

MODERN RECREATIONAL SKIING

MOUNT SNOW LESSONS AND OTHER SKI RELATED TOPICS

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INTRODUCTION

Anyone around skiing for a while couldn't help but notice how much skis have changed during the last two decades or so, but you might not be aware of the significant changes in skiing technique that have occurred as well. If you learned to ski on older, longer and slimmer skis, as many of us more mature skiers have, when you switched to shaped skis you quickly realized they turned better, even using traditional up-

unweighting to change your edges. However, an even more efficient skiing technique has evolved to take advantage of the new ski technology. Section 1 of this article describes the so called “modern” ski technique and was written with the following two groups primarily in mind, veteran skiers who learned and still use classical technique even if they now ski on shaped skies, and the larger number of skiers already using the basics of modern skiing, who want to improve their performance level. My goals are to make you aware of the elements of modern recreational skiing, hopefully give you enough information to start using those elements in your skiing, and to motivate you to further upgrade your recreational skiing skills through careful reading of this and other material, watching ski-instruction videos and taking on-slope lessons. Sections 2 thru 6 cover other specific aspects of skiing, which were added to help you more fully enjoy your skiing.

This article has been an evolving process. It started back in the Peninsula Ski Club’s (PSC) March 1999 Newsletter where I published some of my notes and recollection of modern, shaped-ski technique instructions from Bill Rolya’s advanced, ski-week class, as part of Jim Colbert’s club trip to Mount Snow that year. I have been fortunate to also have Bill as my instructor in several subsequent years. I updated and expanded those original notes to include Bill’s instructions from later years as well as a few tips and instruction from other classes, as related to me by various PSC members. Also included are my own personal experiences with modern shaped skiing and some helpful ideas from ski magazines and books. There is even some very basic information on recreational ski racing.

The ski technique discussions are directed toward skiers with at least some on-slope experience past the novice level. Hopefully the material will be helpful to further your aspiration of eventually becoming an advanced or all-mountain skier, or at least being able to credibly talk like one at your next party or ski social. If your goals are more modest and you only want a few key items to improve your form and control on the slopes, then Sections 1.1, 1.2 and 1.10 should be of interest. To further enhance your skiing, I have expanded this article into more than just technique discussions by adding four other sections with topics closely related to skiing. Those added sections, by number, include: (2), the basics of recreational ski racing; (3), a discussions on the skiing benefits of breathing and relaxation; (4), the major factors to consider when getting your own ski boots; (5), some pre-season ski exercises to improve your on-slope strength and stamina and (6) useful information on altitude sickness for when you ski above 7,000 feet (2,134 meters).

Incidentally, the Peninsula Ski Club’s annual Mount Snow trip is a great opportunity to do what it is that turns you on about skiing. You can improve your skiing with lessons, enjoy plenty of free (open-slope recreational) skiing, and if you wish, participate in the fun and excitement of the trip’s club racing competition. With the included lesson package, you can update and improve your ski technique with five successive days of first-class, professional instruction. This is so superior to taking an occasional one or two-session lesson with no follow-up, which is what skiers too often do. Those trip options should cover your particular “ski thing,” whatever it might be. I am not into snow boarding, but the trip includes equivalent riding lesson for you boarding dudes and

dames who are so inclined. I know that this article might lead some to label me a skiing technique freak, and yes, I have been known to occasionally get “reluctantly drawn” into “how to” discussions. However, rather than being an end in itself, my interest in technique is to improve PSC member’s and my own skiing, to better enjoy its pleasures and challenges in a variety of slope and snow conditions.

SECTION 1 – MODERN, FUN OR FREE-SKIING TECHNIQUE

1.1 The Crossover Maneuver and Modern Carving

Because turning down the slope changes your travel direction and is also the normal means by which you control your speed, it stands to reason that becoming a better skier involves becoming a more efficient, fluid and precise turner. Any moving alpine ski will carve a turn by following a circular arc in the snow if banked on edge with pressure against its center to bend the ski. However, because of its shorter length for the same surface area and its much greater sidecut, a modern shaped or parabolic ski, when pressured and put on edge, will produce a much tighter or shorter radius, pure carved arc than was possible with a traditional ski. The fundamental nature of the so called “modern” ski-turning technique is about efficiently turning by putting your skies on alternate edges with weight pressure on the center of your skies to take advantage of the shaped ski’s much tighter carving capability. Rather than relying primarily on the traditional up-unweighting, foot steering, pivoting, and side-slipping, today’s recreational and racing skiing technique relies more on direct edge changing and pure carving on shaped skies to make turns.



Classical-Turn Action Sequence

The classical, longer-straighter-ski, turn technique firmly planted the pole, flexed knees and up-unweighted from the old-turn’s downhill ski’s big-toe edge and shifted virtually one’s entire ski loading to the big-toe edge of the old-turn’s uphill ski, to start a new turn. This is shown in the Classical-Turn Action Sequence above. As a result, the unloaded and passive inside ski tended to slide next to the outside ski in the new turn, creating a narrow feet-together stance. This was the look of the older, more one-legged, parallel-Christie technique that involved both some carving and some skidding of the outside-of-new-turn ski.

Visualize yourself into the latter part of a carved, round turn (with skis hip distance apart like the top figure in the following Modern-Turn Action Sequence) with your outside-of-old-turn or downhill leg more extended to resist the turn's centrifugal force and with both skis banked on edge (outside ski has your big-toe side turned into the hill and inside ski has little-toe side turned into hill). To start a new turn, release the downhill or old turn's outside-ski big-toe edge and pull or flex that leg back somewhat toward your chest while allowing your body's center-of-gravity (C.G.) to move diagonally-forward-and-across (relative to the snow) so you C.G. crosses over the skis to the inside of new turn (called crossover) and also extending your other leg to pressure and put the uphill or new-turn's outside ski on a new edge (big-toe side) against the snow. It is important that your hips or C.G., and not just your shoulders, move diagonal across your moving skis and down the hill. Your downhill femur moves toward where the tip of the downhill ski is at start of turn, giving you the transitional feeling of flattening your skis and then riding along your new-turn edges, not just going across your skis and abruptly slamming into the new edges.



Modern-Turn Action Sequence

Relative to your body, you can also think of the process as the skis moving across under your body to the outside of the new turn (called crossunder). Actually, in some situations, crossunder is a more accurate depiction of what is really happening, with the upper body relatively quite and your legs alternatively retracting and then extending across and below the upper body. The transition process, illustrated in the Modern-Turn Action Sequence above, is more often referred to as crossover although technically it is a crossing movement that can have varying degrees of specific crossover and crossunder, depending on type and length of the turn and the terrain.

If you are new to carving, it might be helpful to consider crossover as being similar to turning on a bike, when your leg movements are in the position of pulling-up on the inside-of-turn pedal and pushing down on the outside-of-turn pedal, while also leaning to the inside of the developing turn. You reverse which is the more heavily loaded outside foot while, at the same time, leaning your body to the inside of the new turn, away from

the newly, heavier loaded or pressured outside-of-new-turn foot. In essence, much of the modern, carving, ski technique discussion is about the various means and movements to effectively accomplish the body-crossover or ski-crossunder process and transition to a new set of edges so you turn efficiently and in control.

In contrast to the classical technique shown in the earlier Classical-Turn Action Sequence, today's carving technique, as shown in the above Modern-Turn Action Sequence, is a wider-stanced, two-footed process with outside-inside ski loading distribution depending on the following factors: your speed, the turn's quickness, the phase of the turn you are at, and the snow depth and condition. Often modern skiing instruction will use words like leave 25 % of weight on or over the inside-of-turn ski. What you see seems to contradict that statement. As you can plainly see in the two bottom ski figures of the Modern-Turn Action Sequence, the majority of the skier's static body weight, after crossover, is actually above or over the inside-of-turn ski. However, the outside-of-turn ski is being more heavily loaded or pressured to counteract the dynamic centrifugal force (force due to radial acceleration or change of motion direction during the turn). So as not to confuse you always-thinking, sharp-eyed observers, we must be careful how we use words like "weight over," "weight above," or "weight on" as opposed to words like "load the ski" or "pressure against the ski" when we describe the force applied to each ski. I want to make clear the distinction between the almost total body weight being above or over the inside-of-turn ski, which is different from the actual greater pressuring or loading being applied to the outside-of-turn ski because of the turn's centrifugal force.

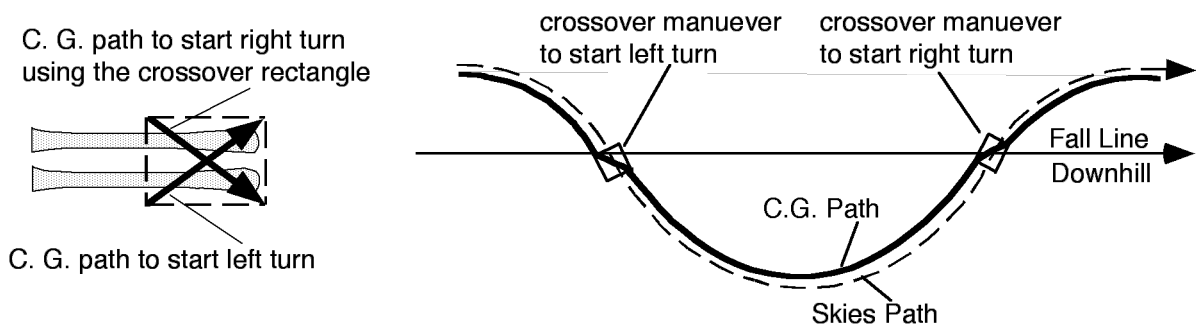
When skiing on freshly groomed or harder pack, leave on-average about 25 % of your skis' loading on the little-toe edge of the new turn's inside ski so it tracks a parallel but separated arc in the snow (Sections 1.7 and 1.8 discusses different conditions and loadings). This means the outsides of your feet should stay a natural hip distance apart (about the same as when walking) and trace two parallel, railroad-like tracks in the snow. The little-toe edge of the inside ski, to a new turn, must be engaged some to keep your feet apart. For equal change of edges, a wider, hip-distance-apart stance requires considerably less hip and center of gravity lateral movement to inside of the turn than does a narrower stance.

The efficiency and energy-saving feature of incorporating more carving into your skiing are threefold. First, you save the muscle strength used for traditional up-unweighting to break the ski's pressure against the snow to change edges. That continual up-and-down pumping motion takes energy. Second, rather than using only one edge and leg, you use the slicing bite of two edges and the strength of more than one leg to offset the forces of the turn. Third, in the process of extending your more weighted leg to the outside of the new turn and setting a big-toe edge to that ski, with your belly button inside of turn, you also will be better positioning your body to efficiently balance or resist the centrifugal force of the new turn. This involves your hips being diagonally across your skis to the inside of the new turn with the outside leg more extended. The feeling is more of standing against the non-skidding, slicing outside ski, rather than the classical parallel Christie feeling of transferring your weight and

balancing against the variable resistance of the skidding outside ski. Thus you use your bone structure more, and less of your leg muscles, to resist the turn's force.

The earlier described crossover maneuver is a dynamic process that moves your torso and upper body diagonally forward-and-across to the inside of the new turn so they cross your skies, or moves your skies to the outside of the new turn relative to your torso and upper body. Crossover is the act of transitioning from old turn to the new turn, from the old balanced position to the new balanced position. The ski's edges-to-snow progression from the old turn to the new turn is as follows: (1.) Old-turn outside ski on big-toe edge, inside ski on little-toe edge at end of old turn as shown in the top figure of the Modern-Turn Action Sequence. (2) All four edges momentarily flat on the snow in what is called the transition of the crossover as shown by the second figure down in the Modern Turn-Action Sequence. (3.) New-turn outside ski on big-toe edge, new-turn inside ski on little-toe edge as shown by the bottom two figures in the Modern-Turn-Action sequence. You want to let yourself go through all three steps of the progression, particularly step (2) with skies flat to snow, and not slam too abruptly from old-turn's edges to the new-turn's.

With your belly button well inside of the current turn's outside more-pressured ski, to start a new turn, your belly button moves diagonally forward-and-across an imaginary rectangle in the snow we call the crossover rectangle (shown in the left figure below), while you also roll your ankles to the inside of the new turn to set your new-turn's edges. Notice, you are mostly moving across relative to your skies, but actually forward-and-across relative to the snow. The back or rear side of the crossover rectangle is located at your center of gravity (C. G.) position (belly button) at the end of old turn, its side edges are to the outside of each ski, and its front side is just in front of your ski tips, (left diagram below). The belly button moves diagonally straight forward-and-across the rectangle, not diagonally upward-forward-and-across as in classical up-unweighting. Skiers who learned to start a turn with classical up-unweighting often have a tendency to strongly elongate their body upward as well as diagonally-forward-and-across instead of what should be mainly diagonally-forward-and-across.



Your center of gravity (C.G.) or belly button moves across relative to the skies while the skies themselves are moving across and down the slope. The result is that while crossing the skies to the inside of the new turn, as shown in the above right diagram, in reality, your belly button moves down the mountain in a steeper descent (closer to the fall line) than the ski path, during crossover. Transitioning from old-turn

edges to the new-turn edges will cause the skies to arc from the outside of old turn, to below you, then outside again of your belly button in the new turn, to regain dynamic balance and prevent what you might at first worry about - - doing a face plant into the snow down the slope. At first you just have to have faith it will all work as described. This falling of the body forward-and-downhill is old hat to advanced skies, but does cause some anxiety to skiers just starting to do carved parallel turns who don't yet trust the process. The process works if the inside tipping or lean of your body dynamically balances the centrifugal force of the new turn created by the skis' arcing carve in a new direction as a result of setting new edges after crossover. A pronounced tipping across your skies while going slow on a flat slope will of course put you in an unwelcomed unbalanced situation and a result that will have people pointing at you from the chair lift, with various levels of amusement. The degree of inside-the-new-turn body lean during crossover depends on both your speed and radius of turn, which you will quickly develop a feel for with experience. The crossover maneuver just described is a result of releasing old-turn edges, and allowing you C.G. to follow you downhill momentum across you skies. The new turn occurs from changing to new-turn edges after crossover in concert with the bike-like pedaling action of extending and transferring appropriate loading or pressure (about 75 % for moderate to large radius turns on hard pack) from the old turn's downhill ski to the uphill ski, as described earlier.

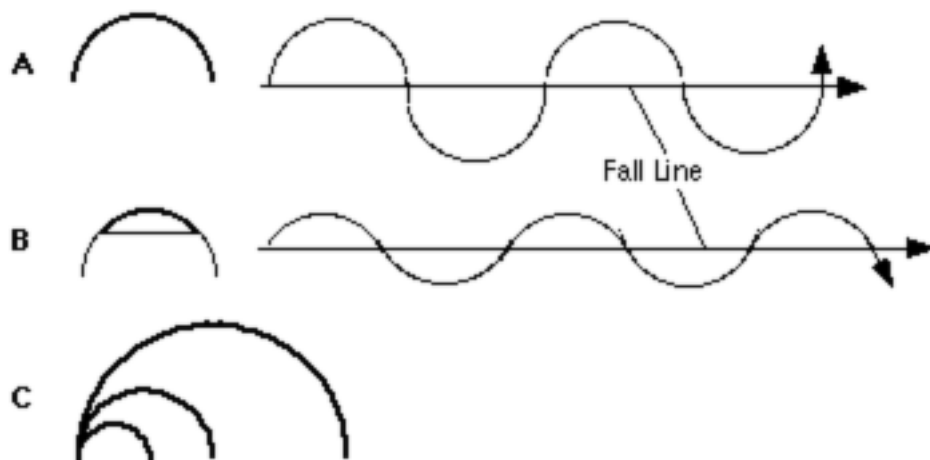
For a smooth transition, make the diagonally across-and-forward body movement, relative to the cross-over rectangle in the snow, a smooth increasing move rather than too abrupt. The idea is to be patient and let the new-turn edges carving arc bring you around; don't jerk or twist your feet to hurry the turn. In general, good skiing is typified by constant alternating crossovers and edge changes, blending one turn smoothly into the next. It not only feels graceful and pleasantly rhythmic, but it is also efficient to link your turns one into the other. This involves continual combined body/ski side-to-side balancing movements. Relative to your upper-body, your legs and skies move like a pendulum, back-and-forth below your body. Relative to the skis, your body moves like a mechanical metronome, back and forth across and above the skis. Lack of continual movement is often seen on steeper slopes (relative to one's ability) where skiers make a nice initial turn. However, instead of continuing the flow and movement directly into the next turn, they stay static over their skis, hanging on to the security of a pronounced traverse before starting the next turn. This breaks the harmony of the continuous turn rhythm and result in a series of Z's down the slope instead of the more desired and graceful S's.

1.2 Speed Control Using Different Arcs in Carving Turns

If you change your edges with about 75 % of weight pressure to the uphill ski early in the turn, your new turn will start tracing part of a circular arc in the snow. With sufficient speed, this can be extended to almost a complete, large half-circle, as shown in the left of Figure A in the following drawing. When linked together as in the right of Figure A, you will trace a series of round, near half-circles down the fall line of the slope that might keep your speed under control, depending on slope steepness. If you choose to start a new turn after doing only a quarter-circle instead, and link these

individual quarter-circles, you will trace a straighter path like that shown in Figure B. Down the same slope inclination, and with the same arc radius, this straighter-line, quarter-circle rhythmic pattern will be faster than the half-circular turns of Figure A. Linked quarter-circle turns can be used to increase your speed relative to half-circle turns or maintain your speed when encountering flatter terrain. You can of course select a turn rhythm that is between half and quarter circle turns with a corresponding affect on the speed that is between those two cases.

The larger the radius of the half-circle arc, the more speed you will carry at the end of the turn. The reason is because you are going in a downhill direction longer. Conversely, the smaller the radius of the turn, the slower is the end-of-turn speed. You could choose to link either less-than-half-circle turns of the smallest radius, or complete-half-circle turns of the medium radius, of Figure C, to control speed on slopes with more pitch. On moderate terrain, depending on your fancy, you might link half-circle turns of the largest radius or link quarter-circle turns of the midsize radius. Linked quarter-circles of the largest radius turns could be used to maintain speed on flatter terrain, or to juice-up your speed on moderate terrain. While in the process of linking larger radius turns, you may have to suddenly execute a small radius turn to avoid an obstacle or to quickly slow down. There is an infinite combination of different radii and fractions of half-circles you can select. They are what you use to reflect your mood (speedy and daring or slower and controlled), adapt to snow conditions, or react to the pitch of the slope. Think of these varied carved arcs as the brush strokes you use to paint your own personal descent picture down the snowy canvas of the mountain's side. These are the various moves that good skiers use in their graceful dance with gravity and the mountain.



There is an even simpler approach to controlling speed using carving besides choosing different radii turn arcs or different parts of a half circle. All you need to do is follow the arc of any carved turn across the fall line until you go up the hill and slow down to a satisfactory speed, then move into a new downhill arc.

1.3 Additional Tips to Aid Crossover and Carving

- To shift about 75 % of loading from downhill or outside ski to uphill ski, think of a softening or relaxing, rather than a full-fledged retraction, of the downhill leg. Softening the old-turn's downhill ski is too passive for some skiers and they prefer a more active flexing of that leg by using their hamstring muscle to pull their buttock closer to the snow.
- Raising the tail slightly of your downhill ski is another technique to shift 75 % of loading to the uphill ski.
- To aid crossover and help set new edges, think of tipping or rolling the little toe of the current or old-turn outside foot into the snow, at the start of the new turn. Ski instructor and coach Harald Harp calls this phantom edging.
- Your outside leg of the new-turn extends to resist the centrifugal force of the turn and the inside leg of the new-turn flexes while the thigh of both legs rotate or twist to the inside to increase the skis' edge angle.
- The following two tips are both aimed at moving the hips forward during crossover but focus on opposite sides of the body. The first says to lean or move the outside-of-old-turn's hip (downhill side hip) toward the direction of new turn. The second says to move the inside-of-old-turn's hip (uphill side hip) downhill in the direction of the new turn.
- Keep your shoulders and hips level with the snow for good body angulation and ski edging. Keep your hands level with the snow or raise inside-of-turn hand slightly for proper hip-shoulder angulation.

1.4 Limits Of Pure Carving For Recreational Skiing

The pure edge-to-edge curved turn, with little or no skidding of the skis, is what racers use around gates to lose as little speed as possible. In recreational skiing, pure carving is not the right answer for every situations. It isn't always desirable to carry the maximum possible speed through a turn. As discussed in Section 1.2, the simplest way to reduce speed, when carving is to follow the arc of a turn to up the hill some, until you slow down to a satisfactory speed, then move into a new downhill arc. On fairly steep, even wider slopes, you may not want do the repeated fuller carved turns required to keep from picking up higher-than-desired speed. Also on very steep or narrow trails you will want a shorter quicker turn than is possible by carving alone, even with the shorter radius-of-turn shaped skis. In those cases you can bleed off speed by smearing or twisting the skis to scrape sideways at the end of your turn. The term smearing is the currently politically correct term that recognizes the judicious use of skidding in recreational skiing.

1.5 Fore and Aft Balance Over Center of Feet and Skis

You want to balance over and against the center of the skis for better body stability and to get the maximum ski bending in the snow, for efficient carving. Balance yourself over the center of your feet and skis with ankles flexed so your center of gravity is directly above the center of your feet (equal weight on balls of feet and heels). Don't balance against either the ski tip or tail by pressing either shins or calves hard against boot. If your center of gravity is behind your feet, your ankle and feet muscles

will be involved in trying to maintain balance and will not be fully available to perform the desired thigh rotation necessary for edging and control.

Stand in an athletic stance with your back relaxed and slanted somewhat forward, with your hands forward and your shoulders forward and loose, not hunched over and tense. If you feel you need more stability, bend your ankles to flex your legs more deeply and keep your feet under your center of gravity. Don't bend over at waist or crouch forward; nor should you lower your rump in what is often referred to as the potty position, off-balanced with your hips behind the center of your feet. Skiing balanced with ankles flexed is often what prevents lower-level skiers from reaching a higher level. You will be surprised how incorporating this into your skiing will improve your performance in all kinds of conditions.

On skis, fore-and-aft foot movements for maintaining the body's balance are quicker than moving your hips and upper body forward or back. Using ankle flex to center the body translates to ski pressure on both tips and tails for maximum ski arc. Stand balanced, centered and relaxed, with both your ankles and knees flexed, not in the potty posture with only knees flexed, nor with your upper-body crouched-over and tense. Apply some pressure on the front of your boots from ankle bend to drive your knees forward, not from leaning your body forward.

Flex and tighten your ankles to remain centered. Skiing with loose ankles will result in considerable fore and aft motion about your feet centers and a likely loss of your fore-aft balance. The shorter length of shaped skis makes it even more important to stay centered. You no longer have the leverage of long-tailed traditional skis to work against, to regain your balance, if you do get back on the skis.

1.6 Thigh Rotation or Twisting to Quickly Change Ski Edges

The crossover maneuver of placing your body's center-of-mass to the inside of the turn is an easy and powerful maneuver, to put your skis on edge, but it takes a little time. In advanced skiing you also want to develop more and quicker edging than you get only from the lean of moving your upper body completely across your skis. Your pelvis' hip sockets will let you rotate your thighs independently of your upper body. This allows you to move your knees across by only rotating your thighs without either hip rotation or lateral hip movement. Twisting or rotating your thighs will move your ankles and knees to provide quick and pronounced outside-ski-big-toe and inside-ski-little-toe edging to carve a tighter arc, if you have your knees flexed. Section 1.10 has added discussion of thigh twisting.

There is a simple ski exercise you can do to get the idea of using your thighs to get additional, quick, and simultaneous mirror image edge change. Facing to the right with skis across the slope, put poles next to boots on little-toe side of left ski and big-toe side of right ski and rotate both thighs so knees push against poles to begin left turn (knees moved in direction of new turn). Likewise facing left across the slope, put poles next to boots on little-toe side of right ski and big-toe side of left ski and rotate both thighs so knees push against poles to begin a right turn.

There is another simple ski exercise you can do to get a feel for the action of quickly changing the edging of your skis during the turn. Centered over the skis, with

skis about hip distance apart, flatten your ski bottoms to the snow and sideslip down a moderate pitch slope; then use thigh twist or roll to make knees and ankles angulate and quickly set edges and stop, release edges and set again several times. Turn and face the opposite direction and repeat the exercise. If you use thighs and knees to change your edge angle, when you stop sideslipping, you will be balanced over your skis. Varying either body lean or hip angulation is a more powerful but slower middle and upper body movement. If you use increased hip angulation to get extra ski edge angle (like racers do to carve at high speed and resist the strong turning force), your center of gravity will not be over the skis; you will need poles or adjustment movement to retain your balance when you stop yourself while doing the sideslipping exercise.

Generally the rounder, almost half-circle, longer or lower frequency, higher-speed carved turns use more crossover and body lean. On the other hand, narrower, higher-frequency carved turns can be made by employing more pronounced and quicker thigh rotation to get the quicker edge angulation. For example, the high frequency, short turns you see advanced skiers execute down the fall line of smooth slopes or in moguls use mainly rapidly alternating thigh rolls, with knees flexed, for edging.

There are many who are convinced that ski instructors do these types of rapid-fire turns to make most other skiers feel inadequate, especially their students. Here, out of the bag for all to see, is their uppity “I am better than you” show-off secret. For a series of quick, shallow, slalom-like turns on shaped skis, rapidly alternate twisting or rotating your thighs to move your flexed knees alternately right-and-left to the 2 o'clock and 10 o'clock positions, as you keep your upper body stable and facing the fall line. The thighs and knees move in unison, slightly forward from side to side.

1.7 Use of Poles

When serving a tennis ball, you want to grip the racket so you maintain a loose, relaxed hand, arm and shoulder. The same holds true for how you hold your ski pole. By holding the pole so that your little finger and ring finger are not exerting any force on the pole's grip, in other words holding the pole only with pressure from your thumb and first two fingers, will help keep not only your hands but also your shoulders and upper-body more relaxed. Being relaxed is a good thing for your skiing (see Section 3 for more on relaxation). A tight grip, with all fingers exerting pressure on the pole's grip, will also tend to cause you to use excessive arm movement rather than the desired wrist flex motion to touch your pole to the snow.

Keep your hands in front of you (elbows just ahead of your rib cage), with elbows comfortably bent and hands at or just below chest level. Dropping your hands lower will tend to move your body backward on the skis. This will cause you to ski off balance, without enough pressure on your ski tips to fully carve your turns. The pole plant process for a new turn starts in the last third of the old turn.

Although the term pole plant is still commonly used, some instructors prefer the term pole touch because it more accurately describes the desired action. The pole plant or touch begins with a forward and slightly-rising across movement using body crossover or with a forward and slightly-downward across movement with some down-weighting and ski crossunder. With an upward wrist rotation, flick the pole tip forward

at an angle ahead of the hand. Use the forward lean created by the diagonal motion of your turn's crossover or crossunder to lower your forearm and lightly tap your pole tip to the snow, in front of and to side of the new turn's inside boot. Let the motion of your body's crossing and leaning to inside of new turn touch your pole to the snow instead of reaching your arm forward and slamming it down. As the pole tip touches the snow, make sure your pole hand drives or continues downhill over and past the lightly planted pole with a rotation of your wrist downward. Letting the planted pole drag the hand back, as the skier moves downhill, is an all too common problem that will drop and turn the shoulder back uphill, rather than keeping the shoulders facing downhill. Allowing the pole-plant hand to be dragged back takes you off balance, leaving you unprepared for the next turn.

Classically the pole plant served as a trigger to lower then raise the body to up-weigh and tended to be more pronounced or forceful (see the Classic-Turn Action Sequence in Section 1.1. When carving turns on shaped skis, pole plants are often eliminated on moderate pitched groomed slopes with moderate or longer turns. On steeper slopes, short turns, in deep or heavy snow and in moguls, a stronger pole plant is recommended to project your center-of-mass forward and across, center and stabilize your upper body, and establish timing and rhythm to your skiing. Unfortunately, all too often many skiers who have only skied and taken lessons on moderately-pitched, groomed slopes have never learned how to use a pole plant to start a new turn. If that is your case, start using pole plant on your groomed, moderate-slope turns. Thus, when you try to handle more demanding conditions you will be able to devote your full attention to coping with the unfamiliar conditions, instead of also having to devote some of your attention to learning a new and unnatural skill for you, which is pole planting.

Many skiers of the old school have the hard-to-break habit of reaching downhill with their arm and planting and then leaning on the pole to change edges. Instead you should arch the pole tip forward with an upward wrist flick and lightly touch the pole tip to the snow by tipping your body forward-and-across, downhill toward the new turn. Reaching diagonally downhill with your body, should ring a bell. That's right, it's the by now familiar crossover maneuver! This has the effect of beginning the edge change early, before the actual pole plant, resulting in a quicker and smoother turn. On the other hand, reaching with your arm or planting too forcefully will delay edge set.

1.8 Skiing Moguls

A prerequisite for in-control mogul skiing is being able to make quick, body-in-balanced, edge changes. Don't kid yourself, unless you have mastered quick edge changes to make quick, tight turns on smooth steeper slopes you are not ready for serious moguls. Good mogul skiing requires good balance, swift edge changes with quick thigh-knee twisting or rotation, together with rapid leg retraction and extension and rapid pole plants.

Your feet, legs, and skis must work as a unit doing the same thing, in the same place, at the same time. Things happen fast, particularly in bigger moguls on a steeper slope, and a narrower-than-normal stance will help your feet, legs and skis work together. By narrower stance I don't mean skis glued together, you can leave a little

space between the skies. However, a hip-distance or wider stance can place you in the awkward situation of having one ski down in the trough and the other ski high on the mogul crest. Narrowing one's stances some is easier said than is sometimes consciously done. After performing thousands of wider-track two-footed turns on smoother slopes, that by nature becomes your natural, ingrained reflex pattern to turn. It's very easy to enter a mogul field and without thinking or realizing it, continue trying to use your normal wider track stance. If you don't ski moguls fairly regularly, before entering a mogul field it's a good idea to stop and pause before proceeding and think about your stance width, as well as your balance as discussed next.

When you enter bumps, you want to be balanced and centered over your skis, definitely not sitting in the back seat. Your hips should be over your feet. Flex and tighten ankles to bend knees and put shins forward against boot fronts, with back somewhat slanted forward, but relaxed and balanced over the center of your feet. Use ankle flex to lower yourself some on mogul tops (rump to the bump) and extend legs on backside of moguls to maintain snow contact and control. The key is to move your feet up and down in concert with the changing snow height so your center of gravity barely moves and you stay in balance.

Young or competitive mogul skiers use a fairly straight line down the moguls' troughs with extremely quick, rapid-fire pole and knee actions. Older skiers generally prefer a more leisurely pace with a more pronounced turn and some side-slipping down the mogul's backside to control speed. That technique involves quickly changing edges at the crest of the mogul and then extending down the backside with carving and side-slipping and repeat at the crest of the next mogul. Using the latter approach generally requires a reversion to closer-stanced skiing, particularly in tight moguls, where almost 100 % of the ski loading quickly switches back-and-forth to the alternating outside-of-turn ski. Your hands must remain ahead of your body, at about chest level, with your elbows ahead of your rib cage while planting poles; if elbows come back past your rib cage or you drop your hands, you will get off balance on the back of your skies and quickly lose balance and control.

1.9 Handling Deeper Snow

Except for the mogul discussion, most of the previous material was directed toward skiing on groomed slopes or on groomed slopes covered with only a few inches of loose snow. When the snow gets deeper, don't panic if you don't have deep power experience. You will only have to modify your groomed-slope ski technique a little to cope. Only three modifications to your technique will allow you to adapt. First, bring your feet and knees closer, next to each other, which makes the second modification easier. Second, keep your ski loading about evenly balanced on each ski instead of the groomed slope's downhill-ski/uphill-ski average ratio of about 75/25 loading. Third, you will not tip or angulate your ankles and skier's edges as much as on a groomed slope, thus you will more ride the bottom of your skier's edges against the snow like water skier's edges against the water, rather than riding against your slicing ski edges. As a result your body will tend be more straightly banked or angled to the inside of the turn, like in water skiing.

Loading both skies equally will prevent one ski from sinking while the other floats to the surface in a different turn-arc radius and getting crossed. Two-footed, equally loaded skies will give you a broader support surface that floats closer to the top of snow to turn on. When turning you still do a body's center-of-gravity crossing of skies from inside of old turn to inside of new turn, but instead of retracting the outside-of-old-turn leg and extending the outside-of-new-turn leg, retract both legs together from outside of old turn and extend both legs together to outside of new turn to move skies across under you. Older skiers will relate to this as using retraction or compression as was done in classical down-unweighting turning. The turns generally are a little slower and longer radius than on groomed slopes because of the deeper snow's resistance. Be patient, let the turn develop.

Nervous in unfamiliar conditions, novice power skiers tend to turn too often and too sharply across the fall line to keep their speed down. That is the biggest obstacle that new-to-powder skiers must overcome. The fall line and some speed are your allies in making your skies float. You certainly don't want to hurtle down the slope on the precarious edge of high anxiety, but you need considerably more speed than a novices learning to handle groomed slopes. If you are a competent groomed slope skier, try and relax and allow yourself to reach at least the mid to high-end speed you ski on groomed slopes. Like a water skier, you need a little speed to enable the skies to plane. Even a stone will skip across the top of water if tossed at a shallow angle with enough speed.

Welcome home all you old-school classical skiers. Tired of being beat up in ski school class for your feet being too close together and your habitual pole plants on every turn. The worm has turned. You are now the class model for deeper and heavier snow conditions. The word now is to keep your boots and skies close together, but remember your weight stays evenly balance instead of being shifted to the outside-of-turn ski as was done in the classical one-legged turn. Use compression or leg retraction together with a pole plant diagonally forward and down the hill to start your next turn, then extend both legs to outside of turn to finish the turn. Think of the leg retraction and extension as both legs being extended together on one-side, then retracted back-to-you like you are absorbing a phantom bump, then extended to other-side, which also has a strong lateral component rather than just an up-down or vertical movement.

You should be basically balanced perpendicular to your skies both laterally and longitudinally. Longitudinally you should not be forward against tips or backward against tails. Whether you are flexing or extending, your feet must remain under your body. Keep your ankles flexed with slight contact between shins and boot tongues to balance over center of skies. Fight the all too common tendency to sit back with weight against back of boots and tails of your skies to float ski tips, as this will quickly tire your legs. If you quickly feel your thighs burn, you are sitting too far back. If you feel the urge to lean back, pull both your feet back into a lower but balanced athletic stance with hips, knees and particularly ankles flexed. For quicker and more subtle leg retraction in making shorter turns, think of lifting your toes to float skis and make edge change, but don't press against the back of your boots.

When you will be skiing significantly deep snow for any substantial time, you should consider renting power skies if you don't have any. The wider width of these

skies and their rocker tips make them much more buoyant and easier to turn in deep or curd snow. With these skies you can either carve power turns or you can smear them by holding the turn to take the skies into a controlled sideward slide. Regardless of whether you use your regular shaped skies or power skies, a pair of poles with full-size power baskets is helpful in deeper snow.

1.10 Common Core Elements of Efficient Free-Skiing And Racing

1.10.a Parallelogram of Power Posture Over Skies

Most of advanced free-skiing technique, particularly that used on groomed slopes, has been adapted from ski racers who are always looking for more effective and efficient ways to turn down a racecourse. Racing ski technique along with ski design has evolved considerably over the years. My ski class's 06 Mount Snow instructions were based on Steve Cook and Terry Barber's video analysis of the body positions and movements of top ski racers. They are in the first section of an instruction DVD produced by Sean Warman called "Skiing Movements." What I like is the insightful way Steve and Terry have reformulated longer and more detailed explanations of modern ski technique and boiled them down into a few basic elements that are easy to understand and visualize. Their approach doesn't fundamentally change or negate what has already been presented. Rather think of it as a more organized and simpler way of looking at modern, two-footed skiing. It's all about the best body stance and movements to get quick, effective crossover and strong, early edge change. This and the following discussion on evolving technique while presenting in the context of effective, modern free skiing technique, will serve as a transition to the brief discussion of recreational ski racing where these same techniques are also regularly applied.



Good skiing starts with a good stance for greater control and edging as shown in the figures above. The elements of a good skiing stance are: 1.) Your body's center of gravity is over the center or arches of your feet at the center of boot, not the balls nor the heels of your feet. Avoid the fairly common tendency to incline or lean too far forward or stand against your boot tongues, with your weight pressed against the ski tips. 2.) Your body is in what is called a "parallelogram of power" posture with your shins angled forward some from ankle flex and your back also angled forward parallel to your shins, as shown in the previous diagram. Bend your ankles to angle your shins forward. Good skiing requires you to have your ankles flexed and firmed up. 3.) Your ankles and knees are flexed with the upper leg about 45 degrees to skies and slope. 4.) The front of your knees should be over the center of your binding's toe-piece to position body weight over center of boot and bend your ankles. 5.) You should hold your poles

ahead of you with your elbows never behind the front of your rib cage. For easier forward ankle flex in the parallelogram of power posture, position your boot's power strap so it is only against the front inner lining of your boot, not on boot's front outer hard plastic, when you tighten the strap. Some skiers even replace the original equipment straps with straps that have some elastic stretch, for easier flex.

When starting a new turn, touch pole lightly by leading with your hip that is now on outside of old turn or that will be on the inside of new turn and also twist your thighs in direction of your turn, instead of just laterally moving them across. By leading I mean bringing the downhill hip forward in the direction of travel, and also downhill of your feet's current position or across your skies similar to what was done with your belly button when using the crossover rectangle image described earlier in Section 1.1. Which hip is outside or inside, and which one leads can sometimes be confused. The old-turn's outside hip is the downhill hip at the completion of the old turn or the hip on the same side you do a pole plant starting a new turn. To start a left turn, lead with the left hip - - to start a right turn, lead with right hip. This has been described as "alternate hip leading" or "butt walking" yourself down the slope from turn to turn. If "butt walking" is too coarse for your sensibility, then perhaps a different description like "alternate rump leading" or "alternate tush pushing" from turn to turn might be less objectionable.

With your body in the previously described parallelogram of power stance, when you lead with the hip on the side to which you want to turn to (new turn's inside hip), also twist or rotate both thighs toward that same side (inside of the new turn) for quick strong edge change. Thigh twist, roll or rotation movement does not come from an rotating your hips, but comes from the upper thighs twisting or rotating at the pelvis. Your thighs don't just move laterally but also rotate or twist significantly at your pelvis (counterclockwise for left turn, clockwise for right turn). While turning with thigh twist, bring the new turn's inside ski up the hill toward your chest, with more inside leg flex than the straighter outside leg, for a strong racer-look type of turn with pressure on both inside ski edges. The feeling should be like you are pinching your outside or downhill hip of the new turn. The inside leg flex is much more pronounced on longer-radius, higher-speed racing turns with skier's inside hip almost touching the snow and skies widely apart.

Recapping, the major common elements that you see in racers and good skies are: 1.) Body balanced over the arches of feet, 2.) Shins and back angled forward some and parallel to each other in a "parallelogram of power" posture, 3.) Thighs angled 45 degrees to slope with knees over toepieces, 4.) Starting a new turn by leading with the hip to the side that you are turning to and moving that hip forward and down-hill of your feet's current position, and 5.) Twisting both thighs from the pelvis, in the direction of the new turn, for strong edge change. What it all comes down to is improving your posture over the skies and starting each turn by leading with your hip to that side (left hip for left turn, right hip for right turn) and also rotating both thighs to the side you are turning to. You will be amazed at how your carving and skiing will improve from simply using the parallelogram of power posture (#'s 1, 2 and 3) along with the two turning body movements (#'s 4 and 5).

1.10.b Three Fundamentals Concepts of Skiing

Sean Warman produced a later (2008) instruction DVD called “Images and Concepts of Skiing.” This video gives you another take on his earlier DVD’s concepts by featuring some excellent footage of Michael Rogan and the Austrian Ski Team. Rogan’s skiing and some stop-action of his positions, with graphic illustrations, are used to demonstrate what Warman calls the Three Fundamentals Concepts. He defines these fundamental concepts as:

- 1.) The Path Of The Ski Is Round. The ski traces an arc or part of a circle in the turn. Like I said at the end of Section 1.1, you want graceful “S” shapes, to your descent down the mountain, not “Z.” shapes with long traverses and sharp turns.
- 2.) Balance Against The Outside Ski. The balance shifts from mostly against the current turn’s outside ski (about 75 % of pressure) to mostly against the new turn’s outside ski (again about 75 % of pressure). The balance, with the outside leg extended is against the slicing inside-edge of the outside-of-turn ski. The critical movements that enable you to balance mostly against the outside ski are:
 - a.) The Hips Move Forward. Your hips move forward in direction of new turn to start turn.
 - b.) The Legs Change Length. Your right and left legs exchange their respective extended and flexed length in the process of going from an old turn to a new turn. The flexed inside leg of the old turn becomes long in the new turn and the long outside leg of the old turn is sucked up or flexed so its knee moves toward chest.
 - c.) Level Out. Level out your hips and shoulders as the new turn begins and through its finish before starting the crossover for the next turn.
- 3.) The Legs Tip, The Legs Twist. The upper legs tip and twist (rotate at the hip socket as earlier described by Cook and Barber) to edge and turn the skies.

The above three fundamentals concepts are a slightly different way of describing and summarizing much of what has already been said.

1.10.c Two Focuses For Better Skiing

Sean Warman produced another of his outstanding instruction DVD’s called Images and Concepts Going South. This video features Michael Rogan, Robin Barnes and the U.S. Ski Team at Portillo Chile. He illustrates the two main themes of the video with Michael and Robin making turns and superimposing clarifying graphics. He tries to further simplify modern recreational skiing with what I call two main focuses. They are:

- 1.) Hip-Leg Alignment.
 - a.) In skiing down the hill, depending on size of the turn, the hips don’t always face directly down the fall line, but they do always face significantly inside of the turn. The hips and upper body face inside the next turn and down the hill to where you want to turn to. Hips don’t rotate to the side of hill or where the skies are pointed to during the latter part of a turn.
 - b.) From the start of a turn to its finish, your legs turn more than or move past hips during turn. At the end of the old turn, you legs are turned past your hips in one direction and turn past your hip in the other direction in making the new turn. There is separation or independence between the legs from the hips and upper body during a turn. To turn legs independently of the

hips and upper body, skiers need to rotate their upper thighs at the pelvis while using muscular contraction or tension to stabilize pelvis. To keep pelvis from turning with thighs, you need to feel like the left side of your pelvis is trying to rotate to right when your legs are turning to the left and feel like the right side of your pelvis is trying to rotate to the left when your legs are rotating to the right. The stabilized pelvis gives your legs something to turn against.

2.) Tip the Feet From Side to Side.

a.) Feet are the Foundation for Edging and Release.

b.) Tip Your Feet to Engage the Turn and to Release the Turn.

The two focuses of this Section 1.10.c can be related to the discussion of Warman's earlier two DVD's in Sections 1.10.a and 1.10.b. This DVD more than anything else made me realize the important role independent-thigh rotation plays in edging and turning skies. The focus here is on leading the turn with knee moving across your skies with thigh rotation rather than focus on a forward-and-across hip movement. Sections 1.10.a, 1.10.b and this Section all discuss rotating thighs, however this Section more strongly emphasizes rotating thighs and doing so independently of the hips and upper body.

1.11 Constantly Evolving Modern Skiing

To start a turn, it seems to me that modern carving instruction initially focused on leading or moving the hip or side of your rump that is now on outside of old turn, or that will be on the inside of new turn (downhill hip), forward in the direction of travel. Then we saw in # 2.a. of the Three Fundamentals Concepts (1.10.b) above that the hips move forward. Now we are seeing and hearing more about moving the uphill hip forward in the direction of travel as we shall discuss next. What we call modern skiing is not a static finished product, but a constantly evolving process. Racers and coaches are always looking for an edge. There are at times competing visions of what is "modern skiing" until the skiing community gravitates toward a new consensus. This year's modern skiing being taught is often slightly different from last year's as could be the case for next year. With that in mind let us describe some current phases in this ever-continuing evolution of ski technique.

1.11.a Uphill Hip-To-Tip For Turn Initiation

Imagine yourself as the top figure in the following recreational hip-to-tip action sequence, finishing a turn and about to start a new turn, with the downhill (outside of old turn) leg straighter and the uphill leg flexed. To start the new turn, advance your uphill hip (what is going to be the new-turn outside hip) toward the tip of that ski (left hip in top figure as shown by the arrow) and roll your downhill ski to a new edge by rolling your downhill ankle (tipping or pressing your little toe toward the snow) together with a rotation of both thighs. The desired uphill hip movement is not a pure rotation movement downhill, nor is it a pure upward movement.

The uphill hip movement is forward, diagonally toward current position of the tip of the uphill ski, which with an initially flexed uphill leg has that hip move forward to catch up and come over its knee some, resulting in that leg extending and body elongating on

that side while the other leg is bent back toward your chest some to move your body forward and to the inside of the turn. We see that progression taking place in the middle and bottom figures of the recreational hip-to-tip action sequence. We also see the same progression in the higher-speed racing hip-to-tip



Recreational Hip-To-Tip Action Sequence



Racing Hip-To-Tip Action Sequence

action sequence from youcanski.com. Instructors describe the movement and its purpose with the catchy phrase “hip to ski tip for grip.” For a little more specificity and clarity, permit me the license of a less catchy and longer rendition of that phrase, “uphill hip to its ski tip and downhill little toe to snow for early edge exchange.” These movements employ a slightly different focus and mental image than earlier discussion, but fundamentally it’s still all about early and smooth edge change and crossover transition.

Focus on moving the downhill hip forward, both hips forward or the uphill hip forward, does it make any real difference? As I understand some of the discussion in the racing community, you can get earlier and more simultaneous edge change for both skies by coming more off the old turn’s uphill ski’s little-toe edge. Back when skies were not so shaped, racers would do a so called downhill ski release where they would push off the old turn’s downhill ski’s big-toe edge and step to the uphill ski resulting in the big-toe edge of the new turn’s outside ski’s quickly engaging, but with a little delay before the new turn’s inside ski fully edged. With shaped skies, the uphill or inside-of-turn ski is

more engaged and carving in the old turn, so some innovative racers started experimenting with releasing or pushing off the little-toe edge of old turn's uphill or inside-of-turn, partially-weighted ski in moving their center of mass inside the new turn in crossover. The result was a quicker roll of the new turn's inside ski, to more rapidly use the edges of both skies in a wider stance, for earlier turning. Going back to the "hip to tip" movement describe earlier, we can now connect the dots. The uphill or old turn's inside hip movement forward is being made to activate an uphill ski release and a quicker engagement of the new turn's inside ski's little-toe edge.

1.11.b Leading Turn With Knees Moving Across And Thigh Rotation

In the time progression of carving instruction, we first focused on leading the turn with the downhill hip, then both hips, and later the uphill hip-to-tip maneuver. Leading with the mid-body moving forward and downhill across the skies was initially the primary focus and the rotation of thighs was a complimentary movement to increase edging. My impression is that focus on leading with both knees moving across the skies with thigh rotation is itself evolving into a primary focus, in carving instruction and training, to initiate a turn and quickly engage the new-turn edges of both skies. I base this impression on Sean Warman's instruction video discussed in Section 1.10.c and Ken Chaddock's book "How I Ski, Expert Alpine Skiing Demystified." Bode Miller is reported to have said "I like to feel I'm changing edges with my knees." In starting their new turn, you can see that the skiers in the two preceding figures are, either consciously or unconsciously, using the thigh-turning and knee-crossing movement in the initial part of new turn.

Because it is so relevant to this Section's material, I have quoted from an e-mail that Jim Colbert sent me. As most of you know, Jim along with Cathy Margiotta, are the Peninsula Ski Club's own current PSIA (Professional Ski Instructors of America) Level II Certified Skiing Instructors. Jim's quote follows. "Section 1.11.b. is dead on. I skied with National team members in Dec. 2011, including 4hrs. with Robin Barnes. The emphasis is on the ball joint of the hips, the strongest joint in the body. With knees flexed, strong stable hips and moving the femur from the ball joint of the hip, you get a natural lead with the uphill hip/ski. The muscles in the waist work to counter the tendency for the upper hip to lag behind."

1.11.c Waist Steering

Although the total waist-steering technique package would likely be regarded as unconventional in today's typical U.S. resort's PSIA taught ski school lessons, I have primarily included it in this discussion of modern skiing to stimulate you to do some thinking about and experimentation with the loading of, and the release from, the inside-of-turn ski in your skiing. Gary Dranow of ModernSkiRacing.com and his compatriots are pushing what they claim is a revolutionary new concept in modern ski racing technique they call waist steering. In fairness, I should point out that there are others in the ski racing community, including Greg Gurshman at youcanski.com who take issue with some of the waist steering methodology such as more heavily loading the inside-of-turn ski for much of the turn. The waist steering material recounts how it originated from their recognizing that the body's core muscles, as used in certain Tai Chi movements, can also be used to initiate and continue a new turn, which is started from a significantly

more weighted uphill ski than conventional, at the finish of the old-turn. Reversing which is the extended and flexed legs together with a quick tightening of the crossing muscles of the abdomen (those used to move pelvis clockwise and counterclockwise), called screwing down while keeping your knees and feet apart, is used to simultaneously tip your skies to new edges and rotate your pelvis and waist in the direction of the new turn. The new turn's outside ski generally tends to lag a turn because it has to travel a longer distance. Waist steering powers the outside ski around the turn by advancing the outside hip forward, using the body's core muscles. This core rotation process continues into the new turn, as the following left figure below is doing, which results in a loading bias on the uphill ski (described as stacking over inside knee).

The skier in the following figure is in the process of using the crossing muscles of his abdomen to turn his body leftward to resemble the core and lower-body positions shown by the Tai Chi Master on the right (actual feet-ski separation and body inclination depends on skier's speed and radius of turn). Both figures are from ModernSkiRacing.com. Initially steering the waist or rotating the uphill hip in the direction of the new turn, from a more heavily loaded uphill ski, results in an uphill ski release and an earlier inside-of-new-turn's ski edging as discussed in the second previous paragraph. The claimed benefits of waist steering are that skiers, new to carving, can be easily taught how to create a quality carved turn by using the rotational power of the body's strong core muscles to simultaneously tip both skies on edge and then drive the new turn's outside of the body and the outside ski through the turn arc.



While waist steering is being discussed in amateur racing circles, and its supporters assert that their system inherently has the innovative features being use by top pro tour racers like Bode Miller and others, it is unclear how much of an impact waist steering will have on ski racing much less near-tern recreational free-skiing technique. As per their description, a waist-steering turn starts and maintains a significantly more heavily loaded uphill foot than is now generally advocated, which causes the new turn's outside leg to have more of a stabilizing, outrigger-like role rather than its traditional role as the principal balance-against platform. With the uphill leg serving as the pivot anchor point in their geometry-compass analogy, the waist-steering literature describes the downhill leg as acting much like the drawing leg of a compass, by simply following the arc of the waist rotation.

To put some historical perspective on the claims and counterclaims made about waist steering, I would like to insert the following quote from Horst Abraham's book *Skiing Right* (1983, pg. 134). "That skiing in an open stance 'wide track' the partly

pressured inside ski becomes the fulcrum about which the outside ski is turned. The open stance allows the strong rotary muscles in the pelvic region to turn the legs and skis without large counter movements that may upset the skier's balance." In a high speed racing turn with modern skies, the inside foot is sucked up to the chest and kept underneath the torso/hip with the body forward, chest squarer to skis than traditional, skis parallel, and legs/shins parallel, as shown in the following two ski racing figures from youcanski.com. The result is that the inside ski is squeezed between the pelvis/folded leg and the snow, applying increased pressure to the inside ski, toward the end of the turn, which at that point, can temporarily exceeds 50 percent loading pressure. The key is to realize that inside loading is not constant but depends on the phase of the turn.



You can't help but wonder if some of the controversy about waist steering is about how 'above or against' is interpreted when used with 'weighting, pressuring, stacked and loading'. You can certainly have more body weight physically positioned above the inside ski while still put more pressure on the outside ski to resist against the centrifugal force of a high speed turn. However, from what I am able to understand of the waist steering literature, it doesn't appear to be a case of only semantics. There is no question that top racers are now loading their inside ski more than even a few years ago, and that loading varies throughout turn with the heaviest loading at the turn's finish. However my understanding is that, except for unusual situations, racers still are not regularly putting majority loading or pressure on their inside-of-turn ski except possibly toward end of a turn to transition to the new turn. Will the trend in racing to more heavily load the inside ski, through a significant part of the turn, ever take it past the 50 % mark? For now I will have to leave open the question as to whether that is a peculiarity of the waist-steering technique or whether it ever becomes one of the turning techniques regularly used by World Cup racers, or whether even further down the road it is incorporated into mainstream recreational skiing.

Given what was presented earlier, where does this waist steering discussion leave us relative to our understanding of modern recreational skiing? From my admittedly limited perspective, and using previous material in this article, it seems to me that waist steering has some common elements with mainstream recreational technique but it does have two notable differences. As described in this Section, a waist steering turn employs more pressure on the uphill ski than is traditionally used in recreational skiing. The other significant difference is that waist steering tighten the crossing abdomen muscles to rotate hips and thighs in the new turn direction, which is directly opposite to how Section 1.10.c describes muscular activity to stabilize upper body to insure

separation so that the hips and upper body don't turn together with legs. Among the common features are extending and flexing legs and a vigorous rotating of thighs in the new-turn direction combined with rolling of your ankles, to actively and quickly edge the new turn's inside ski similar to the "uphill hip to ski tip and downhill little toe to snow" and "lead with knees" types of movement (described in Sections 1.11.b and 1.11.c). While waist steering might be considered to be on the fringe of modern skiing, some past fringe techniques have moved the boundary of what is considered mainstream. It remains to be seen how, or even if, waist steering will influence racing or recreational skiing.

SECTION 2 - BASICS OF RECREATIONAL SKI RACING

Because running gates, in both the Tuesday time trials and the Thursday renowned Peninsula Ski Club (PSC) Race, are firmly established traditions of the Mount Snow trip, some very basic race technique instructions are often included in our ski classes. Adding to each year's race-ambiance ado is the selection of "evenly" matched teams (by the always scrupulously impartial trip captain). To fairly match the racing teams, the trip captain uses the results of the Tuesday time trials and a sophisticated computer recursive process, known as "Colbert's Subgroup Factor Equalization Algorithm," from an obscure branch of optimization mathematics.

The Thursday race is the real deal, with numbered bibs, starting-tripped timers, racers simultaneously coming down two parallel courses, and even a public address announcer giving bib numbers, names, running commentary and skiers' course times just like they do on TV. We are talking the whole nine yards here, with prizes and some years even with official NASTAR medals. The race enables trip members, who wish to participate, to experience another interesting facet of skiing, the fun, excitement, and personal challenge of ski race competition.

2.1 Fundamentals of Where to Turn on a Race Course

In general, you should think of a ski race as the use of good basic free-skiing technique with the turn locations being prescribed by the gate location on the racecourse instead of it being your choice as it is when you free ski. A turn to the gate should always begin uphill of a gate when the tip of your skies crosses the rise line of that gate. This is shown in the second following figure with the five gates. The rise line is the fall line extended back up the hill from the gate. The fall line is the path of steepest descent or highest gradient down the slope.





If the next gate is significantly offset, your turn should be about complete when the first gate is passed. This is shown for the finish of the turns just past the first three gates of the previous figure. When the next two gates are fairly closely aligned, as in the last two gates of the previous figure, your skies should be going down the fall line when you pass the first of the two gates. Don't get fixated on the next gate, which is the most common mistake that beginning racers make. In order to make the smooth transitions described above you need to be aware of the gate location of the gate beyond your next gate. You don't want to wait until you cross the next gate before looking for the subsequent gate. Look ahead at least one gate, better racers look ahead two. Your speed will of course be dependent on your skiing level, but you want an aggressive attitude and posture suitable for your ability level, with your hands forward. However, aggressive should never mean reckless, remember, we do this for fun.

2.2 Use of Hip Lift in Racing Turns

The hip lift was for a time considered an "insider hot movement" employed by top slalom racers to quickly apply big-toe edge pressure to the new turn's outside ski. The movement was quick and subtle. When used in a turn on the slope, it is not easy to spot. If you stand on level ground and quickly lift one hip straight up, that leg and foot will also rise slightly and your other knee will turn in some. When applied to the downhill hip, this movement will cause a quick pressure release on the downhill ski and a big-toe-side edge set of the uphill ski. While quickly and smoothly transferring pressure from the downhill to the uphill ski, it keeps the downhill ski on the snow and moves the center of gravity toward the inside of the new turn. In addition, the hips are quickly leveled into the new turn with minimum leg movement or adjustment. This is an advanced, subtle but dynamic movement that was used for quick turning.

A perception of the edge-set effect of hip lift can be obtained by moving down a gentle slope in a snowplow (wedge) and alternating the lifting of left and right hip. You should feel the right ski edge or bite the snow more when you lift the left hip and the left ski bite more when you lift your right hip. There is another perspective that might help give you a sense for the hip lift movement. Actually lifting the downhill ski off the snow, at the start of a new turn, was a practice exercise skiers once used to learn classical, one-legged, complete-weight transfer. Racers in the Stenmark-Mahre era did the same thing to apply maximum pressure to their longer, narrower, and stiffer, new-turn-outside ski to carve and hold on icy racecourses. If you can relate to the technique of lifting the downhill ski to start a turn, you might think of hip lift as an analogous but quicker and much subtler form of lifting your downhill foot.

Hip lift and leading with the downhill or inside-of-new-turn hip, which is discussed in the Common Core Elements of Advanced Free-Skiing and Racing (Section 1.9), are closely related. They can be used together. Hip-leading with the old turn's outside hip or the new turn's inside hip is about a forward-and-diagonal movement of the hip rather than a lift, but hip-lift can be added for heavier snow conditions or for quicker turns. As the discussion in Section 1.10 indicates, the latest thinking seems to be moving toward and uphill hip lead, but there are cycles in ski technique. So who knows if we will see some form of hip lift again?

As I said in earlier articles, there is no question that some PSC (Peninsula Ski Club) members are unique. However, if you see one of our skiers walking around with a usual "funky chicken like" gait, you shouldn't automatically assume they are weird. Only after reading the above do you now realize they were only practicing their hip lift technique. This only makes them skiing fanatics, which you would no doubt agree is different and much more acceptable than being weird.

SECTION 3 – BREATHING AND RELAXATION WHILE YOU SKI

To avoid quickly tiring, it is important that you continue regular breathing, while you ski, to provide a constant oxygen supply to your muscles. That is rather self-evident you might think, so why bring it up? If joggers don't need to be reminded to continue regular breathing, why should skiers? Unlike joggers, skiers, particularly those at lower to mid-levels, often unconsciously slow or halt their breathing when skiing in conditions that raise their anxiety level. You can certainly see how it might be difficult to breathe normal when you have a death grip on your poles, with your toes curled inside your boots. Actually, anxiety levels much less extreme than such a tight pucker-factor situation can unconsciously affect breathing. Some typical examples of situations that raise anxiety to various degrees include skiing in terrain steepness that is near or past what one feels comfortable with, the pressure of keeping up with faster skiing buddies, facing unfamiliar snow conditions like moguls or deeper powder, or the tension of performing in a NASTAR race with team pressure and people watching. Even if somewhat tense, you need to be aware of your breathing so you don't unconsciously slow down or stop regular breathing.

The better solution of course is to ski more relaxed to avoid breath-arresting tension. There are several advantages to being relaxed while you ski. You will stay warmer; ski more balanced, fluent and efficient; not tire as quickly; and of course enjoy the experience much more if you are relaxed rather than tense and tight. As will be described below, occasionally utilizing a simple breathing exercise will help you to prevent over-tenseness in you skiing.

At opportune time during the day, using a special type of calming breathing is an easy and effective technique to reduce anxiety and muscle tension. In fact, such deep breathing is a basic technique of Yoga and the Eastern martial arts to calm the mind

and body, as well as being a normal part of most meditation rituals. Take a really deep breath through your nose, initially expanding your belly or abdomen (not your chest) for a slow count of four, hold for a count of two, exhale slowly and completely through your nose for a slow count of eight. Some recommend exhaling through the mouth instead. This type of deep breathing is called diaphragmatic or abdominal breathing which small babies naturally use, as opposed to thoracic or chest breathing which adults normally use. When your diaphragm contracts downward and abdominal muscles relax, oxygen is drawn to the more calming and blood rich lower lobes of the lungs. As you inhale, raise your shoulders up and back, then let your shoulders loosely and completely fall while exhaling. Opportunities to relax yourself, with four or five abdominal breaths, can be taken before you start your run, when stopping to regain your leg strength, or waiting to gather your ski group.

Another useful and easy way to help you relax is simply to smile. That might sound somewhat Pollyannaish but it does have a sound biological basis. Putting on a smile sends a signal to your body's parasympathetic nervous system that the perceived threat causing the body's stress producing fight-or-flight response is over, resulting in a reduced stress level. The fight-or-flight response is the body's natural response to a perceived threat to one's safety or security (either physical, social or psychological), which results in arousal and tension. If you develop the habit of smiling and thinking of yourself as loose and enjoying yourself, then you will become a more relaxed and happier skier on the slope.

SECTION 4 – BOOT CONSIDERATIONS TO ENHANCE YOUR SKIING

4.1 Why Buy Boots First

If you enjoy and plan to continue skiing after trying it with rental equipment, you more than likely will start thinking about getting your own gear. If you don't buy both skis and boots together, the first personal ski equipment that you should consider purchasing is a pair of ski boots. Boots that fit right will affect your skiing more than anything else. You will ski much better in a correctly fitted pair of boots with mediocre skis than with ill-fitted boots and high performance skis. With having your own boots you can easily find good skies to rent at most any ski area, while the reverse, with having your own skies, is not true. When and if you decide on buying skies, you should try several pairs in the performance range of interest before purchasing. Most ski-area shops allow you to try their demo skies and take the rental cost off the purchase price of similar new skies. With your own boots as a constant in the trial process, you can compare the relative performance of a number of demo skies at different shops and even at different ski areas over a season before making your ski selection.

Another consideration, of whether to just buy boot and forgo skies, is the increasing cost of taking personal skis along if you fly to your ski destination within the U.S. If you can pack your boots and clothes into one check-in bag and one carry-on, you will save

yourself the second bag charge. The second bag charge has been as high as \$50 one-way and could go even higher with escalating fuel prices. The second bag surcharge can be applied to ski rental at your destination resort. Some club members, who are Western skiers, are weighting the financial advantage of renting at their destination versus the combination of added luggage charge and the purchase price and maintenance cost of personal skies. An important factor is how much skiing you do per season and how long you keep your skies before updating. If you only ski a week out West most years, the financial trade-offs might well favor renting skies. Two added bonus for renting are the opportunity to try the latest performance skies and of getting skies that better fit the local conditions, like fat power skies after snow dumps.

4.2 The Basics of Boot Fitting and Purchase

Let's be clear, when I say boots that fit I don't mean boots that fit your ski outfit's color scheme. In this context, fit has nothing to do with color matching and everything to do with proper sizing. Regardless of whether you are a first time boot buyer or looking for replacements, you should put some time and effort into getting correctly fitted boots. Boots that are too loose will not properly transmit the leverage of lower leg movement to the skies. You will need extra ankle movement to put your skies on edge and carve turns. So, even if you do what your ski instructor says, your skies will not respond like those of your classmates, who have snug-fitting boots. True, there are adjustment buckles to snug the fit. However, if the boots are too big to start off with, when you try tightening them to fit, you will excessively distort the hard plastic shell and create painful pressure points. On the other extreme, boots that are too small to begin with will have excessive tightness or pressure points that might only feel uncomfortable in the shop, but will become ever more painful under the flexing and pressure of normal skiing. In addition, boots that are too tight will cut circulation and be cold. Nothing can ruin an otherwise gorgeous ski day like cold or hurting feet. I hope I have gotten your attention about the importance of proper fit. The three most important factors in selecting boots are fit, fit, and of course fit.

The Brannock is the device you see used in a shoe store to measure your shoe size. Brannocks used for ski boot fitting are calibrated to give you a half-size smaller reading than your normal shoe size. Beware of someone trying to sell you boots the same size as your shoe size or that fit too comfortable when first put them on. After skiing some, the liner gets compressed and the boots are then too loose. If you ask around, you will find that one of the most common problems people have with their ski boots is that they purchased boots that seem to fit decently in the ski shop but were actually too large. I can name you a number of PSC members who have experienced this very problem.

People's lower legs and feet come not only in different sizes but also in an endless variety of shapes. High insteps, low insteps, wide heels, narrow heels, wide forefoot, narrow forefoot, thick calves, thin calves, some feet are stable when they are weighted, others pronate when weighted, etc. etc. People with pronating feet almost always get fitted with boots that are too large, unless the fitter stabilizes the feet so they don't elongate in the boot when weighted. Skiers that are bowlegged or knock-kneed will also

need either cuff alignment or canting. The point of all this is to go to a person with the local reputation of being a good boot fitter and who has the proper equipment to make adjustments. A good fitter will have orthotics footbeds, equipment to check for canting and a number of boot brands to choose from. To handle unusual fitting problems, a good fitter will have a variety of boot fitting pads, heel wedges, and tools to heat and expand the boot shell, which many smaller ski shops don't even have.

You should ask around to find a boot fitter with a good reputation. The odds of finding a well-qualified fitter are much better nearer a larger ski resort. There is a big difference between some ski shop clerk selling everything including boots and that of a trained, experienced full-time boot fitter. Be open to the fitter's suggestion, because the boot that your buddy swears by might be the best for his feet type, but not necessarily the best for yours. Some brands fit narrow feet or thin calves better while others are roomier for wider feet or thicker calves. A good boot fitter will evaluate your feet-calves characteristics and steer you toward a model that better fits your particular type rather than push one brand name for everyone.



Avoid a quickie 20-minute selection or a rushed lunchtime pick at the mountain. Allow at least one and a half hours, if not more, to fit and purchase your boots. Bring the socks you ski in when trying out boots. With your ski socks on, try on the perspective boots without the liner. Without liners, a rule of thumb that many fitters use for correct boot length is that when the big toe just touches the front of the shell, there should only be enough room to reach down with your hand and be able to slide one finger down behind the heel and the back of the boot shell, as shown in the previous figure (Ski, Dec. 2007). Replace the liners and buckle the boots to a medium setting. The boot should fit real snug at the instep, ankle and the balls of your feet. Remember, you don't want the roomy, comfortable fit of a bedroom slipper here. If you can lift your heels any, up and down inside the boot, then the boots are too loose. If after repeatedly flexing forward against the tongue, for about ten minutes, your toes still press hard against the boot tip, with no wiggle room, then the boots are too short.

If the boots fit correctly, they should initially feel really, really snug, bordering on or feeling too tight. After several hours of skiing the liners will compress and conform to your feet and you will go on to enjoy a happy relationship with your boots. The fairly thin line between real snug and too tight is why you want to learn a few basics of ski boot

fitting, as well as deal with a good boot fitter who will listen. With the boots on, walk and hang around the shop for 30 minutes to an hour to check for places where the contour of the plastic boot and that of your feet or ankles have a significant mismatch, which are called pressure points. This isn't the time to be stoic and silent. If there are any noticeable pressure points, work with your fitter because, unless alleviated, they will become painful when you ski.

In addition to fit, you also need to pay attention to boot stiffness or flex. A stiff boot will not flex much when you push your knee forward. Such a boot will turn the ski quicker but will also transmit most of the ski's vibrations to your shin. On the other hand, a softer flex boot will not allow you to turn the ski as quickly but will dampen out or isolate much of the ski's high frequency movements from your shin. If you are a beginner to intermediate skier, you want a decent quality, medium-stiffness recreational boot. A low-end beginner's boot is generally too soft and flexible; you want a boot that will support your skill improvement. On the other hand the top model, very stiff, racing boot is not made for general open-sloped, recreational skiing and most certainly not for lower level skiers. Unless you are an upper level skier who knows exactly what he wants, avoid the often mistaken notion that because stiff racing boots are more expensive they will be better for your skiing.

A boot's flex index or rating is often marked on the boot, if not ask the salesclerk for its rating. Flex indexes are associated with skiing ability. Flexibility ratings are 50 to 65 for beginners, 65 to 80 for intermediate skiers, 80 to 100 for advanced skiers, over 100 for expert skiers and 110 to 150 for experienced racers. In addition to skiing ability, take into account your personal situation. Consider adding 10 points if you are a heavier skier or a fast and aggressive skier. On the other hand if you light and slight, have weak knees, tender shins or advancing in age, you should consider adjusting down 10 points.

4.3 Foot Warmth and Ski Boot Preservation

The modern ski boot is much warmer than earlier models. Today's performance boots are designed to be worn with medium to thin ski socks. Wearing thick or two pair of socks is not recommended for skiing performance or for warmth. Don't give up if your blood circulation is such that you tend to get cold feet. There are several remedies. One simple, cheap option is wearing a pair of low-quarter nylon sheer stockings as a thin insulation layer under your ski socks. They are so thin that it won't affect your boot fit. This also works well for skiers with normal circulation on those particularly bitter cold days. Another simple option is a pair of thermofeet heat insole, which are thin reflective insoles placed underneath your existing footbeds to act like a mirror and reflect thermal wavelength energy back to your feet. Yet another and commonly used option is the so-called boot gloves that give you an insulation layer over your lower boots. If you are especially cold natured, a more expensive but effective option is procuring battery-powered heaters for your boots.

Getting a small portable boot-dryer which simultaneously blows room-temperature air into your boots and gloves, and that are compact enough to fit in your boots when packing, is worth the investment. When you come back to your room or condo, use the boot-dryer for several hours and your boots and gloves will be nice and dry to start your

skiing the next day. Damp boot liners will quickly moisten your socks and chill your feet. Don't blow heated air into your boots with a hair dryer; this will greatly speed up the deterioration of your liners. After each trip, you should remove the liners to let them completely dry or use your boot dryer before putting them away. Also a word of caution about off-season boot storage, store them in an insulated and temperature-controlled part of your house, not your attic or other hot spots. Significant exposure to high temperatures will significantly speed up the deterioration of both your liners and plastic outer shells.

SECTION 5 – SIMPLE PRE-SEASON EXERCISES TO PREPARE YOU FOR MORE ENJOYABLE SKIING

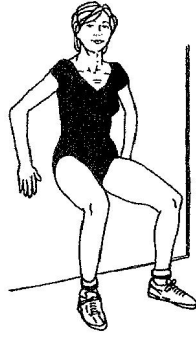
There are some cynics out there who will say I have concocted the following story only to make my point about pre-season exercising. Not so! There actually is an underground, hush-hush, small group of hard-core PSC (Peninsula Ski Club) members who work out and practice, on their own ski training machines, all year around. They are the skiing equivalent to the addicted, totally-committed, gung-ho tennis or golfing nuts you hear about. Being a recognized and self-admitted tennis nut myself, I know the type. I suspect you probably want to know who these people are so their exclusive, some might even say unfair, advantage is uncovered for all to see. For personal health reasons, I regrettably can't give out names because they are a secretive and self-protective clique, who all know where I live.

The point of the above partial exposé is that whatever else you might say about those ski nuts, they definitely prepare themselves for the very real physical rigors of skiing before hitting the slopes. The question is, do you? For the rest of us who are less dedicated and driven, particularly if you are not physically active, some form of physical preparation before skiing is advisable to avoid midday lack of energy, that uncomfortable second day soreness, or worst the dreaded ski-week-vacation, mid-week burnout. Don't despair; you can avoid being a ski-slope wimp or wimpette without having to spend a huge hunk your hard-earned bucks on fancy equipment or having to devote a major part of your life slaving away in some sweatshop gym.

If you regularly work out with machines or weights, concentrate on your quadriceps and body core a little more, 4 to 6 weeks before your skiing starts. For those who get little active physical exercise, some pre season walking, swimming, bicycling or playing an active game like tennis will help prepare you for the slopes. I recommend supplementing that with a couple of more ski-oriented exercises.

Skier's Throne - One of the oldest, most used and simplest ski oriented exercises is the skier's throne. This exercise is shown in the following illustration. You stand an appropriate distance from the wall so that when you bend your legs and lower your rump, your upper back will lightly touch the wall and your thighs will be a little above parallel to the floor. Let your arms hang down, don't try and hold yourself up with anything but your thighs. Think of it as sitting in an imaginary chair with the wall as your

chair back. Do the exercise every-other day or evening because it takes about two days for the rebuilding of muscles tissue, necessary to build muscle strength and endurance, after the breakdown that occurs in an exercise session. Start out in the imaginary sitting position and time yourself until your thighs start to burn and add 5 seconds to your next session two day later.



Don't wait until just a few days before you start skiing. You want to begin doing the skier's throne early enough before your first skiing so that by adding 5 second on alternate days or evenings you will reach somewhere between three to five minutes depending on your dedication and motivation. Continue doing them through the ski season to maintain your muscle tone. This does not take much time and can be done anywhere. My being an active tennis player, and doing the skier's throne and some simple half sit-ups and crunches are really the only physical activities I do to prepare for skiing. If you do nothing else, I strongly recommend that you at least spent some pre season time building-up your quadriceps strength with the skier's throne. If you don't do any quad exercises, once you experience the benefits of the skier's throne on the ski slope, I doubt if you ever will go skiing again without preparing by doing the throne or some other quad exercise.

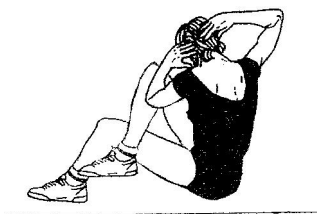
Skier's Lateral Hop - Another good but more dynamic and taxing exercise, for the dedicated with no serious knee, ankle or foot problems, is the skier's lateral leg hop from side to side over a short object or line on the floor. This is shown in the following illustration. This can be done by hopping off both your feet, hopping only with your outside foot on each side, or doing short periods of each. Lateral leg hops not only improve your strength and endurance but also improve your balance. Time yourself the first time and stop when you get somewhat winded. Like for the throne, add five seconds on each alternate night you do the hopping until you reach one-and-a-half to three minutes. People who are more serious about their preparation do the skier's throne one day and the skier's hop the next day.



Jump Rope - Another tried-and-true, effective and simple exercise, not requiring elaborate equipment, is one-person rope jumping. Rope jumping is one of the major exercises that boxers have traditionally used to reach their extreme level of fitness. You can hop repetitively on only one leg between rope turns (as the rope jumper in the next figure is doing), you can simultaneously hop on both legs, or you can sequentially hop on one leg then the other. My suggestion is to start with one leg until fatigued, then the other leg, and then switch to two legs. Working yourself up to two to four minutes will do wonders for your conditioning.



Half Sit-Up And Crunch - The next body area to consider in preparing yourself for the ski season is your core or torso area. I recommend you do some form of core exercise. You use your core to bring and maintain your upper and lower body into alignment and balance. The core is also the connecting link between your upper and lower body in making rotational movements during turns. With the idea that we want to keep it straightforward but not as strenuous as a full sit-up, and also not require special equipment, the simple half sit-up and crunch exercise fits the bill. Lay on your back and slide your left foot toward your rump so your thigh is about 45 degrees to the floor and then cross your right leg over your left (as shown in the following figure). With your hands behind your head, lift your shoulders and upper body and touch your left elbow to your right knee (as the woman in the following figure is in the process of doing). Lower your shoulders and upper body and repeat until you feel some side and stomach tightness. Again repeat the process by reversing the leg positions and the elbow that you touch your knee with. Gradually increase the repetitions until you can do twenty to forty on each side.



A little time and effort physically preparing for the ski season will allow you to ski longer distances and more vertical on a given run before needing to take a thigh-burn or catch-your-breath break. In addition you will be able to ski longer each day and more fully enjoy what we all agree is the ripping fun of skiing. You also will feel stronger and more confident. I believe you will find some conditioning well worth the effort before your next ski vacation. So PSC, what do you say? Let's all hit the slopes better physically prepared to more fully enjoy your skiing this season.

SECTION 6 – ALTITUDE SICKNESS

Altitude sickness is not a problem for Eastern U.S. skiing, but has occasionally been a problem for some PSC (Peninsula Ski Club) skiers at the higher altitude of some Western U.S. and Canadian resorts. Altitudes that can cause problem are in the vicinity of 7,000 feet (2,134 meters) or higher. Altitude sickness is the body's reaction to having less oxygen molecules available to the lungs in a breath of air at higher altitudes. The more pronounced dehydration, because of the higher rate of water vapor lost from the lungs at higher altitude, can also contribute to the symptoms of altitude sickness.

The symptoms of mild to moderate altitude sickness include one or more of the following: headache, fatigue, stomach distress, dizziness, sleep difficulties, rapid heart rate, and shortness of breath with exertion. About 20 % of people that go from sea level to between 6,300 and 9,700 feet moderately experience at least one or more of the symptoms of mild altitude sickness. Normal symptoms usually manifest themselves 6 to 10 hours after going to higher altitude and generally subside in one or two days. However, healthy athletic people, with good lung capacity will sometimes experience a heart irregularity after 1 or 2 days, if they start off skiing hard with the same hydration normally use for lower-altitude skiing. This is due to the increased evaporation rate from your lungs at high altitude. Sleeping the first night at a lower intermediate altitude is a regularly used technique by mountain climbers to acclimate themselves to higher altitude. Unfortunately the typical arrangements of most ski trips don't permit this.

When arriving at high altitude, the body will start to produce additional red blood cells to help absorb more of the available oxygen. The body's acclimation to the higher altitude's reduced oxygen generally takes 1 to 2 days. To reduce the likelihood of any altitude sickness symptoms, it is best to avoid very strenuous activities within the first 24 hours at high altitude. Postpone your high-speed descent down the double diamond chutes or moguls until your second day. The prescription drug Acetazolamide has been found to speed the body's acclimation to high altitude and help reduce the symptoms of

altitude sickness if taken 24 hours before going to high altitude and continued 1 to 2 days while there. A common dosage is 125 mg. taken morning and evening.

Any PSC skier, who has experienced some altitude sickness in the past, and is going to a ski resort with a base altitude over 7,000 feet should take some sensible precautions. Start by getting a prescription for Acetazolamide from your doctor. Many of our skiers take off the third or fourth day of a 6-day ski week to shop or rest. If you have reason to believe you are susceptible to altitude sickness, I suggest you take the first day off instead of in the middle of the week. Assuming you arrive late afternoon or evening before the first ski day, taking the first day off allows about 36 hours for your body to acclimate to the altitude before subjecting it to the rigors of skiing. Good hydration, walking some and light activity during that first day is better than sleeping because respiration decreases during sleep, thus exacerbating the symptoms of altitude sickness. At high altitude it is important that you hydrate properly and bring water with you to drink on the slope when you do begin to ski. If susceptible to altitude sickness, it is a good idea to avoid tobacco and alcohol and other depressant drugs including, barbiturates, tranquilizers, and sleeping pills, especially during the first 2 or 3 days. These depressants further decrease the body's normal reduced respiration during sleep, which could worsen the symptoms of altitude sickness. Also avoid or go light on caffeine because of its dehydration characteristics. Taking into account that the body's acclimatization process to altitude is inhibited by over-exertion, dehydration, and alcohol and other depressant drugs, you should be able to enjoy higher altitude skiing if you take the above sensible precautions.