

INCLINATION OR ANGULATION?

By José “Pepo” Hanff

During my long professional career I have often encountered skiers that once they have reached a certain technical level they have not been able to continue advancing to a higher level.

My experience indicates that frequently this is caused by the fact that the skiers confuse the mechanisms they possess to direct and control their skis. Those mechanisms are:

- * Mechanisms to control the reorientation.
- * Mechanisms to control the edging.
- * Mechanisms to control the pressure.

The desired ski-snow interaction will be the result of the combination, quantification, assemblage, coordination, orchestration, harmonization, and integration of these mechanisms through motoring actions or movements that the skier makes while he is journeying down the hill as a result of a component of the force of gravity acting on him.

On the other hand, due to the countless changes that occur while we ski, our dynamic balance is continually affected. To be able to perform the above mentioned mechanisms properly and efficiently one needs an optimal dynamic balance. For that purpose the skier has available **Mechanisms to control his balance**. Those balance mechanisms are the means of support on which the other mechanisms depend to be able to guide our skis precisely where one wants. **Without proper balance we are incapable of performing the other three types of mechanisms to achieve the desired trajectory.**

One of the primary mechanisms for the control of balance is the inclination. We incline inwards of the turn to counter the forces which unbalance us laterally through the turn as for example the centrifugal force does. If we incline excessively inwards we lose our balance and fall in. If we don't incline enough we fall outwards. The amount of inclination required during a turn depends of the speed of the skier and the radius of the curve. It must be very precise.

As a **secondary consequence** the inclination generates a change in the degree of edge angle between the ski and the snow. (An increase in the inclination generates more edging). This makes some skiers think that they can use the inclination as a means to regulate the edge angle which, in my opinion it is a major error.

If for example, during a turn a skier needs to increase his edging, he will not be able to do it by inclining further inwards because obviously he will fall to the inside of the turn. The only way he can avoid falling if he increases his inclination to edge more is by tightening his turn (shorten it's radius) but then his turn will not be of the same size. Other solutions to the problem would be to separate his skis or increase his speed but neither is efficient or easy to do. He

can also avoid falling by deviating his skis diagonally to their trajectory making a controlled sideslip which will generate a friction force opposing the fall. But, where is the logic in creating more friction when the objective is to edge further to avoid sideslipping?

An even worst error is to shift the inclination from one side to the other like a pendulum in order to achieve the necessary edge change required for a new turn. The extent or amplitude of the movement required to achieve this purpose will result in unnecessary lateral movements of the center of gravity, unbalancing displacements of major body mass and unnecessary energy expenditure.

The appropriate mechanism to use to control edging is “Global angulation”. This manoeuvre (in case the objective is an increase of the edge angle) consists of a simultaneous rotation of the knees and the hips; while the legs turn around a vertical axis on the hip joint (clockwise), the hips turn in the opposite sense through the vertebrae joints (counter clockwise) aiming to maintain the thigh parallel to the ski.

The Global angulation, also called simply angulation is the only mechanism for the control of edging that doesn't directly interfere with the other mechanisms required to ski. It is also the only mechanism that is anatomically appropriate due to the fact that it doesn't put ant natural loads on the leg joints, particularly the knees.



Image of the Swedish racer Anja Paerson from publicity by Salomon on Ski Press Magazine. (action: Pentaphoto).

On it we can clearly see an excellent example of Global Angulation. Notice the longitudinal alignment of the right thigh and the right ski.

Due to the fact that when we ski our skis scrape against the snow and that it is precisely that friction that allows us to make the ski interact with the snow, it is

impossible to perform one mechanism without affecting the others. Nevertheless, it is crucial for the skier to understand and separate the mechanisms in his mind with the goal of being able to combine, quantify, assemble, coordinate, orchestrate, harmonize, and integrate all three sets of them. **It is impossible to become a competent and efficacious skier if we confuse and mix the muscular actions that control the different mechanisms.**

It is essential to understand and to try to control each mechanism independently, adjusting and quantifying them separately to be able to achieve the finesse required for each, to finally achieve the precise trajectory required for our skis in accordance with the specific conditions of the moment.