Basic Training 101:

Periodization Principles For Figure Skating

An Easy-To-Use Workbook

by Tom Zakrajsek

Preface

Before you begin reading this workbook, let me say its very title “Basic Training 101” is meant to suggest further exploration and inquiry on the part of the reader.

Having coached figure skating for 27 years, studied Physical Education at Missouri Western State College and completed my master’s work in Science with an emphasis in Exercise Science at the University of Colorado-Colorado Springs, I have endeavored to join the theory of periodization with its practical daily application in the sport of figure skating.

Though I have spent over two and half years on this project, I certainly do not claim to integrate every aspect of periodization theory into practical coaching tips. I wrote the book like I was having a conversation with a skating parent, skater or colleague. The table of contents highlights the main points but the details of the text provide very real practical examples about how to train to reach your goals. Please know that I tried to make the workbook visually appealing, easy to reference and most importantly easy to understand and apply. The subject order is not random and in part reflects my personal thought process. As you read you will notice many page references and the words, “as mentioned previously”. This reflects the fact that when dealing with a topic like periodization it becomes apparent that certain important points like volume, intensity, tapering, recovery or proper nutrition and hydration, etc. must be mentioned more than once and in different contexts.

I am aware that I have made choices (as all authors do) to go into extreme detail in certain areas and in others to provide you with merely a glimpse of information into a complex area of study. For example, on page 19 in the section on myelination I debated whether I should provide a picture or diagram of an axon or further clarify some of the language (i.e. saltatory conduction). It's always a difficult judgment call whether to include more detail or not when integrating so much information. Details and images nearly always aid understanding, but sometimes the detail gets pretty boring and does not apply to the daily work of coaches, one of the goals of this book.

Since many of us coaches know instinctively what to do when working with an athlete, but may be unsure of the specific parameters in which to function, I wrote this book to share my applied knowledge and evidence-based training procedures designed over many years.

Additionally, because training when recovering from an injury is so specialized and depends largely on the type and extent of the injury that important topic is not addressed in this book.

The process of writing this book helped me reconnect in an even more meaningful way with the work I had done with Dr. Bill Sands, when he was working at the United States Olympic Training Center in Colorado Springs. Dr. Sands now works in Utah with the United States Ski Association.

Finally, I was also able to exchange emails with world-renowned expert on periodization Tudor Bompa, whom many consider the “Father of Periodization”. His notes provided details about the historical evolution of periodization terminology -- beginning in Germany before the 1936 Olympic Games held in Berlin -- from “macrocycle, or grosse (about 4 weeks long) and microcycle, or kleine (weekly plan). Then, following World War II how the terminology was modified in the Soviet Union (now Russia) with the use of “messo cycles” put forth by Matveyev in 1965 and where a macrocycle is in fact an annual plan. Bompa personally encouraged me calling this project “necessary, useful” and I am passing along his suggestion that figure skating coaches read more.

So read on!

Coach Tom Z

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Introduction: Why Create A Training Plan?

Coaching figure skaters, if done properly, isn't just simply showing up at the rink on time and teaching a lesson. Coaching requires careful planning and a high level of commitment, just as your skaters show each and every day. Many coaches have a certain way of going about how they train their athletes. Their methods consider many different aspects of sport such as age, gender, scheduling, duration, anaerobic/aerobic training, and so forth. Ultimately, a primary goal of a competitive figure skating coach is to train the *complete* skater for a specific level of performance in competition, not simply certain skating, jump or spin elements in their short/long program(s).

The *process* used the by the coach involves more than a specific outcome or competition placement and happens over time. This is why it is so important for coaches to design a purposeful **TRAINING PLAN**. The specific details and design of this plan, which will help optimize the athlete's performance and development over time is commonly known as **periodization**.

(Photo: tudorbompainstitute.wordpress.com)

Tudor Bompa is known as "the Father of Periodization". In the early 1990s his book, *Periodization Training for Sports* outlined the basic concepts of periodization for a whole generation of athletes. His ideas are applicable to all sports but apply perfectly to figure skaters. For skaters and coaches alike, his many books are a great resource of knowledge. Learning about periodization and integrating it into your skating and coaching will be one of the best things you can do!

As a coach of skaters who are constantly developing you must also educate them about the importance of hydration, nutrition, and mental training as key ingredients of your plan so that their bodies are prepared in every way for practice. A deficit in one of the above areas—such as not drinking enough water or forgetting to include special nutrition as part of the training plan—can drastically affect their ability to concentrate. This in turn affects their daily practices and overall training and conditioning. Too many poorly designed and executed training sessions eventually impacts competitive performance and could even result in injury.

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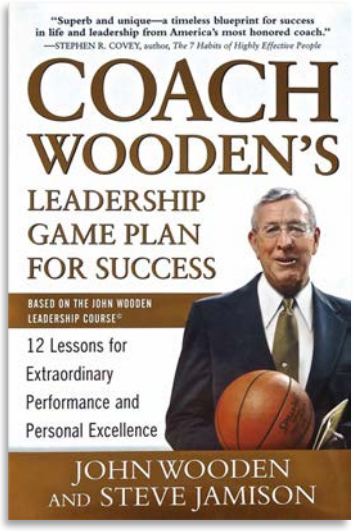
"If you fail to plan, you plan to fail." John Wooden



(Book Cover Image source: coachwooden.com)

There is a difference between skaters who practice as a form of exercise and skaters who train for a high level of performance. Athlete training is the process of preparing an athlete physically, technically, tactically, psychologically and theoretically for the highest levels of performance (Harre, 1982). Exercise involves physical activity but without optimizing training and performance. High-performance training seeks to achieve the highest fitness characteristics, within genetic limits, time available, skill, body size and shape, talent, motivation and personality (Hoberman, 1992; Miner, 1995; Partridge, Knapp, & Massengale, 2014; L. Williams & Gill, 1995).

Training your skaters in the most comprehensive manner requires the use of all of the complex body systems (mind > muscles > energy systems). Planning increases your skaters' performance ability, helps fuel passion and keeps skating fun. If you stay actively engaged in the planning process at all times, then this will enable you to help bring out the best in each and every one of your skaters.

The Basics:

What Is Periodization?

Periodization is the combination of "periods" (hence the name) and the sequencing and cycling of these periods. In other words, periodization is a series of training cycles with varying degrees of volume, intensity and duration. These cycles are broken down into blocks of time (i.e. periods). In order for a block of time to be labeled a cycle, the period has to repeat. These blocks help to progressively build skills, but also act as a path to progress and a method of short and long-term goal setting. By planning each day of training and breaking it

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down across a year, season, month and days/weeks, you create a well-rounded systematic plan for progress.

In the early stages of a skater's career, the coach is the architect and plays a large role in designing the system and providing the framework/structure of the training plan. It is important for coaches (and parents) to take into account the development of the skater's personality, specifically: courage, motivation, commitment and discipline. While these life and sports concepts may seem lacking in the Gen X, Y and Z youth of today's modern world, they form the essence of a strong foundation for the development of any athlete's persistence and dedication to enhancing health and fitness (Hoberman, 1992; Hodge, 1989; Miracle & Rees, 1994; Murphy, 1991).

A skater's primary coach and their support staff should keep the overall healthy development of the skater in mind when weighing training decisions. Because training is a delicate and fluid process, coaches should recognize their substantial influence. A coach does more than simply shape the development of physical attributes and skill. Skaters will look to coaches for encouragement, judgment, motivation and persistent guidance. (Gould & Damargian, 1998; Guagliano, Lonsdale, Rosenkranz, Kolt, & George, 2014; Hatfield & Brody, 2008).

As such, coaches should consider a "guided discovery" approach – where the coach serves as a guide throughout the skaters' processes of learning and discovery about the sport. This involves both direct (telling them what to do) and indirect (asking them what they think and how they feel) methods. Using this type of approach helps skaters to develop, understand *and* effectively learn important training concepts in cooperation with their coaches (Wales, 1993). As a result, this will allow them to mature in a healthy way and eventually become more independent and in control of nearly all aspects of daily training.

How Do You Develop A Plan?

It's simple. Set your **VISION**. Involve the skater, parents and coach(es) in creating and implementing your vision. *Then create an action plan.* This action plan gives everyone on the team a starting point and helps teach the discipline and accountability necessary to achieving goals.

Nowadays, even though you can put almost everything on a tablet, plans should be written down to enhance memory, accountability and motivation. Research has proven that picking up a pen or pencil and physically writing sends a more powerful message to the brain, making whatever is written as the goal more likely to be achieved (Pinola, 2011; Davis, 1999). So ***"INK WHAT YOU THINK"*** and write it down!

COMMUNICATION during all steps of the process is critical because coaches both provide and receive information. It is also necessary to encourage and protect communication through all aspects of this journey. Once specific goals have been agreed upon, everyone needs to make maximum effort every single day during practice. Remember to also commit

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to enjoying the training process. Ultimately it is the journey that will be the most fun, no matter how the competitive chips may fall.

Finally, seek support. Having a team of support professionals working with your skaters helps address all aspects of training. Tackle the critical issues first, such as improving core strength, speed or quickness and then move on to continual refinement of the skills already learned. This will ensure growth to the next level. Adding professionals such as off-ice strength and conditioning trainers, mental coaching professionals and a nutritionist to your team or group of contacts can help keep your skaters on track to reach the next level. Planning ahead while they are young will give them an advantage to achieve the best possible outcome later in their career.

On a side note, as the primary coach in charge of *their* development make sure to assess *your* interpersonal and professional skills to determine your own strengths and weaknesses. This allows you to select support professionals who will enhance your team in critical ways. Additionally, you will almost certainly want to continue to grow and learn within the figure skating coaching community. A lifelong learning mindset is a proven key ingredient to continued success in all professions. Finally, when your skaters and their parents see you actively involved in your own professional growth and development, it creates a powerful psychological effect that in turn helps them be empowered on their own journey.

Remember, *TEAMWORK MAKES THE DREAMWORK!*

Macrocycle: The Foundation For A Training Plan

Periodization organizes training into units of time or "blocks" that link together to create a long-term plan for athletic progress. As mentioned previously, blocks that have a repeated period are termed cycles. These cycles are divided into four categories:

- MICROCYCLES - days and weeks
- MESOCYCLES - weeks and months
- MACROCYCLES - over 6 months to longer than a year; this could be a season or an entire calendar year
- QUADRENNIAL PLAN - a four-year macrocycle for an Olympic goal

The names of the five major phases of training that exist within the various cycles are: active rest, pre-season, in-season, taper and off-season (Bompa, 1999). Each cycle has a unique and different duration and requires a specific volume and intensity. For example, there is always a *transition* period into the *1st stage* and *2nd stage* of any given preparation period, followed by the *precompetitive* and *competitive* periods before the skater *transitions* back.

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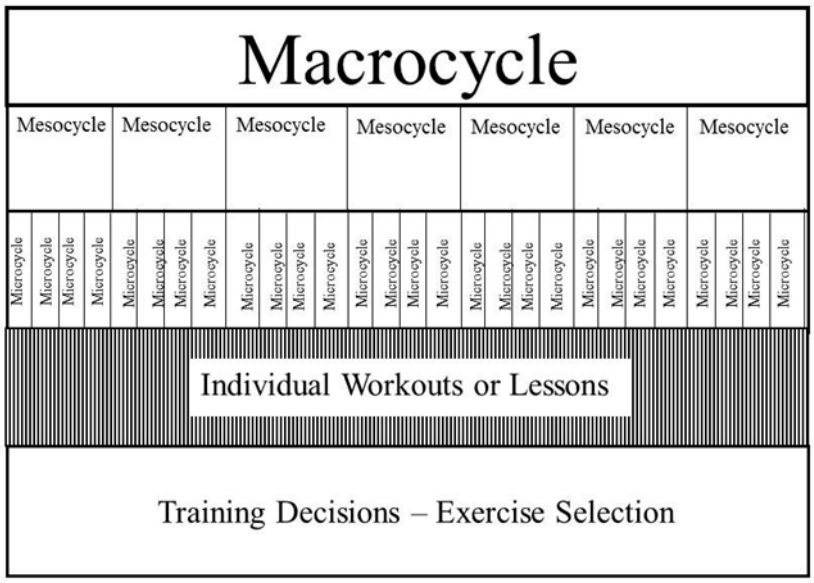
Look at the calendar and determine what is the “peak” event or events of your skater’s year and plan backwards from there. Determining these specific periods ensures you are focusing on the right things at the right time. **Remember it takes a minimum of four months to prepare for a major competition so plan accordingly and carefully**.

What does the natural progression of your planning look like?
1 season > 6 months > 3 months > 1 month > Weekly > Daily



(Figure 1: The arrangement of periods involved in periodization. Sands.)

The coach must develop specific training plans for these cycles, breaking down the long-term goal into specific parts that form the daily lessons and groups of lessons. Selecting specific exercises and making training decisions may sound like a lot of work but don’t be overwhelmed. Taking the process step-by-step will ensure success. Once your mind gets into the planning groove you will start to see it all flow naturally.

Writing Plans Helps Measure Performance

It is important to write out plans because what gets measured gets done. Think of the plans as your map to help you get from point A to point B. Visual targets help maintain inspiration and keep engagement high. As mentioned previously, just as it has been shown that writing goals with an actual pen on paper helps make them happen so too, when writing out training plans.

A weekly plan will vary based on the number of days a skater trains. One suggestion is to map it out in a spreadsheet format. This visual plan is the first step in organizing the daily work toward the long-term goal and will help each and every student maximize the training time.

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An example of a skater's weekly training plan:

DAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
DATE						
5:00						
	Skate 5:55 - 6:40 (NHL); 6:20 - 6:40 w/ Tom	Skate 5:55 - 6:40 (NHL); 6:20 - 6:40 w/ Drew	Skate 5:55 - 6:40 (NHL); 6:20 - 6:40 w/ Becky B	Skate 5:55 - 6:40 (NHL); 6:20 - 6:40 w/ Tom	Skate 5:55 - 6:40 (NHL); 6:20 - 6:40 w/ Becky B	
6:00						
	Skate 6:40 - 7:25 (NHL); 6:40 - 7:00 w/ Tom	Skate 6:40 - 7:25 (NHL); 6:40 - 7:00 w/ Tom	Skate 6:40 - 7:25 (NHL); 6:40 - 7:00 w/ Tom	Skate 6:40 - 7:25 (NHL); 6:40 - 7:00 w/ Tom	Skate 6:40 - 7:25 (NHL); 6:40 - 7:00 w/ Tom	
7:00						Skate 7:00 - 7:45 (Olympic); 7:00 - 7:20 w/ Tom
	Off ice w/ Tom (7:45 - 7:55)		Off ice w/ Tom (7:45 - 7:55)			Skate 7:45 - 8:30 (Olympic); 7:45 - 8:05 w/ Tom
8:00						
				Skating Skills / Intro To Dance 8:25 - 9:10		
9:00						Concepts 9:00 - 9:45
10:00	Ballet w/ Corinne 9:55 - 10:40				Ballet w/ Corinne 9:55 - 10:40	
11:00						
			Synergy Jazz 11:40 - 12:25			
12:00						
13:00						
14:00						
15:00	Skate 3:05 - 3:50 (NHL); 3:05 - 3:25 w/ Becky C	Skate 3:05 - 3:50 (NHL); 3:25 - 3:45 w/ Becky C	Skate 3:05 - 3:50 (NHL); 3:05 - 3:25 w/ Becky C	Skate 3:05 - 3:50 (NHL); 3:05 - 3:25 w/ Drew	Skate 3:05 - 3:50 (NHL); 3:25 - 3:45 w/ Becky C	
16:00		Spin Class 4:00 - 4:30	Jump Class 4:00 - 4:30			
		Off Ice with Drew 4:30 - 5:00				
17:00						
18:00						
19:00						
20:00						

(Figure 2: A sample of a skater's weekly training plan.)

The second step is for you as the coach to also write a weekly training plan that corresponds with your skater's weekly plan and ultimately the achievement of the main long-term goal. Below is one sample for a Pre Juvenile skater immediately following the last competition of the season. This plan is meant only as a guide for what should be the primary emphasis of each 45-minute session. My skaters use this weekly plan in conjunction with their daily practice sheet (see appendix) and this serves as the basis for their daily work.

Note the combination of very specific tasks with detailed notes (3S development work-progressions of 2S: 4 sets of 3) and general open-ended instructions (2A technique work). Also, notice both the variation by day and the repeated daily instructions throughout the week (normal warm up). This structure is not random but an example of applying the previously mentioned guided discovery approach.

Keep an aspect of **PLAY** in each plan. In my sample, "commitment day" on Wednesday is one example. On this day the skaters work on "pulling in" on all of their jumps and being mentally and physically committed to all aspects of their skating. Just because it is **WORK**, doesn't mean it cannot be **FUN** (working on triple development). Keeping an element of fun in the plan ensures skaters enjoy the process.

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A sample of a weekly training plan written by the coach:

Main goal: Rotate 2A cleanly

Secondary goals: debrief regionals and work on getting Juvenile test program ready

Daily duties:

* Set a goal for each session
* **Proper** Off Ice Warm Up and Cool Down (**this means 20-30 min in duration with 10 floor 2A's**)
* Hydrate
* Do one full run through of test program each day
* Review goal after each session
* Snack
* Monitor Sleep

MONDAY	TUESDAY
Session 1: • click single jumps emphasizing head still, straight back, checked free hip and free foot turned in • holding landing position for three seconds • normal warm up • 3 in a row of 2A **Session 2:** • Transition ladder • test program • repeat program section of choice **Session 3:** • 3S development work (measure airtime of 2S) • LSp4 3x with speed	**Session 1:** • 10 2As track percentage and record for Coach Tom **Session 2:** • 5 min warm up • test program **Session 3:** • 3S and 3T development work (front scratch 2S and 2T exercises for alignment, height and axis)
WEDNESDAY **(*Commitment Day* on all three sessions)** **Session 1:** • 3 in a row 2Lz + 2Lo + 1Lo on big pattern track GOE and record for Coach Tom • 2A technique work (step from back to front) **Session 2:** • 5 min warm up • test program • 6-10 2A attempts **Session 3:** • 3S developmental work (progressions of 2S: 4 sets of 3)	**THURSDAY** **Session 1:** • run through all elements jumps, spins and step sequence • 3 in a row 2A + 2Lo! (This is not a typo; it will help you land the 2A) **Session 2:** • step on the ice and do a 2Lz without warm up • normal warm up • test program • 3S technique work **Session 3:** • normal warm up • 2A technique work • Level 4 spin work on FCSp FSSp and CCoSp
FRIDAY **Session 1:** • normal warm up • 5 2F+ 2Lo on big pattern track GOE **Session 2:** • test program • Progression of 2A (4 sets of 3) **Session 3:** Skater's choice	**SATURDAY** **Session 1:** • 2A technical work **Session 2:** • normal warm up • test program

(Table 1: Coach's weekly training plan for the skater)

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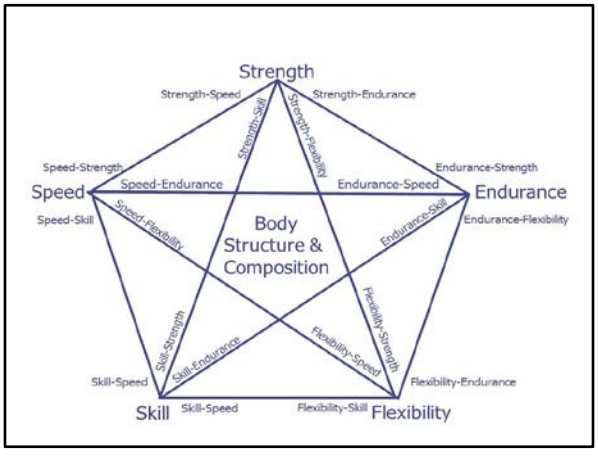
Figure Skating Sport Characteristics

Developing *specific* fitness skills is the primary task of *multilateral* sports training. This contrast of specific vs. multilateral seems contradictory and is often misunderstood because many believe if a figure skating athlete wants to get better at figure skating then they should only increase their practice on the ice, meaning do more figure skating. Multilateral training encompasses a variety of characteristics including: physical, technical, tactical, psychological and theoretical (Sands). Each of the aforementioned characteristics is reliant on physical preparation. Meaning, if the athletes are not physically fit, then they cannot do much else. In the case of figure skating, multilateral development for potential elite skaters means they train their preferred sport –-figure skating— the most, but they also train a **variety** of other things. They emphasize, not specialize when they're young. Using the concept of variety is an important guide for training, planning and implementation because it helps focus on developing basic abilities that form the foundation for further skills and complex conditioning (Bompa, 1990b).

The effects of training from particular exercises within a training plan result in very specific adaptations to a skater's body. A model (See Figure 3) of fitness has been proposed and consists of skill, strength, endurance, speed, and flexibility as the vertices (Siff & Verkhoshansky, 1993) with "body structure & composition" added to the center (Sands). The connections between the vertices involve some hyphenated terms reflecting a "blending" of fitness characteristics. Unfortunately, we lack terms in English to address these components of fitness. Some of these terms are speed-strength, speed-endurance, flexibility-strength, strength-endurance, speed-skill, etc. The point of the hyphenated terms is to provide a simple means of describing the dominant form of fitness or effort that is required in a given activity or used to reach a specific fitness goal.



(Figure 3: Fitness model, Siff & Verkhoshansky, 1993)

Consider a figure skater; skating is a "power" sport, requires flexibility to achieve certain unusual positions (e.g., laybacks and layover camels) and requires that skills be performed within limited time constraints: seconds or fractions of seconds. As such figure skating

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training should spend relatively little time in the endurance domain of the fitness model (Siff, 2000).

If you are coaching an elite figure skater then you should know that competitive figure skating high performance relies primarily on strength, speed-strength, coordination of skills and flexibility. However, not all skaters want to reach the elite level so if your skater is interested primarily in weight gain/loss, then your plan may focus on muscular endurance, strength and stamina in addition to some obvious nutritional counseling. Additionally, if the skater is an adult skater and middle-aged or elderly and his/her primary concern is balance and fall prevention, then lower extremity strength, strength-speed, perceptual-motor skill and reactivity would be the primary training focus (Sands, 2015, 2007a, 2007b).

The Weekly Cycle: Microcycle

Now let's put some of the theoretical information we have mentioned so far to practical use. The following example discusses how a long-term macrocycle goal cascades from an annual meeting onward and "downward" to a mesocycle, microcycle and finally a training lesson -- because we all know that once you and your skater are on the ice it's time to get to work and this is the most crucial part.

Working from the standpoint of a one-week microcycle "block," each individual day's volume should be varied and coordinated with the off-ice training plan for the skater. For example, a typical week looks like this:

Weekly Microcycle by Day

Monday is a ***HARD*** on-ice day and is paired with Ballet/Dance.
Tuesday is a ***MEDIUM*** on-ice day and paired with Off Ice Strength.
Wednesday is another ***HARD*** on-ice day and is paired with on-ice Power Class.
Thursday is a ***LIGHT*** on-ice day and paired with another Off Ice Strength.
Friday is a ***MEDIUM*** on-ice day and paired with a Program Simulation.
Saturday is a ***LIGHT/MEDIUM*** on-ice day with room for skater input.

(Table 2. Adapted from Sands, 2009)

Throughout a weekly microcycle, your skater will experience performance highs and lows related to imposed stress and later adaptations from your training plan related to both volume and intensity you have chosen/designed. After a hard training Monday, the skater might be complaining of soreness or feeling tired. This is a normal body response to growth and progress. These complaints may lead you to back off the high volume. Keep pushing but proceed safely. The body and the muscles must be stressed in order to adapt. In simple

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terms, this is called finding out what your skater's limits are. If you do not keep pushing forward, then there will be no or slow progress. This type of short-term overtraining is an accumulation of both training and non-training stress and characterized by a slight decrease in performance that is reversible within a short-term recovery period (p.20). The overloaded training that pushes an athlete into an overreached state is a normal and necessary part of the training process (Smith, 2003). A constant state of medium stimulus will not help your skater's body adapt (Sands, 2009). Using a growth mindset as a mental tool while training will always help progress because when skaters are focused on the process they learn more quickly and take more risks (Dweck, 2006). Finally, necessary adaptations in training occur only when the training reaches an optimum intensity that depends on the skater's standard of performance coupled with a certain minimum volume. This also applies to the development of both the psychological properties and training load tolerance associated with becoming an elite athlete (Harre, 1982). That said certainly there are days when a medium or light stimulus related to either volume or intensity or both is appropriate.

You may be asking yourself, but what do the words "**hard, medium** and **light**" really mean for my skater? The interactions and the differences between these words are extremely important and become the core of your training plan. Coaching figure skaters requires emotional intelligence and intuition so be creative, observant and listen to both your skaters as well as your own inner voice (Goleman, 1995).

Below, you will find an example of what a **MEDIUM VOLUME** day would look like for a qualifying skater with two programs:

Medium Day: Intermediate through Senior Qualifying Figure Skater
(based on sessions that are 45 minutes in duration; maybe done in any order)

Session 1: do a full run through of a short program and repeat one section three times with an emphasis on the step sequence

Session 2: do a full run through of a long program

Session 3: a set of 10 repetitions of a specific jump element

Session 4: skating skill exercises and choreographic movement only

Off-ice strength and conditioning session: (one hour in duration of maintenance based on **in season** training cycle)

(Table 3: Medium Day Sample Training Plan)

Phew, that looks like a lot of work! If you are coaching lower level skaters, use the above example as a "stretch" goal for them (and yourself) as this will help you both progress to a higher level. Some ways you can modify this medium day for lower level skaters include:

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eliminating 1-2 sessions because of no short program, working on compulsory programs instead of short programs or doing a set of five repetitions instead of 10.

Now let's take a look at a **SPECIFIC LESSON** example within the same weekly microcycle:

Week 1, Day 2 – Tuesday, 20-minute lesson:

- Review the posterior chain of the power angle by having the skater do forward and backward squats: head, shoulders, hips, knees, ankles, toes and vice versa.
- Emphasize nose staying in line with belly button as the core body moves (this is the technical cue "head straight or head right")
- Two-foot hops (use of toe picks, leg muscles, and hip flexion/extension)
- One rotation jump at a standstill (use of right arm for torque as the rotator creator)
- One rotation "bell" jump ten times on diagonal moving backwards to forwards

The following three pages contain even more specific examples of lesson examples and exercise selection. Since figure skating is a sport of medium duration because the length of a skater's short and long program is between 120-480 seconds, then given these parameters, one effective way to train a skater during a 20-minute lesson is in four sets of five-minute intervals (Sands, 2009).

Generally, these training lessons given by you should have three parts:

1) Warm-up
2) Body of the lesson
3) Conclusion
(Bompa & Haff, 2009)

The warm-up should include exercises that will increase body core temperature and be related to the skills that will be used in the body of the lesson. For example, if the skater is trying to *learn* a 2A jump cleanly as mentioned in the previous weekly plan (p.9) then the warm up could incorporate bilateral edge exercises related to the 2A jump as well as both the back spin 2Lo exercise and a click 1A jump. The body of the lesson should begin with the task or exercise (i.e. rehearsal) that is the most important for that session, such as stepping with proper alignment from the RBO edge onto the LFO edge and achieving the proper edge pressure and timing associated with the needed takeoff angle. This task reinforces the broader goal of the microcycle, which is to *rotate* the 2A cleanly. After the skater has completed the edge exercises and 2A attempts using the interval format, at the conclusion of the lesson, it is advisable for the skater to do something that reinforces the idea that the task is simple and fun while at the same time challenging.

As coaches, I am confident many of you use this three-part lesson format as it is a generally accepted teaching model for learning. Secondary tasks (not related to the 2A) *may* be included after completion of the primary task but you must use your judgment in each lesson

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and with each skater. Sometimes “adding” something fun to the primary task can confuse the skater or detract from focus on the main goal.

Bompa and Haff’s format makes structuring a 20-minute lesson relatively easy. The following are the five key areas of fitness that figure skaters need to develop as mentioned earlier (p.10):

- **Speed-endurance**
- **Strength-endurance (actual ability to complete a clean program)**
- **Speed-strength**
- **Speed/acceleration**
- **Endurance-speed**

If you are still wondering what these terms mean and how you could incorporate them into your training lessons, then read on. Creativity is key to keeping skaters engaged so flex your “mental” muscles to keep training interesting by constantly creating new lesson plans. Using the basic three-part format from the previous section, here are a few more ideas of how the above key fitness areas would translate into well-planned exercises in a 20-minute lesson:

1. ***Speed-endurance***: When training fast-twitch muscle responses (type II), you want to focus on quick repetitions. The first part of your lesson could be as simple as 10 single backward hops in a row with the skater bringing their feet together in a side by side fashion or something more complex such as 10 loop jumps in a row, emphasizing the rebound motion into the next jump with proper head alignment, hip initiation and extension of the take off leg. The most important aspect of this type of training is to make sure the skater completes the exercise at the predetermined speed or faster (Clarke & Henry, 1961; Moffroid & Whipple, 1970; Morrissey et al., 1995; L.E. Smith & Whitley, 1965)

2. ***Strength-endurance:*** Use a portion of your lesson time to focus on one of two 3-5 minute drills: jumping ladders or progressions. In a jumping ladder a skater performs only one of all of the jumps from waltz through 1A (or 1A through 2A, etc.) at each end of the rink. Timing this exercise helps you track progress and sets a target for completion. Aim for the skater completing this drill in less than three minutes. In a progression, skaters pick one jump such as a 2A and alternate both rehearsing an aspect of the take off and performing it three times for a total of six repetitions. Have them do this in four consecutive sets and it becomes obvious why their muscles will get stronger which in turn will help them complete the jump in their program.

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3. ***Speed-strength:*** The simple definition of power (Power=Force x Distance/Time) is the rate of doing work: the combination of strength and speed. Thus, increasing force or distance, or decreasing time or a combination can increase power. For skaters, this means using appropriate **force as they change their body position and quickness of its movement at the same time.** Need a good analogy to understand this concept? Think of the difference between an electric and a manual screwdriver. Both do the same job; one just does it a lot faster! Some exercise examples include: specific take off drills designed to improve body alignment at the moment of leaving the ice or back spin variation drills that help develop quick rotation.

4. ***Speed/Acceleration:*** Acceleration is a vector quantity that is the result of a force and the rate of change of velocity so changing either force or direction or both results in acceleration. Various stroking and skating exercises done with a resistance band will create a focus on and build the type of strength needed to increase speed across the ice when necessary. Be sure to mix up your drills depending on your particular focus within a given cycle.

5. ***Endurance-speed:*** This is important during competition events when skaters must perform their programs several times during a week. It is also very important the skater appears to be strong throughout all sections of the program during a clean performance. With this in mind skaters can run a full long program and immediately follow it with three laps in either a clockwise or counterclockwise direction. Laps can be timed to increase efficiency. You can even mix it up having the skater use a power chute for resistance or by adding specific jump repetitions or repeating the middle or last section of the program after the laps. Finally, if you want to change/improve a certain aspect of your skating like speed endurance, it must be the dominant characteristic of your training (Sands, 2009).

Hard Training: Volume vs. Intensity

It is important to note that high volume "hard" training must be done in the pre-season and not later in the year when the skater is in-season. **Note: you will only pursue high volume later in the season if there is a substantial break or gap in the competitive calendar.** Build the appropriate skill set for your skaters such as learning required short program jumps or level four spins early in the season because once skaters start competing in qualifying events most of their energy should be directed toward refinements necessary for peak performance. That said, remember that using your intuition and communicating/listening to your skater is important in determining if they are at the appropriate "edge of their training," the point where they are at 95% capacity for work. Being on the correct side of the “edge” (no pun intended) will help increase their performance but if they are pushing too far into the zone of overtraining this could lead to injury.

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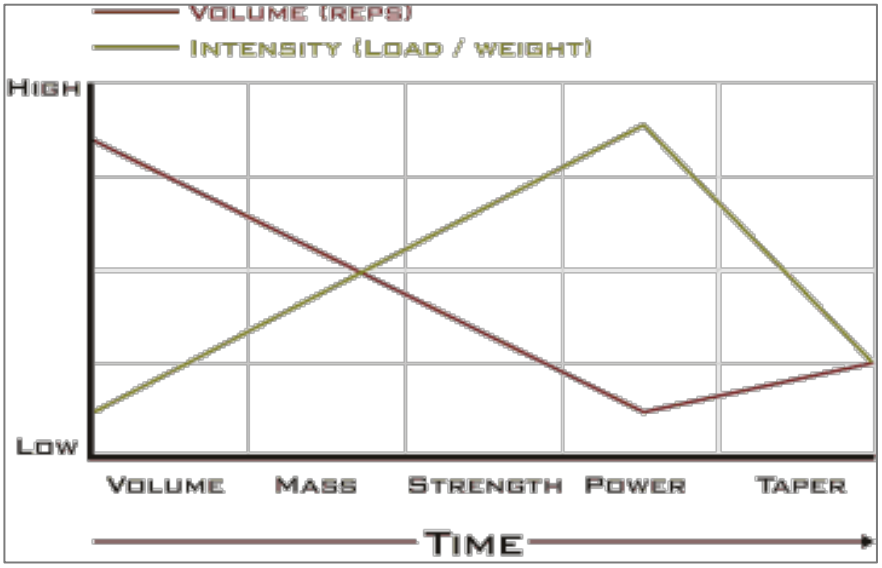

(Figure 4: Strength Training Programs)

Figure 4 is a representation of an annual strength training plan. The phases at the bottom refer to the emphasis of the off ice strength training program during those times: Volume=high reps, Mass=hypertrophy, Strength=force, Power & Taper. Early in the season, a skater is training off ice with higher volume but not high intensity. On the ice this means more repetitions of skills but not the most difficult skills. As you progress through the year, the number of skill repetitions declines while the difficulty of skills and completion of program run-throughs increases. Additionally, coordinating the off ice workouts scheduled on Tuesday and Thursday each week with the off ice trainer is an important job for you as the primary coach.

Returning to our discussion of the weekly microcycle, take a few minutes and make some notes in the space below about what a Hard Wednesday and Light Thursday would look like.

Wednesday:_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

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Thursday:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Microcycle by Day

Thursday is a ***LIGHT*** on-ice day and paired with another Off Ice Strength.
Friday is a ***MEDIUM*** on-ice day and paired with a Program Simulation.
Saturday is a ***LIGHT/MEDIUM*** on-ice day with room for skater input.

(Table 2. Adapted from Sands, 2009)

Remember, Thursday is an important light day because as the week progresses your skaters will be tired and if they have worked hard they deserve a light day, although most elite athletes will do more than you ask on this type of day (Foster, 2016). As the week winds down, Friday or Saturday is when skaters are encouraged to bring out their weekly ***peak performance*** as these are typically the days on which they compete. This should occur regularly when the skaters are in their pre-season and in-season cycles.

At the Broadmoor Skating Club this means a “Fire and Ice” exhibition. The goal is to simulate the atmosphere of an actual competition – with the same physical and mental preparation. Each week the skaters choose one program as the focus, short or long, and attempt to skate it as cleanly as possible with a high level of performance just as they would in competition.

As a coach, even if your rink doesn’t have a formal exhibition, it is easy to create this type of medium day. For example, your skaters could purchase a freestyle session and use that time for a simulation. They simply do a five or six minute warm up, select a skating order and wear their costume.

Additionally, when your skaters do multiple sessions, encourage them to use one of the day’s earlier sessions as a 20-minute warm up and the other as the simulation session. If they have a third session, it can be used to run sections of the program they are not simulating that day. This is related to the endurance-strength fitness goals mentioned previously (pp.13-14) and also the format for their practice sessions during a competition. In addition to specific program training, this also trains the mind to compartmentalize by focusing on both what will be

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performed at the "competition/exhibition" as well as the other program, usually the long program, which they will simulate the next day.

The above exhibition scenario is another example of a "medium" day because of the mental and physical strength needed by the skater to perform as if it was a competition. Do this consistently and notice how the simulation of a competition environment trains some of the anxiety out of your skater. This weekly exhibition also offers you as the coach an extra opportunity to video the program, assess component skills and continue to build training momentum in a more specific way actually related to the competition experience.

What happens after the exhibition? Make sure to set aside a few minutes to “debrief” the experience with your skater. With phones and tablets, as well as slow-motion video analysis apps, it is easy to record and review the performance. Compare what they have done in a daily training lesson with what they completed in the exhibition. Use this as a moment to discuss technical elements and also how they felt *emotionally* (their response to moments of stress, distraction, falling) and/or physically, such as how they used breathing during their performance. These brief conversations should give you extra insight into what needs work in the upcoming lessons and what to tackle in the next plan.

Saturday is a day when ice time can be limited at many rinks. It is also the end of the weekly microcycle. When planning your week, it makes sense that this be a light day. It’s a good day to review the key jump and spin techniques that have been learned or improved throughout the week and a perfect time to review all of the drills and exercises of the past five days.

If your skaters do not have a lesson scheduled for Saturday, find some free time to text them or have a brief conversation about what they should accomplish. This allows you to both indirectly guide your skaters and hold them accountable for accomplishing some specific tasks: a win-win for everyone! Does this guided discovery process sound familiar? Note: If your skater/parent wants a specific weekly training plan in which you describe what needs to be done each day and each session, you can spend a few minutes filling out by hand a worksheet as explained in the following videos or use the computer generated example found on page nine or the one in the appendix.

Want to know more about the overall process for writing plans?
Watch the **“Getting Started Part 1” video:** https://vimeo.com/87926140 and
“Getting Started Part 2” video: https://vimeo.com/87926141

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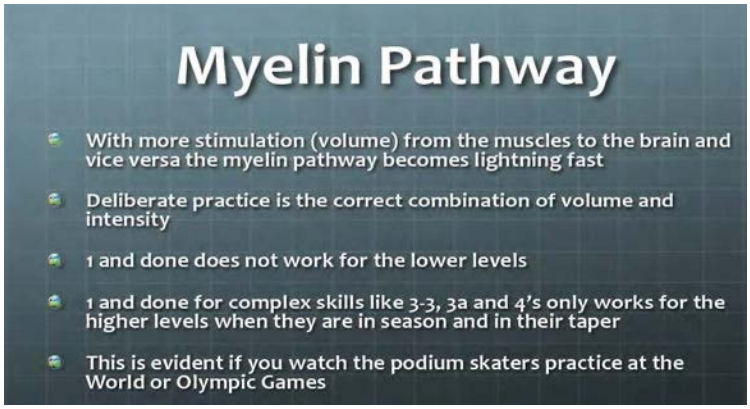
Guiding Scientific Principles

Myelin Pathway: Myelination

A training plan based on periodization principles properly trains the myelin pathways that connect your brain with your muscles. What is myelination? Neuroscience 101: Neuron axons can have myelin sheaths or not. The myelin wraps around axons that are usually involved in more high-speed neural transmissions via saltatory conductions (from the Latin saltare, to hop or leap) much like knocking down the first domino in a long chain. Increased practice of motor skills in the learning process thickens the axon and during myelination the nerve impulse speeds up and jumps across the myelin sheath to the next open spot on the axon. So the myelin turns the electrical signal into the brain version of Nightcrawler, the teleporting X-Man (Shen, 2013). This happens because the arrangement of insulation is not continuous. For our purposes, let's simply describe the myelin pathway as the insulated cable that connects your thoughts from your brain to the movement of your muscles and allows more direct communication. The more repetitions of a skill you complete the faster this pathway becomes. In a sport like figure skating you need this pathway to be lightning fast so the more correct reps your skaters do will lead to consistency: another key component of elite performance.



Improving Consistency

During the training process it is important to focus on improving what is often referred to in layman's terms as the "law of averages" with regards to skill set development. High volume days with proper intensity create consistency in training which leads to strong performance at the right moment and ultimately success. By having your skater focus on practicing quality repetitions when acquiring new skills, your skater will become consistent and be able to use this so-called "muscle memory" and repeat these results under pressure, such as during an exhibition or an important competition. For example, you would never want your skater to add

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a 2A into a program after only landing it a few times. Regularly scheduled repetition during training cycles ensures quality and consistent ability to perform under varying circumstances. Always practice with the goal of improving your averages as your primary mindset.

Recovery

Fine-tuning the relationship between the on and off ice work associated with figure skating training and the subsequent recovery process is essential in order for your plan to be effective. Properly controlled training causes fatigue followed by a temporary reduction in performance. After your skaters complete their training it should be followed up with two processes:

- The recovery process leading to the re-establishment of the full ability to function, and
- The adjustment process leading to the functional improvement of performance and the morphological reorganization of the functional systems under stress (Harre, 1982).

Recovery is needed because adaptation processes are brought about only by demands that so strongly disturb the psychological and physical balance of the skater that they can only be restored at a higher level or by additional functional reserves (Harre, 1982). From the biological viewpoint these processes not only renew the sources of spent energy (regeneration), but also at the same time regenerate beyond the original level (supercompensation). Supercompensation, sometimes also referred to as overcompensation is widely accepted as the basis for all improvements in function and performance (Harre, 1982)

With the completion of a hard and productive week or even a day of training, it's important to make sure your skaters understand the specific components of recovery.

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***Q:** How does a skater effectively recover and reduce muscle soreness?*
A: Proper sleep, nutrition and hydration

- Skaters should aim to get 9.25-10 hours of sleep per night (Maas, 1998). Parents need to be active partners in ensuring this happens because this shared responsibility is important for success (Silby, 2000).

- Nutrition basically means eating food, and for an athlete food is fuel. Additionally, everyday there should be a balanced intake of carbohydrate and protein. A 60/40% combination of a carbohydrate to protein meal consumed within 30-90 minutes at the end of training helps to restore the fuel stores in the muscles and aids in repairing inflamed tissues. Making healthy snack choices throughout the day in a "grazing style" is also key to maintaining energy (Sands, 2009).

- It's essential to balance food intake with water. A skater can do this by sipping or drinking a full bottle of water throughout a skating session or before/after training. This will keep their body hydrated. With so many varieties of water bottles available, it can be easy (and fun) for skaters to keep hydrated. A commonly accepted recommendation for water intake is:

Males: about 3 liters per day
Females: about 2.2 liters per day
Source: Mayo Clinic

Finally, when your skaters find time to simply relax and do "nothing" -- this is perhaps the most important part of recovery (Sands, 2009). They can also use a variety of "other" recovery modalities to help make the process effective. Passive activities such as mild stretching, sauna, massage or reading a book/watching a movie/TV show help the skater recover both physically and mentally. Encourage your skaters to make a little time each day or on the weekends to create balance in their training schedules. Proper nutrition, rest and recovery will help skaters avoid overtraining and contribute to their being able to achieve peak performance at a competition event.

Energy Systems

The following information is a condensed description of the body's energy systems that though tedious to read is extremely necessary in order to fully understand the concept of training and tapering elite figure skaters, which will be discussed later in this workbook (p.31). This excerpt is taken from personal correspondence with William A. Sands, PhD:

> Energy production in the muscle cell comes from carbohydrate, protein and fat in varying amounts. Energy systems provide ATP (adenosine triphosphate) for muscle tension based on the intensity and duration of the need for energy. ATP is the

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immediate energy source used directly by the muscle to produce force. ATP is depleted in seconds, but never completely (Powers & Howley, 2007). ATP is then chemically changed to ADP (Adenosine Diphosphate), what we would think of as energy. The longer and more rapidly the muscle works, the more ATP is needed. The energy for the process of creating new ATP comes from a compound called phosphocreatine (PC) or creatine phosphate. Estimates of the duration of the ATP-PC system range from approximately 5 to approximately 20 seconds of high-intensity effort. (Brooks & Fahey, 1987, 1984; Fox, 1979; Wilmore & Costill, 1999). Note that no oxygen is required for this reaction and no lactic acid is developed from this short "burst" of energy production. Activities such as isolated skills, jumps, spins and other activities that require less than 10 seconds to perform are served by the above described phosphagen system.

If the athlete must persist longer in his/her exercise effort, then ATP is obtained via the breakdown of glucose and glycogen. Glucose is readily available to the cell from blood, and specialized receptors help channel the glucose into the cell, particularly in the presence of insulin. Glycogen is a storage form of glucose in the muscle cell. Glycogen is hooked together and is stored in glycogen granules in the muscle cell. A process called glycolysis (sugar cutting) takes glucose or glycogen and splits these six carbon sugars into two three-carbon molecules that are worked on by enzymes. The end products of this series results is pyruvate and lactate depending on the availability of oxygen and the intensity of effort and releases enough energy to form a few new ATPs. This is where proper nutrition in the form of complex carbohydrates helps the training process. Explosive sports like figure skating as well as off ice strength training use fast and slow glycolysis in training and performance.

New research has shown that lactate and muscle acidity are NOT the precursors of fatigue but actually enhance the muscle's ability to produce force, however, lactate (an end product of glycolysis as mentioned above) tends to mirror the outcome effects of fatigue while not being the source (Allen & Westerblad, 2004; Maffiuletti & Bendahan, 2009; Pedersen, Neilsen, Lamb, & Stephenson, 2004; Westerblad & Allen, 2009; C. A. Williams & Ratel, 2009). Fatigue most likely has two sources: within the muscle or alpha neuron and a central source in the brain. As such two fatigue models have been proposed that include the peripheral catastrophe model dealing with the muscle source and the central governor model (Central Nervous System). Since "fatigue" is incredibly complex and no single molecule has yet been identified as its source, coaches should keep in mind that while scientists are coming to understand the peripheral mechanisms of reduced muscle force, the details of understanding the CNS mechanisms may be decades in the future (Bigland-Ritchie, 1981; Bigland-Ritchie, Bellemare, Woods, & Pierce, 1986; Brouns, Beckers, Wagenmakers, & Saris, 1990; Carsten, 1997; Davies & McDonagh, 1982; Fitts, 1994, 1996; Froyd, Millet, & Noakes, 2013; Gandevia, 2001; Green, 1986; Hultman & Sjoholm, 1986; Katz, Sahlin, & Henriksson, 1986; MacIntosh & Rassier, 2002; McCully, Authier, Olive, & Clark III, 2002; C. A. Williams & Ratel, 2009).

Summarizing to here, if you need lots of energy, then both the phosphagen and fast glycolysis systems are the energy systems on which you rely. Fast glycolysis works well for less than two minutes, declining rapidly after approximately 40-50 seconds. If the athlete must persist even longer, then he/she will necessarily reduce the intensity

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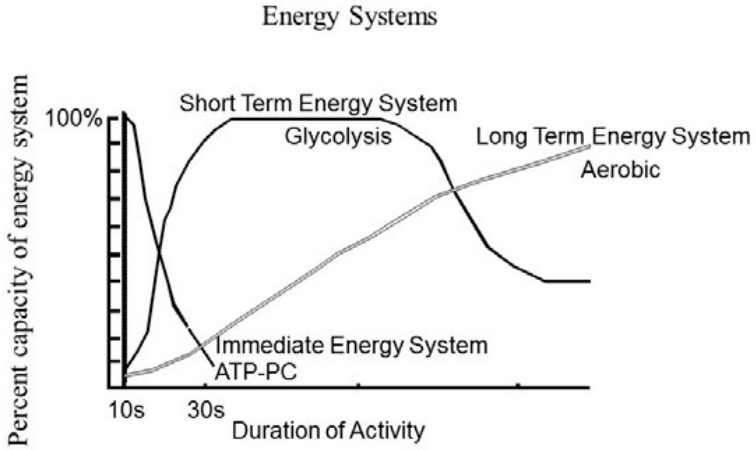
of the effort and energy production will shift to slow glycolysis and the aerobic energy system. All energy systems are in play during the high-intensity exercise. However, the most dominant energy systems are the ATP-PC (phosphagen) and fast glycolysis in high-intensity, short-duration exercise (the systems that can produce ATPs the fastest).

A low energy demand by the athlete allows the pyruvate to enter the Krebs cycle without accumulating and being converted to a large amount of lactate (some lactate is still produced). Energy produced by the Krebs Cycle and the Electron Transport Chain (also a part of aerobic metabolism) is much greater than the few ATPs produced by fast glycolysis. However, what the aerobic system lacks in speed it more than makes up for with a larger energy production. The other issue with aerobic energy production is that energy requirements need to be low and close to a sustainable steady state. Figure 5 shows the interactions of the three dominant energy systems. Note that there is considerable overlap or "blending" of the energy systems. Thus, *ALL* energy systems are working *ALL* the time, but usually one energy system is dominant but not exclusive.



(Figure 5: Relationships of the 3 energy systems)

As mentioned previously, given the parameters that figure skating is a sport of medium duration because the length of a skater's short and long program is between 120-480 seconds the use of the aerobic energy system is obvious by definition. To clarify, what is meant by aerobic training? Does this mean that running for warm up is not allowed? The answer is that running for warm up is allowed. It takes from 8-10 minutes of vigorous activity to raise body core temperature the 2-3 degrees Celsius thereby indicating that a warm up has occurred, and the body is ready for activity. When was the last time you saw a figure skater sweating after warm up (unless the environment is hot and humid)? Also, consider that a recreationally trained runner can cover a mile in 8-minutes. However, when used for warm up, running for 8-minutes is unlikely to contribute to aerobic fitness. Running hard for 8-minutes after warm up for training is another story.

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Of note, research has demonstrated that aerobic training interferes with strength and power development (Hickson, 1980; Hickson, Rosenkoetter, & Brown, 1980) (Fry, Haakkinen, & Kraemer, 2002; Hennessy & Watson, 1994; Hickson, 1980; B. Sands, 1985). Moreover, the knee-jerk training approach of developing an “aerobic base” may be counter-productive in power-related activities (Arnett, 1993; Bamman, 1996; Dudley & Fleck, 1987; Hennessy & Watson, 1994; Kraemer et al., 1995; Shealy, Callister, Dudley, & Fleck, 1992). Both of these points clearly make the case for coaches understanding the nuances of figure skating energy systems in order to properly train their skaters.

Most recent information on energy systems training and the interference that results from athletes training within non dominant energy system parameters identify a lot of variables involved. The order of presentation of training methods, duration, intensity as well as the athletes current fitness state all make a simple training idea more complex. Within the sport figure skating, interval training is commonly accepted as the preferred method for endurance training because it involves less long-slow distance and still increases VO2.

(Source: Personal Communication, William A Sands, PhD, 2016)

Monthly Cycles: Mesocycle

Mesocycles are blocks of time divided into weeks and months. A mesocycle is usually about four weeks in duration but can range from two to about eight weeks. There are typically five main mesocycles during a figure skating season that coincide with the phases previously mentioned on page 6. A major part of the in-season training cycle will follow a "build and taper" progression based on the dates of the most important competitions (for example, the Junior or Senior Grand Prix or regionals and sectionals leading up to the US National Championships) or the training period leading up to a testing date.

On the next page you will find two examples of specific macrocycle planning which includes several detailed mesocycles. These elite skater plans are color coded to allow for easy identification and understanding. Below each plan is a separate graph that depicts changes in volume, intensity and peaking. Carefully read and study these examples. They are extremely detailed and will help you understand how to create the various important mesocycles that are necessary throughout the season to insure that the main goal of peaking at the US Championships and beyond are reached by your skater. A full size annual plan template chart can be found in the appendix and is provided for your personal use.

Look to see if you can identify the main mesocycles. How many are there? What happens to a skater’s training mesocycle when the competition occurs over a two-week period? This can happen because of international travel or simply because of scheduling. The reason doesn’t really matter but this becomes an important planning consideration for you as a coach.

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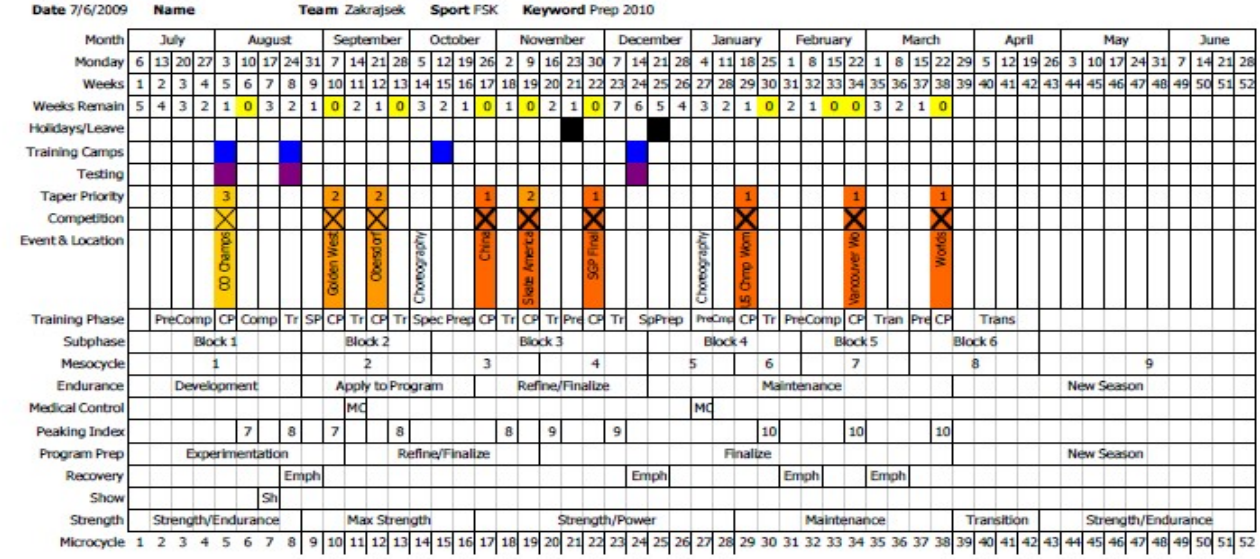

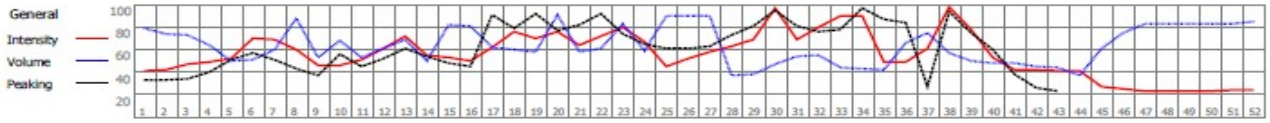

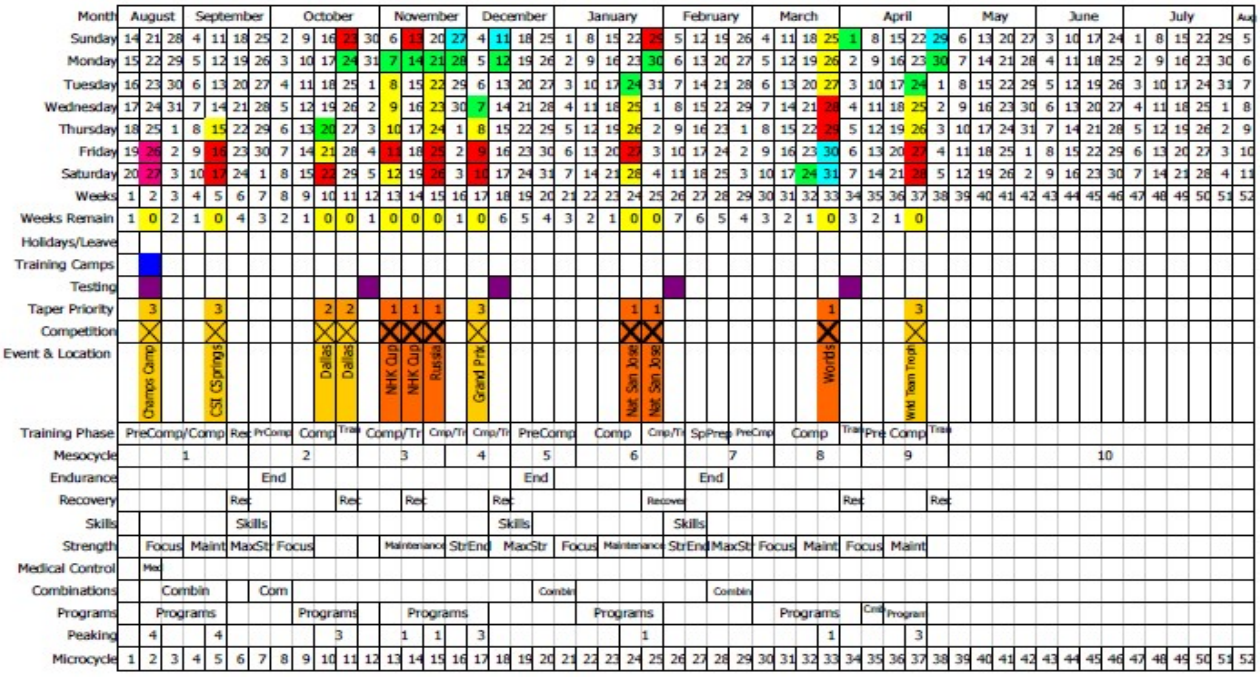

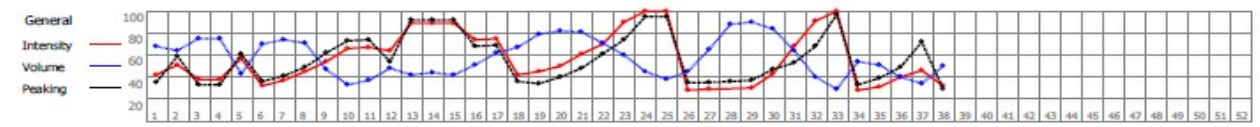

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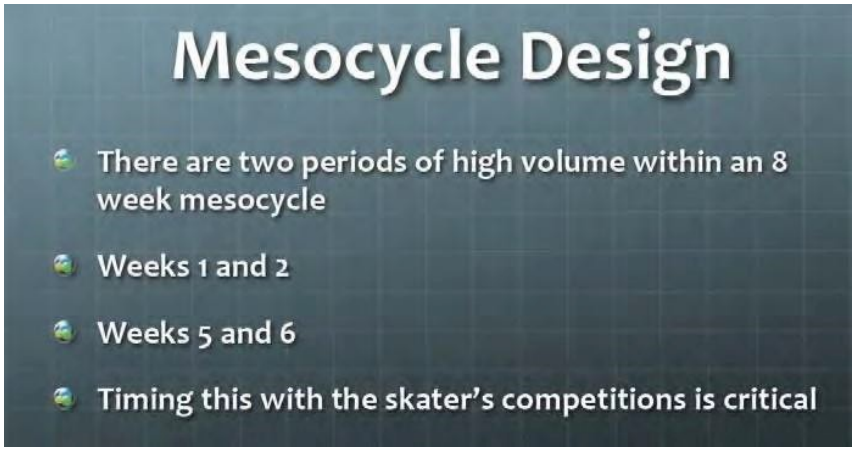
Now compare the previous elite training plans. *Do you notice any similarities? What are the differences?* As you can see, the specific details of each skater's mesocycles will look different depending on their exact competition schedules but the focus and timeframes will be more or less the same: usually between three and twelve weeks. Although this requires careful consideration, the basic framework is usually that of an eight-week block when two competitions occur one month apart as is common with regionals and sectionals.

Next, you will see an example of the five main mesocycles of a **non-qualifying competitor** whose peak competition will most likely be in October at their specific regional championship.

As mentioned many times throughout this book, creating periodized training cycles is part science, part creativity. Now it's time to test your own skills and try it. The chart below breaks it down for you. Using one of your current skaters, create a sample eight-week mesocycle.



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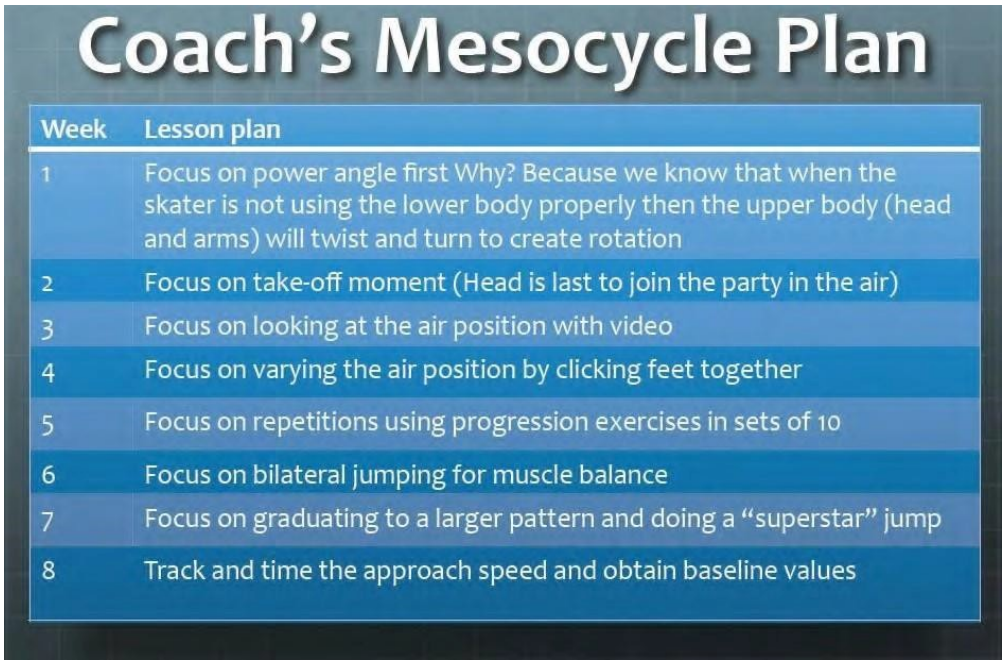
Test it out, using the blank table below:

Week		Focus
1	(High Volume)	
2	(High Volume)	
3		
4		
5	(High Volume)	
6	(High Volume)	
7		
8		

A Coach's Mesocycle Plan

As the mastermind behind each skater's training plans, there are many things to focus on when building towards a peak moment or desired skill set. It is easy to get in a rut and only focus on a few things. Next you will find an eight-week breakdown of key focus points for a coach during a mesocycle. Remember don't forget to apply John Wooden's quote "If you fail to plan, you plan to fail" to yourself, too!



Now it's time to test your own skills and try designing this type of mesocycle, too. Start with some ideas and then take it to the ice – it should be a fluid process. Break down the goal using the week-by-week format of the above chart. Think about your current group of skaters

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and create two sample eight-week mesocycles that will increase their skill level towards any specific skill set goals you choose.

SKATER:
GOAL:

Week	Lesson Plan
1	
2	
3	
4	
5	
6	
7	
8	

SKATER:
GOAL:

Week	Lesson Plan
1	
2	
3	
4	
5	
6	
7	
8	

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Ever introduce something new to your skater that you know will help them but see them struggle during the process? Let's revisit our earlier discussion of volume and intensity. Within a mesocycle when you vary training loads a noticeable delay exists between your increased training demand and the adaptation that follows -- hopefully an increase in performance. This obvious delay (p. 12) has been documented and termed the *long-term lag of the training effect (LLTE)* (Y. V. Verkhoshansky, 1985). This "lag effect" demonstrates that training is a long-term process, not necessarily with immediate results. As mentioned previously, it starts with a vision and some written goals that lead everyone to a specific training plan to ensure proper growth. As the coach you are in charge of tracking performance and adjusting any variables to help move the skater toward their goal.

Consider the following table and any or all of the suggestions for adjusting the volume and intensity of training in the mesocycles you create:

1	Increase the demands for coordination by altering the task.
2	Increase number of competition-oriented repetitions (e.g. beating a previous attempt or performance, chasing personal bests, relay races, direct competition with an opponent).
3	Increase the simple difficulty of the task (e.g. add weight, decrease time, increase distance).
4	Decrease external equipment (e.g. use older equipment, less springy equipment, heavier equipment, more friction)
5	Increase duration of training or number of repetitions during training.
6	Increase task difficulty of training, or shorten training duration while requiring the same amount of training load.
7	Decrease rest time between training tasks.

(Table 4:Harre, 1992)

Most coaches observe and accept that there is a direct relationship between how hard a skater works and the improvements that result. However, sometimes skaters train harder but benefit less than their competitors who train more efficiently and/or intelligently. This means training loads should increase in a purposeful and planned way. As mentioned earlier, this is one of the most important reasons why writing and then rewriting a training plan is necessary.

Studies of changes in training load show that a gradual linear increase in training demands does **not** work as well as sudden (but planned and reasonable) “jumps” in training load. The most important aspect of adjusting training loads is that the new stimulus must produce a significant disturbance in the psychological and physical capabilities of the skater -- meaning they feel tired and sore -- or what is commonly known as fatigue. This is precisely why the new training buzz phrase is that the skater must be "comfortable with the uncomfortable." (Siff & Verkhoshansky, 1993; Verkhoshansky, 1998; U. Verkhoshansky, 1981; Y. Verkhoshansky, 1998; Y. Verkhoshansky & Siff, 2009; Y. V. Verkhoshansky, 1985, 1996, 1977).

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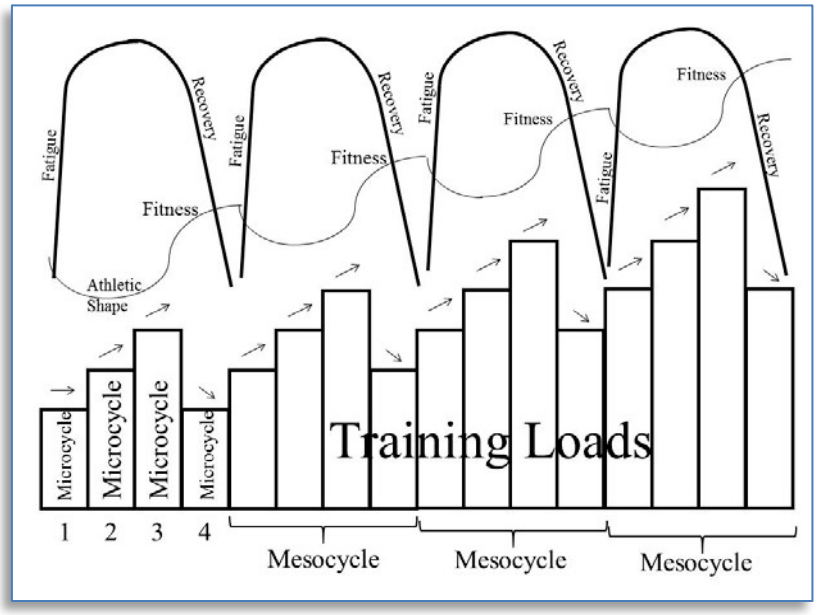

(Figure 6. Relationship among fatigue, fitness, training loads, and periodization concepts.)

It is almost impossible to predict exactly how much you should increase training loads due to the very real inability of a universally accepted measurement which can express magnitudes of increasing loads in common units for all sports and all athletes (Sands, 2015). However, it has been shown that regular but slight increases in load demands do not lead to enhanced performance for extended periods. Thus, the expression, "A medium training stimulus gets you nothing." Deciding the precise changes in training loads becomes complicated by the obvious variations in a skater's responses, recovery as well as their unique physiological systems, as discussed previously.

Training loads can be characterized as both internal and external loads. Internal loads refer to things like rate of perceived exertion, heart rate and lactate accumulation. External loads refer to things like the sets and repetitions that an athlete completes.

Recently, Professor Carl Foster has created a formula for determining training loads:

Training Load = Rate of Perceived Exertion x Duration of Workout

For example, if a skater feels he/she worked hard on a session and selects 17 from the Borg RPE scale (see appendix) and skated a 45 minute session, then the training load is 765 training load units. The above formula is easy-to-use and quite simple since RPE is a self-selected score times the number of minutes of training. Many coaches use this or some version of it in the first go-round of training monitoring. It's an important step and a helpful metric, but not nearly scientific enough. While coaches clearly need to know more about training loads than how the athlete feels about our training plans, this formula is a step in the

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right direction. Who knows what future research and technology will provide for both coaches and athletes of all sports?

An overall summary statement and guidelines for your decision making process when it comes to training loads is shown below:

Overall Summary Statement:
Any increase in training loads must be sudden, substantial and systematic.

Guidelines:

1.	Your skater should participate consciously in the training and not simply “put in the hours.”
2.	Just like a map and compass analogy, training demands should be directed based on the overall long-term goal but with a sensitive awareness of the current capacities of the skater.
3.	Abrupt increases in training loads should be substantial forcing the skater to "reach" in order to meet your demands.
4.	The coach(es) should be aware there are many sources of stress present in everyday life outside of the ice rink. Any addition to the training plan will require the elimination of something so as not to overwhelm the skater.
5.	Varying training is important. Your skater will tend to adapt to the stress of a new and increased training load within two to six weeks. This is why it becomes important to systematically change training loads throughout the course of the season.

(Table 5: Adapted from Sands, 2015)

Tapering

One of the most important elements in a periodization plan is what is known as the **TAPER**. The word “taper” means to "deload" or gradually decrease training stress, force, loads or capacity. In practical terms for figure skaters this means doing less jumps and program run-throughs -- reducing the volume -- but mentally maintaining or increasing the intensity so that a skater’s peak performance is timed with a key competition usually a championship event. Training frequency can also be reduced dramatically, however, through all of it, you must maintain intensity or risk rapid detraining.

By the time you begin to taper, the heaviest training loads associated with skill acquisition such as jumping and spinning will be reduced. Instead, the focus on refinement, consistent performance and "clean" skating will be the main objective. No discussion of tapering can be complete without an analysis of the body's three energy systems and the physiological effects that result from sport participation and training as was discussed earlier in this workbook (pp.21-24). During a taper, many of these physiological changes mark a return to normal for energy systems that have been heavily taxed by months of high mileage and intense workouts (Latter, 2014).

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So how does this physiological information apply to tapering before a competitive event? At the start of the season, when skaters begin training, acquiring new skills and learning increasingly harder elements, they regularly breakdown muscle fibers during this "pre-season" mesocycle. This process though tiring allows their muscles to grow stronger. When this breakdown happens, skaters experience “fatigue” usually defined in their terms as “my muscles hurt or are sore” and in scientific terms as a reduction in force capability with the following symptoms:

1. An inability to produce an expected force
2. An inability to maintain an expected force
3. An inability to maintain a particular skill performance as expected

From a physiological standpoint, the skater may also experience a decrease in creatine kinase in their muscles and blood after prolonged exercise. CK is involved in the reversible reaction of ATP to PC and ADP (p.20). Nowadays, the presence of CK is commonly used in evaluating cardiac health because the enzyme is too large to make it out of the cell without rupturing the cell member. So, if CK appears in blood then there's an indication of muscle damage. When testing for this marker it may or may not be an indicator that athletes should feel less fatigue as several factors such as age, gender and type of exercise may affect CK levels (Bompa, 1999; Baird, Graham, Baker & Bickerstaff, 2011, Sands, 2009, 2015).

The above symptoms are the specific reasons stretching, proper nutrition/hydration and recovery become so important. By the time they reach "in-season" -- the period that includes more than one taper -- they have acquired the skills and built the strength required to perform them in their programs. So theoretically, there will be less “breakdown” of muscles since they should be in what is more of a “maintenance” training mode.

Typically in figure skating, volume refers to the number of skills performed or programs completed and the intensity is either the number of skills per minute or the difficulty of the skills. As the **VOLUME** of doing skills increases (jumps, spins, footwork and programs) increases, the **INTENSITY** of the skater naturally lowers. If you graph these variables specific to a skater’s effort level this creates an “X” curve similar to the one in Figure 4 but with different parameters. Although this will vary as training progresses, being in the center of the “X” zone on your skater’s graph should produce the best results for program and skill completion within any given training cycle but especially during the taper. This “X” zone marks the “sweet spot” for the skater in terms of building confidence in their training process. Keep this in mind as you discuss training strategies with your skater, create plans and progress through lessons. Below are three different examples that show how a coach and skater can vary repetitions on the low, medium and high side. Can you identify each one? All can be effective depending on the “time” as shown. You can use this graph to discuss time as it relates to a certain point of the season, a specific training day or even a specific, unique session.

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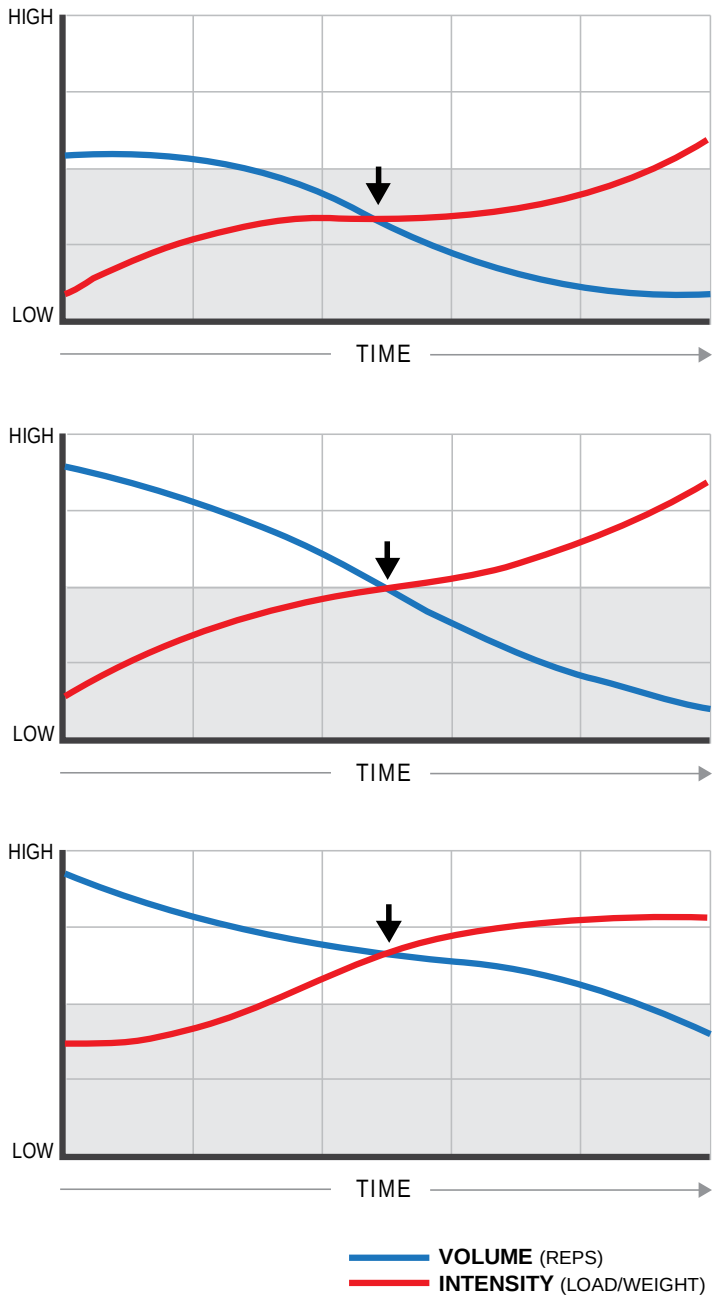

(Figure 7: Volume and Intensity "sweet spot": low, medium and high differences)

As you will see in the graph on the next page, the closer a skater gets to a "pre-season" competition (week 4), jump reps will begin to decrease as section and program reps increase. Simply put, this gradual de-loading of volume allows the skater to feel confident and strong without being over-trained. When the skater is "in season" the mesocycle design before a major event would look different. Can you explain how and why? If you are unsure refer back to the elite macrocycle on page 25.

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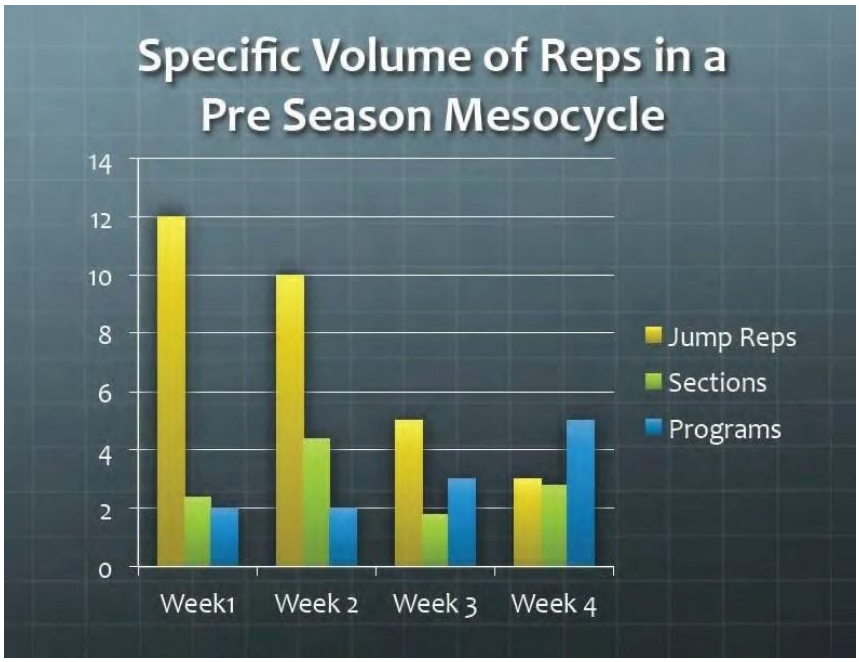

For many skaters, the taper/peaking point will be unique and different. However, it is very important that intensity be maintained while volume is reduced during the actual taper. Additionally, an exponential decrease in volume has been shown to be most effective as the above graph indicates. No matter what the objective, these concepts stay the same when creating a taper. For elite competitive skaters the most important competition is their national championship. For many competitive skaters perhaps the most important competition is their specific regional championship, typically held in October. For beginning skaters, the peak performance may be a local club competition or a solo in your rink's ice show.

In Figure 8, follow the taper pattern from the sample mesocycles on page 25 and Figure 6 on page 30 which show the "build" followed by the "taper" in order to maximize your skaters' performances. As a coach, the goal is to identify the key date(s) and then plan **backwards** from there. Create the skater's weekly training plan from the target date, setting specific objectives across the timeline from the key competition to the present point in training. **Remember: Do not plan more than four consecutive training days off when you are in season because this can contribute to detraining** (Sands, 2009). Modern understanding of peaking and tapering indicates that a taper usually manifests from 0.5% to 7% recovery-adaptation (supercompensation) within about two weeks (Mujika, 2010). Unfortunately, the duration may vary quite a bit from as little as a few days to as long as a month or so. Thus, if training is ceased, you can expect detraining in your skaters to occur fairly rapidly.

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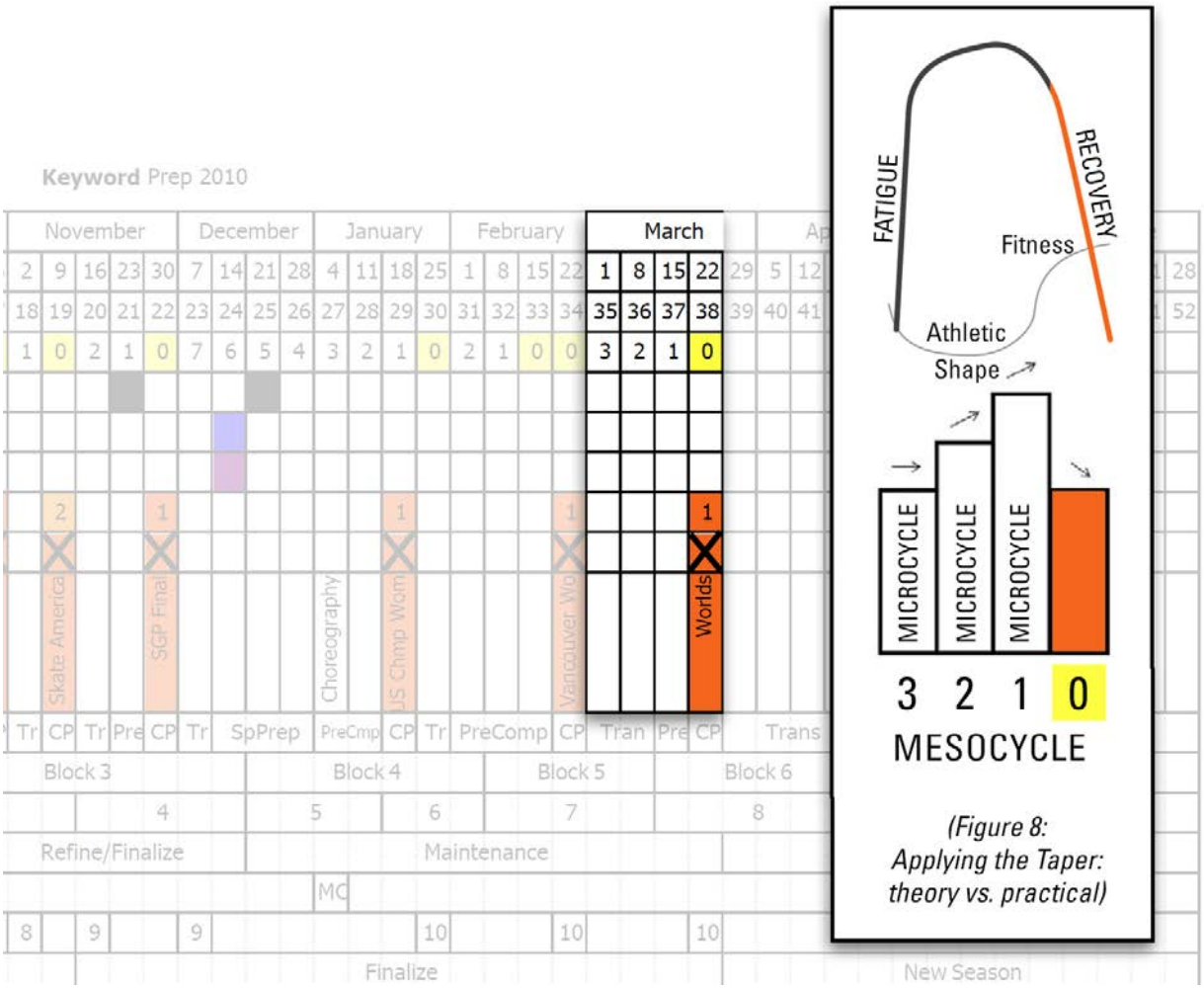

(Figure 8: Applying the Taper: theory vs. practical)

As mentioned previously, the key to effective tapering is maintenance of intensity. Always keep planning, trying and learning in order to perfect the detailed variations required for each skater. Planning a taper within a periodized training plan can be easy to understand in theory but challenging to implement in reality. It is not a linear process and you must be able to figure out when to push your skaters to keep reaching and when to pull back and advise more recovery modalities.

My observation is that many figure skaters tend to deload too early prior to a competition and this results in underperforming. I have learned a great deal from **Inigo Mujika,** who is well known for his work with Australian swimmers when I attended a presentation he gave at a United States Olympic Committee Training Design Symposium in 2009. If you have questions right now and are curious to learn more about tapering, then Google his name and read through his research. Your coaching will always benefit from reading more, learning more and personally inquiring about various training methods.

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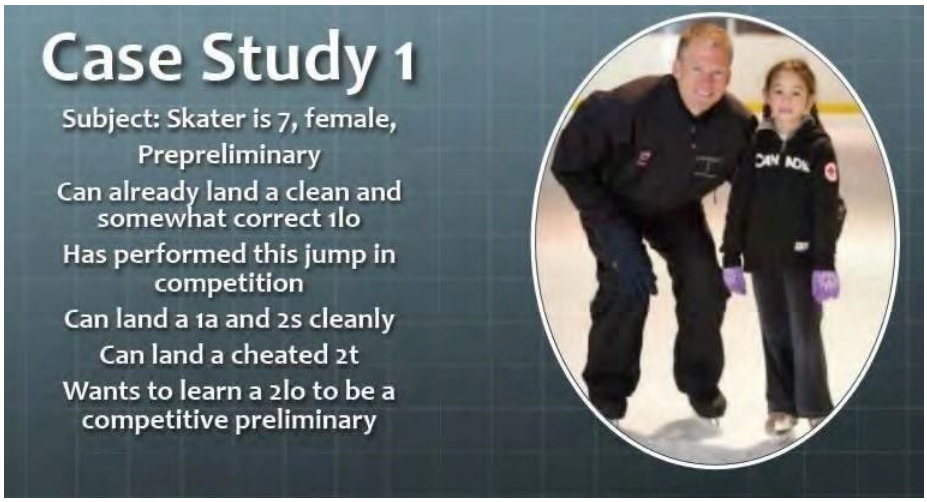
Putting "It" Together: A Case Study

Let's take a look at a specific case study. In this example, we have a seven-year-old female skater at the pre-preliminary level looking to become a competitive preliminary skater.



Coach Tom Z and skater, Aliya Prince (Photo courtesy of Jenae Lopez)

To design a basic training plan based on her goals, we must next begin with the **coach's goal**. Yes, coaches can have goals, too, just like they have plans. In this case, the coach's technical goal of obtaining the proper air position for the duration of flight is based on the skater's goal of learning a double loop.

- **Head straight and eyes up**
- **Shoulders level and neck visible**
- **Arms pulled into a cylindrical position with elbows pointed down**
- **Core balanced, slightly forward**
- **Right leg straight and dorsiflexed**
- **Left leg plantar flexed but not necessarily straight**

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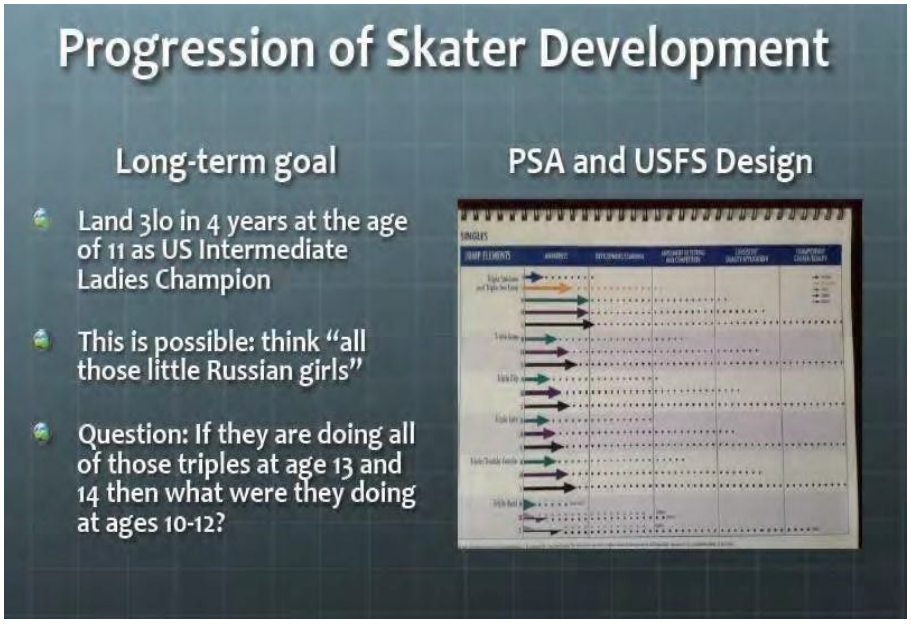
Next, we'll look at the ***progression of this technical goal through various training cycles*:**

- **Microcycle** **Week 1:** Proper air position on single loop jump
- **Mesocycle** **Week 4:** Proper quality of single loop in compulsory program at first competition
- **Mesocycle** **Week 8:** Applying proper air position to all single jumps with 70% or greater consistency
- **Mesocycle** **Week 12:** Proper quality of all single jumps through single axel at next competition

A few additional goals will ensure this skater reaches the next level in the following season:

- **Macrocycle** **Week 32:** Take and pass Preliminary Free Skating Test after regional championship
- **Macrocycle** **Week 36:** Perform double loop jump cleanly during lesson
- **Mesocycle** **Week 4 of 2017:** Perform double loop jump cleanly during the first competition in the Preliminary Free Skating event



Using the specific markers outlined in this chart from United States Figure Skating and the Professional Skaters Association "Progressions of Skater Development" you can build effective, competitive long-term plans for your own skaters' development. These guidelines will assist you in coaching well rounded skaters who make consistent progress and achieve critical element markers at each level.

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Let's revisit the weekly **microcycle** previously described on page 11, and apply it to this case study example:

Remember:
Each week's microcycle is a mix of light, medium and hard effort days.

Always come back to this concept and work from there to build both the training plans for your skaters and your personal coaching lesson plans. The following is a specific **LESSON PLAN** example with the skater's goal in mind:

WEEK 1

Day 1: *Monday, 50 total minutes*

1st 20-minute on-ice lesson of the week:

- Review power angle in forward and backward squats: head, shoulders, hips, knees, ankles, toes and vice versa.
- Emphasize nose staying in line with belly button as the core body moves (this is the technical cue head straight or right)
- One rotation jump standstill (use of right arm for torque as the rotator creator)
- One rotation "bell" jump ten times on diagonal moving backward to forward

2nd 20-minute on-ice lesson of the week:

- Progression of single loop jump around a circle (12 reps)
- Proper knee and ankle action
- Use of free foot as it leaves the ice
- Scissor of legs on knee bend - Inside 3 cross-Back crossover-Standstill drill

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Off-ice lesson, 10 minutes:

- Proper squat - Frog hops
- Air turns (side by side)
- Loop jump (legs crossed)
- Concept: left leg moves to the right leg and the right leg moves to the left leg. Walk through this. Explain difference between toe loop and loop jumps.

Use the above examples as a starting point to get creative with your on and off ice lesson plans. Finish the rest of the week on your own. Fill in lesson plans for Tuesday, Wednesday, Thursday, Friday and Saturday. I've included an example of the second off ice lesson for the week on Wednesday. Remember steady organization of your private lessons contributes to an effective plan that in turn will create extraordinary results!

Day 2: *Tuesday*

20-minute on-ice lesson:

Day 3: Wednesday

20-minute on-ice lesson:

2nd off-ice lesson, 10 minutes:

- Rotation drills on the land harness only
- Air turns
- Single and double loop jumps
- Jump clicks
- Back spin

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Day 4: Thursday

20-minute on-ice lesson:

Day 5: Friday

20-minute on-ice lesson:

Day 6: Saturday

20-minute on-ice lesson:

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Managing Multiple Skaters

Staggering For The Coach

In the above example, you can see that "Pre-Season Week 1" for an elite skater corresponds with "In Season Week 13" for a regional level skater. Coordinating and varying the plans associated with these skaters of different levels is an important concept. In the case study example on page 36, the goal of achieving a proper rotating position can be applied to the learning of any jump, for any skater, at any developmental level, from single jumps to quads. Simply keep the key elements and principles in mind and watch how you can apply them when working with all of your skaters, no matter where they fall in the stagger.

Not to underestimate the challenge of this, varying training for each skater can be a "Gold-i-Locks" problem, according to Sands. Do you remember the children's story of the Papa Bear, Mama Bear and Baby Bear? The Bears had made porridge and left for a walk while the porridge cooled. When Gold-i-Locks entered the Bears' house and tried the porridge, she found one too hot, one too cold and one just right. When she grew tired and tried the beds for a nap: one was too hard, one was too soft and one was just right. The story emphasizes the role of an optimal choice rather than a minimal or maximal choice. Optimization of training seeks to achieve an ideal rather than simply increasing or decreasing some characteristic (Olbrecht, 2000). The same should be true when varying training loads for individual skaters. I call this concept aimed at manipulating training loads within a cycle "topping up" when the coach and skater decide to increase the training load or "topping down" when they decide to decrease it. This choice usually involves a detailed conversation between coach and skater. A necessary point to keep in mind is that simply increasing training loads does not always result in increased performance (Olbrecht, 2000). Now would be a good time to review to volume vs. intensity sweet spot discussion on page 33. All other things being equal, a skater who trains twenty hours per week is likely to improve more quickly than a skater who trains ten hours per week. However, a skater can also train too much without substantial improvement. Consequently, a skater who trains too little may fail or achieve little if any results. As in the case of the three bears, any athlete must train, neither too hard nor too little, but just right (W. A. Sands, 1992, 2007b).

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Track And Record Progress

When creating plans during a macrocycle, keep in mind the end goal. In my mind, and for many top skaters, there is only one competition and that is the Olympics. To reach that goal, a skater should seek to measurably improve each week of their career, perhaps targeting a range of 3-5% (Sands, 2009). That is why I truly believe a skater must train through many competitions. Everything a skater does should lead up to their target moment. Competitions and performances help each skater grow and build confidence. Recording progress, watching for areas of opportunity and areas of competence are **all** so very important because repeated poor performances, tests or competitions in a row can both adversely affect a skater's confidence and mental toughness (Silby, 2000). Monitoring the training weeks when the skater is "in season" and in maintenance mode leading up to a taper is a challenge since many variables within the process are always changing -- including the skater who is constantly growing. As a coach, you will become a master of taking in and synthesizing information to guide your skaters to their best output and performance on a day-to-day basis. Keep in mind that even though you may be applying scientific principles, this is still a trial-and-error process.

Of course, for you as the coach, the key to managing this process becomes challenging with multiple skaters. Creating logs, worksheets or lists to help you track the various markers, objectives and goals makes it easy to measure progress and constantly re-align goals based on the weekly objectives that are achieved. Find the worksheet format that works best for you and create your own shorthand.

A few examples of what I like to record:

- Track consistency of jump elements
- Track achievement of spinning levels
- Track quality of program run throughs

Each and every training marker your skaters are achieving can be tracked on simple printed worksheets (or on a tablet) like the example on the next page that focuses on:

- Speed into all jump elements
- Overall speed in various skating scenarios
- Lap speed after the program run throughs

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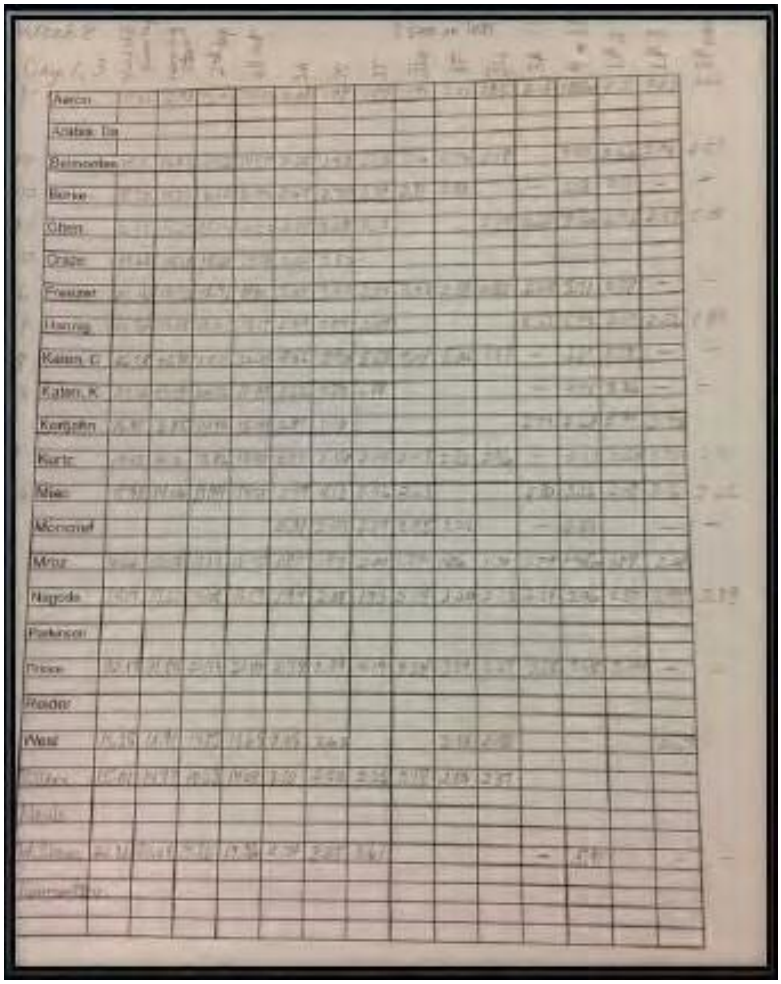

A basic periodization worksheet sample is included in the appendix and is easy for coaches to fill out. It includes all of the very specific areas of training your skaters should complete daily. You can check off which ones are most important within each cycle such as writing daily goals and completing an off ice warm up and cool down. Check out the worksheet for a printable example you can use with your skaters.

Coaches, writing training plans and tracking progress may seem like a lot of work, but the results will be worth it and you will notice how easy it is to apply the methods and system you will create not only with one skater but across your team of skaters. Since no two skaters are the same, no two plans will be the same, but as you adjust to creating detailed individual plans, this process will become second nature to you. Your skaters training plans will be staggered depending on their levels, but you will observe areas of crossover/overlaps throughout your team. What may start as an intimidating and overwhelming process will end up being a fluid, exciting and dynamic process. I promise;) And remember, as mentioned previously on page seven, what gets measured gets done! Finally, if you have any questions, please e-mail me at tom@coachtomz.com.

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Training Camps

Just as many skaters come to the Broadmoor World Arena for the Rising Stars Mini Camp as well as for weekly or monthly visits during the summer, I sometimes have attended Audrey Weisiger's *Grassroots 2 Champions Supercamp* with my elite skaters such as Max Aaron and Mirai Nagasu. This becomes a challenging addition to their summer training. When skaters change their training patterns as part of a periodization plan, this creates what is called "muscle confusion" and can allow for even more supercompensation during a mesocycle (Sands, 2009).

At the Olympic Training Center in Colorado Springs, athletes of all sports often come to do what is called a "training special". These trips are not only valuable for rejuvenating and stimulating training, but offer the opportunity to skate in different environments, take specialty classes and broaden as well as adapt their skill sets. I encourage you to try and incorporate trips like this into your skaters' periodization plans at key points during the preseason as the benefits are obvious. Training cycles aside, these trips also can be very helpful at critical moments in the developmental process depending on the age and level of your skater.

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Conclusion

Writing basic training plans requires skills and knowledge from many areas. Your skater's goals are the starting point. As the primary coach having a vision to break down those goals into smaller objectives that are achieved at various times during the season is the process of periodization. Just as your skater must practice in order to improve, you must also practice writing training plans that will help your skaters reach their goals. Communicating the objectives of the micro and mesocycles to everyone on the high performance teams allows both parents and support coaches to work together effectively.

Systematic hard work over a specified time generally leads to the proper development of the skater and achievement of a goal. Hopefully you have learned a lot about the importance of periodization and planning. With a little work and creativity, you will not only have fun with planning, but will enjoy seeing measurable results. Turn to the next page for a short quiz to wrap things up.

Coach Tom Z's Top Six Training Tips

1. Make sure your skaters map out a **weekly training plan** in spreadsheet format that you approve (p.8).

2. Write a **daily training plan** for your skaters so that they know what you want them to do and when you want them to do it (p.9).

3. Vary training by day in terms of duration and intensity: **light, medium and hard days** (p.11).

4. **Organize exercise selection** and training decisions for key mesocycles (p.13-15).

5. Know each skater's training **"sweet spot" and how to taper** before a major competition (p.31-33).

6. Be **creative** and make training **fun**!

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Quiz

Test your periodization knowledge with this short, fun quiz. Then have your athlete take it and see how much they know. This can become a starting point for important discussions about training.

You need a minimum of _____ to prepare and feel confident for your first major competition.

A. 3 Weeks
B. 2 Months
C. 4 Months

Once you begin training, your body detrains after _____ so plan your time off wisely.

A. Three days
B. Four days
C. Four skating days but not counting normal time off on weekends
D. You never detrain if your mind doesn't think so

Building the myelin pathway from your brain to all of your muscles requires repetitions. Once this pathway exists,

A. Consistent stimulation is necessary to maintain it.
B. The more repetitions you do, the stronger and quicker the pathway becomes.
C. It never needs to be re-stimulated because you are set for life.
D. A and B only
E. A, B and C

The myelin pathway for a skill and the myelin pathway for your entire long program are separate pathways and stored in different parts of the brain.

True or False

You must form a myelin pathway for expression and interpretation from your brain to the different muscles in your face.

True or False

If you want to make any kind of change in your training, for example, skating faster or getting your feet tight – you must emphasize it _____ of the time in your mind while you are training.

A. 95%
B. 100%
C. 99%
D. 95% if you are not talented, but only 50% of the time if you are talented

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Being tired is common when you are training so it is never an excuse to stop training. List 3 things you can do to minimize this negative physical effect of training.

A. _____

B. _____

C. _____

Practicing skating _____ *while training* _____

A. improves your health as a human being/contributes to your fitness level as an athlete.
B. improves your fitness level as a human being/contributes to your overall health as an athlete.
C. is fun/sucks
D. A and C

If you improve 3-5% _____ *you will become an Olympian because that is what they do.*

A. most of the time
B. at least every other week
C. every week of your career
D. most every week of your career

Once you are trained, you do not need to train to maintain your abilities. This is what causes overtraining.

True or False

Thank you for trying the QUIZ! Wondering how you did?

The answers to this quiz are revealed in a video post at Coach Tom Z's website. Check out "Periodization Video 3" at http://coachtomz.com/video/#post15 to get the answers!

Still have questions about periodization? Submit them to: tom@coachtomz.com

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APPENDIX/WORKSHEETS

How you track the training and progress of your skaters is a creative process. On the next few pages you will find examples to help you create your own system.

EXAMPLES

Skater: **Date:**
Circle One: **Short** **Long**
Circle One: **Late On** **Early Off**

Elements		**GOE**	**Presence**	**Sparkle**	**Fall**
2T+2Lo					
2Lo					
Fly spin of choice					
2S					
CSSp					
2A					
Chsq					
2F+2T					
2Lz					
Seq 2F+1Lo+ 2S					
LSp					

***In this example for a younger, developmental skater you might use words such as "Presence" or "Sparkle" but for a more advanced competitive skater you could adjust your word choice to reflect a more advanced focus and understanding of performance.*

We recommend using pencil when filling out this worksheet.

Notes:
You may add additional comments or tasks for your skater to focus on that may not be listed above.

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Name: Date:
Circle One: **Short Long**
Circle One: **Late On Early Off**

Elements	**Level**	**GOE**	**Choreo & Style**	**Interpretation & Feeling**	**Revs**	**Spin Duration**	**Fall**	**Stamina**
Notes:								

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BLANK WORKSHEET

Name: **Date:** *Circle One:* **Late On Early Off**

Circle One: **Short Long**

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SKATER		DATE			
Season: (circle one)	**Transition**	**Pre-Season**	**In Season**	**Early Off**	**Late Off**
Tech. Skills Devel.			Off-ice training focus		
Spins			Ballet		
MIF			Pilates		
Jumps			Strength		
New Items			Jump Drills		
Exercises			Yoga		
Goals			Other		
Session 1	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Goals	Yes _ No	Yes _ No	Yes _ No	Yes _ No	Yes _ No
Warm Up	Yes _ No	Yes _ No	Yes _ No	Yes _ No	Yes _ No
Cool Down	Yes _ No	Yes _ No	Yes _ No	Yes _ No	Yes _ No
MIF/Stroking					
Warm Up/Basic Jumps					
Spins					
Components					
Jumps/Programs					

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Year	

TRAINING AND COMPETITIVE SCHEDULE

Player :		Date of birth		Primary Coach	

		PHASE 1				TRAINING CONTENT			
Wk begin	TOURNAMENT	Rating	TRAINING	Rest	TECHNICAL	TACTICAL	PHYSICAL	MENTAL	Volume

		PHASE 2				TRAINING CONTENT			
Wk begin	TOURNAMENT	Rating	TRAINING	Rest	TECHNICAL	TACTICAL	PHYSICAL	MENTAL	Volume

(Sands)

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6	No exertion
7	
8	
9	
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	
20	Maximal exertion

BORG RPE SCALE
(Rate of Perceived Exertion)

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An example of a skater's daily practice sheet:

GOAL SETTING * HARD WORK * CONCENTRATION * REPETITION

REVIEW GOALS *before* you get on the ice
OFF ICE WARM UP: Jump rope, dynamic stretches, jump class rotations and landings (10-20 minutes)

Stroking (5 minutes):
Power lap (Fernandez)
Power circle (Hanyu)
Footwork from programs (Chan)
Spiral sequence (Medvedeva)
Field moves from Becky Calvin's schedule

Rotational Spins (3-5 minutes):
Back spin
Backs spin 2Lo
Choose one variation from the back spin variation sheet

Warm-up Jumps (5 minutes): Choose one of the following
Basic ladder for the week
Waltz, A, 2 Lo, 2A, 3 of choice
Regular ladder
2 or 3T ladder
2 or 3Lo ladder
3-jump ladder
Program ladder

New Jumps and Combos (15 minutes): 6 times each; 10 if land on 1 foot
When practicing the jump do progressions, rehearsals, hop hop stick, tap ups and toeless take offs

Jump Combinations (7 minutes): do each one 3 times
Short program combo
Long program combos includes 3-jump combo
Sequences from long program

Programs (2-5 minutes): do each once per day; repeat a program or section after your full run through
Short
Long

Extra elements (5 minutes):
Other new spins
Short program spins
Long program spins

COOL DOWN Stretches: (10 minutes)

Evaluation of written goals and setting of written goals for the next session

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GLOSSARY OF TERMS

Active rest: very light exercise often coupled with stretching, which helps to maintain strength and recovery without resulting in the breakdown of muscles that happens during an intense workout; also the final training cycle of a season.

Duration: the length of time something continues. This could be the number of weeks in a training cycle, how long you need to practice a certain set of exercises or the length of a program.

Figure Skating: the competitive and recreational sport of ice skating, which includes many disciplines such as: Singles, Pairs, Ice Dance, Synchronized Skating and Artistic Competitions.

Intensity: the load or weight during an activity of a periodized cycle; the amount of strength or energy needed to complete an action or movement. Typically in figure skating, volume refers to the number of skills performed or programs completed and the intensity is either the number of skills per minute or the difficulty of the skills.

Law of Averages: layman's term for high repetition and consistent training that results in strong muscle memory so the skater is able to repeat results of practice in a high-pressure environment such as a competition.

Macrocycle: a training cycle that is over 6 months to longer than a year. This could be a complete season, or an entire calendar year.

Mesocycle: the weeks/months of a training block usually four weeks but between 2-8 weeks.

Microcycle: the days/weeks of a training block usually one week.

Myelin Pathway: the internal biological "cable" that connects your thoughts from your brain to the movement of your muscles.

Periodization: a series of training cycles with varying degrees of volume, intensity and duration broken down into smaller blocks.

Recovery: using various modalities such as massage, ice baths, sufficient sleep, proper hydration and nutrition and stretching to enable muscles to repair and grow stronger after intense training sessions.

Supercompensation: in sports science theory, supercompensation is the post-training period during which the trained function/parameter has a higher performance capacity than it did in the previous one; also known as overcompensation.

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Taper: the gradual, exponential decrease of the physical volume of training while maintaining intensity to coincide with a timed peak performance. For skaters this peak is a key competition.

Training block: a unit of time that creates a long-term plan for athletic training progress. When this block repeats exactly it is termed a cycle.

Tudor Bompa: known as “the Father of Periodization” and author of *Periodization Training for Sports*, which outlines the process of creating periodization plans.

Quadrennial Plan: 4-year macrocycle for an Olympic goal.

Volume: the number of repetitions of a particular movement. Typically in figure skating, volume refers to the number of skills performed or programs completed and the intensity is either the number of skills per minute or the difficulty of the skills.

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ABOUT THE AUTHOR

Tom Zakrajsek (pronounced Za cry sheck) has been coaching figure skating in the United States since 1990. He has coached many regional, sectional, national and international champions, including US Champions Max Aaron-2013, Rachael Flatt-2010 (for 11 years), Ryan Bradley-2011 (for 22 years) and Jeremy Abbott-2009 (for 10 years). In all, his 18 US Champions have won 22 titles.

He has developed Abbott, Bradley and Flatt from the beginning levels of skating all the way to their National titles and the World Team; and with Flatt, the Olympic Games. Tom has taught triple axels and quadruple jumps to more different male skaters than any other coach in the world.

His primary emphasis in coaching is jump technique and training his athletes for competition performance. He takes a great deal of pride in developing skaters from the learn-to-skate to the national and international level. His coaching philosophy emphasizes goal setting, hard work, discipline and the acquisition of life skills.

Tom graduated from the University of Denver with a degree in Journalism and English. In 2001, he received his master’s degree in exercise science from the University of Colorado-CS. In 1999, Tom was named United States Figure Skating Developmental Coach of the Year. In 2009, Tom was named PSA Coach of the Year. This is his first of four planned workbooks. The other topics include goal setting, jump technique and competition readiness.

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