

# **Candidate's Manual**

**Foundation Level**

**Coach**

**Level 2**

**Edited by**

**Kris Korzeniowski**

Draft

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**Editor:** Kris Korzeniowski

**Contributors :** Willie Black , Bebe Bryans, Mike Davenport, Tracy Davenport, Charles Huthmaker, Kris Korzeniowski, Larry Laszlo, Sara Lopez, Joe Murtaugh, Matt Smith, Alison Pollini, Adrian Spracklen, Maureen Simpson, Christopher Swartz, John Wik.

**Original illustrations:** Alison Pollini

**Rowing photos:** Brett Johnson, Kris Korzeniowski , row2k.

**Designer:** Georgia Read / Read Studio, Inc.

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## ROWING GOVERNANCE

The United States Rowing Association (USRowing) is the national governing body for the sport of rowing in the USA, as defined in the United States Amateur Sports Act of 1978. USRowing was founded in 1872 as the National Association of Amateur Oarsmen, the first national sports governing body, and became the United States Rowing Association in 1981 to reflect the broad purposes of the organization.

### MISSION

The mission of USRowing is to provide ongoing opportunities to achieve excellence in rowing in the United States. In pursuit of this mission, USRowing will achieve the following results:

- Steadily increase awareness of rowing
- Consistently grow lifetime participation in rowing
- Provide education on rowing safety, healthy training methods, and effective rowing technique
- Provide standards for all rowers of safe AND fair racing
- Continually improve performance at the Olympic Games
- Maintain fiscal growth and responsibility

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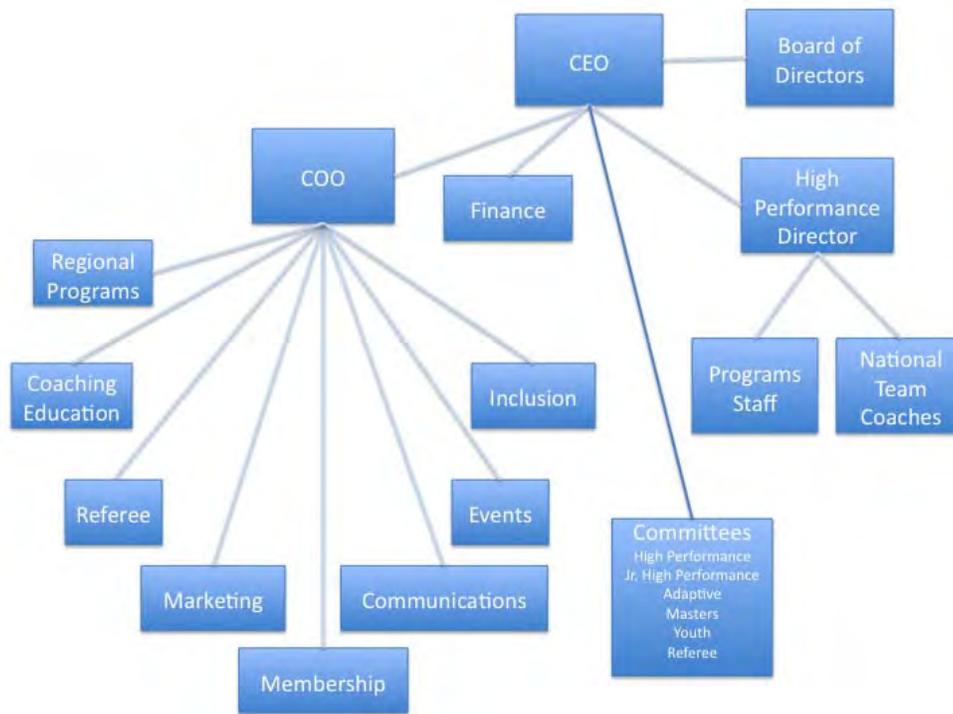
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# BOARD OF DIRECTORS

USRowing's organizational structure is shown in the chart below.

The Board of Directors is comprised of 14 members and their duties include:

- Setting the policies of the Association
- Establishing the annual budget of the Association and monitoring the financial operations of the Association
- Hiring, evaluating and dismissing the Chief Executive Officer of the Association
- Exercising such other powers as may be vested by law



## STANDING COMMITTEES

USRowing is also guided by standing committees. These groups guide and shape the issues of the area controlled by the given committee and report to the CEO. The standing committees are:

- High Performance
- Junior High Performance
- Adaptive
- Masters
- Youth
- Referee

## STAFF

The staff is employed to fulfill tasks and functions detailed in job specifications in addition to outcomes listed in the overall plans outlined by the board of directors, CEO and committees.

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# OVERVIEW OF THE USROWING COACHING EDUCATION PROGRAM

## 1. Goals and Opportunities

The goal for the USRowing Coaching Education Program is to provide our coaches with solid knowledge of how to run a safe workout and how to coach boats efficiently at every level from beginner to the Olympic team.

To achieve this goal, we will provide the following coaching education opportunities:

- Level I, II and III Certification Program.
- Regional coaching clinics and an annual Advanced Coaches Conference.
- Special coaching camps at the OKC National High Performance Center.
- Individual consultations with our expert coach.

## 2. Introduction to the USRowing Certification Program

The new USRowing Certification Program puts an emphasis on the practical aspects of coaching education. We have decided to change the old system because we realized that while coaches had gained a lot of knowledge about coaching in general, there was not enough of a “hands-on” approach in many areas such as the ability to see, teach, and correct the rowing technique; rigging; and preparing appropriate training programs. The new system will introduce:

- More practical class activities during the clinics.
- A comprehensive exam from theoretical material learned at the clinic and online.
- Mandatory mentoring with an experienced coach.
- A final practical assessment by the Evaluator.
- A new Level I structure titled “Learn to Row” for candidates with minimal knowledge of rowing such as teachers, fitness instructors, friends, parents, etc.

## 3. The Learning Process

The first part of the course is “face-to-face” activities, followed by an exam. The coaches will learn through:

- Reading the material in the manual and the required books, articles, and papers prior to the course.
- Watching suggested videos prior to the course.
- Participating in discussions and practical activities in the classroom such as teaching correct posture, teaching rowing technique on the erg or rowing tank, rigging, etc.

Following the clinic, the coach will work with a mentor for a set number of hours. This will include observations and discussions about technique, workouts, safety, and other aspects of coaching on the water.

## 4. Assessment Process

There will be two exams in the assessment process:

- The first exam, a theoretical exam, will take place at the end of the course. The coaches will be checked against the list of competencies.
- The second exam, a practical exam, will take a place after a set number of mentoring hours. It will be run by the coach/evaluator who will follow the Assessment Guide.

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Once the coach has successfully completed both exams and the safety certification requirements, they will be certified at the given level.

### **5. Mentoring Program for Level I, Level II and Level III**

Mandatory mentoring for each level of our certification system is the most important part of the new education program. We recognize that many top international and collegiate coaches came from solid mentoring backgrounds as assistant coaches to established head coaches. Theoretical knowledge came later as a part of their self-education. There is no substitute for practical knowledge.

The mentoring and evaluation requirement for the practical part of the assessment is as follows:

- Level I (minimum of 10 hours) mentoring can be done at the local club/college with the varsity coach.
- Level II (minimum of 20 hours) mentoring should be done at a different club/college with an experienced, varsity coach.
- Level 3 (minimum of 20 hours) mentoring should be done with an experienced varsity coach in the club, during a summer camp, or with the national team coaches during the camps or at the training centers.

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# OVERVIEW OF THE USROWING CERTIFICATION LEVELS

Level	Aim	Requirements
Level I: Learn to Row Rowing Instructor	<ul style="list-style-type: none"> <li>• This program is aimed at the beginner coach.</li> <li>• It is for candidates with no, or minimal, rowing background (teachers, parents, graduates) who will coach beginners of all ages.</li> <li>• The coaches will learn what is expected from them in terms of duties, responsibilities, and ethics as coaches.</li> <li>• The course will teach coaches how to run safe practices and how to avoid accidents.</li> <li>• This course will provide coaches with the basic knowledge of the sport of rowing, teaching methods, and the basics of the rowing technique.</li> </ul>	<ul style="list-style-type: none"> <li>• Familiarity with the USRowing Safety video.</li> <li>• Familiarity with the Level I Manual (booklet and online).</li> <li>• Familiarity with the suggested reading and videos for this level.</li> <li>• One-day coaching clinic, followed by an exam.</li> <li>• 10 hours of post-course practical coaching with the mentor in the club.</li> <li>• The Coach Evaluator will make the evaluation of the practical test, following the Assessment Guide.</li> </ul>
Level II: Foundation Level Coach	<ul style="list-style-type: none"> <li>• This program will train assistant coaches and head coaches on the college and high school levels.</li> <li>• It is intended for people that hold Level I certification and have ONE year as an assistant coach or for candidates with a minimum of four years of college rowing experience.</li> <li>• Level II candidates will know how to run a safe and well-organized program.</li> <li>• They will have a good knowledge of rowing technique and how to teach it.</li> <li>• They will know how to rig boats, develop annual training programs and weekly programs for the different periods of the season.</li> <li>• They will have basic knowledge of physiology, training methods, and testing.</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of Level I online.</li> <li>• Familiarity with the Level II Manual (booklet and online).</li> <li>• Familiarity with the suggested reading and videos for this level.</li> <li>• Two-day coaching clinic, followed by an exam.</li> <li>• 20 hours of post-course practical coaching with a mentor.</li> <li>• The Coach Evaluator will make the evaluation of the practical test, following the Assessment Guide.</li> </ul>
Level III: Performance Coach	<ul style="list-style-type: none"> <li>• This program will train head coaches on the high school and college level, as well as future national team coaches.</li> <li>• The coaches will get a wide range of technical knowledge of the different rowing styles, different problems, and how to resolve them.</li> <li>• They will get extended knowledge of the different training methods.</li> <li>• This program will give coaches more knowledge of physiology and biomechanics and their practical applications (testing).</li> </ul>	<ul style="list-style-type: none"> <li>• Must be Level II certified with a minimum of one year of coaching after certification.</li> <li>• Familiarity with the Level III Manual (online).</li> <li>• Familiarity with the suggested reading and suggested videos for this level.</li> <li>• Two-day coaching clinic, followed by an exam.</li> <li>• 20 hours of post-course practical coaching with a mentor.</li> <li>• The designated Evaluator will make the evaluation of the practical test, following the Assessment Guide.</li> </ul>

# ? A6G71: COACHING PHILOSOPHY – “So, you want to be a coach.”

## Introduction

Welcome to coaching. If you are new to coaching, many new experiences await. Perhaps, you’ve already daydreamed about your athletes being carried off the field on their friends’ shoulders after winning the championship and your friends and neighbors congratulating you for masterminding a perfect season.

Like any profession, coaching has its highs and lows, but if the coach is properly prepared, it can be mostly highs. Join us to find out what makes a coach successful.

## Is it winning races?

Yes, in part, winning is one aspect of successful coaching. Coaches who teach the skills effectively and who nourish the enthusiasm of youngsters are much more likely to win than the coaches who don’t. But a successful coach is much more than a winning coach. Successful coaches not only teach children the skills of the sport, they also teach and model the skills needed for success in our society.

From *Coaching Young Athletes* by Martens, Christina, Harvey, Sharkey, B., Human Kinetics Publishers, Inc. Champaign, Ill. 1981.



Successful coach going into the water

## The goal of this quadrant

With the emphasis on the role of the coach, coaching ethics, and responsibilities, the candidate should be able to demonstrate a good knowledge of how to become a successful coach.

## Learning objectives

1. The candidate should be able to describe the major characteristics of a successful coach.
2. The candidate should be able to describe what is expected from the coach in terms of his roles and skills.
3. Using the coach’s code of ethics, the candidate should be able to identify the major responsibilities in his/her relationships with the athletes.
4. The candidate should be able to describe the values of a positive coach.

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## CHAPTER 1 – Successful Coaching

There are three essential attributes related to successful coaches:

- **Knowledge of the sport** – A coach must know his/her sport very well. Rowing coaches should know how to teach rowing technique, how to train the athlete correctly, and how to prepare the equipment.
- **Motivation to be a good coach** – Regardless of their level of expertise, coaches should try to get better. Coaches should always try to learn something new in order to provide their athletes with the best coaching possible. It is good for coaches to be able to identify their limiting factors and try to improve in these areas.
- **Empathy** – is the “identification with and understanding of another’s situation, feeling, and motives” according to the American Heritage Dictionary (1985). Empathy enables the coach to bring out the best of each athlete’s ability.

Regardless of the age, ability, or experience of the rowers, the coach becomes more than simply the teacher of the skills and techniques of rowing. For youth and collegiate rowers, the coach also becomes a teacher of the skills needed for successful living. For masters rowers, the coach becomes a mentor or partner in introducing new physical challenges and competitive opportunities.

## CHAPTER 2 – The Roles and Skills of the Coach

### The roles

A coach is any number of things to many people, but he or she must always be aware of the influence of these roles on the lives of the athletes. As a coach, you will be:

- A teacher
- A motivator, instilling love for the sport, the race, and the whole process involved
- A trainer, improving fitness
- A disciplinarian, with a fair but decisive approach
- A manager, taking care of logistics, especially with other athletes, club members, educators, and parents
- A fundraiser
- A mentor and friend
- A sport scientist, who is analyzing and adapting
- A student of the sport, who is always trying to become the best coach possible

These roles might happen separately or concurrently, and they may vary depending on the group being coached.

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## The skills

To be successful in the roles mentioned above, the coach must have, or develop, a number of basic skills. Besides having a good knowledge of the sport and an understanding of coaching techniques, he or she must also be able to:

- Organize, plan, and run efficient workouts and a wide variety of programs.
- Observe and analyze performance, looking for the patterns and drawing conclusions.
- Adapt the program to the needs of all participants.
- Communicate efficiently, not only verbally but also by using demonstrations, diagrams, pictures, and videos. Being able to use a variety of communication methods is particularly important when working with adaptive athletes. Encourage athletes to ask questions.
- Improve performance, help the athletes learn new skills, improve fitness, motivate after poor performance, encourage, adjust training programs, add new elements, and support them before, during and after competition.



Meeting with the athletes

## CHAPTER 3 – Responsibilities of the Coach

### The coach's code of ethics

*Every participant in this course is expected to take the "Respect in Sport" course online and make themselves familiar with the USOC Coach's Code of Ethics.*

In this day and age, all coaches need to be aware of and able to handle a variety of issues involved in the world of sport, covering all matters of sportsmanship, doping, cheating, injury, discrimination, sexual harassment, and even the personal relations between coaches and athletes.

**The USOC COACH'S CODE OF ETHICS**, which is supported by USRowing, provides the standards and guidelines for all coaches dealing with many of the situations that appear in our profession. Here is a simplified version:

- Treat each person respectfully and courteously
- Maintain your authority and respect by being professional
- Obey the rules and expectations of our sport
- Keep a safe environment for the athletes
- Exhibit sportsmanship and demand it of your athletes
- Convey empathy to those you coach
- Be fair, honest, and responsible for your own actions
- Treat everyone equally regardless of gender, race, religion, or limitation
- Work to make training and competition enjoyable despite the rigor needed
- Keep winning in perspective
- Refrain from any form of harassment towards your athletes (racial, sexual, or on the grounds of disability)
- Make the interests of the athletes a priority in planning

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## CHAPTER 4 – Coaching Styles

Martens et al., in *Coaching Young Athletes*, described three of the most common coaching styles: the “command style,” the “submissive style,” and the “cooperative style” (p. 11).

- The command style coach makes all the decisions with little or no input from the athletes.
- The submissive coach provides almost no instructions, exerts as little influence on the athletes as possible, and resolves discipline problems only when absolutely necessary.
- The cooperative coach recognizes the responsibility to provide leadership and guide the athletes toward achieving personal and team objectives. The cooperative coach gives direction and instruction when necessary but also knows when athletes should be a part of the decision-making process.

Coaches should select the style that best matches their personality and background.

## CHAPTER 5 – Positive Coaching

A coach who is positive sets up a positive environment. He makes the activities enjoyable and fun. This will encourage more participation and the athletes sticking with the sport.

Positive coaching, in terms of the feedback an athlete receives during practices and competitions, can have a major impact on an athlete:

- It is the most important tool to motivate athletes.
- It encourages athletes to keep trying to improve technique.
- It can reduce anxiety in athletes during the workout and competition.

Being positive can be difficult at times. This may be especially true when a rower makes mistakes repeatedly or is not honestly trying to do his or her best. However, showing acceptance, reacting calmly and positively to mistakes, and giving encouragement and positive suggestions for improvement can be greatly productive, for both the coach and the rowers.

### Summary

Coaching philosophy is simply what a coach is, how she or he acts, behaves, talks, and lives. The athletes analyze all the actions and behaviors of the coach as a model for their actions and behaviors. Coaches must never lose sight of all these different obligations. A coach must remember, regardless of whether he or she is paid or a volunteer, the he or she has legal and moral responsibilities for the safety of the athletes during each practice session.

### Additional Reading

- *Coaching Young Athletes* by Martens, R., Christina, R., Harvey, J., Sharkey, B., Human Kinetics Publishers, Inc., Champaign, Ill., 1981
- *Positive Coaching* by Jim Thompson, Warde Publishers, Portola Valley, Calif., 1995
- *Coaching Mental Excellence* by Vernacchia, R., McGuire, C., Cook, D., Warde Publishers Inc., Portola Valley, Calif., 1996
- *Successful Coaching* by Martens, R., Human Kinetics, 2004
- *Creative Coaching* by Lynch, J., Human Kinetics, 2001

## **CLASS ACTIVITIES**

1. What are the major characteristics of a successful coach?
2. What are the four major roles of a coach?
3. List four aspects of the USOC Coach's Code of Ethics?
4. In a few sentences, describe what it means to be a positive coach?

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## **CHAPTER 6 -- The Changing Face of Rowing: Creating and Sustaining Diversity and Inclusion within Your Program**

Diversity and inclusion in rowing is important for the growth of our sport and for what USRowing wants to represent, which are opportunities for everyone to participate in and enjoy the sport of rowing in a respectful and open environment.

### **Learning Objectives:**

1. To understand the terms and definitions associated with diversity and inclusion.
2. To challenge our views and perceptions of diversity (race, gender, class, etc.)
3. To understand the barriers to inclusion in our sport.
4. To learn “best practices” to create a more inclusive and diverse boathouse.

### **1. Foundations of Diversity and Inclusion in Rowing**

#### **Diversity and Inclusion on the Water**

##### **Then and Now**

- Conversations about diversity and inclusion in athletics, and particularly in rowing, can be difficult.
- To help start the conversation and provide opportunities for traditionally underrepresented populations, USRowing launched America Rows in February 2010. America Rows is a nationwide diversity and inclusion initiative and is aimed at increasing awareness of rowing and introducing the sport to a diverse group of Americans.

##### **Learning what we think about diversity**

- How we think about gender, race, class, sexual orientation, ability status and culture in sport is socially constructed and implemented.
- We learn what the various aspects of our identities signify to the world around us through a lifetime of experiences.
- It is important to critically reflect on these social constructions and ask ourselves which of them are important and necessary to creating diverse and inclusive spaces within rowing and which we need to release. It is equally important to reflect upon those constructions that hold us back, histories that have oppressed for far too long and have kept us from achieving equality.
- Coaches who are better informed can create a more respectful and open environment, provide knowledgeable answers and facilitate optimal performance.
- Be prepared to challenge yourself, your athletes, even your clubs and foundations. Remember that meaningful discussion occurs when we push our own boundaries.

Programs, coaches, and athletes need to move beyond “blindness” (e.g., I don’t see color, I just see athletes -- I’m “colorblind.”) Blindness to difference does not create equality. It is okay to recognize and celebrate differences. Differences are what make us better, stronger, faster, smarter and more innovative.

#### **What is Culture, Diversity and Inclusion?**

##### **Culture**

- Culture is the way of life in a given society.
- It is passed down from one generation to the next through learning and experience.
- Because culture is taught, we have far more control over the culture than we realize. We have to ask ourselves: “What are our values? Who are we? Imagine yourself and your club or team as a brand.

What will your brand symbolize to others?

## **Diversity**

- Diversity is any way in which people differ.
- Of course, people differ in thousands of ways. However, the type of diversity that we are focusing on here is linked to those characteristics that have been made more salient and symbolically meaningful than others (e.g. aspects of people's identities that have historical significance and connections to the denial of power and political voice.)

Often when people hear the word "diversity," they think of two things: 1) Racial Diversity and 2) Numbers/ Percentages. This is problematic since racial diversity is only one of the many types of diversity linked to histories of oppression. Further, even if the number or percentage of minorities (whether by gender, race, sexual orientation, class, culture, religion or ability-status) was equal to that of the majority population, there is no guarantee that their experiences are equal. By believing that quantity is the same thing as quality, we fall victim to the classic problem of creating a false equity.

## **Diversity in USRowing**

Diversity is a core value of USRowing. Diversity for USRowing means that every individual member is valued for his or her differences. The differences include, but are not limited to, appearance, ideas, race, gender, religion, socioeconomic, ethnicity, beliefs, sexual orientation and physical disabilities.

## **Inclusion**

- Inclusion is the process of ensuring that people feel included and valued in an organization or a community.
- If "Diversity" stands for quantity, then "Inclusion" stands for quality. We want to ensure that our participants have a quality experience.
- If we are truly going to sustain change, we have to make sure we are focused on BOTH diversity AND inclusion.

## **Inclusion in USRowing**

Inclusion at USRowing means that the individual's differences are embraced and respected. We are passionate about recruiting and retaining the most skilled professionals and athletes, and we recognize that diversity will strengthen the sport of rowing.

## **2. Race and Culture**

### **Introduction**

"Sport is a contradictory space...the resilience of the notion that sport takes place on a level playing field, outside the relations of inequality and oppression, is necessary in racially inscribed societies that deem themselves not racist. However, the persistence of racism is inextricably tied to claims of the absence of racism." (Douglas, 2003, p. 9)

What is race? What is ethnicity? Where do our ideas about race come from? What role does race play in rowing? These questions are by no means easily answered. However, it is important to recognize that despite a long legislative history of combating racial discrimination and prejudice, racism remains a highly salient part of American culture. As stated by Delgado & Stefancic (2001):

Because racism is an ingrained feature of our landscape, it looks ordinary and natural to persons in the culture. Formal, equal opportunity rules and laws that insist on treating all persons alike can thus, remedy only the more extreme and shocking sorts of injustice -- the ones that do stand out. Formal

equality can do little about the business-as-usual forms of racism that certain people confront every-day and that account for much misery, alienation and despair. (p.xiv)

Thus, the most critical aspect of examining race in today's society is not only looking for what oppressions can be seen, but also for those that cannot.

### **Race**

- A social classification based on physical characteristics such as skin color and hair, rather than biological determinants (Matsumoto & Juang, 2004).

### **Ethnicity**

- Traditions, customs, activities, beliefs and practices that pertain to a particular group of people who see themselves and are seen by others as having distinct cultural features, a separate history and a specific socio-cultural identity (Smedley, 1993).

Our ideas regarding race, ethnicity and the people who belong to certain groups within each come from a variety of places. From birth, our cultures, family groups, friends, media, institutions, etc. socialize us. The characteristics we are born with, the experiences we have had and the choices that we have made all factor into our understanding of race and ethnicity.

### **Minority Participation in Rowing**

Despite the numerous programs working to increase minority participation in rowing and other sports historically lacking in racial diversity, much remains to be done.

### **Dispel the Myths**

One of the first things that must happen in order to enhance diversity and inclusion within water sports, and particularly within rowing, is to begin to dispel the stereotypes and myths regarding minority participation in water sports.

### **Real Reasons for Lack of Participation in Water Sports**

- Availability of safe spaces to engage in water sports
- Lack of adequate public facilities
- Limited access to transportation
- Lack of sufficient funds/disposable income
- Lack of discretionary time (parental and youth)
- Cultural issues
- Stereotypes
- Hair issues
- Peer pressure
- Inherited fear of water
- Non-traditional sports not seen as a priority
- Lack of encouragement and support from parents

*Swimming. (n.d.) USA Swimming Outreach Manual. Retrieved from [http://www.usaswimming.org/\\_Rainbow/Documents/75d58187-5847-40bc-b64a-2d8f0bc6908c/Outreach%20Manual.pdf](http://www.usaswimming.org/_Rainbow/Documents/75d58187-5847-40bc-b64a-2d8f0bc6908c/Outreach%20Manual.pdf).*

### **Activity: Privilege**

Reflect on the following statements regarding race and privilege in sport, which were written based on an article by Peggy McIntosh (1988).

- I can be fairly sure that wherever I go to play sport, people will be neutral or pleasant to me where 'race' is concerned.
- I can go to any college/university and find myself represented in its administration and management.

- I do not have to educate my teammates on the existence of institutional racism.
- I am never asked to speak for all the people of my racial group.
- I can worry about racism without being seen as self-interested or self-seeking.

Take some time to list the ways that you are privileged. Broaden your list by including ways that you are privileged not just by your race but also your gender, sexual orientation, class, culture, language, ability status, etc.

Privilege is not about guilt or about blame. It is about recognizing and putting a name to cultural phenomena. How can you use your list to make a difference in sport?

### 3. Sex and Gender

#### Introduction

Although often used interchangeably, sex and gender have vastly different definitions.

**Sex:** A person's biological make-up of both internal and external genitalia, sex hormones and chromosomes (Wharton, 2005).

**Gender:** A person's own sense of themselves as male or female, as well as the socio-cultural meanings attached by others or given to one's sex (Wharton, 2005).

The distinction between sex and gender is critical. A person can be biologically male but identify with the female gender. And vice versa.

It is important to recognize that stereotypes based on sex and gender also are socially constructed and implemented. They have power whether we consciously think we have bought into them or not. Furthermore, stereotypes create both conscious and unconscious biases.

#### Activity: Implicit Association Test (Harvard University)

Go to the following link: <https://implicit.harvard.edu/implicit/demo/> and take the "Gender Test." Explore your own unconscious acceptance/rejection of male and female gender stereotypes.

### 4. Sexual Orientation and Sexual Minorities

#### Introduction

Dominant ways of knowing divide people into inflexible categories, and evidence supports that as a whole, sport reinforces traditional gender stereotypes while simultaneously denigrating LGBT participants.

Traditional gender stereotypes are created by the dominant culture's beliefs, and we all consent to them despite their oppressive nature (Gramsci, 1971). This is not to say that we do not acknowledge or fight against such ideals, but merely that they become so "naturalized" and taken-for-granted that they are often left unchallenged (Cooky, Wachs, Messner, & Dworkin, 2010).

"While sport has been shown to be homophobic for both gay and lesbian athletes (Griffin, 1998), there are important differences between the two. Women's athleticism in itself is a contradiction to femininity, so female athletes are frequently assumed to be lesbians." (Anderson, 2002, p.866)

**LGBTQI:** Stands for lesbian, gay, bisexual, transgender, queer/questioning and/or intersex.

**Homosexuality:** The direction of one's sexual attraction toward the same sex (homosexual), the opposite sex (heterosexual) or both sexes (bisexual) assumes the definitions of the L-G-B (Griffin, 2003).

**Transgender:** "An inclusive term to describe people who have gender identities, expressions or behaviors not traditionally associated with their birth sex." (Mayer, Bradford, Makadon, Stall, Goldhammer, & Landers, 2008, p. 990)

**Queer:** Historically used to oppress LGBT persons. Recently reclaimed as a positive reference to said persons, while questioning implies an open and "unsettled" gender and/or sexual orientation preference.

**Intersex:** A blanket term, often applied to any person(s) with ambiguous sex characteristics.

### **Activity: Coming Out Stars**

This activity is meant to simulate the coming out process. Don't tell participants what the activity is about until step 3. Once the narrative begins, you can mix up the order in which you tell what happens, though the reactions were written in numerical order here for ease of understanding.

To complete this activity, go to: <http://sait.usc.edu/lgbt/files/ComingOutStars.pdf>

## **5. Best Practices for Diversity and Inclusion**

### **Value Diversity**

- Believe in the moral obligation to provide equality for all persons.
- Appreciate the learning to be gained from working with people who are different.
- Appreciate people for who they are and all they bring to the table.
- Move beyond "compliance" and develop an ethos or culture of valuing diversity

### **Honest and Open Communication**

- Practice and support honest and open communication about the topic of diversity.
- Realize that the leaders in an organization play a vital role in setting the tone for the creation and sustentation of a culture which values diversity.

### **Program Analysis**

- Investigate diversity and inclusion in all areas of your organization.
- Go beyond proportionality.
- Focus on Qualitative versus Quantitative Equality.
- Examine the deeper structures of the organization.
- Explore how and why the organization acts in certain ways and explore the taken-for-granted power and political structure within it.

### **Bold Leadership**

- Make diversity and inclusion a visible priority to YOU and the organization.
- Attend diversity training and hold others accountable to attending AND participating.

### **Mentoring**

- Allow more experienced persons to model, guide and support developing novices.
- It is critical to provide mentors from both similar and diverse backgrounds.
- Support mentorship relationships.

## **Training/Professional Development**

- Engage in educational processes whereby people acquire skills, knowledge and attitudes about diversity-related issues.
- Employers of all professions need to invest in their own employees and allow them to develop their skills and talents.

## **Institutional and Community Resources**

- Broaden your definition of the rowing community.
- Form alliances with other organizations and community partners.
- Break down and challenge stereotypes.
- Encourage rowers to support and volunteer at urban youth organizations.

## **Marketing**

- Work to attract a more diverse fan base.
- Connect to the community.
- Make small adjustments (e.g., bilingual announcements and marketing.)
- Efforts to develop relationships with communities must be forged over time; “one-hit wonders” are doomed to fail.
- The more diverse the organization, the more diverse the fans.
- The more supportive of diversity the organization, the more connected diverse groups within the surrounding communities will be.

## **Recruiting Directors, Coaches, Staff and Participants**

- Focus on the entry point.
- Look to increase under-represented groups in ALL areas.
- Make your hiring process purposeful.
- Go out and find or create strong pools of applicants.
- Widen the net.
- Meet more people.
- Groom promising rowers and organizational participants.
- Bring alums home.
- Look to organizations working to promote diversity.
- Make a goal to always interview at least one minority candidate.
- Go out and find and/or create strong pools of applicants.

## **Retaining Diversity**

- Pay attention to the unique needs of culturally diverse members.
- Adjust leave time, etc. to accommodate cultural differences in holidays or important community events.
- Adapt the physical environment to include cultural artwork, pictures, artifacts to demonstrate concern and commitment to diversity.
- Build a relationship between the organization and the community.
- Provide information to culturally diverse athletes and staff on the formal and informal politics and communication styles of the organization.
- Mentor and develop opportunities for upward mobility, skill enhancement and promotions.
- Create a community and encourage and support the development of support/issue groups of culturally diverse populations.
- Make it social.
- Host luncheons, celebrations to acknowledge cultural holidays or events.

## Tips from USRowing on Recruiting

- Hang your summer rowing camp or learn to row poster not only in the boathouse, but also in the local black barbershop, ethnic hair salons or the Hispanic Chamber of Commerce.
- Personally invite the target group, not by email or website, but face-to-face.
- Recognize that camp fees can be barriers to participation.
- Become a rower in the community not a rower at the boathouse. Partner or volunteer with minority-led and minority serving nonprofit organizations.
- Culturally competent coaches, staff and board members are the difference between a sustainable or disappointing rowing experience.
- Develop cultural competency or cultural specific expertise goals for the coaches, program managers and volunteers.
- Evaluate if diversity is reflective of your surrounding community. If not why not?
- Create an external diversity council made up of the minority community influencers.
- 70% of African American children and nearly 60% of Hispanic children have low or no swim ability; unless addressed upfront, this will be the your predominate barrier to participation.
- Go beyond race and gender and research other dimensions of diversity and inclusion.

## Action Planning for Change

Choose two goals (one personal and one program oriented) for change and outline a plan of implementation.

What will be done? (Action Steps):

Who will do it? (Responsibilities):

By when? (Timeline):

Resources available and/or needed? (Resources):

What individuals or organizations might you enlist to help? (Potential Allies):

Who might resist? (Potential Barriers):

Who is going to be involved? Methods? (Communication Plans):

Evaluation Processes

Evidence of Success

## 6. Resources and References

### Resources

- America Rows: <http://www.usrowing.org/DomesticRowing/AmericaRows.aspx>
- Amphibious Achievement (Massachusetts Institute of Technology): <http://amphibious.mit.edu/>
- Cross-Currents Minority Rowing: <http://www.ccminorityrowing.com/>
- Pacific Crew Deep Water Rowing: <http://www.pacificdeepwater.com/>
- Finding Leaders Among Minorities Everywhere (FLAME) – USOC:  
<http://www.teamusa.org/About-the-USOC/Resources/Programs/FLAME.aspx>
- Philadelphia Community Boathouse Initiative: <http://www.parowing.com/boathouse.html>

- PCBI Youth Development Program: <http://www.parowing.com/pcbi.html>
- Row New York: <http://www.rownewyork.org/>
- Row to the Future: <http://rowtothefuture.wordpress.com/>
- Three Rivers Rowing: <http://www.threeriversrowing.org/>

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# ? A6G72: SAFETY

## CHAPTER 1 – Safety and Risk Management

### Introduction

As a coach, the first priority and duty is to protect the safety of the rowers. Nygaard (1981) describes the following coach's duties in order to reduce risk:

1. Provide a safe environment
2. Properly plan the activity
3. Evaluate students for injury or incapacity
4. Match or equate students
5. Provide adequate and proper equipment
6. Warn of inherent risks in the sport
7. Supervise the activity closely
8. Keep adequate records

Let's look at how each of these pieces fits into the puzzle of risk management and safety in the sport of rowing.

### 1. Providing a safe environment on the water and on land.

#### **Problems on the water**

This chapter should be done in conjunction with the USRowing Safety Video.

Coaches are expected to take their athletes out on the water to practice on a regular basis. **But, there are four conditions when you definitely should not go on the water:**

- *In stormy conditions with lightning and thunder. If you are caught in a lightning storm, try to get off the water quickly.*
- *When there are high waves and white caps.*
- *In thick fog conditions.*
- *In extremely high (above 95 degrees) and low temperatures (below 32 degrees). Rowing in such high temperatures can cause heat stroke, heat exhaustion, heat cramps, and sunburn. Low temperatures (below 32 degrees) can create frostbite, hypothermia, and could be deadly in the case of the athletes falling into the water.*

Here are the other difficult, but common, situations (2- 3 cases every year) that every coach should be prepared to deal with:

#### **Submerged eight with rowers in the boat** (Watch the USRowing Safety Video!)

The key points of the rescue operation are:

- Assess the situation and try to call for help – emergency number in the boathouse, other coaches on the water, Coast Guard, and 9-1-1. It may take a lot of time to get through to 9-1-1, especially when you are on the water without a clear address.

#### **The goal of this quadrant**

Through an emphasis on many different factors including environment, weather, equipment, the athletes, planning, and supervision of the workout, coaches will be able to provide the safest environment for rowing activities, while reducing the possibility of litigation.

#### **Learning objectives**

1. The coach will be able to recognize common, unsafe conditions on land and on water, anticipate problems, and make sound decisions.
2. The coach will be aware of the importance of pre-activity medical screening and matching the athletes in order to prevent injury or an accident.
3. The coach should be able to describe the emergency plan for his or her program.
4. The coach will be able to properly outfit his or her coaching launch and check rowing shells as well.
5. The coach will be able to describe the safety concerns of adaptive athletes in the boathouse.
6. The coach will know about safety information available through USRowing and other resources.

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- Count heads to make sure that you account for all of the rowers who were in the boat. Maneuver the launch next to the shell, but keep the propeller away from the athletes. If the shell is drifting towards a hazard, tie your anchor line to the shell and drop the anchor to keep the shell from drifting any further.
  - Turn off the motor and distribute life vests to everyone.
  - Help as many rowers as the launch can safely hold and take them to shore.
  - Make sure there is someone on the shore or at the boathouse to tend to the athletes and who can call 9-1-1 if needed.
  - Return to the swamped shell to collect the remaining rowers.
  - If the athletes are in good care, return to the swamped shell, load the oars into the launch, and tow the shell back to the boathouse.

### **Capsized boat in the water** (watch the USRowing Safety Video!)

The key points are:

- Get the athlete(s) back into the boat, either by him/herself or with help.
- If that is not possible, the athlete should stay with the boat and wait for help.
- Athletes should not try to swim to shore.
- In cold water, athletes should try to keep their bodies out of the water as much as possible.

### **In hot or humid conditions:**

Avoid intense or very long activities. Limit the number of races for the athletes on extremely hot days. Monitor the athletes for symptoms of heat illness like tiredness, headaches, cramps, sunburn, nausea, sweating, or even fainting.

- In case of heat illness, be prepared to pull the athletes out of activities, lay them down in a shaded, cool place, make them drink a lot, and place wet towels over them.
- To avoid sunburn, it is advisable to always wear a t-shirt and hat and use sunscreen.
- Drink, drink, drink – before and after activities and in regular breaks during activities. The athlete should never feel excessively thirsty.
- Plain water is an effective fluid replacement; supplement it with sport drinks in extremely hot and humid conditions.
- Wear polarized sunglasses to protect your eyes. Severe eye damage can happen while on the water.

### **Cold and/or wet conditions:**

- Avoid standing in wet and cold weather for a long time. For instance, conduct a meeting after the workout in the boat bay.
- Have dry clothes to change into.

### **Stay warm in cold weather**

- Wear a hat and layers of clothes to stay warm. The layers should include “technical” wear – clothing that retains heat even when wet and can wick moisture away from the body. Cotton should not be worn if the weather is very cold or wet.



**Stay warm in cold weather, dress properly**

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- Cold can be life threatening if an athlete goes into the later stages of hypothermia. Symptoms to watch for include feeling cold, turning bluish, shivering and then uncontrollable shivering, numbness, apathy and lethargy, disorientation, and finally, loss of mental capacity.

### Problems on land

Many of the same weather issues are applicable to land training including lightning, heat, and cold complications.

- Plan safe venues and routes for running or any other activities done outside.
- Create a safe venue for any training while using rowing machines, weights, or other equipment at the boathouse or other facility.
- Many accidents occur while moving equipment; make sure this is done safely and with an adequate number of people.

## 2. Proper Planning

Coaches invest a lot of time on planning workouts. A significant amount of time should be spent on how to make those workouts safe. Proper planning should involve developing emergency procedures.

Read, review, and discuss your program's safety procedures and protocols on a regular basis.

- It is absolutely critical that you make sure the areas where you plan to practice – on both land and water – are safe.
- Have a good knowledge of your waterway. Know the location of submerged objects, blind corners, pilings, and boat crossings. Alert your coxswains about any potential dangers.
- Know the traffic pattern, especially during races.

### A poor course during the race can lead to an accident.

- Post a map inside the boathouse with all of the information about the safety issues, traffic patterns, emergency contact information (EMS, water patrol, USCG), etc.
- Have all emergency contact information in the motorboats.
- Know that your equipment, both the rowing shells and the training equipment on land, is in proper working order.

One of the critical things that you can do to limit risk is to ensure that you have reliable communications to emergency medical services (EMS) and other coaches when you are on the water. A cell phone or radio must be available for every coach.



**Know the traffic pattern, especially during races**

## 3. Evaluation of Athletes

One of the best ways to reduce the risk of athletes being injured is to make sure they are physically sound. No rower should participate until he or she has been examined by a physician. When your season begins, rowers should be evaluated by coaches for such factors as their fitness level, flexibility, injuries, and preparedness for physical and mental exertion.

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You should also evaluate the swimming abilities of your athletes. Your concern is not whether your rowers can swim well, but whether they can survive in the water. Even good swimmers do not always survive the shock and panic of sudden immersion in cold water. Coaches should also complete a swim test.

#### **4. Matching of Athletes**

- Matching activities with the participant's fitness level, skills, age, and size.
- Matching participants within the group by age, skills, and strength.

#### **5. Safe Equipment**

- Shells need to be rigged properly for comfort and efficiency.
- Make sure that all the nuts and bolts are tight and the oarlock's gate closes properly.
- Bow ball fitted and secure.
- Bow and stern compartments are sealed.
- Heel safety straps are placed and tied.
- Other equipment – docks, launches, racks, ergometers, weights, and trailers -- must be checked regularly.
- Do not risk using equipment that is unsafe.

#### **6. Safety of a Coaching Launch**

- When in a launch, your priorities are twofold: to ensure the safety of the rowers and to teach the sport of rowing.
- You and everyone in the launch should be wearing a life jacket.
- If the engine has a kill-switch with lanyard, it should be worn by the person driving the launch.
- When you are coaching, it is advisable to have someone else in the launch with you. An extra set of eyes can make a surprising difference.
- Make sure the launch is properly stocked, as required by law, and includes other safety equipment. That might include such items as a tool kit, a first-aid kit, lights, anchor and line, paddle, life jackets, sound-generating devices, and other items.
- Many of these items are included in the USRowing Kippy Liddle Safety Kit. Contact USRowing headquarters for more information.
- The launch and rowing shells should be well lit, according to regulations. You can make or purchase lights that greatly improve the visibility of your shells.
- It is required for certification to take a boating safety class offered by your state or a live or online boating safety course that is recognized by the National Association of Safe Boating Law Administrators (NASBLA).

#### **7. Warning of Risk**

- Have a meeting with your rowers, coaches, and parents (if appropriate), and discuss risk and safety. Discuss such things as agreement to participate forms, medical information, medical release, and medical emergency forms.
- Explain your emergency plan, and document that it has been explained.
- Discuss the importance of adequate health and accident insurance coverage.
- Document when the meeting was held, topics covered, and who was in attendance.
- It is also a good time to show USRowing's DVD on safety. This DVD is available through USRowing headquarters.

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## 8. Supervision

A coach is required to provide proper supervision for all athletes at all times! Whenever there is a practice on water or land, there must be a coach present.

A safe rower-to-coach ratio should be established, depending on your specific program's resources (launch size, water temperature, rowers' abilities). Coxswains also can help in the supervisory role; however, it needs to be emphasized that coxswains are rowers – not coaches – and therefore their ability to respond to emergency situations is not the same as a coach's ability.



Fortunately, a coach's launch was close by.

## 9. Records

The records you keep can become essential in case of a legal challenge. You should make every effort to properly record all safety meetings held with athletes, other coaches, parents, and administrators.

Records should include assignments of personnel, practice plans, special safety measures, attendance of athletes, emergency plans, safety rules/procedures, reports of injuries, copies of records of all oral and written communications concerning an injury, or other unusual event.

## 10. Special Safety Concerns About Adaptive Athletes

### The first steps in the boathouse

- New participants should be given a tour of the facilities during their first visit to the boathouse with emphasis on both hazards and safety features.
- Overhead and protruding boat racks
- Suspended oars that can become dislodged
- Trip hazards from lines and cables
- Proximity to water

Such hazards may pose a greater danger for those with certain disabilities who may not be able to see or hear well or may be using a wheelchair.

### The first instructions

Do not be afraid to ask the participant what basic movements they can and cannot do (torso control, rotational ability, feeling in the feet for balance, etc.)

A buddy system should be implemented, at least in the early stages of a program, so that each adaptive participant is paired with a volunteer rower who rows with them and who will advise and assist them during the outing, especially in the event of an emergency.



Adaptive athletes may need additional assistance.

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The participant's safety is always paramount, especially when water is involved. Require all participants to wear PFDs while rowing. However, this should be assessed on a case-by-case basis based on the perceived level of risk, the comfort level of the participant, and the type of boat, as well as the environmental conditions.

All participants should be "talked through" individually as to what to do in an emergency, both on and off the water. Once this has been done, the participant can then sign the membership and waiver.

### **11. Risk Management of a Different Kind**

Bullying, sexual harassment, and other emotional and physical abuses are not the topics we typically think about when we talk about the safety of our athletes, but unfortunately, we need to.

**The Respect in Sport** Coach and Activity Leader program is a tool designed to assist coaches, volunteers, and referees in identifying and dealing with abuse, bullying, harassment, and neglect in sport and responding to and reporting negative behaviors, if necessary.

The Respect in Sport program can be accessed from the "Coaches" page of the USRowing website at: <http://www.usrowing.org/DomesticRowing/Coaches/RespectSportCoach.aspx>

### **12. Insurance**

As a coach, it is imperative that you have insurance coverage. If you are coaching for a club that is a USRowing member organization, you are afforded insurance coverage through your club.

If your club is not a member, you do not have any insurance coverage through USRowing, and you should check with your club to be sure they have insurance coverage in place for their coaches, whether they are employees or subcontractors.

Insurance coverage is critical. It is not an alternate to a risk management program or a way to ignore or not inform athletes of the safety programs at the boathouse. If you are found to be negligent in your coaching duties and there is no insurance coverage in place, you will have to pay for all defense costs, court costs and any judgments rendered against you out of your own pocket.

### **13. Safety Resources**

Below is the list of safety resources that are available to coaches, rowers, and the rowing community at large from USRowing.

- USRowing Safety DVD – Rowers, coaches, and rowing administrators should view this DVD, take the information, and adapt and apply it to their program.
- Safety Poster – The Safety Poster is a quick reminder of general safety issues at any boathouse. The poster is free from USRowing headquarters.
- USRowing safety pages on the USRowing website.
- Kippy Liddle Safety Kit – From the safety web page, there is a link to the kit – the best deal for 11 life jackets, first-aid kit, throw rope, mylar blankets, and other safety equipment, all in a nice bag that can be easily carried to the launch before each practice.
- Rules of Rowing – Read them.

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- USRowing Safety Committee – This group is here to answer questions and help provide a constant stream of information about safe rowing practices. Almost every month, committee members write an article for the USRowing Newsletter and update materials that are currently available.

## **14. Examples of Two Incidents Involving Coaches**

### **Kippy Liddle**

On March 23, 1984, Kippy Liddle was killed on the Schuylkill River in Philadelphia. She was a 23-year-old coach of the novice girls' crews at Brooks School, a boarding school in Massachusetts. All the girls' crews were practicing out of the University of Pennsylvania boathouse on the Schuylkill in Philadelphia. The river was swollen with spring rains, logs and debris were floating downstream, and the weather was shifty – one minute sunshine, the next wind and snow. Kippy was in a launch with a student trying to coach a novice four away from the Fairmount Dam, which is just downstream from Boathouse Row. What happened then was entirely avoidable had the launch been properly equipped. Kippy's motor stalled and could not be started again. She had no anchor, no life jackets, no paddles or oars, no whistle, no blankets or ropes. While the novice crew pulled away and another launch went to rescue them, Kippy and the other young woman went over the falls of the Fairmount Dam, a low-head dam. The young woman swam to safety, but Kippy never came up.

### **John Steve Catilo**

On the morning of June 25, 2004, John Steve Catilo was coaching a summer novice program from a 14-foot aluminum launch with a 15-horsepower outboard engine along the Potomac River. It was a warm summer day; the water was not cold, and the weather was nearly ideal. John Steve was not wearing a personal flotation device (PFD), and neither the law nor the rowing program required him to wear one. While the safety cut-off switch on his launch's engine could be engaged with a lanyard, the lanyard was not in use; neither the law nor the rowing program required it to be in use.

Suddenly, and without warning, John Steve was thrown from the launch into the river. He treaded water for a short period of time but disappeared before help could arrive. His body was found two days later some distance down river from where he went into the water. John Steve's autopsy report found no signs of blunt force trauma to his head or other factors contributing to his death. By all accounts, John Steve was a strong swimmer and knew how to operate his launch, and if John Steve had been wearing a PFD, he would likely be alive today. Thus, the tragic death of John Steve Catilo serves as a lesson to all coaches and others in launches that they should wear PFDs and use safety cut-off switch lanyards at all times when on the water.

Of the four people involved in rowing who have drowned (not killed in accidents or suffered heart attacks, etc.) from 1985 to 2010, two have been coaches. Both were preventable by having the proper safety equipment in the launch and using it. The coach is supposed to be the first responder in an emergency, but if the coach is incapacitated, who is supposed to help the athletes?

### **Summary**

The most important element of risk reduction and accident prevention is common sense. The big race coming up doesn't give you the right to ignore safety.

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## PRE-PRACTICE SAFETY CHECKLIST

Each item should be checked prior to any water practice.

### Coach

- Proper clothing, including a PFD, worn at all times while in the launch
- Cell phone or radio
- Safe water conditions
- Knowledge of waterway
- Emergency plan
- Practice plan
- Swim test
- Megaphone
- Weather forecast
- Observer in launch
- Tools
- Leave note in boathouse as to direction and time of return
- Every coach should also have the following safety credentials and are required for Level I certification.
  - CPR Course
  - First-aid Course
  - Boating Safety
  - Respect in Sport

### Athletes

- Swim tests
- Physicals
- Stretched
- Safety talk
- Proper clothing
- Water to drink

# Draft

### Launch

- Life jackets for everyone under your supervision
- Engine kill-switch lanyard
- Registration
- USCG-required equipment
- First-aid kit
- Navigation / safety lights
- Anchor and line
- Sound-making device
- Paddle
- Spare spark plugs

### Shells

- Watertight compartments sealed
- Megaphone or COX-BOX™ for Coxswain
- Rigged properly
- Equipment checked (rudder, fin, etc.)
- Lights
- Bow-ball properly affixed to the shell
- Heel-ties tied

CLASS ACTIVITIES: Discuss safety issues, especially safety on the water.

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## CHAPTER 2 – Injury Prevention, Management, and Care

In this chapter, we will look at the prevention of injuries, which is generally not the subject of litigation against coaches.

### Prevention

Pre-participation screening and knowledge of existing health issues are two of the most important factors in the injury prevention process.

- Medical history – This can be a sensitive topic, but coaches need to know about any pre-existing conditions like asthma, diabetes, epilepsy, heart disease, bronchitis, allergies, and more. This applies to disabled athletes as well.
- Medical conditions such as diabetes, epilepsy, asthma, and heart disease should not preclude people from participating in the sport. Sensible precautions should be followed, and the coach needs to be aware of the coaching implications of the person's condition and what to do in case of an emergency.
- Be aware of past injuries – broken bones, back surgeries, or torn ligaments.
- A physical examination should be scheduled on an annual basis. Almost all sports sponsored by high schools and colleges require a physical for all people participating in competitive sports. Even if your program is a club, physicals should be required.
- Special concerns working with disabled athletes – In addition to regular physicals, you must ask the participant what basic movements they can and cannot do (torso control, rotational ability, feeling in the feet for balance, etc.)
- Daily check of the athlete's health – Before every workout, the coach should check the condition of the athletes. For example: "Show me your blisters. Sorry, they do not look good. Please take another day off from rowing," and so on.
- Coming back from injury – If the injury is serious, a physician must clear the athlete before returning to practice or racing.
- Coaches should have emergency contact details for participants with some medical history, and this information should be securely stored at the boathouse or where the athlete is training. The information is important if there is ever a medical issue and emergency services are called to respond.

### Learning objectives

1. The coach will learn the basic information that should be on file about each athlete as part of pre-participation screening.
2. The coach will be able to identify dangerous heat and cold-related issues and will be able to advise the athletes on how to prepare for temperature extremes.
3. The coach will be able to advise the athlete on how to work with blisters and other minor rowing injuries.
4. The coach will know how to match athletes properly to prevent injuries.
5. The coach will know the basics of how to plan a safe workout.
6. The coach will know where to get his or her safety credentials and the importance of knowing how to help the athletes find the proper medical care.

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**Dealing with extreme environmental conditions.** See Chapter 1.

All the same rules apply to the coaches who are out in the sun for hours at a time. Polarized sunglasses will improve the coach's vision while driving a launch. Glare off the water and driving into the sun can quickly turn very dangerous.

**Other common rowing health issues:**

- Blisters on the hands. **Prevention:** Encourage athletes to hold the oar lightly; apply rubbing alcohol to toughen skin; use pumice stone to shave down build-up of a callous; cover an area with athletic tape or elastoplasts. **Treatment:** Use a sterilized needle to make a small hole to drain the blister and cover the blister with a bandage.
- Slide bites on the back of rower's calves. Cover the area with knee-high socks or special wrap; keep the wounds clean to avoid being infected.
- Keep all of the equipment clean, especially if the athlete has bled on the oar handle or on part of the boat. Erg handles and weight benches need to be cleaned continuously to prevent the spread of MRSA and other diseases.



**Blisters, a common rowing health issue**

**Well planned workout as a prevention tool**

- Matching activities to the athletes in terms of abilities, skills, and strength. Be realistic in your expectations and design appropriate programs and drills to the skill level of the athletes.
- Matching the athletes within the group. It is important for the coach to be aware of individual differences within the group and adapt activities according to the needs and abilities of the participants.
- Make sure the boats are rigged correctly for the crew. The wrong height, the wrong footboard angle, or asymmetrical shoes can cause injury.
- Poor rowing technique, especially poor body posture, can create over lasting lower back injuries.
- Rowing in rough conditions with gusty side wind can create some rib injuries. Do not take this chance if you do not have to, especially if some of the athletes already have rib problems.



**Poor rowing technique can create an injury.**

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## Check safety of facilities and equipment

- A wet, slippery floor in the boathouse can be dangerous to the athletes carrying the boats. Many injuries happen while the athletes are in or around the boathouse. Make sure that safety issues are known and precautions are taken.
- All rowing boats should have the bow balls installed, heel safety straps tied, sealed bow and stern compartments, and gates on the oarlocks closed and secured properly.

## Health Professionals

One of the most important resources in caring for the injured athlete is a certified athletic trainer, doctor, chiropractor, and masseuse. The coaches should follow instructions provided by the trainers. It is important to allow the athletes the time to recover fully from an injury before returning to practice.

## Emergency plan

It is strongly recommended that every club has a safety plan updated regularly, so that it clearly covers all eventualities and provides all information necessary should any need arise.

- It should display a safety map of rowing routes, local navigation rules, and a list of up-to-date emergency telephone numbers and addresses.
- It should include a well-stocked medicine cabinet.
- It should also indicate where medical information or physical examination forms and medical treatment consent forms of the rowers are located.

## Coaches' First-Aid Skills

Knowledge of safety procedures and life-saving techniques enables coaches to prevent injury or even save lives. We recommend that all coaches take the following the courses:

- Standard First-Aid
- CPR (cardiopulmonary resuscitation)
- Boating Safety

## Summary

As a coach, you will find yourself very frustrated when the best rower comes down with some kind of injury a day before the race. You start panicking, looking for the replacement, moving people around from one boat to another, and so on. You have to realize that in most cases, with some basic knowledge and with just a dose of common sense, this injury could have been prevented.

## USRowing Safety Pages

<http://www.usrowing.org/Safety.aspx>

## Red Cross course list and sign-up

<http://www.redcross.org/portal/site/en/menuitem.d8aaecf214c576bf971e4cfe43181aa0/?vgnextoid=58d51a53f1c37110VqnVCM1000003481a10aRCRD&vgnextfmt=default>

## Boating Safety

<http://www.nasbla.net/courseListing.php>

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## CHAPTER 3 – Ensuring Safety and Fairness

### The Role of the Referee

The competitive rowing community is made up of three distinct groups: the athletes, the coaches, and the referees. For most young athletes, the role of the coach is pretty well defined, but the role of the referee and the *Rules of Rowing* they enforce are often not fully understood.

- Referees play a vital role in our sport by ensuring that the athletes are safe and the conditions under which they compete remain fair.
- Referees are unpaid volunteers.
- The United States Rowing Association has developed an extensive program to fully train and license referees.

Working both on and off the water, referees are trained to understand the rules and their application at regattas.

The *Rules of Rowing* are available in hard copy from USRowing or at [www.usrowing.org](http://www.usrowing.org). Knowledge of the rules and compliance with the rules is the responsibility of the athletes and their coaches.

During a regatta, the major concerns of the referees are:

- The safety of the competitors. Referees will check boats, launching area, traffic pattern, race course, and the weather forecast. After each race, referees check the condition of the athletes.
- The fairness of racing is achieved through the consistent application of the rules.

Perhaps the easiest way to understand and appreciate the role of the referee and the application of the Rules of Rowing is to examine their use at a typical regatta.

### Before Racing

Before racing begins, a coaches/coxswains meeting is typically held. The meeting is presided over by the chief referee. The chief referee will review the schedule, review boat traffic patterns both for practice and for the regatta, review the alignment and starting procedures to be used, and answer any questions.

### Control Commission

Referees conduct or supervise the weighing of athletes competing in lightweight events, coxswains, and the racing shells (in trials and some national championship regattas).

### Launching and Warm-up

Before crews are allowed to launch, their shells are inspected by either a referee or a volunteer. Three items are important: (1) bowballs, (2) quick-release footgear, and (3) if a shell is bow-coxed, the dimensions of the coxswain's hatch.

Once the crew has launched, it progresses to the warm-up area. Warm-up areas tend to be congested; most serious accidents occur during warm-ups. As a result, marshals are very firm in enforcing the traffic and warm-up patterns.

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## The Start

The start of a race involves two processes: alignment and the start itself. All crews are expected to be in position, ready for alignment, at two minutes before the scheduled start of their race. If a floating start is used, the crews should be in their assigned lanes, ready for instructions from the aligner and starter.

**A note on starting:** There are two types of starts – the standard start and the quick start. The starting procedure should be covered in the coaches / coxswains meeting. If it isn't, ASK! If conditions warrant, the starter may decide to use a quick start at the time of the race. The starter will announce the change to all crews in the race before proceeding with the start.



At the start

## The Race

Once the starter has given the starting command and providing there are no false starts, control of the race shifts to the referee(s) who follows the race.

Referees are concerned foremost with safety, i.e. ensuring that crews do not place themselves in danger or endanger another crew. Beyond that, referees are there to prevent interference between crews and to control any actions that might give one crew an unfair advantage.

Referees will correct this situation by calling the name of the offending crew and signaling, with a white flag, what corrective action the crew must take to avoid the situation. In some instances, they may judge that the only safe/fair solution is to stop the race – this they do with a red flag and noisemakers, usually bells.

**A note on the race:** Referees are not traffic cops. Normally, they will not direct the movements of a crew down the racecourse. Their signals are generally issued only to prevent the development of an unsafe rowing condition.

## The Finish

The first priority of the finish-line staff is to record the order of finish. Timekeeping, especially the recording of intervals between successively finishing crews, while important, is secondary.

After the last crew has crossed the finish line, referees will move closer to the crews, looking for rowers who may be in distress and need assistance. At this time, referees also look for any crews that may be signaling their intent to protest. If there is no protest, the referee signals to the chief judge with a white flag and announces the winning time.

**A note about finish:** A boat that feels that the race was unfair, or that it was interfered with, and wishes to lodge a protest, must do so on the water before the race is made official. This is done by the coxswain, or athlete in the case of a non-coxed boat, raising a hand to signal the referee and stating the reason for the protest.

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A formal protest is heard by a jury of three or more referees, chaired by the chief referee and conducted under procedures detailed in the Rules of Rowing.

### **Issuing Penalties**

The Rules of Rowing provide several levels of penalties and define the conditions under which certain penalties must be issued. The intent of a penalty is not to punish, but rather to restore fairness to all athletes competing in an event. Sometimes, in the interests of fairness, a referee will issue a penalty – even though the offended crew or crews have not protested.

### **Things That You as Coach Can Do to Help Assure a Successful Regatta**

A successful regatta depends on the actions and cooperation of several entities – the rowers, coaches, local organizing committee and its volunteers, and the referees.

As a coach, there are three important areas in which you can help:

- Make sure that your shells are fully equipped and in good racing condition before they arrive at the launching dock. Other than inclement weather, nothing so disrupts a regatta as having to delay or reschedule races because of failed equipment.
- Train your coxswains about the rules. Coxswains who know and understand both the Rules of Rowing and the responsibilities of the referee corps can assist in assuring the success of a safe and fair regatta.
- Train yourself about the rules. Go through the Rules of Rowing and the new Rowing Referee Training Manual available on the USRowing website.

Draft

## CHAPTER 4 -- Health and Medical Issues

By Thor Nilsen, Ted Daigneault and Matt Smith (FISA Coaching Education)

Edited by Kris Korzeniowski

### Introduction

Coaches are obligated to provide their athletes with a safe environment for training and competition. Some of these strategies are described in the injury prevention chapter. The topics introduced in this chapter are different than just an injury. They could have a long-term effect on the health of the athletes or their performance. These issues are:

- Nutrition (more details in the chapter on physiology)
- Overtraining
- Concussions
- High altitude (which will be discussed in Level 3)

### Nutrition

#### Carbohydrate replenishment

Exercising athletes use energy obtained primarily from carbohydrates stored in the muscles as glycogen.

Replenishment of carbohydrates is critical to recovery and reducing the effect of fatigue before the next session. You should replenish carbohydrates within 20 minutes after the end of the workout.

- Open weight athletes require 500g of carbohydrates daily.
- Lightweight athletes need from 300-400g of carbohydrates daily.
- If someone is on a weight-loss program, he or she should maintain his or her carbohydrate intake level, while reducing fats (e.g. butter, oil.)

Failure to replenish carbohydrates has been found to impair physical performance.

#### Strength development

Success in rowing, as in many sports, depends on the power of the athletes. The strength of the muscles depends on:

- **Heredity:** Athletes are limited by the type of muscle fibers they have inherited, which decides on the natural predisposition of the athlete for the given sport (e.g. power, endurance, speed.)
- **Training:** Increases in the size and strength of muscles is obtained by training, using specific exercises and the principle of overloading.
- **Diet:** During training, the muscles require a correct diet to support muscular development. It is not necessary to consume a diet enriched with proteins, minerals and vitamins, as long as the current diet is balanced. Iron supplementation is advised for female athletes to prevent sport anemia/iron deficiency.

#### Weight control

In cases where an athlete's caloric intake exceeds his or her caloric expenditure, even if he or she maintains the same percentage of lean body weight, an increase in muscle size and strength will result in net weight gain.

Controlling body fat percentage should be done by taking skinfold measurements or underwater weighing.

- Rowers generally have a body fat percentage within the range of 8-12% for men and 16-20% for women.
- It is suggested not to exceed a minimum of 5% for men and 9% for women.
- Athletes who approach this limit with the intent to lose body weight will decrease lean body mass

and strength as well.

The best method to lose weight is a combination of diet and exercise.

- Reduction in caloric intake and increase in exercise or caloric expenditure
- A decrease of intake of 500 calories and an increase of expenditure of 500 calories = 1,000 calories. This reduction per day = 1kg of body weight per week.

Rapid weight loss by decreasing carbohydrates and hydration level will result in impaired performance.

### **Hydration**

It is important to realize that water is an important nutrient since it makes up 60 percent of a person's total body weight and 40 percent of their muscles. The most important aspect of water is its ability to cool down the body. An increase of body temperature creates sweat, which evaporates from the skin and results in a cooling effect.

### **The negative effects of dehydration include:**

- Prolonged sweating causes dehydration and electrolyte loss (vital to muscles contraction).
- If the loss of water is severe and the water is not replenished, the results can include heat illnesses ranging from cramps to heat exhaustion to heat stroke.
- Dehydration will occur more quickly in an athlete who has been losing weight, where the water level was already low to start.

### **How to control the loss of water or dehydration**

- Record morning heart rate and body weight
- Observe urine (clear to pale yellow if hydrated; dark yellow and strong smelling if dehydrated)
- Record body weight before and after training or racing

### **How to stay hydrated**

- Drink water throughout the day and during training
- Drink 1-2 cups (8 to 16 ounces) of water or sport drink **two hours before training or competition**
- **During workouts**, drink 4- 6 ounces of water every 15 minutes
- **After training or competition**, drink 16-20 ounces of water or sport drink
- Drinking should exceed the body's desire to drink (by the time you are thirsty, you are already dehydrated)
- Hydration during the winter and at altitude must be maintained.

### **Overtraining**

Some athletes cannot improve performance because of insufficient training. But, this also may be true with athletes who do too much, too soon and for too long. Their performance level may decrease due to overtraining.

### **The general symptoms of overtraining are:**

- Behavioral:
  - Increase in nervousness or depression
  - Inability to relax/sleep
  - Loss of appetite
  - Loss of motivation
  - General fatigue
- Physical:

- Extreme muscle soreness or stiffness the day after hard training
- General increase in muscle soreness over time, decreased body weight
- Sudden or gradual increase in morning heart rate
- Predisposition to infection

Permitting decreased training or stopping training for a few days allows for recovery. If these conditions persist even after reduction or time off of training, it may require a longer rest period followed by a gradual increase in the training load (allowing for the body to build up its reserves.)

**Overtraining prevention includes:**

- A gradual increase in training load, particularly during early season or after periods of reduced activity.
- Proper recovery from heavy training sessions, controlled by monitoring morning heart rate, observing physical appearance and muscle soreness.
- A balanced diet.
- Observing personality changes.
- Rest periods are a necessary part of a training program. They allow the athlete to adapt better to continual training and maintain enthusiasm for the sport.

**Concussions**

Coaches may be surprised that there are procedures and laws that youth rowing coaches may have to follow with regards to concussions. Many states are adopting laws that require coaches (and referees) to take concussion training if they supervise youth athletes.

Rowing is extremely low on the list of sports or activities where young people suffer concussions, but it does happen and it's better to know how to recognize the symptoms and have a boathouse policy. Concussions don't usually happen on the water but most likely in and around the boathouse. They happen in ways one might expect, like slipping on a wet floor or banging into a rigger. The awareness of the damage concussions can cause people is forcing all sports to have a look at their procedures and for state legislatures to consider laws concerning the care and reporting of incidents. For more information, visit the link below.

[http://www.edweek.org/ew/section/infographics/37concussion\\_map.html](http://www.edweek.org/ew/section/infographics/37concussion_map.html)

The Centers for Disease Control and Prevention website is another excellent source of information:  
<http://www.cdc.gov/concussion/sports/index.html>

Many states, organizations and schools offer concussion training and baseline testing for athletes. We recommend that you find out what is offered and take advantage of concussion training.

## **CLASS ACTIVITIES (Module 2 Additions)**

### **Chapter 1 - Risk Management**

1. What are four key duties of a coach in order to reduce risk?
2. Describe four situations when you should not go on the water?
3. You are coaching an eight. In very windy conditions, the eight suddenly takes on water and is almost submerged. The wind pushes the shell into a dangerous position. Complete a brief response to the following question: What actions, and in what order, would you take to assure the safety of your rowers?
4. List at least five safety items that you would equip your coaching launch with.
5. List at least three factors that are important in preventing injuries.
6. Describe the first steps in coaching adaptive or para athletes.
7. Why is it important for coaches to have insurance?

### **Chapter 2 - Injury Prevention**

1. What basic information is required for each athlete before he or she can start participation?
2. How would you prevent blisters on the hands?
3. Describe three factors in preparing a workout to avoid injuries when working with a big group of athletes.

### **Chapter 3 - Health and Medical Issues**

1. What type of meal would you choose following a hard workout and why?
2. What is the best method of losing weight?
  - a. Sweat more
  - b. Diet only
  - c. Exercise and diet
  - d. None of the above
3. List three symptoms of overtraining.
4. Describe two ways to avoid overtraining.

### **Chapter 4 - Insuring Safety and Fairness**

1. What are three things you can do to help assure a successful regatta?

# MODULE 3: LEARNING AND TEACHING

By Kris Korzeniowski

## Learning Objectives

The candidate should be able to:

1. Describe the three phases of the learning process.
2. Demonstrate the methodology of teaching and correcting basic rowing skills.
3. Identify conditions to have an efficient learning and teaching process.
4. Describe the differences in approach to adaptive athletes.

## CHAPTER 1 -- Athlete Growth and Development

### Introduction

Coaching is principally about teaching the sport and making sure athletes enjoy it. For several reasons, rowing coaches face unique challenges when attempting to do this. One of the challenges is that rowers come in a variety of shapes, sizes, ages and abilities. The coach has to be very aware of the different stages of an athlete's development.

### Physical Growth

Many developmental physical changes occur as rowers move from childhood to adolescence to adulthood. These changes influence sequential learning and the performance of motor skills in young athletes.

Body size, shape and composition are unique to each individual athlete, as is body development. There are some physical traits that are common to specific age groups:

- For juniors (under 18 years of age), changes in growth are most apparent.
  - Strength increases steadily as the body grows.
  - Kids usually have a growth spurt (height) around 14 years of age.
  - This occurs about two years earlier in girls than in boys.
  - A weight increase usually follows the growth in height.
- Many collegiate rowers (18 to 22 years of age):
  - Have reached their maximum growth by the time they begin college rowing
  - Can still increase muscle mass
  - Can still improve coordination
  - Can still increase heart and lung capacity
- Masters (rowers 27 years and older) are physically mature, but there are a variety of physical problems that come with aging athletes.
  - There can be a reduction in flexibility, senses and strength.
  - There can be increased aggravation of existing injuries
  - There can be an increase in body weight.

### Mental Development

As with physical development, athletes also go through different stages of mental and emotional development.

- Junior rowers are not small versions of adults. A junior may have memory similar to an adult. However in some cases, the athlete will not have the ability to process information, pay attention, use feedback, or make quick decisions as well as an adult.
- A junior athlete's self-confidence and ability to absorb criticism also may be less developed than that of an adult. During practices, instructions should be very clear, workouts should be less stressful and less complicated than those for older athletes and coaches should use demonstrations instead of

detailed explanations.

- Collegiate rowers are fully developed mentally, but they can make coaching very demanding due to:
  - Social-psychological issues such as peer pressure
  - Lower self-esteem
  - Single-parent families
  - Substance abuse
  - Violence
  - Sexual identity, emotional stress, and child abuse
- Many masters rowers show a different set of problems such as:
  - The ability to learn quickly and absorb new information
  - Being easily frustrated or resistant to change
  - Time management
  - Financial matters
  - Family obligations such as child care problems, aging parents or job stress.

Each age range presents difficulties and opportunities for a coach because of the ways athletes grow physically and develop mentally.

# Draft

## CHAPTER 2 -- Learning process

### Introduction

Rowing technique is one of the most important factors in athletic performance. For this reason, the ability to teach correct rowing technique should be number one on the list of coaching skills. For the beginner coach, there is no need to go through years of mistakes and unnecessary experimentations. The whole process of learning and teaching can be methodically organized in a few steps. Coaches can start their careers by using the following important learning and teaching methods.

### Learning phases

To be a successful teacher of rowing technique, the coach should know what is happening on the receiving end of this process. This means knowing how the athletes learn and what is the best way to reach them.

As the athletes attempt to learn a new skill, they will move through three different stages or phases of learning: initial (cognitive), intermediate (associative) and advanced (autonomous).

For coaches, knowing these stages will dictate the approach that should be taken, the number of details addressed and the demands made.

**Initial phase:** The learner tries to:

- Understand a skill
- Form a mental picture
- The mental picture includes only large, basic motions without details.

The coach should concentrate on:

- Communicating the basic points of technique
- Limiting the number of tasks and drills
- Eliminating distractions
- Making sure that the athletes have fun.

**Intermediate phase:** In this phase, the execution of the skill needs less of the rower's attention.

- Errors are gradually eliminated through practice.
- The learner is able to absorb more details and new skills.
- The mental model of the skill is developed
- There is more emphasis on the quality of the motion
- There should be a greater number of successful repetitions of the drills
- Workouts can be extended in length.

**Advanced phase:** The learner:

- Has a good understanding of the execution of the motion
- Is able to perform the skills automatically and under pressure
- Is close to imagining and feeling the correct motion
- Improvements at this stage usually come quite slowly and require additional motivational elements.

## CHAPTER 3 -- How to Teach New Skills

The basic teaching process includes four steps: description, demonstration, practice and feedback.

### Step 1. Describe the motion or skill.

- The coach must get the group's undivided attention, making certain that each rower can see and hear clearly.
- Name the skill and explain the reason for it.
- Keep it simple and short (two to three minutes.)

### Step 2. Demonstrate the correct motion. This is the most important part of the process.

- Use a video, an ergometer, a rowing tank or a boat. Demonstrate the motion in both regular and slow speeds, giving the rowers a few major reference points.
- Ask for questions that relate to the demonstration.
  - Many times, this step is skipped or overlooked, making it hard to visualize what the coach expects.

### Step 3. Practice the skill as soon as possible following the demonstration. Create optimum conditions for practicing a new skill.

- Guarantee good balance by having one or more pairs of rowers sit stationary, holding the balance. This allows athletes to focus on learning the new skill without any external distractions.
- Start from slow execution at low speeds, then gradually increase the speed of the motion.
- Only increase the speed of the boat when the execution of the new skill is acceptable.

### Step 4. Provide feedback after letting the rowers attempt the movement for a while.

- Compare their performance to your mental model.
- Focus on the major points without too many details. The athletes are in initial learning phase.
- Use a positive approach in your commentary. Try to communicate everything in a precise and consistent way.
- Using video for direct feedback can be very efficient.
- Ask questions to see if the rowers comprehend everything that was presented.



Figure 1. Demonstration

## CHAPTER 4 -- How to Correct Rowing Technique

As coaches, we spend most of our time correcting technique. Of course, we complain about the bad habits of the athletes and how “poorly” they were taught in the past. A coach’s ability to correct skills and technique will often determine how successful he or she will be as a coach. After teaching new skills, coaches usually spend a great deal of time correcting technique. The whole process of improving or correcting technique can be organized into a few steps.

### 1. Observe and evaluate the execution of the skill or performance.

- Concentrate on the fundamentals: run of the boat, blade work or individual skills.
- Compare the athletes’ performance to your ideal model.

### 2. Identify the errors and their causes.

### 3. Rank the errors in order of priority, starting from the major limiting factors and moving to the less important.

This is a key point of this process.

**You cannot work on all mistakes simultaneously!** You will drive your athletes crazy. Focus on one thing at a time.

- Without looking into the small details, ask the question: “What is the one major mistake (limiting factor) that prevents the boat from going faster or the athlete being more efficient?”
- Identify the secondary mistakes.
- Very often, one mistake is the result of a chain of mistakes that happened before.
- In this case, we have to identify the cause of the chain.

### 4. Design effective workouts and drills to correct the faults.

- Use the limiting factor and the priority of mistakes as a starting point to prepare the plan for the workout.
- Decide on the drills, when to use them and how many to do.

### 5. Use the four teaching steps in correcting individual errors.

- Describe the incorrect execution and then contrast correct and incorrect execution using video or a live demonstration.
- Demonstrate correct execution and make sure the athlete understands the problem.
- Let the athletes practice. Be patient. Performance may get worse before it improves. New and different motions may feel strange or wrong to the athlete.
- Provide a lot of positive feedback. Congratulate the rowers for good performances much more than criticising bad performances.
- Communicate to the athletes in a simple, precise and patient manner.
- Make certain the athletes understand the new instructions and allow time for the learning process.

## CHAPTER 5 -- Optimizing the Process of Correction

Unlearning mistakes or braking old habits can be very difficult. Coaches should be able to change their approach when they see that something does not work. Finding the best solution to the problem depends on the coach's ability and the athlete's coachability. Here are examples of the the correction process.

- Contrast right and wrong, using video or live demonstration.
- Use mirrors, videos or an ergometer to make your feedback clear.
- Use exaggeration of the motion as a tool to eliminate a strong habit. For example, stress very early "body opening" and slow legs to eliminate the habit of "shooting the seat."
- Find a drill that prevents the mistake from happening. For instance, row with "feet out" to correct too long of a layback.
- Provide conditions for correct execution of the drills. No "miracle drill" or hours of drilling are going to help if the athletes cannot execute the skill correctly. They need a balance!
- Spend a lot of time rowing with less than the full boat. Let the eight row by pairs, fours and sixes.
- Do not rush. Insist on the drills. It is a very difficult to correct old habits, and it often gets worse before it gets better.



**Figure 2. Shooting seat**



**Figure 3. Exaggerated open body**

### Summary

Rowing technique is one of the most important factors in athletic performance. There are coaches whose crews always row well, regardless of the talents of the crew members. Some of them are known as coaches "who don't coach" or "who don't talk." Do not believe it. They know what to do. They know the process and they do talk, but only when necessary.

## CHAPTER 6 -- Coaching Para-Rowing Athletes

The methodology for teaching Para-Rowing athletes is exactly as described above, but there are some additional concerns to remember.

1. All people with disabilities are uniquely different in their abilities.
2. Don't expect each participant to be able to do what another can do.
3. Do not be afraid to ask the participant what basic movements they can and cannot do (torso control, rotational ability, feeling in the feet for balance, etc.) The more information the coach has about the athlete's abilities, the better.
4. Instruct first, then assist. Offer instruction on how an athlete may be able to do something themselves, make suggestions, and allow the athlete to try it.
5. Never assume: Talk to each participant individually about what they are comfortable and confident with when it comes to rowing (mobility, equipment, water, etc.) and with what they are not.
6. Be patient. If they are not in any danger, allow the athlete time to try and figure it out on their own first, then instruct or coach them. Physically interject ONLY if they are in danger or no progress is being made.
7. Remember when offering instruction, there are many ways to word things. If you are saying the same thing over and over, perhaps you should rephrase it. The way we all process and understand information is different.
8. If an adjustment needs to be made, always ask a Para-Rowing athlete for permission before moving a limb.

Para-Rowing athletes compete internationally in the following classes:

- LTAMix4+ -- Legs, Trunk and Arms Mixed Four with Coxswain
- LTAMix2x -- Legs, Trunk and Arms Mixed Double Sculls
- TAMix2x -- Trunk and Arms Mixed Double Sculls
- ASW1x -- Arms and Shoulders Women's Single Sculls
- ASM1x -- Arms and Shoulders Men's Single Sculls

### Suggested Reading

<http://www.usrowing.org/DomesticRowing/AdaptiveRowing/AboutAdaptive.aspx>



Figure 4. ASM1x



Figure 5. TAMixed2x



Figure 6. LTAMixed4+

## CHAPTER 7 -- Coaching Coxswains

### Introduction

There are many roles for the coxswain to play, from simply steering and not saying anything to a real strategic leader who makes a difference in the outcome of a big race. The secret to producing outstanding coxswains lies in attitude, which the coach reveals in the coxswain's role. How quickly and how well the cox will develop these strategies will depend how much time coaches spend instructing them.

Small boats, like the coxed pair and coxed four, have the coxswains steering lying down under the bow deck of the boat (bow loader). They have unobstructed vision in front of them, but they do not see the rowers and the blades.

The eights, and some fours, are steered by coxswains seated facing the athlete who strokes the boat (stern loader). Their vision is obstructed by the athletes sitting directly in front of them, but they see the blades, can see what is going on in the boat, and can make some corrections.

### Recruiting the coxswain

- Look for people of smaller size who appear confident. Timid, withdrawn individuals might be able to steer and reiterate commands, but they will be unable to motivate the crew.
- Good coxswains are self motivated. They know how to learn on their own.
- As a coach, describe the role of the coxswain as exciting and challenging. He or she will be a strategist, decision maker, leader, and surrogate coach.
- Make the coxswains feel needed, especially in the first weeks at the boathouse when coaches are busy with scheduling, boats, line-ups, and teaching new athletes how to row.

### Handling the coxswains

- The coach should instruct the novice coxswain before every workout and give him/her some feedback after the workout.
- Novice coxswains should spend several days in the launch before being given a shell to command
- Coaches should give the coxswains some materials to read and study related to his or her duties.
- Make sure the coxswain knows that the number one priority is the SAFETY of the crew and the equipment, not winning the race or the piece.

### The role of the coxswains

We want the novice coxswains to get through the first workouts without any accidents, damage to the equipment, and without any injuries to the athletes. Within time, we will ask them to learn how to steer straight, how to dictate the cadence, how to make simple technical calls and how to race.

These goals define the first steps for the coxswains in the boathouse.

1. Be familiar with general safety on the water. Make them watch the safety DVD.
2. Be able to take the boat safely from the boathouse onto the water.
  - Know commands
  - Comments should be brief and direct as possible
  - Be alert to potential danger when taking the boat from the rack
  - Turning around, swinging one end around
  - Putting boat on the slings
  - Putting the boat on the water
3. Before launching on the water, the coxswains should always know traffic patterns and where they should and should not be.
4. Once in the boat:

- Sit in the boat with lower back pressing against back of the seat.
- Both forearms should be resting on the gunnels while each hand grasps hold of the steering cables.
- To steer the boat: moving your left hand forward will steer the boat to the left (port); moving right hand forward will steer the boat to the right (starboard).
- Make small steering adjustments, avoid over steering and then overcorrection.



**Figure 7. Bow-loaded coxswain**

#### 5. Once on the water

- Never get too close to any other object (moving or fixed) on the water.
- Keep your eyes watching three areas: far away, a little ahead and right in front of you.
- Focus on what is happening around you on the water – look for objects like logs, buoys, other boats – and not so much on your own boat.
- Do not hesitate to bring the boat to a stop (weigh enough!!!) to avoid collision with any debris, bridges, other boats, or launches.



**Figure 8. Stern-loaded coxswain**

6. The landing of the shell by a novice coxswain needs special attention. Many boats get damaged every year during the landing.

#### **Correct approach to the dock**

- Land into the wind or current when possible.
- Slow down the boat, row by half of the boat, or even by two in the eight. High speed approach is dangerous.
- Approach the dock at a 10 to 15 degree angle.
- Have the rowers lean away from the dock, causing the boat to turn parallel to the dock.
- Have the bow person watch the bow of the boat, as novice coxswains will have a hard time seeing the bow of the boat and judging the bow's distance from the dock.
- Always have someone standing on the dock ready to help.



**Figure 10. Correct approach to the dock**

#### **Recommended Reading**

Kirschbaum, George, *The Down and Dirty Guide to Coxing*, 2nd Edition (2002).

Keeley, Joe, *The Coxswain's Manual*, 1998.

## CHAPTER 8 -- Coaching Novice Rowers

By Eric Houston , Head Coach at Kent School Boat Club

Coaching novices can be a very rewarding experience for both the coach and the athlete. It also can be frustrating, scary and intimidating to both the athlete and the coach. Coaches can help alleviate some of the anxiety of the first time rower by being prepared and setting realistic goals. The following is a basic guide to help coaches organize those first few weeks of the season and to get the most out of the novice rower.

### 1. Keep It Simple

- It's our job to introduce rowing in a way that is both fun and safe. Getting in a shell for the first time for a novice rower can be pretty scary.
- Empower your rowers! As much as you can, prepare the novice rower prior to getting on the water.
- Talk about the sport -- the fun, the competitiveness, the mental discipline and what they can get out of the sport.
- Discuss the stroke and introduce the vocabulary of rowing.

### 2. Before you go on the water

- Use an erg or tanks to demonstrate the stroke.
- Posture on the erg (sitting on your seat bones).

Key terms to stress:

- "show your pockets"
- Loose grip (hook, don't grab)
- Wrists flat
- Shoulders in their socket
- Relaxed elbows



Figure 1. Correct posture

### 3. Spend the time to teach on land

- Bad habits learned on the erg will follow onto the water.
- Teach the rowers early in their careers that they should row the erg the same way they row on the water. The 2k scores will come with fitness, technique, and mental toughness.

### 4. Relate the stroke to other exercises

- Get a bar or a broom handle and demonstrate the stroke from the explosion of the legs, connection of the core (dead lifts), and follow through with up-right rows.
- The bar should be weightless at the top of the exercise.

### 5. Safety First

So, you think the novice boat is ready to get on the water...

- Make sure the rowers can swim (swim test).
- Go over safety protocols around the boathouse, the docks and on the water.
- Show them how to get out of their shoes.
- Stay with the shell.
- Show the USRowing safety video.

## 6. Equipment

- Know your athletes and try to match the equipment to the level, size and athleticism of your rowers.
- Shell size, oarlock height, load -- all are worth looking at before you boat a group of novice athletes.
- If you can avoid boating a crew of 150lb freshmen boys in a large racing hull, do so!
- If you are rigging your first boat boys 8+ with Concept 2 Big Fat 2 Vortex, medium stiff shaft at 367, 84, 114, it makes no sense to have your novice rowers rigged the same.
- Lighter is better! Give them a chance to actually row a full stroke with a lighter load rather than shorten up to half strokes with a heavy load.
- If you have smaller blades in the boathouse, give them to the novice crews.
- A stable hull platform is a comfortable and less scary platform. The rowers can focus more on their technique and "pulling hard" than trying to stay upright in the wrong size hull.

## 7. Before going out on the water for the first time

- Place a shell in slings.
- Go over the terminology of the equipment.
- Place an oar in the oar lock and demonstrate what you mean by "squaring the blade, feathering etc..."

## 8. Mix it up for the first couple practices. (Try this for four practices.)

- If you can, mix experienced rowers in with novices. This is worth the time and practices lost with the experienced crews at the beginning of the season.
- Mix them by pairs with experienced rowers at stroke and bow.
- Also, put in experienced coxswains with novice rowers.
- Have the rookie coxswains in the launch or in an experienced boat for a couple of practices, so the experienced rowers can help the coxswain.
  - ADVANTAGES:
    - The experienced rowers can help get the shell safely out of the boathouse, onto the docks and back again.
    - The boat will be better set and easier to steer.
    - You can actually make it back to the boathouse after practice!

## 9. On the Water

- Find a quiet stretch of water.
- Show how hand levels affect the set of the boat. Starboards raise their hands, ports lower their hands and visa-versa.
- Drill by pairs. The rest of the rowers can set the boat.
- The release: Body at the finish position, blades squared and buried, tap down with the outside hand to show how to release the blade. (Multiple times.)
- Hands down and push away with the outside hand. Backs remain in the bow. (Multiple times.)
- Hands down, push away, forward body angle by swinging from the hips, not curving the back. "Express the chest." (Similar to a sprinter crossing the line.)
- At this point you can then practice the catch with legs flat.

## 10. Early strokes

- • Take strokes with body forward, flat legs. Talk about prying the boat past the catch using your core, not your arms or shoulders. "Drive the hips at the catch"!
- • Introduce pause drills... Finish, arms away, arms and back away, ¼ slide. (Usually no more than 10 strokes at a time).
  - Start with square blades until they understand the basics of the stroke. (Usually 4 to 5 practices.)

- It is very important to discuss the idea of a horizontal stroke at this point.
- Have the rower watch the blade. The water should be just covering the paint of the blade. Explain how a change in hand height through the drive can change the depth of the blade in the water.
- Try this with just the core, no arms or legs.
- Same stroke, now add the arms. Again focusing on a horizontal stroke, watching the blade.
- Add different slide lengths,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  and full. Each time have the rower watch the blade.

### 11. Teach the finish (release)

- Let's face it; the release is the scariest part of the stroke for novice rowers.
- Most rowers have issues at the release due to fear of getting caught at the release or catching a crab.
- Many novice rowers mistakenly lean away from the handle at the finish. (See Figure 2.)
- Correct handle heights through the mid-stroke will help get the handles to the proper position at the release...just below the pecs. (See Figure 3.)
- A strong, supported core at the finish is the key to a good release.
- Hands squeeze into the chest just below the pecs, with a straight back, gives you ample room to push the handles down without dumping into your crotch.
- Handle speed should be the same into the chest as out, without "slamming your chest."
- Arms away with shoulders remaining in the bow. Try to get the arms straight. A great drill here is pausing with arms away with your shoulders remaining in the bow.
- PIVOT FROM THE HIPS – Body preparation (See Figure 4.) This is a critical part of the recovery, which in turn, sets up a good catch.
- With arms away, start your pivot from the hips. This changes the center of gravity over the hull. This position is "called body preparation." (See Figure 4.)
- Legs draw to the chest as you come up the slide, maintaining the same body angle to the end of slide. (See Figure 5.)

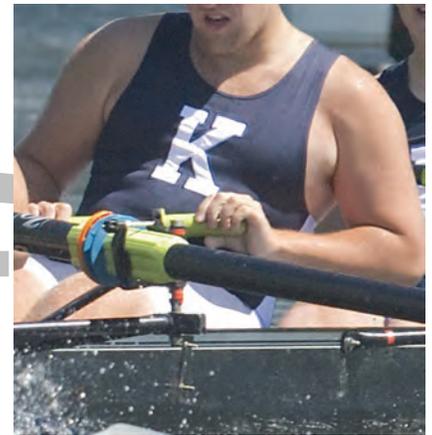


Figure 2. Novice at finish



Figure 3. Correct handle height

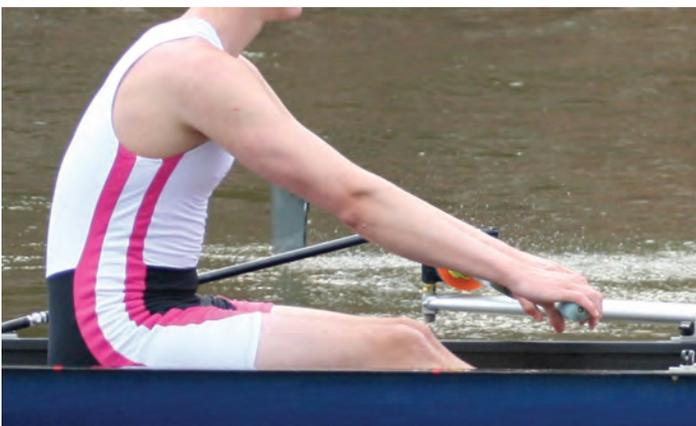


Figure 4. Body preparation



Figure 5. Beginning of the slide

## 12. The catch

Tips for a good sweep catch:

- Use the slide for length, not the upper body.
- Knees don't pass perpendicular.
- Outside armpit above outside knee.
- Sternum to inside knee.
- Legs not too far apart.
- Slight upward motion at the catch end with the outside forearm. Try not to use the shoulders to lift the blade.
- A good drill to practice placing the catch is from the USRowing site – "Karate chop rowing: During the recovery, place your hands on the oar handle in a karate chop position. After dropping the blade into the water at the catch, change the hands to their regular position. Extract the blade from the water at the release with the hands back in the karate chop position. This helps relax the shoulders, which is key to good catches."



Figure 6. In half of the slide



Figure 7. At the catch



Figure 8. The catch

### 13. The Drive

- Focus on the novice rower moving the boat with their feet, just hanging their weight on the handle of the oar. Getting up on water skis or a wakeboard is a good analogy to use in explaining how to press off the foot stretchers and hang your weight.
- A great drill to use to get the rower to feel what load should feel like at the catch is to start the stroke at the finish with the blade buried and then “backing the stroke to the catch end with the blade still in the water.” Do this by pairs or fours.
- When they get to the catch, pause to “load the blade.” Usually, this drill puts the rower at the optimum position for the catch.
- Start the drive by pushing against the foot stretchers, hanging your weight on the handle and driving the hips towards the stern.
- Figure 14 shows a rower getting “reach” with the upper body and not the slide. Notice that he is basically “at the catch” with the oar handle, but he is only at  $\frac{3}{4}$  slide. He is not in a strong position to use his legs at the catch and will have to open his back early in the stroke to get into a natural position to start the drive. The result is a shorter and less efficient stroke.



Figure 9. Beginning of the drive



Figure 10. Middle of the drive



Figure 11. Over reaching

## 14. Be positive, be patient

- Our job is to encourage athletes to row. Most of these athletes have never tried anything as difficult both physically and mentally as rowing. Make it fun, teach them respect, character and mental discipline and the speed will come.
- At some point, however, we just have to let them row and race. You should not expect perfection. If they are moving the boat in the right direction and having fun, then you have done a great job.
- After the season starts, focus on the fundamentals.
- Choose only one or two things to work on per day and let them have fun just taking strokes.
- Teach them how to compete.
- Racing is what it is all about for the young rower.



Figure 12. Novice boat racing

### Summary

As a coach, the daily task throughout your career will be teaching and correcting rowing technique, regardless of the level of the crew being coached. The steps and instructions outlined in this chapter apply to coaching of any sport, as well as any boat from novice up to the national team. How effective you are in your teaching skills will determine what kind of coach you will be.

For instance, there are coaches whose crews always row well, year after year, regardless of the talents of the crew members. Some of them are known as coaches “who don’t coach” or “who don’t talk.” Do not believe it. They know what to say, when to say it, and how to make changes happen.

### References and Further Reading

Davis, Rich, *Coaching Novices, Patience and Fundamentals*, USRowing Coaching Education, 2011.

Gentile, MA 2000. Skill Acquisition: Action, Movement and Neuromotor Processes, in J. Carr and R. Shepherd (eds.) *Movement Science Foundations for Physical Therapy in Rehabilitation*, Gaithersburg, Md., Aspen.

Lauder, AG 2001. *Play Practice: The Game Approach to Teaching and Coaching Sports*, Human Kinetics, Champaign, Ill.

Martens, R. 2004. *Successful Coaching*, Human Kinetics, Champaign, Ill.

USRowing Adaptive Information, <http://www.usrowing.org/DomesticRowing/AdaptiveRowing.aspx>

## CLASS ACTIVITIES

1. Describe the three major learning stages, giving brief characteristics of each one.
2. In three points, describe the difference in coaching a high school novice boat and a college boat.
3. Describe four major steps in coaching a new skill.
4. In pairs, demonstrate the four major points of teaching a new skill. For example, teach doing a correct squat, push-up or squat jump.
5. Using a demonstration on the erg, describe the steps in the process of correcting rowing technique.
6. What is the most important step in the process of correcting technique?
7. You have explained to your crew a change you want them to make. They are still not making the change you want. What other means can you try to use?
8. What key factor is important in planning a technical workout to be productive?
9. What are the basic steps in managing group of 30 young athletes?
10. Describe two major concerns when dealing with para athletes.
11. True or False: All people with disabilities are the same?
12. True or False: You should talk to each para athlete individually about what they can do and what they can not do?
13. Before going on the water, what should you do with a group of novices?
14. List five things you would do as safety precautions with novice athletes.
15. True or False: Equipment should match the level and size of the athletes.
16. True or False: It is advisable to put a more experienced coxswain in a boat with novice rowers.
17. What is the best sequence of drills to start with novices?

# MODULE 4: BASIC ROWING TECHNIQUE

By Kris Korzeniowski

## Learning Objectives

The candidate should be able to:

1. Describe rowing technique -- THE NATURAL STYLE
2. Have an understanding of basic rowing physics and biomechanics
3. Have a good knowledge of the phases of the rowing stroke
4. Have a good knowledge of blade work, grip and technical drills

## Introduction

Knowledge of rowing technique and safety matters are the basic necessities to becoming a successful coach. Very often, efficient rowing technique can outweigh the lack of power in a crew. There are many examples of lightweight crews being much faster than the heavyweight crews made of stronger and bigger athletes.

Every rowing coach, regardless of his or her level, should:

- Have a thorough knowledge and understanding of the basic principles of rowing technique
- Possess a very strong image (a mental model) of the rowing stroke
- And should be able to transfer this image to the rowers in simple, easy-to-understand language.

For the Level 2 coach, basic rowing technique comes down to the following points:

1. The definition of the natural rowing style and principles of moving a boat
2. Basic biomechanics of rowing
3. The posture of the rower in the boat and on the erg
4. Phases of the rowing stroke: recovery and drive
5. Blade work
6. Sweep and sculling grip
7. Technical Drills

## CHAPTER 1 -- Definition of the Natural Rowing Style

Why use the natural rowing style? Because the whole stroke happens naturally once:

- The rower **locks the blade** in the water.
- The initial push of the legs creates **suspension of the rower's body** on the oar handle.
- This continuous suspension dictates the natural sequence of the legs, then back, then arms overlapping each other.
- It also makes all motions related to the speed of the boat.

Well executed style makes the whole rowing cycle look effortless, without any abrupt acceleration during the stroke.

## CHAPTER 2 -- Basic Biomechanics of Rowing

In *Biomechanics in Rowing* (FISA, Coaching Education), Volker Nolte defines biomechanics as “the science that explores the human patterns of the movements with the application to physics. Biomechanics in rowing is interested in how the rower converts his physiological capacities into the moving the boat.”

Biomechanics in rowing covers many different subjects like:

- The athletes and rowing technique. In our case, the sequence of work of the different muscle groups used in the rowing stroke: legs, back and arms (details later on.)
- The physics of moving the boat, positive and negative force
- The forces and the angles of the blades during the drive
- The movement of the boat, acceleration and velocity curves
- Rigging and angles (an unexplored area with great potential in the future.)

More details on some of these subjects, with the latest in biomechanical testing in the boat, will be presented in Level 3.

### Power Application and Rowing Styles

There are three major groups of muscles that are involved in the rowing motion: legs, back and arms. Their work is defined by the changes in the angles during the stroke cycle: the knee angle for the legs, the hip angle for the trunk and the elbow angle for the arms. (See Figure 1)

Looking at these angles helps us to analyze the rowing technique, sequence of the motion and difference between rowing styles. (See Figure 2 and Figure 3)

For instance, in Figure 2:

1. The catch position
  - Knee angle is sharp. The shins are vertical.
  - Trunk is almost vertical
2. During the drive:
  - The knee angle is slowly getting flatter.
  - The hip angle opens from the beginning.
  - At half slide, the trunk reaches a full, layback position.

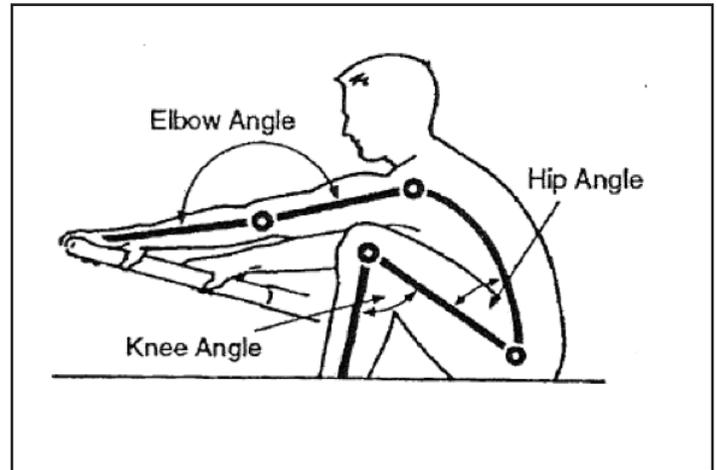


Figure 1. The angles between the major muscles

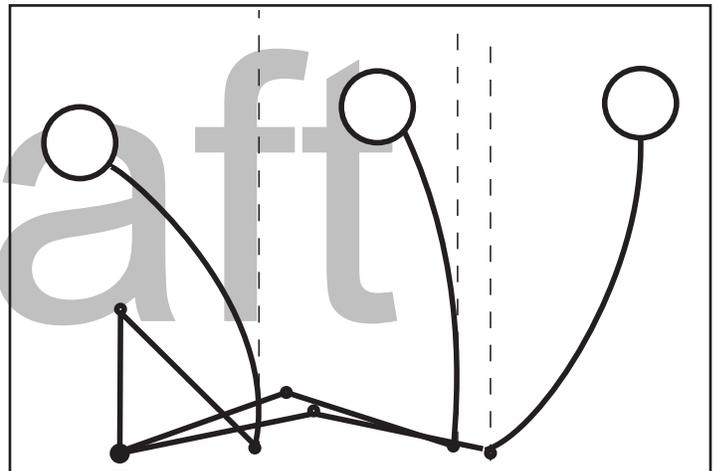


Figure 3.

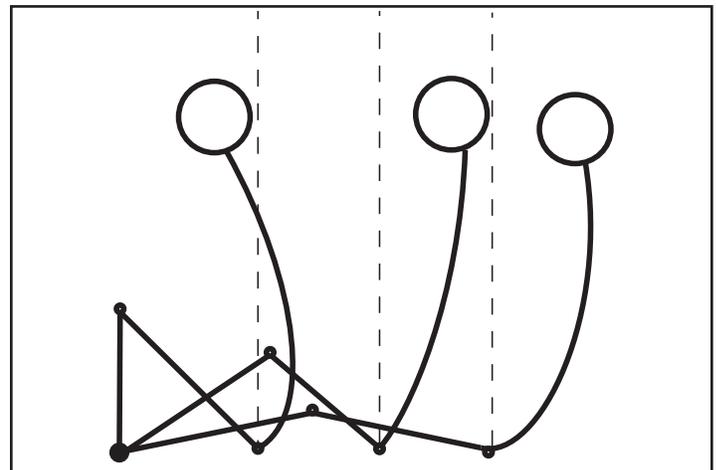


Figure 2.

- The legs and the back finish working together.

Figure 3 represents a very different rowing style.

1. At the catch:

- The shins are vertical.
- The trunk leans forward (sharp hip angle) a lot.

2. During the drive:

- The knees go down fast.
- The hip angle stays the same for the first part of the drive.
- The body (hip angle) starts to open towards the end of the leg's drive.
- The legs finish first, then the body. It is a well-defined sequence of the legs and body.

### Movement of the Boat: Positive and Negative Force

What follows is a simplification of the physical laws, as they relate to the movement of the boat. This subject will be expended upon in level 3.

During the rowing stroke cycle, a rower is moving on the slide backward and forward. (See Figure 4)

- During the drive, the boat is propelled forward (positive force)

$$F \text{ (force)} = M \text{ (mass of the rower)} \times A \text{ (acceleration of the rower to the bow) - positive force}$$

- During the recovery, the mass of the rower is moving in the opposite direction, towards the stern.

$$F = M \times A \text{ (acceleration to the stern) - negative force}$$

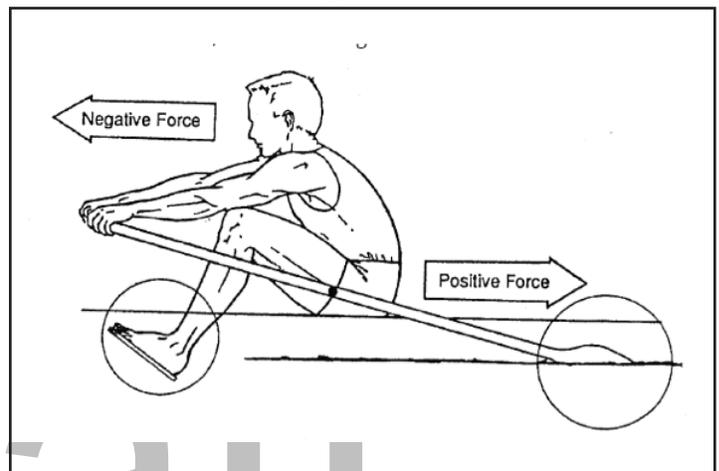


Figure 4.

It is impossible to completely reduce negative force. There will always be some "checking" of the boat, slowing it down a little before the catch. It is the degree of checking that separates the good crews from the poor ones.

Negative force, the check of the boat, occurs as a result of the following conditions:

- The mass of the rower is moving to the stern, in the opposite direction of the movement of the boat.
- If the blade is not in the water at the end of slide (the catch), all of the negative force goes to the footboards, slowing the boat.
- The upper body is still traveling forward, even though the slide has stopped. This is commonly called "diving" or "lunging" before the catch.

If the blade is in the water before the rower changes direction (starts the drive), the force goes to the blade decreasing the negative effect of the motion to the stern.

For this reason, we can say that the catch is the most important part of the stroke. Direct entry of the blade into the water minimizes the negative force.

## Velocity of the Boat

The effect of positive and negative forces on the velocity of the boat has some significant patterns.

**The curve of the velocity of the boat (Figure 5)** is a wave showing the increase and decrease of velocity during the stroke.

- The entry of the blade into the water occurs during the deceleration phase.
- An additional small decrease of boat speed follows the entry.
- Velocity of the boat is increasing during the drive.
- It continues even after the release, until around the middle of the slide.

This makes a very strong argument for the importance of a properly executed recovery. We know that crews with very good technique show smaller variations from the given average velocity.

## The Forces on the Oarlock as the Blade Works in the Water

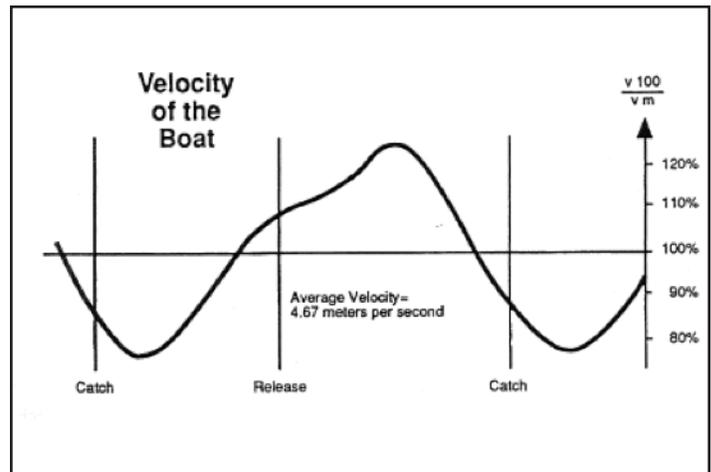
Scientists have found that how the forces are produced on the blade has a big effect on the efficiency of moving the boat.

- Case A – The force is very hard towards the beginning of the stroke. This creates a high peak of force very early on after the catch. All fast boats, like the 8+ and the 4x, have the peak of force relatively early in the stroke.
- Case B – The peak of the force is reached more gradually and close to the pin line (90 degrees) but still in front of it. This is characteristic for most boat classes.
- Case C – The peak of force is very late, almost at the pin line. This means there is very little power after the catch and a lot of acceleration towards the end of the stroke. This is characteristic for very slow boats like the 2+ and singles.

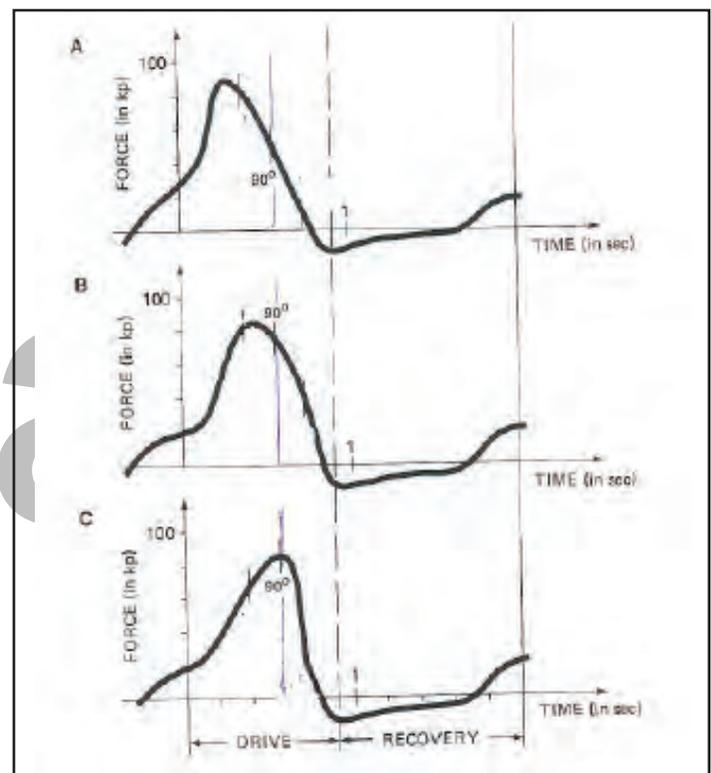
The newest devices allow us to measure, quite precisely, the forces on the oarlock for the all members of the boat.

Many coaches recognize the importance of uniform power application and use devices with force diagrams on the ergs, oars and the oarlocks

More details on the force and force curves will be provided in Level 3.



**Figure 5. Diagram of the velocity of the boat, as adapted from studies by Wenzel Joesten, DDR.**



**Figure 6.**

The perfect diagram of force on the oarlock.

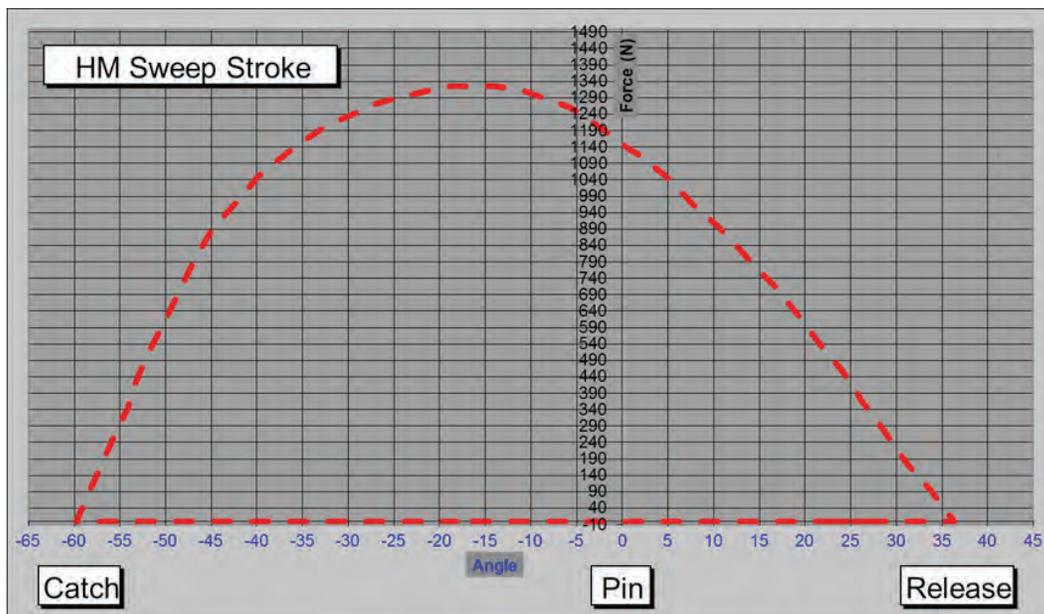


Figure 7.

# Draft

## CHAPTER 3 -- Body Posture

Correct body posture during the rowing stroke is important because:

- It provides a **solid connection between the different groups of muscles** during the drive.
- It makes an **efficient power application**.
- It **prevents injury**.

**At the catch**, the athletes should sit tall, relaxed and tilt forward from the hips without hunching the back. The athlete should keep this strong, tall and erect position to the end of the drive.

**At the finish**, there is still some pressure on the footboards, and the body remains tall. The chest and chin are up and behind the oar handles. This position guarantees pressure on the blade to the very last moment and gives a solid finish to the stroke.

### Suggested videos to watch:

- Rowing Exercises – Arms and Body, Double Set by SydneyHighRowing -- <http://www.youtube.com/watch?v=NhICRjI99P8>
- Tom Terhaar on Posture with Kady Glessner (<http://www.usrowing.org/Multimedia/CoachingVideoClips.aspx>)
- Tom Terhaar on Posture with Caryn Davies (<http://www.usrowing.org/Multimedia/CoachingVideoClips.aspx>)



Figure 8. Correct body posture at the catch



Figure 9. Correct body posture at the finish

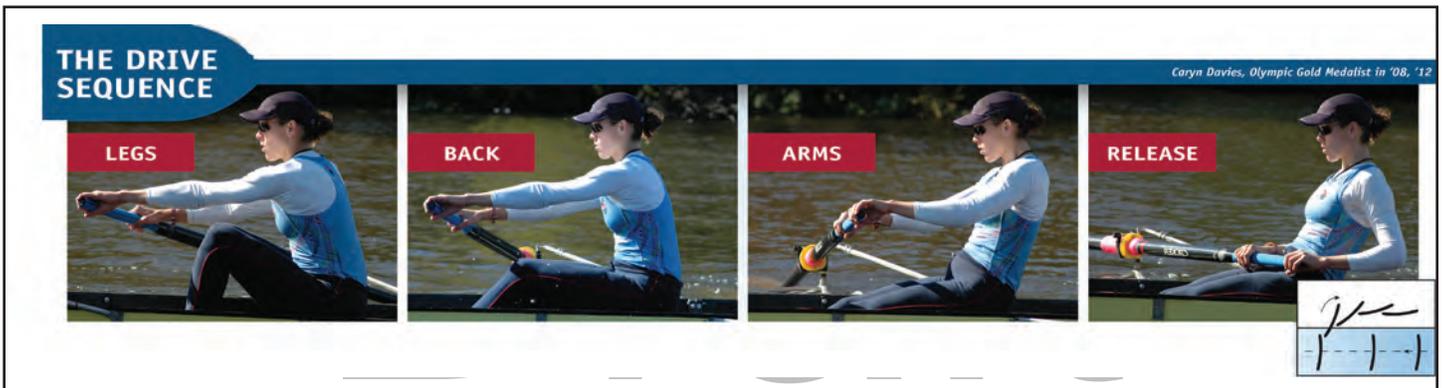
## CHAPTER 4 -- The Phases of the Rowing Stroke

The rowing stroke has two phases – **the recovery and the drive**



**Figure 10. Recovery sequence**

The recovery (see figure above) is when the blades are out of the water and the athlete is sliding forward towards the catch. It is defined by the sequence of the motion: **hands, body and slide. The catch is part of the recovery.**



**Figure 11. Drive sequence**

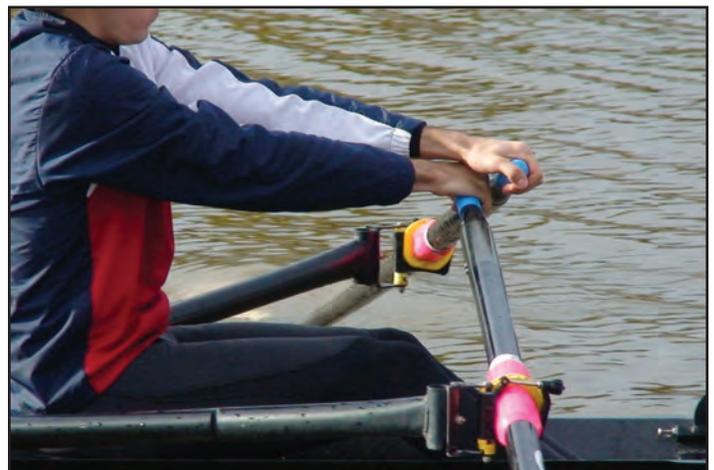
The drive phase is when the blades are in the water and the boat is propelled through the water. It is defined by the sequence of the motion: **legs, back and arms** (see figure above).

There is no significant difference between sculling and sweep rowing. All principals are exactly the same, except the overlap of the hands in sculling.

Overlap (crossing) takes place in sculling during recovery and during the drive, when the oar handles overlap each other for a very short time.

To accommodate this overlap, the port handle is rigged a little lower (0.5- 1.5cm) than the starboard handle. This differential should be as small as possible.

Too small a differential between the hands will tip the boat to port; too big a differential will tip the boat to starboard.



**Figure 12. Overlapping in sculling**

In order to limit the roll of the boat, it is necessary to keep the hands almost at the same level.

**The hands should barely touch each other during the overlap.**

### Recovery Phase

After the release of the blade from the water, the rower pushes his or her **hands away** from the body to almost full extension and only then does the **body pivot** forward. The **slide** starts moving forward when the hands pass the middle of the shins. The recovery is one continuous, relaxed and flowing motion that finishes with the entry of the blade into the water.

For novices learning to row and just for teaching purposes, it is recommended to keep some separation between the hands, body and slide during the recovery.

A controlled and organized recovery has a big positive influence on timing, balance and relaxation during the approach to the catch.

The athletes should move (glide) forward, creating as little disturbance to the run of the boat as possible. As they get close to the catch, they need to be thinking about good blade placement and the immediate “lock” of the blade in the water.

The recovery phase (in detail) looks as follows:

#### Hands



Figure 13. The first part of recovery - “hands”



Figure 14. The first part of recovery - “hands”

1. The athlete sits in the finish position, relaxed with knees down.
2. The body is in the layback position, chest still behind the oar handle; the blades are out of the water.
3. The hands start moving away from the body to almost full-arm extension (but not locked).

## “Body” -- Preparation



Figure 15. Body preparation

1. Stretched arms pull the body forward (pivot from the hips) to the full reach position.
2. The hands have gone over the knees, up to the middle of shins.
3. Now, the athlete is ready to start his or her motion (slide) forward towards the catch.



Figure 16. Body preparation

This leaning forward before the beginning of the slide (having the “body prepared”) is a very crucial to the rest of recovery and to the correct execution of the entry of the blade into the water.

The lack of the body preparation creates a chain of mistakes, like diving (lunging) before the catch, skying the blade, lifting the body at the catch and missing water.

## “Slide” -- Last Part of Recovery



Figure 17. Last part of recovery - “slide”



Figure 18. Last part of recovery - “slide”

1. The knee angle is getting sharper, as the rower continues gliding forward towards the catch.
2. The hip angle is quite sharp; the body is leaning forward at maximum reach (“maximum reach” is the correct angle for proper rowing, not how much a rower can actually get).
3. The arms are stretched (but not locked at the elbows), and for sweep rowers, the outside shoulder is a little up and in front of inside shoulder as the rower arrives at the catch.
4. The body stays along the boat’s axis.

Avoid additional reaching out (“diving”) at the end of the slide. It slows down the run of the boat dramatically.

## Catch as a Part of Recovery



Figure 19. Catch as a part of recovery



Figure 20. Catch as a part of recovery

1. The rower arrives at the front of the slide. The knee angle is most acute; shins are vertical, in “full compression” position.
2. The rower sits tall, relaxed and maintains the forward body angle gained during the earlier part of the recovery.
3. The arms are totally relaxed and extended forward.
4. The blade is squared by the rolling of the fingers, as both hands maintain a relaxed, but firm, grip on the oar handle.
5. For sweep rowers, the outside hand (not the shoulders) moves up in a small, quick motion, placing the blade into the water as the seat changes direction. There should not be any backsplash behind the blade at this moment. For scullers, the hands move up in a small, quick motion as the seat changes direction.
6. As the blade submerges in the water, the rower is able to suspend his or her body weight on the oar handle(s).
7. The speed and accuracy of this motion makes a big difference in the speed of the boat. Conversely, poor execution “kills” the run of the boat.

### The difficulty of correctly executing the catch lies in:

- **Synchronization between the relatively slow horizontal change of the direction of the legs and the vertical, quick lift of the arms.**
- **Dropping and locking the blade in the water relative to the speed of the boat.**
- **Being able to find resistance and suspending the body on the oar handle.**

**All this happens in approximately 0.15 seconds.**

More information about the catch will be provided in “Blade work.”

### Drive Phase

The drive phase begins when the blade is in the water. The rower is able to suspend his or her bodyweight on the oar and keep the suspension to the end of the drive. This suspension will create the sequence of the legs, back and arms overlapping each other.

**An efficient drive will keep the boat accelerating during the entire drive.**

During the drive, there are no significant differences between sculling and sweep rowing.

## Drive Phase in Detail: "The Legs" -- First Part of the Drive



Figure 21. The first part of the drive - "the legs"



Figure 22. The first part of the drive - "the legs"

1. The blade is already locked in the water.
2. The knee angle is getting flatter as the legs push against the footboard.
3. The body position (angle) remains unchanged for this part of the drive.
4. The arms are stretched ("arms like ropes".)
5. The rower passively hangs on the oarhandles. Sweep rowers should feel most of the tension on the outside arm and outside lats.

## "The Back" -- Middle of the Drive

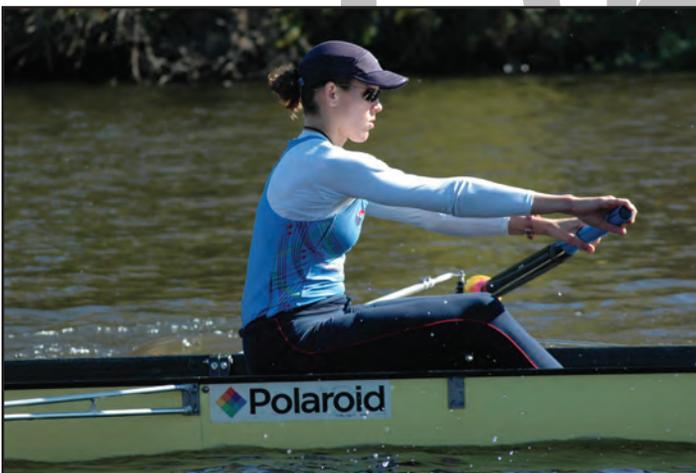


Figure 23. The middle part of the drive - "the back"



Figure 24. The middle part of the drive - "the back"

1. Some knee angle remains in the last quarter of the drive. The legs are in their strongest position.
2. The back "uncoils." It appears as if the **body swing** takes over from the leg drive. The tall, upper body is pivoting from the hips.
3. The arms are still stretched, and the rower keeps hanging on the oar handle.
4. The blade approaches perpendicular to the boat. Mechanically, it is the most efficient part of the stroke.
5. The shaft keeps its flex, and the blade continues at 2-3" below the water level.

## “The Arms” -- Finish of the Stroke



Figure 25. The finish - “the arms”



Figure 26. The finish - “the arms”

1. The knee angle is flat. The seat has stopped in the bow position, and the legs finish their work just before the back finishes.
2. The hip angle is open, and the body arrives to the layback position of about 10 degrees past vertical.
3. The rower keeps a tall body position with the chin level and chest behind the oar handles, without slouching.
4. The **arms continue** the last few inches of the draw. The outside forearm is horizontal, and the elbow pulls past the body.
5. The rower continues to keep pressure on the footboards by accelerating the oar handle to the body.

## “The Release”



Figure 27. The release



Figure 28. The release

1. The rower sits tall with some support against the foot stretchers. The head and chest are behind the oar handle.
2. For sweep rowers, the outside hand makes a semicircular (tapping) motion down, without touching the body and without slowing down. For scullers, the wrists are pushed down slightly.
3. The blade comes out of the water.
4. The inside hand feathers the blade, and for scullers, both hands feather the blades using the thumb and fingers.
5. The oar handle slows down a little.

More details about the release are discussed in “Blade Work.”

When both phases – recovery and drive – are executed correctly in harmony with the speed of the boat, the whole rowing cycle looks easy, fluid and effortless.

# Draft



# Natural Rowing Technique

## RECOVERY SEQUENCE



### HANDS

#### THE FIRST PART OF RECOVERY – “HANDS”

- The athlete sits in the finish position, relaxed with knees down.
- The blade is out of the water.
- The hands start moving away from the body to almost full-arm extension, but not locked.



### BODY

#### BODY PREPARATION – “BODY”

- The rower straightens the arms and pivots the body forward to the full reach position.
- The hands have gone over the knees, but the knees are still down.
- Now, the athlete is ready to start his or her slide forward towards the catch.



### SLIDE

#### LATE PART OF RECOVERY – “SLIDE”

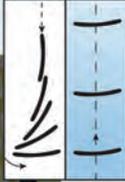
- The rower continues gliding forward to the catch, without any change to his or her body position.
- Avoid additional reaching out (diving) on the end of slide. It slows down the boat.



### CATCH

#### CATCH, THE ENTRY OF THE BLADE INTO THE WATER

- The rower arrives at the front of the slide, tall and relaxed, with the body angle maintained exactly the same as during the last part of the slide.
- The shins are almost vertical in “fully compressed” position.
- The arms are totally relaxed and extended forward.
- The arms and the hands move upwards in a small motion to place the blade into the water.



## THE DRIVE SEQUENCE



### LEGS

#### THE FIRST PART OF THE DRIVE – “LEGS”

- The blade is already in the water. The legs push against the footboards and the whole body changes direction and starts moving towards the bow.
- The arms are stretched; the rower passively hangs on the oar handle.
- The body position remains unchanged for the first part of the drive.



### BACK

#### THE MIDDLE PART OF THE DRIVE – “BACK”

- The seat is approaching the last third of the slide.
- The back extends to open (uncoils), so it appears as if the body swing takes over from the leg drive. The tall upper body is pivoting from the hips.
- The arms are still stretched and the body hangs on the oar handle.
- Mechanically, the most efficient part of the stroke.



### ARMS

#### THE FINISH – “ARMS”

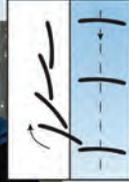
- The legs are flat and the rower sits back in a position of about 10 degrees past vertical.
- The head and chest are behind the oar handle without slouching.
- The arms continue the last few inches of the draw. Outside forearm is horizontal and pulling through.
- The rower continues to keep pressure on the footboards.



### RELEASE

#### THE RELEASE

- The rower sits tall with some support against the foot stretchers. The head and chest are behind the oar handles.
- The hands make a semicircular tapping motion down, without touching the body.
- The blade comes out of the water.



Caryn Davies, Olympic Gold Medalist in '08, '12

Draft

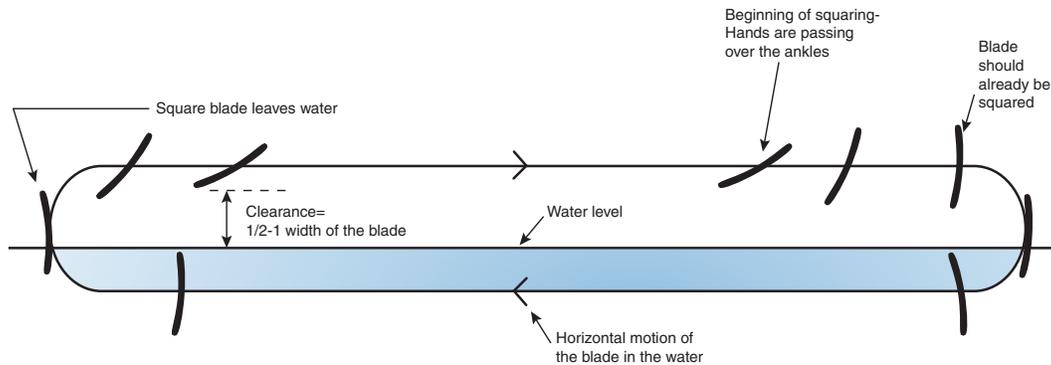
Suggested videos to watch :

1. YouTube.com: "Front end warm-up full slide (square and feather)" by oarsportltd.  
<http://www.youtube.com/watch?v=qg8Rb60BmJQ&feature=related>
2. Australian 2- (Tomkins). -- [http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Australian\\_2-\\_Tomkins.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Australian_2-_Tomkins.aspx)
3. USRowing Video: Good Rowing -- [http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Good\\_Rowing.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Good_Rowing.aspx)
4. USRowing DVD: *Sweep Technique - The Art of Moving the Boat*
5. USRowing DVD: *Sculling Fundamentals*

# Draft

## CHAPTER 5. Blade Work

Blade work is a skill that has direct impact on the movement and speed of the boat. For this reason, many coaches pay more attention to correcting blade work than to the body motion. Yet, blade work is a direct reflection of what is happening inside the boat. It is possible to change either body motion or blade work and see improvements in the other element.



**Figure 30. Simplified path of the blade during the stroke**

### Simplified Path of the Blade

The path of the blade in, and above, the water should be horizontal and connected by semicircular ends (entry and release) where the blade changes direction. The whole motion (squaring, entry, release and feathering) should be related to the speed of the boat and the stroke rate.

### Recovery

During the recovery, the blades travel toward the bow in a smooth, horizontal plane at a steady height. The rower should allow enough clearance (1/2 to 1 width of the blade) for easy squaring of the blades before entry, without skimming the surface of the water.

### Squaring

Ideally, squaring should start as the hands go over the ankles. Squaring should be done by the inside hand, executed gradually at a constant speed, during the last part of the recovery. It should neither slow down nor stop the motion ("hanging") of the blades just before the entry.

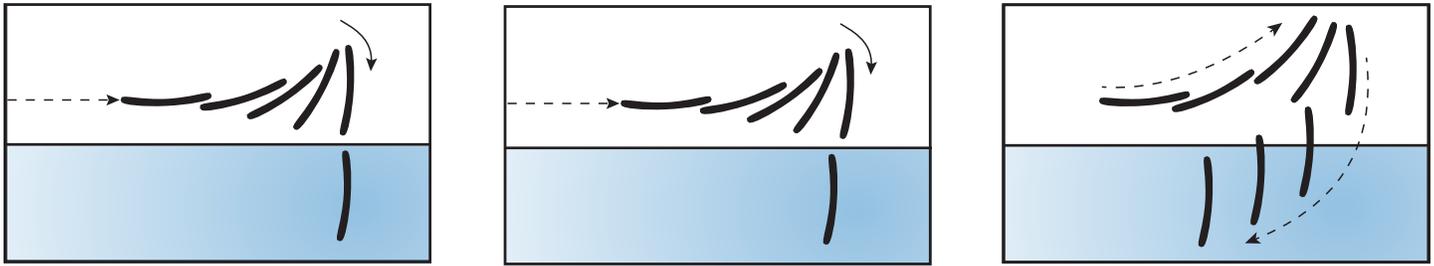


Figure 31. A) What to teach

B) What it should be

C) What to avoid

**The catch (figures above) is the most important part of the rowing stroke** and the most difficult one to execute correctly.

The entry of the blade into the water should be a continuation of the recovery. It should be well synchronized with the speed of the boat.

For the teaching purposes, **(Figure A)** we should say that the blade changes direction only after it is totally submerged in the water.

In reality, **(Figure B)** to be able to row at a higher cadence, the catch is a “scooping motion” followed by an immediate horizontal power application (leg drive). The change of direction of the blade occurs at the moment when the bottom edge of the blade touches the water. There is always a small front splash at the higher cadence.

**Figure C**, illustrates a very common mistake we are trying to avoid. The blade “misses the water,” changes direction over the water and then travels for a few inches towards the stern before it finally meets the water.

Because of the difficulty to execute the catch correctly, we coach “A” to avoid “C,” hoping that we end up somewhere in between as shown in “B.”

### Drive

The shaft of the oar should bend at the moment of the catch. During the drive, the blades remain evenly buried in the water, at a depth of two to three inches below the water surface. As the boat accelerates during the stroke, it is important that the rower is able to keep steady pressure on the blade, or in other words, to keep the shaft bent to the very end of the drive.

### Release

The release from the water should follow “the last push of the boat,” which creates a small cavity behind the blade. This cavity is a guarantee that the pressure has been kept to the very end of the stroke. The rower employs a quick, fluid, semicircular, mostly outside hand motion down in front of the body. The

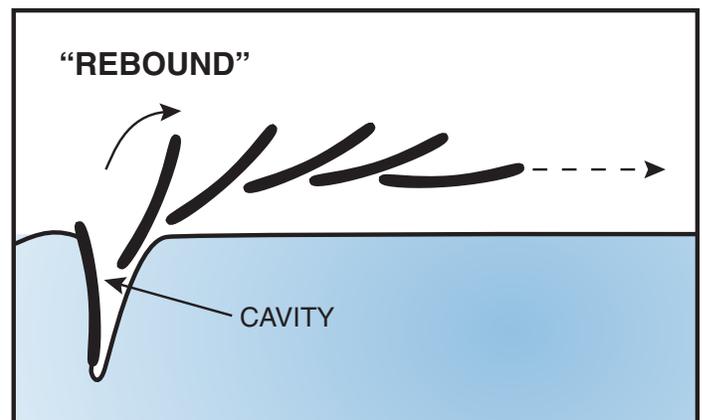


Figure 32. Release from the water

blade “whips out” or “rebounds” out of the water towards the bow.

The blade should not travel to the stern after release from the water. That would mean decreasing pressure or losing connection (washing out) towards the finish of the stroke.

**The feather**, turning the oar so the blade is parallel to the water surface, occurs as the blade leaves the water. For sweep rowers, the whole action of feathering should be done by the inside hand only. If the feather is too fast, it ends up cutting the last part of the stroke and, more or less, means the athlete is feathering in the water and thus slowing the boat.

Suggested videos to watch:

1. USRowing video: Blade Work -- [http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Bladework.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Bladework.aspx)
2. Catch from the legs, U.S Men's Eight, 2012 (Coming Soon)

# Draft

## CHAPTER 6 -- Rowing Grip: How to Hold the Oars

Watch USRowing video on grip with Eric Catalano and Chris Chase: [http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Grip.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Grip.aspx)

Novices must learn to hold the oars properly early in their training. An incorrect grip causes many mistakes and is difficult to change once it has been established. Do not be afraid to spend plenty of time teaching novices the correct method of holding the oars and the sculls. Teach them how to hold the oars before teaching anything else. A good routine would be to practice correct gripping, feathering and squaring at the beginning of each workout.

The correct sculling grip:

- Relaxed, with the thumbs on the end of the handles, pushing the oars out to the oarlocks.
- The rest of the fingers are wrapped loosely around the handles, with the knuckles forward as if to punch.
- The wrists are slightly elevated.

To feather, press the wrist down a little, rolling the fingers out and allowing the oar handle to rotate in the fingers.

To square, roll the wrist up and push the hand up a little at the same time.



Figure 33. The correct sculling grip



Figure 34. Feathering

The correct sweep grip:

- The hands should be positioned on the oar handle about two to three hand-widths apart.
- The fingers wrap around the oar handle with the thumb under the oar handle.
  - Wrists are flat, while holding the handle between the fingers and palm in order to feel the weight of the hands on top of the handle.
  - This will put the punching knuckles over the center of the oar handle.
  - At the release, push the handle down with the fingers of the outside hand (the hand furthest from the blade).

To feather, push the wrist of the inside hand down.

- Use the pressure from the fingers and the thumb to initiate rotation of the oar handle in the hand.
- The outside hand should be relaxed and flat. The fingers are loosely wrapped around the end of the handle, allowing for the handle to rotate.
- To square and place the blade into the water, the inside hand's wrist and fingers roll the oar handle up and into the water.



Figure 35. The correct sweep grip



Figure 36. Feathering

**Required video:**

1. Short video "Rowing Grip" by Eric Catalano and Chris Chase

**Suggested DVDs to watch:**

1. USRowing DVD: *The Art of Moving a Boat*
2. USRowing DVD: *Sculling Fundamentals*
3. USRowing DVD: *Let's Row*

**Suggested reading:**

Davis, Rich, *Coaching Novices*

Raymond, Peter, *Hands and Handles*

Vespoli, Michael, *Hold on to Your Oars Correctly*

## CLASS ACTIVITIES

1. Describe the natural rowing style in bullet points.
2. Why is correct posture important?
3. What two forces are in the boat?
4. Where is the peak of velocity of the boat?
  - a. After the release
  - b. Middle of the drive
  - c. Middle of the slide forward
5. Describe the sequence of the recovery.
6. Describe the sequence of the drive.
7. Look at Figure 37.
  - a) Identify the phase of the stroke.
  - b) Describe his position using angles of the knees, hips and elbows as guides.
8. Look at Figure 38.
  - a) Identify the phase of the stroke.
  - b) Describe his position using angles of the knees, hips and elbows as guides.
9. Look at Figure 39.
  - a) Identify the phase of the stroke.
  - b) Describe her position in bullet points.
10. Which part of the stroke is the most important and why?
11. Body preparation prevents which of the following from happening, directly and indirectly?
  - a. Diving before the catch
  - b. Skying the blade before the catch
  - c. Missing the water
  - d. All of the above
12. When do you start to square the blade?
  - a. Directly after the release
  - b. Just before the catch
  - c. Hands over the ankles
  - d. As the seat starts to move
13. How should feathering should be done?
  - a. By inside hand
  - b. By outside hand
  - c. Both



Figure 37.



Figure 38.



Figure 39.

d. Doesn't matter

14. What happens after the release of the blade?
  - a. Continue moving to the stern
  - b. Rebound to the bow
15. True or False: The blade should be touching the water on the recovery?
16. True or False: In sculling, the thumb should be on the end of the handle?
17. True or False: When sculling, the left hand is further away from the body than the right hand?
18. True or False: When sculling, the right hand should be over the left hand?
19. True or False: The legs start the recovery when the hands clear the knees?
20. True or False: The catch is made by lifting the upper body at the end of the recovery?
21. What kind of splash should there be when the blade enters the water?
  - a. Back splash
  - b. Front splash
  - c. No splash

22. List three major faults in this catch (Figure 40) .

23. What are the two major reasons for the mistake in Figure 40?

24. What creates the mistakes mentioned in question 23 and what drill would you use to correct them?

25. True or False: At the catch position, the shins are vertical?

26. What initiates the first part of the drive?

- a. Legs
- b. Upper body
- c. Arms

27. In what position should the outside elbow be at the finish of the stroke?

- a. Below the hand
- b. Level with the hand
- c. Above the hand

Demonstrate on the erg in the class:

1. Correct posture at the finish and catch
2. Both phases of the rowing stroke and explain the sequences

Demonstrate on the blade in the class:

1. Sweep grip on square and feather
2. Sculling grip on square and feather

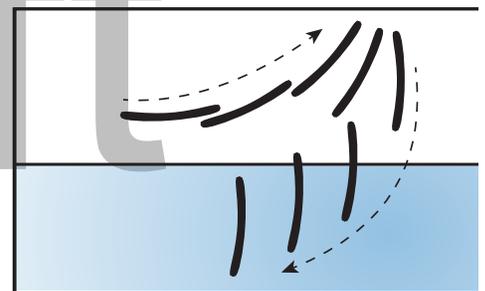


Figure 40.

## CHAPTER 7 -- Basic Technical Drills

By Kris Korzeniowski

Technical drills are a very big part of coaching. To make a drill efficient and effective, coaches must have a good understanding of what a drill does and how it should be executed.

There are many examples of coaches ordering their novice crews to do a drill, such as “all eight, with a pause at half slide, on the square,” because they saw the national team doing it. Not only is it painful to watch, but a poorly chosen drill can set a crew back in the learning process.

Experienced coaches are very selective and focus on just a few drills that they will use to achieve a particular result. Those coaches know it is not about the number of the drills they use, but it is about choosing the right one and executing it correctly.

Here are some simple principles for using drills efficiently:

- Explain the reason for doing the drill, demonstrate the drill, discuss common mistakes in the execution of the drill and make sure the drill is appropriate for the level of the crew.
- Be sure to thoroughly discuss and demonstrate the drill on land prior to the workout in order to limit any interruptions on the water.
- The boat must have balance in order for the drills to work. When doing the drills, create balance by having only part of the boat rowing. Even the national team does drills by sixes.
- Make sure to give the athletes enough repetitions, so they can learn the drill correctly and the drill can have the desired impact. Doing 20 strokes of a drill is not enough to have any impact. Keep the same technical focus for a week or two.
- Doing drills is not a goal in itself. The goal is to improve some part of the technique. Always incorporate regular strokes after each drill to see if the rowers can transfer what they learned during the drills into normal rowing. In other words, see if the drill worked or not.

**Do not kill the fun of rowing by hours of drilling. Keep it simple. Think about your athletes' age, skill level, attention span and ability to be coached.**

Here are some basic individual drills, which are sufficient to use with any crew from novice to the national team:

## 1. Arms-Only (sometimes called “pick drill”)

USRowing video: “Arms Only, Arms and Body” (See link summary at end of section)



Figure 1. Arms-only sweep



Figure 2. Arms-only sculling

This drill teaches rowers:

- How to put the blade into the water by raising the hands up.
- How to get the blade out of the water by pushing the hands down in front of the body.
- How to develop good timing and rhythm at the catch and finish.

Watch out for straight arms on the catch and good posture with pressure on the footboards. This is the best exercise to start the rowing stroke sequence and the warm-up.

## 2. Arms and back (sometimes called “pick, swing”)

USRowing video: “Arms Only, Arms and Body”



Figure 3. Arms and back sweep



Figure 4. Arms and back sculling

This drill is a natural extension of the pick drill, with the addition of the back motion.

It teaches the rowers:

- To use the back and hang on the oar handle.
- How to pivot the upper body from the hips.
- Coordination between body swing and the arms at the finish.

It is a difficult drill to execute when the boat is moving fast.

**Make sure the rowers keep the arms straight until the body reaches vertical.**

### 3. Quarter Slide and Half Slide



Figure 5.



Figure 6.

This drill is a natural extension of the arms and back drill, with the addition of the slide. It teaches rowers:

- To use the slide in coordination with the body swing and arms.
- To make a catch on the run due to the very short stroke.
- To change the direction of the body and the seat at the catch.
- To raise the cadence (builders – short sprints).

**Make sure the athletes are getting the correct body angle (body prep) before beginning the slide, even on quarter slide.**

### 4. Legs only

USRowing video: [“Legs only and Legs/Back”](#)

This drill teaches rowers:

- Correct body position during the approach to the catch.
- Eliminates “diving” before the catch.
- Correct catch by using the hands only, without lifting the back.
- Correct speed of entry and depth of the blade at the catch. (You cannot “chop wood” on legs only.)
- To be horizontal at the beginning of the leg drive.

**Legs only can be done with a “wide grip,” which re-enforces leaning to the oar, feeling pressure in the outside lats and making the catch with the outside hand only.**



Figure 7. Legs only

## 5. Legs and Back, Straight Arms

USRowing video: “Legs only and Legs/Back”

This drill teaches the rowers:

- A horizontal beginning of the stroke by the legs only followed by the body swing.
- It helps to create a uniform power application of all the rowers during the drive by the distinctive sequence of the legs followed by the body swing.
- How to use body swing to add more acceleration to the boat at the end of the leg drive.



Figure 8. Legs and back, straight arms

The drill should be followed by some regular strokes. When adding the arms, make sure that they continue acceleration started by the legs and back.

**A good variation of this drill is to do it with a pause after release (see picture above), so the rowers can feel a uniform send of the boat caused by the body swing.**



Figure 9. Inside arm only

## 6. Inside arm only

USRowing video: “Inside Arm and Outside Arm”

This drill teaches the rowers:

- To use the inside arm to feather and guide the oar handle during the recovery.
- To use the inside arm to square the blade before the catch and drop it into the water.
- To develop patience through the water by making it so heavy that the rower has to wait for the blade to come to him or her.

## 7. Outside Arm Only or “Wide Grip” (an easier version of outside arm only)

USRowing video: “Inside Arm and Outside Arm”



Figure 10. Outside arm only, first part of drive



Figure 11. Outside arm only, straight arm at the end of leg drive

Outside arm only is the best drill to teach the athletes:

- How to use their body weight during the rowing stroke.
- How to “hang on the oar” and how to use their outside lats.
- It forces the rowers to use their legs.

### **Hang on the oar until the body passes the vertical (see picture below)**

We suggest this drill be done by half of the boat because of the difficulty of maintaining good balance. Half should row and the other half should set the boat.

### **Wide grip**



**Figure 12. Wide grip in middle of drive**



**Figure 13. Wide grip, hanging to the end**

Wide grip is the easier version of the outside arm drill because it is easier to keep the boat balanced. It teaches the rowers all of the same things as outside arm.

**Note! It forces the athletes to have correct body position at the catch and the finish (outside shoulder slightly higher than inside). See picture above.**

### **8. Feet Out**

This drill teaches rowers:

- To hold the pressure on the blade and on the footboards to the very end of the stroke.
- To be very horizontal and relaxed during the stroke.
- To eliminate unnecessary layback. The athlete will fall backwards if he or she does not “hold on” to the water through the entire stroke. To “hold on” to the water, the rowers have to accelerate the arms enough to keep solid pressure on the blade to the very end of the stroke.
- It looks like the chest is coming to the oar-handle at the finish.



**Figure 14. Feet out**

**Most of the drills like: arms only, arms and back, outside arm only and regular rowing can be done with the feet out in order to reinforce a good hold of the water.**

## 9. Placement Drill

USRowing video: "Placement and Rusties"



Figure 15. Placement drill (beginning)



Figure 16. Placement drill (end)

This drill teaches the rowers to:

- Have a uniform gliding motion from release to the catch.
- Balance the boat during recovery.
- Make the catch part of recovery, because the drill has no drive.

**Look for:**

- **A very deliberate sequence of the hands, body and slide out of bow.**
- **Perfect timing of the blade getting into the water and the end of the slide.**

Correct execution of this drill requires good balance. It is suggested to start this drill using half of the boat, while the rest of the athletes set the boat.

## 10. Rusties

USRowing video: "Placement and Rusties"



Figure 17. Rusties: Beginning of exercise



Figure 18. Rusties: End of exercise after the stroke

To clarify, this drill is named after the legendary Australian coach Rusty Robertson.

Australians call it “roll up and pull.” It is not “cutting the cake!!”

It is a drill that covers every part of the stroke; plus it develops a good feeling for moving a boat.

1. Start from the finish, like the placement drill (see Figure 17).
2. Take the stroke after the catch.
3. Send the boat and stop at “body over” position (see Figure 18).
4. Return to the finish and start again.

In other words, it is like rowing with the pause body over, but start from the finish after each pause. Let boat run during the pause as the athletes return to the finish.

## 11. Square Blade Rowing

USRowing video: “Square Blades and Quarter Feather”

This drill teaches rowers:

- To keep the correct pressure on the blade at the finish, which allows the blade to get out of the water cleanly.
- To be more deliberate and precise at the finish, coming out and around.
- It can be a good balance exercise at low rigging.
- It also facilitates a good catch because the blade is already squared.

This drill requires relatively good balance. If the balance is poor or if the boat crashes to either side, then is time to have two or more rowers set the boat.

## 12. Quarter Feather Rowing

USRowing video: “Square Blades and Quarter Feather”

This drill is very popular among coaches. Sometimes coaches row an entire workout using quarter feather. It is easier than rowing square blade, and it achieves similar results.

- It improves the finish by slowing down the feather. This allows the blade to come out square and feather later.
- It helps eliminate feathering of the blade while it is still in the water.
- It improves the catch because the blade is almost prepared for the catch during the recovery.



Figure 19. Square blade rowing



Figure 20. Quarter feather rowing

### 13. Pause at the Finish (Figure 21)

USRowing video: "Pauses in Teaching Rowing Technique"

This is a very good drill for any level of boat. It creates a strong gathering point that defines the end and the beginning of the stroke. It also develops:

- A sense of timing and rhythm at the end of the drive and before the start of the slide.
- A uniformed, one-motion recovery and perfect timing for the catch.
- Catching as a part of the recovery.
- Uniform power application in the water, with good acceleration to the pause.

It became the preferred way of rowing, even for many international boats, because of the simple, easy to learn rhythm. This is highly recommended to use with novice boats.

### 14. Pause Body Over (Figure 22)

USRowing video: "Pauses in Teaching Rowing Technique"

This drill teaches rowers:

- To prepare the body (to get the correct body angle) before beginning the slide.
- To use body swing to accelerate the boat before the release from the water.
- To have a strong finish with the blade "re-bounding" or "whipping" from the water.

Make sure the hands lead the motion out of the bow, followed by the body.

### 15. Pause at Half Slide (Figure 23)

USRowing video: "Pauses in Teaching Rowing Technique"

The purpose of the drill is:

- To develop a patient, controlled slide.
- To finish the body prep by half slide.
- It helps to create a uniform approach to the catch.

Make sure that the athletes do not rush to the pause, that they still patiently go through the "hands" and "body." It is suggested to do this pause following the pause "body over."



Figure 21. Pause at the finish



Figure 22. Pause body over



Figure 23. Pause at half slide

## Drill Combinations

### 1. Rowing sequence from the finish: arms only, back/arms, quarter slide, half slide and full slide

USRowing video: "Arms only, Arms and Body"

This is the easiest sequence to build the stroke from the finish, especially for novice athletes.

- It teaches the rowing stroke gradually from the easiest part (arms only) to the most difficult (full slide).
- It teaches the natural flow and the sequence of the motion during the drive and the recovery.

**It also is the best sequence to start the workout for any boat from, from novice up to the national team. It should be the very first part of every warm-up.**

### 2. Rowing sequence from the catch: Legs only, legs/back, regular rowing

USRowing video: "Legs and Legs and Back"

This sequence is very good to build the stroke from the front end, starting from the catch.

- It teaches the drive sequence: legs, back and arms.
- It helps to create a uniform power application during the drive.
- It combines all the positive aspects from each drill.

This sequence can be done with the pause after release to create better execution of each drill and to prevent rushing through the sequence.

### 3. Inside and outside arms only, regular strokes

USRowing video: "Inside and Outside Arm"

The purpose of the sequence is:

- To teach athletes to differentiate the functions between the outside and inside arms.
- To use the inside arm to guide the blade during recovery and to take the catch.
- To use the outside arm to suspend the body on the oar and press the oar handle down at the release.
- It also teaches the athletes how to apply these different functions during regular rowing.

It might be better to use wide grip instead of outside arm only with less experienced crews.

### 4. Recovery sequence: double pause -- at the finish and at body over

USRowing video: "Sequence of the Pauses"

The purpose of this sequence is to:

- Develop a uniform end of stroke and a uniform beginning of the recovery with the hands first and then the body.

Many athletes have the opinion that the double pause sequence always cleans up and organizes the end of the stroke and beginning of recovery.

## 5. Advanced recovery sequence: double pause -- body over and at half slide

USRowing video: "Sequence of the Pauses"

The purpose of this sequence is to develop:

- A uniform finish of the stroke.
- Correct body preparation before beginning the slide.
- Creating a patient slide forward and completing all of the body prep by half slide.

### Summary

These 15 drills and five combinations of drills are more than enough to develop technically good boats. They are very good for novices and national team athletes alike because they cover all of the fundamentals of the rowing stroke.

**It is suggested to use pauses a lot, especially with novice crews. Pauses are good for giving the athletes very strong reference points, dictating the sequences and timing of the motion.**

### Summary of USRowing videos to watch:

1. Arms Only, Arms and Body  
[http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Arms\\_Only\\_Arms\\_and\\_Body.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Arms_Only_Arms_and_Body.aspx)
2. Legs and Legs and Back  
[http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Legs\\_Only\\_Legs\\_Back.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Legs_Only_Legs_Back.aspx)
3. Inside Arm and Outside Arm  
[http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Inside\\_Arm\\_Outside\\_Arm\\_Wide\\_Grip.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Inside_Arm_Outside_Arm_Wide_Grip.aspx)
4. Placement and Rusties  
[http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Placement\\_Drill\\_and\\_Rusties.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Placement_Drill_and_Rusties.aspx)
5. Square Blades and Quarter Feather  
[http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Square\\_Blades\\_and\\_Quarter\\_Feather.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Square_Blades_and_Quarter_Feather.aspx)
6. Pauses in Teaching Rowing Technique  
[http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Pause\\_Drills.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Pause_Drills.aspx)
7. Sequence of the Pauses  
[http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Pause\\_Sequence.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Pause_Sequence.aspx)
8. Good Rowing  
[http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level\\_2\\_Coaching\\_Videos/Good\\_Rowing.aspx](http://www.usrowing.org/multimedia/coachingvideoclips/level2coachesmanualvideos/Libraries/Level_2_Coaching_Videos/Good_Rowing.aspx)

## CLASS ACTIVITIES

1. What do experienced coaches use?
  - a. A lot of drills
  - b. No drills
  - c. Only necessary drills
2. Give one condition needed for a drills' session to be productive.
3. What is the best way to do drills with a novice boat?
  - a. All eight on square blades
  - b. Row by half crew
4. What are some principles of using drills efficiently?
  - a. Drill for hours
  - b. No fun
  - c. Keep it simple and pay attention to athletes' age, skill level and attention span
5. True or False: When doing arms only, break the arms at the catch and do not focus on posture?
6. True or False: When doing pick swing, hang on oar handle until body passes vertical?
7. True or False: Quarter and half slide can be used to raise cadence to do builders?
8. True or False: Legs only encourages diving at the catch and poor body position?
9. True or False: Legs and back should not be done with straight arms?
10. What does inside arm teach?
  - a. To square before catch,
  - b. To feather at finish
  - c. Both
11. Outside arm only is used to do what?
  - a. Make more difficult for rowers
  - b. Teach how to hang on the oarhandle
  - c. Balance the boat
12. In wide grip, where should the rowers should lean?
  - a. Away from oar handle
  - b. Into oar handle
  - c. Rowers should not lean at all
13. What does rowing with feet out help with?
  - a. Holding on to the water
  - b. Not having too much lay back
14. What do placement drills teach rowers?
  - a. Deliberate sequence into the catch
  - b. Make catch part of recovery

- c. Separate catch from drive
- d. All of the above

15. What does quarter feather teach rowers?

- a. Make stroke more difficult
- b. To have a clean finish
- c. To have the blade prepared for the catch

16. The purpose of pausing at the finish is to:

- a. Define beginning and ending of the stroke
- b. Uniform recovery
- c. Sense of timing and rhythm
- d. All of the above

17. Pausing at half slide teaches rowers to:

- a. Rush the slide
- b. Dive at the catch
- c. To have body prepared before half slide

18. To build the stroke from the finish with novice rowers, would you use:

- a. Arm, arms back, quarter slide sequence
- b. Legs only, legs back sequence
- c. Inside and outside arms combination
- d. Double pauses

19. To develop recovery sequence of hands body slide, would you use:

- a. Arm, arms back, quarter slide sequence
- b. Legs only, legs back sequence
- c. Inside and outside arms combination
- d. Double pauses

20. To build stroke from the front end, would you use:

- a. Arm, arms back, quarter slide sequence
- b. Legs only, legs back sequence

21. Demonstrate and briefly describe all of the drills below?

1. Arms Only
2. Back and Arms
3. 1/4 and 1/2 Slide
4. Legs Only
5. Legs and Back

# MODULE 5: RIGGING

By Kris Korzeniowski

## Learning Objectives

The candidate should be able to:

1. Have an understanding of the principles of gearing.
2. Have a knowledge and understanding of all personal adjustments in the boat.
3. Do all rigging on his or her own.

## Introduction

Rigging deals with the preparation of the boat, allowing the athletes to **feel comfortable and to row efficiently**. In this process, coaches deal with:

- The size of the boat.
- The load measurements, which effect the load and power application.
- Personal adjustments to guarantee the comfort of every athlete in the boat: height of the oarlock, pitch, lateral pitch, height of the feet and the angle of the footboards.

## CHAPTER 1: The Size of the Boat

Boat builders make boats in different shapes, which depend on what the builders and coaches believe to be the fastest. The most popular designs are “V” shape, “U” shape and “Banana” shape.

Popular belief is that the “V” shape is the fastest, but it is more difficult to balance. Coaches and athletes indicate that the “U” shape is the most comfortable to row. The “Banana” shape has the smallest wetted area, but it may create some balance problems for less experienced rowers.

Beside the shape, boats also are designed to accommodate the weight of the crew. The boat builder will ask the coach about the crew’s average weight, and this number will determine the size of the boat. This guarantees that the boat sits correctly in the water with a minimum amount of wetted area.

Sometimes, the boat is rigged correctly, but it is very tippy. This would mean that the boat is too big for the crew. To check this, measure the distance from the horizontal sill of the oarlock to the water level, distance “C” on Figure 1a.

Put your crew into the boat at the dock. Use a foam cup floating on the water to find the water level (Figure 1b.)

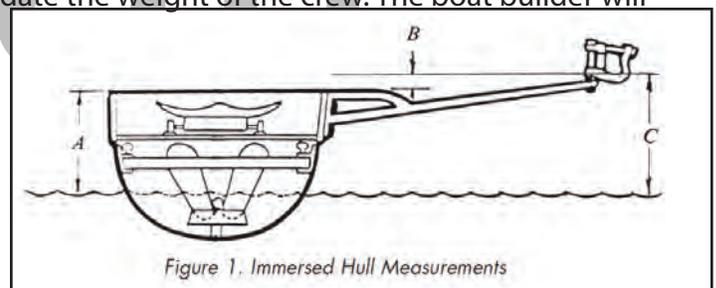


Figure 1a. Immersed Hull Measurements

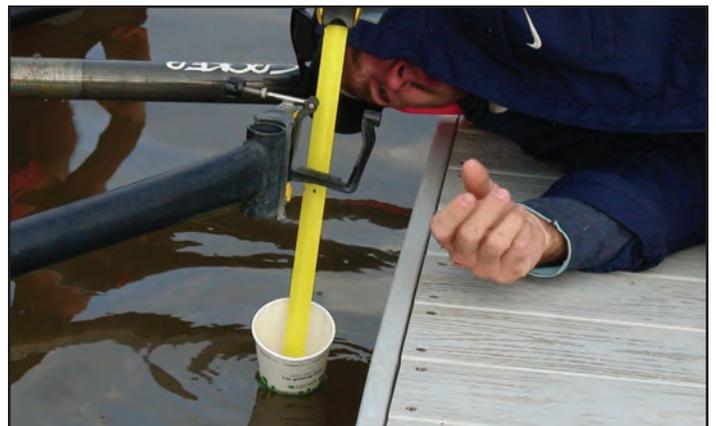


Figure 1b. How to Measure

**The standard measurements should be 26 cm for both sweep and sculling.**

**Minimum boat weight for each boat class.** The International Rowing Federation (FISA) establishes minimum weight limits, and the boats are checked during all major international regattas. In the USA, similar rules are followed and boats are weighed through a random selection process at USRowing national championship regattas and national team selection events. Boats also are weighed at the collegiate national championships.

# Draft

## CHAPTER 2: Basics of Loading

This area of rigging seems to be the most vague, and many coaches secretly measure the boats and the blades of their opposition, especially the winning boats, to learn any secrets. However, it is not that simple. Just copying the winning boat may be the wrong approach because many factors are used to determine these measurements. The factors to consider are:

- The size of the athletes, which determines the length of the arch in the water.
- The strength of athletes, which determines their capability of handling a heavier load.
- Extremely fast or slow conditions (wind, current) might require some load adjustment, mostly to the outboard of the blades.

The measurements that influence the load are

- Spread
- inboard of the oar
- Outboard of the oar

### 1. Spread

- In sweep boats, it is the distance from the center of the boat to the center of the pin.
- In sculling boats, it is the distance between the centers of the port and starboard pins (left and right.)

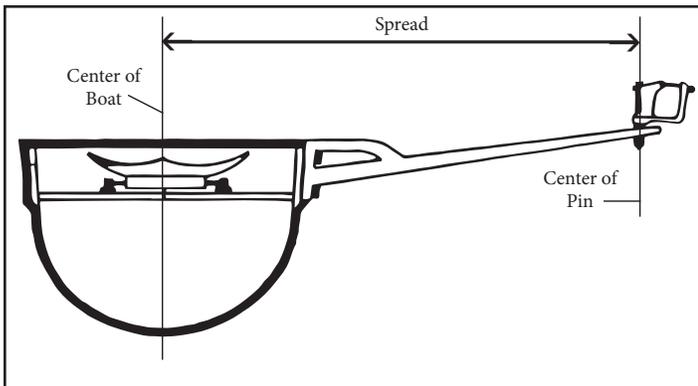


Figure 2. Spread in a sweep boat

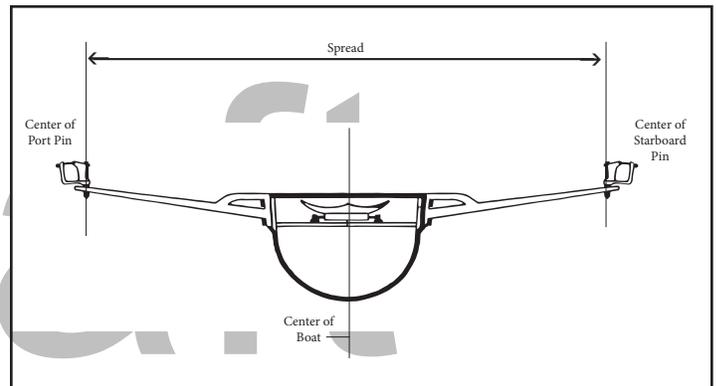


Figure 3. Spread in a sculling boat

The spread determines the length of the arc of the blade in the water.

- A shorter spread means a wide angle, sharper arc and heavier load.
- A longer spread means a narrower angle, flatter arc and lighter load.

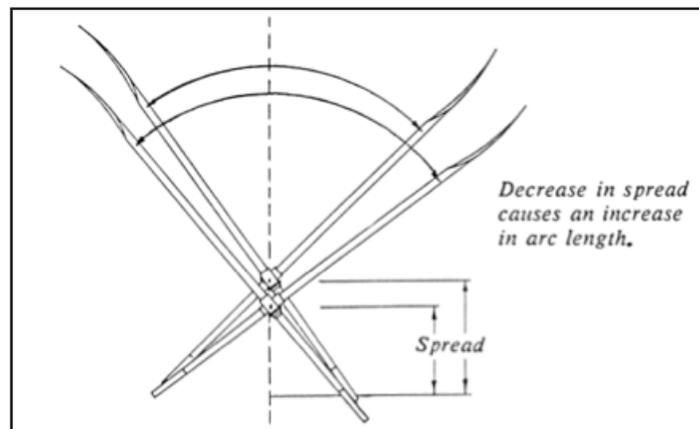


Figure 4. The different spreads and different arcs in the water (FISA).

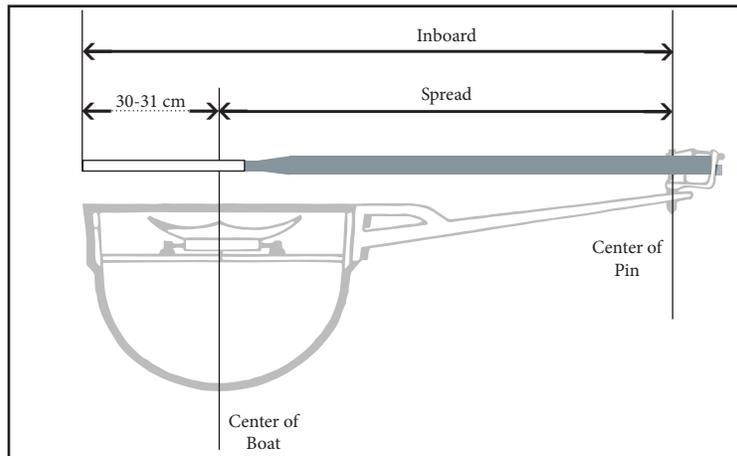
## 2. Inboard of the oar

The inboard length of the oar is the measurement of the oar from the blade side of the button to the end of the oar handle.

The length of the inboard defines the comfort of the rower moving in the boat.

**For sweep boats: inboard = spread + 30cm (+/- 1cm)**

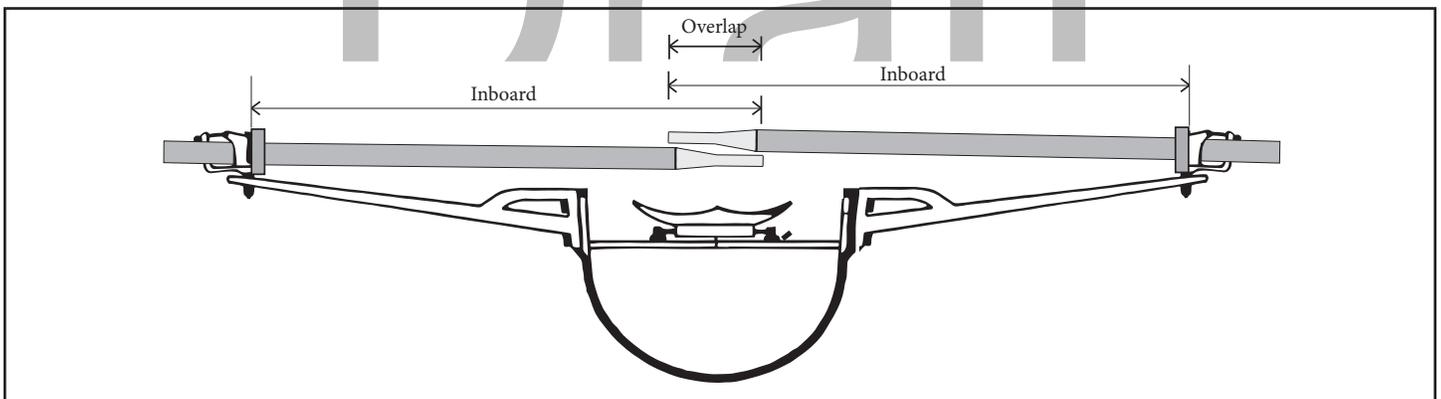
e.g. spread = 84cm + 30cm = 114cm of inboard



**Figure 5. Inboard in the sweep boat**

**For sculling boats: inboard = (Spread + overlap) divided by 2**

e.g. spread 160cm + 18 cm = 178 / 2 = 89cm of inboard



**Figure 6. Inboard in the sculling boats/overlap**

When rowers use the same blades to row an eight and a pair, they have to change the inboard of the oar. They should set up the inboard for the eight, for instance 114cm, and when it is time to row the pair, they can change the inboard to 116cm by using two "clams," each one cm thick on the outboard side of the button.

## 3. Outboard of the oar

The outboard length of the oar is the difference between the total length of the oar and the inboard. Outboard is very important in the calculation of the load.

The load or gearing is calculated as follows:

**For sweep boats: load = outboard (cm) divided by spread (cm)**

**For sculling boats: load = outboard (cm) divided by half of spread (cm)**

#### **4. Simple adjustments to the gearing (load)**

##### **Lightening the gearing (load)**

- Cases where a lighter load might be needed:
  - Strong head wind conditions
  - Long distance race (4k or longer)
  - Novice crew that is not strong enough. A lighter load will allow them to row the full length of the stroke.
- How to make a load lighter:
  1. Increase the inboard (using clams). This is a quick method. It will change the comfort of the athletes, especially at the finish if the change is too big.
  2. Increase the spread, which will automatically force an increase of the inboard as well.
  3. Decrease the length of the outboard (most correct method.)

##### **Loading up, making it heavier**

- Cases for making the load heavier:
  - Strong tail wind conditions
  - Short races (shorter than 1,000 meters)
  - Strong athletes who are short in the water.
- How to make a load heavier:
  1. Decrease length of the inboard, only in cases of lack of time.
  2. Move the footboards forward (stern), which increases the catch angle.
  3. Increase the length of the outboard (most correct method.)

#### **5. Rigging Tables (Figure 7)**

Through the years, coaches have tried different loads and different rigging. In the end, they have come to several conclusions, which are summarized in the rigging table in Figure 7.

For this reason, there is no need to bother with any gearing calculations.

To start, pick dimensions from the table, row, race and observe the boat.

If the fit crew:

- Cannot move the boat from the start but is able to keep cadence and speed through the distance, it could mean that the gearing is too light.
- Moves the boat from the start but fades very quickly after, it could mean the gearing is too heavy.

Use factory recommendations for any new type of the blades like "fat blades."

#### **6. How to measure spread, inboard and outboard**

**See USRowing DVD: Rigging**

<b>Heavyweight Men</b>			
<b>Boat</b>	<b>Spread/ Span</b>	<b>Inboard</b>	<b>Oar Length</b>
<b>1x</b>	159-160	88-89	289-291
<b>2x</b>	159	88	288-291
<b>4x</b>	157-158	87-89	289-291
<b>2-</b>	86	116	376
<b>4-</b>	85	115	376
<b>4+</b>	85.5	115-116	376
<b>8+</b>	84	114	376

<b>Lightweight Men</b>			
<b>Boat</b>	<b>Spread/ Span</b>	<b>Inboard</b>	<b>Oar Length</b>
<b>1x</b>	160	88-89	289-290
<b>2x</b>	159	87	289-290
<b>4x</b>	157	86	289-290
<b>2-</b>	86	115	372-376
<b>4-</b>	85	115	372-376
<b>4+</b>	85-86	115-116	372-376
<b>8+</b>	84	114	372-376

<b>Open Women</b>			
<b>Boat</b>	<b>Spread/ Span</b>	<b>Inboard</b>	<b>Oar Length</b>
<b>1x</b>	158-160	88-90	288-290
<b>2x</b>	158-160	87-89	288-290
<b>4x</b>	157	87-89	288-290
<b>2-</b>	86	116	372-374
<b>4-</b>	85	115	372-374
<b>4+</b>	86	116	372-374
<b>8+</b>	84	114	372-374

<b>Lightweight Women</b>			
<b>Boat</b>	<b>Spread/ Span</b>	<b>Inboard</b>	<b>Oar Length</b>
<b>1x</b>	158-162	87-90	284-288
<b>2x</b>	159	87-89	286-288
<b>4x</b>	158	87-89	286-288
<b>2-</b>	86	114	372
<b>4-</b>	85	115	372
<b>4+</b>	86	117	372
<b>8+</b>	84-85	114-115	370-372

<b>Junior Men</b>			
<b>Boat</b>	<b>Spread/ Span</b>	<b>Inboard</b>	<b>Oar Length</b>
<b>1x</b>	159.5	88.5	288
<b>2x</b>	159	88.5	289
<b>4x</b>	158.5	88	289
<b>2-</b>	86	116	373
<b>4-</b>	85	115	375
<b>4+</b>	85.5	116	375
<b>8+</b>	84	114	375

<b>Junior Women</b>			
<b>Boat</b>	<b>Spread/ Span</b>	<b>Inboard</b>	<b>Oar Length</b>
<b>1x</b>	159.5	88	288
<b>2x</b>	159	88	288
<b>4x</b>	158.5	88	288
<b>2-</b>	86.5	116.5	372
<b>4-</b>	85	115	372
<b>4+</b>	86	116	372
<b>8+</b>	84	114	373

Figure 7. Rigging Table (Club Level)

## Spread

To measure spread in a sweep boat (Figure 8):

- Measure the width of the boat along the pin line, from gunnel to gunnel, and divide that number in half.
- On the tape measure, find the number (half of the total width), place it on the gunnel and hold it there. (see picture 8)
- Stretch the tape to the center of the pin and read off the number – that is the spread.

To measure the spread in a sculling boat, measure the distance from the center of the port pin to the center of the starboard pin. Make sure the pins are equal distance from the center of the boat by measuring the distance from the port track to the starboard rigger and the starboard track to the port rigger. One pin should not be further away than the other.

## 6. Outboard and Inboard

In order to find the length of the outboard, we must measure the full length of the oar and the length of the inboard.

To measure the full length of the blade (Figure 9):

- Put the end of the tape against the end of the blade.
- Spread the tape in a straight line on the shaft to the tip of the oar handle.
- Read this measurement.

To measure the length of the inboard of the blade (Figure 10):

- Put the end of the tape against the tip of the oar handle.
- Spread the tape on top of the handle to edge of the collar.
- Read off this measurement.

The most economical length of spreads, inboard and outboard, have been calculated and put in tabular form for each category of boat (see Table A at the end of the chapter.)



Figure 8. How to measure spread



Figure 9. How to measure the full length of the blade



Figure 10. How to measure the inboard

## CHAPTER 3: Personal Adjustments (height, pitch, footboard position and angle)

### 1. Height of the Oarlock

Correct oarlock height makes it easy to execute a horizontal stroke. For this reason, oarlock height is very closely related to the size of the athlete, and it needs an individual adjustment for each rower.

The height of the oarlock in sweep boats is the distance from the top edge of the sill of the oarlock to the lowest point of the seat.

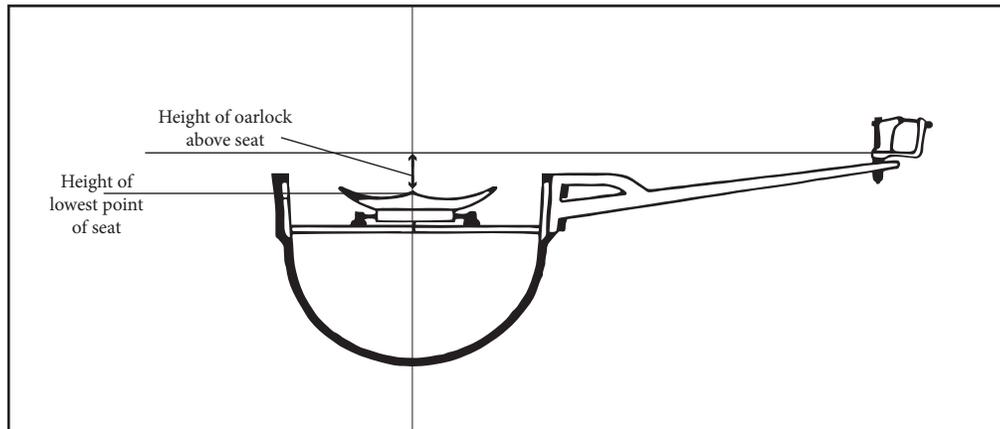


Figure 11. Height in sweep rowing

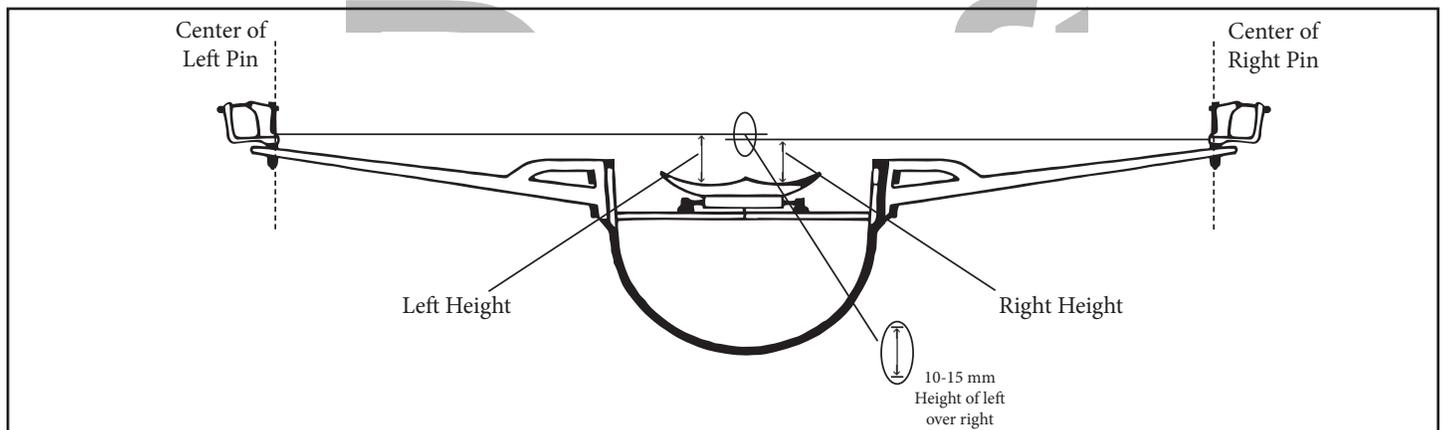


Figure 12. Height in sculling

In sculling boats, there are two measurements for the height: the right and left oarlocks, in order, to accommodate the crossover of the hands during the sculling stroke.

Right height is a distance from the seat to the right oarlock, and left height is a distance from the seat to the left oarlock.

Usually, all sculling boats are rigged with the left oarlock a little higher than the right oarlock.

**The standard difference is 0.5 – 1.5cm.**

**The standard heights are:**

**For sweep boats: 17 m (+/-2cm)**

**For sculling boats: 17cm left/ 16cm right (+/- 1cm)**

## Correct height

The athletes have correct height (Figures 13 and 14) when they are able to:

- Have horizontal trajectory of the oar handle during the whole drive.
- Have forearms horizontal at the finish.
- Have enough room for the hands and the blades during recovery.



**Figure 13. Correct height in sculling boat -- both forearms are horizontal at the finish**



**Figure 14. Correct height in the sweep boat -- the outside forearm is horizontal at the finish to create a horizontal trajectory of the hands from the catch to the finish**

### **If the rigging is too high, it will be difficult to:**

- Keep the blades buried in the water
- Lock the blades in the water. The rowers will be scratching the water and “spinning wheels.”
- Balance the boat. The boat will be tippy for the reasons above.

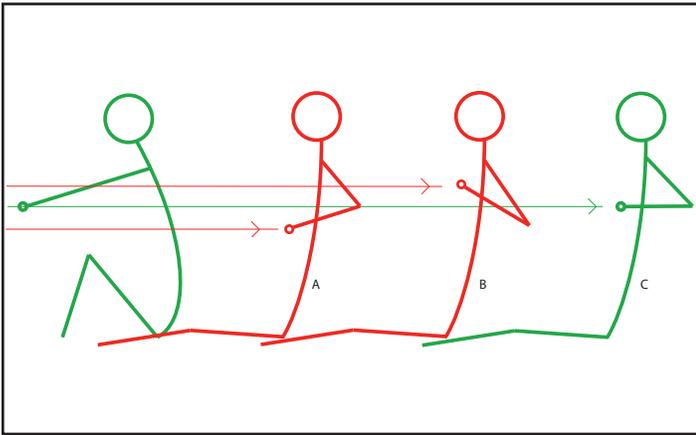
### **If the rigging is too low:**

The blades will be forced too deep into the water.

It will be difficult to have a clean release from the water.

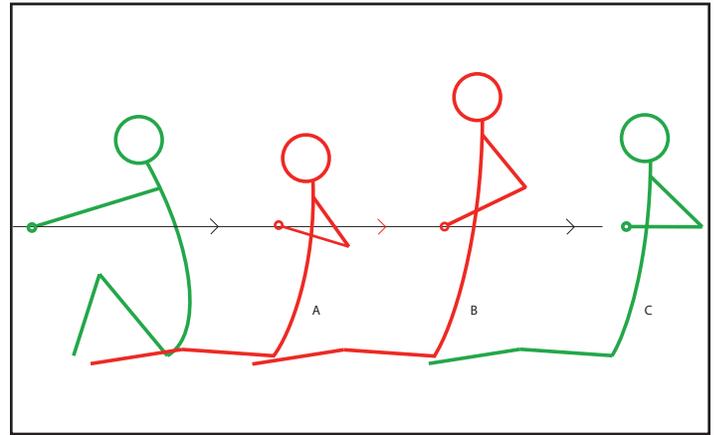
There would not be enough room for the hands during recovery.

It is very important to make personal height adjustments in cases when different crews are sharing the same boat (Figures 15 and 16).



**Figure 15.** In this case, the size of the athletes is the same, but the heights of the oarlocks are different.

- A.** Too low rigging
- B.** Too high rigging
- C.** Correct rigging



**Figure 16.** In this case, the heights of the oarlocks are the same, but the sizes of the athletes are different.

- A.** Shorter athlete, rigging is too high -- at the finish the outside elbow is below the hand
- B.** Taller athlete, rigging is too low -- the outside elbow is higher than the hand at the finish
- C.** Correct rigging for this athlete -- at the finish, the outside forearm is horizontal

**How to Measure the Height** (see pictures below)



**Figure 17.** From the seat to the top edge.



**Figure 18.** From the top edge to the sill of the oarlock

1. Put the straight edge across the boat, perpendicular to the boat just below the oarlock.
2. Bring the seat below the edge.
3. Read distance from the lowest point of the seat to the top of the edge (Figure 17.)
4. Read the distance from the top of the edge to the sill of the oarlock (Figure 18.)
5. The sum of these two measurements is the total height.

To measure height in a sculling boat, repeat the same procedure for both the left and right oarlocks.

## How to Change the Height

In recent years, the traditional height washers on the pin have been replaced by spacers, which are easy to switch from the bottom of the oarlock to the top and vice-versa.



**Figure 19. Oarlocks with adjustable height washers. Most of the oarlocks have removable snaps on the height washers installed on the pin below and above the oarlocks.**



**Figure 20. Adjusting the height on the water -- the athlete reaches out and changes the height of the washer.**

## 2. Pitch of the Blade

The pitch of the blade is the sternward angle between the plane of the blade and the absolute vertical in the middle of the drive (when the blade is perpendicular to the boat). Correct pitch guarantees the correct depth of the blade in the water during the drive.

Most oars are built "flat" or with "zero pitch," which means the face of the sleeve on the oar is parallel to the plane of the blade (no difference in angle). In this case, the pitch of the blade is equal to the pitch on the oarlock (if the oarlock has four degrees pitch, then the blade will have four degrees pitch).

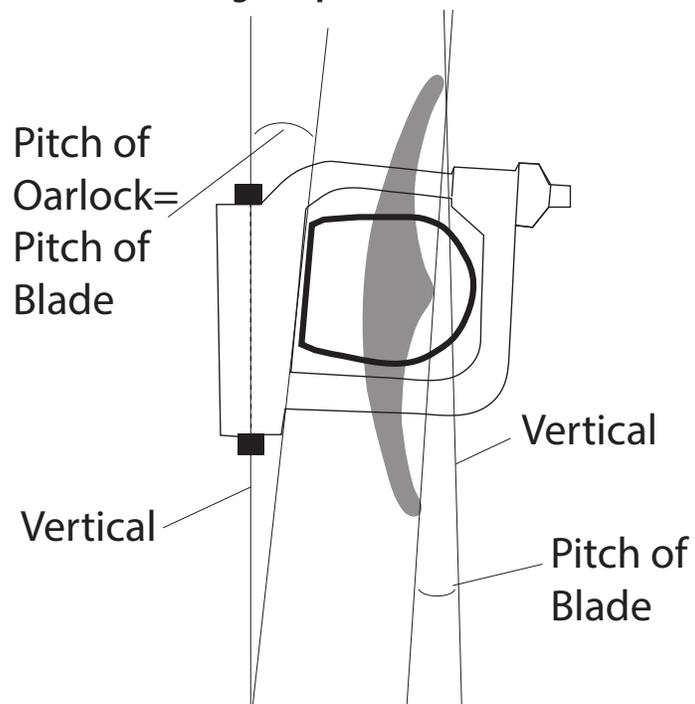
**The most common measurements for the blade pitch are;**

**Sweep: 4-5 degrees (more skillful rowers use 4 degrees pitch)**

**Sculling: 5-6 degrees (more skillful rowers use 5 degrees pitch)**



**Figure 21. Pitch of the blade**



**Figure 21a. Pitch of the blade**

### Too little pitch:

- Makes the oar to go too deep below the surface during the drive.
- Creates a bad finish with a possible “crab,” which slows down the boat.
- Makes it impossible to have a horizontal drive.

### Too much pitch:

- Prevents the blade from submerging totally in the water.
- Prevents the blade from being “locked” in the water. The rower is “tearing” the water but is not moving the boat.

### How to Measure Pitch

The pitch of the blade can be measured in three ways:

- Directly on the Oarlock (pitchmeter)
- Directly on the Blade (using special pitchmeter)
- Directly on the Blade (using Plomb-Bobs)

For practical reasons, the first method is the best one to use, especially for big boats. The other two require more space, a balanced boat in both directions, expertise and a lot of time. These will be discussed in Level 3.

**Directly on the oarlock**, using a device called a “pitch meter” (see Figure 22.)

The pitch meter measures the angle between the face of the oarlock and the vertical.

Two conditions have to be satisfied:

1. The oars have to be “flat” with the 0 degrees of pitch on the blade.
2. The pin should be vertical (exactly perpendicular to the gunnel of the boat.)

To measure the pitch (along the boat):

- Put the pitch meter on the gunnel of the boat and level the spirit level of the pitch meter with the boat (see Figure 23.)
- Put the pitch meter against the face of the oarlock and move the pointer until the air bubble in the spirit level is centered (see Figure 24.)
- Read the pitch in degrees.



Figure 22. Pitch meter



Figure 23. Level the pitch meter with the boat



Figure 24. Put the pitch meter against face of the oarlock

## How to Change the Pitch

Most modern boats have oarlocks with changeable inserts. The inserts go inside of the oarlock. The inserts have different angles built in. Using inserts, it is possible to change the angle of the oarlock without moving the pin.

### 3. Lateral Pitch

Lateral pitch is the angle of the pin in the plane perpendicular to the boat (see Figure 26.) Most boats are rigged with 0 degrees of lateral pitch. This means the pins are perfectly vertical.

### When to Use Lateral Pitch

We use lateral pitch when the blades have the tendency to “wash out” of the water towards the end of the drive due to the common mistake of pulling the hands down at the finish.

The outward pitch decreases the stern pitch gradually from the catch to the finish.

For instance:

Outward Pitch	Stern Pitch at the Catch	Stern Pitch at the Pin Line	Stern Pitch at the Finish
1*	5.5*	5*	4.5*
2*	6*	5*	4*

It is suggested not to use more that 1\* degree of outward pitch.

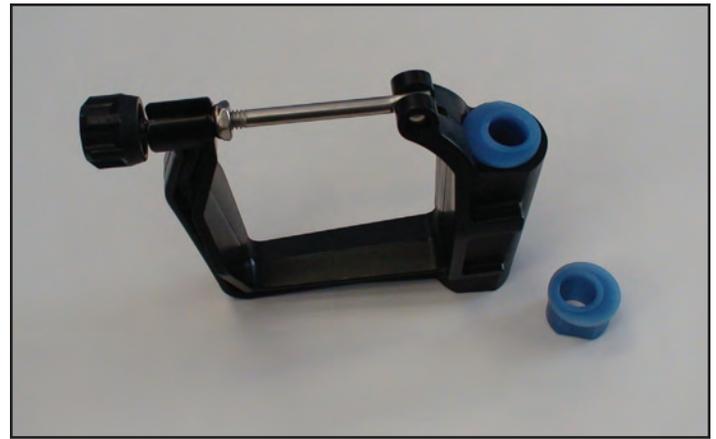


Figure 25. Inserts with angle built in

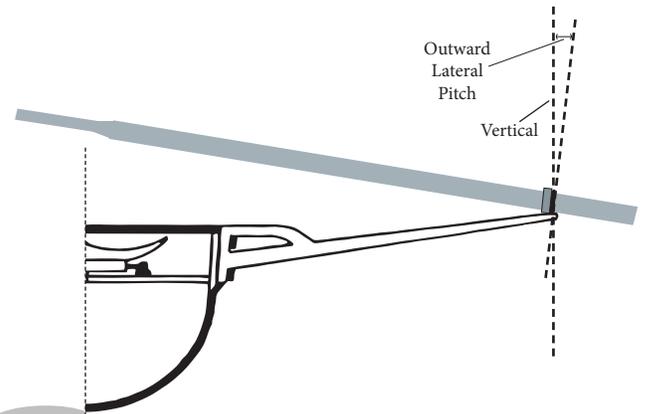


Figure 26. Lateral pitch in platform perpendicular to the boat.

## How to Measure Lateral Pitch

Lateral pitch can be measured by using a pitch meter:

- Directly on the pin without the oarlock (simpler.)
- On the oarlock (turning oarlock around and checking the pitch in three positions: at the catch, middle and at the finish of the stroke.)

To measure lateral pitch on the pin:

- The boat must be secure in slings and leveled in perpendicular (port to starboard) (Figure 27.)
- Level the pitch meter on the top of your level (Figure 28.)
- Keep the boat leveled and put pitch meter against the pin perpendicularly to the boat (Figure 29.)
- Move the pointer to level the sprit level and read the angle.

It is recommended to have all of the pins vertical, and to teach the athlete to keep the correct depth of the blade in the water from the catch to the finish

Changing the lateral pitch to help an athlete should only be done on an individual basis.

To change the lateral pitch

- Either the riggers or the pin would need to be bent, which is a difficult job that requires some experience.
- Or special washers with the angle built in would need to be installed. The washers would be placed between the pin and the rigger to tilt the pin.



**Figure 27. Level the boat in perpendicular**



**Figure 28. Level the pitch meter in perpendicular**



**Figure 29. Check the pitch of pin perpendicularly to the boat**

#### 4. Footboard Position

This is a very important adjustment, especially if different sized crews share the same boat. Changing the footboard position effects:

- **The arc of the blade in the water.**
  - Closer to the stern of the boat makes the catch angle longer and heavier.
  - Closer towards the bow makes the finish longer (Figure 30.)
- **The load** – a longer catch angle creates a little more resistance at the catch.
- **Comfort of the rowing motion** -- too far in either direction makes rowing uncomfortable and inefficient.

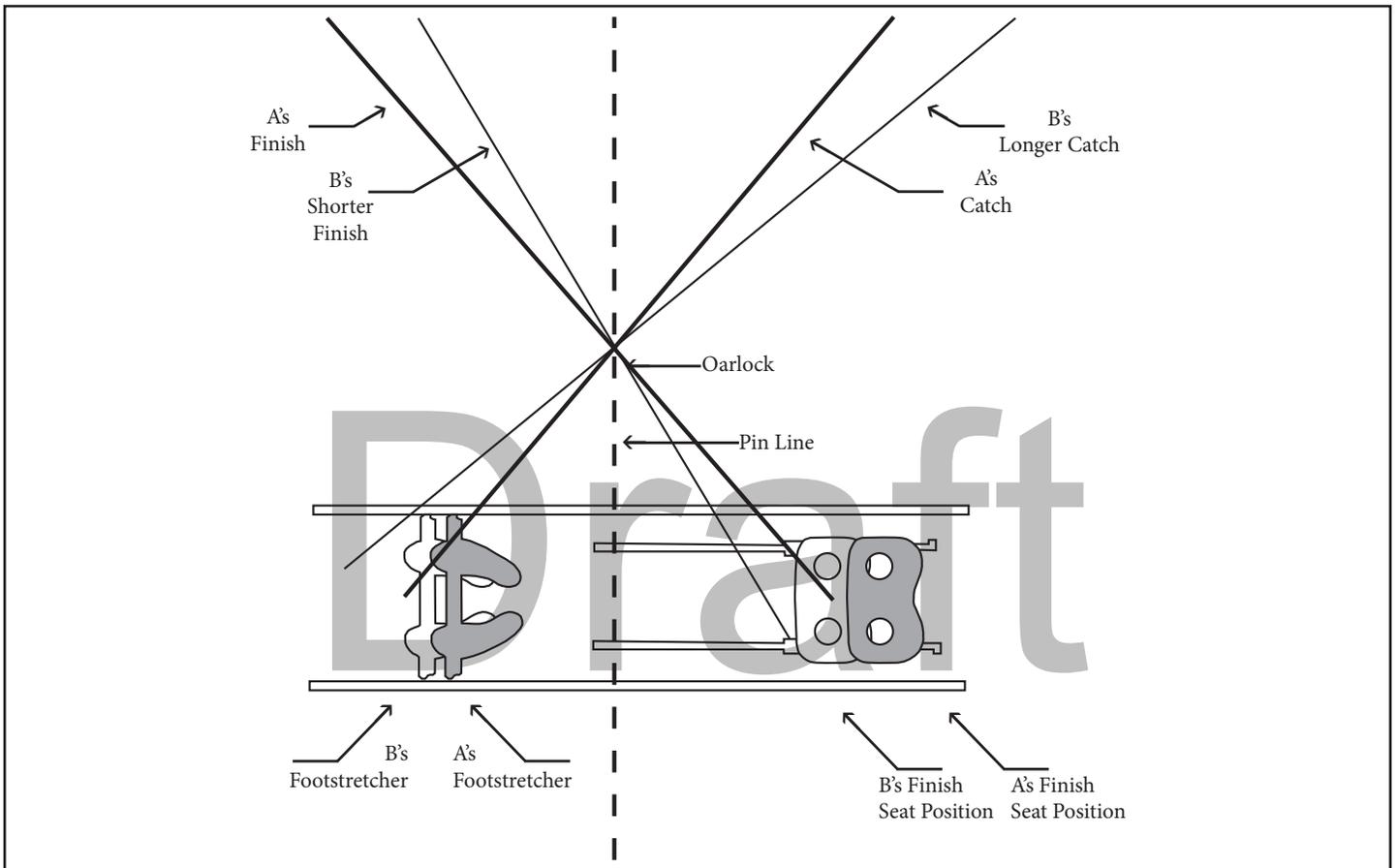
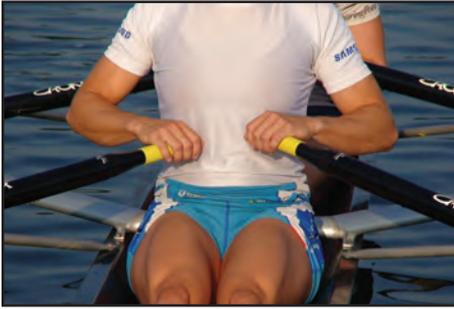


Figure 30. The effect of footboard position on the angles of the arc in the water

## Different Cases of Footboard Positions



**Figure 31. CORRECT**  
Correct footboard position in the sculling boat

- Sit at the finish with the legs extended flat.
- Position yourself so that your hands are 5"-6" apart at the body.
- This is the correct position for your footboard



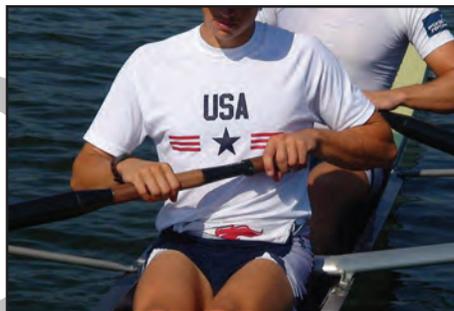
**Figure 32. INCORRECT**  
The footboard is placed too far towards the stern. The rower sits too close to the oar handles and the hands are too close together.



**Figure 33. INCORRECT**  
The footboard is placed too far towards the bow. The rower sits too far from the oar handles and the hands are much further apart than 6."



**Figure 34. CORRECT**  
The footboard position is correct in the sweep boat when the athlete sits at the finish.



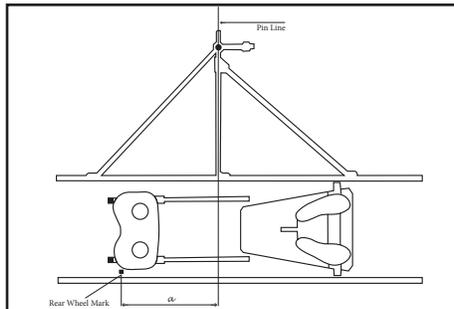
**Figure 35. CORRECT**  
Correct footboard position in the sweep boat.



**Figure 36. INCORRECT**  
The footboard is placed too far towards the stern. The rower sits too close to the oar handle.



**Figure 37. INCORRECT**  
The footboard is placed too far towards the bow. The rower sits too far from the oar handle.



**Figure 38. The back stop**



**Figure 39. Marking desirable distance**

It is recommended to have all the same finish angles. The most common distance from the pin line to the back stop of the rear wheels (distance "A" on Figure 38) are:

Short Athletes -- 57 cm

Medium Athletes -- 60-63 cm

Tall Athletes (6'4" and taller) -- 65-67 cm

Many coaches mark desirable distances on a piece of tape next to the back of the tracks (Figure 39.) The athletes get in the boat, and they can easily see where to adjust the footboards.

## 5. Footboard Angle

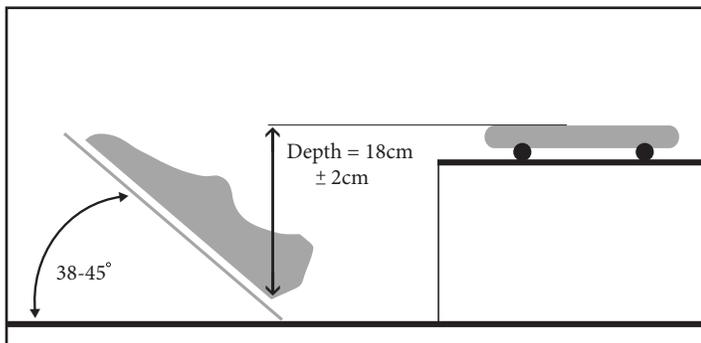


Figure 40. The angle and the depth of heels

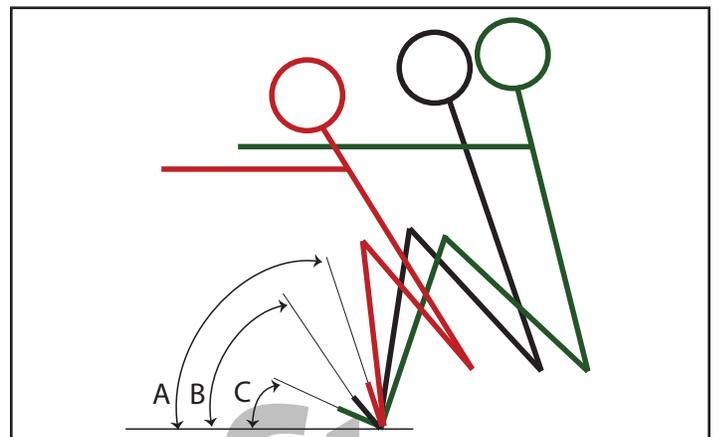


Figure 41. The three cases of different footboard angles

The footboard angle is an angle between the footboard and horizontal. It effects the comfort of the athletes as they slide forward and the effectiveness of the leg drive. The proper angle depends on the physiology of the athletes and their ankle flexibility.

**The standard angle of the footboard is 40 degrees ( +/-2.)**

### Technical effects of different footboard angles (Figure 40)

- Too flat an angle -- the rowers will slide forward too far and their shins will pass vertical. The leg drive will be directed towards the bottom of the boat, and the leg drive will be at a different angle than the other rowers in the boat.
- Too steep an angle -- the rower will have difficulty bringing his or her shins to the vertical position. It might affect the length of the stroke and initial power application on the footboards.
- The correct angle will allow the athlete to get to the full compression position with sufficient body angle.

## 6. The Depth of the Heel Cups

This is the vertical distance between the lowest point of the seat and the bottom of the heel cups inside the shoes (Figure 40.)

**The standard depth is 18cm.**

The proper depth depends on how the athlete is built, the length of the shins and thighs and ankle flexibility.

### Technical effects of different depth of the heels (Figure 42)

- Too deep -- the rowers shins will easily pass vertical and the body will lean too far forward.
- Too shallow -- the rowers will have difficulty getting their shins vertical and the body position will be too upright.
- The correct depth allows the rower to get the shins vertical and achieve a comfortable body angle forward.

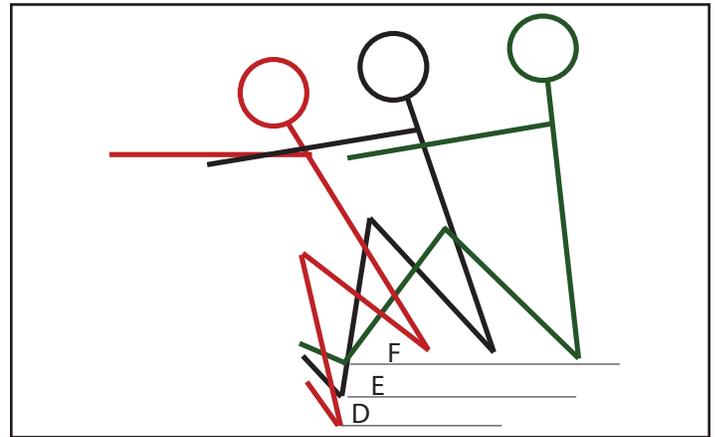


Figure 42. How to measure the depth of the heels

Athletes with unusually long legs or with poor ankle flexibility might need more depth to lower the knee position. This will allow them to get to full compression at the catch in a comfortable and strong position. The rule of thumb is that at the catch position, the knees should fit under the armpits or be at the same level.

### Tools Needed for Efficient Rigging

- Two adjustable wrenches large enough for the top nut and bottom nut on the pin or box end (or open end) wrenches to fit the specific nuts on your boat.
- Metric tape measure
- Pitch meter
- A level
- Five foot straight edge (a piece of one-inch square aluminum tube works well)

### Suggested Order of Rigging (when starting from the beginning)

1. Set the spread
2. Check the pins (in both directions)
3. Set the pitch
4. Set the heights
5. Set the footboard position (corrections can be done on the water)
6. Check the footboards angles and depth
7. Set the oars (inboard/outboard)

### Suggested Videos

1. USRowing DVD - Rigging

### Suggested Readings

Mike Davenport, *The Nuts and Bolts Guide to Rigging*  
Volker Nolte, *Rowing Faster*  
FISA Coaching Education, *Intermediate Rigging*

## Class Activities

1. How does one decide on the correct size boat?
  - a. Measure length of the boat
  - b. Weight the boat
  - c. Measure distance from water to oarlock with crew sitting in the boat
2. How and why does an increase of speed change the load?
  - a. It makes it lighter because...
  - b. There is no change because...
  - c. It makes it heavier because
3. In sweep rowing, what does inboard of the oar equal?
  - a. Spread plus 30cm
  - b. Spread minus 10cm
  - c. Spread
4. In a sculling boat, what does inboard of the oar equal?
  - a. Spread plus overlap divided by 2
  - b. Spread plus 31cm
  - c. Spread divided by 2
5. From a rigging standpoint, what would you do and why would you do it if a sudden strong head wind developed just before launching for a race?
6. What would you do in a situation if you have a very short, strong person in the boat and she is much shorter in the water? Why?
7. List three reasons why rigging too high is bad.
8. A sculling boat is rigged left over right and tips down to the left. What could be the cause?
  - a. Differential is too big.
  - b. Differential is too small.
  - c. Uneven spread between left and right.
9. In a sweep boat, when is the oarlock at the correct height?
  - a. Rower's outside forearm is pointing up
  - b. Rower's outside forearm is horizontal
  - c. Rower's outside forearm is pointing down
10. In a sculling boat, when is the oarlock at the correct height?
  - a. Both forearms are pointing up
  - b. Both forearms are horizontal
  - c. Both forearms are pointing down
  - d. Starboard forearm is pointed up and port side down.
11. What is the most common pitch in a sweep boat?
  - a. 4-5
  - b. 2-3
  - c. 0

12. What is the most common pitch in a sculling boat?
- a. 5-6
  - b. 6-7
  - c. 2-3
  - d. 0
13. To measure stern pitch using a pitchmeter, the boat should be leveled in what manner?
- a. Perpendicular to the boat
  - b. Along the boat
  - c. Does not have to be leveled
14. What is lateral pitch?
- a. Pitch of the pin along the boat
  - b. Pitch of pin perpendicular to the boat
  - c. Pitch of the oarlock along the boat
15. To measure lateral pitch, the boat should be leveled how?
- a. Perpendicular to the boat
  - b. Along the boat
  - c. Does not have to be leveled
16. Correct footboard position in sculling is measured by the distance between oar handles at the finish. What is the distance?
- a. 5-6 inches
  - b. 2 inches
  - c. When the hands can move past the body
17. Correct footboard position in sweep rowing is measured by the end of the oar handles at the finish lining up with what?
- a. Side of the body
  - b. Center of body
  - c. Sticking outside the body
18. True or False: Standard footboard angle is 40 degrees?

19. From the three pictures below, which one has the correct footboard position and why?



**Correct?**

**Incorrect?**

**Why?**



**Correct?**

**Incorrect?**

**Why?**



**Correct?**

**Incorrect?**

**Why?**

20. True or False: For a rower with very long legs and a short torso, the feet height should be set at the highest position?

21. Demonstrate how to set:

- Spread
- Inboard
- Height
- Pitch
- Footboard angle and depth of the heels

**Bring your tape measure, pitch meter and straight edge!**

# Draft

# MODULE 6: ROWING PHYSIOLOGY

By Kris Korzeniowski

## Learning Objectives

The candidate should have a good knowledge of the:

1. Physiological requirements of the sport of rowing
2. Energy systems in sport of rowing
3. Training methods for the energy system
4. The muscular system and how to train it
5. Testing
6. Nutrition

## Introduction

Physiology can be a scary word for many new coaches, but it should not be. Professor Sigmund B. Strømme and Thor Nilsen from Norway (FISA coaching education) came up with the concept of how to teach physiology in a simple and easy way. This module follows their concept. It contains:

- Basic Physiology
- Physiology of the rowing race
- Aerobic fitness (transportation and utilization)
- Anaerobic fitness
- Training methods for the energy system
- The muscular system and how to train it
- Testing
- Nutrition

## TOPIC 1. THE ENERGY SYSTEM

### CHAPTER 1 -- Physiology of a Rowing Race

The source of energy for muscle contractions – movement – is a high-energy compound known as ATP (adenosine triphosphate). The breakup of ATP in the muscles creates energy and contracts the muscles. The force of the muscle pulls the tendons and bones, ultimately creating the motion – walking, running or rowing. The fuel to produce ATP is mostly carbohydrates and fats. This fuel can be turned into ATP in two ways:

- Aerobically by the breakdown of carbohydrates and fats with oxygen
- Anaerobically by the breakdown of carbohydrates without oxygen

**The aerobic process is 18 times more efficient in production of ATP than the anaerobic process, but it is much slower to start working.**

Unfortunately, the aerobic process requires up to 90 seconds to reach maximum efficiency. Therefore, it is inefficient in the situation of rapid energy demand (e.g. at the start and at end of the race.)

**The anaerobic process provides energy very quickly but for a shorter period of time. It also is associated with the production of lactic acid, which creates severe muscle fatigue – acute discomfort that drastically lowers performance.**

Energy demand in a 2,000-meter rowing race is a complicated issue. The athletes need to utilize both systems of energy production – aerobic and anaerobic – to perform well.

For simplicity, let's call these systems the "engines." The aerobic process is a big "diesel" engine; it is efficient and economical, but takes time to get to full efficiency. The anaerobic engine is a small, high-revolution engine, and it can produce energy very rapidly, but for short periods of time due to the negative effect of the lactate accumulation.

To start the race fast, the body needs quick energy, and that requires the use of the small, high-revolution engine – the anaerobic engine. Around 500 meters, the athletes start to feel very tired, an effect of the lactate accumulation in the muscles. At this point, the big diesel (aerobic) takes over and provides energy until the sprint. In the last 250 meters of the race, the rowers want to sprint. Sprinting requires additional fast energy. The body switches back to the anaerobic engine. That means, of course, more lactic acid and more pain towards the end of the race.

The curve, in Figure 1, represents the physiology of a 2,000-meter rowing race. The slope of the uptake curve in the first two minutes represents the supply of oxygen rising to meet demand. Where the curve levels off corresponds to maximum oxygen uptake.

The area above the uptake curve represents the anaerobic process, and the area below represents the aerobic process. The top line shows maximum energy production during the race.

As we notice:

- **80% of total energy is produced aerobically.**
- **20% of total energy is produced anaerobically.**

That is a very important statement because it dictates a strong priority for the rower's training program. For a shorter race, for instance 1,000 meters, this proportion is close to 50/50. This means that masters athletes should have a very different program than athletes who race 2,000 meters.

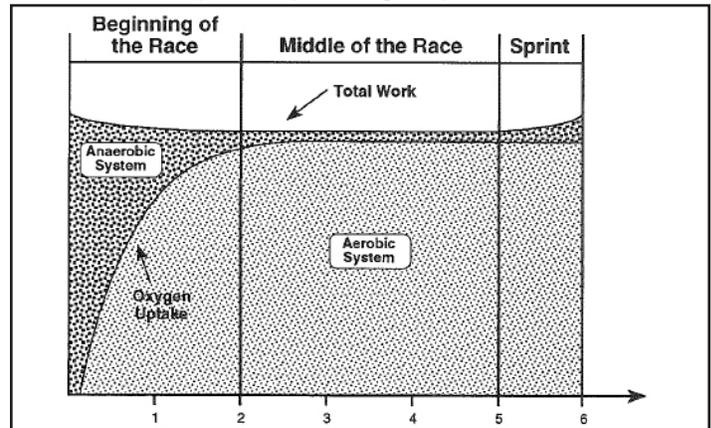


Figure 1. Energy systems in a six-minute rowing race

## CHAPTER 2 -- Aerobic System

As we stated before, aerobic energy is provided by the breakdown of “fuel” (carbohydrates and fats) with oxygen, and it supplies 80 percent of the total demand of energy for the rowing race.

There are two major components of the aerobic energy system:

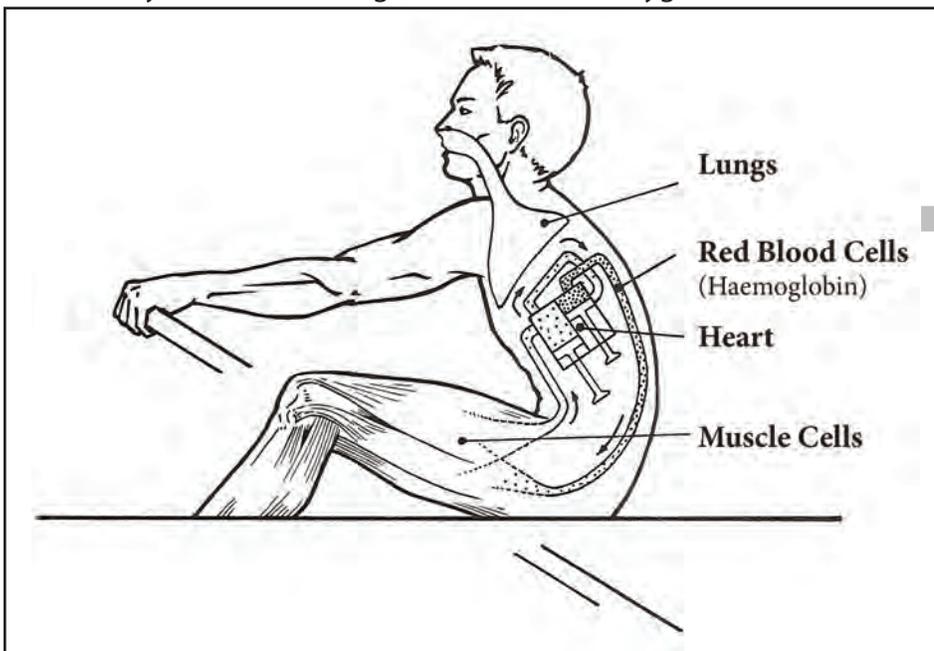
- **Transportation of Oxygen** – the ability to deliver oxygen to the muscle cells
- **Utilization of Oxygen** – the ability of the muscle cells to utilize the oxygen to produce energy

In Level 2, we talk about the approach in which both components are important as we are trying to develop athletes. In Level 3, we will talk about the theories and training programs that emphasize one component over the other.

### 1. Oxygen Transportation System

The simplified description of this system begins with the air we breathe, which contains about 20 percent oxygen. In order for the muscles to use this oxygen, it must be transported through the body to each individual muscle cell.

- Delivery starts in the lungs, where inhaled oxygen diffuses into the blood (See Figure 3.)



- The saturated blood is pumped by the heart through the arteries to the capillaries.
- The oxygen then passes through the capillary walls into the muscle cells, to be converted into energy.

**The heart is a pump** -- the most important part of this system. In effect, by proper training, we can improve the efficiency of this pump. We can increase the volume of the blood the heart is able to pump per one beat of the heart (stroke volume).

Figure 2. The Oxygen Transportation System

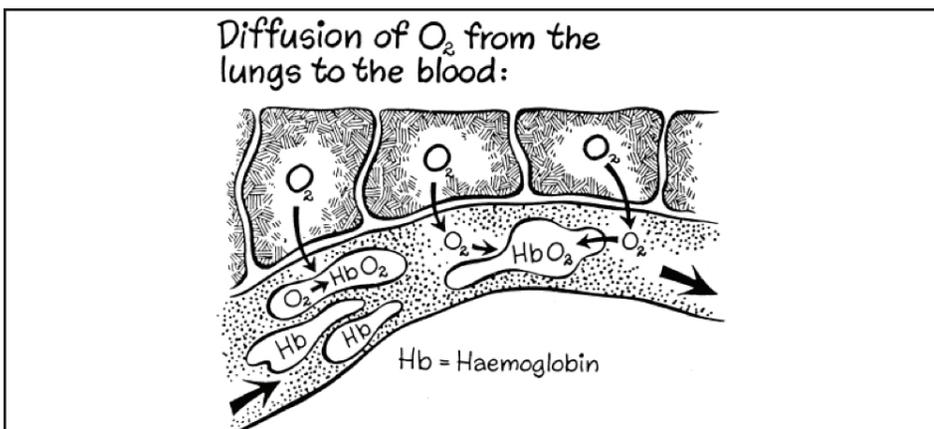
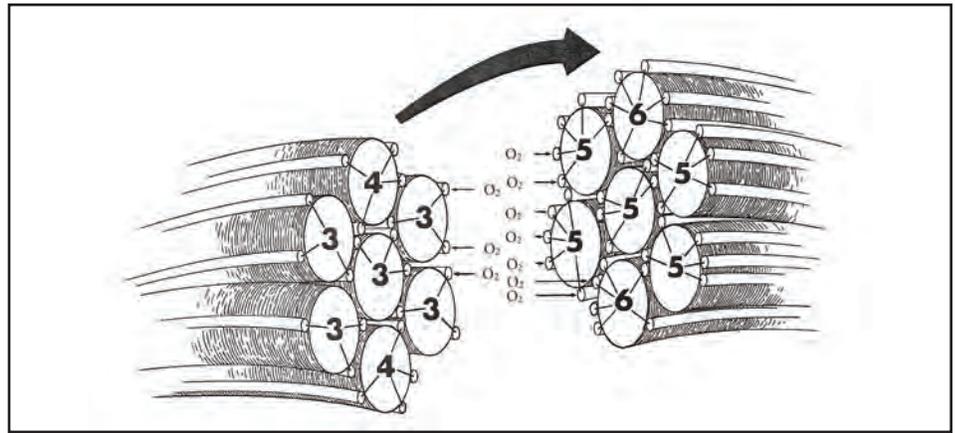


Figure 3. Diffusion of O<sub>2</sub> to the blood (FISA)

**Capillarization** is another component of the transportation system, which can be trained and improved. In Figure 4, the large tubes are the muscle fibers and the small white cylinders are capillaries. An untrained person's regular day-to-day activities require the use of only three or four capillaries per muscle fiber. Well-trained athletes, whose muscles have a higher demand for oxygen, require up to six or seven capillaries per muscle fiber, which allows more oxygen to be available to the muscles.



**Figure 4. Capillarization**

## 2. Oxygen Utilization System

Once the transportation system gets oxygen to the muscles, the muscle cells convert the oxygen and carbohydrate fuel into energy.

Utilization of oxygen occurs in the mitochondria, which are the “power plants” within muscle cells. The ability of the muscles to utilize oxygen improves with the increase in the number and size of the mitochondria in the muscle cells.

At this point, we should mention the importance of the genetics. In general, our muscles are made of two different types of fibers.

- Slow-twitch fibers (ST) contain many mitochondria, good for oxygen utilization.
- Fast-twitch fibers (FT) have very few mitochondria and cannot utilize oxygen. They rely exclusively on the anaerobic process to produce ATP.

Each of us has a different proportion of ST fibers to FT fibers.

**Individuals with a higher percentage of ST fibers are naturally predisposed to the endurance sports. The converse is that a higher percentage of FT fibers would indicate a natural talent for the quick, short duration sports.**

For instance:

- Long distance runners have 80 percent ST fibers and 20 percent FT fibers.
- Sprinters have 25 percent ST fibers and 75 percent FT fibers.

Level 3 will deal with the subject of muscle fiber in more detail.

## 3. Aerobic Threshold

Another important component of aerobic capacities is the so-called “anaerobic threshold.” It is the threshold where the energy demand cannot be covered by aerobic processes anymore, and it needs to switch to the anaerobic system. In other words, the intensity of the piece is so high that it cannot be done aerobically anymore, and the body has to turn on the anaerobic system to accommodate the demand for more energy.

The “Anaerobic Threshold” is often used as an indication of the aerobic fitness of an individual athlete. For instance, rower A's anaerobic threshold on the ergometer is at 400 watts and rower B's is at 350 watts. It means rower A can produce more energy before going anaerobic than rower B.

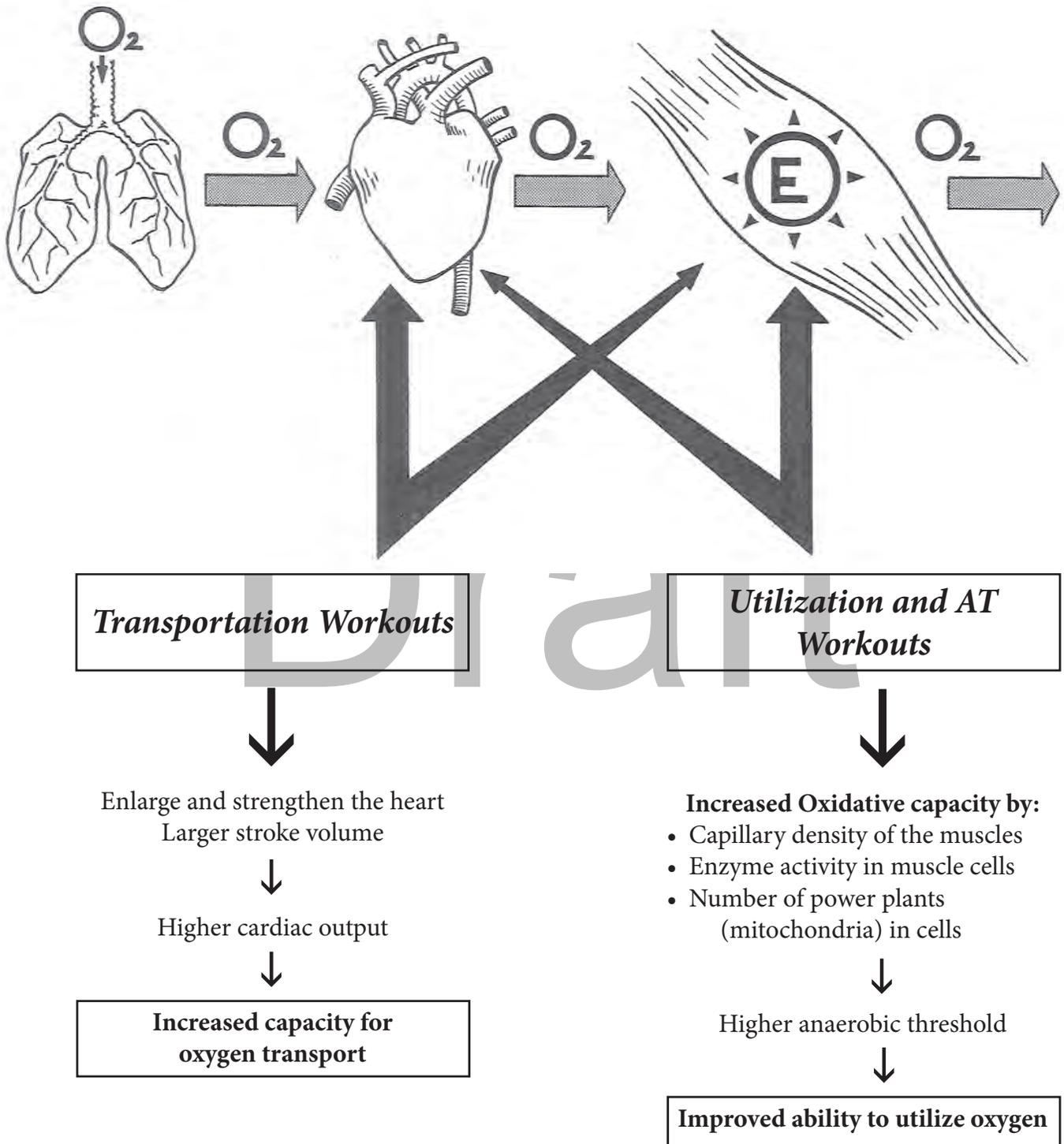


Figure 5. Graphic demonstration of the aerobic energy system (FISA)

## CHAPTER 3 -- Anaerobic Energy System

As stated before, 20 percent of the total energy during a 2,000-meter rowing race is provided anaerobically (without oxygen). The anaerobic system provides energy very rapidly for the start and the finish of the race by the breakdown of carbohydrates – glycogen without oxygen. Unfortunately, this process also produces lactic acid. A high accumulation of lactic acid creates discomfort and fatigue in the muscles to the point where athletes are significantly slowing their energy output (i.e. they are out of gas.)

**Extremely good aerobic capacities are sufficient to win rowing races with almost no anaerobic training at all.**

There will be more details about lactic acid in Level 3.

### Recommended Reading

Korzeniowski, Kris, "Physiology for Non-Scientific," *American Rowing*, Part 1: May/June 1989, p. 36-38; Part 2: July/ August 1989, p.42-44.

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## TOPIC 2. TRAINING METHODS FOR AEROBIC FITNESS

### Introduction

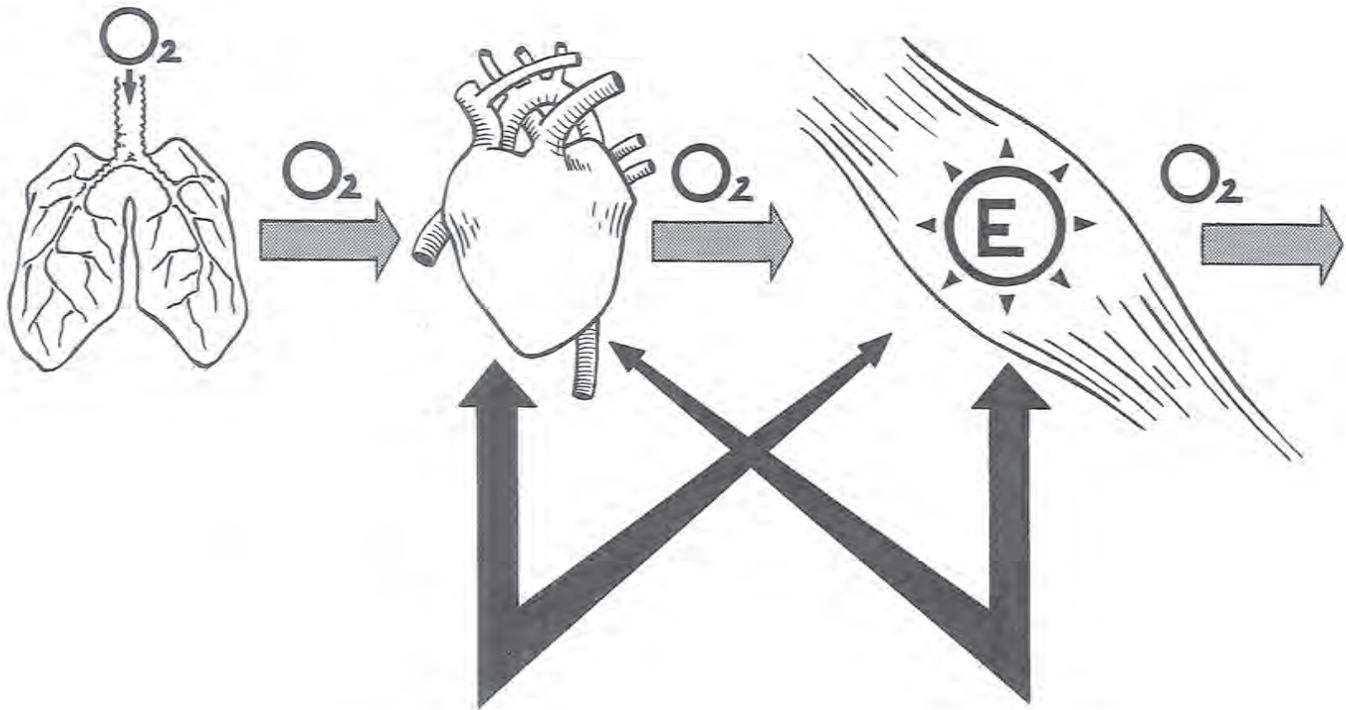
There are plenty of the training programs available on the Internet from different countries around the world. There are no more secrets, and this is a positive development. On the negative side, for the less experienced coaches, there is so much information that it can be confusing. Coaches are left jumping from one approach to another, not knowing which training program is best for their athletes.

For this reason, we decided to present the training method called "mix method" or the "Thor Nilsen Method." This method has been popular in the U.S. because the workouts are not too long, vary in intensity, and there is room for some fun racing during the workouts. It is the perfect training method for programs with limited time for training, like high schools and colleges.

**This method is based on the belief that both physiological components -- transportation and utilization -- are equally important and they both have to be developed and used in training.**

Level 3 will deal with the other training methods, which are also successful, but emphasize one physiological feature over the other and require a lot of time in training.

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**Transportation Workouts**

**INCREASED CAPACITY FOR OXYGEN TRANSPORT**

(TR 1) **Long Interval**

- 4x5' @ 32-34
- 3x10' @ 28-32
- 3x2000m @ 28-34

(TR 2) **Short Interval**

- 3x6 (1'/1'off) @ 34-36
- 2x10' (20"/40" off) @ 36-38

**Utilization and AT Workouts**

**IMPROVED ABILITY TO UTILIZE OXYGEN**

(U 2) **Low Intensity/Steady State**

- 60-90' @ 18-20, HR = 140-150
- 3x20' @ 18-20, HR = 140-150

(U 1) **Medium Intensity Steady State**

- 2x20' @ 20-22, HR = 150-160
- 5x2k @ 18-22, Racing

(AT) **Anaerobic Threshold**

- 2x20' @ 24-28, HR = 170
- 3x4k @ 24-28, HR = 170

**Figure 1. Training for aerobic fitness in rowing (FISA, Thor Nilsen, modified by Kris Korzeniowski)**

## CHAPTER 1 -- Different Types of Workouts

### 1.1 Transportation Workouts (TR1 and TR2)

The goal for the transportation workouts is to improve the efficiency of the **heart**, so it can pump more blood per single beat. This means more oxygen will be delivered to the muscle cells.

The intensity of the workouts has to be high enough (90-95% of HRmax) to be able to stimulate the heart. That also means that the rowing cadence has to be relatively high, from 0-6 beats below racing cadence for the given period in the season.

Below are examples of transportation workouts:

#### 1. Long Interval (TR 1)

- Duration of the pieces from three to 10 minutes.
- Two to six pieces.
- Rest five to seven minutes.
- Cadence two to six beats below race pace at the given time.
- HR = 90-95% of max

**For example:**

- **4x10 minutes/5 minutes rest; at 28 , early in the season**
- **3x7 minutes/6 minutes rest; at 30, later in the season**
- **4x5 minutes/7 minutes rest; at 32, if race at 36**
- **3x6 minutes (3', 2', 1')/7 minutes rest; at (32, 34, 36)**

#### 2. Short Interval (TR2)

- Duration of the pieces is from 30-60 seconds.
- The pieces can be done in sets of six to 20 repetitions.
- Number of sets from two to four.
- Rest 15-60 seconds; Five to seven minutes between the sets.
- Cadence can be two beats above or below race pace or at race pace.
- HR= 90-95% of max

**For example:**

- **3 sets of 10x (30" on/30" off)/ 7 minutes rest; at 36-38, if race at 36**
- **3 sets of 6x (1minute on/1 minute off)/6 minutes rest; at 34-36, if race at 34**
- **3-4 sets of 8x (40" on/20" off)/7 minutes rest; at 36-38, if we race at 36**

Short interval workouts can be used effectively to row a higher cadence early in the season. There is no risk of overtraining. The effort is too short and the rest, even though it's short, is the safety valve.

Because the transportation workouts are about the heart, they can be carried out in different activities as well. Running is the best alternative. Long interval running workouts could be on a hill or a flat road doing four by four minutes with six minutes rest. Running stadium stairs is a popular short interval workout.

### 1.2 Utilization Workouts (U2 and U1)

The major goal of this type of workouts is to improve utilization of oxygen in the muscle cells. Utilization workouts increase the size and number of mitochondria, and increase the number of capillaries around the muscles cells.

This can be accomplished by long distance workouts at low and medium intensity.

### **1. Utilization (U2): Low Intensity Workout**

- Duration 60-100 minutes of continuous rowing.
- Can be in combination 15-, 20-, or 30-minute pieces.
- Rest is very short, two to three minutes. Try to work as continuously as possible.
- Cadence is 16-20.
- Heart rate of 140-150 beats per minute.
- Target HR is about 65-75% of HRmax.

For example:

- 80-100 minutes of continuous rowing at 18-19
- 3-5 x 20 minutes/3 minutes rest at 16-20
- 3 x 30 minutes/3 minutes rest at 16-20

Sometimes, these workouts are used as regeneration workouts after very hard work.

### **2. Utilization (U1), Medium Intensity, Sometimes Called “Hard Steady State”**

U1 workouts are similar to U2 workouts, but the short rest (two to four minutes) between the long pieces allows the athletes to use more power and keep an almost continuous aerobic effort, without the intensity getting to high.

- Duration of 45-60 minutes of rowing at medium intensity.
- Cadence from 18-24.
- Heart rate 150-170 beats per minute.
- 72-80% of HRmax.

These workouts are great aerobic workouts for programs with limited time to train. They can be done in the form of competition to add some fun to the workout, but the cadence has to be kept low. The length of the pieces can vary as long as the rest is short enough to guarantee a relatively continuous effort.

**For example:**

- **2-3 x 20 minutes/3 minutes rest at 19-20**
- **5 x 9 minutes( 3', 3', 3')/3 minutes rest, at (18, 20, 18) -- This could be a competitive effort and is perfect for high schools kids who are learning how to pull.**
- **2-3 x 19 minutes (4', 3', 2', 1', 2', 3', 4')/4 minutes rest at (18, 20, 22, 24, 22, 20,18) -- Start at a lower cadence (16, 18 ,20 ,22... 16) if you want to make it competitive.**
- **4 x 2,000 meters/4 minutes rest at 20-22 -- It can be competitive and is perfect for high school boats. It is important to keep the rest short.**

Both utilization workouts are great for learning rhythm, feel for the boat, and improving technique, but also for developing specific aerobic power (medium intensity). However, these workouts also can have a damaging effect if proper technique is not reinforced and mistakes are repeated hundreds of times over 60 to 80 minutes.

### **1.3 Anaerobic Threshold (AT) Workouts**

The goal of these workouts is to:

- Duration from 20 to 40 minutes
- Cadence from 24 up to 30
- 80-90% of HRmax

These workouts are great for training the rhythm of the boats at race pace without getting too tired. They can be done in the form of a long piece, as well as a very short piece – as short as 30 seconds or 17 strokes. The very short pieces are excellent workouts, because they can allow the team to row at a relatively high rate very early in the season, without worrying about the work being too intense.

**For example:**

- **3 x 15 minutes (5' + 5' + 5') at (24, 26, 28)/5 minutes rest**
- **2 x 15 minutes (5', 4', 3', 2', 1') at (24, 26, 28, 30, 32)/5 minutes rest**
- **3 x 4k, First and third piece at 24-28; Second and fourth pieces at (17 strokes on/5 strokes off) at 32**

**Summary of Workouts for the Energy System**

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Type of workout		Example	Rest min	Stroke rate	% MHR	Total time
U2	Utilization, low intensity	3 x 30 min 2 x 40 min 3 x 20 min	3-4 3-4 3	16- 18 16- 18 16-18	65-75	60-100 min
U1	Utilization , medium intensity	2-3 x 20 min 5 x 10 min 6 x 2,000m	3 3 3-4	18-22 18-22 20-22	70-85	40-60 min
TR 1	Transportation , long interval	4 x 10 min 4 x 5 min 3 x 2,000m	5-7 5-7 5-7	26- 32 30-34 28- 34	85-95	12-40 min
TR 2	Transportation, short interval	3 x 6 (1'/1'off) 2 x 10 (40"/20" off)	7 7	32- 36	85-95	12-30 min
AN	Anaerobic	2 x 3 (2'/1' off) 2 x 3 (2'/2' off) Race rehearsal	7-12	Max or at race pace	95-100	9-12 min

Figure 2.

## CHAPTER 2 -- Intensity and Volume of the Workouts

### Introduction

Volume and intensity are two factors that define the load of the workouts in any sport.

**Volume – duration** defines how much work is done. It can be expressed in:

- Distance (meters, kilometers or miles)
- Time (seconds, minutes and hours)
- Number of the sessions per week
- Number of the sets or repetitions
- Kilos or pounds of lifted weight

**Intensity defines effort – how hard. It can be expressed in:**

- Lactate concentration in the blood after an effort (subject for Level 3)
- Speed of the boat, if the body of the water and weather is reliable (subject for Level 3)
- Percentage of the max heart rate (e.g. 75% of HRmax)
- Rowing cadence or frequency of the motion
- Speed of an activity (running, swimming, etc.)

Volume and intensity of the workouts define the quality of the program. They are used to analyze the program from year-to-year or month-to-month, to control and monitor the program and can also be used in designing a new program.

For practical reasons, we will concentrate on two simple ways of checking intensity in rowing in Level 2:

- Percentage of the heart rate
- Rowing cadence

**2.1 Percentage of maximum heart rate (HRmax)** is calculated on the basis of the individual max heart rate.

**Max heart rate** can be defined:

- As the highest heart rate (pulse) after an all out effort during a 5 minute ergometer piece or three to five minute run.
- Or using the formula:  $HR_{max} = 220 - \text{athlete's age}$ .

Example:  $220 - 20$  (year old athlete) = 200 bpm. So,  $HR_{max} = 200$  bpm.

This value should be used to calculate the percentage of the HRmax for the different types of workouts.

**To check the HR during the workouts**, athletes can use:

- A heart rate monitor
- Check themselves by counting the number of heartbeats per 10 or 15 seconds and multiplying by six or four, respectively, to get the number of beats per minute.

The best places to feel the pulse are either at the vein at the wrist or the neck (Figure 3).



**Figure 3. Checking your pulse at the wrist or neck**

**2.2 The rowing cadence** is probably the simplest and the most practical way of checking the intensity of the workouts in programs with many athletes.

Here is the relation between the cadence and different types of workouts:

- Cadence 16-18 is good for U2, steady-state workouts.
- Cadence 18-22 is good for U1, hard steady-state workouts.
- Cadence 22-28 is good for AT workouts.
- Cadence 28-34 is good for TR1 and TR2 workouts.
- Cadence 34 and up is good for AN (anaerobic workouts.)

**All the workouts listed above (except U2) can be competitive, as long as the lowest range of the cadence is used.**

### 2.3 Intensity of Ergometer Workouts

The rowing ergometer has become an important part of rowing workouts. Thanks to individual monitors, the erg is “hated” by the athletes and “loved” by the coaches. It allows coaches to test and train athletes at their individual intensity related to their individual capacities.

There are several methods to define intensity on the erg:

- Checking blood lactate (Level 3)
- Percentage of max heart rate
- Stroke rate
- Splits, calculated on the basis of 6,000-meter or 4,000-meter (juniors) tests

For instance, John Smith had a time of 19:00 minutes (1:35 splits) on his 6k erg test. Let’s find out his intensity -- splits for the different types of workouts -- by putting 1:35 as the 6k split into Figure 4.

TR2	TR1	TR/AT	AT	AT/U1	U1	U1/U2	U2
100%	95%	90%	85%	80%	75%	70%	65%
6k	6k+2”	6k+4”	6k+6”	6k+8”	6k+10”	6k+12”	6k+14”
<b>1:35</b>	<b>1:37</b>	<b>1:39</b>	<b>1:41</b>	<b>1:43</b>	<b>1:45</b>	<b>1:47</b>	<b>1:49</b>
32-34	30	26/28	26	22/24	22	20/22	18/20
408w	387w	367w	347w	327w	306w	286w	266w

**Figure 4. Calculations of intensity for the different types of ergometer workouts.**

Some coaches use watts to define intensity. For instance, the split of 1:35 = 408 watts. = 100%.

Then, they calculate percentage for each type of workout in watts.

Figure 5, on the opposite page, has all percentages in splits and in watts already calculated.

Watts	Avg 500	Specific PWR 2000m	Max Aero PWR 6000m	Transporation			workouts			AT			workouts			UT1			UT2			UT3		
				95% W	95% S	90% W	90% S	85% W	85% S	80% W	80% S	75% W	75% S	70% W	70% S	65% W	65% S	60% W	60% S					
1020.4	01:10.0	04:40.0	14:00.0	969	01:11.2	918	01:12.5	867	01:13.9	816	01:15.4	765	01:17.0	714	01:18.8	663	01:20.8	612	01:23.0					
918.4	01:12.5	04:50.0	14:30.0	872	01:13.8	827	01:15.1	781	01:16.5	735	01:18.1	689	01:19.8	643	01:21.7	597	01:23.7	551	01:26.0					
829.6	01:15.0	05:00.0	15:00.0	788	01:16.3	747	01:17.7	705	01:19.2	664	01:20.8	622	01:22.5	581	01:24.5	539	01:26.6	498	01:28.9					
751.9	01:17.5	05:10.0	15:30.0	714	01:18.8	677	01:20.3	639	01:21.8	602	01:23.5	564	01:25.3	526	01:27.3	489	01:29.5	451	01:31.9					
683.6	01:20.0	05:20.0	16:00.0	649	01:21.4	615	01:22.9	581	01:24.5	547	01:26.2	513	01:28.1	479	01:30.1	444	01:32.4	410	01:34.9					
623.3	01:22.5	05:30.0	16:30.0	592	01:23.9	561	01:25.4	530	01:27.1	499	01:28.9	467	01:30.8	436	01:32.9	405	01:35.2	374	01:37.8					
569.9	01:25.0	05:40.0	17:00.0	541	01:26.5	513	01:28.0	484	01:29.7	456	01:31.6	427	01:33.6	399	01:35.7	370	01:38.1	342	01:40.8					
550.3	01:26.0	05:44.0	17:12.0	523	01:27.5	495	01:29.1	468	01:30.8	440	01:32.6	413	01:34.7	385	01:36.9	358	01:39.3	330	01:42.0					
531.5	01:27.0	05:48.0	17:24.0	505	01:28.5	478	01:30.1	452	01:31.8	425	01:33.7	399	01:35.8	372	01:38.0	345	01:40.4	319	01:43.2					
513.6	01:28.0	05:52.0	17:36.0	488	01:29.5	462	01:31.1	437	01:32.9	411	01:34.8	385	01:36.9	360	01:39.1	334	01:41.6	308	01:44.3					
496.5	01:29.0	05:56.0	17:48.0	472	01:30.5	447	01:32.2	422	01:34.0	397	01:35.9	372	01:38.0	348	01:40.2	323	01:42.7	298	01:45.5					
480.1	01:30.0	06:00.0	18:00.0	456	01:31.6	432	01:33.2	408	01:35.0	384	01:37.0	360	01:39.1	336	01:41.4	312	01:43.9	288	01:46.7					
464.5	01:31.0	06:04.0	18:12.0	441	01:32.6	418	01:34.2	395	01:36.1	372	01:38.0	348	01:40.2	325	01:42.5	302	01:45.0	279	01:47.9					
449.5	01:32.0	06:08.0	18:24.0	427	01:33.6	405	01:35.3	382	01:37.1	360	01:39.1	337	01:41.3	315	01:43.6	292	01:46.2	270	01:49.1					
435.1	01:33.0	06:12.0	18:36.0	413	01:34.6	392	01:36.3	370	01:38.2	348	01:40.2	326	01:42.4	305	01:44.7	283	01:47.4	261	01:50.3					
421.4	01:34.0	06:16.0	18:48.0	400	01:35.6	379	01:37.4	358	01:39.2	337	01:41.3	316	01:43.5	295	01:45.9	274	01:48.5	253	01:51.4					
408.2	01:35.0	06:20.0	19:00.0	388	01:36.6	367	01:38.4	347	01:40.3	327	01:42.3	306	01:44.6	286	01:47.0	265	01:49.7	245	01:52.6					
395.6	01:36.0	06:24.0	19:12.0	376	01:37.7	356	01:39.4	336	01:41.3	316	01:43.4	297	01:45.7	277	01:48.1	257	01:50.8	237	01:53.8					
383.5	01:37.0	06:28.0	19:24.0	364	01:38.7	345	01:40.5	326	01:42.4	307	01:44.5	288	01:46.8	268	01:49.2	249	01:52.0	230	01:55.0					
371.9	01:38.0	06:32.0	19:36.0	353	01:39.7	335	01:41.5	316	01:43.5	298	01:45.6	279	01:47.9	260	01:50.4	242	01:53.1	223	01:56.2					
360.7	01:39.0	06:36.0	19:48.0	343	01:40.7	325	01:42.5	307	01:44.5	289	01:46.6	271	01:49.0	252	01:51.5	234	01:54.3	216	01:57.4					
350.0	01:40.0	06:40.0	20:00.0	333	01:41.7	315	01:43.6	298	01:45.6	280	01:47.7	263	01:50.1	245	01:52.6	228	01:55.4	210	01:58.6					
339.7	01:41.0	06:44.0	20:12.0	323	01:42.7	306	01:44.6	289	01:46.6	272	01:48.8	255	01:51.2	238	01:53.8	221	01:56.6	204	01:59.7					
329.8	01:42.0	06:48.0	20:24.0	313	01:43.8	297	01:45.6	280	01:47.7	264	01:49.9	247	01:52.3	231	01:54.9	214	01:57.8	198	02:00.9					
320.3	01:43.0	06:52.0	20:36.0	304	01:44.8	288	01:46.7	272	01:48.7	256	01:51.0	240	01:53.4	224	01:56.0	208	01:58.9	192	02:02.1					
311.1	01:44.0	06:56.0	20:48.0	296	01:45.8	280	01:47.7	264	01:49.8	249	01:52.0	233	01:54.5	218	01:57.1	202	02:00.1	187	02:03.3					
302.3	01:45.0	07:00.0	21:00.0	287	01:46.8	272	01:48.8	257	01:50.9	242	01:53.1	227	01:55.6	212	01:58.3	196	02:01.2	181	02:04.5					
293.9	01:46.0	07:04.0	21:12.0	279	01:47.8	265	01:49.8	250	01:51.9	235	01:54.2	220	01:56.7	206	01:59.4	191	02:02.4	176	02:05.7					
285.7	01:47.0	07:08.0	21:24.0	271	01:48.8	257	01:50.8	243	01:53.0	229	01:55.3	214	01:57.8	200	02:00.5	186	02:03.5	171	02:06.9					
277.8	01:48.0	07:12.0	21:36.0	264	01:49.9	250	01:51.9	236	01:54.0	222	01:56.3	208	01:58.9	194	02:01.6	181	02:04.7	167	02:08.1					
270.3	01:49.0	07:16.0	21:48.0	257	01:50.9	243	01:52.9	230	01:55.1	216	01:57.4	203	02:00.0	189	02:02.8	176	02:05.8	162	02:09.2					
263.0	01:50.0	07:20.0	22:00.0	250	01:51.9	237	01:53.9	224	01:56.1	210	01:58.5	197	02:01.1	184	02:03.9	171	02:07.0	158	02:10.4					
245.8	01:52.5	07:30.0	22:30.0	234	01:54.4	221	01:56.5	209	01:58.8	197	02:01.2	184	02:03.8	172	02:06.7	160	02:09.9	147	02:13.4					
230.1	01:55.0	07:40.0	23:00.0	219	01:57.0	207	01:59.1	196	02:01.4	184	02:03.9	173	02:06.6	161	02:09.5	150	02:12.8	138	02:16.4					
215.8	01:57.0	07:50.0	23:30.0	205	01:59.5	194	02:01.7	183	02:04.0	173	02:06.6	162	02:09.3	151	02:12.3	140	02:15.6	129	02:19.3					
202.5	02:00.0	08:00.0	24:00.0	192	02:02.1	182	02:04.3	172	02:06.7	162	02:09.3	152	02:12.1	142	02:15.2	132	02:18.5	122	02:22.3					

Figure 5.

## 2.4 The training zones for workouts in the boat and on an ergometer

		boat		ergometer		
		% HR max	rate	rate	% of 6k test	6k + n"
<b>U2</b>	light	65-75	16-19	18- 20	65-70	6k+14
<b>U1</b>	moderate	75-82	18-24	20-22	70-75	6k+10"
<b>AT</b>	hard	82-87	24-28	22- 26	75-85	6k+6"
<b>TR 1</b>	very hard	87-95	28-34	26-30	85-95	6k+2"
<b>TR 2</b>	very hard	90-100	34-38	30-34	95-100	6k
<b>AN</b>	exhausting	100	38-42	34-38	140	max

Figure 6.

### Summary

All coaches should have a basic understanding and knowledge of physiology and related training methods. Knowing the basics will help prevent coaches from making mistakes, and it will give them confidence and control over the training process throughout the season.

In Level 3, we will further explore the subject of rowing physiology, with more details on the energy systems, lactic acid, methods of testing and different types of workouts.

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## CLASS ACTIVITIES -- Rowing Physiology and Training Methods for the Energy System

1. What are the methods of energy production in the sport of rowing?
2. Which of these methods is the most important and why?
3. Describe the two major components of the aerobic system with a short definition of what they do?
4. True or False: The heart is the most important part of the oxygen delivery system?
5. True or False: Anaerobic threshold is when energy demands cannot be met by the aerobic process?
6. True or False: Anaerobic energy is not required for the start and the finish of the race?
7. What is the basis of the "mix method" approach to training?
  - a. Transportation is more important
  - b. Utilization is more important
  - c. Both are equally important
8. True or False: Volume of the workout is defined by how hard the workout is?
9. True or False: Intensity of the workout is defined by how much work is done?
10. What are three basic ways of controlling the intensity of a workout?
11. In a high school or college program, what is the most practical way to control intensity of the workouts on the water?
  - a. Distance
  - b. Heart Rate
  - c. Cadence
12. What is the formula for calculating maximum heart rate?
13. What cadence would you use for U1 hard steady state workouts?
  - a. 16-20
  - b. 20-22
  - c. 22-28
  - d. 28-34
14. What cadence would you use for AT workouts?
  - a. 16-20
  - b. 20-22
  - c. 22-28
  - d. 28-34
15. What are the simplest ways of defining intensity of workout on the erg?
16. If your 6k split is 1:40, what would your U2 (65%) split be on the erg?
  - a. 6k +14
  - b. 6k +12

- c.  $6k + 2$
- d.  $6k + 10$

17. Design individual intensity for the ergometer for one of your junior men's athletes. His  $6k=21.00$  (splits 1:45.)

- a. U2, 3x20 min @ 20, Splits?
- b. U1, 2x20 min @ 22, Splits?
- c. AT, 3x12 min @ 24-26, Splits?

18. A TR long interval workout on the water is:

- a. 3x20' @ 18-20
- b. 3x4k @ 24-26-28
- c. 4x5' @ 32
- d. 3x6x1' on/1' off @ 34-38

19. An AT workout on the water is:

- a. 3x20' @ 20-22
- b. 3x4k @ 24-26-28
- c. 4x5' @ 32
- d. 3x6x1' on/1' off @ 34-38

20. A TR short interval workout on the water is:

- a. 3x20' @ 20-22
- b. 3x4k @ 24-26-28
- c. 4x5' @ 32
- d. 3x6x1' on/1' off @ 34-38

21. A U2 workout on the water is:

- a. 2x20' @ 18-20
- b. 3x4k @ 24-26-28
- c. 4x5' @ 32
- d. 3x6x1' on/1' off @ 34-38

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## TOPIC 3. THE MUSCULAR FITNESS SYSTEM

### Learning Objectives

The candidate should be able to:

1. Have an understanding of the components of the muscular system in rowing and how to train them.
2. Implement basic testing procedures for athletes.
3. Have a basic knowledge of nutritional requirements in rowing.

### Introduction

The human body is a very complicated and precise machine made of many different systems. One of them is the muscular system, which makes movement of the body possible. The other features of the muscular system are outlined below:

- The tendons and ligaments connect the muscles to bones that comprise the body's internal structure (the skeleton).
- Muscles are made of long cells bound together called fibers. Muscles can comprise 50 percent of an athlete's total body weight.
- Movement is made possible as muscle fibers lengthen and shorten during muscle contractions and relaxation stimulated by nerve signals from the brain.

When athletes perform skills, they make conscious efforts to stimulate certain muscles or muscles groups. Training programs help to strengthen and enlarge the muscles and increase the blood supply to them.

### CHAPTER 1 -- Muscular System in Rowing

The following aspects of the muscular system should be trained in the sport of rowing:

- General conditioning
- Maximal strength
- Strength endurance
- Core and flexibility

The Means to develop the muscular system can be:

- Athlete's body weight
- Partner's body weight
- Medicine balls
- Weights
- Rowing ergometers (for instance, 15-second accelerations on the erg at max power and speed can develop maximal strength.)

The workouts for the muscular system can be done in form of:

- **Circuit training**, where the athlete performs a given number of repetitions of one exercise and then moves to the next exercise. The advantages of this type of workout are listed below.
  1. All means can be used (see the list above.)
  2. More athletes can train simultaneously.
  3. Any place available can be used.
  4. The workout is time-efficient, when athletes go by time instead of reps.
  5. Athletes train at their own level.
- **Stationary training**, where the athlete performs all the sets of an exercise at the given station without coming back to this exercise again.
  1. Suitable for a smaller group of athletes.
  2. Allows ability to focus on one particular group of muscles.

## **CHAPTER 2 -- General Conditioning (Fitness)**

General conditioning develops muscle tone, strengthens the tendons and ligaments, improves circulation, builds initial levels of strength and muscular endurance, and improves flexibility, agility, and coordination. A good conditioning program gives the athletes a base before they start more specific training to develop maximum strength or muscular endurance.

General conditioning can be done in a variety of forms:

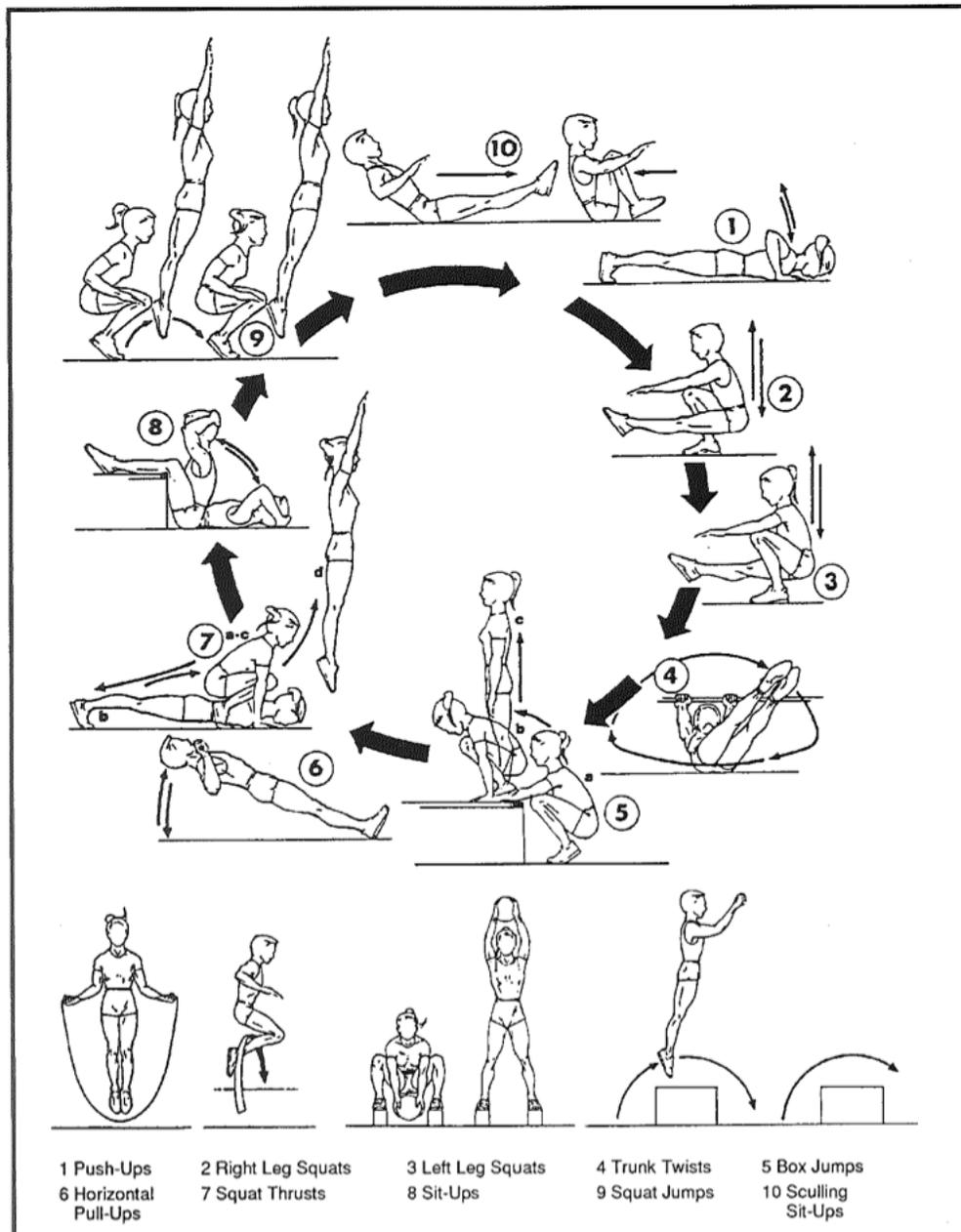
- Body circuits
- Very light weight circuits
- Workout with a partner and medicine balls

These types of the workouts should be the first priority for young athletes up to the age 16.

The same circuit could be used for a muscular endurance workout by going for a longer duration, for instance two to three minutes per exercise.

This circuit also can be done as a general preparation circuit.

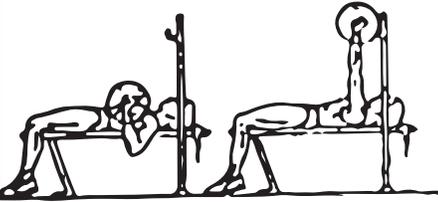
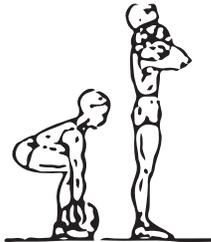
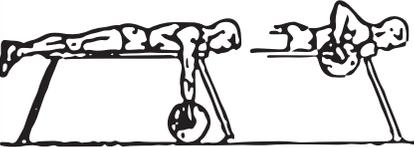
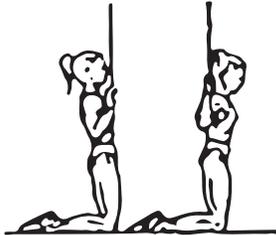
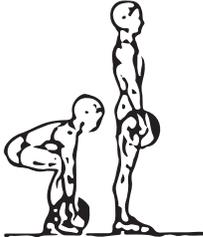
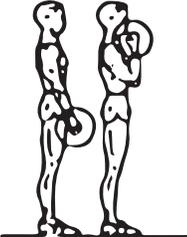
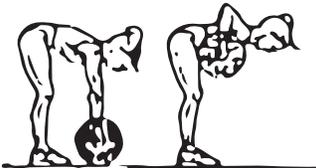
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**Figure 1. General Conditioning -- Body Circuit Workout**

This body circuit is made of 10 basic exercises. It can be supplemented by additional exercises above.

- Timed execution should be 45 seconds on, 15 seconds off for change of exercise.
- Number of circuits should range from three to five, with five to six minutes of rest between circuits.
- Correct execution of exercises should be stressed.

	Bench Press		Cleans
	Bench Pulls		Lat Pull Downs
	Sit Ups		Dead Lifts
	Back Extensions		V-Sits
	Arm Curls		Bent-Over Rows
	Squats		Squat Jumps

**Figure 2. General Conditioning -- Light Weight Circuit**

The light weight circuit can be used as a general conditioning workout as follows:

- Load: 60-70%
- Repetitions: 10-20
- Number of circuits (sets): 2-5
- Rest between exercises: 30-60 seconds
- Rest between circuits: 3-4 minutes

The circuit also can be used based on time:

- Load: 60-70%
- 45-60 seconds duration of each exercise
- 15 seconds off to change exercise
- Number of circuits: 3-5
- Rest between circuits: 4-5 minutes

## CHAPTER 3 -- Maximal Strength

**Maximal strength** is the ability of the muscle to apply force in single maximal contraction. The percentage of an athlete's "One Repetition Maximum Load" (1RM) is used as a measure of the load for the different types of workouts.

### Finding 1RM

After warming up, the athletes start lifting at an estimated percentage of their max lift:

*Step 1.* Lift 10 x 60 percent of max lift, then 10 x 40 percent.

*Step 2.* Lift 10 x 60 percent, then four x (60 percent + 10 pounds), then keep lifting four reps and adding 10 pounds until the athlete is unable to complete four repetitions consecutively. The last full set of four completed lifts is the athlete's 85 percent of 1RM.

$$1RM = \text{load (4 reps)} \times 100/85$$

To avoid injuries due to poor lifting technique, stay away from the 95-100 percent (1RM) lifts.

### Pure maximum strength workouts are listed below:

- Number of exercises from four to six per workout
- Load between 80-100 percent of 1RM
- Number of repetitions from one to five per set
- Number of sets from one to five per workout

Maximum strength workouts are not recommended for young rowers (except very experienced elite athletes.) Heavy loads require very good lifting technique; otherwise it is easy to get injured.

**Maximum Strength – Hypertrophy** is a type of maximum strength workout that uses a little lighter and safer load. It increases the size of the muscles and maximum strength.

- Number of exercise from four to eight per workout
- Load from 70-80 percent of 1RM
- Number of repetitions from eight to 15 per set
- Number of sets from four to six per workout.

### These workouts (below) are recommended for rowers.

*Complete at 70-80 percent of 1RM or a load that is very hard to complete given the number of repetitions.*

Power Clean	4 sets of 5-12 reps
Back Squat	4 sets of 5-12 reps
Bench Pulls	4 sets of 5-12 reps
Dead Lift	4 sets of 5-12 reps

**Figure 3.**

## CHAPTER 4 -- Strength Endurance

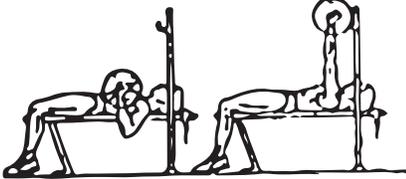
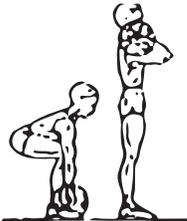
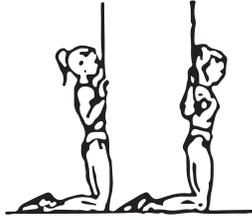
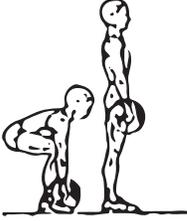
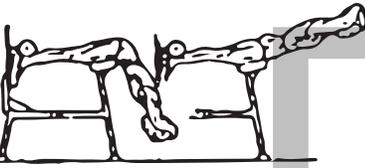
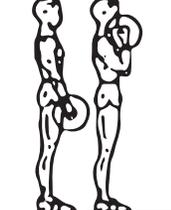
**Strength endurance** (muscular endurance) is the ability of the muscles to work effectively over a period of time. Many coaches believe that muscular endurance is the most important factor for rowing. Because of the relatively low intensity and long duration of the workouts, there also is some aerobic capacity development as well. Typical muscular endurance workouts are structured as follows:

- The number of exercises should be from eight to 14, selected from the following group of exercises.
  - Complex (clean, dead lift, vertical row)
  - Legs (squats, legs press, jumpies)
  - Arms (bench pulls, horizontal row, bench press)
  - Core/flexibility (sit-ups, back extension, Russian twist)
- The load is low, about 40-50% of 1RM.
- The number of repetitions can be from 20-40 per exercise or 1-2 minutes.
- Execution should be fluid, around 24-28 reps per minutes for major exercises.
- Or, the numbers of repetition can go up to 100 per one exercise or 3 to 3.5 minutes for elite athletes.
- The total number of repetitions per workout should be from 800–1,600.
- Duration of the workouts can be from 45 minutes up to 90 minutes.

For large groups of athletes, it is better to use time (minutes) instead of repetitions. This allows every exercise to start and finish at the same time and will guarantee an uninterrupted flow of the workout.

Here is an example of a strength endurance workout for older juniors and seniors.

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	Bench Press		Cleans
	Bench Pulls		Lat Pull Downs
	Sit Ups		Dead Lifts
	Back Extensions		V-Sits
	Arm Curls		Bent-Over Rows
	Squats		Squat Jumps

**Figure 4. Strength endurance workout**

The circuit is made of 12 exercises:

- Duration of 2 minutes per exercise, 15 seconds rest to change exercise.
- Frequency from 20-30 reps per minute. Sit-ups and back extensions are slower.
- Number of circuits: 3-4
- 5 minutes rest between circuits

Summary of the workouts:

- One circuit = 12 exercises x 2 minutes (average 35 reps) = 24 minutes (420 reps) per circuit
- 3 circuits = 420 reps x 3 = 1260 reps
- Max number of reps per workout = 1,300-1,600

	<b>General Conditioning</b>	<b>Maximal Strength</b>	<b>Strength Endurance</b>
<b>Intensity</b>	65-75%	70-80%	40-50%
<b>Repetitions</b>	10-20	8-15	3-6
<b>Sets</b>	3-4	4-6	3-6
<b>Rest</b>	3-4 min	3-5 min	1-2 min
<b>Speed of Movement</b>	Fluent	Fluent	24-28 reps/min
<b>Number of Exercises</b>	6-12	6-7	5-15
<b>Total # of Repetitions</b>	400-500	220-240	600-1800

**Figure 5. Summary of the workouts for the muscular system**

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## CHAPTER 5 -- Training Recommendations for Young Athletes

The table below illustrates the former East German approach to the strength training for different age groups. Maximum strength workouts before age 16 are rare. General conditioning (fitness), general endurance (running, swimming) and some rowing endurance combined for 85 percent of the whole training program for this group.

**Former East German strength training guidelines for different age groups**

	11-14 yrs	15-16 yrs	17-18 yrs	18 +
<b>General and Specific Endurance</b> (Rowing)	45%	50%	60%	60%
<b>Strength Endurance</b> (Indoor circuits)	12%	16%	14%	12%
<b>Maximal Strength</b> (Indoor weights)	-	-	4%	8%
<b>General Conditioning</b> (In and outdoor)	43%	34%	22%	20%

**Figure 6.**

Below is an example of the traditional periodization of weight lifting workouts during the season. It can be used for older juniors, seniors and elite athletes.

Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.
2x/ week	1x	2x	1x					2x	3x	3x
GF	GF	MS	MS					GF	GF	GF
	1x	1x	2x	3x	2x	2x	2x	1x		
	SE	SE	SE	SE	SE	SE	SE	SE		

**Figure 7.**

GF = General Fitness: 7-12 exercises, 20-40 reps/exercise, 140-800 total reps/workout

MS = Max Strength: 4-7 exercises, 8-12 reps/exercise, 320-360 total reps/workout

SE = Strength Endurance: 8-14 exercises, 20-50 reps/exercise, 900-1,600 total reps/workout

### Summary

For the protection of all involved, make sure you have sound knowledge of weightlifting technique prior to teaching weightlifting. Consulting with a certified trainer or strength and conditioning specialist is recommended.

### Suggested reading

McArthur, John, *High Performance Rowing*, The Crowood Press, 2008.

## CLASS ACTIVITIES

1. What kind of muscular fitness workout would you do with a high school student age 14-15?
  - a. General Conditioning
  - b. Max Strength
  - c. Strength Endurance
  
2. Body circuits are an example of what type of muscular fitness workout?
  
3. True or False: Athletes age 14-15 should not do resistance exercises in their first year of training?
  
4. True or False: General conditioning can be done with weights?
  
5. Which of the following is a maximal strength workout?
  - a. Four exercises, four sets of eight reps at 80 percent of 1RM
  - b. Twelve exercises, five sets of 50 reps at 50 percent of 1RM
  - c. Eight to 10 exercises, four sets of 20 reps at 70 percent of 1RM
  
6. Which of the following is a general conditioning workout?
  - a. Four exercises, four sets of eight reps at 80 percent of 1RM
  - b. Twelve exercises, five sets of 50 reps at 50 percent of 1RM
  - c. Eight to 10 exercises, four sets of 20 reps at 70 percent of 1RM
  
7. Which of the following is a strength endurance workout?
  - a. Four exercises, four sets of eight reps at 80 percent of 1RM
  - b. Twelve exercises, five sets of 50 reps at 50 percent of 1RM
  - c. Eight to 10 exercises, four sets of 20 reps at 70 percent of 1RM

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## **CHAPTER 6 -- Core Stability and Flexibility**

By Kris Korzeniowski (in consultations with Marc Nowak, physiotherapist with the U.S. Olympic and National Rowing Teams).

Core stability and flexibility are a very important part of the muscular system for rowers. They might not have a direct effect on the athlete's performance; but indirectly, they have a great influence on the athlete's health by preventing injury, making them stronger, allowing them to be more efficient in how they use power and how they row.

### **Core stability**

The abdominal and back muscles support the spine during the different positions of the rowing stroke.

Good core stability helps rowers to:

- Prevent spine injuries
- Improve, posture, mobility, stability and strength
- Improve rowing technique and power application

### **What exercises improve core stability?**

- Prone hold
- Side Hold
- Hip rotation
- Bridging
- Reverse Bridge
- Swiss ball hip tucks
- Swiss balls hamstring curls

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These exercises can be included in the post-workout stretching routine or during specially designated stretching sessions after a good warm-up.

### Prone Hold – 2 x 1 minute hold

- Chin tucked, elbows/knees on floor, toes curled under
- Exhale, extend hips/knees, keeping trunk neutral, hold
- Inhale, slowly control knees to the floor, exhale



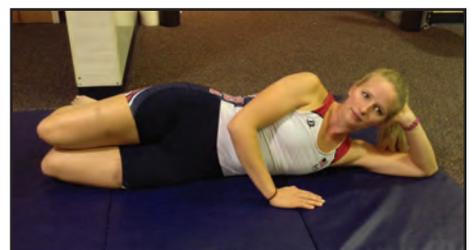
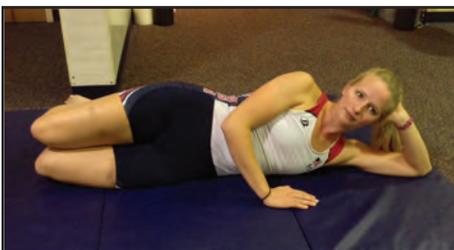
### Side Plank – 1 minute hold, each side

- Side lying, knees straight, shoulders/hips/knees in line
- Elbow under shoulder, exhale, lift hips in line with trunk
- Inhale slowly, lower hips to the floor, touch, exhale



### Hip Rotation – 6 x 6 second hold, each side

- Lying on the side, neutral trunk and hips
- Raise the top knee to ceiling, hold while maintaining a neutral spine
- Feel work in outer hip



### **Bridging – 6 x 6 second hold**

- Lying on the ground with knees bent
- Squeeze glutes and draw belly to spine
- Hold body position with knees, hips and shoulders in line



### **Swiss Ball Hip Tucks – 6 x 6 second hold**

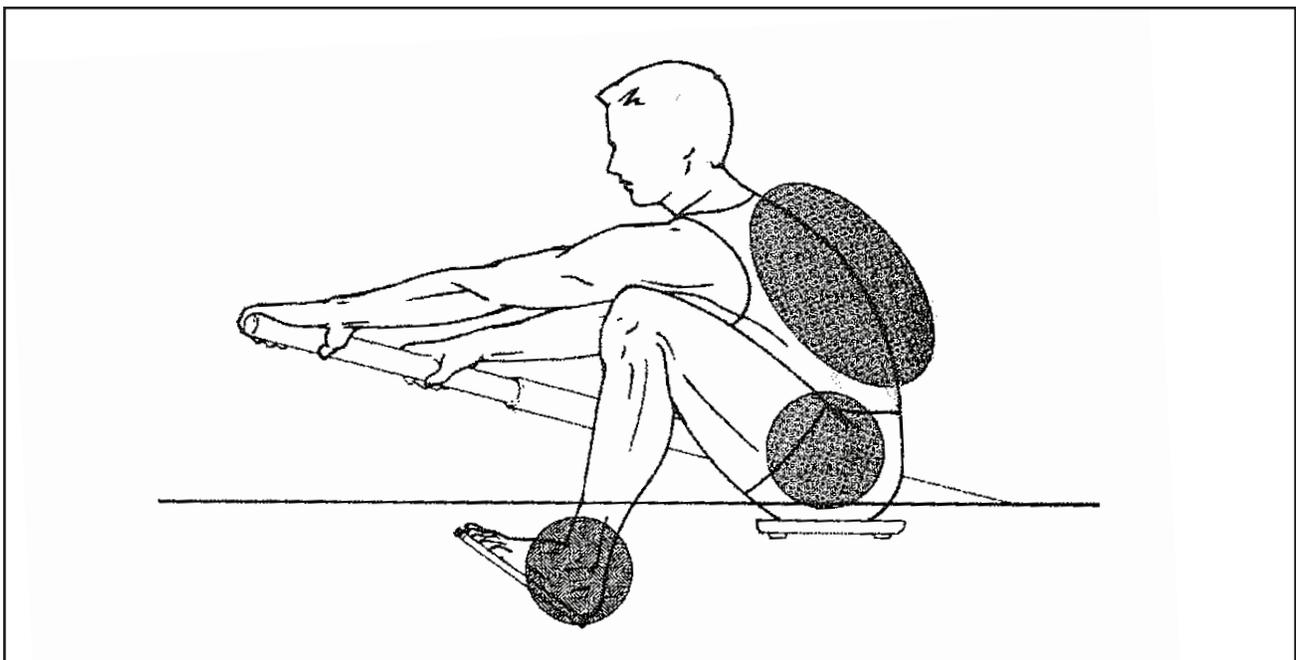
- Place legs/feet on the ball, hands on the floor and trunk neutral
- Tuck knees up towards the chest. Keep trunk neutral and still as still as possible.
- Return to start



### **Flexibility**

Adequate flexibility also may be a significant factor in injury prevention.

The key areas of flexibility for rowing include the ankles, hips and lumbar spine.

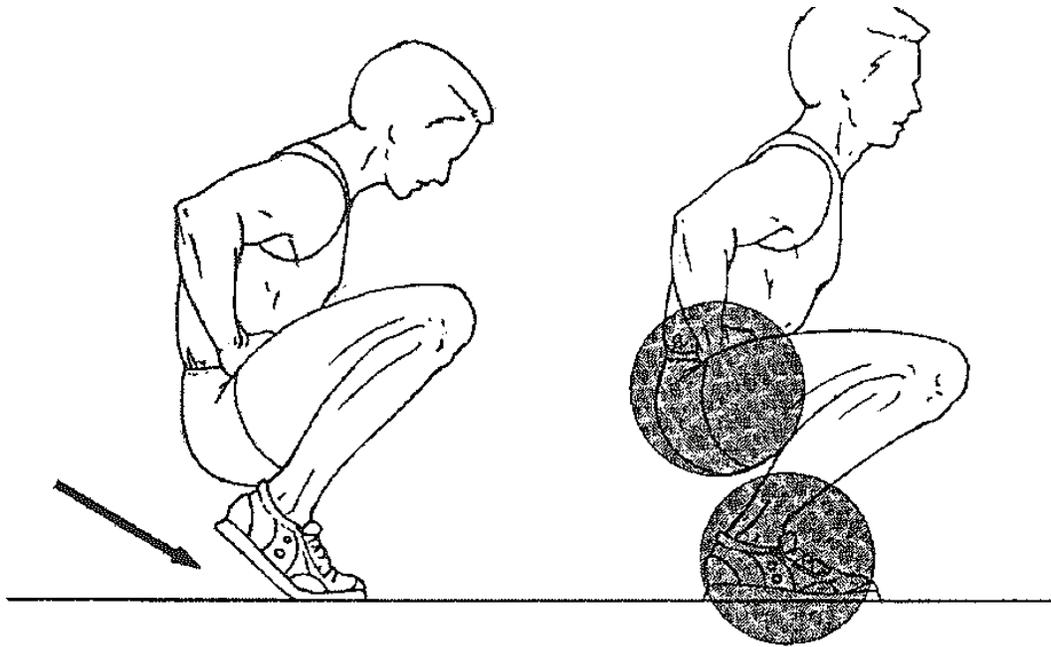


**Critical areas of flexibility for rowing include the ankles, hips and lumbar spine.**

## Ankle flexibility

### How to test?

Do a “deep squat” with the feet flat on the ground. If the heels rise up off the floor, that means the athlete has poor ankle flexibility.



Ankle flexibility is inadequate in athlete on left and adequate in athlete on right.

### Why it is important to improve ankle flexibility?

Because it will:

- Give the athlete a more comfortable position in the boat
- Improve slide control and the ability to reach the top of the slide comfortably
- Provide better stability at the moment of the catch
- Provide better foot support against the footboards
- Allow more efficient power application

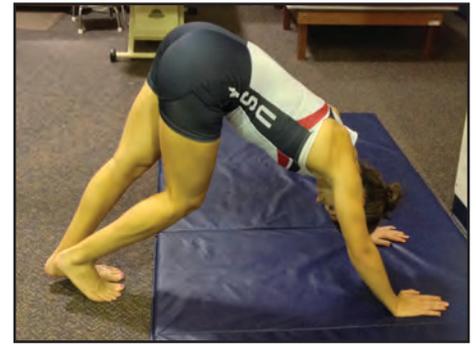
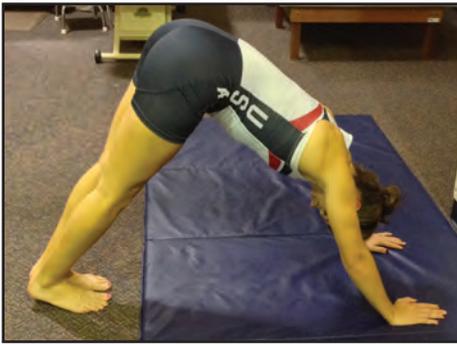
### How to improve ankle flexibility?

The best way to work on ankle flexibility is to include some specific exercises into the post-workout routine.

The exercises to improve ankle flexibility include calf raises on stairs, alternating active calf stretch, wall soleus stretch, lunges, jumpies and a deep squat.

## Alternating Calf Stretch -- 6 x 6 second hold each side

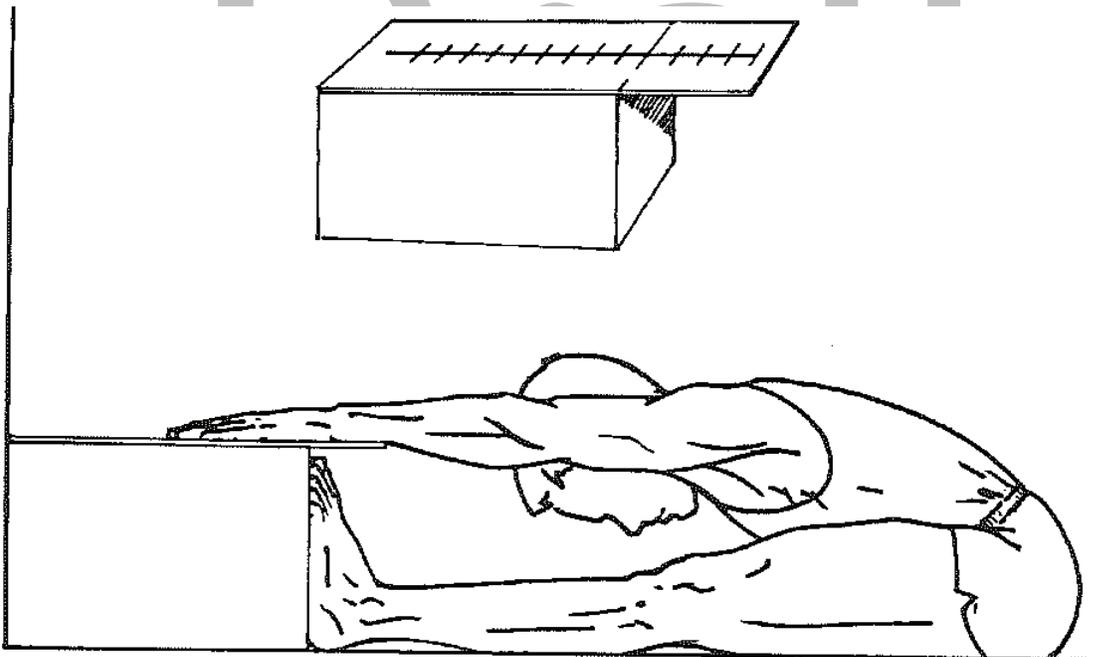
- On all fours with hips up
- Bend one knee and let the heel come off the floor, pressing the other heel down
- Reverse leg positions and repeat



## Hip and Lower Lumbar Flexibility

### How to test hip and lower lumbar flexibility?

The "sit and reach" test measures the flexibility of the lower lumbar and the hips (see figure below). The rorer sits down with his or her legs straight and the feet in vertical position against the box, trying to reach out past their toes. Measure the distance between the tips of the fingers and the toes.



Reach and flexibility test

Interpretation of the sit and reach test results

	poor	average	good
For men	< -3"	-2" to + 2"	> + 3"
For women	< -1"	+2" to + 4"	+ 5"

## How and when to work on improving flexibility?

These activities can combine core strength exercises, static stretching, and yoga poses to restore or increase range of motion to the joints and muscles used in rowing.

This type of cool down should be done within an hour following the training session, while the athlete's body temperature remains elevated.

The exercises provided below have been selected to address particular muscles groups and joints that are stressed during rowing.

### Warrior Pose, Upper Trunk Extension – 2 x 15 second hold each side

Purpose:

- Improves flexibility in hip adductors, hip flexors, gluteals, calves, abdominals, and shoulder muscles.

Execution

- Lean back, extending forward arm overhead and bringing the backward hand to the knee.
- Feel stretch in the lats, abdominals, and back hip flexors/adductors.



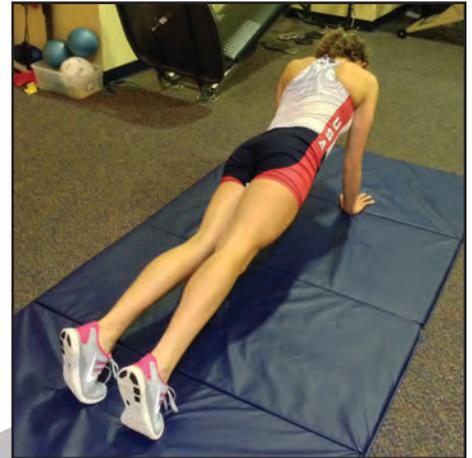
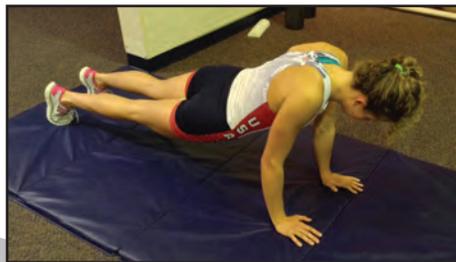
## Plank with Low Back and Hip Rotation – 2 x 15 second hold each side

### Purpose:

- Improves strength in core, shoulders, hips and back
- Improves flexibility in the abdominal and low back muscles

### Execution

- Plank position on hands and feet
- Rotate and lower the trunk and hips to the floor, keeping the elbows straight and feet together
- Hold for one full breath
- Return to the plank position and repeat to the opposite side
- Perform 6 repetitions to each side



## Plank with Downward Dog and Upward Dog Poses “Inchworm” – 2 x 15 seconds hold

### Purpose:

- Improves strength of abdominals, hips and knees.
- Improves flexibility in pectoral, abdominal, hip flexors, hamstrings and calf muscles

### Execution:

- Keep knees straight, hold this position for 15 seconds.
- Extend the neck and upper back towards the ceiling, hold for 15 seconds, then return to the plank position.
- Repeat the exercise two times.



## Bridge with Alternating Hip Flexion – 2 x 15 second hold each side

### Purpose:

- Improves core strength in trunk extensors, gluteals, and hamstring muscles
- Improves flexibility in ankles, hip flexors, gluteals, shoulders, neck, and wrist/finger flexors.

### Execution:

- Hold for 15 seconds, then go back to bridge position.
- Perform two times each side.



## Plank with Forward Lunge – 2 x 15 seconds hold, each side

### Purpose:

- Improves flexibility in hip flexors, gluteals, hip adductors, and calf muscles

### Execution:

- Hold the pose for 15 seconds, return to plank position.
- Perform this exercise two times with each leg.



The post workout activities also can include some static stretching exercises, which address typical rowing problems like including tight hips, calves, and lower back muscles.

## Static Stretches for the Hips

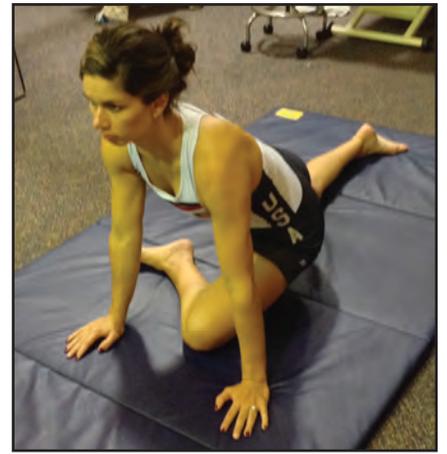
### Hip Flexor Stretch – 3 x 30 seconds each side

- ½ kneeling, involved hip back, outer hand on the wall
- Put inside hand on the hip and push it forward and away from the wall
- Feel the stretch in the outer trunk, hip and thigh



### Piriformis Stretch – 3 x 30 seconds hold each side

- Kneel, cross involved heel in front of the other knee bringing the heel towards the opposite hand.
- Straighten and slide the opposite leg back, keeping the trunk and head up



## Hamstring Active Stretch – 6 x 6 second hold each side

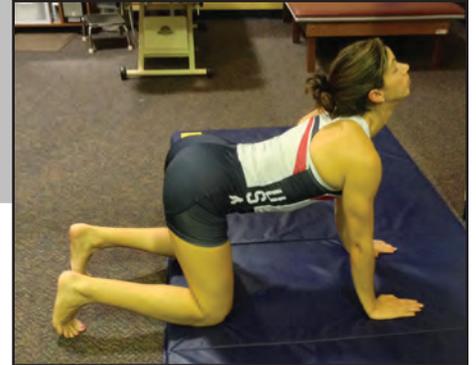
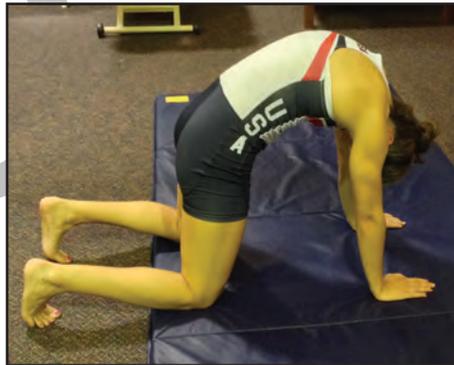
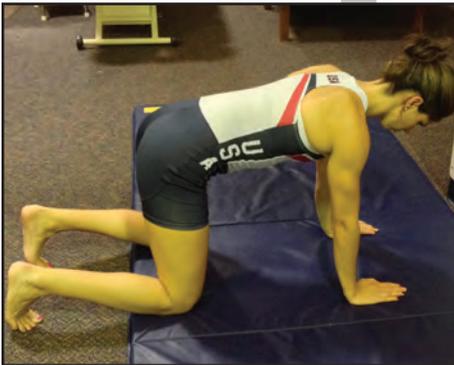
- Cup hands behind the thigh, knee bent and opposite leg flat on the floor
- Extend the knee, press the heel up and keep the back/hip on the floor. Point the toes to nose and hold the tension



## For the Lower Back:

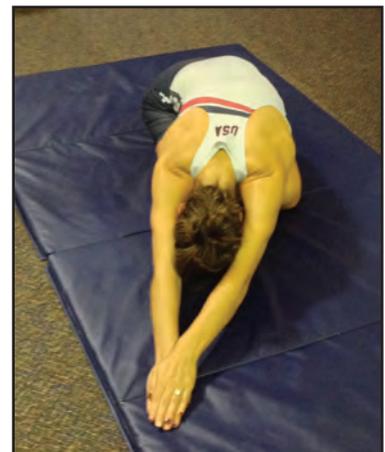
### Cat and Camel – 6 x 6 second hold for each position

- On all fours, hip/knees at 90 degrees and the elbows straight
- Lower the head, exhale, tighten the abs, roll the hips down, and arch the back up
- Return to start position, inhale, raise the head, lower the back



### Lion Stretch – side to side, 6 x 6 seconds on each side

- Hands together and stretched out in front
- Walk hands to one side, feel stretch in shoulders, trunk and hips
- Return to start, walk hands to the other side



### Prone Press Up – 6 x 6 second hold

Left: Lay flat on the floor, palms down by the shoulders

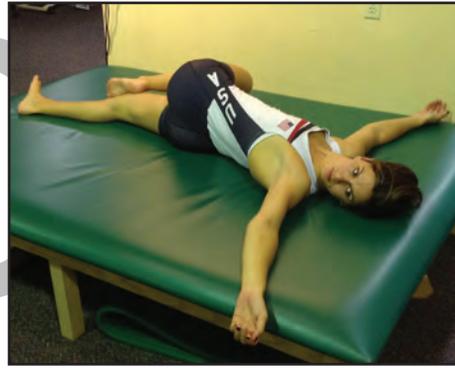
Middle: Press up with the hands and elbows, arch the back and neck

Right: Relax trunk and feel the stretch in the lower back



### Lumbar Rotation in Supine – 3 x 30 second hold each side

- Lie on your back, bend one knee
- Lower the knee over the other leg and look in the opposite direction
- Return to start, bend the opposite knee and repeat to the other side



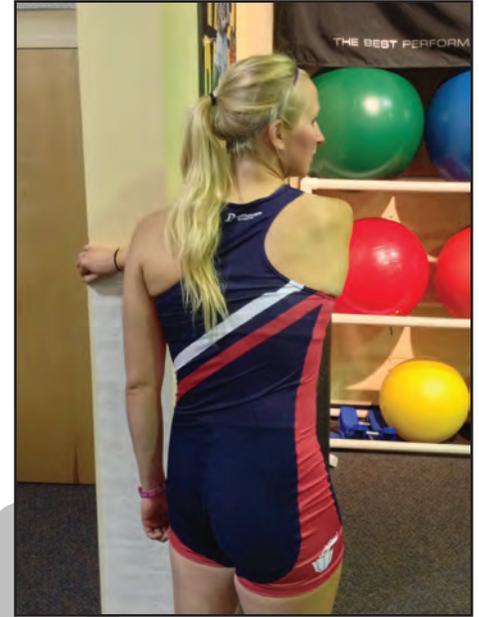
## Exercises for the Neck and Upper Shoulders:

### Posterior Shoulder Stretch – 3 x 30 second hold each side

Left: Grasp the doorway with the involved hand at shoulder height

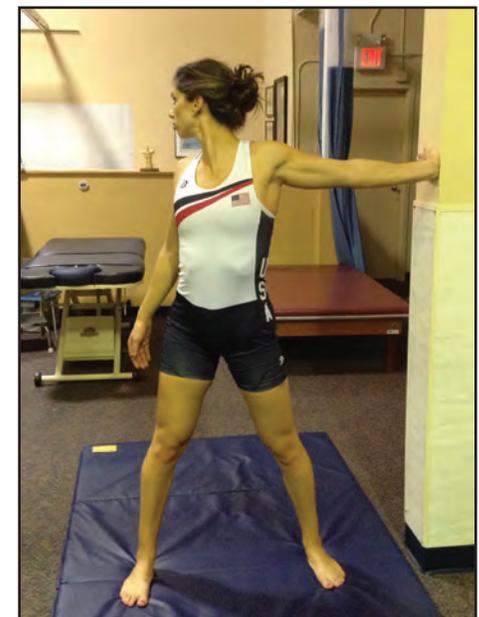
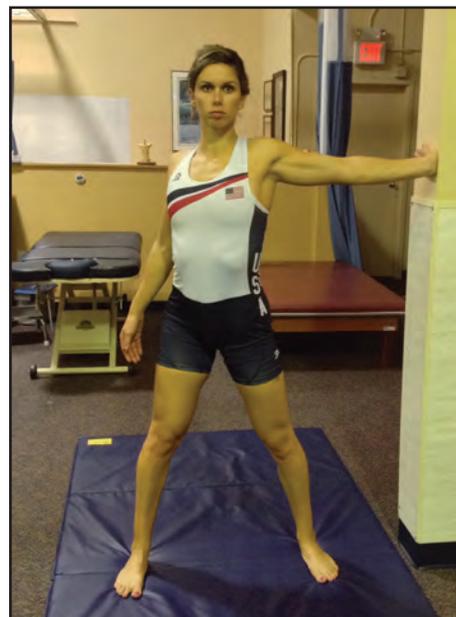
Middle: Rotate the trunk into the involved shoulder and hold the stretch

Right: Feel the stretch in the back of the shoulder



### Median Nerve Glide – 10 x 10 second hold each side

- Palm flat on the wall, elbow flexed and head facing forward
- Extend the elbow, turn the head and trunk away from palm
- Feel tension in the arm, hold, and return to start



## Quadruped Kneeling, Upper Trunk Rotation – 6 x 6 second hold each side

- Left: On all fours, chin tucked, back neutral and elbows straight
- Middle: Raise hand to ceiling, pivot trunk on down shoulder
- Right: Feel work in the upper back, stretch in the shoulder/chest, return to start, repeat to opposite side



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## Land Warm-ups Before Going on the Water

It is essential to provide appropriate warm up exercises to prepare the athletes to race or practice everyday.

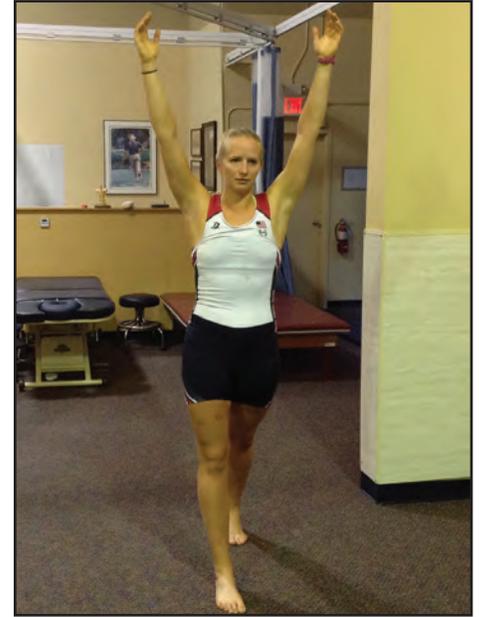
The warm up should contain:

- 10-15 minutes of aerobic activities (run, bike or erg) to elevate the heart rate, increase blood circulation and increase body temperature.
- Dynamic stretching, following the aerobic activity. These exercises and movements increase muscle temperature and progressively move the muscles and joints through their full range of motion.

Dynamic stretching can be performed individually or as a team. About 20-30 feet of free area is needed. The exercises are:

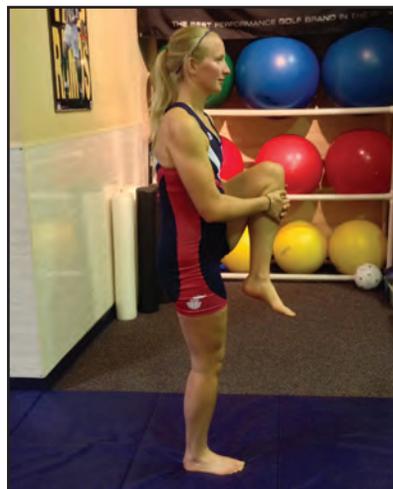
### Jogging with the Arms – arm circles 2 x 30 feet

- Swing arms forward in large circles, jogging in one direction 20-30 feet.
- Swing arms backward in large circles when returning in the opposite direction



### Knee Hug Lunge – 2 x 30 feet

- Lift the knee and pull the knee with the arms towards the chest.
- Release the leg and take a large step forwards directly into a lunge/hip flexor stretch position.
- Maintain good upper body posture and hold this position for 2-3 seconds.
- Stand up and repeat the movement with the other leg.
- Perform this exercise 2 x 30 feet



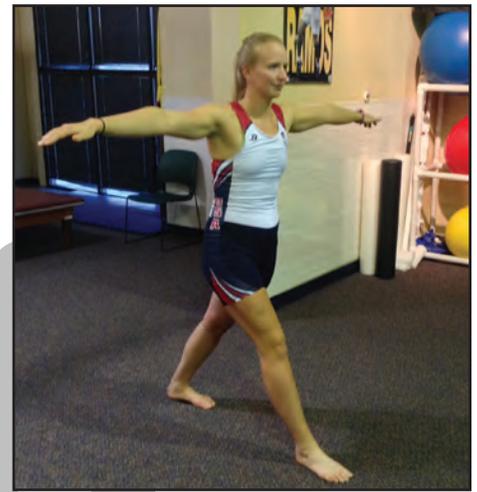
## Inverted Hamstrings – 2 x 30 feet

### Purpose:

- Improves strength in the legs and core
- Improves flexibility in the hamstrings
- Improves dynamic balance

### Execution:

- Stand on one leg and bend forward at waist until a slight stretch is felt in the hamstrings of the leg on the ground
- Hold for 3 seconds, step forward with the back leg
- Repeat the exercise standing on the opposite leg
- Perform this exercise 2 x 30 feet



## Backwards Lunge with a Twist – 2 x 30 feet

### Purpose:

- Improve flexibility in the hip flexor muscles
- Improve dynamic balance

### Execution:

- Take a large step backwards with the left leg into a lunge position
- Gently twist the torso to the right and reach for the left heel with the right hand.
- Stand up, step backwards with the right leg and repeat to the opposite side.
- Perform this exercise 2 x 30 feet.



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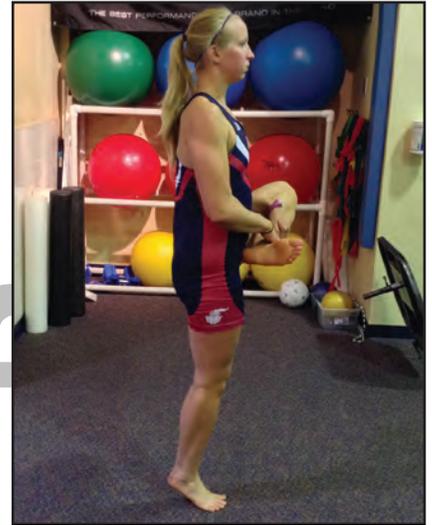
## Alternating Leg Cradle – 2 x 30 feet

### Purpose:

- Improves flexibility in the muscles of the groin and hips
- Improves dynamic balance

### Execution:

- While standing on one leg, lift the opposite leg with the assistance of both hands, turn the knee outwards while lifting the ankle.
- While maintaining the cradled leg, lift the body up by raising onto the down toes.
- Release the leg, step forward, and repeat with the opposite leg.
- Perform this exercise 2 x 30 feet.



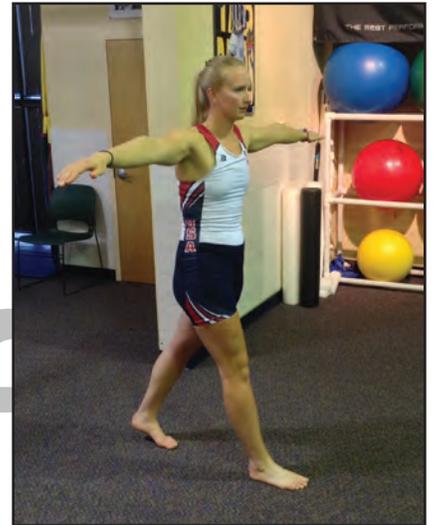
## Straight Leg March – 2 x 30 feet

### Purpose:

- Improves flexibility in the hamstrings, gluteal and lower back muscles.

### Execution:

- Swing one leg forward until stretch is felt in the hamstrings.
- Try to touch the raised foot with the opposite hand, keeping the trunk neutral, holding the position for 2-3 seconds.
- Return the leg to the ground, contacting the front part of the foot.
- Repeat with the opposite leg.



### Recommended Link

View Marc Nowak's, PT, warm-up and cool down dynamic exercises at [www.sportsphysicaltherapy.com](http://www.sportsphysicaltherapy.com), services, rower's corner.

## **Class Activities**

1. What are three reasons why core strength and flexibility is important for rowers?
2. Name three exercises that can improve core stability.
3. What are the two critical areas for flexibility in rowing?
4. True or False: Flexibility should be done as a post-workout activity?
5. True or False: A static warm-up is the best preparation for a workout?

# Draft

## TOPIC 4. TESTING

### Introduction

Rowing, specifically rowing a race on a 2000-meter course, is a very complex activity. Many components like rowing technique, aerobic capacity, anaerobic capacity, muscular endurance, maximum strength, motivation and racing toughness contribute to the final result of the race. The best test will be as specific as possible. This means racing 2,000 meters in the single. For many logistical reasons, however, this test would not give a coach any answers except which rower has better sculling skills.

For this reason, the ergometer test has become very popular because the environment can be controlled. Ergometers (Concept 2) are reliable and results are consistent from machine to machine and from year to year.

### Why do we test?

1. To find out the weakest links or limiting factors in the performance of the athletes.
2. To provide information on how to train (intensity zones.)
3. To monitor the progress of the training program during a certain period of time. It could be during one season or from year to year.
4. Testing provides additional competition during the off-season. This is good for young athletes to learn how to become racers.

### Simple testing is recommended for high school or college programs.

- 2,000-meter ergometer test
- 6,000-meter (or 4,000-meter for juniors) ergometer test
- 100-meter ergometer test
- Six to seven minute bench pull test
- Three kilometer run on the track

### 2,000-meter Ergometer Test at Maximum Effort

- This test is good to assess the athlete's total capacity (meaning aerobic capacity, anaerobic capacity, mental toughness and motivation.)
- It is very exhausting both physically and mentally.
- It should not be done very often.
- It does not give a lot of training information.

### 6,000-meter (4k for juniors) Ergometer Test at Maximum Effort

- It provides an adequate measurement of anaerobic threshold.
- It provides a good measurement of aerobic capacity.
- It can be used to design training zones for individual athletes.
- It is not very exhausting and can be repeated quite often.
- It is a good test to monitor the progress of a training program.

### 100-meter Ergometer Test at Maximum Cadence

- It assesses the athlete's specific power (anaerobic power.)
- If the results are good, it means that all the improvement has come from endurance improvement.
- If the result is below the average of the group but the 6k is very good, it means further improvement



Figure 1. The 6k test is not as exhausting as a 2k test.

of the 2k test can come from improvement of anaerobic power.

- Because the effort is short, coaches use it as a specific power workout in sets of 20" on and 40" off.

### **Six to Seven-Minute Bench Pull Test (The Best Measure of Muscular Endurance)**

- Many coaches see a correlation between results in this test and results in the boat.
- The frequency should be very close to racing cadence, around 28- 30.
- The weight should be put on the floor and the bar should strike the bench.

Suggested loads for this test are:

<b>Category</b>	<b>Heavyweight</b>	<b>Lightweight</b>	<b>Juniors</b>
<b>Male</b>	45-50 kg	35-45 kg	30-40 kg
<b>Female</b>	20-30 kg	15-25 kg	15-25 kg

### **3,000-meter Running Test at Maximum Effort**

- It measures the athlete's total capacities like the 2k erg test.
- This is the best test for young athletes for whom the erg is too heavy and when poor technique can be a limiting factor.
- It can be done once a month and even more often.

Most testing should be done at the beginning and the end of the training cycle. The results should be written in an organized way that is easy to compare from month to month or year to year.

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## TOPIC 4. NUTRITION

by Cameron Kiosoglous and Kris Korzeniowski

(Information is based on FISA Coaching Education materials and USADA's True Sport Nutrition Guide)

### Introduction

Nutrition requires common sense and moderation. But, competitive rowers need to focus on a diet made up of specific fuels and fluids. Because rowing is a such a high-energy expenditure activity, rowers need a high caloric intake in order to optimize performance.

In general, food groups are divided into the following groups.

Providing Energy	Building Muscles	Regulating Metabolism
Carbohydrates	Proteins	Vitamins
Fats	Minerals	Minerals
Proteins	Water	Electrolytes

Rowing is an endurance sport with a big power component. Rowing workouts are long and intense. For this reason, there is a big demand for energy foods like carbohydrates and foods that support muscular development like protein. The rower's diet should be well balanced, but with well-defined priorities.

### CHAPTER 1 -- Foods Providing Energy

#### Carbohydrates

Exercising athletes use energy obtained primarily from carbohydrates stored in the muscles as glycogen.

Replenishment of carbohydrates is critical to recovery and reducing the effect of fatigue before the next session. You should replenish carbohydrates within 20 minutes after the end of the workout.

- Open weight athletes require 500g of carbohydrates daily.
- Lightweight athletes need from 300-400g of carbohydrates daily.
- If someone is on a weight-loss program, he or she should maintain his or her carbohydrate intake level, while reducing fats (e.g. butter, oil.)

Failure to replenish carbohydrates has been found to impair physical performance.

**Good sources of carbohydrates include bread, rice, pasta, cereal, fruit, vegetables, dried beans and juices.**

Some considerations for carbohydrate intake include:

- Total daily intake: 5-13g/kg of body weight/day
- Before practice (1-4 hours): 1-4 g/kg
- After practice: 1-2 g/kg/hour (until next meal)
- Athletes should eat within two hours after practice
- Less than 24 hours between competition:s 0.7-1.0g/kg/hour (until next meal)
- More than 24 hours between competitions: 7-10g/kg/day
- Athletes should increase their carbohydrate consumption three days prior to competition.

Before exercise, carbohydrate intake can help to restore sub-optimal glycogen level stores, which is critical

for prolonged exercises.

## Pre-event Meal

Pre-event meals should be high in carbohydrates, non-greasy, and readily digestible.

1 hour or less	Serving Size	Grams of Carbohydrates	2-3 hours before	Serving Size	Grams of Carbohydrates
Food bar	1 bar	47 g	Baked Potato (plain)	1 large	58 g
Raisins	Small box	34 g	Cereal (whole grain)	1 cup	47 g
Banana	7 oz	31 g	Bagel (whole grain) with peanut butter	1 bagel	47 g
1/2 Bagel	2 oz	26 g	Fruit Smoothie	12 oz	47 g
Pretzel	20 pieces	22 g	Food bar (oatmeal)	1 bar	43 g
Toast	1 slice	14g	Oatmeal (instant)	1 cup	26 g
Fig bar	1 oz	20 g	Yogurt (non-fat)	1 cup	33 g
Sports Drink	8 oz	14 g	Fresh fruits (chopped)	1 cup	19 g

**Figure 1. Suggested pre-event meals (Adapted from the USADA True Sport Nutrition Guide)**

For athletes racing two or more times a day, the following is recommended:

- One hour or less between races
  - Stick with carbohydrates that are in liquid form such as sport drinks
  - Use fruits like bananas, oranges or apple sauce
- Two to three hours between events
  - Solid carbohydrates like bagels, hot or cold cereal with low-fat milk, English muffins, bananas, apples, and oranges
  - Drink a lot of water or sport drinks
  - Avoid drinks that contain caffeine, carbonation and the other stimulants
- After exercise or race
  - To completely replenish energy in the muscles, eat within 30 minutes after exercise. Then eat small meals two hours and four hours after the workout.
  - Recovery snack: cereal with milk, non-fat yogurt, pita and hummus, chocolate milk, banana with peanut butter.
  - Drink three cups of fluid for each pound lost during the workout.

## Fats

**Fat** is another fuel used to produce energy in long and low intensity activities. The body has an unlimited capacity to store fat.

A regular diet should include between 20-25 percent of the daily caloric intake from fats. Unsaturated fats, such as olive oil, canola oil, nuts, or peanut butter, should be prioritized over saturated fats from animal

sources.

Some important considerations for fat intake include:

- Essential Fat: Nuts, seeds, avocado, olive oil, canola oil, legumes, fish and whole grains
- Saturated fats: chocolate, meat and dairy
- Trans fat: fast food, processed/baked goods, snacks, chips, crackers, cookies, processed meats, hot dogs, frozen fries, pizza, chicken tenders

A research study on elite rowers who consumed either 40 or 20 percent of their calories from fat produced the following results (USADA True Sport Nutrition Guide):

- The rowers who consumed the low-fat, high-carbohydrate diet had more muscle glycogen.
- The rowers on the high-fat, low-carbohydrate diet had moderate levels of muscle glycogen but were still able to complete the workout sets.
- When it came to power output and faster speeds, those rowers who consumed the low-fat, high carbohydrate diets had significantly higher power and speed.

This has significant implications for athletes in muscular endurance sports that require a burst of power, such as rowing and swimming, to have energy generated aerobically.

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## CHAPTER 2 -- Foods for Strength Development

### Protein

As in many sports, success in rowing depends on the power of the athletes. A correct diet is very important in the support of muscular development. Protein is a key food group for all power sports.

**Primary sources of protein include meat, fish, eggs, soya, nuts and dairy products.**

Small amounts of protein with carbs can aid muscle-protein recovery (for example, 250ml of chocolate milk, fruit, yogurt.)

Some considerations for protein intake include:

- Normal requirement of protein: 0.8 g/kg body weight/day
- Endurance athlete: 1.2-1.4 g/kg body weight/day
- Power/strength athlete: 1.4-1.8 g/kg body weight/day
- Small amounts of protein with carbs can aid muscle-protein recovery (for example, 250ml of chocolate milk, fruit, yogurt.)

•  
Research shows that most athletes consume more protein than their bodies can use.

To keep athletes properly fueled and to meet protein needs, use the following guidelines:

- Eat breakfast. The best way to start the day is to be well fueled. Include foods that contain carbohydrates and protein such as non-fat milk, yogurt or eggs.
- Add carbohydrates and protein to post-exercise meals. Some energy bars provide carbohydrates to replenish muscle glycogen and protein to help rebuild and repair muscles.
- Toss the supplements. Athletes should rely on protein from good sources instead of supplements. In addition to meat, dairy products, nuts and seeds are all good sources of protein and can easily be added to any meal or snack.

## CHAPTER 3 -- Water and Hydration

It is important to realize that water is a crucial nutrient as it makes up 60 percent of a person's total body weight and 40 percent of their muscles. The most important aspect of water is its ability to cool down the body. An increase of body temperature creates sweat, which evaporates from the skin and results in a cooling effect. If fluid is not replaced at regular intervals during practice or competition, it can lead to dehydration.

### The negative effects of dehydration include:

- Prolonged sweating causes dehydration and electrolyte loss (vital to muscles contraction).
- If the loss of water is severe and the water is not replenished, the results can include heat illnesses ranging from cramps to heat exhaustion to heat stroke.
- Dehydration will occur more quickly in an athlete who has been losing weight, where the water level was already low to start.

### How to control the loss of water or dehydration

- Record morning heart rate and body weight.
- Observe urine (clear to pale yellow if hydrated; dark yellow and strong smelling if dehydrated.)
- Record body weight before and after training or racing.

### How to stay hydrated

- Drink water throughout the day and during training.
- Drink 1-2 cups (8 to 16 ounces) of water or sport drink **two hours before training or competition.**
- **During workouts**, drink 4- 6 ounces of water every 15 minutes.
- **After training or competition**, drink 16-20 ounces of water or sport drink.
- Drinking should exceed the body's desire to drink (by the time you are thirsty, you are already dehydrated.)
- Hydration during the winter and at altitude must be maintained.

Avoid beverages containing caffeine, alcohol and those promoted as energy drinks. If you have never had a sport drink, don't drink one for the first time on competition day.

### How to lose the weight safely

There are a number of considerations for athletes to lose weight safely.

1. Athletes should not be permitted to perform with less than five percent (men) and nine percent (women) body fat, respectively.
2. Athletes approaching this limit and still desiring to lose body weight must do so by the loss of lean body mass (related to some loss of power.)
3. The easiest and best method to lose weight is a combination of diet and exercise.

## CHAPTER 4 -- Vitamins, Minerals and Electrolytes

**Vitamins** help to run physiological processes. During long physical efforts, there is a need for vitamins.

- Group B: Speeds up metabolism of carbohydrates and fats
- Vitamin C: Strengthens bones and connecting tissue
- Vitamin D: Promotes bone growth

A normal diet should contain enough of vitamins.

**Minerals** are elements found in water, vegetables and animal foods.

- **Calcium (dairy products, vegetables)** helps muscle contraction and bone growth.
- **Magnesium (halibut, mackerel, boiled spinach, almonds, bran breakfast cereal)** is identified as an electrolyte. It is involved in many essential metabolic functions. Magnesium is needed to break-down carbohydrates and fats in order to produce ATP and energy.
- **Iron (red meat, green vegetables, eggs, nuts)** helps in forming hemoglobin in the red blood cells. Low levels of iron means there is not enough hemoglobin to carry oxygen. Iron deficiency can result in sport anemia and a significant decline in performance. Female athletes should be very aware of this condition because they lose iron due to menstruation.

### Supplements

Many athletes believe they do not get enough vitamins and minerals and look into supplements. In reality, a well-balanced diet composed of a variety of natural foods meets all energy demands.

Athletes searching for a competitive edge often look into supplements. However, there are no quick-fix supplements for improving performance .

For athletes subject to sport drug testing, taking supplements may cause a positive test for a prohibited substance that may not be disclosed on the product label.

### Summary

It is important for the coach to emphasize to rowers the essential food groups and how a proper diet should be constructed. Rowers should be made aware of when to eat before and after practices and prior to competition. Hydration is another key element to a healthy and balanced nutritional plan.

### Recommended reading:

1. FISA, Coaching Manual
2. True Sport Nutrition Guide (USADA), [www.TrueSport.org](http://www.TrueSport.org)
3. USSwimming.org, Coaching Education

## Class Activities

1. List the three major groups of food?
2. What major group of food is most important for rowers?
3. What is the best diet for the rowers ?
  - a. Low-fat, high-carbohydrate
  - b. High-fat, low-carbohydrate
4. What kind of food has to be replenish after the workout or the race?
5. How long after the workout should the athletes have their first meal?
6. Meat, fish, eggs, nuts and dairy products are a primary source of what?
7. What are the two major signs of dehydration?
8. What is the simplest way to detect dehydration?
9. Drinking water should:
  - a. Exceed the thirst
  - b. Satisfy the thirst
  - c. Leave the athlete feeling a little thirsty
10. When should athletes drink water?
  - a. Before the workout
  - b. During the workout
  - c. After the workout
  - d. All of the above
11. Why is the iron level in blood important?
12. What is the danger of taking nutritional supplements?
13. Provide an example of a meal three hours before the race.

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# MODULE 7: BASIC TRAINING METHODOLOGY

*“Failing to plan is planning to fail.” -- US Swimming*

## Learning Objectives

The candidate should have good knowledge :

1. Of the principles of training theory, volume and intensity of workouts
2. Of the training phases during the year
3. Of how to prepare monthly and weekly training programs
4. Of how to design training session in detail
5. Of running a proper crew selection process

## Introduction

Basic training methodology teaches coaches how to plan the whole process of the individual athlete's development, as well as development and preparation of specific boats to the championship. A lot of components have to be put together during one season, as well as during the careers of high school or college career athletes. There are several subjects that every coach should know before he or she starts to work on the specifics of a future program:

- Basic principles of training theory
- Periodization of the training process -- organizing all components of the training
- How to prepare training programs weekly, monthly and annually
- How to design individual training sessions
- Crew selection

## CHAPTER 1 -- Basic Principles of Training Theory

In the area of training methodology, there are some well-established and accepted theories and principles. These training principles have very practical applications to improve performance and can help coaches:

- Train athletes correctly ,
- Avoid major mistakes and injury
- Be more productive with their athletes' training time

The six most basic training principles are : specificity, individual response, adaptation, over-compensation, progressive overload and variation.

### 1. Specificity

The athlete should engage in his or her own sport as often as possible. Runners should run, swimmers should swim, and rowers should row. Each sport has its own characteristic energy requirements. Specific training brings the biggest improvements. Non-specific activities can be used to train the muscular system and mostly as an off-season training diversion.

### 2. Individual Response

Each athlete responds differently to the same training. These differences can be caused by one or more of the following factors:

1. **Heredity:** Differences in inherited factors such as muscle tissue composition, as well as heart and lung size.
2. **Maturity:** A more mature athlete can handle a heavier training load.
3. **Nutrition:** Some athletes eat better than others.
4. **Rest and sleep:** Adequate rest allows athletes to recover faster.

- 5. **Fitness level:** Some athletes already may be in better condition than others.
- 6. **Motivation:** Self-motivated athletes work harder.

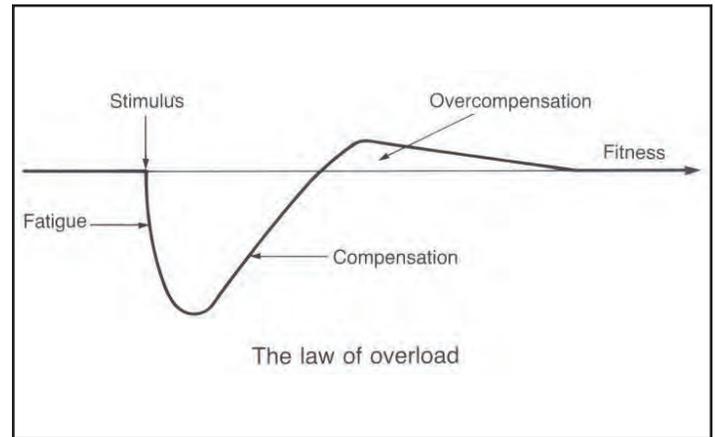
**3. Adaptation**

After a certain period of time at a given training load, the body will adapt to it and physiological changes will occur. Any increase in the training load should come only after adaptation (improvement) has taken place.

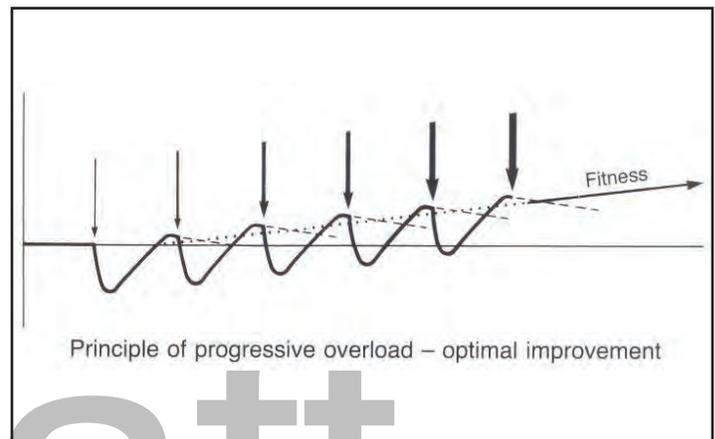
**4. Overcompensation**

As adaptation occurs, the training load should be increased accordingly. Training load can be controlled by adjusting the frequency, intensity and duration of exercise.

Increasing the load during training produces fatigue, which, when followed by recovery time, causes a phenomenon called “over-compensation.” This improves the standard of performance and increases the athlete’s training load tolerance (Figure 1) below the initial level.



**Figure 1. Over-compensation curve (from Yakolev)**



**Figure 2. Progressive overload (from Harre, 1978)**

**5. Progressive Overload**

The next overload should be introduced at the peak of over-compensation, after recovery is complete (Figure 2). This creates rhythmic change of the load and the rest. The most common approach among coaches is four to one. It means four weeks of gradual loading (70%, 80%, 90% and 100%) to one week of rest (only 50% of the load.)

In cases of continuous increases of the load or incomplete recovery, over-compensation will never take place. This would cause a decrease in performance.

A similar wave of the load should apply to the weekly schedule.

Load /Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
High							
Medium							
Low							
Rest							

Figure 3. Suggested weekly distribution of the training load with Sunday off.

**6. Variation**

Variation is about exploring different ways to achieve the same training goal. A lack of variation in the training program leads to boredom, staleness and poor performance. The most common ways to introduce variety to the program is to:

- Alternate easy days with hard ones

- Alternate difficult tasks with easy ones
- Change routines and exercises
- Change location (camps in different locations)

Coaches who work with very young athletes should be aware of so-called **development principles**.

- **Limited training before puberty:** Physically immature youth should be careful when starting systematic training. It can create injury, abnormal growth and psychological burnout.
- **Individuality due to development process:** Young athletes of the same chronological age can be a very different in terms of physical maturity. Some kids reach puberty at 10, others at 16. In these cases, the group approach can be very harmful for late-maturing athletes if they train together. Coaches also should check the height of the athletes to avoid too much training during growth spurts.
- **General fitness at the beginning:** Due to growth spurts, young athletes need coordination, flexibility and muscular fitness training to keep their bodies growing together. They should do very little specific endurance work, focus mostly on rowing technique, and do a variety of activities and different sports.
- **Make it fun:** Keeping it fun is more important than anything else.

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## CHAPTER 2 -- Periodization of the Athletic Process

Periodization is a way of distributing the different training components of the sport during the cycles of an athletic career in preparation for a major event.

The basic components of development of the rower include: technical skill, aerobic power, anaerobic power, muscular fitness (maximum strength, strength endurance, flexibility), racing ability and racing toughness. Each component is prioritized very differently for groups of the athletes in the different stages of development.

Those are a lot of components on which to focus. Periodization prevents confusion, prioritizes the components and optimizes the time at which to work on them, in order to guarantee the correct development of the athletes or the development of a specific boat.

The biggest unit of development time of an athlete or specific boat is a four-year cycle (see figure below). The cycle can be:

- From freshman year to senior year in high school or college
- An Olympic cycle for elite athletes

The total load of the goals, technical focus, volume of workouts and intensity of workouts will vary from year-to-year (Figure 4).

Quadrennial Plan			
Year 1/Freshman	Year 2/Sophomore	Year 3/Junior	Year 4/Senior
			Very High
	Medium	High	
Low			

**Figure 4. Quadrennial plan for the high school kids**

## 1. Periodization of a one-year program

A macrocycle of one year is presented in Figure 5. It is divided into three periods (2-5 months). Each period is divided into two phases (3-12 weeks), and the phases are divided into mesocycles (4 weeks), which are usually made of weekly microcycles.

## 2. The length of the phases

To define the length of each phase, move backwards from the major championships through the races and preparation until the last race of the previous season.

For a typical high school program, the phases will look as follow:

**Competition Phase** -- From the last race until the championship.

**Pre-competition Phase** (April, May) -- From the first race to the last race of the season.

**Specific rowing preparation phase** (February, March) -- From getting on the water until the first race of the season, or just eight weeks.

**General preparation phase** (November, December, January) -- From beginning of training after the head races until beginning of the specific rowing phase.

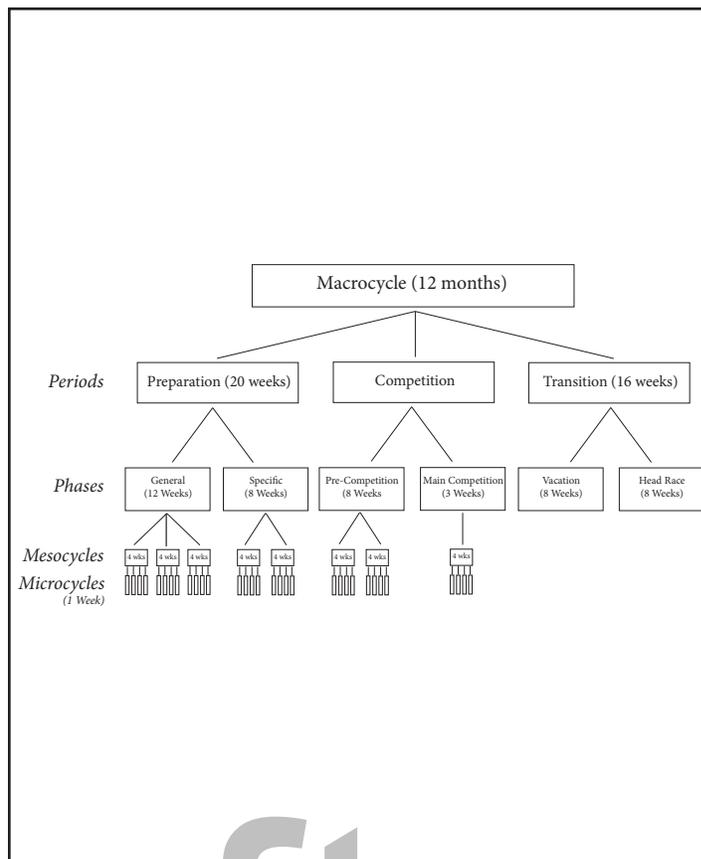


Figure 5. Map of periodization

## Typical High School Periodization Table

July	August	September	October	November	December	January	February	March	April	May	June
Transition Period				Preparation Period				Competition Period			
Vacation / Head Races				General Preparation Phase			Specific Preparation Phase		Pre-Competition Phase	Main Competition Phase	

Figure 6.

High school and college programs have very consistent racing calendars from a year-to-year. This allows for almost the same periodization every year, with some opportunities for changes in the specific workouts.

## 3. The primary focus and goals for the different periods and phases

### Transition period -- after the racing season

- Vacation phase
- Introduction/head races, a lot of fun, mix focus on:
  - Technique
  - Fitness running, rowing (U1, U2, AT and some body circuit)

### Preparation period

The major goals are:

- Improve aerobic capacities through general means like running, swimming, erging, and rowing (U1, U2, AT)
- Improve strength, endurance and flexibility

## Specific rowing preparation phase

The major goals are:

- Continue improving aerobic capacities in the boat and on the erg (U1, U2, AT)
- Introduce some higher intensity (TR1, TR2) because the races will start soon
- Continue with power workouts on the land and in the boat

## Competition period

- Pre-competition phase, the major goals are:
  - Improving racing abilities by racing on the weekends and through high intensity workouts (AT, TR1, TR2, AN)
  - Maintain aerobic base (still some U1, U2)
- Main competition phase, the major goals are:
  - Short rest before the final preparation to the major championship
  - Peaking for the final races (a lot of race pace pieces, TR1, some lactate tolerance, AN)

## 4. Distribution of the different types of the workouts, reflecting priorities for each of the phases, each month

With six workouts per week, the following distribution of the different types of workouts per week is suggested (Figure 7).

Period	U2	U1	AT	TR1	TR2	AN
Specific Preparation, February	2x	2-3x	1x	1x?	-	
Specific Preparation, March	2x	2x	1x	1x	1x?	
Pre-competition April	1x	2x	1x	1x	1x	
Competition, May	1x	2x	1x	1x	1x	
Main competition June	1x-	1x	1x	1x	1x	1x

**Figure 7. Workouts in a season**

One common question is how does a coach control intensity during the season in order to peak for the championship. The answer is:

- Get efficient at every cadence level before going up to the next level.
- The cadence for the all high-intensity workouts (TR1, TR2, AT and AN) should be increased gradually throughout the season.
- If the crew is slow at 30 and slow at 32, it is not going to be suddenly fast at 36 (your race pace). That is impossible!
- Spend four weeks training at the given cadence and then go up.
- For instance: If the plan is to race at 36 at the championship in June, that means that crew should row all TR1 workouts around 34 in May, 32 in April and at 30 in March.

This approach should guarantee an efficient cadence of 36 in June. Figure 8 reflects the gradual change of intensity controlled by the rowing cadence.

### Change of Intensity of the Workout During the Season (by Kris Korzeniowski)

<b>PROGNOSTIC RACE PACE FOR EVERY MONTH</b>		January <b>28</b>	February <b>28</b>	March <b>30</b>	April <b>32</b>	May <b>34</b>	June <b>36</b>
<b>TRANSPORTATION WORKOUTS</b>							
<b>short interval / # of the workouts / week</b>	<b>TR2</b>	0	0	x1	x1	x1	x2
3x 4x(250/250) 3x 6x(1min/1min off)			28-30	30-34	32-36	34 -38	36-40
<b>long interval / # workouts per week</b>	<b>TR1</b>	<b>1X</b>	<b>x1</b>	<b>x1</b>	<b>x(1-2)</b>	<b>x(1-2)</b>	<b>x2</b>
4x 10 min. 4x 1500m 3x 6min(3,2,1) 3x 10min(4,3,2,1) (4-6) x 1000m		26- 28	26 -28	28- 30	30- 32	32- 34	34- 36
		0	0	0	0	34- max	36- max
<b>ANAEROBIC THRESHOLD WORKOUTS</b>							
number of the workouts per week.		1X	x1	x1	x1	x1	x1
3x 15min( 5,5,5) / 5' rest 2x 15min( 5,4,3,2,1) / 5' rest 3x 4k, 1st and 3rd at steady cadence 2nd 4k is (17/5)			22....26	24...28	24...28	26...30	26 ....30
			22...30	22....30	24....32	24...32	26.....34
			24	24	26	26	26
			28	30	30	32	34
<b>UTILIZATION WORKOUTS</b>							
<b>hard steady state at 80% of progn. speed</b>	<b>U1</b>	<b>x 2</b>	<b>x 1</b>	<b>x 1-2</b>	<b>x1-2</b>	<b>x 1</b>	<b>x1</b>
4x 15min/3'rest 3x 19'(4,3,2,1.....4) at 18,20,22,24.....18) 6x 10min/ 2 ' rest 6x 2000m /3' rest at (18,22,22,18)		20	20	20-22	20-22	20-24	20-24
4x 15min/3'rest, alter. Continuous with ( 30"/30") at 22,24,26.....38 .....down							
<b>regular steady state at 75% of progn.speed</b>	<b>U2</b>	<b>x 2</b>	<b>x 2</b>	<b>x 1-2</b>	<b>x 1</b>	<b>x 1</b>	<b>x 1</b>
4x 20min/2'rest 3x 19'(4,3,2,1...4) at (16,18,20,22.....16) 6x 10 min /2'rest 60 min		16-18	16-18	18	18	18-20	18-20
<b>SPECIFIC POWER WORKOUTS</b>							
it can be instead of U2 .		x 1	x1	x 1	x 1	x 1	x 1
3x 7 min /5' rest 4 sets of 4x( 20str.at 14 + 10 str.at 20) rest between the sets 4'.		22	22-24	22-26	22-30	22-30	22-30

Figure 8.

## CHAPTER 3 -- How to Prepare an Annual Training Program

Start designing the annual program by completing the following steps:

**Step 1: Define your training periods** for the year, working backwards from the major competition:

**Competition period** -- from championship to beginning of racing season (April)

**Preparation period** -- from beginning of racing (April) to the beginning of training (November), after the head races.

**Transition** -- from the last race of the season before vacation until the end of head races (November).

**Step 2: Define your training phases (going backwards)**

**Competition phase** -- from the championship until the last race

**Pre-competition phase** -- from last race to the first race of the season (April, May)

**Specific rowing preparation phase** -- from first race of the season to getting on the water, or just eight weeks (February, March)

**General preparation phase** -- from beginning of training after the head races until the beginning of the specific rowing phase (November-January)

**Step 3: Prepare the goals and priorities for each phase.**

These are defined in Chapter 2.

**Step 4: Define the number and types of workouts per week, which reflect the goals and priorities for the given phase.**

For instance, suggested workouts for the month of March (Figure 7) would include:

2x regular steady state -- U2

1x hard steady state -- U1

1x -- AT

1x -- TR1

1X -- TR2

**Step 5. Create the following columns (Figure 9):**

- Column 1: Weekly schedule
- Column 2: Variation of the load
- Column 3: Take the workouts from step 4 and distribute them accordingly with column 2

Column 1	Column 2	Column 3
Days	Intensity	Type
Monday	Medium/High	U1
Tuesday	Low	U2
Wednesday	High	AT
Thursday	Low	U2
Friday	Medium	TR2
Saturday	High	TR1
Sunday	Rest	Rest

Figure 9.

### Step 6. Create Column 4

From Figure 5, pick specific workouts for the month of March, which correspond with the workouts in the third column (Figure 10).

Column 1	Column 2	Column 3	Column 4
Days	Intensity	Type	Workouts
Monday	Medium/ High	U1	<ul style="list-style-type: none"> <li>• 5x2,000m/3' rest at 18, 22, 22, 18)</li> <li>• Racing</li> </ul>
Tuesday	Low	U2	<ul style="list-style-type: none"> <li>• 3x19' (4', 3, 2, 1...4)/4' rest</li> <li>• at (16, 18, 20, 22...16)</li> </ul>
Wednesday	High	AT	<ul style="list-style-type: none"> <li>• 3x15' (5, 5, 5)/5' rest</li> <li>• at (24, 26, 28)</li> <li>• Could be racing</li> </ul>
Thursday	Low	U2	<ul style="list-style-type: none"> <li>• 3x20' (5, 5, 5, 5)/4' rest</li> <li>• at (16, 18, 20, 18)</li> </ul>
Friday	Medium	TR2	<ul style="list-style-type: none"> <li>• 3x5 (1'on/1' off)/7' rest</li> <li>• at 30-34</li> <li>• Racing</li> </ul>
Saturday	High	TR1	<ul style="list-style-type: none"> <li>• 4x1,500m/7' rest</li> <li>• at 30</li> <li>• Racing or seat racing</li> </ul>
Sunday	Rest	Rest	

Figure 10.

### Step 7. Complete the program for the month of March by setting the load for all four weeks.

Now, we have prepared the typical week for the month of March. By having four weeks in this mesocycle, we can vary the load between the weeks by changing the number of the pieces in the Friday and Saturday workouts. For instance, a load ratio 3 to 1 means three weeks of increasing the load followed by one week of some rest. The other workouts do not change.

	week 1 - 80%	week 2 - 90%	week 3 - 100%	Week 4 - 50%
Friday workout	3x5 (1' on/1' off)	3x6 (1' on/1' off)	3x7 (1' on/1' off)	2x6 (1' on/1' off)
Saturday workout	3-4 x 5 min	4-5 x 5 min	5-6 x 5 min	2-3 x 5 min

It is not necessary to prepare an annual training program 12 months ahead, with all of the details for every week and every month. Things change during such a long period. It is enough to prepare a monthly program as done above.

## CHAPTER 4 -- How to Design a Training Session

The general parts of a typical workout are:

1. Pre-workout meeting (short)
2. Warm-up (land, water)
3. Primary workout
4. Cool down (on-the-water, static stretching)
5. Post-workout meeting (athletes, coaches)

### 1. Pre-workout meeting

The pre-workout meeting should be a short explanation of the workout, plus a review of major safety points such as:

- "Be alert for boats coming from the channel. We will stop even if it is in middle of the piece."
- Check to make sure everyone understands, especially the coxswains.
- If the workout includes drills, demonstrate the drills now or at the dock instead of on the water. It will save a lot of time.
- Have a written list of the drills available for the coxswains.

### 2. Warm-up

The goal of the warm-up is to prepare the body physiologically for the increased effort:

- Elevate the heart rate,
- Elevate the body temperature
- Stretch the tendons and muscles

**Land warm-up:** Start with 10-15 minutes of light aerobic activities like running, erging or cycling, followed by some dynamic exercises such as jumps, turning body, turning arms, lunges and so on.

### On the water warm up

- First 2k: Start with some easy exercises, but in good rhythm, like only arms; then add the back; then add the slide, first at half slide and then at full slide.
- Row easily for another five to seven minutes, gradually increasing pressure up to three-quarters. Preferably, this should be done by half the boat.
- Second 2k: Use this for a more intensive warm if you want to start the primary workout (e.g. 3-4x20 strokes, gradually increasing the cadence and power).
- If time permits, use the second 2km for skills drills. Prepare a written list of drills (e.g. front end (leg + legs/back + regular row) 20 times each, 3x around).
- Start the final warm-up of 3-4x20 strokes. Always include a few starts in your warm-up.

### 3. Primary Workout

- Before starting any piece, check the situation on the water. Make sure there are no logs in the water, and there is no one in front of your boats.
- During coaching or racing, always check the safety of the athletes. Stop the boat if there is the possibility of a collision. Check the course in front of your motorboat. There have been many cases of a coaching launch hitting other boats or the bridge.

### 4. Cooling Down

Plan the workout so it finishes with at least one mile of easy paddle before the crew gets to the dock.

- This will allow the athletes to recover physically and mentally from the session
- An on-land, static stretching session can be added.
- Do not provide coaching during the cool down

## **5. Post Workout Meeting**

Make sure to have this short meeting even if everyone is anxious to run home. Try to get some quick feedback from the athletes and provide an assessment of the workout. Let the athletes know what was good and what needs to be improved .

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## CHAPTER 5 -- How to Select the Crew

### Introduction

Selecting the best crew out of a group of athletes is a difficult task. A lot of time has been spent on training and coaching, and now it is time to select the fastest boat. It is always a controversial and emotional process regardless of the level of the athletes -- novice, junior, collegiate or national team.

The perfect selection process should be as specific as possible. This means:

- Racing different combinations of the crew in the boat for which they are being selected; and
- Racing over the distance at which the crews will compete.

That can be almost impossible in the real world of high school or collegiate rowing. Races can be on different days in different weather conditions, making it impossible to compare. The process also can be very long, making it impossible to implement in a regular schedule.

### Different Types of Selection

Coaches can use different tools to select the athletes to the crews:

- Ergometer results (such as top four scores are in the four)
- Racing in smaller boats, side-by-side, to select the bigger boat, such as:
  - Pairs to select the fours and eights
  - Fours to select the eight
  - Singles to select the double and quad
- Seat Racing (Racing two boats side-by-side, with the switching of athletes after each race.)
- Time Trial Racing (Each boat races for a recorded time. The boat switches one athlete and races again. This method is used when there are not enough athletes of equal ability to have two boats race side-by-side or when selection is just for the last spot in the boat.)

### Seat Racing

For practical reasons, the most popular method of selection is the "seat racing method" of two boats racing side-by-side a few times during one session.

In this method, two boats race side-by-side from two to four times at a distance from 1,000- to 1,500 meters during one session at a controlled cadence. Two athletes are switched after each race (see picture above.)

If boat A was faster than boat B in the first race and boat B got faster after the switch, it means the athlete who moved to boat B was superior to the athlete who moved to boat A.

In any given session, there could be from two to four races.

Seat racing is not just simply switching people around. There are many factors to consider in order to have reliable sessions. Here are some of them:

- The athletes should not know who is going to be switched.
- Make sure the athletes know the procedure that is being used (distance, cadence). If the cadence gets too high, will the piece be stopped and re-started.



Figure 12. Pull boats together, switch two-seat

- The boats should be prepared, checked and rigged the same way. Be sure to have a spare seat and tools in the motorboat.
- The distance and the body of water should be well defined.
- If the water is flat with no wind and no current, races can be done in both directions. This saves a lot of time.
- If it is quite windy or conditions are not the same, races should be conducted in only one direction. This means the crews should turn around after the piece and paddle back to the start.
- Always race with the tail wind. A head wind magnifies the differences.
- Check each boat's cadence very often. It makes a big difference even if the cadence is only one beat higher.
- Try to use distance and not a time for the length of the pieces. Take the times and the differences on the finish of the each race.
- Try to have two boats with relatively even speed to start seat racing.
- Make sure the two "strokes" are consistent in rhythm and cadence.

Interpretation of the results can be difficult. For instance:

- On the difference in time between two boats, athlete A beat athlete B.
- On the final time, the first boat had a faster time with athlete B.

Try not to make decisions on just one seat race. Disregard the results if it is discovered during any point in selection that one athlete makes every combination lose by a significant margin. This means that the athlete negatively effected everyone who was with him or her in the boat.

The most common distance for seat racing is 1,500 meters.

Seat racing is usually conducted in three races at the cadence below race pace or the highest rate they can row efficiently (probably 28-32 at the beginning of the season and 32-34 later in the season.)

Try to keep rest consistent with a minimum of 10 minutes between the races.

### **Important notes:**

1. Keep very good notes of everything related to selection -- announcements, meetings and results. This might prevent future controversies or even law suits.
2. If you have to make cuts, be prepared to give straight-forward answers as to why the choice was made. Have the results compiled and ready to show.

### **Suggested Reading**

Bompa, T., *Periodization Training for Sports*, Human Kinetics Publishing, 1999, Champaign, Ill.

Bompa, T., *Theory and Methodology of Training*, Kendall/Hunt Publishing Co., 1983, Dubuque, Iowa.

Korzeniowski, Kris, *Crew Selection*, FISA Level III Development Program, 1986.

McArthur, *High Performance Rowing*, 2008.

Nolte, Voler, *Rowing Faster*

*Training Methodology*, FISA Level 1

*Preparing a Plan*, US Swimming Coaching Education

## Class Activities

1. What are the six basic principles of training?
2. Using the progression principle, what does after a period of training mean?
  - a. Increase loading into the next period of training
  - b. Provide recovery period and then begin the next period of training
3. What is periodization?
4. List the steps in developing an annual training program.
5. What are two phases of the preparation period?
6. What priorities would be the focus of the pre-competition phase?
7. Using all the information from this chapter, create a sample week of training for December. Assume crews are not rowing on the water.
8. Using all the information from this chapter, create a sample week of training for February. Assume crew are already rowing on the water.
9. Write a detailed plan for a session on the water including drilling and 5x5-minute pieces to present to a boat.
10. List four different types of selection to pick a crew.
11. True or False: Athletes should know who is going to be switched and explain why (during seat racing selection)?
12. True or False: It is important for the athletes to know the distance and rating of the piece?
13. True or False: For side-by-side seat racing, one boat should be rigged lighter than the other?
14. True or False: For side-by-side seat racing, one crew should have newer equipment than the other?
15. True or False: It is acceptable for one crew to row two beats higher than the other boat during seat racing?