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Stretching and Downhill Skiing

by Thomas Kurz

About a year ago I was interviewed by a freelance writer for one of the ski magazines. The interview did not appear in the magazine, but the first part of that interview was printed in the Winter 2006 issue of *Stadion News*. Here, in this issue, is the remainder of the writer's questions on stretching for skiing, along with my answers.

What specific stretches would you recommend for skiers?

Here are examples of stretches that can be done in a warm-up before putting the skis on. **By no means do I advocate stretching as part of a skier's warm-up.** I believe that a few deep squats with feet at various widths, a few trunk rotations, and a few circle push-ups give all the range of motion one needs on the slope. Nevertheless, if someone feels like including stretches in a warm-up, then here they are:

For legs and hips:

Hold a ski pole in both hands and step over it.

Leg raises or swings in the sagittal plane (front and back) and in the frontal plane (outside, like a side raise to stretch adductors, and inside to stretch abductors).

Flow from front lunge to side lunge with the foot of the extended leg pointing forward, then in the side lunge turn your trunk to face the extended leg (it is like the back stance or crouching stance of Wushu), then turn the foot of the extended leg so it points up, then back to normal side lunge, then flow into a low horse-riding stance, then lean forward (like a tuck with feet wide apart), then put one hand on the ground and sweep same-side leg behind the other and extend it to feel stretch in the outside of the extended leg (it looks similar to that phase

of breakdancing's leg sweep when one just jumped over the sweeping leg).

You can alternate sides in each stance or move through the whole sequence and then change sides. Gradually lower your hips in all stances. (If you do not know the stances I'm talking about, look them up in Wushu or Kung-fu manuals.) Stop for a few seconds at your greatest range of motion. You can add leaning and twisting of your trunk to stretch it too and to feel more stretch in your legs as you go through these moves.

For trunk and arms:

Hold a ski pole above your head with a wide grip and rotate the trunk (can be done with the ski pole behind neck); lean to sides (to feel stretch as far as the outer thigh), forward, and back (move slowly). Lean forward as in the downhill tuck, extend arms behind back, and look up.

Before a workout (in a warm-up), do not stretch to increase your maximal range of motion but rather move through your comfortable range. In the case of static stretches, move into and briefly hold extended positions needed in the main part of your workout. These positions require less range of motion than what you reach when you really stretch statically at the end of your workout. At the end of a workout, after its main part, is the time to stretch to increase ROM.

How should downhill skiers stretch in their warm-up?

First warm up by walking and then by running with some agility movements (side to side hops or jumps). Then do dynamic stretches such as leg raises before putting the boots on, then with boots and skis on do turns and twists in one spot. After skiing, while still on the skis, go

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down a very gentle slope, spreading legs wide and then bringing them together several times, which is similar to isometric stretches.

How long should a stretch be held?

For best gains in static passive flexibility, a relaxed stretch should be held up to 30 seconds. An isometric stretch may be held anywhere from a few seconds to a couple of minutes.

Do you do any downhill skiing? If so, how long have you been a skier, and where do you like to ski?

I do not downhill ski anymore. I did when I had to, most recently during my phys ed studies because it was compulsory.

During the winter, students like me had to attend a ski camp to learn skiing techniques and pass practical exams.

Can You Have Too Much Flexibility?

by Thomas Kurz

While in some sports more than average flexibility in all or some of the major joints is needed just for the execution of their basic techniques, in some others the reverse is true: The greater than average the flexibility of some joints, the worse the performance. For example, running economy has been associated with decreased flexibility. Stiffness of the calf muscles and Achilles tendon enhances “elastic energy storage and return” during every running step, and the small range of motion of external rotation in the hip reduces the metabolic cost of the muscular activity needed for stabilizing the pelvis during long-distance running (Craib et al. 1996). So, for long-distance runners, the greater the dorsiflexion of the foot and external rotation in the hip joint, the worse the running economy.

Even in sports that most people imagine require maximal flexibility, an athlete can have too much of it. Female gymnasts with symptoms of musculoskeletal disorders of the lower back can touch the floor behind their feet (when leaning forward in a standing position) farther than those without symptoms (Kirby et al. 1981). This may be caused by having weak or overstretched (inhibited by excessive stretching) hamstrings or muscles of the buttocks (Walther 2000).

In sports that stress overhead or above-shoulder arm movements, such as baseball pitching, javelin throwing, racket sports, butterfly or freestyle swimming, and Olympic-style weightlifting, athletes spend considerable time on stretching their shoulders. This stretching has to be done intelligently—not just pushing and pulling for the maximal possible range of motion. Forced stretching of the shoulder—past the point where you can move *using* the stretched muscles—can damage the capsule of the shoulder joint, leading to shoulder instability and pain (McMaster and Troup 1993; McMaster et al. 1998). This principle of not stretching past the point where you can move using the stretched muscles holds true for all joints, not just the shoulder.

In some techniques, above-average flexibility may pose problems other than increasing the likelihood of injury or making movements less economical. Coach

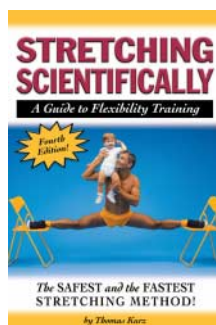
Obrebski, author of *Acrobatic Tumbling*, points out that while “in the aerial cartwheel and in the front handspring greater overall flexibility will help, in the back handspring, however, a great flexibility of the spine may cause one to perform it by bridging backward more than by jumping.” This robs the back handspring of its dynamic drive backward, which can be converted to increasingly higher and faster techniques for an impressive tumbling run. After the less dynamic back handspring, done more by bridging backward than by jumping, there is not enough momentum to bounce into a high somersault, for example. The error of bridging or bending back into a back handspring happens to some very flexible female gymnasts and can be very difficult to correct.

Coach Obrebski further notes: “Generally, in gymnastics and acrobatics [just like in all sports involving jumping—TK], an overly flexible body weakens takeoffs and rebounds because these elements benefit from high stiffness of the body. This is why acrobats have to work both on flexibility and on strength. Having the adequate range of motion, with stability and explosiveness, makes it easier to perform acrobatic techniques.”

Adequate flexibility or range of motion is such flexibility, which permits performing one’s techniques in the most efficient body alignment and without wasting energy on overcoming tightness of muscles and ligaments.

Excessive flexibility is such that one needs to exert an extra effort to maintain stability of one’s joints or even cannot actively stabilize one’s joints at near maximal range of motion.

For full references quoted in this article, see my book *Stretching Scientifically* (www.stadion.com/stretch.html).



Athletes and Disease

by Thomas Kurz

One of the coaches I correspond with sent me an article on causes of disease among dedicated competitive athletes. The article blamed the poor health of a large number of outstanding athletes on overspecialization, excessive training loads, and insufficient “maintenance” (means of speeding up recovery). Many examples of top athletes who were wrecked by their training were listed, too.

The coach asked me for my comment, and here it is:

Well-trained athletes are very versatile (i.e., are good at a wide variety of skills). Ball players are good at gymnastics and at other games; track-and-field athletes play ball games, know weightlifting as much as Olympic weightlifters, and also do gymnastics.

Their health problems arise not so much from overspecialization as from “pushing the envelope” (i.e., from exercising for records and not for pleasure). Their goals, and the pace of reaching for those goals, are set not internally but externally. Athletes train not to be the best they can be when good and ready, but when the meet is scheduled. Hence excessive training loads (volume, intensity, frequency) and not listening to the body’s and mind’s demands for adequate rest.

Some athletes are not good enough to achieve the level they are pushed for (i.e., they are not capable), and force-training them only overworks them. Others have the potential and could reach that level—if allowed to train at their own pace and not forced.

The most famous athletes of ancient Greece were products of spontaneous training, with very little externally imposed structure. A well-known example is Glaucus of Carystus. His strength was discovered while he was still a boy, when he was seen hammering in a plowshare that had dropped out of its place by the blows of his fist, without the help of a hammer. He went on to win one Olympic, two Pythian, eight Nemean, and eight Isthmian victories in boxing. (Note that spontaneity does not preclude being systematic. One can train systematically while spontaneously regulating frequency and content of workouts—that is, doing what one feels like

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doing, thus systematically staying in agreement with one's body and mind.)

A more recent example of spontaneous training: In his article "Steroid-Free Physical Preparation in Athletic Development" (*NSCA Journal* vol. 11, no. 6, pp. 34–37), Istvan Javorek tells about a wrestler and powerlifter Jozef Kovacs, who could wrap a steel bar of 5/8 inch diameter around his forearm into the shape of a coil spring. This strongman "started working out as a young boy bending narrow iron wires, gradually increasing the length and thickness of the wires. . . . He worked out regularly, *when he felt comfortable and when he had the desire. . . .* Most significantly, *he motivated himself, without being pushed by someone or something* other than the desire to be the strongest and the best."



. . . could wrap a steel bar of 5/8 inch diameter around his forearm into the shape of a coil spring

A quote from the book *Science of Sports Training*: "Athletic training and education should take into account the individual abilities, health, age, and sex of athletes. The coach's job is to know each individual athlete well and to adjust the means of training so each athlete develops his or her fullest potential."

To conclude: In the first half of the third century (A.D.), Flavius Philostratus, in the *Gymnasticus*, wrote that "the degeneracy of athlete" was caused by "the vicious system of training. . . . Trainers had . . . developed hard and fast systems of training which they applied indifferently to all alike, without any regard to age or individual requirements."

So, *nihil novi sub sole* (nothing new under the sun).

The More You Know, The Easier You Learn

by Thomas Kurz

Speed of learning and the ability to perfect movements depend on the size of one's stored experiences of movements ("movement erudition"). Yes, those who have more will get more, easier.

This is why well-trained athletes do a wide variety of exercises besides those that are sport-specific for them and practice techniques of other sports.

Such non-sport-specific or general technical training provides athletes with this movement erudition. Learning a sport's techniques is easier if the skills formed in the course of this general technical training are included in sport-specific skills (techniques). For example, a number of gymnastic techniques are used in the process of learning to pole vault or to figure skate.

To use gymnastic techniques to prepare for the pole vault, the athlete has to learn these techniques; to use weights for strength development, the athlete has to learn the technique of lifts; to use swimming to develop endurance or as active rest, the athlete has to learn swimming strokes. But there are more benefits of enlarging one's store of movement skills than just the positive transfer of some movement patterns to sport-specific skills or acquiring alternative means of conditioning. Movement coordination and the overall ability to learn and perfect movements also improve in the process of learning new skills.

The richer the athlete's store of movement skills, the more skills he or she can easily learn or change (Bompa 1994; Matveyev [Matveev] 1981).

Wazny (1992c) warns that not introducing new exercises may slow down the learning of new techniques. He gives an example of advanced, experienced athletes who for a long time settled into a routine of known exercises and had more difficulty

mastering new techniques than athletes of lesser standing who were continuously exposed to new exercises.

There are more benefits of learning new skills than just increasing learning capacity, better coordination, and positive transfer of movement patterns: There are also mental benefits if the new skills require considerable will or overcoming natural inhibitions, such as when learning somersaults. Resulting mental toughness and greater self-confidence help in every sport—actually in every endeavor.

Learning skills such as gymnastic vaults, revolutions on the bars, or tumbling, which to be performed safely need to be done decisively and without hesitation, develops courage and decisiveness as well as improves elements of coordination, such as spatial orientation and movement synchronization.

My professor of gymnastics told us in one of his lectures that, prior to World War I, gymnastic exercises, especially vaults, were used extensively in the Imperial German Army to train soldiers. This was because gymnastic vaults develop decisiveness needed for bayonet charges—once you decide to go (or are ordered to), you can't hesitate or you will get hurt.

Many coaches include gymnastic apparatus exercises and tumbling in their training programs. Athletes in a wide variety of sports practice gymnastic techniques so they can benefit from the improved movement coordination and mental qualities that such exercises develop.

For full references quoted in this article, see my book *Science of Sports Training: How to Plan and Control Training for Peak Performance* (www.stadion.com/science.html).



Back somersault—frame grabs from DVD *Acrobatic Tumbling: From Rolls to Hand-springs and Somersaults*

Q and A on TRAINING

Study these questions on training carefully. You may find information that relates to questions of yours. Question is in *italic boldface*.

■ *I'd like to have your opinion on an article by Jack Savage about the effects of exercise on growth hormone response. The article, quoting Bulgarian research on exercises used by Olympic-style weightlifters, lists exercise types in descending order as to amount of fitness-related hormones produced:*

1. *Exercises in which you move your whole body, or most of it (e.g., dips, squats, deadlifts, Olympic lifts, jumps, pull-ups, sprints). This type of exercise releases the most hormones.*

2. *Free-weight exercises in which most of your body mass does not move (e.g., bench presses, military presses, bent-over rows, curls). This type of exercise does not produce as great a hormonal response.*

3. *Exercises that are performed on a machine (e.g., pull-downs, leg extensions, triceps push-downs).*

4. *Isolation exercises (e.g., curls, triceps extensions, ab crunches). These exercises produce the least amount of hormonal response, whether done with free weights or on a machine.*

Look for the common denominators in the four types of exercise, and it all will make sense. These common denominators are (in any order and in any combination):

Power output (work divided by time)—

The greater the total power output of a given exercise, the greater its metabolic cost and the hormonal response to that exercise.

Metabolic cost (energy expenditure and protein degradation)—The more muscle groups used in an exercise and the greater the total muscle tension, the greater the metabolic cost of the exercise and the hormonal response to it.

Muscle mass—The more muscle groups used in an exercise, the greater the total muscle mass involved, the greater the metabolic cost of the exercise, and the greater the hormonal response.

Muscle tension—The more muscle groups used in an exercise, the greater the total tension values of the involved muscles,

the greater the metabolic cost of the exercise, and the greater the hormonal response.

So, Jack Savage's order of exercises descends according to any and all of these denominators.

■ *I am a green belt in Goju Ryu and have above-average flexibility in all of my joints; however, when I attempt mid-height forward thrust kicks (from a back-leaning stance), I experience pain and tightness in what I assume is my hip joint (near the groin)? I was examined by a physical therapist who suggested that weak hip flexors are the culprit, but stretching them doesn't seem to be doing much. I regularly do L-sits on parallel bars and L-sit pull-ups or hanging leg raises with absolutely no problem. Can you provide any advice?*

You write "a physical therapist who suggested that weak hip flexors are the culprit, but stretching them doesn't seem to be doing much." If by stretching you mean passive stretching (relaxed stretching), then I don't see how such stretching could do anything to strengthen your muscles. Passive stretching does *very little* to strengthen the muscles, and isometric stretching may be too much for weak hip flexors.

To strengthen your hip flexors you need to do resistance exercises throughout the range of motion (ROM) these muscles work during your kicks. Your L-sits apparently do not hit that whole ROM. Try exercises shown on the DVDs *Power High Kicks with No Warm-Up!* and *Secrets of Stretching*.

■ *How should a person breathe during stretching?*

Naturally, which means abdominally, and deeply. In relaxed stretches, imagine relaxation spreading through your body with every exhalation.

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