A Quick Primer on BOS & COM

Base of Support (BOS): Imagine a photo or freeze frame of a skier. Now draw a line where each of their skis is touching the ground. Now draw a line connecting to front of the two lines, and another connecting the back end of the two lines. This will draw a polygon on the snow, which is called the Base of Support (BOS). For parallel skier it will be something like a skinny rectangle or a parallelogram. For a snowplow skier it is closer to a triangle.

Centre of Mass (COM). This is a concept you might remember from high school science, any 3-dimensional object (in our case a skier) has one point which is their centre. It's their centre in that

- Half their mass is above it, half below
- Half their mass is in front of it, half behind
- Half their mass is left of it, half to the right.

This point is called the Centre of Mass (COM). For a skier just standing still their COM is approximately between their navel and their spine. For a skier in a complex position, especially when leading forward at the waist, their COM might be outside their physical body.

Forces acting on the skier, especially gravity, act as though all their mass was at the COM.

Now that we have defined those terms there are a few statements we can make about them.

- A skier whose COM is vertically above a point inside the BOS is stable, at least to the level where they can stand up.
- A skier whose COM is vertically above a point outside the BOS is unstable, and actively falling over right now.
- One reason we teach snowplow skiing to beginners is that it has a big BOS. They can move their COM around a lot without it going outside their BOS.
- One reason we don't teach skiers to ski with their ankles & skis locked together is that it produces a very narrow BOS. Any small bump can push their COM outside the BOS and cause them to fall over.
- A skier who is performing a high-speed parallel turn will have their COM outside their BOS, towards the inside of the turn. This is part of balancing off multiple forces to create the turn. People do the same thing when leaning into a turn when running or cycling.