

A Matter of Angles

Ron LeMaster

At the junction between the upper and lower body, and wrapped by the biggest muscles in the human body, are the ball-and-socket joints where the legs turn in the hips. They are incredibly versatile and capable of powerful movements. They're also the site of some interesting variations in technique among the best skiers. One of the most interesting is how they use differing amounts of knee angulation, a movement which is actually generated by the muscles surrounding the hip joint, to control the ski's edge angle.

Just about everyone agrees that today's best World Cup athletes use less outside knee angulation than those of twenty years ago. In addition, today's top-level skiers indisputably make more active use of their inside skis than they did in the past, often pointing the inside knee toward the inside of the turn to edge the ski. However, there are clear differences in style and preference between individual racers with regard to how much they angulate with the inside and outside knees, and how much their shins appear to be parallel.





The photomontages show Julia Mancuso and Lindsey Kildow making the same two turns in the U.S. National Championships giant slalom last April at Mammoth Mountain, California. Julia is a good example of a great skier who tends to use less outside knee angulation than others, but uses her inside leg to help her inside ski grip a bit more. Her style tends toward the what some call the “parallel shins” look. Lindsey, on the other hand, shows more inward movement of her outside knee without a complimentary movement of her inside knee.

The differences between Mancuso and Kildow are most likely due to differences in physiology and boot setup. Personal style is important, too: Some skiers do well by using their inside ski more than other skiers. And although Mancuso doesn’t show as much knee angulation through much of the turn as Kildow, Trevor Wagner, head women’s World Cup tech coach for the U.S. team, points out that they both turn their outside knee inward at the initiation of the turn in order to get early edge pressure and to get the outside ski carving by the time it enters the fall line.

The changes over the years in outside and inside knee angulation are due to improvements in equipment. Modern skis, in conjunction with plates, bindings and boots, require less angulation to hold an arc. That means skiers generally don’t need to bring the outside knee in as far as they used to in order to make the ski hold. Modern equipment also allows a racer to take advantage of putting more pressure on the inside ski, which enables the athlete to manipulate the outside ski with more finesse, and supplies a larger, more stable platform, among other things. To take advantage of this, a skier needs more inside edge angulation than in the past, which requires moving the inside knee toward the inside of the turn.

However, excessive knee angulation, with either leg, makes a skier stiff and unable to perform other necessary movements smoothly, such as flexing and extending or moving fore and aft over the skis. Excessive outside knee angulation is usually caused by bad boot setup, and can't be fixed by simply trying not to do it. Angulating more with the inside leg and increasing the inside skis' edge angle won't fix the problem, either. Generally speaking, canting the boots so the cuffs are angled farther outward is the solution because this gives the inside edge of the ski more bite with less knee angulation.

The important thing to keep in mind is that while the shins of some great skiers may appear to be parallel much of the time, that "look" is an end in itself, and, being able to use your legs independently has great advantages. A skier who fights to keep his skis edged at the same angle at all times by keeping his lower legs parallel is denying himself the natural versatility built into those two great ball-and-socket joints at the tops of his legs.