

# RACE COURSE TACTICS

Course Inspection - Take the time to become familiar with a course before running it. The goal is to look for sections that need to be prepared for to ski well, and sections where speed can be picked up.

Pay attention to:

## Terrain

- Slope of the terrain, such the steepness or flatness of the hill.
- Terrain changes – from flat to steep or from steep to flat.
- Bumps or knolls.



## Course Set

- Location of the first gate out of the start.
- Distance between gates.
- Gates that require rounded turns.
- Gates that require less turning.
- Thru gates.
- In Slalom – hairpins, elbows, and flushes.
- Fall away gates (slope slants away to the outside from the gate location).
- Gates on knolls.
- Where to set up for difficult sections of the course.
- Straighter sections that could be tucked.
- When to drop into a tuck for the finish.
- The straightest line from the last gate to the finish.
- Stopping room in the finish area.

## Snow Conditions

- The firmness of the snow.
- The likelihood of ruts being formed by previous racers.
- Icy gates.

## After inspection:

**Simplify** - Simplify your evaluation. On a 30 second course there may be 3 or 4 sections that may require more attention to set up for and ski well.

**Visualize** - From memory, try to visualize the course. Practice skiing it in your mind or imagination.

**Visualize the whole course or just visualize certain sections.** It may help to close your eyes to do this.

**Re-inspect** - On race day, inspect again and verify or adjust your initial evaluation. Visualize skiing the course again.

**Don't over-think** – Some racers ski better if they don't get wrapped up in too many details. At some point, a racer has to trust in themselves and just go for it!

## Breathe

When the mind is under pressure to perform in competition it is not uncommon for people to “tense up” and take shallow breaths. Yet, ski racing demands a lot of energy from the body and needs to be replenished with oxygen while skiing in the race course. The best way to get yourself to breath better is to exhale. If you forcefully exhale, your body will naturally breathe in again. Try exhaling every turn down a course and see if it doesn't keep up your energy level better.

## Start

Set Up: Ski poles set in front of the wand.  
Shins positioned up next to the wand.

Get Ready "Go!"



1 – Coiled.



2 – About to step onto the left foot.



3 – Step on the left foot. Extend back the right foot.



4 – Extend back the left foot. Body straight.

1) Flex down or coil the legs.

2) Rise up and step on one foot.

3) Immediately extend back the other foot and lean forward out over the poles, using poles for support. The body should start to straighten out.

4) Immediately, the other foot should extend backwards, also. The starting wand has not been tripped yet.

5) Push forward with the arms on the poles, and bring the legs forward, with as much force as possible.

6) Make a powerful skating step towards the first gate.



5 – Push forward.



6 – Skate.

## Be the Fastest to the First Gate

Successful racers have said, "The best way to win a race is be the fastest to the first gate, and then be the fastest to the second gate, and etc. all the way down the hill."



Push out of the start as hard as you can and make two or three strong skates to the first gate. If the slope out of the start is very flat you may want to skate more. If it is steep, one or two skates may be all that is needed.

If your competitor gets to the first gate a half second before you do, you will have to play “catch up” the rest of the way. If you ski equally well down the rest of the course, you will not win. You will have to ski better than your competitor just to tie them, let alone beat them.

Be super aggressive out of the start. After reaching the first gate, you can tell yourself: “Breathe, relax, ski smooth, and stay forward.”

### Look Ahead



“Look ahead!” If a racer were to pick one thing to think about while racing, this might be the best. Looking ahead helps to ski a better line, handle terrain changes better, and navigate ruts and ice better. By looking ahead, the course will surprise you less. You can ski the course the way you planned, rather than getting bounced around by the course. By looking ahead, you will execute turns better, lessen mistakes, and achieve faster race times.

In slalom, you should be looking at the exit of a flush when you enter it. You should be looking at the exit of a hair pin as you approach it. In any course, before reaching a transition from steep to flat, you should be

adjusting your line and turn shape.

Ski racing usually involves travelling at a high rate of speed, but by looking two or three gates down the hill, you won't feel as rushed.

An entire practice of running gates could be devoted to looking ahead several gates down the hill while skiing the course.

### Efficient Turns – Understanding Gravity and Centrifugal Force

A turn could be broken up into three phases or parts:

1) Initiation phase or top part - Centrifugal force has the least effect in this part of a turn. It is the easiest part of a turn to carve, with the least amount of external force exerted on a skier to cause their skis to skid.

2) Fall line phase or middle part - Gravity exerts a strong pull on a skier in this phase. This phase has the greatest potential for acceleration of speed.

3) Completion phase or bottom part – Gravity and centrifugal forces combine in this phase to exert a strong force on a skier as they ski across the fall line. Because the forces are combined, this phase has the greatest potential for a skier to skid and scrub speed.

Genevieve Simard



Initiation Phase

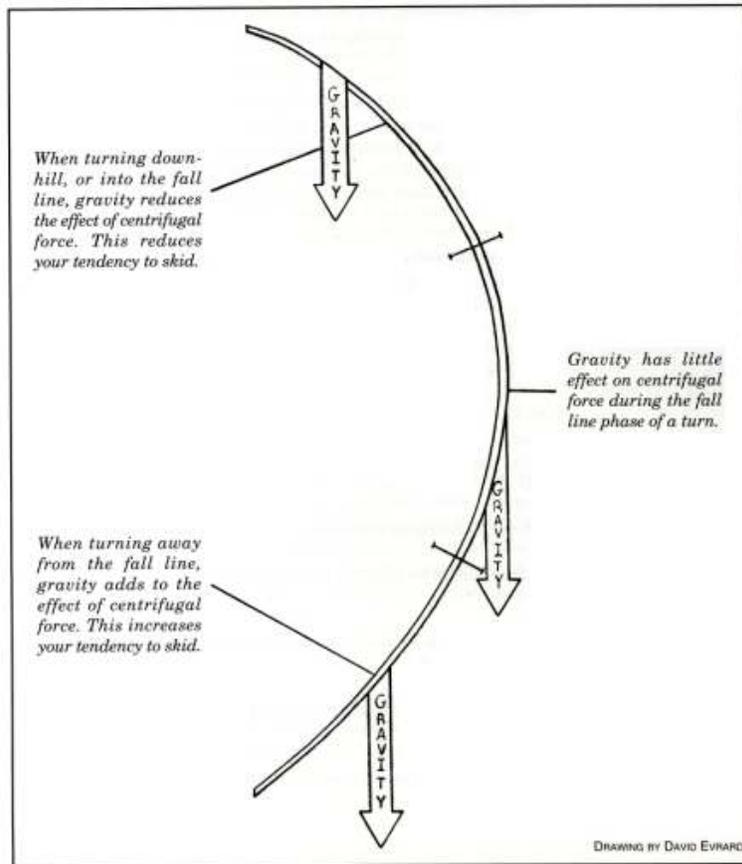


Fall Line Phase



Completion Phase

Gravity and centrifugal force in three phases of a turn:



**HOW GRAVITY AFFECTS A SKI TURN**

Understanding these forces in a turn leads to the conclusion that it is easier to carve a ski without skidding in the top of a turn, than it is in the bottom. As a result, many skiers try to make “**comma turns**”. A comma turn resembles a comma in its turn shape. The radius is tighter at the top, but gradually increases as the turn progresses. In a comma turn, more direction change takes place at the top of the turn than at the bottom.

A comma turn is in contrast to the “**J turn**”. The shape of a J turn is relatively straighter at the top, but quickly tightens its radius in the bottom phase. The J turn, was more popular years ago. It was used on the premise of going straighter at the gates in the top of a turn, to gain more acceleration. However, the tendency was to also skid more in the bottom part of the turn, and lose speed.



Comma Turn



J Turn

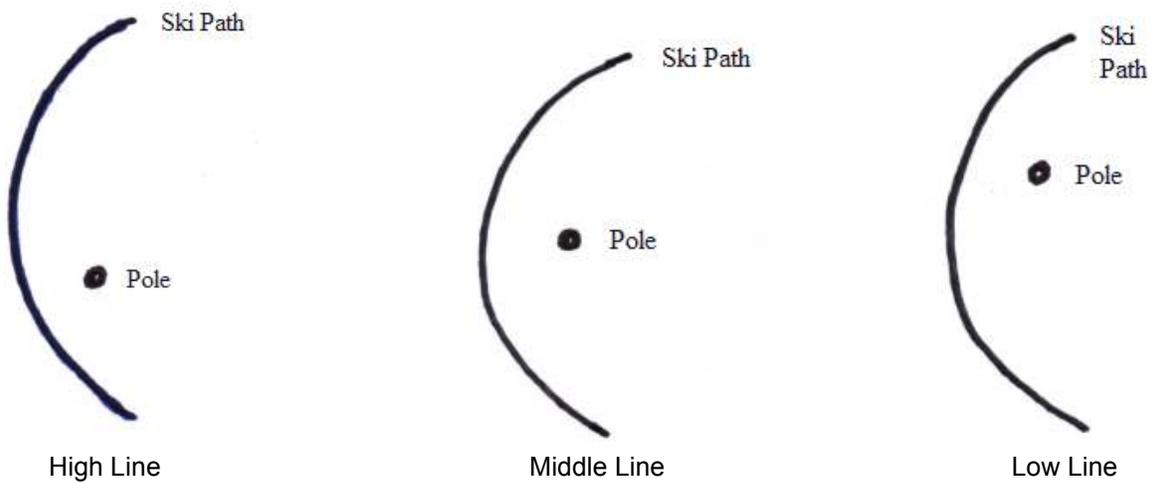
In ski racing it is more important not to lose speed, than it is to gain speed. It is more efficient and faster to maintain speed once gained, than it is to continually slow down and speed up all the way down. Speed once scrubbed has to be gained all over again. Additionally, because skidding forces are strongest in the bottom phase, relying on making the greatest amount of direction change in this phase, increases the risk of instability and falls.

Putting skis on edge early in a turn and getting “upside down”, helps a skier to accomplish more of their direction change on a clean edge before they reach the bottom phase. To the right, Thomas Grandi is shown putting his skis on edge in the upper part of his turn.



### Line

The fastest line or path skied on clean edges usually wins the race. Line is the path skis travel as they move through a ski course. As racers ski around gates or poles on a course their path could be described in one of three ways:



The high line is usually the preferred line and means that about two thirds of a turn is completed by the time a racer passes the pole.



In the pictures above, the racers have completed about two thirds of their turns as they pass the gate.

Theoretically, if all turns are made equally well it should not make a difference which line is taken. But there is a difference between theory and practice.

1) A high line leaves a racer with a bigger margin for error. If a racer encounters trouble in a turn due to poor snow conditions, poor turn execution, or bad timing; a high line leaves more room to get across the hill to the next gate with a greater angle of descent. Encountering trouble on a low line could mean having to turn the skis up hill more to get to the next gate, resulting in a loss of speed. When the slope is steep, a high line is even more advantageous, as errors are magnified.

2) Because a straighter line is faster, racers try to ski close to the poles. A higher line usually has a passing angle that enables a racer to get closer with less disturbance to their body and skis. Racers on lower lines tend to jam their edges more as they brush gates, slowing them slightly.

3) Sometimes gates are set on a knoll, where the terrain below a gate gets steeper and the skidding force increases. If a high line is skied, most of the turn will be completed by the time the gate is passed. This allows a racer to cut across the steeper slope towards the next gate with less turning.

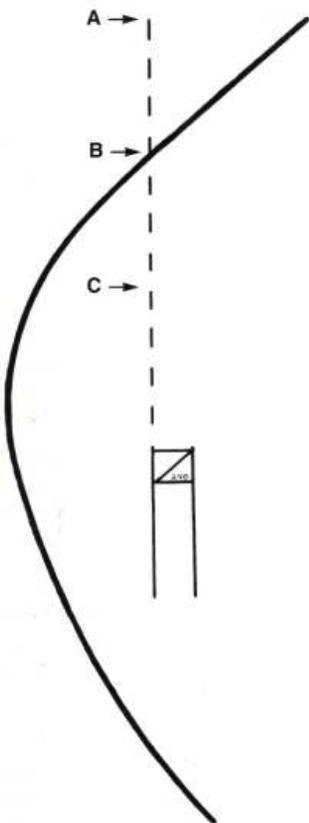
Top level skiers who can carve tighter arcs efficiently can ski more of a middle line as they have the skill to ski this line consistently well. On flatter sections of a course, the middle line is usually considered to be faster than a high line.

If a racer falls behind on a course they may find themselves on a low line. The goal, when this happens, is to get back on a higher line. However, this doesn't always need to be accomplished all in one turn. Doing so might mean slamming on the edges, and scrubbing a lot of speed. If possible, don't fight a low line. Progressively, get a little higher with each succeeding turn.

### Rise Line

A challenge in ski racing is to adapt to continually changing conditions and still ski a fast or efficient line. On a race course every turn is different. Snow conditions, terrain, course set, and speed are constantly varied. Different racers, also, have different abilities. Not every racer will choose the same line, or have the skill to ski the same line. A racer must make split second decisions about their line, as they are moving quickly down the course.

Because of all these variables, it is impossible to definitively say what the "best" line is. However, the "rise line" concept applies well to a majority of racing turns.



The following is a quote from "The Athletic Skier" by Warren Witherell:

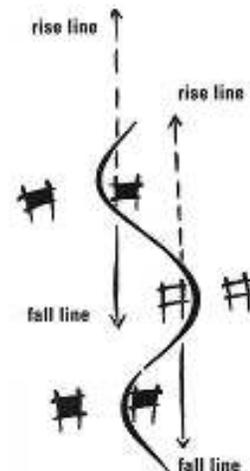
"When Diann Roffe won the World Championship Giant Slalom in 1986, she was an 18-year-old senior at Burke Mountain Academy. When we study films of that race, it is clear that Diann skied a more efficient line than the World Cup veterans whom she beat. It was a line she learned from her Burke coaches. When Diann won the Silver Medal in Giant Slalom at the '92 Olympics, she was still adhering to that classic line. Approaching the '94 Olympics, she says: "Despite all the changes in skis, technique, and course-setting, the rise line concept still works.""

The rise line concept is used to determine where to start a turn on a race course. The rise line is an imaginary line that extends directly uphill from a turning pole. The idea is to start a turn when crossing that line. (Start does not mean edge change, but rather the point at which already edged skis become pressured and start carving an arc.)

#### Diagram on left

- A = High line location on the Rise Line
- B = Turn location on the Rise Line
- C = Low line location on the Rise Line

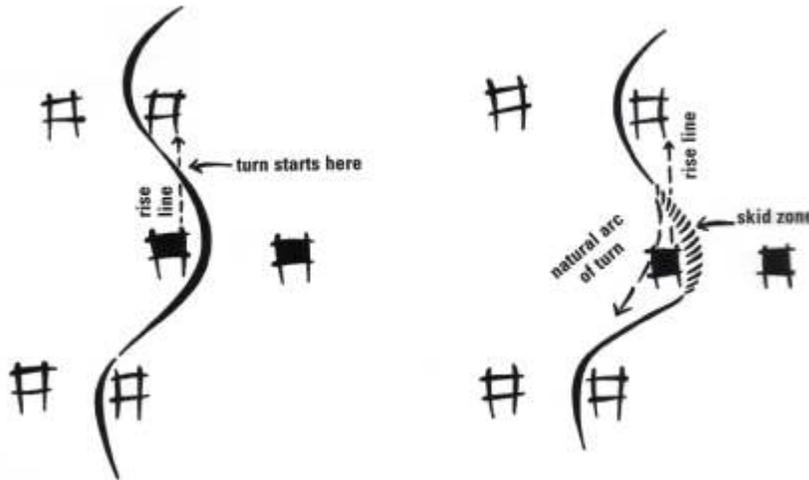
At the right is another diagram showing the Rise Line in Giant Slalom gates.



Many racers have to discipline themselves to wait for the rise line. Due to the speed and difficulty of a race course, a racer's instinct can be to turn their skis toward the next gate before reaching the rise line. Racers also do this if they are being overly aggressive or have been trained to "turn early".

The problem with starting a turn before reaching the rise line, is that a racer's skis could turn inside the gate before reaching it. If this happens, the racer is forced to skid, as an adjustment to allow their skis to move farther outside and go around the gate. Then, when they pass the gate they must jam on their edges to get themselves moving back into the direction of their intended turn. This results in a loss of speed and a lower line going into the next gate.

Racers who wait on the rise line can carve aggressively and carry more speed on a carving ski below the gate.



Turn at the Rise Line

Turning before the Rise Line

Kristian Saile, a coach for the US women's ski team in 2010 said the following regarding the rise line concept:

"We would paint blue lines in GS and slalom vertically above the gate and below the gate. While running the course the athletes were tasked with waiting for the blue line before starting the turn and being completely released off the outside ski as they crossed the blue line under the gate. These drills if done properly will help put the turn in the correct place as well as provide space at the gate to be strong.

Along with the patience for the rise line, the concept of not skiing too high of a line was critical. On average most athletes seemed to be running an entirely too high of line. We tasked the athletes with pushing the line down the hill and running a low apex as well as a direct line towards the next rise line. Just by playing with the line we would see variations of up to 2 seconds in some athletes in a 40 second GS. This was with the top juniors in the country. Proper tactics can singularly find the most time for an athlete in a course."

To read more of his comments: <http://boyneracing.com/2010/02/12/interview-kristian-saile-us-ski-team/>

The only way to cure turning too early or heading too straight at the gates is to delay the start of turns. Wait for the rise line.

There is a difference between skiing a high line and turning too early. Turning too early means starting a turn before reaching the rise line above the gate.

## Terrain Transitions

### 1) From Flat to Steep

**Body Position Change** - When a slope changes from flat to steep a racer needs to be ready to adjust their body position. The racer needs to dive or drive forward with their head, upper body, and hands at the moment of transition. This needs to be an aggressive action. Otherwise, the racer could quickly find themselves sitting back, turning late, and possibly skiing off course. The racer also needs to maintain this forward body position down the rest of the steep.

**Speed Consideration** – Occasionally, when approaching a steep from a flat, and carrying a lot of speed, and the following steep looks to be especially challenging; it might be a consideration to quickly check skis sideways to dump a little speed. This could reduce the risk of blowing out of the course on the steep. Speed on a steep can be regained quickly. This would be a strategy to finish the run and place well, rather than go “all out” to win.

### 2) From Steep to Flat

**Body Position Change** - When a slope changes from steep to flat a racer needs to move their body up and forward before the transition. Being up and forward helps to be prepared to absorb the downward and backward compression force that will be exerted in the transition. In the transition, absorb the compression by flexing the legs and keeping the arms forward.

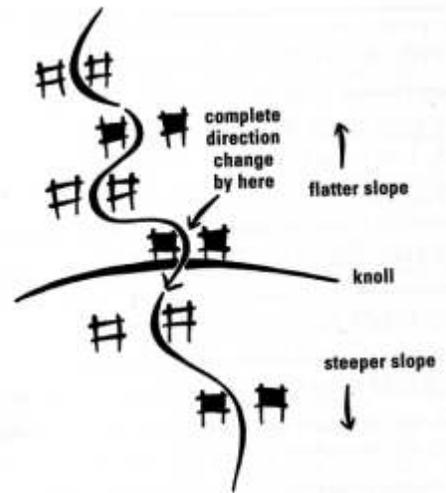
**Speed Consideration** – A steep to flat transition is very important because the racer who can “carry” their speed from a steep onto a flat, gains a significant speed advantage. Two or three gates preceding a flat a racer should try to ski a high line. This will provide for the steepest possible angle of descent onto the flat, and thereby maximize speed. A racer also needs to be clean on their edges, to avoid scrubbing speed right before the flat.

### 3) Gates on a Knoll

One way to ski a gate that sits on a knoll is to take a very high line and try to complete the turn before the knoll, and then absorb the knoll by flexing the legs. This strategy is depicted in the diagram to the right:

Another way to ski it is not change the line. Rather, when skiing over the knoll, allow the legs to come up higher and out to the side of the body, while the hips drop low to the snow. After passing the top of the knoll, press the legs back to the ground to maintain snow contact and finish the turn. (see below)

Practice both ways, and evaluate the differences.



1 Approaching knoll.

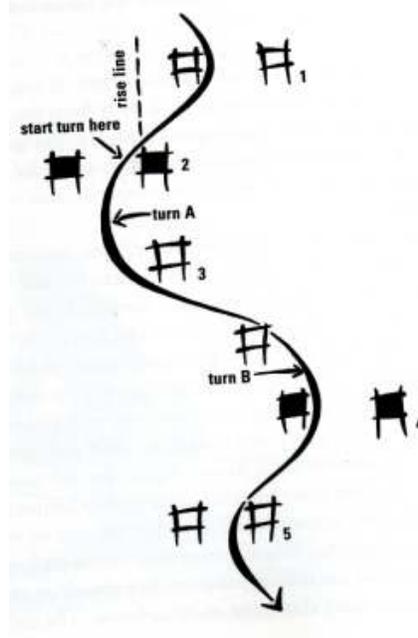
2 Legs come up to the side and hips drop.

3

4 After knoll, press legs down.

## Thru Gates

Thru gates (also called delay gates or under gates) are non turning gates that are set in a course. They usually dictate a shift in the course line moving across the hill, or a change in the rhythm of the course. Below is a diagram showing how a thru gate could be skied.



## Cross-blocking

Cross-blocking in a slalom course is when the outside hand is used to "clear" a gate or block it out of the way. As a racer gets their feet closer to the base of a slalom pole, and their body moves laterally to the inside of the slalom pole, this becomes necessary. Getting feet closer to the slalom poles means a straighter or faster line for the racer. But in order to keep from getting hit in the face by the slalom pole, or some other part of the body; the outside hand is used to block it.

Look at Ryan Semple and Ivica Kostelic below. Their upper bodies are to the inside of the slalom poles and their feet are close to the poles.

Ryan Semple



Ivica Kostelic



Young racers can learn to cross block by doing the following:

1) Learn to put their skis on edge in turns. With edging and carving comes stability and confidence. Until a skier feels secure under their feet, they will feel insecure getting close to poles. The more edge, the more secure a skier will feel.

2) Learn to get “upside down” at the top of turns. The more the hips or upper body move to the inside of a turn, the easier cross-blocking is. If the feet are far away from the base of a pole and there is little inward movement of the body, cross-blocking is difficult. This is because a skier would have to reach across their body with their outside hand to block the pole, causing a rotation of their upper body and skidding of their skis. This is unstable and slow.

3) Run a slalom course set with stubby gates. This allows a skier to practice getting their feet closer to the poles without having to think about (or be afraid of) blocking the poles.

4) Run an easy slalom course holding ski poles horizontally, in both hands, out in front. Ski close to the slalom poles and block them with the crosswise held ski poles. This drill helps skiers become comfortable making contact with the slalom poles, before actually doing it with each individual hand.



On the left the skier holds both ski poles crosswise, and uses them to block slalom poles.

5) Diamond Hitch Drill – In a practice course, set stubby poles for all turns made with one foot, and full length poles for all turns made with the other foot. Running this course allows a skier to practice cross-blocking one hand at a time.

6) Angled Gate Drill – In this drill, slalom gates are set in the snow at an angle across the skier's path. This course set helps teach cross-blocking without having to reach across the body to block. If done properly, the ski pole should come to the hand, rather than reaching over for it. It also makes it easier to focus on cross-blocking, without having to pay as much attention to getting the feet close to the slalom poles, or having to get the body to the inside.



Diamond Hitch Drill



Angled Gate Drill

4) Half-and-Half Slalom - Set a slalom course with alternating sets of 3 regular slalom poles followed by 3 or 4 stubby poles. This allows a skier to practice cross-blocking for a few gates, then have a break, followed by practice again, and then have a break again, etc.

## Slalom Flushes

Ski a line as straight as possible in a flush. There is no need to overturn. Think of a flush as an opportunity to gain speed by taking a straight line.

Some racers will cross-block with one hand for all flush gates.

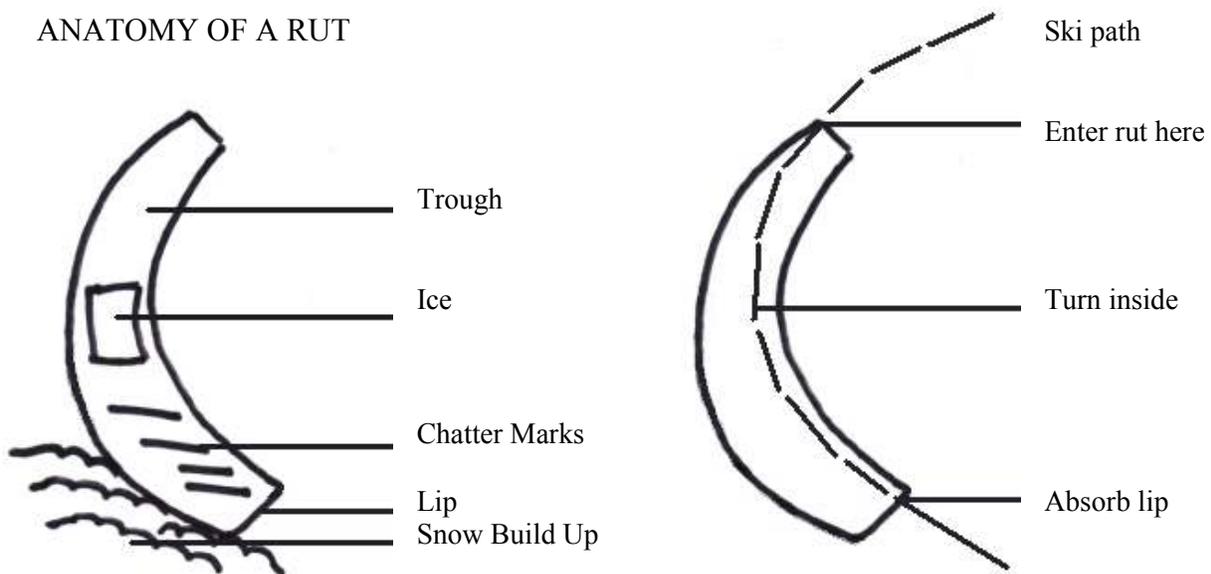
In the last gate of the flush, put the skis on edge and break out of the straight line towards the next gate.



## Skiing Ruts

Learning to ski ruts is an important skill in racing. Sooner or later every racer will ski a rutted race course. While certainly more challenging than a smooth groomed course, with the proper approach, a rutted course can be skied fast without blowing out of the course or falling. A rut is a trough that gets dug in the snow by numerous racers, making turns in the same spot on the course, one after another. Ruts often have chatter marks in the lower portion of the rut. Chatter marks are ridges or ripples in the snow surface, which can run across the line of travel and cause skis to bounce around and lose snow contact. Ruts may have a lip at the end of the rut that can cause a racer to launch into the air, if not absorbed. Ruts can also have ice in the middle of the trough.

### ANATOMY OF A RUT



The proper approach to ski a rutted course is to ski the ruts rather than the gates. In other words, pay less attention to the poles or gates and pay more attention to the ruts themselves.

1) Ski a wider line and enter a rut at the very top and on the outside of the trough.

2) Cut across to the inside of the rut, and exit the bottom on the inside of the rut.

a) The path on the inside of a rut, in the lower half, will have less ice and chatter marks, than the path towards the outside.

b) By skiing this path, more of the turn will be completed by the time the lower portion is reached. This means less centrifugal skidding force to deal with on ice or chatter marks.

3) Absorb any lip at the bottom of a rut by retracting or flexing the legs.

4) In very soft snow ruts can become deep. In this case, treat ruts like a toboggan run. Ride the outside of a rut a little longer with almost all your weight on the outside ski. Then, move to the inside and be prepared to absorb the lip.

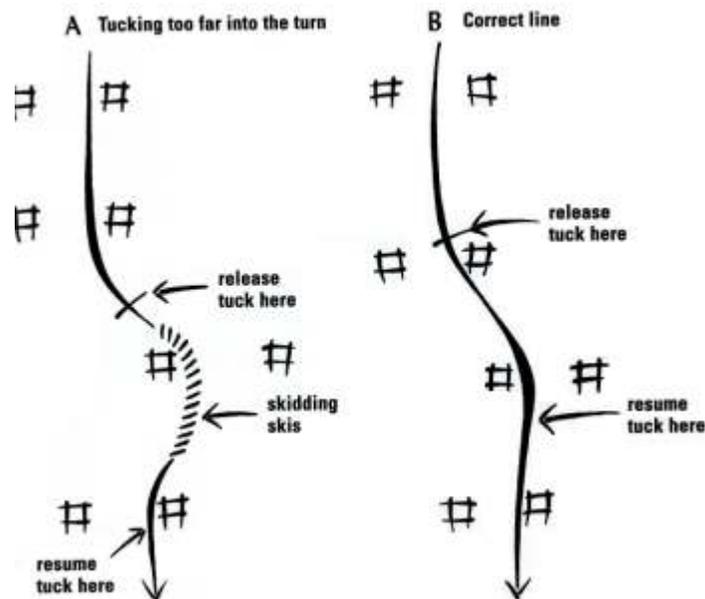
5) Occasionally, ruts left by lesser skilled racers will be wide of the gate. In this case, a better skier may be able to avoid the rut entirely by skiing to the inside of it.

### Tucking

Tucking is used in easy sections of a course, where little direction change is required in turns or the course is straight. The tuck position decreases wind resistance and allows for an increase in speed. In speed events, the tuck is used extensively. In slalom, the tuck is practically never used.



Avoid using a tuck in turns where a skidding ski can result, or the initiation of the next turn can be delayed. While long radius turns or shallow turns, made in a tuck, can be very effective; it is difficult to make sharp turns in a tuck that are clean. Also, changing edges between sharp turns is less dynamic, while in a tuck. These limitations mean that skidding skis and a lower line can result from using a tuck in sharper turns. A skidding tuck is always slower than a clean turn made in a regular skiing stance.



The above diagram shows that releasing a tuck too late before a sharper turn in a course, can result in a delayed and skidded turn.



Low tuck

High tuck

The low tuck is used when the course is straight and the terrain is smooth. The high tuck is used in long radius turns and over bumpy terrain where flexibility is needed in the legs to absorb the bumps.

### Stivot

The “stivot” is a tactic of pivoting the skis at the very top of a turn, usually on tight gate that is set on a steep. After pivoting the skis in the top part of the turn, the skis are put edge and carved through the completion phase. The stivot allows a skier to change the direction of their skis very quickly and with a tighter line than a pure carved turn. A pure carved turn on a steep could require a wider, rounder line to execute. The stivot is slower turn than a pure carved turned because it involves some skidding. But, it is also faster because it takes a shorter line. Because the stivot is usually utilized on a steep section of the course, any speed sacrificed by skidding is quickly regained.

Carlo Janka – Up un-weighting into a “stivot” turn.



Frame 1 – Shifting more weight to the inside ski. Frame 2 – Stepping up onto inside ski. Frame 3 – Up movement from step causes skis to become un-weighted. Frames 4 & 5 - Skis are pivoted sideways to the direction of travel. Frame 6 – Sliding sideways to the right. The next gate is just about to come into view from the right. (continued next page)



Frame 7 – Still sliding sideways. Frame 8 – Starting to engage edges. Frame 9 – Skis carving.

### Never Give Up

Skiing a “perfect” run is a great goal. Feeling like you “nailed it” is a great feeling. However, few runs are ever mistake free. Even World Cup ski races are won with ski runs that have mistakes in them. Sometimes, winners are not just great performers, but they are survivors.



Above is Lindsay Vonn in her first World Cup Slalom win at Levi, Finland. In her second run she made this mistake, getting back and then turning her ski totally sideways. She scrubbed all her speed, but kept on charging and won! What if she had given up?

### The Finish

The quickest path from the last gate on a course to the finish line, is a straight line down the fall line. Every hundredth of a second counts in ski racing. Tuck to the finish if possible. In slalom, skate to the finish if possible. Reaching forward to break the timing beam at the finish line is a tactic to shave off a little time.

