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Exercise/alternative names	Description	Variations/notes	Coaching points
<b>General Endurance activities:</b>			
Paceline/riding in a line/riding in a string	Riders should ride around the track on the black (pursuit) line, one behind the other, without changing order. Gaps between riders should initially be 2-3 bike lengths and should decrease as rider confidence grows.	Riders can move to red (sprinters) line, blue (stayers) line or higher on the track.  If the group is large, consider splitting into two or more.	- Do not look at the wheel in front - look at a fixed point like the saddle or seatpost. - Alternate looking at the rider in front with looking ahead and around. - Don't kick back - use track geometry to control speed. - Press on in the bankings, don't slow down.
Changing in a line/bunch/string	Riders should ride around the track as above, but every lap the front rider should change to the back of the line.	As above, consider splitting larger groups.  Once more confident, progress to half lap changes then to changes on the blue/higher up the track.	- CHECK over shoulder - PAUSE to process what you've seen - MOVE up the track with a solid drive - Change as high as possible without it costing additional effort. In a large, slow group it may be more effort than it's worth to go very high. Adjust your changes based on the circumstance. - Don't wait for the last rider to pass before moving down. It's better to come down early than late.
Dot Slalom	Useful for riders of any age to improve their movement on the track. Lay out 5-7 non-slip flat markers on the home straight in a slalom pattern, alternating on the red and black lines. Riders should weave between these dots at a jogging pace then return to the cote or safety for the rest of the lap. Every few laps, make the slalom more difficult by moving the dots on the red line gradually up the track to make the turns sharper.	As left, make the slalom gradually more extreme. You could also specify more speed or add dots to the back straight too.  Possibly add in other activities i.e. a track stand area or one-handed section.  Ask riders to look over their shoulder while riding.	- Ride through slowly initially. - Push hard on the way up - Control speed on the way down by resisting pedals. - Return to cote after slalom - you will not have enough speed to go around the banking.

Pursuit changes	Riders ride fast and in small groups of 3-5 riders. Leave the changes further around the banking and move up much more sharply. Attempt to re-join at the start of the next straight.	Ride faster. Introduce a competition to see who can complete a change in the shortest distance/time.	<ul style="list-style-type: none"> <li>- Changes should now be high and "sharp" with the rider's path taking a more triangular shape as opposed to spending any time high on the track.</li> <li>- You can afford to lose quite a lot of speed on the way up because you aren't spending any time at the peak of the change. You'll get the speed back as you come down the track again.</li> </ul>
Lumps and bumps/square track/follow the leader/chase the snake	One designated rider (ideally a more skilful one) should lead the other riders in a line with gaps of at least 2-3 bike lengths. They move around the track, moving up and down at random. When the next rider reaches the point at which the lead rider moved, they should make the same movement. The result should be a string of riders drawing a wiggly line over the surface of the track.	Have the lead rider make more exaggerated movements more sharply i.e. straight up the side of the bankings or right up to the top fence and steeply down.	<ul style="list-style-type: none"> <li>- Maintain the gaps - this is not a paceline</li> <li>- Don't move until you reach the point on the track at which the rider in front of you moved</li> <li>- Look well ahead and be aware of what the next move will be</li> </ul>
Chain gang	Riders should ride in single file initially while getting onto the track. On coach's signal, the front rider should move up to about 1m above the line they were riding on. The string of riders passes underneath and as soon as the next rider is clear of the upper rider, they move up directly in front. This continues until there are two lines on the track - a slightly faster one on the bottom and a slightly slower one on the top. Once a rider in the slower line reaches the back of the faster line, they drop down to re-join it again and the cycle repeats.	Move up the lines, ride faster.	<ul style="list-style-type: none"> <li>- Track cycling is a sport of individual observation. No rider should ever call "last rider" or tell another rider to move.</li> <li>- Similarly, no rider should ever move without looking because another rider has told them to do so.</li> <li>- Constant observation is required for smooth movement between the lines.</li> <li>- There should be no gaps in the top or bottom line.</li> </ul>
Reverse chaingang	As above, but the faster line is the upper line and the lower line is slower. This variation tends to increase in speed unless managed and is physically more difficult than the standard chaingang.	As above, riders can move higher. This activity tends to get faster on its own.	<ul style="list-style-type: none"> <li>- Be careful not to overshoot when joining the front of the slower line</li> <li>- Try not to pick up the pace when re-joining.</li> </ul>
Chaingang switch	Riders begin in one of the chaingang formats above. On coach's signal, the direction of motion switches from forward to reverse or vice versa.	Move up the lines. Use the reverse format to increase the speed, then switch back to the standard format to rest if needed. Blow the whistle at shorter and shorter intervals as the activity progresses.	<ul style="list-style-type: none"> <li>- Observation and communication are critical to keep everybody safe when switching directions on the track.</li> </ul>
Stacking	Riders should ride in single file initially while getting onto the track. On the coach's signal, they should form into a "stack" of a certain number of riders abreast. This number can be indicated beforehand or by coach's signal. Riders should remain abreast both in the straights and bankings. Multiple stacks can be spaced evenly around the track.	Stacks can start at 2 riders then grow up to any sensible number.  Begin on black, then red, then stack above the blue.	<ul style="list-style-type: none"> <li>- The bottom rider is the anchor - they should maintain a steady pace and all other riders should match them</li> <li>- You will have to push harder in the bankings and easier in the straights. Anticipate this and don't be caught out.</li> <li>- The closer you are to each other, the easier it is.</li> </ul>

Stack sprints	<p>Riders stack up as above in a minimum of two evenly spaced stacks. On coach's signal, one rider from each stack sprints to the stack ahead of them then settles into place. The usual patterns are the top rider sprinting to the bottom of the next stack or the bottom rider sprinting to the top (with the stack in front leaving a gap if appropriate), but other patterns are possible.</p>	<p>Speed up the stacks, stack more riders, move the stacks up the track.</p> <p>Sprinting top-to-bottom is slightly more difficult than bottom-to-top because of accumulated fatigue from riding at the top of the stack.</p>	<ul style="list-style-type: none"> <li>- Accelerate hard, making sure you are clear of your stack before moving up or down</li> <li>- Don't use all your energy - you will need to continue riding afterwards.</li> <li>- Control your speed and don't overshoot the next stack, especially if slotting in at the bottom.</li> </ul>
Riding out of the saddle	<p>Riders should get out of the saddle on coach's signal and not sit down again until the next signal.</p>	<p>Start at the bottom and on the straights, move on through bankings and heights until riders can get out of the saddle mid-banking at the top of the track.</p>	<ul style="list-style-type: none"> <li>- Engage core, stay strong</li> <li>- Don't rock the bike as much as you might on the road</li> <li>- Stay as relaxed as possible.</li> </ul>
Lap gains/island hopping/many other names	<p>There are many, many variations on this theme. This is not intended as an exhaustive list.</p> <p>Riders should form up on the blue line, normally in single file but sometimes in pairs or stacks. On coach's signal, riders (either singly or in groups) drop down to the black and attempt to gain half laps or whole laps, individually or working together before re-joining the back of the resting line or group.</p> <p>Riders are generally sent off at the start of the home straight, back straight or sometimes both. A lap counter or number boards can be used to indicate how many riders should drop down from the resting line.</p>	<p>If riders are weaker or track longer, split into two groups and gain half laps.</p> <p>If riders are stronger or track shorter, send them on their own or to gain multiple laps.</p> <p>Groups of different sizes can be sent from the same resting line - stronger riders in smaller groups and weaker riders as part of larger groups using a lap counter or other indicator of how many should go.</p>	<ul style="list-style-type: none"> <li>- Observe before dropping down</li> <li>- Don't overshoot when re-joining</li> <li>- Work together, trying not to drop "team members"</li> <li>- Make your changes appropriate to the circumstances/how many people in the team</li> <li>- Pace yourself - you will have to do this more than once.</li> <li>- If you are dropped, rest either on the cote or high on the track before re-joining the resting line.</li> <li>- <b>The purpose of the resting line is to rest. At <u>no point</u> should the riders in it accelerate before they are told to or build the resting pace higher over the session.</b> Riders who do so should be reminded of basic interval training theory.</li> </ul>
Russian steppes/steps/whistle sprints/whistle training etc.	<p>Again many variations.</p> <p>Riders space out around the track, generally singly but sometimes in small groups of 3-5, normally riding on the blue line. On coach's signal, riders accelerate down to the black until coach signals again.</p> <p>Rest and effort periods can remain constant or change over the session. 20 sec on 20sec off for 5 efforts is a common pattern, as is 15sec on 15sec off, 30/30, 45/45, 1min/1min, 45/45, 30/30, 15/15.</p> <p>If performing this activity with groups, the intervals should be longer but less intense to allow for changes to happen.</p>	<p>This is a physically demanding session, especially the longer intervals. There is no real need to alter the difficulty of the session, but the riders can be briefed differently in terms of how hard to work within the session.</p> <p>Riders should generally be made aware of the format of the intervals before the start of the activity to allow them to pace themselves better.</p>	<ul style="list-style-type: none"> <li>- Riders should be briefed not to go too deep on the first interval otherwise they will not be able to complete subsequent intervals.</li> <li>- Riders should let other riders know if they are going to overtake</li> <li>- Riders must observe when moving between lines, especially at the end of an effort when rider distribution may be quite different from how it was at the start of the effort.</li> </ul>

## Shaun's Game

All riders spread out around the track and circulate at a resting pace above the blue. The coach calls down three riders who form the first "train". Each rider does one lap on the front, then peels off back above the blue when they cross the finish line. If a rider above the blue sees that a train has fewer than three riders, they should join on the back.

The effect should be that the train moves fast around the track and every lap the front rider peels off to rest while a new rider joins on the back to keep the numbers constant.

More trains can be added to give less rest. The number of riders in the train can be increased so that riders work for longer.

- Observe when peeling off the front - if riders are in the way, continue further around the track before peeling off.

- It's not a race - you don't need to go full gas when you hit the front, though you should push hard.

- Use the height of the track to help you join the back of a train effectively

- Don't ride too slowly above the blue and risk slipping down.

## Trains and stations

This is usually done with two evenly spaced resting groups or "stations" on the blue line. As with Shaun's game, a "train" of some number of riders (usually three) rides fast around the black. When a train meets a station, the front rider from the train peels off and joins the back of the station while the rider at the front of the station joins the back of the train.

There is no changing in the trains or the stations.

As with Shaun's game, the trains can be made longer or shorter and there can be more or fewer stations.

- If on the front of the train, bear in mind that you will be going considerably faster than the station. Allow for this by moving up early to lose speed.

- If joining the train, accelerate slightly before the train reaches you to make joining easier.

## MattAttack

One resting group rides around the blue without changing. One fast group rides around the black, changing every half lap.

When the fast group passes under the resting group, the front 2-3 riders from the resting group must join the fast group and complete at least one lap gain. After gaining one lap, riders in the fast group may choose to remain there or to re-join the resting group.

Some riders will remain in the fast group for only one lap gain at a time, while others may remain for long periods of time. This activity runs with minimal coach interference.

The self-selected nature of this activity means that the effort level will be different for different riders. You could adjust how many riders must join the fast group on every pass to make it harder or easier.

- Be very careful when re-joining the resting group from the middle of the line

- If continuing in the fast group, be aware that gaps may form in the string as riders re-join the resting group

- Anticipate the speed differential and move up slightly early when joining the resting group - riders will be dropping down from the front so overshooting is a bad thing.

## Two pacelines

One fast paceline on the blue, one slow paceline on the black. This may seem counterintuitive, but it makes the fast paceline work harder and allows the slow line to change lower and more easily.

Riders are free to swap between lines as and when they wish.

This is often a useful end-of-session activity, especially if the rest of the session has been difficult or demanding.

One possible evolution of it is to wait until the groups are half a lap apart, then transition into a scratch race of 5-10 laps with the slow group as the head of the race.

- Observe when moving between lines.

## English Pursuit

Split the group into two teams with the weaker team having **fewer** riders in case of an imbalance (this is actually an advantage in an English pursuit)

Each team starts from the top rail at the pursuit line on opposite sides of the track. On coach's signal the first rider accelerates down to the black and completes a lap as fast as possible. Once they pass under their next teammate (who will have shuffled up to the pursuit line), that teammate does the same.

Once a rider has completed their lap, they should move to the cote, slow down and stop on the inner fence/infield.

The winning team is the first team to have its final member cross their pursuit line first.

A team with fewer riders will have their final rider complete two laps to make up for it. On a 250m track this corresponds to an advantage of 4-5 seconds as they don't have to get up to speed for their second lap. Teams should be picked with this in mind.

The teams should be as balanced as possible if the numbers are even and the team with more riders should have a collective 4-5 second time advantage if uneven. For this reason English pursuits work very well if you have already done timed efforts in the session or have a clear idea of riders' relative strengths.

Unlike an Italian pursuit where it is critical, the order is irrelevant in an English pursuit apart from the case of the final rider in unbalanced teams, who should be the strongest rider.

- Leave the track as quickly as possible once you've completed your lap

- Move up to the pursuit line while waiting for your turn if you are the next rider up

- Pull as hard as possible off the top rail

- Cranks should be vertical when starting as the first 1/4 rev is taken up by the pull.

- Maximum effort at all times

## Italian Pursuit

An Italian pursuit is a team sprint with more people, started from the top rail.

Split group into two and assign each group a pursuit line. On coach's signal, both groups accelerate down to the black and get up to speed without dropping any riders. Each rider completes one lap on the front before peeling off and circulating above the blue until the end of the race.

The winning team is the team whose final rider crosses their pursuit line first. Teams should be as balanced as possible.

In the case of a number imbalance, the final rider of one team must ride two laps.

Order is critical - the weakest rider should be first and the strongest rider last.

To emphasise communication and observation, allow teams to pick their order then reverse it for them. Specify that nobody should be dropped.

- Italian pursuits are not won by the fastest team, but by the team that stays together

- Do not go full gas right off the rail - use the first lap to build up to speed and have everyone settle in.

- Do not ride too slowly above the blue once your turn is done

## Cambridge Pursuit

As above, but every rider must ride two laps instead of one (or four rather than two in case of an imbalance)

As above

As above

## Australian Pursuit

Every rider starts evenly spaced around the bottom of the track. On coach's signal the race begins with every rider attempting to catch the rider in front of them. Once caught, a rider is eliminated and should move down to the cote and off the track. The race ends when there is one winner and every other rider has been caught.

Handicap stronger riders by placing them directly behind other strong riders or further back than other riders are.

- Ride safely and don't attempt to block overtaking riders

- Slow down a little on the track before moving to the cote once caught

## Changing in Pairs

Riders pair up into two lines, usually on the blue but sometimes lower on the track as well. Every lap (half lap on longer tracks) the front two riders communicate that they're going to change.

The top rider drives forward and up as in a normal change while the bottom rider drives further forward until they are clear of the top rider, at which point they move up as in a normal change. The two riders who were on the front should now be in single file at the top of the track and above the lines of paired riders.

They allow the lines of paired riders to move underneath them and slot onto the back of the group with the rear rider (who was in the top line) moving to the bottom line and the front rider (who was in the bottom line) moving to the top line.

This is an extremely common warm-up drill that forms part of the mandatory accreditation assessment at many tracks.

It is often paired with a single-file paceline/mini-scratch race toward the end of the block.

- The key to the whole activity is in the forward drive of the two front riders prior to them moving up to the top of the track.

- It's much better to drive too hard than too little as not driving hard enough will cause riders behind to take evasive action.

- Riders changing will often ride very slowly in order to accomplish the change more quickly. This should be discouraged - it is not normally practical to complete changes very quickly in this drill and can be dangerous if riders start to slip.

Fan changes	<p>Riders ride in single file on the black in groups of no more than 6. As they enter the home straight, the second rider in the line sprints up beside the lead rider, the third rider sprints up beside the second rider and so on until the line has become a stack as they cross the finish line.</p> <p>As the stack goes into turn 1 they use the geometry of the track to fold back into single file and the front rider changes to the back as normal.</p> <p>The exercise repeats ever 2 laps on a 250m track or every lap on a longer track and is good preparation for elimination racing amongst other things.</p>	<p>If there are fewer riders, the exercise can be performed every lap or higher up the track (i.e. above the blue)</p>	<ul style="list-style-type: none"> <li>- The rear rider will have to push at full power to get into place</li> <li>- The front rider should keep a slowish and steady pace otherwise the drill is nearly impossible</li> </ul>
Changes on the top rail	<p>Riders ride around the track in single file against the top rail. Every lap/half lap depending on the schedule, the front rider remains high while the rest of the line ovalises (cuts the top off the bankings) to undertake them. The line then flows around the changing rider and back to the top when possible.</p>	<p>This is useful for getting riders to ride closer to the top fence with more confidence or as part of a warmup/line riding drill. It also has benefits if lots of different groups are using the track at the same time.</p>	<ul style="list-style-type: none"> <li>- Don't look down, look over the top rail to stay close to it</li> <li>- Don't slow down as the line passes you or you will struggle to join at the back again.</li> </ul>
Rider 2	<p>One rider is nominated to lead at a steady pace (this activity could also be done with a motorbike or derny) while all other riders attempt to be "rider 2", that is directly behind the lead rider. Once a rider has remained there for one lap/half a lap, they should move out and change to the back of the group.</p>	<p>Speed the pace up gradually throughout the session</p>	<ul style="list-style-type: none"> <li>- Ride safely</li> <li>- Some contact may be permitted</li> <li>- Hands in drops</li> </ul>
Pair sprints	<p>Riders roll around in pairs on the blue. On coach's signal, the front two riders sprint against each other for a pre-determined distance (e.g. a lap) before sitting up and re-joining the back of the group.</p>	<p>You could specify that one rider must begin the sprint and the other can't attack until they do, or that one rider should give another a head start.</p>	<ul style="list-style-type: none"> <li>- Think about your strengths compared to the other rider. Who has the higher top speed? Who has the better acceleration? Sprint with these things in mind.</li> <li>- Once a rider enters the sprinters box (between the black and red lines) after the sprint has begun, they must stay between those lines and may not prevent another rider from overtaking.</li> </ul>

Attack if you can	<p>Best performed in a large group, the riders form into a bunch on the track at a steady pace. On coach's signal those riders who are in a position to immediately attack must do so. Those who are blocked in or poorly positioned may not attack.</p> <p>Once the attack has gone and got a gap, the coach should signal again to get the attack to sit up and the bunch to rejoin them. The exercise then repeats.</p> <p>This forces the riders to think tactically - they always have to be aware of their position on the track and its consequences.</p>	<p>The attacking riders could be made to gain a lap rather than sit up, or the attacking riders might be told not to sit up on the coach's second signal, but instead work together to hold off the bunch.</p>	<ul style="list-style-type: none"> <li>- Decide what strategy you want to use and position yourself appropriately.</li> <li>- If you want to attack, position yourself near the front, ideally with some height.</li> <li>- If you want to rest, tuck in near the bottom in the middle of the pack.</li> <li>- Be aware that the situation will be changing constantly - you should always be aware of your track position and how it affects your options in a race.</li> </ul>
Square dance/gauntlet/washing machine	<p>Riders line up in pairs with a gap of 2-3 rider widths between the lines. On coach's signal, the rear two riders move together toward the gap and ride through to the front, side by side, before re-joining their lines.</p>	<p>This can be done with a smaller gap and the riders moving through in single file to allow them to swap lines</p>	<ul style="list-style-type: none"> <li>- Hands always in drops</li> <li>- Don't worry if you bump shoulders - you're not going to fall off</li> </ul>
Riding in contact	<p>Gather riders in groups of 2-3 and have them ride around the safety/infield to start. Riders should roll around slowly, gently but deliberately bumping elbows or shoulders in the straights.</p> <p>Once riders are confident with this, progress onto more forceful contact/leaning and remaining in contact all the way around the apron.</p>	<p>This can be an excellent precursor to madison practice as well as a way to persuade less confident riders to ride closer together.</p>	<ul style="list-style-type: none"> <li>- Hands always in drops</li> <li>- Arms forming a strong "ring of steel" shape</li> <li>- Lean gently toward the other rider</li> <li>- Talk to each other and stop if the other rider is uncomfortable</li> </ul>
Bingo!	<p>Repeat this process on the track if safe to do so.</p> <p>Each rider in a group is given a team number. Teams should contain 3-6 riders.</p> <p>All riders form into a steady-paced bunch on the track. When a team's number is called or otherwise indicated, every member of that team has to escape the bunch and attack together to gain a lap. Once the lap is gained the bunch re-forms and the activity repeats.</p>	<p>Larger teams are harder, as is an insistence that every team member completes the lap gain. If riders are struggling with this, the lap gain could become a half lap gain or just a specified distance until the coach indicates that they can sit up again.</p>	<ul style="list-style-type: none"> <li>- The first riders to get out should wait to be joined by other members of their team.</li> <li>- Riders should do longer turns if they're feeling strong and shorter turns if they're feeling weak. The speed should remain constant.</li> </ul>
Scratch race	<p>Riders get together in a bunch, race for X laps (usually between 2k for small youth riders and 30k for elite racers, though around 10k is common in track leagues) and the first rider across the finish line is the winner.</p>	<p>Shorter scratch races favour sprint-focused riders while longer races allow for much more tactical development and often see very different riders winning.</p>	<ul style="list-style-type: none"> <li>- Play to your strengths as a rider</li> <li>- Know whose wheels to follow and who is not a threat</li> </ul>
Unknown distance	<p>As above, but the riders do not know the distance they will be racing until the bell goes for the final lap.</p>	<p>This favours aggressive yet patient riders who are prepared to spend time in the wind in order to remain near the front.</p>	<ul style="list-style-type: none"> <li>- If you're not in the first four riders when the bell goes, your chances of winning are minimal.</li> </ul>



Chaingang chase/split scratch	<p>The group divides into a slower group who perform a chaingang on the black line and a faster group who perform a chaingang on the blue line. At some point in the activity (usually when the faster group has just passed the slower group) the coach starts a scratch race with the slower group at the head.</p>	<p>There are various variations - the groups might have to stay in chaingang formation until the bell lap, the fast group might have to do their chasing on the blue line etc.</p>	<ul style="list-style-type: none"> <li>- Work together for the benefit of all until the last couple of laps</li> <li>- If chasing, pace your effort bearing in mind you will have to contest a sprint at the end.</li> </ul>
Handicap bib race	<p>The slower group has to work together (either in a chaingang or otherwise) to hold off the faster group until the end of the race.</p> <p>Riders are divided into 2-3 groups based on strength ahead of a scratch race. In a three-group race with red, blue and green bibs the red riders (the strong group) would start two laps down. The blue riders (medium group) would start 1 lap down and the green riders would be on 0.</p> <p>The race then goes as normal. Riders who are down laps must unlap themselves (alone or as part of groups) during the race before they can win it.</p>	<p>The distance of the race can be chosen based on the relative strength differentials of the group. A big gap between the strong riders and the weaker riders would mean a shorter race while a small strength difference might mean a much longer race.</p>	<ul style="list-style-type: none"> <li>- Work with other riders to gain laps or hold off stronger groups</li> <li>- Know where the head of the race is and your relative position</li> </ul>
Hiding from the wind	<p>Split the group in half. One half should be given bibs and one half not. Run a scratch race with a long, fast neutralised section (i.e. 8k at 43kph average or X seconds a lap).</p> <p>Riders without bibs must do lap/half lap turns on the front. Riders without bibs must not do any turns.</p> <p>With some number of laps to go, it becomes a straight scratch race. All riders without bibs are a lap down and must lap the field in order to win.</p>	<p>The riders who are not allowed to do turns could achieve this by changing early, performing double changes, staying in a semi-separate group near the back or any way that seems sensible.</p>	<ul style="list-style-type: none"> <li>- As above</li> </ul>

## Points race

Riders ride a known distance as in a scratch race, but there are a series of intermediate sprints that are worth points. A 50 lap points race would probably award points for a sprint every 10 laps in the format 5,3,2,1 for the top 4 riders. These points are doubled in the final sprint.

Points are also awarded for gaining a lap on the field, though doing so does not put a rider at the head of the race. The number of points awarded for gaining a lap is different depending on track length but is always considerably higher than the points on offer for winning an intermediate sprint.

The winner is not necessarily the rider who has gained laps or crossed the line first, but the rider with the greatest overall points total.

Different length points races will produce very different strategies and outcomes.

There is no right or wrong way to ride a points race.

- The first and final sprints are usually the fastest, so decide if you need to contest them

- Gaining laps is very difficult in a short (under 12k) points race; trying and failing to do so will destroy your chances, so sprinting for points is often better

- Don't go too deep in the sprints because there are more to come

- If you want to attack, a good time is often just after a sprint when the field is strung out and people are tired

- If you are about to gain a lap and there's a sprint very soon, delay catching the bunch until you get some sprint points as well.

## Snowball points race

Riders get together in a bunch. The sprints are more frequent than in a normal points race (every 2-3 laps rather than every 5-10), only the first rider across the line gets any points and the points on offer for each sprint increase throughout the race.

As an example, in a 30 lap race, there might be 10 sprints. Sprint 1 is worth 1 point for the first rider across the line and nothing for any other rider, sprint 2 is worth 2 points for the first rider and no points for any other and so on until the end.

In the case of a points tie, positions will be decided by the finishing order in the final sprint.

The coach can decide whether to award points for lap gains or whether to require regrouping after each sprint, though this may be difficult with short times in between the sprints.

This race will likely run very fast and may be unsuitable for a group of highly mixed ability.

- Keep track of how many points others have

- Riders with a stronger sprint can wait until later in the race before hitting the front

- Riders who are strong pursuiterers or less able to sprint should consider trying to accumulate points early on

- Very strong pursuiterers should wait until any sprinters are poorly positioned in the latter part of the race before attacking for points

## Devil take the hindmost/Elimination race

Riders get together in a bunch. After the race start, the last rider to cross the line (decided from the trailing edge of the rear wheel) every lap or two laps depending on local rules is eliminated and must leave the track.

If the coach/commissaires cannot tell conclusively who should be eliminated, there is no elimination.

Some variations continue until three riders are left to sprint for victory with the first across the line winning. Others continue the elimination format until there is one rider left standing.

The length of the race is defined by how many riders there are.

This is an incredibly useful tool for teaching positioning, but riders often dislike leaving the track after a very short space of time. Consider using numbered bibs to indicate who has been eliminated rather than forcing riders to leave the track.

- The black line is a bad place to be unless you're in the first couple of riders as it's very easy to get boxed in.

- Always be aware of how many riders are behind you going into a sprint lap

- The front of the race is not a bad place to be as it might be in a scratch race because the pace varies a lot less there than at the back or in the middle

Eliminations happen on the back wheel, not the front. It's easy to think you're safe and ease off too early.

Keirin	<p>Usually raced by groups of six, though up to eight can race on larger tracks. Riders either start from the top fence or are held up by holders six abreast on the pursuit line.</p> <p>Riders are led up to speed, maintaining their original order until the race proper starts, by a derny, motorbike or pacer cyclist who collects the riders at 30kph and builds up to 50kph over approximately 750m before leaving them to race to the finish for another 750m. The first rider across the line is the winner.</p>	<p>While keirin is fundamentally a sprint discipline, it can be used to break up endurance sessions too.</p>	<ul style="list-style-type: none"> <li>- A stack of riders above you is bad news - accelerate if you can to draw them down again</li> <li>- Three laps (750m) is usually too far to lead from the front</li> <li>- If your position is poor (i.e. man 6 at the start) it might be a good idea to move up before the derny peels off. This is permitted, though you may not pass the derny.</li> </ul>
Win-out	<p>Riders get together into a bunch on the track. There are a certain, predetermined number of sprints, e.g. 10, maybe every 3 laps depending on track length.</p> <p>The winner of the first sprint is the winner of 1st place (i.e. the entire race) and retires from the track. The winner of the second sprint is the winner of 2nd place and retires from the track and so on. There is no reward for placing anywhere other than 1st in a sprint.</p>	<p>This activity allows weaker riders/riders with a poor sprint to contest places with the quickest riders absent.</p>	<ul style="list-style-type: none"> <li>- Decide where in the pecking order you think you are and which sprint to aim for</li> <li>- Start to be alert for the couple of sprints before yours - you might be able to spring a surprise if people are hesitant.</li> <li>- Have a plan for what to do if you don't win your sprint</li> </ul>
Reverse win-out	<p>The reverse win out is similar in nature to the win out, but the order of the placings to be contested is reversed. The first sprint would be for, say, 10th place, the second sprint for 9th place and so on until the final sprint is for 1st place. As with the win out, there is no reward for coming second in a sprint.</p>	<p>This activity is more suited to groups with bigger skill disparities than the standard win out, because the low place sprints happen early and the race builds to a conclusion.</p>	<ul style="list-style-type: none"> <li>- Similar to the above - have a plan for which sprint to target, but have a backup in case that doesn't work.</li> </ul>
Random win-out	<p>As above, but the sprints are in a random order unknown to the riders.</p> <p>When the riders are coming up to a bell lap, the lap counter/number boards should show what position the riders will sprint for. The winner of that sprint finishes in that position.</p>	<p>This take the planning out of the equation for the riders - instead of developing a scheme before the race, riders are forced to position effectively and conserve their energy for when it's needed.</p>	<ul style="list-style-type: none"> <li>- If you're going for a high position, try to remain in the first few riders</li> <li>- If you're aiming for a lower position, sit further back and attack over the top if you can</li> <li>- Go for 1-2 places higher than you think you'll manage if they come up before your target sprint. If you aren't successful, you'll have a chance to recover a little.</li> </ul>

## Longest Lap/Marymoor crawl

Riders start from the inner and/or outer fence and roll around for a lap/half lap depending on track length on the infield up to the starting straight. Riders should remain in a loose bunch during this period.

As the riders come onto the starting straight, they should slow right down and track stand near to or on the start line if they can, or ride very slowly if they can't. Riders may not put a foot down, lean on anything (including other riders), hold anything, cross the start line or ride backwards.

Over the next seconds/minutes depending on skill level, riders will wobble, fall, or ride off the track once they can't remain behind the start line any longer.

Once there are a few riders left, the coach/commissaire signals with a bell or whistle that the race has started. The race is then a 1-lap race with the first rider to cross the finish line the winner.

This is a good race for building skills and for finishing off sessions. Be aware that riders who are able to track stand have a massive advantage over those who cannot.

It also makes a good crowd pleaser at events as the winner is often unpredictable.

It can also be run in a handicap format using other lines (e.g. pursuit line) for other groups.

- Track stand if you can

- At the top, by the start line is probably the best place to be

- Attack full gas at the start

- Use a smaller gear than usual to get off the line quickly when needed.

## Controlled elimination

This race uses a pacer (which could be a derny, motorbike or strong rider) to keep a steady pace for the duration. It is not a race in the traditional sense, but a positioning and observation drill.

Riders should not allow themselves to be last across the line - riders who are will lose a point for every time, though they will remain on the track

Riders may not remain directly behind the pacer for more than a single lap

Riders may not pass the pacer's back wheel at any time

Every rider is simply attempting not to be last.

This is a useful positioning activity because it allows riders who are very strong to compete with weaker riders on even terms. The weaker riders get to spend more time in an active bunch while the strong riders are unable to simply win through strength.

- Keep moving. No position will be good for long.

- Be assertive in your positioning - don't allow other riders to push you about

- Avoid the black line, especially in the middle of the bunch and backwards.

## Tempo race/Course de Prime

Riders get together into a bunch on the track. There is one point for the first rider over the line every lap until the end of the race and no points for any other riders.

These are not normally long races, ranging from 5-30 laps.

Tempo races suit strong pursuit riders who can maintain a gap toward the end and gather large numbers of points in one go.

- The race will start fast, but the leader after the first few laps will not normally win because of the effort they will have expended. To do well, try to stay in touch until the pace has died off a little before going on the offensive.

## Hunter's Variation

Riders assemble into one line on the blue at resting pace. On coach's signal the front four riders drop to the black and gain a lap on the blue line group, no changing allowed. Once the lap gain is made, the front rider from the black line group join the back of the resting group and a new 4th rider joins from the front of the resting group.

If riders are unable to gain another lap, they may join the back of the resting string. In this case, a corresponding number of riders should join the fast group i.e. two riders go up to rest, two riders drop down to work. There should always be four riders in the fast string and there should be no changes.

## High and Slow

Riders should spread out around the track, ideally above the blue but it is possible to gain confidence by starting lower down the track. They should then gradually slow down until they are riding as slow as is safe for the track.

On a 250m wooden track of about 43 degrees, anything slower than 35 seconds is a good benchmark. A skilled rider can ride considerably slower than this.

Gaining laps is always physically difficult and gaining multiple laps in one effort is even more so. This activity should only be done with strong riders or with a group capable of riding a slow pace on the blue line.

Riders should be aware of what is safe before undertaking this exercise i.e. they should know that wheels slipping is a bad thing. Ideally there should be a clock visible at a certain point each lap so that riders can check their lap times and attempt to gradually reduce them.

This is an often overlooked but extremely important exercise in many areas. The ability to rest while remaining on the track will improve Madison, sprinting and the quality of a rider's interval training by considerable amounts.

Riders are often uncomfortable practicing this drill, but its value is such that they should be made to anyway, where doing so would not bring significant negative effects.

- This will be a long effort - pace yourself

- As you're coming up to the resting group, ask yourself "do I have another lap gain at a greater effort level in me? If not, pull out

- Be aware there may be more than one rider re-joining the resting group and conversely, more than one rider dropping to join the faster group

- Start at a comfortable pace and very gradually reduce it

- Put out no power at all in the straights, where no power is required to remain on the track

- As the banking starts to get steeper at the entrance to the turns:

1. Gradually increase your power until you reach a moderate level of power at the steepest point of the banking

2. Gradually reduce your pedalling power as the steepness of the banking reduces, until you are producing no power in the straight again.

- Some coaches hold that riders should focus on producing power with their left leg rather than their right as they go through the banking, to push the bike into the track surface better.

- Some coaches hold that riders should sit slightly to the right of their saddle, tilting the bike to the left and producing more grip.

## Six day efforts

Riders pair up on the blue line, not changing. As the exercise starts, the lap counter is set to 5 (on a 250m track) and counts down each lap as normal.

With 3 laps to go, the group moves to the black in single file and the pace increases.

With 1 lap to go, the front two riders attack and work together to gain a lap. The remaining riders move back to the blue and pair up again.

This is a more dynamic and structured method of gaining laps that can be used if riders want something a little different.

A variation is to allow any number of riders to make their way forward and attack with one lap to go.

- Don't go full gas on the front of the bunch - remember you're going to attack off whatever pace you set

- If you don't make the lap gain in the 5 lap window, you can choose to keep going or sit up.

- Stronger riders should do longer turns, not faster turns. Correspondingly, weaker riders should do turns at the same speed but for less time.

## Madison drills:

### Handslings 101

Due to the complexity of the Madison and how easily things can go wrong, this drill is performed on the apron.

Riders should pair up as appropriate and the coach should take them through the correct hand positions for resting rider and racing rider. Each rider in the pair should take it in turns to perform and receive handslings, with the coach circulating around fixing technical errors.

If any riders are struggling, the coach should provide extra demonstrations.

Don't be afraid to spend a long time on this exercise and on the early Madison exercises in general. Building good technique at an early stage is the single most important task of a Madison coach.

- Resting rider: right hand in the drops, left hand formed into a "paddle" shape (as though swimming) with fingers and thumb pressed tightly together, hand slightly cupped. Hand should be placed near rider's left hip with palm facing backwards.

- Racing rider: left hand on the tops, very close to or touching the stem. Right hand forming the paddle shape described above. Hand should be held level with the right hip, palm facing forward and slightly out from the body, ready to hook the resting rider's hand.

- When contact is made, it should be "paddle to paddle". Thumbs never have a place in a Madison sling because it is much easier to hook a hand than to grasp a hand.

- Riders should be as close together as practical while slinging. The closer they are, the easier it becomes to transfer power and speed.

- Maintain a strong arm and a solid core. Pressure on the handlebars should be minimal.

## Apron slings

Once the above drill is being performed to a consistently good standard, it's time to add the bikes. Riders should ride around the apron in their pairs at jogging speed and perform a series of gentle handslings, resetting into the appropriate positions before repeating the exercise.

Every few laps the riders should switch from resting rider to racing rider and vice versa so they experience both positions.

If riders aren't getting close enough together (indicated by excessive swerving, low power development or arms extended fully to the side) consider doing some simple contact riding drills before moving on.

Riders will tend to get excited and speed up over this activity, so be ready to manage this.

- Be close together - the closer the better, within reason

- When receiving or performing a sling, always allow your arm to go to full extension before driving forwards. This generates maximum power and speed. You should feel a noticeable tug from the other person's arm before you begin to drive through into the sling.

- Try to keep a steady pace

- Switch places often.

## Fire and reload

As above, but once the sling has been completed, both riders continue to hold hands and pull back in the opposite direction to a normal sling.

The riders should alternate moving forward and backward relative to the other as they ride around the apron, holding hands the entire time.

This allows for a very large number of "slings" to be performed in a short time. As above, riders should switch sides every few laps.

- Keep the pace steady

- Don't go wild - keep the slings technically good, yet controlled.

- Stay close together, don't drift apart.

## High and slow

This is discussed in the "bunch riding" drills, but it's so critically important to Madison that it is included here as well. If riders have not already practiced this, it may be worth starting here even before practicing handslings.

Riders should spread out around the track, ideally above the blue but it is possible to gain confidence by starting lower down the track. They should then gradually slow down until they are riding as slow as is safe for the track.

On a 250m wooden track of about 43 degrees, anything slower than 35 seconds is a good benchmark. A skilled rider can ride considerably slower than this, into the area of 45 seconds or more.

Riders should be aware of what is safe before undertaking this exercise i.e. they should know that wheels slipping is a bad thing. Ideally there should be a clock visible at a certain point each lap so that riders can check their lap times and attempt to gradually reduce them.

This is an often overlooked but extremely important exercise in many areas. The ability to rest while remaining on the track will improve a rider's Madison riding greatly by allowing them to change more frequently with their partner.

Riders are often uncomfortable practicing this drill, but its value is such that they should be made to anyway as it is impossible to be a good Madison rider without skill in this area.

- Start at a comfortable pace and very gradually reduce it

- Put out no power at all in the straights, where no power is required to remain on the track.

- As the banking starts to get steeper at the entrance to the turns:

1. Gradually increase your power until you reach a moderate level of power at the steepest point of the banking.

2. Gradually reduce your pedalling power as the steepness of the banking reduces, reaching zero in the straight again.

- Ride high in the straights and cut the tops off the bankings (i.e. ride over the middle of the stickers) to reduce the height change per lap.

- Some coaches hold that riders should focus on producing power with their left leg rather than their right as they go through the banking, to push the bike into the track surface better. Others believe pedalling should be consistent.

- Some coaches hold that riders should sit slightly to the right of their saddle, tilting the bike to the left and producing more grip. Others hold that this makes no difference.

## Lurgy

All riders except one should join the track and circle around above the blue at a slow but steady pace, equally spaced out. One rider will be designated the racing rider at random and they will ride around the black at a faster pace.

As the faster (racing) rider on the black approaches a slower (resting) rider on the blue, the resting rider should drop down to a few boards above the red line, using the track to build their speed up to close to that of the racing rider. As the racing rider passes the resting rider they should perform a handsling.

The former resting rider is the new racing rider and vice versa. The new resting rider move above the blue and the new racing rider repeats the activity with the rider ahead of them.

The racing rider can whistle or call out to the resting rider if they are struggling to look over their shoulder, though observation should always be encouraged.

More racing riders can be added as the drill progresses.

- The resting rider should move to just above the red and remain there until the sling has happened

- Both riders' arms should be at full extension before the push/pull phase of the sling

- Don't panic or tense up, but retain a strong arm and core

- Slings in the straight can seem easier, but increase the chance of riding into each other

- Slings in the banking will generate more speed

## Changing from the front

Once all riders are reasonably comfortable with handslings, give out matching bibs/jerseys to pairs of riders.

One rider from each pair is the first resting rider and circulates slowly above the blue. The remaining partners form a paceline and ride as normal, changing occasionally (i.e. every lap/2 laps). When the lead rider reaches their partner, they perform a sling with them as before. The second rider in the line should push forward over both changing riders so that they are level with the rider who is about to be slung into the line.

Drawing level like this means that when the rider being slung in accelerates away with the force from the sling, the second rider can drop neatly onto their wheel.

The formerly racing rider should ride on the cote, staying down and out of the way as the string passes over them. They should move up and rest above the blue when it is safe to do so.

This is an intermediate exercise that gets riders used to the idea that if riders are changing in front of them, they must ride up and over both changing riders.

It is a useful introduction to riding in a paceline without having many changes happening all over the place.

- If you're second wheel, overlap the changing pair completely. The rider being slung in will be accelerated out from under you.

- Observe carefully for times when your partner is on the front of the string or will be shortly.

- If you're further back in the line, move with it. Go up and down as appropriate.

- If you have just performed a handsling, stay down until there's a clear space to move up.



Changing from anywhere in the line

The general points from above apply, but now riders will change whenever they catch up to their partner, regardless of where they are in the line.

Whilst this sounds similar to the exercise above, in practice it is significantly more busy and active, even with relatively few riders.

- Always look ahead, both for your own partner and for other riders changing ahead of you. You may have to perform your handling quite high on the track to accommodate this.

- If resting, maintain space from other riders so that you aren't changing on top of each other.

- Resting riders should come in for a change at about 70% of the speed of the racing rider for the best balance between energy conservation and safe handlings.

Motorpaced Madison

This is a good idea if the riders involved are experienced Madison riders or riders with motorpace experience who are new to Madison. The motorbike or Derny rides at a steady speed and riders perform changes behind it.

This is used for benchmark testing by federations i.e. "riders can ride a Madison at 45kph behind the motorbike for X minutes" but is also very useful for containing stronger riders.

- Resting riders should remember that a derny or motorbike is wider than a single rider, and move in for the change with this in mind if their partner is near the front.

- Riders should perform Derny changes behind the motorpacer

- Riders should be more careful than usual not to ride too slowly for two reasons. Firstly, being hit by a motorised vehicle will hurt. Secondly, with higher speeds in the racing line, the resting rider will need to be travelling slightly faster as they come in for the change.

When first learning Madison, there is a temptation to attack off changes and open gaps. The motorbike prevents this. It also allows the racing line to move faster and perform more slings for less effort, which can be very useful with limited numbers.

For a very tough session, the motorpacer can hold a speed of X while riders are instructed to take laps together or in groups.

Attacking off a change

As a pair changes, the rider who is slung into the line should use the speed boost to attack the group.

Attacks can come from anywhere. Encourage riders to attack from different positions in the line to get a sense of how to do so.

- If at the front, consider changing off the front just before reaching your partner to gain height, making an attack easier.

- If in the middle or toward the back, consider laying off slightly from the rider in front, then rushing into the gap as you perform the handling for more speed.

- If at the back, you can lay off a long way and generate an enormous amount of extra speed, making it easier to attack from behind in the Madison than some other races.

## Tandem/Triple etc. changes

This is an extremely useful skill for racing Madison. A tandem change occurs when riders directly behind each other in the racing line change simultaneously with their resting partners.

If two riders are together in the line and both corresponding resting riders are next to each other above the blue, the rear rider of both pairs (racing and resting) should sit close to the wheel of the front rider, but about 15cm/6 inches above it. The riders should descend and change simultaneously.

The reason for sitting slightly higher than the wheel in front is that if the front rider changes in a different way or their bike comes back further during the sling, there is less chance of a crash happening.

It is the responsibility of the resting riders to make sure their order corresponds to that of the racing riders. If it doesn't, the rear resting rider should move under the other resting rider to a position just ahead of them.

This is not normally encouraged for beginner riders, but it is a useful component of breakaway riding - the break can consist of two/three riders who are all changing with their partners at the same time. This means the riders will be the same level of freshness rather than some being more rested than others, risking the group splitting.

It's a fact of life that this will occasionally happen in racing even if the riders aren't aiming for it, so preparation is good.

- Watch for occasions when a tandem change is desirable - if your partner is in a break with two other riders, can you get to one (or both) of their partners easily?

- Swap your order when the racing riders swap theirs, unless it's clear that they will change again before the next handsling is due.

- If you're not at the front, sit slightly above the rider ahead of you whether you're racing or resting. If the front riders put more or less force into their sling, their bike could move a different amount to yours. This could cause an accident if you're directly behind.

## Ordering

One racing rider from each pair rides in a paceline around the black, while the resting riders ride in a loose line above the blue, taking up maybe 50-70m of track space. Coach will signal to riders within the black line group to move in specified ways e.g. "Red jersey, move three places back". The resting riders have to observe and identify these moves, then change their own order to match.

This could be useful as a warmup drill, swapping which line is the active and which is the resting on an occasional basis.

It can also be used to get riders used to ordering without the added pressure of changes in a large group.

- Keep an eye on the group and wait for any movement to settle down before mirroring it.

- You should already be riding slowly so if you need to move backwards, encourage other riders to move underneath you rather than slowing further.

- Some coaches encourage resting riders to keep their left hand on the hoods to facilitate looking around. Others do not believe this helps.

Lap gains	<p>Riders should ride in a bunch at a steady pace, performing handslings as normal. When coach signals that one or more riders should attack, they should do so and attempt to gain a lap by working together.</p> <p>In the meantime the coach may send other groups or riders.</p> <p>If more than one rider is sent, their corresponding resting riders should attempt to form up so that they are performing tandem/triple changes, or at least changing close to each other. This shouldn't necessarily be done instantly if the resting riders are far apart, but it should ideally be in place after a couple of handslings - unless the lap has been gained by then.</p>	<p>As with the individual rider version of this activity, riders and groups should be sent with consideration to their strengths and weaknesses, though as the Madison involves two riders, even a weaker rider can gain laps effectively.</p> <p>To give stronger riders a workout, consider asking the main bunch to speed up.</p>	<ul style="list-style-type: none"> <li>- Perform multi-pair changes if possible to keep similar level of freshness in the fast group</li> <li>- Conserve a little energy if doing so will help you really drive through the change and give your partner a boost.</li> <li>- Don't go full gas on the first gain - you will likely have to perform more.</li> <li>- Keep observing in both lines - the racing line are watching for their partners and for riders changing in front, while the resting riders are focusing on ordering and position.</li> </ul>
Madison Scratch	<p>A simple race, the Madison Scratch is simply a scratch race for Madison pairings. X laps and the first rider across the line is the winner.</p>	<p>Madison races are usually longer and faster than the corresponding individual races, so bear this in mind when considering how many laps to use.</p>	<ul style="list-style-type: none"> <li>- Gaining laps may be slightly easier at the end of the race</li> <li>- The speed will be much higher</li> <li>- If one rider has a much faster sprint, try to make sure that rider changes in with 1.5 laps until the finish.</li> </ul>
Madison Elimination	<p>The final racing rider across the line every X (usually 1-2, but sometimes more for small fields) laps is eliminated from the race until there are only two racing riders remaining - these sprint for the win.</p>	<p>You can run this on a points based system: -1 point for an elimination, -2 for a change in the last lap before elimination, -3 for a change in the last 1/2 lap before elimination, -5 for missing a change or a similar scoring system to suit your needs. The advantage of this is that riders can continue to take part even if "eliminated". The winner is the pair with the best points total.</p>	<ul style="list-style-type: none"> <li>- This race demands concentration. An elimination race has a great deal of motion in it and this version even more so.</li> <li>- Don't get caught on the black line, especially if you need to make a change.</li> <li>- Beware of changing directly after a sprint. It's a good idea, but everyone wants to do it.</li> </ul>

## Madison Time Trial

This is usually a six-day event, either over 200m, 500m or 1km. Either one rider slings the other into the start of the TT, or the riders switch at the midpoint.

This has traditionally been a race with a high number of crashes and is not often contested any more, though some variations of it will be safer than others, especially if it's used with younger (slower) riders.

The issues tend to arise when this activity is performed with fast riders as they will be performing handslings at a greater speed than is ever usually done. Numerous professionals have crashed in recent years as a result.

- Make sure your changeover point is agreed between you and your partner in advance
- If something goes wrong, don't try to correct. Accept that it's sometimes better not to take the risk.
- The resting rider will themselves need to be going much faster than they usually would in order to change safely.

## UCI Madison

The rules of the Madison have changed numerous times over the last few years. This description is current as of June 2020, but it may change again. Check the rulebook.

The Madison runs as a points race for teams - there are sprints roughly every 2.5km throughout the race worth 5,3,2,1 points for the top four riders. Gaining and losing laps is worth an amount of points dependant on how long the track is - 20 points either way for a 250m track.

The winning pair is the one that accumulates the greatest number of points over the course of the race, with laps gained not automatically putting a team at the head of the race.

As with other Madison races, the speeds are much higher and the races are correspondingly longer with a world-level race being 50km.

Madison partnerships used to consist of a pursuit rider and a sprinter, but there is now more emphasis on both riders having strengths in both areas.

- The head of the race may not be where you expect. It will be indicated by a commissaire at the lap counter pointing as the lead rider passes. Keep track if you can, especially coming up to a sprint.
- If you're a resting rider, be aware that the racers are lapping faster than you and in a different position on the track. This may lead you to underestimate how soon the next sprint is happening - the lap counter doesn't refer to you, but to the head of the race.
- There is no right or wrong way to ride a Madison race.
- Have a plan, but be prepared to change it and to communicate this to your partner in a couple of words during a change if needed.

## Madison chase/six day racing

The "traditional" Madison is now only raced at special events. It differed from the modern Madison in that it was decided first on laps gained, then on points. A pair who managed to finish a lap up on the field would always win regardless of points accumulated, so long as no other teams had also gained a lap. In this case, the points would split them.

If the laps and points were equal, it would go to the finishing position in the final sprint.

The traditional Madison also had fewer sprints and no double points in the final sprint, with sprints roughly every 5km rather than 2.5km as in the modern version, so the emphasis was more on gaining laps if possible.

In six-day racing, the points and laps accumulate over the entire duration of the event, with several short races held every night.

Many riders and observers disagreed with the changes, arguing that the traditional Madison was more interesting and tactical.

- The reduced sprint opportunities mean there is more emphasis on lap gains.

- Watch for opportunities to attack with other strong riders.

- If you are about to gain a lap as you come up to a sprint lap, hang back for a lap or so and collect some extra points whilst you are still the head of the race.

- Unlike a points race or modern Madison, the final sprint is not worth double points.

## Motorpace activities:

## Derny/motorpace Changes

This is a special method of changing that is only used in motorpaced activities. In a derny change, the rider directly behind the pacer pushes forward on the exit of the banking and draws alongside the right hand side of the pacer, taking the string with them. The rider behind them drops onto the back of the pacer and the first rider changes up the track.

The reason for this method is that motorpacing training is often much faster than normal training. If a rider loses the wheel, especially that of the pacer, it can throw the session into trouble very quickly. Drawing the second rider onto the wheel of the pacer before changing helps reduce issues with riders being dropped if the pacer should choose that moment to accelerate.

Riders change less frequently, with changes happening every 500-1000m depending on the number of riders (5 riders or fewer would be 750 or 1000m, over 8 riders would be 500m). This is because the more riders there are, the less shelter they get (and the harder they have to work) further back in the line.

In traditional training, the rider at the front works the hardest and the riders further back (though not necessarily AT the back) work less hard.

In motorpace training, this order is reversed. The rider directly behind the pacer gets the greatest amount of shelter, with this shelter decreasing back through the string. As a result, the rider working hardest is the one at the back.

Weaker riders should position themselves nearer the back initially so that they get through more of the block before having to change to the back again and likely being dropped as a result.

- Use the exit of the banking (and resulting downslope) to make it easier to draw alongside the pacer.

- If you can't keep the pace in the line, try to use a derny change to draw the next rider up just before you have to pull out.

- Be aware of whether there are other pacers on the track and how high you can change if so - if you're on the black, there may be a string on the blue forcing you to change below them.

- Remember how long you're supposed to spend behind the pacer. If you're not sure, it's better to change early than to hog the pacer bike.

- Do not change at all in the last 5 laps as the pace really ramps up. If other riders are dropped, they are dropped.

## Motorpace string training

This is what is often considered traditional motorpace/derny training. Riders form into a line on the track where they are collected by the pacer at their starting speed. The pacer can then either maintain a steady pace or more usually speed up throughout the block so that only a few riders are left by the end.

For steady pace training, the line can be quite long if permitted by local guidelines. For training with increasing speed, no more than 8-10 riders is recommended as beyond that the riders at the back are getting no significant draft benefit from the pacer.

On an indoor track, speeds of 65kph plus are easily attained for brief periods.

"Derny changes" - in a derny change, the rider directly behind the pacer pushes forward on the exit of the banking and draws alongside the right hand side of the pacer. The rider behind them drops onto the back of the pacer and the first rider changes normally.

Riders change less frequently, with changes happening every 500-1000m depending on the number of riders (5 riders or fewer would be 750 or 1000m, over 8 riders would be 500m).

Gearing is a contentious issue for this exercise. There are two schools of thought:

1. Gears should be restricted and riders should use a derny session to increase their maximum cadence and their endurance at high cadences in general.

2. Riders should use race gears and faster speeds to simulate all the sensations of a very fast race without having to be super fit all of the time, as well as improving their bike handling skills.

It's important to note that there is no "right" way to ride a derny session and both these approaches have their place depending on the riders and their relative strengths and weaknesses. Neither of the two approaches above should be neglected.

- When changing, remember to draw the next rider on. Never just swing up.

- If you are about to go pop in the middle of the line, perform a derny change just before you do.

- If you lose the wheel and can't get back, swing up safely and let those behind you get back on asap.

- If you are fully dropped, leave the track as soon as you can. Do not linger on the cote and ride as close to the inner fence as possible before exiting the track area.

- If you are dropped, you are dropped. Do not take a lap out and attempt to re-join.

- At the end of the effort (signals for this to be agreed beforehand, though some are below), the derny will accelerate off the front. Do not follow it.

- The pace may be up to the pacer or you may have input. The recognised signals (shouted by riders) are:

Faster - Allez

Slower - Ho

Pacer signals:

Hand behind back with X fingers showing - X laps to go

Arm straight up in the air - mechanical problem

Arm waved horizontally to the side - effort over, do not follow.

## Flying efforts

Often used by sprinters, flying efforts see the pacer and rider going through a standard flying effort buildup (this will be track and situation-specific) before being led into the effort by the pacer.

The pacer can:

1. Accelerate away at the rider's jump point, simply having made their buildup easier.
2. Lead the rider a certain distance into the final acceleration then pull out, allowing them to complete it themselves.
3. Complete the entire effort with the rider behind them.

The best approach will depend on the rider's goals.

Other riders should not be on the track or rolling around the apron at the time.

Flying motorpaced efforts can be challenging for the pacer, who will often have to hit very high speeds with a very slow buildup to satisfy good sprinters. Both of these things can be tricky on a derny or motorbike and pacers looking to do this type of session should make sure to practice without riders first.

This activity is an excellent way to keep sprinters' bike handling skills sharp and to build top-end speed ahead of competition.

- Lay off the pacer a little in the windup - a motorbike or derny will react differently to the track geometry.

- Do not follow the pacer past the agreed end point of the effort

- If signalling to the pacer, you will have to shout loudly to make yourself heard over engine noise.

## Rolling efforts/accelerations

Rolling paced efforts can often be more useful than the flying efforts described above as the rider will not have to use so much effort to get up to pace and higher top speeds can be attained.

The windup will often happen on the blue line for 500m or so before the pacer and rider drop down to the black for the main part of the effort, picking up the last bit of speed on the way.

This type of effort can be useful for kilo riders and team pursuiter to help them get used to the high-speed handling of a bike on aerobars, especially if they are also getting used to other aero gear like front discs.

- Don't follow the lines - follow the back wheel of the pacer.

- The back wheel of the pacer bike should always be covered. Don't be afraid of bumping against a mudguard or fender - you will simply lose a fraction of your speed and drop back a little.

- Specify the pace that the pacer should hold for the main part of the effort and don't be afraid to give feedback for the next one.

## Starts/Team Sprint drills

Here the pacer can take the place of either of the first two riders. Riders can chase the pacer from a standing start for 1 or 2 laps. Alternatively, the rider can start as normal then the pacer can drop in front to shelter them after a certain time - say 3/4 of a lap - before upping the pace.

The pacer can also totally replace rider 1 by pacing the other rider(s) in from the blue line for the appropriate distance before pulling away.

This can be useful motivator for rider 1 to improve their starts, as well as excellent speed/speed endurance training for rider 2 or 3.

- Go full gas to get on the bike - if you start to overlap, the pacer will notice and accelerate.

- Give the pacer space to swing up when it's time for them to do so.

- Discuss your requirements with the pacer beforehand.



## Motorpaced Points race

Here the pacer can do several different things. The pacer can control the speed in between sprints to give the bunch a chance to regroup or the pacer can increase/decrease speed at different points in the race - riding a very fast lead in to one sprint to advantage certain riders and a very slow lead in to the next one to benefit others.

The pacer should control the speed until the bell before the sprint lap, at which point they should pull away.

No rider should remain directly behind the pacer for more than a lap and no rider may ever overlap the pacer, other than where they are performing a derny change.

This can be used to stretch fast riders as well as give slower riders a leg up. The coach could also specify that a certain rider should attack ahead of the sprint so that they have a head start on the bunch when the pacer pulls away.

- Don't overlap the pacer except when changing

- Position yourself well for the sprint - being directly behind the pacer is likely not the best place to be.

- Conserve your energy - don't go all out in any sprint except the last.

- If you're dropped, get down to the safety zone as soon as you can and stay well in to the centre, away from the racing line the pacer will be taking.

## Motorpaced Elimination race

This is run on a point-based system with the following rules:

The pacer will ride a steady pace all race (say 40kph). Riders may not overtake or overlap the pacer at any point other than when changing.

Riders may not spend more than a single lap directly behind the pacer.

Riders are fighting not to be last. The last rider over the line every lap gains/loses a point, but keeps riding.

The winner (or likely winners) of the race are those riders who have been last the least often.

This drill is a powerful way of teaching positioning. An issue that often affects strong riders is that their tactical development is lacking - and when they attend larger races with equally strong riders, they make poor decisions.

This exercise levels the playing field, making it impossible for any rider to dominate through strength alone. Only a tactically sound rider can be consistently successful.

- Avoid the black line in the middle of the bunch. You're likely to be swamped by riders coming around the outside.

- If you're at the back, just do as much as you need to in order to pass one other rider. You don't have to get to the front.

- Second position is a good place to be, but other riders will be trying to get there too. Learn to defend your position in the race.

## Motorpace racing

Motorpace racing happens with one rider behind every pacer and up to six rider/pacer pairs on the track at one time.

The riders draw for starting positions and their pacers assemble in that order on the blue line at a steady pace. The riders are held down on the cote in the corresponding order. Once everything is in position and the pacers approach the riders, the riders are pushed off to join their pacers on the track.

After a lap or two to get in formation correctly, the race starts. The first pacer to lead their rider across the line is the winner.

Undertaking is banned in all forms of motorpacing.

## Motorpaced Shaun's Game

This activity is the same as Shaun's game except in three places.

1. The fast group is led by a pacer, who should gradually increase their pace throughout the session.
2. Riders should perform derny changes behind the pacer - if they are feeling good then they should attack the pacer for a lap before peeling off.
3. With the use of the pacer bike, the string can contain more than the usual 3 riders - up to 5 is normally the limit.

Some federations and/or insurers require a different level of licence for training and racing, as well as different licences depending on the nature of the pacer bikes.

In the UK, motorpace racing is prohibited in coaching sessions though it is permitted at race meets.

The pace of the string should start slower if there are more riders in it and faster if there are fewer. For a string of 5 riders on a 250m velodrome, a starting pace of around 40kph is a good idea - finishing as fast as the riders can handle.

If riders haven't been behind a pacer before, they should be briefed on the general etiquette involved.

- Make sure that both you and your pacer understand the standard signals.

Allez (shouted) - faster

Ho (shouted) - Slower

Fingers held behind back - number of laps to go

Arm straight up in the air - mechanical

Arm waved to the side - abandon effort

Clenched fist behind back - attack

- At no point should any rider swing up or down the track without due care.

- When overtaking, it is the responsibility of the pacer to ensure that both they and their rider are clear of the pair being overtaken before moving down.

- Don't lose the wheel in front of you.

- Don't be afraid to get super close to the pacer if they have a guard on the rear wheel. Nothing will happen if you hit it except that you will drop back a few inches.

- If you're going to join the string, be aware it will be going faster later in the session.

- Remember that you don't have to join if you don't want to.

- Unlike normal Shaun's game, these efforts start very hard and get easier rather than the other way around. Be prepared for this.

## Sprint activities:

## Flying 200m

The qualifying time trial is the first part of a sprint competition and is normally an excellent predictor of the finishing positions. It is important to master this activity because the higher your initial placing, the easier your route through the early rounds of sprinting.

The distance covered will be roughly 900m with the final 200m timed. The best technique for riding a 200m TT differs significantly from track to track and rider to rider, but in general terms:

The first 250-300m is used to gain height on the track by gradually working upwards.

With 600-650m to go, the rider should start to gradually build to about 70-80% of their maximum speed.

With 300-350m to go the rider should attack as hard as possible out of the saddle and move gradually down the track, reaching their peak speed as they hit the black with 200m to go. The rider should hold this speed as well as they can for the rest of the effort.

- There is no one-size-fits-all approach that will work in all circumstances. Riders and coaches should work together to establish what acceleration profile, gear choice and line will produce the best results.

- Gear choice is contentious with many coaches suggesting that riders should use small gears and spin fast. This approach is not backed up by the current evidence from senior riders, but is beneficial for reducing musculoskeletal stress and improving cadence in younger riders, many of whom will be subject to gear restrictions anyway.

- The second 100m should always be slower than the first 100m of the effort. If it is not, it indicates that the rider has not hit their peak speed on entry to the effort.

- Build height by riding slowly initially.

- You should slow down through the effort. This is normal and shows that you've got everything out.

- Focus on holding an aero position not just during the effort, but during the seated portion of the windup.

- Build speed by accelerating out of the banking, using the downhill slope to help you. You can get out of the saddle to do this if you wish, a technique pioneered by the Dutch sprinters.

- Get as close to the top fence as you can in the build up and acceleration phases

- Stick as close to the black as possible in the bankings during your effort - differences between riders can often be hundredths or thousandths of a second.

- If you find it hard to hold the black, consider moving out a little in the straights, to the red or just above, then dropping down again in the bankings. This can help hold you down.

- Tip your head to the right in the bankings. This tips the bike to the left and holds you down better.

## Longer flying efforts

These should generally be done in the manner specified above, but the final "flying" part of the effort is significantly extended. Flying 500m efforts are a useful means to build "speed endurance" or the length of time a rider can hold their top speed.

It's psychologically difficult for riders to commit to going full speed into an effort like this when they know it's going to be very hard. It can help to build up to it.

A rider will get more benefit from a flying 300m at maximum effort than a flying 500m at submax effort.

- All the same coaching points from the F200m above still apply.

- Break it down mentally into sections - not a flying 500m, but a flying 200 and then another 100m, then another 100m then the last 100m.

## Progressive efforts

Progressive efforts are used to extend the duration of an effort without too much metabolic fatigue. An example would be a progressive kilo where the rider builds speed more gradually over the first 500-600m, before an all out finish. This allows more training load while making it manageable to do more often and with more efforts in a session.

These efforts are often used in combination with very big gears - much bigger than race gear - to build bike-specific strength. If a rider was coming off a gym-based strength block, they would likely focus on track efforts like this.

If a rider is going to do multiple hard efforts in a session, the duration can decrease while the intensity stays high - progressive kilo, progressive 750, progressive 750, all out 500m. The decreasing duration means it is psychologically easier to hit maximum effort.

- Start from a roll in or a standstill.
- Remain in the saddle while accelerating.
- Try to engage your core and stay stable.
- Don't hit full gas too early - fatigue may reduce the quality of your subsequent effort unless you have a very large base of training.

## One-Three-One

A 1-3-1 is another type of effort that reduces metabolic fatigue while still getting some training load in. A rider should attack full gas from a standing start for 100m, cruise at a decent pace for 300m and attack full gas again for the final 100m. This helps mimic the pace and intensity changes that might be required in a team or match sprint.

If a rider finds this activity too easy or is training for a longer race like the Kilo or Keirin, consider reducing the rest or increasing the effort sections beyond 100m.

- Roll very slowly into the effort from the black line
- Don't back off fully in the midsection - keep a good degree of power on the pedals to build some fatigue ahead of the final jump.

## Team Sprint

The team sprint is contested over 750m with three riders for men and 500m with two riders for women. The first rider will usually start from a gate while the other rider(s) will be hand held on the pursuit line, one above the other.

On starting, each rider completes a lap as fast as they can and peels off to allow the rider behind to complete their lap.

A rider will normally start to draw aside as they enter their starting straight, but the next rider may not pass their front wheel until the pursuit line on pain of disqualification.

Once a rider has done their turn, they pull off and circulate above the blue line until the race is over.

The fastest starter should go first, the rider with the highest top speed should be second and the rider with the best speed endurance should go last (if applicable), though there are always exceptions.

Rider two will often lay off a few bike lengths then rush into the slipstream of the first rider just before they pull up, building extra speed in the process.

- All riders should go full gas from the start. If rider 2 or 3 starts to pull ahead (often because rider 1 has started poorly) they should use the banking to drop into place rather than backing off.
- Rider 3 should not attempt to rush at rider 2 - it's too much effort at that point in the race.
- Riders 2 and 3 will normally use a gear 3-4 inches bigger than rider 1.

## Match Sprint

The Match Sprint is contested by 2-4 riders, with 2 being the norm in sprint-specific competitions and some local competitions running rounds of 3. 4 rider sprints are usually reserved for the recharges - a sort of second chance for riders who have lost in the first round.

The match sprint is contested over 750m or as close as is practical. The riders draw for position and start from a held position on the start/finish line. The rider who has drawn first place must remain there at at least walking pace for the first 1/2 lap, unless relieved of the lead by the other rider.

The first lap is often, though not always, slow and tactical as riders jockey for position, with the speed building until the finish.

There are many rules and tactics that can be applied. This list is not the place for a full examination of them, though some are referenced in later drills.

The winner is the rider who crosses the line first after 3 laps.

Sprinters have many skills that most endurance riders lack - the ability to ride big gears very slowly on the track, a tremendous acceleration and top speed and the ability to ride while looking continuously behind them.

These are not necessary, but all are an advantage to a rider who possesses them. A rider who is keen to take part in sprint racing should also invest considerable time in developing these abilities as well as improving their physical capability.

- Always keep an eye on your opponent.

- Try to ride in a way that maximises your abilities and minimises your opponent's. If, for instance, they can't sprint for a long distance, consider upping the speed early in the race to pressure them.

- If you see an opportunity, take it. Don't ever second-guess yourself. Over time, your decision making will improve.

## Kilo/500m TT

The kilo is a simple event, but widely considered the most painful in the entire sport of track cycling.

The rider starts from a gate on the pursuit line and rides a kilometre as fast as possible, nearly always with the use of aerobars.

Female riders ride the 500m TT instead of the kilo.

Kilo riders are often good Keirin riders or the third rider in a team sprint due to their ability to hold a high speed for a long time. They must also be excellent gate starters, have an ability to hold a good aero position and control the bike effectively on aerobars.

Many different gear choices are possible - riders and coaches should experiment to find the best one for a given athlete. There is a balance to be struck between a fast opening 500m and a faster (or less bad) final 500m, with even world level riders often making very different choices.

- Don't try to pace yourself. There is no pacing strategy in a kilo that is as effective as going all-out.

- Larger gears will slow down the start of your effort but speed up the end and vice versa

- Maintaining an aerodynamic position is very important, but not to the extent of compromising your ability to ride to the black line in the bankings.

## Keirin

The Keirin originated in Japan and is still a major gambling sport over there, occupying a similar niche to dog or horse racing in the western world.

It is usually contested between 6 riders (sometimes more on a larger outdoor track) over 1500m. Riders draw for their order and line up side by side with holders on the pursuit line of the home straight, rider 1 at the bottom. A pacer (usually a derny but sometimes a motorbike or even another rider) starts from the back straight.

As the pacer approaches the riders the coach or race official will signal with a whistle or shot. The racers are pushed off and they drop behind the pacer bike as it, remaining in their order. The pacer leads them for 750m, going from 30kph to 50kph for men and 30kph to 45kph for women in the process.

The pacer exits the track onto the safety zone/apron and put on the brakes whilst the riders race alone over the next 750m with the first rider across the line declared the winner.

Juniors or weaker riders can have lower drop-off speeds - the racers should be able to accelerate from whatever speed ends up being used.

This is another race where the rules have changed significantly over the last 30-40 years - be aware when discussing with older cyclists that the rules may have altered since they last rode.

- You must not pass the rear wheel of the pacer until they pull off, but you may change your order after the first lap by moving up or dropping back.

- You must maintain your order as you initially assemble behind the pacer.

- Very few riders will have the strength to attack for the full 750m - pick your time and don't go too early.

## Gate starts

Gate starts are a highly technical activity with no single method being necessarily the best. Before using a gate, coaches should have undergone some training or instruction on how to do so, as the process can be tricky at times and procedures can differ from venue to venue.

The rider should set their pedals to their preferred starting position. For those who are unsure, a good guide is to start with the left pedal forward and the spindle of the right pedal level with the lower part of the chain. Individual riders should be allowed to experiment and discover their preferences.

The bike is put into the gate by the coach or race official and the rider then has 50 seconds to get on the bike, settle in and do up any straps. In a coaching session, this will generally be less time.

The timing system should beep at 30 seconds, 10 seconds and then give a 5-second beep countdown. A commonly used approach is to tense the arms and core on 3, stand tall on 2, go far back on 1 and launch forward on 0. There are too many variations to list here, but many riders will go up and back in one motion earlier in the countdown.

Starts are important for a wide variety of riders from pursuitters, team sprinters and kilo specialists. All riders can benefit to some extent from the training they can provide.

A typical start session would look like 50-60m effort X 3, 125m effort X 1 with a couple of mins rest between efforts and 15-20 mins between sets.

If a rider is struggling with timing, consider having them only go three pedal strokes to get the feel of it. Bear in mind that even this can be much more tiring than is immediately obvious.

Don't neglect longer efforts - it's really important to do the occasional lap or longer effort so riders get used to producing maximal power at the entire range of cadences from a standstill to top speed.

- If you are unhappy with any aspect of how your bike is set up, do not get on it. You have the right not to start until you are totally happy.

- Set up as far back and as you can during the countdown.

- Your wrists should be turned slightly outwards to give yourself space for your body to pass through your arms. Your lead foot should be flat, not sitting with the heel downward and your head should be in a neutral position - not looking fully up as this reduces back muscle recruitment.

- On 0, throw yourself as far forward as you can to generate speed. Your knee should almost touch the fork.

- As your foot passes through the bottom of the pedal stroke, reset back to half the distance you went to in the gate and push forward again for your second pedal stroke.

- Do the same on the third stroke, but reset half as far again this time.

- Some coaches and riders suggest going down to the cote out of the gate to get the bike up to speed quicker with the height drop. This is no longer allowed in competition.

- If you're a sprinter, fully commit to every start. If you're tired it's better to rest than to get too used to submax starts as you will never use these.

## Hand held starts

Hand held starts are quicker to do than gate starts and are a good way to build confidence without the risk of mistiming it and being caught in the gate. They can be a useful introduction to the coaching points used above.

A rider will usually be sitting on the bike, clipped in and straps done up if used. The rider will either be pushed onto the track by the coach or will gently roll up to the line.

The coach should place their legs either side of the rider's rear wheel for stability and lift them upwards (saying "lifting" as you do so) so they can spin the cranks into their preferred starting position before putting them down again.

Riders should sit still and never turn their front wheel. If they are off balance, they should put a hand out to the side to indicate that they want to be leant to one side or the other.

If many riders are practicing at once, helpers can be recruited to hold them up in a stack on the track surface.

It can be best to practice this with riders on the flat in trainers first so that both they and any volunteer holders know what to expect from the activity.

As coach, remember to brace your hands against the back of the rider's saddle when they start, as they will often push the bike back against you. Ensure your shins are well clear of the dropouts for this reason.

Be ready for some riders to want to be held squint or unbalanced. This is fine with lighter riders but can be challenging if a heavy rider is being held by a small holder.

- Don't turn the front wheel, hop, lean or wriggle. If you want to go one way or another, tell your holder.

- Use the same coaching points as above in "gate starts"

- If you're not happy with your pedal position, ask for it to be changed. The holder should always oblige.

## Rolling starts

This is the easiest type of start to perform and can be done without help or while other activities are happening on the track.

The rider(s) should prepare themselves, then roll onto the track into the appropriate position(s).

Unlike in the other starts described above, riders should not necessarily go directly on the line. They should wait until a point close to the line when their pedals are in the correct position - it doesn't matter if this is a little before or a little after the line itself.

In this situation, the role of the coach is to time if necessary, to manage track traffic if necessary and/or provide encouragement.

- See above



## Accelerations

Accelerations are used to mimic attacking in a match sprint or keirin. Riders will generally do a couple of laps on the blue, then attack down to the black for the desired distance on reaching a particular point on the track.

The entry speed and distance ridden will depend on the race being prepared for. A sprinter might attack from a relatively low speed and for 200-300m, while a keirin rider might accelerate from a higher speed or for a greater distance.

Accelerations can be done in the saddle or out of the saddle, depending on which aspect of their cycling the rider needs to work on.

Normally a rider looking to improve on-the-bike strength might accelerate in the saddle, while one looking to improve power and add snap might attack out of the saddle.

- Make your distance, style of acceleration (in or out of saddle, gradual or sudden) specific to the demands of your event
- Use the height of the track to help get up to speed.

## Low cadence efforts

Low cadence efforts are an important part of sprint training. Power production is force applied divided by time taken. In order to produce more power, we seek to improve force development or reduce the time taken.

Force production goes down as cadence goes up, so sprinters train at low cadence to improve this aspect of their cycling.

Using big gears allows riders who may have been working in the gym to build strength to transfer that strength into a more cycling-specific area.

Low cadence doesn't need to mean big gear - riders can attack from a standstill in the saddle and climb up the banking. This would keep them in the low cadence/high force production zone as they got up to speed.

This type of training works very well with the progressive efforts described above.

Junior riders should avoid too much of this type of training unless they have a large training background.

- Focus on staying stable on the bike and recruiting as many muscles as possible.
- Use as big a gear as possible unless you're a junior rider on restricted gears.
- This will not feel the same as using race gears and you will not be able to produce as much power as you usually do. This is normal.

## High cadence efforts

The opposite side of the equation described above, high cadence efforts seek to improve a rider's ability to apply force in a short time.

This type of activity can be effectively combined with motorpacing activities.

It is useful for sprinters to develop power at high cadences to allow them to accelerate hard in race situations.

High cadence efforts should be done at a cadence that is uncomfortable for the rider - whether this is 180rpm or 90rpm will be a matter of personal variation.

- Focus on spinning smoothly and bouncing as little as possible
- These efforts will come with a great deal of metabolic fatigue and may well be more taxing than typical race gear efforts due to lactic acid buildup.

## Rushing the gap

If a rider is travelling at speed on the track and another rider wishes to pass them effectively, the rear rider should leave a gap of at least 2-3 bike lengths on the lead rider, then accelerate into the lead rider's slipstream to accelerate to a higher speed than the rear rider could achieve alone.

Just before they hit the rear wheel of the front rider, they should snap out and pass around the outside of the front rider as closely as possible.

If the rear rider is directly on the wheel of the front rider at speed, they can move up the track at full power and then descend back down to create a gap to rush into. It's counter-intuitive that a rider seeking to pass another rider would allow a gap to form, but the extra speed it's possible to generate outweighs the negative effects.

If possible, the gap rush should be timed to bring the rear rider out of the front rider's slipstream just at the start of the straight where passing will be easier and quicker.

If the front rider is observing closely, they can counter an attempted gap rush by riding at 90% of pace, then accelerating as the rider behind attempts to pass them, greatly increasing the difficulty of this move. See "Seated squeeze" and "holding on the hip" for more information.

Riders can practice this activity in both positions at a variety of submax speed to get the techniques involved right.

- The rate at which the gap is closing will get quicker as you get closer to the front rider and benefit more from their slipstream - adjust your timings in light of this.

- Don't be afraid to lose a little distance in order to gain a little speed.

- This move is one of the reasons why the concept of "space to race" is important when riding as the rear rider in a match sprint.

- Get as close as you possibly can before moving out into the wind.

## Observation

Observation is a vital skill in track cycling - in fact, it underpins almost every aspect of the discipline. In a sprint context, it refers to knowing where your opponent is at all times.

This activity is normally done with pairs of riders. The front rider will lead the rear rider around the track, with the front rider looking over their shoulder and attempting to keep the rear rider in their sight at all times. Peripheral vision should be used to keep the bike on the appropriate part of the track.

The front rider could have an extra task such as identifying how often the rear rider touches their nose or how many fingers they are holding up.

After a certain amount of time, the riders will swap positions and repeat the exercise.

This activity can also be performed with more riders, though it becomes exponentially harder to keep track with each extra rider added.

- If you can't keep constant watch, don't look in a predictable pattern. Vary the length and timing of your glances so your opponent won't be able to perfectly time an attack.

- If you take up a position at the bottom or top of the track, you will have a much easier time because you will only need to look in one direction.

- You can look between your own legs when out of the saddle.

## Ducking and Diving

This is an extension of the observation activity above. One rider should ride a few boards above the red line, just out of the sprinters' lane. The other rider should take height on the track.

The front rider should keep a watch on the rear rider. The rear rider will periodically move down the track as though to attack under the front rider. Every time this happens, the front rider should drop into the sprinters' lane as though to cut off this possibility.

After a certain period, the riders should switch positions.

To make this activity harder, the lead rider might have to ride higher above the sprinters' lane or the rear rider might have to ride closer to the front rider, giving less reaction time.

- If at the front, use peripheral vision to keep your bike where it should be.

- From the front, watch for the rear rider maintaining position but closing distance quickly with a seated acceleration. This usually means an attack is imminent, but it can be hard to notice if the rear rider is strong in the saddle and their body movements stay largely the same.

- If at the rear, drop as sharply as you can to try and catch the front rider napping.

- From the rear, look for opportunities where the front is poorly positioned. Things like vertical cranks, a bike pointed up the track and insufficient observation can all create opportunities for movement.

## Seated Squeeze

If a rider finds themselves on the front of the race with a reasonable distance to go - over 250-300m, for example, they may need to save some energy to hold off other riders in the closing stages of the race.

In this case, they should ride full gas in the straights where it is easier for other riders to pass them, but back off a little in the bankings where passing is more difficult.

This concept is related to holding on the hip, below.

This technique will not be enough for a weak rider to overcome a strong one, but it's extremely useful for strong riders who have found themselves in an undesirable position.

It can also be used effectively in endurance races where a rider finds themselves on the front too early ahead of a sprint.

- Don't back off fully in the bankings, just go to 90-95% instead of 100%.

- Don't panic if someone starts to come around in the bankings - wait until the exit of the turn to put the power down again.

- A seated squeeze is most useful with 300m-600m to go to the finish. Shorter than that and you should just hit full power if needed, longer than that and there's little you can do to sustain power for so long anyway. Changing position may be a better option.

## Holding on the hip

Holding on the hip is a useful method early in a competition. In the early rounds, conserving energy is important. Single day sprint events are often won not by the fastest rider, but by the rider who can conserve energy best over the day.

The core of holding on the hip is to not ever ride faster than needed. If a rider is coming around you, push on just enough to keep them on your hip, with their front wheel a little behind yours.

This concept is related to the seated squeeze and rushing the gap as detailed above.

One mark of a great sprinter is one who always wins by a nose - these racers may have the capacity to win by far more, but realise they don't have to use it.

- You don't need to win by a mile, you just need to win by a millimetre. Anything more than that is not necessary and will reduce your chances in later rounds.

- Don't leave it too late - you should push on a little as soon as someone starts to come around you.

- Use less power in the bankings where it will be harder to pass you.

## Pinning on the fence

The fence pin is a technique that doesn't work very well against experienced sprinters, but can be used to great effect against over-eager rear riders.

If a rear rider gets too close to a front rider - overlapping their wheel or nearly so - the front rider can move sharply up the track. The position of the rear rider will mean that they too have to move up or risk crashing.

The front rider can carry the rear rider right up to the top fence in this manner. If the front rider gets close enough to the fence, the rear rider will not be able to pass over the top. Their only option will be to kick back on the pedals and lose speed, at which point the front rider will attack.

The three reasons this would not work against an experienced rider are:

1. A good rear rider will allow at least 2-3 bike lengths of room to the front rider.
2. This move can be countered by pushing forwards as soon as the front rider tries it and leaning on them with a shoulder or head, though this happens less in modern sprinting.
3. A skilled rider can trackstand, making this move impossible at low speeds.

- Be prepared for the other rider to resist physically by leaning on or bumping you. If they do so, you should back off. They are entitled to defend their line.

- Some riders may panic when taken sharply to the fence. Remember that it is both against the rules and the spirit of the sport to cause a crash.

- If you have a rider well pinned, there is no reason to back off. Keep them there until the finish of the race if you want to.

## Track Standing

The track stand refers to balancing on the bike, rocking it slightly back and forward as an aid to balance, but overall remaining in the same spot on the track. It is used in sprinting to force a less skilled rider to take an unfavourable position or to intimidate a rival by forcing them into a very small space.

It can be a severe psychological blow to have a plan to ride from the back and to suddenly be forced to take a different position - this confusion can be exploited by a tactically aware rider.

Track stands are by a long way the most difficult skill in this list. It's not unusual for even a skilful sprinter to be unable to reliably track stand, especially in a high-pressure situation.

Encourage riders to practice regularly between efforts - even those who can track stand reliably should keep their skills sharp.

The traditional progressions are: One handed

No handed

No handed one foot

No handed no feet (achieved by placing the toes of the right foot onto the front wheel and moving it back and forth directly).

Riders can also attempt to juggle no handed and anything else they want.

- Roll into position with your front wheel turned to the right and your right foot forward.

- Cranks roughly horizontal or your lead foot slightly higher than your trailing foot.

- The only correct way to learn a track stand, regardless of preference, is as follows: right foot forward, front wheel turned to the right. Anything else is unusable on the track.

- Focus on a point on the horizon.

- The front wheel should be parallel with the boards of the track i.e. pointing directly forward.

- The rear wheel should be about 30-50cm higher on the track than the front, leaving the frame pointing down the track and ready to move off. It is easier to maintain the track stand if you don't have to fight the track gradient.

- Your body should remain still and you should apply pressure to the front and rear pedals to allow the bike to rock back and forth under you, maintaining balance.

- Track stands are mostly performed standing, but can be done seated if it is easier.

