

# Agility Training for Junior Cross Country Racers

**By Chris Grover (U.S. Ski Team) and Rick Kapala (Sun Valley Ski Team)**

Agility is defined as "the ready ability to move with quick easy grace" (Merriam-Webster), and is an important element in the preparation and execution of every sport, cross-country ski racing included. In ski racing, agility (also referred to as balance and coordination) is crucial. Not only are ski racers attempting to deliver power to their skis and poles in order to achieve forward momentum, but are doing so in a dynamic, unstable and slippery environment: snow! This environment demands balance, the ability to shift the athlete's weight completely from ski to ski, and the ability to ride a flat ski. The importance of being able to master both skills simultaneously (apply power and balance) can be readily seen when top endurance athletes that lack ski-specific backgrounds attempt to compete in the sport (the Kenyans are a good example).

Ironically, many of our most talented young cross-country ski racers lack basic agility skills. Although some athletes come to skiing with a wide range of athletic experiences in their pasts, many athletes arrive with a decidedly endurance background. This background often is focused on endurance activities that the skier's parents enjoy: running, biking, cross-country skiing; all activities that are important for building base endurance, general and specific strength, and basic agility. However, these activities can not offer the wide range of agility skill development of sports like gymnastics, alpine skiing, soccer, and other team sports. This is why most coaches will suggest that a wide range of athletic experiences is so important in the development of athletes in any sport, and further that sport specialization should wait until the athlete has reached his or her mid-teens.

Why is agility so important to the development of cross-country ski racers? Over the years, we have observed that skiers with wide athletic backgrounds are able

to make technical adaptations much easier than those with decidedly endurance backgrounds. In short, they can quickly "feel" the technique change the coach is asking them to make. On the other hand, we as coaches have all dealt with athletes who struggle to make a change, and when they do make a small change, lack the body awareness to be able to sense the difference between the change and what they were doing before. These are the athletes that are so often frustrated by our technique suggestions. Agility training is also important for the development of neurological pathways that allow skiers to stabilize their mass while skiing (allowing them to relax and glide between power applications) and to react to sudden changes in their environment (getting pushed by another skier, uneven trail conditions, etc.).

U.S. Ski Team member Andy Newell is a good example of how a background in agility training can prepare an athlete for success in modern-day cross-country ski racing. Over the past several years, Andy has demonstrated that he is the fastest man in North America, winning almost every sprint prelim and setting a world record at 100 meters. This past season, as a first-year senior, Andy became the first North American male to qualify for a World Cup Sprint round of 16 in Europe. Andy's speed on skis however, does not come entirely from his ability to create pure speed (other USST members can beat Andy in a running sprint) but rather his agility or technical efficiency on skis. What Andy does so well (in both skate and classic techniques) is apply power and transfer weight to the gliding ski very quickly. Once he has transferred weight, he is also very good at relaxing and riding a flat ski. This quick power application and complete weight shift allow Andy to create speed while producing perhaps less lactate than an athlete relying on turnover or tempo.

What was Andy's athletic background? Andy grew up running (endurance), skateboarding (agility), and rollerblade racing (endurance and agility) among a host of other activities including skiing. Once in high school at the Stratton

Mountain School, coach Sverre Caldwell's training program included speed training (moving quicker than race pace in varied terrain) and strength training (general and specific) in most sessions. Andy's pre-high school agility skills background allowed him to get the most out of Stratton's speed work, since he spent less time trying to balance, and more time learning how to apply power faster and shift his weight fully from ski to ski.

If we can agree that agility training is important in the development of cross-country ski racers, then our challenge becomes inserting this training into programs that are already full of necessary training activities and simultaneously short on time. How does agility training fit into the training plan when we already need to address endurance, VO2max, anaerobic threshold, technique, speed, general and specific strength, etc and we are short on time due to the school, work, and home demands of the junior athlete? The solution is to find workouts that satisfy the above needs while addressing agility skills at the same time. Here are a few that we like:

### **Rollerblade Agility Course**

USST Coach Trond Nystad witnessed the German National Team using rollerblades extensively to work on agility this summer. Coaches set up all kinds of obstacle courses involving cones and sticks to facilitate strong lateral pushes (or kicks), quick turning, stepping, jumping etc. The possibilities are endless and creativity is all that is needed.

### **Rollerski Agility Course**

If you don't have access to rollerblades, use rollerskis instead. This is a workout that we have recently begun here in Sun Valley. The agility course is made up of cones on a large flat parking lot (that we have swept for rocks and other debris). The course is made up circles that the skiers approach in both clockwise and counterclockwise direction (to practice cornering on both sides) as well a slalom courses. Both the circles and the slalom courses are designed to be skied in one continuous loop. The athletes move through the course quickly and alternate

between using poles and not using them. As they become more proficient at the course, we modify it to become more challenging (tighten up the cones, etc.). A typical workout might include a solid distance warm-up and cool-down, and 3 sets of 3 laps of the agility course with no-pole distance rollerskiing in between sets. As with any rollerski workout, it is important that the athletes wear helmets, and that is certainly the case in this workout!

### **Spenst Training**

Spenst is a Norwegian word that translates loosely to "vertical jump". In ski training, spenst refers to training that is short and explosive in nature and designed to develop lower body power. Spenst training is characterized by short intensive efforts, high resistance (steep terrain), and complete recovery between sets. For those of you coaches that are familiar with spenst training, you may have noticed that the more agile athletes in your program do well at spenst exercises, while the less coordinated skiers struggle. This has led us to believe that spenst training must help to develop agility skills. This is especially true if you keep the stimuli changing (i.e. use varied and uneven terrain and rotate different exercises in and out of training sessions). Here are several spenst exercises that we like for building agility:

- 1.) Speed Skaters or Lateral Jumps: The athlete keeps his body perpendicular to the direction of travel (uphill). He then explodes up the hill by pushing off his downhill foot. As he lands, he crosses his downhill foot in front of his uphill foot and then explodes again off that foot. During each rep, the skier concentrates on staying perpendicular to the direction of travel and getting as far uphill as possible. He can add V2 timing with the arms to create a more ski specific feel. Have the athletes try different timing as well: exploding off only one foot or off both (creating a continuous movement pattern up the hill).
- 2.) Single Leg Hops (Extended Diagonal Position): Starting in an extended diagonal position (balanced on one foot with other foot extended naturally behind and the opposite arm reaching forward) the skier uses a powerful forward knee

drive to propel herself up the hill. She takes off and lands on the same foot, and is forced to pause and regain her balance between each explosive repetition.

3.) V1 Bounds: The athlete mimics the V1 skating technique without poles by bounding mostly laterally and little forward up the hill. Incorporate both right and left lead-arm timing and encourage the athlete to focus on a strong lateral push and moving as far as possible in each jump.

The possibilities are endless when creating a spenst workout. Try to keep some activities ski-specific and be creative with others. We like to use poles during some of the more ski specific exercises, and then drop the poles for other ones.

### **Spenst + Rollerski Speed**

This is a workout that we have recently begun doing here in Sun Valley and one that we think is very good for developing ski-specific agility and quickness in athletes. The idea behind the workout is to take the speed and explosiveness of spenst and transfer it to a more ski-specific activity (i.e. rollerskiing). Find a steep hill suitable for spenst with a good semi-steep section of pavement nearby. Run the athletes through a short spenst workout and focus on the technique that you will be using in the rollerskiing part of the workout (i.e. if you are going to classic rollerski, focus on classic bounding). Here is what a typical workout might look like:

- A.) 15 min easy warm-up run
- B.) Ballistic stretching
- C.) 20 min. spenst (classic focus)
  - a.) single leg hops, 3 sets x 8 reps (each leg)
  - b.) classic bounding w/out poles, 4 reps x 10 seconds
  - c.) double leg hops (frog hops), 2 sets x 7 reps
  - d.) classic bounding w/ poles, 4 reps x 10 seconds
- D.) Quick change into classic rollerski gear
- E.) Classic striding speed work (10 x 10 seconds uphill speed) with 2 min. recovery between each
- F.) 15 min. cool down rollerski

We really like the proprioceptive challenges that the athlete faces when moving from a static (the ground) to a dynamic (moving on rollerskis) environment. It's also a good place to show developing athletes just how important the ability to produce power on skis really is.

### **Rollerski Speed Work**

Since juniors don't get on rollerskis that often compared to seniors (perhaps 2-5 times during the week), it is important to make every rollerski session count. We think it is important to include some sort of speed work in almost every rollerski session. Since speed training makes its impact on the athlete's neurological development, and generally not his or her anaerobic development, including it often doesn't usually overload the skier. Remember to keep speed training short and to allow plenty of recovery, so that each effort is maximal. Besides reinforcing good neuromuscular development, speed training is great at improving agility by forcing the athlete to balance while shifting weight completely and applying a large amount of force.

When it comes to skate speed work, athletes often gravitate toward the V2 technique since it is the most centered and weight shift is less dramatic than that of V2 alternate. Challenge the athlete to get uncomfortable by having them V2 alternate in faster terrain in subsequent workouts. Make sure that the skier is swinging his arms from the shoulder and using a full arm-swing to propel him or her from ski to ski (i.e. shifting weight completely). Athletes also tend to struggle with V1 speeds in steeper terrain, where they often are not comfortable moving quickly enough from ski to ski. Pete Vordenberg's "Hot Feet" Drill is very useful here for teaching the skier how to get on and off the ski as quickly as possible. Once the athlete has begun to master this drill, they can then begin to add a complete kick.

In classic rollerskiing, many juniors are used to double-pole speed work, but struggle with striding and double-pole kick speeds. Athletes may not be able to maintain good body position or control the travel of their rollerskis when striding quickly. As you approach striding speed work with junior athletes, focus on maintaining good body position (the hips stay high) by encouraging the athlete to keep his or her stride length shorter at first. When double-pole kicking, encourage the athletes to make a full weight shift from ski to ski and to swing the hand forward very quickly (which will make the kick quick as well).

### **General Strength Training**

Another great way to challenge an athlete's agility and balance is in the weight room. Over the past few years, coaches, trainers, and rehabilitation specialists have recognized the paradigm shift in the gym from fixed-pelvis exercises to those that require a wider range of movement and stabilization of the core muscles. As a group, we've recognized the benefits of training dynamic movements, rather than focusing simply on individual muscles or muscle groups. The carryover to athletic performance has been obvious: athletes are not stronger simply to be stronger, but stronger in ways that translate to increased power delivery while in motion.

In the gym, there are endless ways to build strength while challenging the athlete's balance and coordination. The key is to be creative, to find exercises that train dynamic movements while requiring some degree of stabilization, and to keep some exercises sport-specific. Here are several strength exercises that we use here in Sun Valley:

- 1.) Dyna-Disk Squat: The athlete places his feet on two dyna-disks (inflatable pillow-like rubber disks which provide an unstable surface) and performs a standard squat. The skier will have to back way off on the load at first, until he

has a feeling for the balance that is necessary. Once he has gained stability, raise the weight and make sure movement is quick.

2.) Physio Ball Medicine Ball Throw: This is a classic and still one of the best exercises in our routines. The athlete sits on a Physio ball (Swiss ball, stability ball) and her partner throws an appropriately weighted medicine ball to her just above head-level. The athlete then reclines on the Physio ball and throws the medicine ball back to her partner using mostly her stomach muscles and only a bit of arms. Once the athlete has mastered the load and the stability, again look to see that the movements are quick before increasing the load.

3.) Bosu Ball Knee-Bends with Weight: The skier stands on one leg on a Bosu Ball (this looks like ½ of a Physio ball) or dyna-disk, foam roller, etc. and holds hand weights. He then performs deep knee bends. Again, once the athlete has mastered the stability, look to increase load, repetitions, or instability.

Athletes in many sports and certainly in the ski sports are recognizing the importance of this type of strength work. Many of our world-class alpine, cross-country, and freestyle athletes in this country can actually jump on top of a Physio ball and balance there (do not try this at home)! This type of skill highlights the importance of being able to stabilize the body's core enough to effectively apply power while moving quickly in a dynamic environment (snow).

These are just a few of many different ways to incorporate agility training into what we as coaches are doing with the athletes already. Other ideas include off-trail running and orienteering, plyometrics, etc. The key is to be creative with the design of workouts so that we ensure the development of "athletes" as well as cross-country skiers.

We'd love to hear your thoughts for workouts that might challenge a skier's agility. We can be reached at: [cgrover@ussa.org](mailto:cgrover@ussa.org)