes in. Use the slipstream to get up to max speed or over and then spend your bickies. That way you work maximally at maximal speed. You have to train your nervous system to coordinate your muscular contractions at that speed.

Same in the gym. If all you do is slow, heavy. You get **STRONG** and **SLOW**. You need to do most of your work at race speeds using submaximal loads but at high speeds. If you can't do single-leg stuff, then Olympic pulling movements are your next best option, but unloaded plyos are more important for higher cadences. You don't need to be able to clean or snatch or jerk. The pull phase from the floor to full hip and knee extension is where the gains come from. What happens after that doesn't matter. You can throw the bar out of the window and the gains will be the same. I would only recommend this on your last rep as most gym owners get quite irate about their equipment being heaved out into the street, as do passing pedestrians. The overspeed work will come as you try to get away.

Use your maximum capacities at the maximum rate and in as specific a way as possible

to transfer to the bike. I can outlift all our top riders in the gym and out-power them on the ergo, but I'm not in the race on the track. I can't put my power through the bike into the track. I'm just not technically as good as they are. Ryan Bayley may look like a monkey humping a tennis ball when he sprints but most of his power is getting onto the track.

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Weight training for enduros - the same strategies apply but maximal strength and power are less critical. All endurance riding, even the bunch sprint at the end, is really submaximal. A little bit of gym regularly helps to maintain the structural integrity of the body, prevent imbalances and prepare you for crashes, but the real gains come on the road. Racing is the best training. All our best track enduros race on the road in Europe. They come together for camps to touch up their track skills, but all of that was learnt as juniors and in domestic track racing on the way up. For strength endurance on the bike, ride up hills in the saddle on bigger gears. That was the only strength work out team pursuit did for the last three years and they won everything there was to win with a bucket load of world records to boot. Incidentally, they are also the fastest starters."

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