Alignment & Stance in High Performance Skiing

Ron LeMaster
What I’ve Learned in 10 Years

• A lot!
• Good alignment is not well defined
• Alignment and stance are the subjects of many technical misconceptions
  – A desire to find geometric simplicity in skiing
What is Alignment?

- The positions of the skier’s body segments in relation to each other and to the forces acting on the skier
What is Stance?

- The collective effect of various elements of alignment
- You can always improve a person’s skiing by improving his or her stance
Introduction

• Skis do more of the skiing, and the skier does less
• Greater forces in the turn
• More focus on alignment of the body to balance against forces
“I don’t ski like that!”

- Yes you do!
- You balance against the same forces, they’re just not as big (and you’re not as strong)
Alignment is about Balance

- Each segment of your body has to be balanced on and supported by the segment below
Alignment is about Movement

- You must balance accurately over your skis while your body segments move in relation to each other
Alignment and Stance

- The segments of your body must be arranged so that you can effectively perform the movements of skiing to
  - Accurately manipulate your skis
  - Deal with terrain while balancing against the forces of the turn
- Each element of alignment addresses some element of basic technique or balance
General Principles

- Use the upper and lower body independently
- Use inside and outside legs independently
- Keep the core stable and supple
- Use the strongest muscles
General Principles

- Boots must be set up for the individual
- Optimal alignment varies with the individual
Frame of Reference
Sagittal Plane

© Ron LeMaster
Technical Misconception

• Hips must be over the feet
Center of Gravity over Feet
Lower Leg Angle

- Has critical effect on fore-aft balance while moving up and down
- Boots allow only small range of motion
Technical Misconception

- Boots should be upright
Independent Alignment of Legs: Lead
Technical Misconceptions

- There is no lead change in modern skiing
- Parallel alignment
  - Feet and tips
  - Hips
  - Shoulders
Lead

- Results from inclining into the turn
Hip & Lower Back Posture
Technical Misconception

- Spine and lower legs should be parallel in the sagittal plane
Torso and Arms

- Shoulder should be ahead of the hips
- Hands should be ahead of the shoulders
Shoulders Ahead of Hips

• Addresses the need to control fore-aft balance with the feet and lower legs
Frontal Plane
Width of Stance
Technical Misconception

• Feet should be hip width apart
Width of Stance

- Must allow for independence of legs
- Hard snow favors wider stance
- Powder and crud favor narrower stance
- Deep moguls favor narrowest stance
Alignment of the Lower Legs
Alignment of the Lower Legs

- Myth: Lower legs should always be parallel
Alignment of the Lower Legs

- Each has its own job to do
- Some people ski well with their lower legs parallel
- Some people don’t
Lateral Canting
Platform Angle

- \( \leq 90 \) deg., ski holds
- > 90 deg., ski slips
Lateral Cant

• When the following are lined up in the frontal plane
  – CM
  – Head of femur
  – Knee
  – Edge of ski
• The platform angle must be 90 deg
Hips & Shoulders
Technical Misconceptions

- Hips and shoulders should be “level”
- Hip angulation is a thing of the past
Torso Tips to the Outside

- To balance the center of mass over the head of the outside femur
- Progressive articulation through the spine tips the shoulders farther out than the hips
- Pelvis and spinal column has limited range of motion in this direction
- Assisted by putting some weight on inside ski
Transverse Plane
Hips & Shoulders: Counter
Technical Misconception

- The best skiers don’t counter anymore.
- Everyone should stand square.
“Face the Force”
Torso Turns to the Outside

• Most supple posture for hip angulation
  – Folding forward with the torso rather than bending sideways through the spine

• Enlists the best muscles for supporting the upper body on the femur

• Progressive articulation through the spine turns the shoulders farther out than the hips
Establish Alignment in Transition
Wrapping Up
Summary

• Greater forces in the turn
• Each segment of your body has to be balanced on and supported by the segment below
• Each element of alignment is a response to some element of basic technique or balance
Summary

- Use the strongest muscles
- Keep the core stable and supple
- Establish alignment in the transition
- Don’t drink the Kool-Aid!
- Think anatomically
Visit www.ronlemaster.com

- Lots of images
- Articles
- Presentations
- Order signed, discounted copies of Ultimate Skiing