

The Art of Counter Steering (or Push Steering)

A Motorcycling Epiphany

For me, riding a motorcycle is always an enjoyable and fulfilling adventure. That can be when I am idling in traffic in the city, going to work on a weekday, or heading down the highway on the open road. But it wasn't always like that. For quite a while I had problems in corners especially at high speeds. I would often find myself going wide and crossing the centre line, or having to brake in the corner.

During that time I thought you steered a motorcycle around a corner by turning the handle bars and leaning your body first to bring the bike over (I more or less understood I needed to lean), but I never felt stable in the corner and was often relieved to be out of it.

Now every corner is a pleasure and I rarely get it wrong. That is because I heard about and tried 'counter steering'. Actually I heard it in Dunedin from William Glendenning (over coffee after a committee meeting of Ulysses Otago one night) He explained it to me, I thought it was the weirdest thing I'd ever heard, I tried it on the way home (to Balclutha in the dark), and I had a motorcycling epiphany.

What is Counter Steering?

(Referred to by some as 'push steering' but I prefer counter steering).

You may not have realised it but actually at speeds from 30 kph up it is impossible to turn a bike round a bend without using counter-steering.

Counter steering is where you turn the handle bars in the opposite direction of the turn in the bend. Now doesn't that sound weird?

For example: in a right hand bend, you turn the bars to the left and in a left hand bend you turn the bars to the right. The majority of riders start two wheel careers on bicycles, and at low speeds turn the handle bars in the direction of the turn. However contrary to this at higher speeds this is reversed and you use counter-steering.

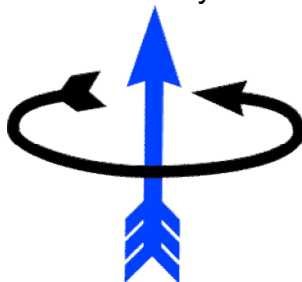
Actually 'turning the bars' is a little over-dramatic. What you actually do is to apply a downward and away pressure on the grip that is on the inside (on the same side) of your turn (in the same direction). Turning right? Press away and down on the right grip. The bike will obediently come over to bring you into the turn. Hold the pressure in proportion the amount of lean you require. Push harder (you came in too shallow) and the bike will lean more. Ease the pressure (you came in too deep) and the bike will straighten up.

It's magic – 'technically' you could take your hand right off the left grip for a right hand turn, even at speed, and all the control (and I do mean control) would be from the pressure on your right grip. *Do not* try this (and especially not with a left hand turn for obvious reasons).

Understanding that it is counter-steering that causes the bike to turn greatly increases your ability to control the behaviour of the bike in bends, and allows you to make quick and small adjustments while you are turning.

Some Technical Stuff

Motorcycles always want and are the happiest being straight up from the ground when the front tyre is rotating (when you are moving). This is true because of the gyroscopic effect of the front wheel spinning around. Remember playing with a gyroscope when you were little and how hard it was to upset its balance from spinning straight up? Well that is same with a motorcycle as well!



Basic Explanation: As the gyroscope spins, the force of the spinning causes the gyroscope to want to stay upright and be stable. As with the motorcycle tyre: As the front motorcycle tyre spins, the force of the spinning causes the motorcycle body to want to stay upright and be stable.

What happens when you counter-steer is you only *temporarily lean* (as long as you are pushing on the grip) the motorcycle to the left or right while looking where you want to go. It requires MORE force to lean the motorcycle to the left or right than it does to bring it straight back up because of the gyroscopic effect. Thus the motorcycle always wants to be stable and will bring itself back up right and therefore the motorcycle won't fall down.

Keep your Head Up and Upright



By looking as far into the turn (where you want to go) as you can, and with your head upright, you assure yourself of making the whole push-steering job easier on yourself! You will always go where you look (or look at), so why not look into the turn rather than stare at the ground or a few feet ahead? Why make it more difficult on yourself?

This is even so on the tightest corner, and is really magic at slow speeds and on roundabouts. When in a turn, never look down at the ground in front of your wheel. Look as far down the road as possible. The bike will automatically follow the line of the curve and come around.

It will rescue you in an emergency – look at your exit out of the danger and put on the power to go there.

Don't Be Afraid to Lean Over

So will the motorcycle ever fall completely over by counter steering? If by "fall" you are meaning skidding it sideways (off the tyres) so you do not have any tyre grip anymore then yes. BUT it would require such an extreme lean angle that you would have to do this on purpose before it would happen. And thanks to other things getting in the way (pegs, exhaust, side/centre stand), these things would touch the ground long before you ran out

of tyre traction! Even if these things scrape the ground you still have good control and it is a breeze to bring the bike back straight up! The moment you ease up on the pressure on the inside grip the bike will straighten up due to the gyroscopic effect described above.

Motorcycle racers do extreme turns around track corners and if you are starting to scrape things on the ground in a turn, then you have clearly mastered counter steering and are bored with this article!

Now, that is an extreme lean and the motorcycle still has not fallen over! Note that they are looking into the turn, not directly in front of them.

So let's Review:

- Motorcycles are extremely stable machines that highly prefer to travel straight up from the ground thanks to the rotating front wheel causes a highly stable gyroscopic effect.



- To counter steer, push away and down on the side you want to turn to. Push on the right grip to go right, push on the left grip to go left.

- It requires more force to temporarily lean (turn) the motorcycle than it does to bring it back up. In fact, the motorcycle will do it almost 100% on its own!

- To counter steer you need to be going 20km/h or greater.

- It is extremely difficult (0.001% chance) to have the bike fall down without doing it on purpose.

- Always look as far down the turn where you want to go to make counter steering easier on yourself.

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