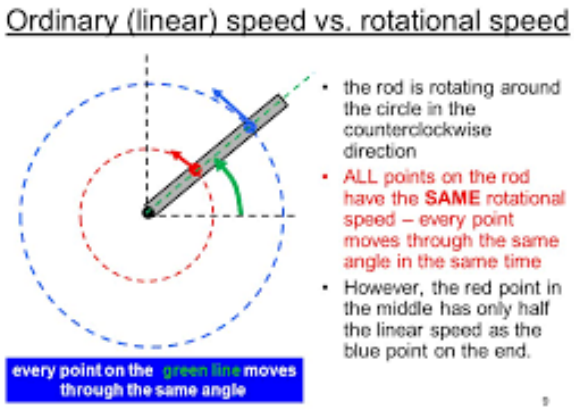
Rotational Speed / Tangential Speed

Rotational Speed is the number of times a body turns through 360 degrees in a given time. It is often referred to as Revolutions Per Minute or RPM.

Tangential Speed differs to Rotational Speed the further along the axis you go.

Using a Roundabout as an example. At any position on the roundabout, you will travel through a full circle at exactly the same time. All points have the same Rotational Speed. However, the further out from the centre you go, the more distance you cover in the same timeframe. The Tangential Speed increases the further out you go.



For the martial artist, this has relevance when throwing all snap kicks, especially turning kicks, hook kicks and spinning kicks. A relatively small movement at the hips, generates much more speed, the further along your leg. Finally, your foot has a much higher Tangential Speed than your hip.

Continual training works to increase your Rotational Speed. This, in turn, increases the Tangential Speed of your foot and hence, increases the impact a kick can generate.

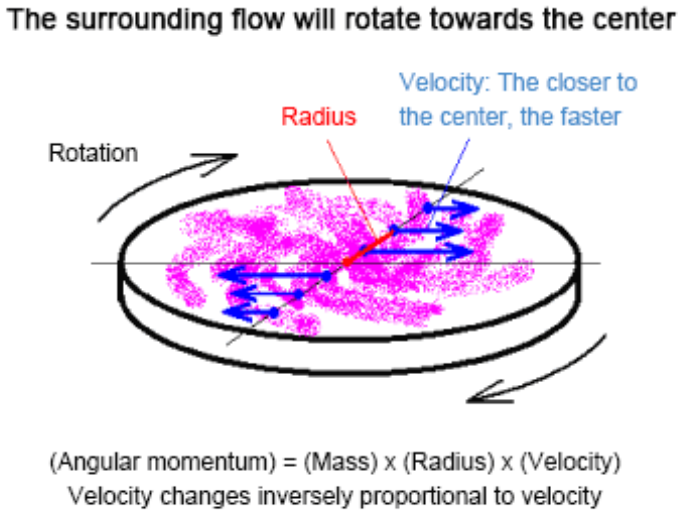
However, every joint along your leg can act as its own pivot point. Your hip, knee and ankle all create a new set of Rotational Speed, meaning that if you use each joint correctly as part of the technique, the Tangential Speed of your foot can be made to be much faster.

Think of a chain. Each individual link in the chain can move independently, each generating its own rotation and tangential speed. If you were to swing a chain then, as we go further down it, each link carries the speed of all the previous ones plus the tangential speed it develops itself. The link at the end of the chain is then moving so much faster than the ones higher up.

Each joint in your leg, from the hip down, acts like a link in a chain. If you can get each individual "link" adding to the tangential speed of the previous one, your kick will be moving much faster.

Couple this with the fact that something more compact will spin faster than something more extended and you can generate even more power…

Consider an ice skater, spinning on the spot. If they hold their arms out, they spin much slower than if they keep their arms close to their body.



So, for instance, when throwing a Reverse Turning Kick, instead of keeping your leg straight and hooking it in a big circle, keep yourself small and compact for most of the spin then extend the kick at the last instant. The Rotational Speed will be faster, making the Tangential Speed of your foot even faster.