



Before we start...

By applying any of these thoughts or techniques, remember it is you who is driving the car and you who is responsible! If you are uncomfortable, slow down and think about what is going wrong before trying again. And don't forget that have a responsibility not to do anything that might adversely affect the safety of those around you on track or in your car.

Most of what follows I learnt the hard way over many years of racing, by hitting other cars or visits to bits of the scenery. They take a dim view of this sort of behaviour on track days, so take it easy and build up speed carefully.

“Drive smoothly” (Sir Jackie Stewart)

It is vital to concentrate on driving smoothly. It helps the car suspension to do its job, the tyres to keep gripping the track and when you reach the limit, things start to go wrong more slowly so you have a chance to undo your error and get things back under control!

You will still be making the car work hard, but get there smoothly, progressively and with feeling.

The basics

Regardless of the spec of your car – your tuned engine, big turbo, straight through exhaust, race suspension, fancy dampers etc, the things that provide the forces to brake, corner or accelerate the car are the tyres. You can work, and spend fortunes, on things away from the track, but on the track, it is the grip of the tyres that you need to manage to drive your car to its maximum.

Go over the limit of the tyres' grip and the car will start to slide. When a tyre slides it provides less grip, so if you keep the tyres gripping the road rather than sliding you will be quicker.

There is, however, a zone between tyres gripping and sliding, which is where race drivers aim to be working and this is where some seat of the pants feel is needed as the grip starts to tail away. When cornering you may feel the steering go lighter as a car understeers and front grip reduces. More attention grabbing is losing grip at the rear of a rear wheel drive car when power is applied too rapidly in a corner. If you don't sense that and either reduce the power or reduce the steering, the

car is going to swap ends and visit the scenery. Country corner is favourite for this at Aintree and almost inevitably each trackday someone has to take their car home a different shape from when they brought it, having found how close and how hard the barriers are on the corner exit.

This zone between gripping and sliding is also where driving smoothly or progressively is useful. It is a lot easier to feel something going wrong when power is applied smoothly. When the pedal is simply stamped hard down, what goes wrong goes very wrong, very quickly and you may not be able to sort it out. However if you apply power (or braking or steering) smoothly you have more time to sense things going wrong and can more easily unwind things a little bit and restore control.

This is an essential track driving skill – holding the car in the zone where sliding just starts and using all your senses to figure out what the car is up to and controlling it at the best condition to get through the corner just as quickly as it can go! It is easy to talk about but hard to do because your initial clumsy attempts will have the car frighteningly unstable at times, but with experience you will start to develop the feel required until it is second nature and you can start to enjoy it.

Effective driving on track

Straights and corners

Race circuits are just sequences of straights and corners. Straights are not difficult, so we'll deal with general cornering theories first before covering the specifics of corners at Aintree.

Cornering involves three main phases - braking into, steering through and accelerating out of the corner. It also involves the transitions between these phases. If you are doing it correctly, each phase involves a single application of effort which reaches a peak and then reduces without needing to increase again along the way because you misjudged it.

Brake, Turn, Apex.

Braking is best done in a straight line to a point where as you release the brakes you also start to turn into the corner. Turn in is the critical point of the corner and it is vital to be in control – at 99% of the cars capability, not trying for 101%. You want to be able to turn the car in accurately, get your apex and apply power out of the corner onto the straight in a seamless process. Then you will be able to reliably get the car to the apex and smoothly apply the power on the way out of the corner knowing that there will still be Tarmac under the car as you hurtle onto the straight.

On each corner you need to make a note of where you start to brake, turn in and clip the corner apex. Then you have reference points you can adjust each lap to get the best out of the car. At Aintree the nice Mr John Harden puts cones out for turn and apex points. You need to be as accurate as you can – within a yard or two along the track and inches sideways, at consistent speed lap to lap, to get consistent behaviour from the car and learn the track.

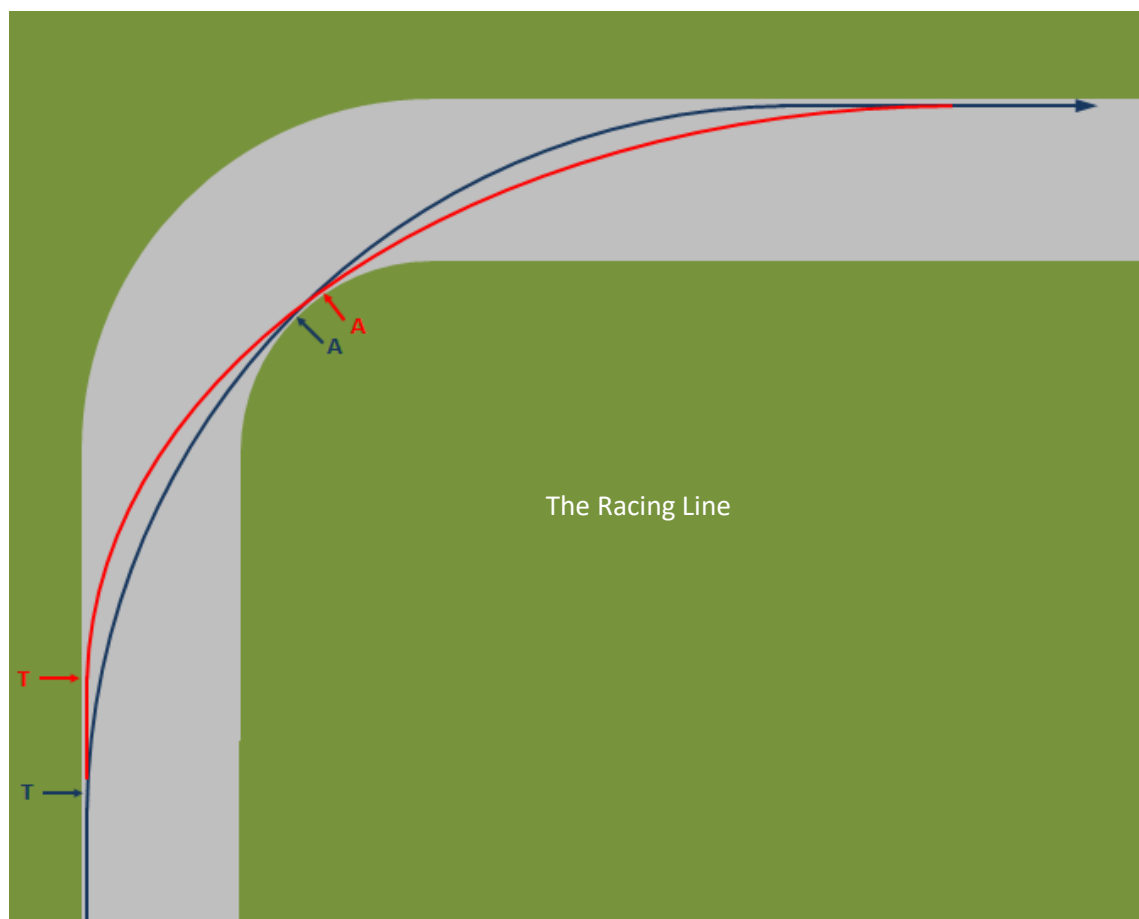
Cornering lines.

The initial aim in cornering is to squeeze in the biggest radius line that you can within the confines of the track. The bigger the radius the faster you can go. However, bearing in mind the desire to get the best exit speed, it is usually better to make the first part of the cornering line with a slightly tighter radius and then open the steering through the corner, widening the radius, so the car can go faster towards the exit.

This will mean a slightly later turn in point that is also slightly slower, because of the tighter radius.

Looking at a 90 degree bend (below), the blue line gives the fastest line in the bend itself – the biggest radius line that will fit. But if you turn in a bit later and slower and on a tighter line initially, you can take an even wider line later and as the radius increases you can accelerate and exit the bend faster. That means you are faster all the way along the next straight which saves a lot of lap time!

In the diagram the red line allows a faster exit. Remember it needs a later and slower turn in and uses a later apex (clipping point).



Approach

Even before you brake, it will help set the car up for braking if you lift off the throttle smoothly.

Braking

Braking forces come into the car from the tyres at ground level. Every car's Centre of Gravity is above ground level which, under braking, makes the car pitch nose down and increase the load on the front tyres and reduce it on the rear – so called weight transfer, though the car's weight doesn't actually move. The reducing load on the rear tyres makes them more prone to locking while the increased load at the front means the front tyres can take more braking force before they lock.

Whether by adjusting brake balance ourselves, or by accepting what a road car manufacturer provides in the way of braking, the system will usually be maximised for the nose down hard braking attitude. This means that there will be more braking done by the front wheels and less by the rear. Look at the relative size of brake discs on cars with discs all round and you will see what I mean.

If you come quickly off the throttle and stamp on the brakes as hard as you can, this bias of braking to the front means the front brakes can lock. However if you lift smoothly (but rapidly!) off the throttle and apply braking progressively you will get the load distribution moving onto the front

wheels and build braking to the maximum for both axles. The difference in practice is very small, but makes the car much more stable and it also develops your driving feel for when the tyres are gripping at their maximum.

First find the bite point of the brakes. When you first push the pedal you have to take up any slack in the linkage and move brake fluid around the system to push the pads into contact with the brake discs (or drums). At that point the pedal load should increase rapidly. Feeling for this is important so you can progressively apply the brakes.

During braking you should also be looking for your turn-in point. As you approach you will need to release the brakes progressively. Tyres that are giving their maximum grip under braking cannot also turn the car into the corner, so you need to be coming off the brakes as you start to turn. It's important to release the brakes progressively so the car can start to sit back down onto the rear wheels – if you turn in while still hard on the brakes, all the tyre load is at the front and the rear will be very light. Fortunately the front tyres won't have much grip available to start turning the car, but if they do bite, the rear axle could start to slide first causing oversteer and a big fright.

Turning in

Next phase as you release the brakes is turning into the corner.

A common mistake on turning in, is to get straight back on the power which only serves to push the car wide, or push the tail out in rear wheel drive cars, which can be unwelcome! A good technique as you start to turn in is to move your right foot off the brake and onto the throttle, then try to just hold the speed steady. You will feel the car working at the moment you turn in. It has to deviate from a straight line and start to roll onto the outside springs as the cornering forces take hold. The car may feel a bit loose, but almost immediately, once turned into the corner, you will feel the car settle and that is the time to start feeding the power back in. Now, because you were already holding the speed steady it will be a much smoother application of throttle. Here is where the smooth progressive application of throttle is most important. The car is still cornering hard so the tyres won't have enough grip to let you use full throttle. As you feed in the power you will feel the car attitude change – it may start to run wide (FWD) or the back start to move (RWD) - you can gently ease off the throttle to control this.

Apex and acceleration out

There isn't a track marker point for hitting the throttle. It comes in sometime after turn in and before the apex, but you won't be "hitting the throttle", you will be feeding it in, responding to how the car reacts to it. If you get into the corner too hot, you will need to stay off the throttle for longer. If you are a touch slow in, you can apply throttle sooner, but you should always aim to have one smooth progressive push from holding steady speed at turn-in to exiting on full throttle, with no big eases or lifts throughout.

Once turned in and starting to feed power in, follow a gently widening line through the rest of the corner. Then the cornering forces reduce through the corner and the tyres start to have some grip available for acceleration. Feed the power in smoothly and progressively so you can reduce again if things start to get loose!

On corner exit, don't try to run the tyres right to the edge of the track - aim to leave a bit of Tarmac on the outside of the corner in case you need it to correct any slides that may develop.

After that it is pedal to the metal along the straight. Time to look at the instruments, and mirrors! Use this time to relax a little, and don't forget to get the car lined up for the next corner.

Practice smoothness on the road

It's worth concentrating on these processes when driving on the road because giving a smooth ride to your passengers will be appreciated and it will translate well to track driving later on.

Much of this is about managing the dynamics of the car in roll, pitch and yaw etc. and taking up slack in controls so your passengers only feel the car speed up, slow down or corner rather than being aware of exactly when you initiated each control input.

Racing lines are also good for passengers, because you will be accelerating through corners which helps push them into their seats and keeps them from sliding about. This may not always be possible in traffic, but you can still adopt a mild racing line while keeping in lane and to your own side of the road!

Corners at Aintree

Country Corner



Country is the first corner after the start straight and is a slowish, reasonably straightforward 90 degree left hand corner.

Concentrate on getting over to the right along the straight, then braking and turning in accurately.

Check your mirrors as you approach because on Track days overtaking is always done on the left and someone may think you are letting them past!

There is very little run off on the left so be very smooth when putting on the power in RWD cars, so you don't oversteer into the Armco. Don't aim to run right to the edge of the Tarmac on exit – leave a foot or two of road for emergencies. If you overdo it and put a wheel on the grass things will go wrong very fast and the barriers are close. You have been warned!!

As you exit, keep a little left lock on so you move to the left to line up for **Village** corner:-

Village Corner



Village is more of a challenge to get right. Faster than Country Corner, Village tightens up as you go round which makes the apex very late.

Get lined up on the left and brake a bit early so you can turn gently at the end of the Armco as you are releasing the brakes. Don't be tempted to turn in too early, but initially stay out towards the left of the track, then smoothly turn in fully for the apex by the yellow marker on the right. You will see the corner is slightly cambered towards the inside which helps. Turn in, hold the speed while the car settles then give a long progressive application of throttle exiting onto the straight on full power.

Again, leave a foot or two of tarmac on the left for emergencies. Exit speed is very high and running onto the grass is not recommended. Stay on the left along the straight (unless moving right to let cars past) for the approach to Bechers Bend.

Bechers Bend



Bechers is also a fast corner. It is tightest at the start then opens out over quite a distance. To add to the challenge, there's a dip in the track just after turn in which can unsettle the car.

Approach on the left, braking and turning in smoothly but positively at the orange cone by the last Grand National jump and aim for the early apex by the yellow marker on the right. Hold speed over the dip, let the car settle then smoothly apply power.

Take care over the dip – car behaviour here will vary so respond according to your own.

My FF1600 likes to go sideways which, at high speed, needs quick, accurate correction.

Once past the apex, try to let the car run on a gently widening line to avoid scrubbing off speed through the rest of the corner, and out onto Railway straight. Some cars can be affected by the joins in the tarmac, so avoid running wheels along them!

Check instruments on the straight, check mirrors and move right to let other cars past if necessary, then move left to prepare for entry to **Club** Corner:-

Club Corner



Club is the slowest corner at Aintree and the hardest to learn. It has a gentle curve on entry which tightens up considerably making accurate lines difficult because you will be braking and turning at the same time on the way in.

Approach on the left and look for something on the left to act as your marker for your braking point. It could be the corner board, a horse jump or something in-between. Most people brake too early (which is not a bad thing!) but then end up coasting into the corner and struggle to find a good line. Once you have a 'marker' you can adjust it later in stages to work up to the best line.

I brake hard initially but reduce braking slightly and turn gently into the first part of the corner. It's not essential to clip the grass as shown above on the way to the turn point but it is important to get the car over to the left again and parallel to the grass at the turn cone.

Many drivers make the mistake of driving straight towards the orange turn cone and end up trying to turn-in with the car still pointing off the track towards the grass.

Getting the car parallel to the grass and turned in is done in the last stages of releasing the brakes. Some (very quick) drivers advocate a final harder push on the brakes at this point before turning for the apex and going back on the power. I think this helps overcome understeer in some cars making turn in more positive.

After turn-in, hold the speed, let the car settle then feed in the power progressively through the corner. There's little to be gained running fully out to the left on exit, so leave a little spare tarmac for catching slides etc.

On exit, move over to the right for entry to **Country** Corner once again, but if you are used to competing in sprints at Aintree, you will probably be arriving at Country corner somewhat faster than you are used to. Check your mirrors before turn in, in case another car is overtaking.

Errors and recovery.

Instincts

One thing that's hard to do on track is to overcome our instinctive driving. Once you have been driving a few years, you no longer actively control the process. You look at the road, decide where to go and your brain automatically controls your arms and legs to control the car to get you there. On track, however this can be difficult to over-ride. You may want to turn in at a particular place, but your instincts will make your arms turn the car in sooner (usually), because that's how they usually do it on the road. If you do wait for a later turn in, there will be a little voice in your mind saying "this is wrong, this is wrong", which makes it hard to keep on line. Persevere however and you will recalibrate those instincts and things will get better (and faster).

Other instincts to keep under control of are not wanting to use the right hand half of the track (for those of us who drive on the left) and not using the full track width because we don't want to hit gutters rubbish or kerbs (but do leave a safety margin so you aren't putting wheels on the grass!)

Braking.

If you brake too soon, just concentrate on releasing the brakes smoothly as you get to the turn in point and turn in smoothly. Make a note of the braking point and try a little later next time.

If you brake too late, steer early into the corner as you brake to get the longest braking distance possible on Tarmac, pick up your line and exit the corner slower and wiser, then try to remember to brake earlier next time!!

Turning in at a little too high a speed is always tempting – after all, you are on a track and trying to go fast. However if you arrive too quickly you will spend the whole corner sliding too much, fighting the car and waiting too long before you can get back on the throttle. Your corner exit will be slow. The only fast thing will be your pulse. Having the car just the right side of control at turn-in is critical, then you can turn accurately for the apex, feed the power in and exit quickly – **slow in, fast out**.

Twitchy steering

Some drivers I see on track days twitch the steering through the corner. Sometimes it's because they have seen race drivers doing this on TV. However that's not a special "race driver" technique, it's usually because the track surface is rough and there is some feedback coming through the steering. Rather than fight it the driver allows the steering wheel to wriggle in his hands while trying to apply steady torque to keep the car on line.

Twitching the steering mid corner can help to get feel for where the limit is, by deliberately going over it momentarily. This will make you slower through the corner though because, once you start the slide the tyre wants to keep sliding. You have to reduce steering to stop it, to a point where you are slower than if you hadn't started the slide. It's not normally appropriate on a race circuit.

Keep the steering inputs as smooth as you can and try to feel the tyres loss of grip as it develops: In a front wheel drive car, if the car starts to understeer in a corner, the steering will start to feel lighter and there may be vibration or "grumbling" through the wheel as the tyres slide across the tarmac – reduce steering and throttle a fraction to restore grip.

In a rear wheel drive car, applying power exiting a corner may induce oversteer as the rear wheels lose grip. In this case you need smooth application of power as well as smooth steering. You may feel the steering go lighter and you will have a "seat of pants" feel of the car turning faster into the

corner. Again fractionally less steering and throttle are needed to save the day. A big throttle lift will likely make things worse though, so here is where control smoothness is critical.

If the tyres are starting to squeal in a corner, they are near their limit – reduce power or steering (or both) to bring things back under control.

Sloppy steering

We have all got used to power steering and very light controls on modern cars which only require one hand on the wheel to keep things pointing in the right direction.

There are many modern driving styles – elbows on the window surround, right hand at 11 o'clock, left hand on lap sort of holding on as the wheel slides through it while the right hand steers, both hands together at the top of the wheel and while turning. A subset of this is wheel shuffling – both hands on the wheel but only one steers about 4 or 5 inches of wheel movement before the other hand has a go and the first repositions.

All are BAD practice on the road and worse on track. The problem is you start to feel natural doing it and uncomfortable when not, then doing it differently (correctly) on track doesn't feel right.

The correct way is to hold the wheel with both hands at somewhere between quarter to three and ten to two and not move your hands as you steer around corners unless the steering is so low geared it's unavoidable.

By not moving hands on the wheel you are constantly feeling the feedback from the tyres and able to learn and respond to maintain control of the car. If corrective lock is required you will also know when the wheels are straight ahead again.

Carrying speed through a corner

Commentators love to suggest the *other worldly* powers of the superstar drivers likes Hamilton, Schumacher, Senna etc include an ability to "carry speed through a corner". This is simply not possible, because the tyres have a finite amount of grip and that is it. But if their car is set up with lots of downforce they will be quick in the corners (and slow on the straights).

Please don't try to carry speed through corners yourself – it will only encourage you to go in too quickly and wind up in difficulties.

Get advice!

There is free instruction from racing drivers/ARDS Instructors available on Aintree track days.

It's always worth a chat and, if you wish, the instructors will come out with you while you drive on track and offer advice.

They've been through it themselves, learnt all the above the hard way and can save you many hours or days of trial and error.