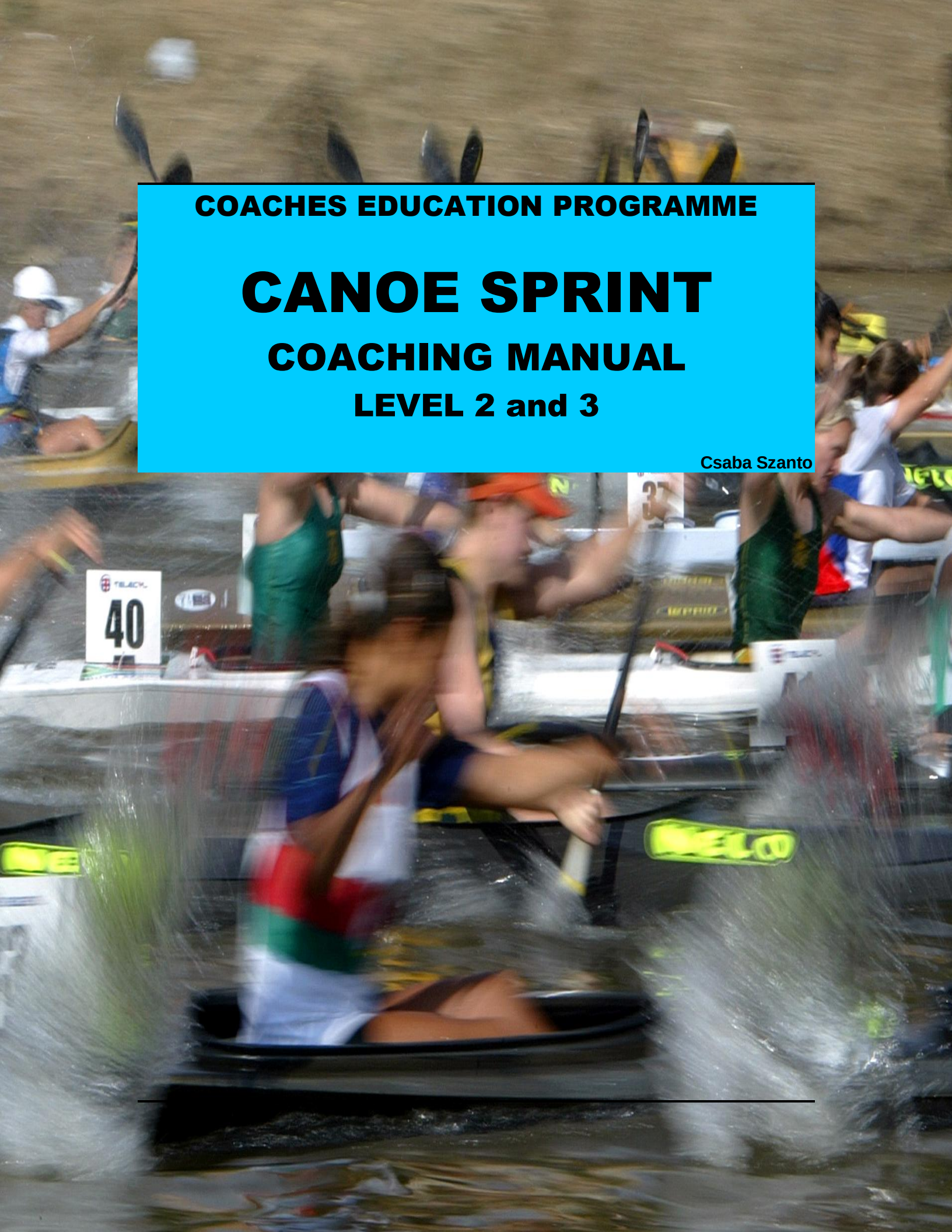

COACHES EDUCATION PROGRAMME

CANOE SPRINT

COACHING MANUAL

LEVEL 2 and 3

Csaba Szanto

REFERENCES OF OTHER EXPERTS

The presented Education Program has been reviewed with regards the content, methodic approach, description and general design. In accordance with above mentioned criteria the program completely corresponds to world wide standard and meet expectations of practice. Several suggestions concerned the illustrations and technical details were transmitted to the author.
CONCLUSION: The reviewed program is recommended for sharing among canoe-kayak coaches of appropriate level of competence and is worthy for approval.
Reviewer:
Prof. Vladimir Issurin, Ph.D.
Wingate Institute for Physical Education and Sport,
Netanya, Israel

Csaba Szanto's work is a great book that discusses every little detail, covering the basic knowledge of kayaking canoeing science. The book provides a wide range of information for understanding, implement and teaching of our sport.
This book is mastery in compliance with national and international level education, a great help for teachers and coaches fill the gap which has long been waiting for.
Zoltan Bako Master Coach, Canoe-kayak Teacher at ICF Coaching Course Level 3 at the Semmelweis University, Budapest Hungary

FOREWORD

Csaba Szanto has obtained unique experience in the field of canoeing. Probably there is no other specialist in the canoe sport, who has served and worked in so many places and so many different functions.
Csaba coached Olympic champions, but he has been successful with beginners as well. He contributed to the development of the canoe sport in many countries throughout the world.

Csaba Szanto wrote this book using the in depth knowledge he has of the sport. He is very much aware what is needed for someone wishing to acquire the basic knowledge of being a good coach.

The book presents a cross-section of canoe sprint for experienced coaches.

I wish every success to the participants at the courses and also to the competitors, who will be prepared and trained by the coaches benefiting from the knowledge in this book.

Budapest, 2014

Vaskuti István
Olympic Champion
ICF 1st Vice President

PREFACE

Unfortunately the worldwide successful Canoe Sprint discipline has not many specialised bibliography and teaching materials for coach's education. This addition is a contribution to reduce the lack of technical books for canoeing.

Over many years the International Canoe Federation (ICF) has been extremely active in promoting and organising coaching courses in Canoeing including seminars and symposiums at national and international level.

The aim of the ICF is to develop canoeing worldwide both at recreational and elite levels. The ICF launched a structured Coaches Education Programme in 2011. The principle goal of the programme is to help coaches at different levels to develop their knowledge and expertise in coaching canoeing skills by giving them an opportunity to participate in well defined courses approved and run by the ICF.

The ICF Coaches Education Programme has four levels:

The Level 1 Courses: National Courses can be organised and hosted by any National Federation. Level one courses are designed for the beginner or inexperienced coaches.

The Level 2 Courses: National, Regional and/or International Courses can be organised by any National Federation, Continental Association and/or ICF. These courses are for experienced Canoeing coaches.

The Level 3 and 4 Courses: These courses are for elite Canoeing coaches and are organised by reputable Universities such as the Semmelweis University Faculty of Physical Education and Sport Sciences, Budapest in English with cooperation of the ICF.
Most of the theoretical part of the course is conducted through online education (four months) whilst the mainly practical modules take place in Budapest, Hungary (one month). The programme concentrates on the Canoe Sprint discipline but also provides information that is transferable for progressing athletes' performance in other canoeing disciplines.
All courses have been designed in accordance with international standards for the sport of canoeing including sustainable environmental behaviour.

The participants who pass the examination at any level will receive an official ICF Diploma, which may entitle them to be employed by National Federations as a canoeing coach. The coaches will be registered by the ICF on their International database.

These courses might be financially supported by Olympic Solidarity. Applications for funding can be made via the respective National Olympic Committee.

This manual is intended for the ICF Canoe Sprint Level 2 and to some extent Level 3 Coaching Course for experienced coaches and/or athletes.

Some subjects of this book have already been mentioned in the Level One Manual. However, more detail and complex analysis will be discovered in Level Two.

The key objective of this manual is to provide a common framework for experienced coaches of canoeing. The book aims to describe accepted working methods for coaching and training of athletes and enable the coach to compare their existing knowledge, methods and experience with standards in the sport.

DESCRIPTION OF THE ICF CANOE SPRINT LEVEL 2 COURSE

The courses can be organised and hosted by any National Federation, Continental Association or the ICF .It is possible to have financial support from the International Olympic Committe through the Olympic Solidarity. (Application to the Olympic Solidarity shall be made via the National Olympic Committees).

The criteria for hosting a course:

- The application for the organisation of a coaches' course shall be made by National Federation to the Continental Association and the ICF
- The coaches participation shall be supported/approved by their National Federation
- The lecturer will be appointed (or approved) by the ICF
- The conductor of the course shall apply the ICF Teaching Materials
- The participants shall pay the required amount for the attendance (if any) and for the ICF Diploma,
- The duration of the course must not be less than 8 (eight) days

The language: selected by the organizer of the course
The content and the teaching materials of the courses will be prepared and provided by the ICF including the form and test of examination.
The participants will undertake a written examination and demonstrate their skills in a practical examination.
The participants who pass the examinations will receive the ICF Certification of the ICF Level 2 Canoe Sprint Coach and will be registered in the ICF coaches' database.

Those coaches whom are motivated and wish to extend their education can participate in the ICF Coaching Course Level 3 programme.

ICF COACH'S EDUCATION LEVEL 2 STRUCTURE

DESCRIPTION		LEVEL 2 National, Regional, Continental or International Coaching courses
COACH LABEL		**ADVANCED COACH**
CURSE NAME		**Canoe-Kayak Sprint Advanced Coaching Course**
COURSE PURPOSE		To provide the candidates with knowledge and teaching skills on a National Level and basic knowledge of all canoeing disciplines
MAIN ROLE		Prepare to deliver and review coaching sessions
COACHING EXPERIENCE		Participant has some experience in coaching canoeing
POSITIONING		This coach directs assistant coaches and reports to the expert or master coach.
RESPONSIBILITY		This coach has considerable responsibility in the coaching process.
ENTRY REQUIREMENTS	**AGE**	minimum 18 years old
	COACHING LEVEL	Completed Level 1 course or has at least 2 years proven coaching or paddling experience on national level
	OTHER SKILL	200 meters swimming ability
	LANGUAGE	National or main regional language (Why? Why not English and national language?) DELETE
	ACADEMIC LEVEL	Secondary school leaving examination (you can't say this Csaba) DELETE
	NATIONAL FED. AGREEMENT	The participation must be supported by the applicants National Federation DELETE
	COACHING EXPERIENCE	Relevant (minimum 2 years)
CAREER PROSPECTIVE		To become a Level 3 Expert coach NOT REALLY, COULD BE HAPPY AT LEVEL 2..DELETE AS IRRELEVANT
TARGET AUDIENCE		Coaches with the recommendation of the National Federation. THIS IS VERY NARROW I WOULD IMAGINE THE BOOK SHOULD SERVE A WIDER AUDIENCE

SUGGESTED DURATION		**8-10 days (60 hours)**
HOURS	**THEORY**	**42**
	PRACTICAL	**18**
PRACTICAL APPRENTICESHIP		Candidates have the opportunity to learn more then in the Level 1 course and apply their skill and knowledge on Club and National Level
VENUE REQUIREMENTS		Requires a suitable place for theory and practical courses, generally the same location
EQUIPMENT	**FOR LECTURES**	Class room, white board, Computer, projector, DVD player and note books
	FOR PRACTICAL	Stable type of boats with paddles, 1.2 m long tube as a paddle shaft, life jackets, coach's power boat. require some athletes for demonstrations
EXAMINATION		All candidates shall complete a written examination, which contains 30 questions, and exam on demonstration and teaching abilities
RECORDS		The ICF keeps the records of the coaches passed the examination: name, date of birth, contact details
CERTIFICATION		Successful candidates shall receive a **"**Canoe-Kayak Sprint Coach Level 2" Diploma
PROPOSED "European Qualification Framework (EQF)" LEVEL		Depending from the system established in the country where the certification is issued. DELETE IRRELEVANT HERE – KEEP TO ICF FOCUS

The Author: 

Csaba Szanto submitted this book in using his more then 50 years of experience in canoeing and the other existing available materials from other experts and sciences.

References:

Comments by Istvan Vaskuti, Zoltan Bako and Prof. Vladimir Issurin

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Kayaking, Imre Kemecsey HUN Master Coach
U.S. Canoe and Kayak Team Sprint Racing Coach Education
Australian Canoeing Inc: Coaching Syllabus
FISA Coaching Development Programme Course
Babak Shadgan MD., MSc. Sports Medicine
Berney Wainwright High performance advisor BCU
The science behind Flatwater Kayaking, Michel Jacob / Graham Kenneth AUS
Kayak New Zealand manual
John Handyside BCU National Development Coach
The International Journal of Canoeing and sports science Volume 2(2009) iss.1 and 2
Miklos Fisher
Attila Szabo
Nutration: www.nutritionaustralia.com

Photos: Balint Vekassy (and others)
Editor and additional recourses: Simon Toulson ICF Secretary General and Peter Niedre

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Appendix 1: Miklos

Appendix 2. Attila Szabo

CHAPTER 1

COURSE ADMINISTRATION

1.1 Knowledge of the course

Name of the course: **ICF Level 2 Canoe Sprint Coaching Course**

Nominal duration of this course: **8- 10 days, 60 hours**

- 40 hours of lectures, (if interpretation is necessary more time maybe required.)
- 14 hours of coaching practice (practical)
- 2 hours of examination
- 4 hours DVD or video on canoeing technique

Practical trainee period (minimum 6 weeks) better to say number of hours because won't be full time.

Target market for the course:
This course designed for canoe – kayak coaches with a few years of coaching experience in canoeing and/or for athletes with several years of practice
The potential target market comprises educated and experienced coaches and/or athletes. The course will provide general knowledge of Canoe Sprint techniques.

Attendance requirements:
Candidates must attend the full course in order to be eligible for sitting the examinations at the end of the course.
The minimum 6 weeks (hours?) practical period should ideally be completed with a higher level coach.

Venue:
The course should be conducted at a venue that has both suitable places for lectures and on water practice sessions. (For the practical sessions local athletes' attendance is highly recommended.)

Required Equipment:

a) For the Lectures
White board and markers, computer projector and DVD player/TV, Note books and pencils for the participants.

b) For the Practical sessions
Boats: stable type of kayaks such as touring, slalom, wildwater boats, polo or children "mini" kayaks and 2 seaters touring canoe.

Paddles: any available kayak or canoe paddle.

For athlete demonstration of paddling technique they need to use their racing boats. Confusing as you just mention stable boats above and now saying racing boats....Do you mean in demonstrations it is advisable to do with Canoe Sprint racing boats.

Paddle shaft: for all the participants which can be a piece of wood, bamboo, plastic tube etc. at length approx: 110 cm for kayaking and 130cm for canoeing
Life jackets
Rescue boat with engine

1.2 Competency Statements

The certified coach of the Level 2 Coaching Course shall be able to:

- compare his athlete's level with the international standard
- construct a yearly training plan and individual session plans for training
- conduct safety and rescue procedures
- demonstrate the technique of kayak and canoe in suitable conditions
- teach the advanced technique for both kayak and canoe
- plan and conduct physical conditioning training
- able to produce training programmes for endurance and speed development
- able to plan and conduct strength development training for maximum force and strength endurance
- prepare athletes for high level competition

Overview of the Level 2 Coaches Course

Chapter Name	Unit Content	Delivery strategies	Nominal Duration
Introducing the course	Targets, administration, operation, requirements	Theory	2 Hour
The required abilities in canoeing	The principal abilities, which determines success The Characteristics of an elite athletes Trends of athlete training	Theory	2 Hour

	methods		
Safety and rescue	Equipment, personal safety, injury prevention and treatment and rescue methods	Theory and Practice	1 Hour 1 Hour
Introducing technique	Hydrodynamics Common points of kayak and canoe technique	Theory	4 Hour
The technique of Kayaking	Position, balance, strokes Advanced technique, power circles	Theory Practice	3 Hour 5 Hour
The technique of canoe and Team Boats	Position, balance, power-transmission, effects of wind Specifics of Team Boats	Theory Practice	3 Hour 5 Hour
Teaching of technique	Introducing the step by step system	Theory	1 Hour
Physiology	The Circulatory and respiratory system; energy supply and Nutrition	Theory	3 Hour
Physical Conditioning I.	Endurance Endurance development,	Theory	1 Hour
Physical Conditioning II	Strength Strength development	Theory Practice	1 Hour 2 Hour
The Speed	Speed, Speed improvement and Pacing	Theory	2 Hour
Training and Training Methods Training intensity	Why training is necessary, Principle of training, Physiological effects Over training, Intensity and its measurement	Theory	2 Hour
Training Plan	Planning programmes Period training	Theory	2 Hour
200m distance	Specificity of the 200m distance and training requirements	Theory	2 Hour
The role of a Coach	Teaching skills and communication, coaching tools, methods and teaching beginners, tasks and pedagogy	Theory	2 Hour

Introducing to Racing	Race course, Racing rules Start and Finish The goals and principles of racing	Theory	1 Hour
Talent Identification	Identification of talented youth Safeguarding talent	Theory	2 Hour
DVD/Video	Technique analysis		2 Hour
Summary	Preparation for the examination	Theory	2 Hour
Examination	Written test Demonstration of technique		1 Hour 1 Hour
Evaluation of the course	Evaluation of the examination Questions and answers Closing	Theory	4 Hour

Total 60 hours: Theory 40 hrs, Practice14hrs, DVD 4hrs, Examinations 2hrs

CHAPTER 2
INTRODUCING CANOEING

2.1 THE HISTORY

Such as every sport the sport of canoeing has its own history origin. The historical development of canoeing and the used type of boats can be separated in three stages considering the purpose and the reason of their use:

- The use of canoe for living and fighting reason from 6000b.c to 18th century
- The use of canoe for transporting and recreational reasons 18th to 19th century
- The use of canoe for sport performance from the 19th century

The oldest proof of, a canoe and paddle was made of silver, more than six thousand years old, in the tomb of a Sumerian King on the banks of the Euphrates River. In those times, it was believed that the monarch would be able

to accomplish his last voyage along the river of Beyond. This tale is repeated in many cultures around the world.

Archaeologists have found Egyptian examples of vessels propelled by paddles 3 to 4000 years old.

In the Yucatan peninsula, canoes were depicted on a mural painting dating 1150 years before Christ.

In Guatemala bones were uncovered with engravings of canoes dating 700 years before Christ.

In literature, Christopher Columbus introduced the word “piragua” (Spanish for canoe) in Europe..

Origins of canoes can be found in all continents. In New Zealand there are the Maori War canoes), Asia there are Dragon Boats and other indigenous boats in India and Africa as well.

Fig 1 Pre- historic rock carving in Canada Lake Superior

Internationally, the word "canoeing" is often used as a collective term for both canoeing and kayaking, probably because a number of languages have no word for the kayak.

Campbell Mellis Douglas (CAN) built his first canoe called “Harmony” in 1864. Harmony remained in Lakefield at Northcotte, with the Douglas family until 2010 where it was placed in the care of the Canadian Canoe Museum.

However the first recorded kayak regatta in modern history was organised in England in 1715 the big increase in kayak touring and racing came in the 1890s. A Scot, John McGregor, often regarded as the father of modern kayaking built a wooden kayak (Rob Roy) which was 4 metres long, 75cm wide and weighed 30kg. (It is still in good condition in Eton’s Ship Museum) He travelled and introduced his kayak to France, Germany, Sweden and Palestine. After returning he organized the formation of the British Royal Canoe Club.

The first canoe club in the United States was organized under the name New York Canoe Club in 1871. Regarding some surcease the first kayak race in

Europe took place in 1862 in Budapest (Hungary) In 1885 the first kayak regatta for women was organised in Russia.
The 1st European Championships was held in Prague in 1933and the 1st World Championships was organised in Waxholm /Sweden in 1938
By the 1890s kayaking and canoeing popularity increased all over Europe.
Parallel to “flatwater” canoeing (recently calls Canoe Sprint) canoe slalom discipline also developed and the 1st Slalom competition was held in 1934.
After the turn of the century the construction and design of kayaks improved dramatically. By 1913, ten different kayak designs were being produced. Kayaking was used for recreational touring and for competitions. Evolution of different disciplines separated from canoe sprint such as slalom, wild-water, marathon, canoe polo, Ocean Racing and Dragon boat disciplines. More and more countries established canoeing Federations and joined the ICF. Also more and more canoe Clubs were established in the various countries. Canoeing went through major technological changes to allow for optimal comfort, speed and performance.

2.2 THE ORIGINS OF KAYAKING AND CANOEING

The word kayak (ki ak) means "man-boat” in Eskimo**. The kayak** originates from Greenland, where the Eskimos have been using it for hunting, fishing and travel for centuries. Kayak historically has been built using animal bones and skins. The paddler is seated, propelling it with a two-blade paddle, and steering the boat by means of a rudder controlled with the feet.
..
The English explorer Burrough, who travelled among the Siberian Samoyeds, described the kayak in 1556. James Cook, who wrote about the exploration of the Aleutian Islands in the 1790s, also mentioned the kayak as a practical means of travel.

Fig 2 The Eskimo boats; ancestor of the modern kayak.

Fig 3 Canadian Inuit kayak

The canoes are open boats built for trading, voyages and warfare, in all sizes and number of paddlers built using a variety of materials. Often used by the indigenous people of North America to cover great distances with their goods or to carry the mail, sometimes taking advantage of the quiet waters and in other occasions, conquering the aggressiveness of rapids and strong currents.

Papyrus reeds were used to construct the boats used by the Egyptians and tree the main material for the Polynen canoes and Indians used deer's skin and birch bark.

A Maori war canoe exhibited in New Zealand is 117 feet long (approx 36 metres) and was manned by 80 paddlers.

The paddler propels canoes with a single bladed paddle, and sits or rests over one or the two knees, having to steer the canoe by means of movements of his paddle, since it has no rudder.

Fig 4 Indonesian Stand Up racing

Fig 5 Peru , Lake Titicaca

Fig 6 Racing in the Amazonas

INDIAN CANOE RACE.

INDIAN SKETCHES.—Drawn by W. M. Cary.—[See Page 513.]

Fig 7American Indians 1847

Fig 8 West Siberia Ob river 1926

Fig 9 African boy in Dugout canoe

Fig 10 Aboriginal people paddle in bark boat - Australia

Fig 11 men made boat in Africa

2.3 THE ICF

The formation of the first international organisation for Canoeing and Kayaking, was inspired by the American W. Van B. Claussen. As a result of his work the International Representative Shaft Des Kanusport or “International Community of Canoeing Representatives” (IRK) was created by Denmark, Germany, Austria and Sweden. This was the origin of the International Canoe Federation. After World War II the IRK was replaced by the International Canoe Federation.

The International Canoe Federation was founded with the cooperation of 19 nations, in Copenhagen, Denmark, January 20, 1924.

Nowadays the International Canoe Federation includes 160 affiliated countries, from five Continents.
The ICF consists of member national federations, Continental Associations from the 5 continents, Committees for each disciplines, Board of Directors included the Executive members. The highest authority of the ICF is the Congress.
The ICF introduced the Canoeing Development Programme in 1988 and the Talent Identification Programme in 2008. In the frame of these programme the ICF support the developing federations by equipment, education and participation in Training Camps and main Events.

In 1924 at the Olympic Games in Paris canoe and kayak were included as demonstration events. At the next Olympics in Berlin, canoeing events became permanent. Since then Olympic Games Canoeing has been ever present in the Olympic programme.

W. P. Stephens wrote the first technical description of canoe, titled: ‘Canoe and Boat Building For Amateurs’ in the 1880s. He defined the canoe as a "Boat of long and narrow proportions, sharp at both ends and propelled by paddles held in the hand, without a fixed fulcrum, with the crew facing forward".

After the turn of the century the construction and design of kayaks improved dramatically. Alfred Hein Reich built the first "faltboat", the Dolphin, in 1904." Faltboat" describes a type of construction still used for recreational kayaks which consists of a rubberised canvas stretched over a wooden framework, which can be taken apart and reassembled with ease. In 1906, Hans Klepper started the large-scale manufacture of "faltboats" in Germany. The first kayak with a rigid hull and canvas deck, named Rodny was built exclusively for racing in Sweden in 1910. By 1913, ten different kayak designs were described in the first authoritive book on the subject ‘the Kenufurer’ written by Alfred Korn. Commercially built canoes followed the same design principles: canvas stretched over wooden framework, followed by solid lamination. The introduction of aluminium considerably boosted the durability of lightweight canoes at the end of the First World War

Mr. Gregor Hradetczky (AUT) was the first Olympic Champion in K1 1000m men with a time of 4:22.9 while in C1 Francis Amyot (CAN) in 5:32.

The first European Championships were hold in Prague Czech Republic in 1933. The 1st World Championships were organized in Waxholm (SWE) where the winners in the single boats were:

K1 men 1000m Karl Widmark (SWE) 5:03
C1 men 1000m Otto Neumuller (GER) 6:45
K1 women 600m Maggie Kalka (FIN) 3:26

The International Canoe Federation oversaw several types of canoe and kayak racing events at the 1948 Olympic Games, in London. Kayak races in post war Olympic Games and World Championships were dominated by Sweden, Denmark, Finland and Czechoslovakia. Since the World Championships in 1954, Russia, Hungary, Rumania, East Germany and Bulgaria become the most successful countries in international competitions.

However Poland, Great Britain, New Zealand, USA, Australia and other countries in the 80-90s have made notable gains such as Norway, Sweden, Spain, France, Portugal, Finland and China.
Now dominating the sport are talented athletes from many different countries.

The most successful paddlers of the Canoeing history are:

Kayak men: **Gert Frederickson (SWE) (6 Olympic Gold Medal)**
Canoe men: **Ivan Patzaichin (ROM) (6 Olympic Gold Medal)**
Kayak women: **Birgit Fischer (GER)** (**8 Olympic Gold Medal)**

Birgit Fischer is the most successful athlete in Canoeing but also among the best athletes in the all sports by winning 8 Olympic Gold and 29 World Championships not mentioning her numerous other silver and bronze medals.

More recently **Katalin Kovacs (HUN),** has won 3 Olympic Gold Medals and 32 World Championship titles in women's kayaking.

Fig11: Ivan Patzaichin (Romania)

Fig 13 Birgit Fisher 8 times Olympic Champion

Fig 14 Katalin Kovacs HUN 3 times Olympic Champion and 33 times World Champion

The most important international canoeing competitions are:

-The Olympic Games: 12 Canoe Sprint and 4 Canoe Slalom events on the programme
- The Youth Olympic Games since 2010 with 8 special events

-The World Championships annually except in the Olympic year
-The World Junior Championships every year (15 – 18 Years of age Under 23 World Championships every year since 2012
- Continental & Regional Games and Championships
- World Cups, 3 events per every year
- Paralympics (Paracanoeing events including Paralympics from 2016

2.4 DISCIPLINES OF CANOEING

The highest honour of Canoe Sprint is to win the Olympic Games. Then there are World Championships, World Cups, Continental & Regional Games, and National Championships.
The sport of canoeing consists of different types of boats propelled by single or double bladed paddles with no fulcrum to the boat in a number of disciplines. The paddler(s) are facing toward in the direction of travelling.

Canoeing disciplines belonging to the International Canoe Federation (ICF) are:

Canoe Sprint (included Paracanoeing)
Canoe Slalom

Canoe Marathon
Wildwater Racing
Canoe Freestyle
Canoe Polo
Dragon Boat Racing
Ocean Racing
Va'a (outriggger) – associate member
Wave ski – associate member

Brief introduction of the main Canoeing disciplines:

Canoe Sprint

In Canoe Sprint events, paddlers race on a straight course in lanes separated by markers over 200m 500m and 1,000 meter distances for both Canoe and Kayak. The aim is to cross the line first by paddling the complete distance at the higher possible speed.

The Youth Olympic Games has a special course and competition format. The description of that can be found in Chapter 27.

Paracanoeing became an official category in canoeing in 2010. Four to eight events will be included in the Paralympics from 2016. Paracanoe gives opportunities for paddlers with physical disabilities to participate and compete at club, national and international levels. Working on the development of the sport for over four years, the ICF has improved and expanded the sport significantly and more and more athletes are competing and enjoying Paracanoe around the world.

Canoe Slalom

Rough waters are the mains feature in Canoe Slalom events. Recently artificial slalom courses exist and the main competition are held on these courses as the conditions are more controlled and predictable.
In Slalom the paddler has to negotiate the rapids as well as the gates that are set up on the course. The course is between 200 and 300m in length. To touch or miss one or more gates incurs a penalty that will be added to the time taken by the competitor to complete the course.

The paddlers start individually at time intervals and must complete the course in the minimum time possible, without penalties. If they touch one or both poles of any gate, a 2 seconds penalty is added. Not passing through a gate or passing it incorrectly receives a penalty of 50 seconds added to that time of the run.

The actual history of Canoe Slalom started in 1932 following the ski slalom in summer times on water. The first Canoe Slalom World Championships were organised in Switzerland in 1949. Slalom Events were held in Olympic Games for

the first time in Munich in 1972 then reappeared from the Olympic Games in Barcelona 1992. There are five Canoe Slalom events in Canoe Slalom.
These are K1 – C1 men and women and C2 men events.

Wildwater Canoeing

Descent is yet another way of enjoying the scenic possibilities of canoeing. The courses vary in length and offer an assortment of natural obstacles. In the Wildwater discipline, the only obstacles are those posed by the river. The skill of the competitors is constantly put to the test in these races.K-1 events are held for both women and men, while the C 1 and C 2 events are reserved for men. There are two distances the 3 Classic and the 3 Sprint events.

The distance of the Sprint events are between 400 and 800 meters while Classical course must be approximately 30 minutes in duration.
The starting process in Wildwater is similar to Slalom with individuals starting at intervals.
The first Wildwater World Championships were organised in France in1959.

Canoe Marathon

Canoeing over long distances has been known as long as Canoeing has been a sport. Long distances races were organised in many countries all over the world a long time ago but the first Canoe Marathon World Championships was held in 1988. Since then the discipline has progressed and being practiced around the world on all the continents and in more then 50 countries. The excitement of a marathon race particularly during the portages makes it an important discipline of the ICF and Canoeing World.

The distance of the races takes approximately 2.5 to3 hours of paddling for seniors whilst for juniors the races are 1.5 hours long and about 18-22 km. A minimum of two portages where all competitors shall disembark in a defined area carry their boats along the portage and re-embark in a defined area.

The Marathon categories are K 1, K 2, C 1, C 2.

Canoe Polo

Canoe Polo is a spectacular sport in which pits two teams against each other to score with a ball in each other's goal on a marked water pitch. It is a cross between basketball and water polo in boats.

The roots of Canoe Polo can be found in the other disciplines of Canoeing. In the thirties, European countries started sitting in a kayak and throwing a ball to each other. These plays became a spectacular and exciting ball game with more formal rules applied. A team consists of five players one of them is the goal tender. The Polo kayaks are 3m in length and the front and back of the boats are supplied with protection material so to avoid personal injury and equipment damage.

The ideal playing area has a length of 35 metres and the width of 23 metres. The goals measure 1,5 m X 1m and are suspended at a height of 2 meters measured from the water surface.

Dragon Boat

Ancient China used Dragon Boats for religious purposes since 278BC. Dragons have a symbolic meaning for the Chinese. A classic dragon has the head of an ox, the antler of a deer, the mane of a horse, the body of a python, the claws of a hawk and the fins and tail of a fish. Through his strength and power he can ride on clouds and command both the wind and rain. Dragon Boats are designed to resemble these creatures. The bow is crafted as a dragon head while the stern resembles the tail. The hull is painted with scales and the paddles symbolically represent the claws.

With at least two boats competing against each other over various distances, not only are strength, endurance, courage and skill important, but unity, harmony and team spirit are as well. This all becomes apparent when everybody in the boat paddles to the rhythm of the drum. With its strong visual impact, Dragon Boat is a superb spectator sport.

Dragon Boat a global canoe discipline at competitive, festival and recreational levels. The long boats have 20 paddlers while the shorter modern version is paddled with 10 people. In addition both boats have a drummer and helmsman. The craft is often decorated with a dragon head and tail.

Canoe Freestyle

This white water discipline belongs to the extreme sports category. The discipline involves the athlete leaping into a large wave behind rapids in wild water.. Athletes perform a range of acrobatic tricks and show their skills by manoeuvring the boat in the wave for 45 seconds. The moves are scored by judges. The winner is the one with the most accumulated points. There is a K1, C1, Open C1 class and Squirt Class. . *Combined moves add greater scores.*

Canoe Ocean Racing

Ocean Racing is the latest discipline to fall under the ICFs mandate. This exhilarating sport encompasses long distance Surfski, Sea Kayak and Sea Touring races and its athletes are among the fittest of the Canoe World, requiring endurance and navigational skills as well as other ocean-going expertise.

A marriage of kayak technique and speed, Ocean Racing is an ideal meeting place for athletes of all Canoe disciplines. Indeed, some of the most successful Ocean paddlers are well-established Canoe Marathon or Canoe

Sprint athletes. That's not to say there are no specialized Ocean Racing athletes out there too. An extremely popular sport in warm coastal regions, such as Australia, USA (California and Hawaii), the Mediterranean and South Africa

2.5 THE DEFINITION OF CANOE SPRINT DISCIPLINE (CSP)

Canoeing is a technical isokinetic, dynamic sport that involves symmetric (kayak) or asymmetric (canoe) rhythmical movements.
Sprint Canoeing is among the endurance type of sports but requires great strength and efficient technique according to the distances paddled. The target of Canoe Sprint Racing is the highest possible seed on the given racing distance. Canoeing is a common name of two types of distinct categories: Kayak and Canoe.

CHAPTER 3
THE DETERMINING ABILITIES IN CANOEING

INTRODUCTION

All sports require certain characteristic abilities from the athletes, which are essential for their success.

Canoe/kayak is a sport that requires coordinated action between the paddler (athlete), the paddle as the propulsion tool, the boat as the vehicle providing buoyancy and the water as the medium of transportation.

Canoeing also requires a well-conditioned body able to operate at a high performance level, both during training and during competitions.

The best canoe/kayak athletes are incredibly fit with a great capacity to deliver oxygen to their muscles and are very strong relative to their body weight. Athletes paddle with efficient technique to maximise boat speed and distance.

Performance is basing on the physical condition of the athlete, his/her technique and mental ability to adapt to the racing conditions.

3.1 DETERMINING ABILITIES IN SPRINT CANOEING

The simple factors which are essential for successful performance in Canoeing are:

- **EFFICIENT PADDLING TECHNIQUE with adequate stroke rate acceptable for the distance and speed required**
- **ENDURANCE (aerobic; anaerobic) note: keep same terminology from first book...**
- **MUSCULAR STRENGTH (maximum, explosive and endurance)**
- **SPEED (maximum speed and constant speed endurance)**
- **"WINNER" PSYCHOLOGY**

IF ONE OF THE ABOVE LISTED ABILITIES IS POOR GREAT SUCCESS IS IMPOSSIBLE!

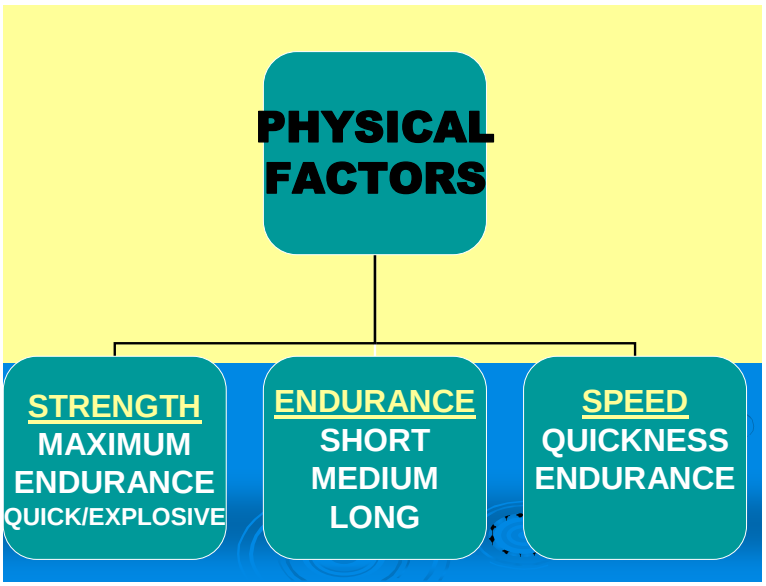
The high level competitive paddler requires a well developed physical condition, excellent technique and robust mental strength. The levels of these determine the athletes' potential performance and results.

Table 1. The determining factors of athletes abilities in canoeing

PHYSICALITY	PHYSIOLOGY	TECHNIQUE	MENTAL POWER
Endurance	Circulator system	Adequate	Will power
Muscular strength	Energy supply	Efficient	Competitive Toughness
Quickness	Lactate tolerance	Proper stroke rate	Passion to canoeing
Morphology			Ability to learn

In addition to the athletes individual genetic and trained abilities the equipment (type, size, weights and condition) also influence the speed of the boat and hence the performance.

Table 2. The physical factors that influence the speed and performance:



In order to develop the speed of the boat therefore the performance level of the athlete all the listed abilities should be considered and improved by

TRAINING!

Table 3 Factors of sport performance:

FACTORS OF SPORT PERFORMANCE

CIRCULATORY SYSTEM	VO CAPACITY, TRESHOLD OF LA LEVEL
PARAMET AVERAGE	VO2: 63, LA MAX: 15, HTK: 0,45% HEART RATE: 187/min
BODY COMPOSITION %	MUSCLE 48,3; FAT 9; BONE 17; RESIDIUM 25,7
BLOOD COMPOSITION	VOLUME OF Hemoglobin
MOTORIC CARACTERS	ABILITY OF LEARNING AND ADAPTATION
PSYCHOLOGY	WILL POWER, MOTIVATION,

3. 2 The performance determined by some elite athletes and coaches

The advice of Arne Nilsson Denmark Olympic and several times World Champion Canoe Sprint says that the key factors involved in the preparation of the success of competitors in canoeing are:

- Defined and well-structured training systems and programmes;
-Controls of training effects; (by testing)

- Measurement of Improvements in training effects
-Technique development/maintenance to obtain the maximum speed;
- Psychological training;

Requirement for successful performance:

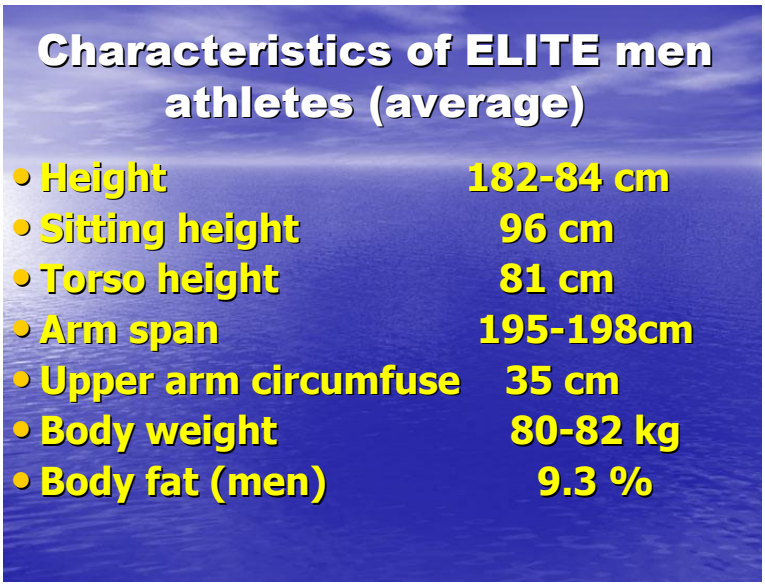
-High endurance capacity
-High speed ability
-Ability to explode from the start line
-Maintain high speed (speed endurance)
-Proper pacing due to distance

3.3 THE PHYSICAL CHARACTERISTICS OF ELITE ATHLETES

The physique of world-class kayakers and canoeists varies considerably. There have been world champions 170 cm (5'7") tall, while some have reached 200cm (6'8")in height. Some World Champions have the capacity to bench press is 160kg whilst others only manage 80kg. Canoeing has World Champions at 19 years old but also at 46.

It is revealing that height or muscular strength is not the dominant factors determining performance. Perhaps the only common feature these paddlers have is the pronounced athletic build: broad shoulders well developed muscles, strong trunk, long arms and relatively slender legs. Thus, we favour athletes with strong upper body, long arms and great fitness. Success is further determined by an efficient technique, strength, endurance and circulatory system, coupled with a positive psychological outlook.

The average statistics of elite Canoeists are:



3.2.1 HEIGHT AND BODY FRAME

In general it is an advantage if a paddler is tall but it's only one of the factors of all the necessary abilities for success.

Measurements of the athletes' body size are often completed to determine the "ideal" body frame for paddlers. This data is gathered by coaches and researchers during major world-class races.

Body frame measurements mainly deal with the specific parts of the body associated with canoeing technique and arm relationship..

3.2.2 AGE

Age is an indicator of physical and mental maturity of an individual. Many international sports competitions are classed by age. But the definition of a youth or junior athlete by age is not uniform because of the physical and mental activity which each particular sport is based on. For example, swimmers or artistic gymnasts are generally younger than athletes of other sports while the average age of the bob racers or archery athletes are much older.

Exceptionally, the Swedish paddler, Gert Frederickson, who holds the record of having obtained, six gold medals in Olympic Games, five of them in K-1, between 1948 and 1960, the last when he was 45 years old. The International Olympic Committee awarded him, in 1956, the "Trophy Mohamed Taher", in recognition for his sporting career.

Another outstanding case is Birgit Fisher the most successful paddler ever. She won her 7th Gold medal in Athens at the age of 40. Another Olympic and World

Champion Josepha Idem (ITA) won Silver Medal at the Olympic Games Beijing at age 44. Both of them were mothers of two children.

The next table shows the height - weight and age statistics in Olympiads:

AGE – HEIGHT - WEIGHT

Year	MEN KAYAK			MEN CANOE			WOMEN KAYAK		
Olympics	AGE	cm	Kg	AGE	cm	kg	AGE	cm	kg
2000	25,8	184	81.2	27.2	182.5	81.1	25.8	171	65
2004	25.7	185	84.1	26.5	179.8	80.8	25.7	171.4	67.2
2008	25.9	185.2	86.4	27.5	180.7	81.9	25.9	172.6	66.3

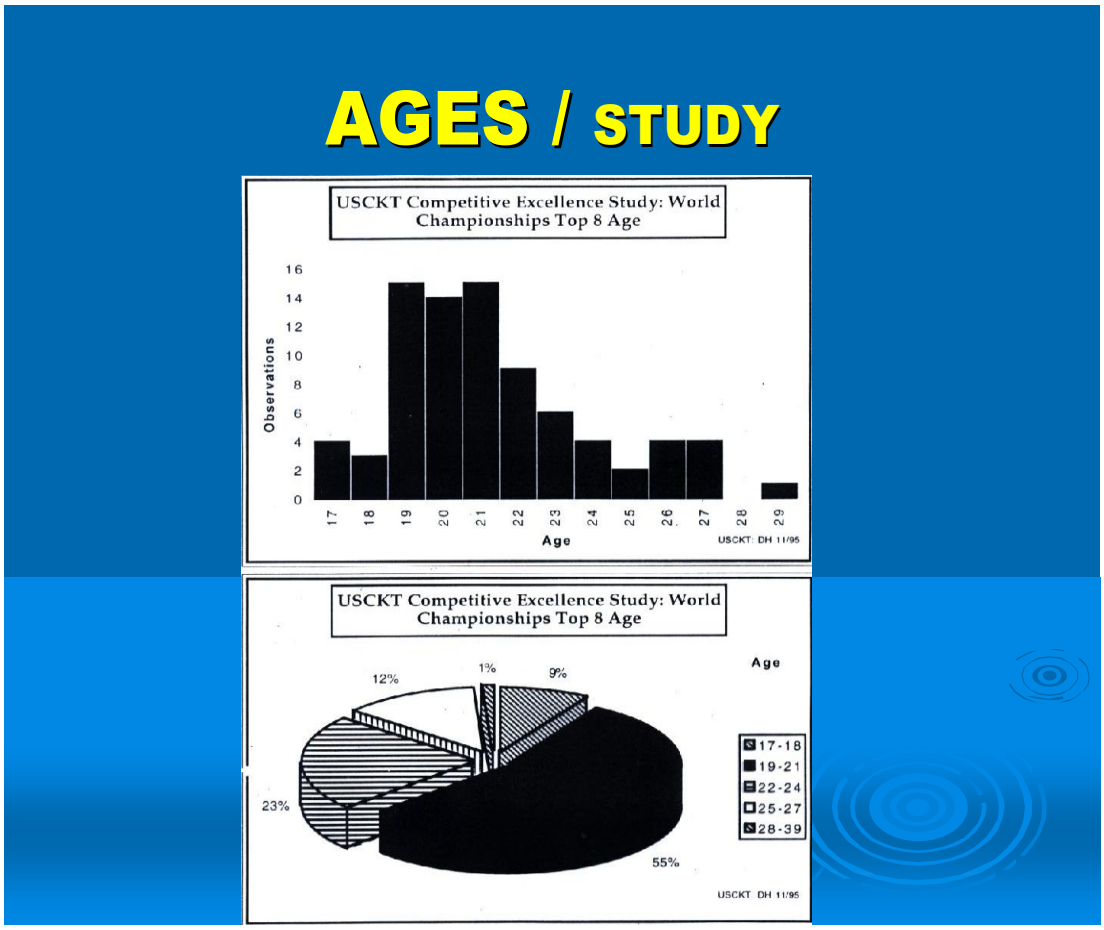
AGE, HEIGHT and WEIGHT STATISTICS

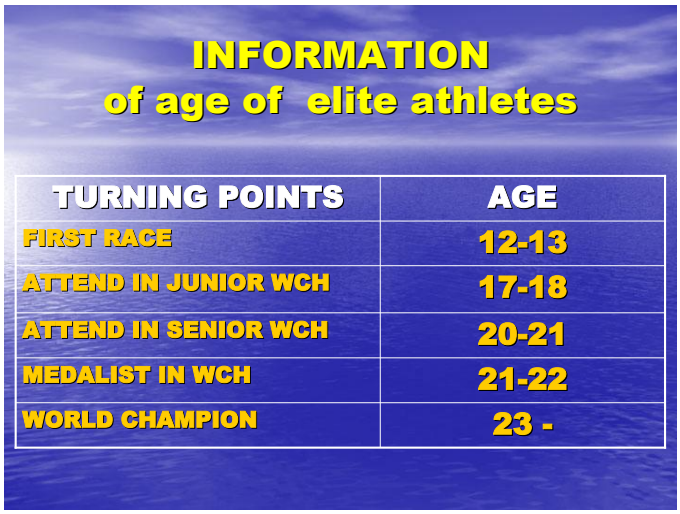
of the athletes participated for Flatwater Canoeing in the Olympic Games Sydney 2000 and Atlanta 1996

	EVENT	AGE				HEIGHT				WEIGHT			
		ALL ATHLETES		MEDALIST		ALL ATHLETES		MEDALIST		ALL ATHLETES		MEDALIST	
		1996	2000	1996	2000	1996	2000	1996	2000	1996	2000	1996	2000
MEN	K1	25,6	25,5	26,5	27	184,2	184,6	189	190,6	82,9	83,5	87	89,7
	K2	25,5	25,8	28	25,3	183,9	184,6	185,4	184,5	83,9	84,1	86,5	86,1
	K4	26,1	26,5	27,7	25,7	186,8	186,5	190,2	188,25	85,5	85,4	87,9	84,2
	C1	26,6	27,4	26	27,5	180,4	181,5	181,2	181,3	81,8	83,2	87,2	82
	C2	26,3	27,7	26	27,8	179,2	179,8	178,2	182,8	79,8	80,6	80,2	82,9
WOMEN	K1	25,3	26	30	32,6	171,7	171,9	175	175,3	67	65,1	68,3	69
	K2	26,7	26,6	32	25,8	171,4	171,6	173	170,2	66,8	65,8	67,2	67,8
	K4	25,12	25,8	28,08	26,5	171,2	172,2	170,6	174,8	67,7	68,1	68,3	70,4

The dates from two Olympic Games did not show significant differences.

The following table show the results of a study concerning the age of 70 world level athletes. The conclusion showed that the successful paddlers started in canoeing between ages of 12 and 13 and the majority (55 %) of the participants in World Championships are between 19 and21 years of age.





Consequently **the recommended age to start Canoeing is between 10 and 12 years of age but realistically should be before 14 years of age.**
However, there are a number of examples of World and Olympic medallists taking to canoeing later in life. Generally these are exceptional athletes with a background in other sport. People such as, Kenny Wallace (AUS) or Ian

Fergusson (NZL), 4 times Olympic Gold medallist then his son began kayaking aged 18 who grew up using Ocean Racing, lifesaving, surfing etc. Here we also state that the height, weights or physical characteristics itself does not determine the athlete potential in canoeing.

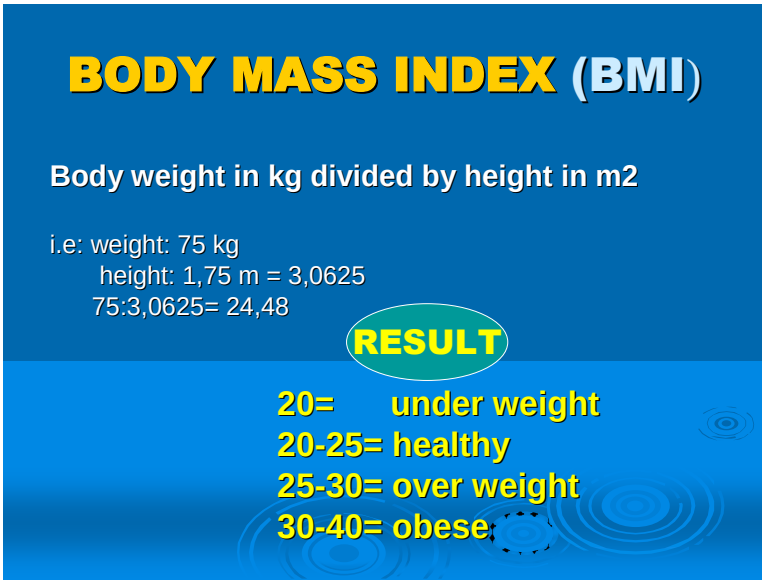
The psychological characteristics of the athlete strongly affect their performance in competition but also their training.

3.2.3 WEIGHT AND BODY COMPOSITION

Weight is a basic measurement.. However, total body weight is not a true indication of an individual's muscle mass so placing emphasis on this measurement alone should be done sparingly.

Weight is compared to height ratio (Body Mass Index) and composition of the body to determine lean body weight is a good indicator of fitness. Lean body weight is determined by subtracting body fat from total body weight. The measurement is used to determine percentage body fat and calculates the relationship of body fat to total body weight.

The percentage of body fat is often related to a specific sport. For canoeing body fat ratios are approximately 7 % to 10 % for men and 10% to 14% for women. Once an ideal weight is established for an athlete, nutrition and weight control can be used to maintain the correct weight and keep percent body fat at a level conducive for high-level competition. Sudden body weight loss during heavy training usually indicates over training.



The next table is based on a survey of high level athletes and shows the main factors for physical performance of elite athletes in canoeing:

3.2.4 PHYSICAL ABILITIES

Canoeing requires a large proportion of muscular strength besides endurance and speed.

Some available test examples of elite athletes prove this fact:
:

PHYSICAL TEST RESULTS OF ELITE ATHLETES

TEST		C1	C1	K1m	K1M	K1 w	K1 W
MAXIMUM STRENGTH	BENCH PRESS	160kg	155 kg	135 kg	140 kg	85 kg	85 kg
	BENCH ROW	135 kg	125 kg	135 kg	125 kg	83 kg	85 kg
ENDURANCE	COOPER TEST	3750m	3300m	3300m	3200m	3000 m	3050 m
	2000M PADDLING	09:00	08:31	08:10	08:06	08:55	08:48
	400M RUNNING	58 sec	01:03	60 sec	57 sec	01:10	01:08
SPEED	100M CRAWL	65sec	01:08	01:08	60 sec	01:20	01:15
	200M PADDLING	40sec	41 sec	37 sec	37:5 sec	41 sec	42 sec
SPEED ENDURANCE	1200M RUNNING	03:20	03:50	03:50	04:00	04:20	04:18
	1000M PADDLING	03:58	03:55	03:35	03:33	04:02	04:05

Physical Parameter testing 16 years old athletes in National teams with 4 year experience

CATEGORY	Paddling		Bench press maximum in kg	Running Men 1500m Women 800m
	2000m	100m		
Kayak men	9'00 - 10'30"	19"9 – 23"2	60 – 100	4'26 – 6'08"
Canoeists	9'50 - 11'30"	23"8 – 28"	60 – 100	4'26 – 6'12"
women	10'00-11'40"	23"5 – 28"	42 – 75	2'35 – 3'25"

Physical Tests of athletes at age of 9 to 18 in Hungary

CANOE / KAYAK BOYS PHYSICAL TEST HUNGARY 2004 (377 persons)

TEST	RANK	AGE 9	10	11	12	13	14	15	16	17	18
PULL UP'S 1´min	1	20	26	25	24	37	35	34	36	42	39
	2	14	25	25	24	31	30	32	36	38	36
	3	8	24	24	23	30	30	32	35	38	35
	4	5	23	24	23	28	29	31	34	37	34
	last	4	2	1	1	2	1	19	17	19	24
LEG UP`S 1´min	1	57	59	58	55	34	34	34	35	38	40
	2	54	55	57	54	26	34	33	33	37	33
	3	48	53	53	54	26	30	32	32	33	30
	4	42	51	52	51	25	29	31	31	32	27
	last	37	36	31	8	2	1	8	4	4	18
BENCH PRESS 40 KG 1´min	1	0	0	0	0	0	0	54	71	81	86
	2	0	0	0	0	0	0	41	62	81	79
	3	0	0	0	0	0	0	38	59	78	78
	4	0	0	0	0	0	0	37	59	78	69
	last	0	0	0	0	0	0	12	34	32	55
Cooper test	1	X	X	X	X	X	X	3338	3475	3483	3485
	last	x	X	X	X	x	x	2440	2000	2720	3090

CANOE / KAYAK GIRLS PHYSICAL TEST HUNGARY 2004

TEST	RANK	AGE 9	10	11	12	13	14	15	16	17	18
PUL UP'S 1`min	1	27	23	30	23	31	30	32	30	33	34
	2	12	21	30	23	26	27	30	26	29	32
	3	13	17	29	22	25	25	28	26	27	31
	4	10	8	26	20	24	24	27	24	26	29
	last	0	8	11	0	5	7	2	7	18	13
LEG UP`S 1`min	1	57	50	61	53	29	28	29	35	36	36
	2	46	49	58	52	26	24	27	32	28	33
	3	38	26	57	50	26	22	27	26	28	31
	4	54	21	54	47	19	21	27	26	23	29
	last	32	21	26	21	1	7	2	7	4	12
BENCH PRESS 30kg	1	0	0	0	0	0	0	59	72	74	86
	2	0	0	0	0	0	0	54	62	69	85
	3	0	0	0	0	0	0	43	56	66	79
	4	0	0	0	0	0	0	40	56	65	78
	last	0	0	0	0	0	0	14	17	25	28
Cooper test	1	X	X	X	X	X	2820	3005	2905	3080	2995
	2	X	X	X	X	X	2798	2949	2890	3080	2930
	3	X	X	X	X	X	2795	2840	2845	2820	2920

According to evidence of athlete comparing performance the following table shows the physical level requirements of canoeists at young age.

PHYSICAL REQUIREMENTS, BOYS
(MINIMUM)

AGE	SIT UP`S Max (1 min)	PULL UP`S Max (1 min)	COOPER TEST meter	300m SWIMMING
11	20	3	1600m	8:30
12	25	5	1950m	8:00
13	30	10	2100m	7:30
14	35	15	2300m	7:00
15	38	20	2550m	6:30
16	40	25	2800m	6:00

3.2 THE PSYCHOLOGICAL PROFILE OF ELITE ATHLETES

The psychological characteristics of the athletes are strongly effects their performance in competition but also in training.

The Characteristics of Elite athletes:

- High level of confidence
- Optimism
- Mental toughness
- Highly competitive
- Control anxiety
- Good adaptation abilities for the environment
- Set and achieve real goals

CHAPTER 4

SAFETY AND RESQUE

INTRODUCTION

Water Safety and Rescue was described in the Coaching Manual Level 1 the importance of this subject requires some addition explanation.

Water can pose a potential danger to those who are not sufficiently versed in safe paddling practices and the technique of rescue. Here are some of the important aspects of personal safety.

Since Canoeing is a sport that is performed in an environment that is not controlled and is predominately natural the safety measures must be adhered to at all times to avoid accidents.

The safety philosophy and activation should start from the moment a Canoeing activity is being planned.

Novice paddlers must always go out paddling under the close supervision of a coach or in the company of more experienced paddlers, who can help in case of emergency.

4.1 WATER DIFFICULTIES

Any area if water can be apt for the practice of Canoeing. These range from a covered swimming pool where the basic techniques can be learnt and practised in relative safety to the most turbulent rivers or the ocean.

The following is the international standard table of degrees of difficulties for water difficulties. The definition of difficulties might differ slightly from one National Federation to another. Paddling in Canoe Sprint racing boats is recommended only on Class I water.

Class I. Easy. Calm waters, no difficulty for navigation.

Class II. Minor difficulties, with currents, small weirs and rapids. Not apt for racing boats. Use of helmet and life jacket recommended.

Class III: Difficult navigation. Starting with this class, the use of helmet and life jacket is mandatory. Here are quick currents, strong rapids that require good control of the boat, not suitable for racing boats.

Class IV: Very difficult, but without hazards for trained boaters. Dangerous for racing boats. It is mandatory to use life-jacket and helmet.

Class V: Extremely difficult navigation. White-water. Dangerous. Only suitable for paddlers with extensive experience, trained and fit. Usage of life jacket and helmet are mandatory.

Class VI: Not passable. No possibility of navigation.

4.3 PERSONAL SAFETY

You must be able to swim! You need not be a fast swimmer but a confident one who will not panic in unexpected situations (e.g. Cold water). Your ability to swim can make the difference between a minor mishap or a tragedy.

Using a life jacket or vest while paddling gives more safety and confidence for paddlers!

Other requirements:

- Be familiar with the water
- Make sure you know the approximate depth of the water throughout your course. Shallow spots can damage your boat and paddle, or may cause you to capsize.
- Make sure your course is free of turbulence, eddies, sudden rapids, drops, unforeseen dams, submerged obstacles /rocks, stumps or other debris/ or logjams.
- Be familiar to areas good for landing if you must stop for emergency reasons, especially if you paddle on a long course that takes you far away from your starting point.
- Paddle in daylight only. In the dark you are heading for danger, even on water familiar to you. Floating obstacles and powerboats can cause catastrophe. Reflected or flickering light can play tricks on your sense of balance in the dark making paddling hazardous or impossible.
- Do not train in severe cold, intense heat, thunderstorms or in heavy rain. Heat exhaustion is a more frequent occurrence among paddlers than hypothermia. It is the result of excessive water loss of the body. When the environmental temperature exceeds 29-32ºC (83-90ºF) water loss occurs mostly through heavy sweating, which the body's protective mechanism to excessive is heating. When sweating dissipates more water than the body can furnish, dehydration, heat stroke, convulsion, and even kidney failure will occur. The use of salt tablets for the effective prevention of dehydration has been repudiated in recent years. Acute and prolonged exposure to the sunlight causes sunburn and sometimes serious damage to blood vessels. Always wear light protective clothing in strong sunlight.

The following table shows the effect of water temperature on the body:

Water temperature:	unconsciousness occurs in:
0ºC (32.0ºF)	less than 15 minutes
0-4.4ºC (32-40ºF)	15-30 minutes
4.4-10ºC (40 50ºF)	30-60 minutes
10-15.5ºC (50-60ºF)	1-2 hours

These times are further lessened if you attempt to swim in cold water.
A simple technique can extend your survival time by 35-65% depending on how you are dressed. It consists of curling up in a fatal position and keeping your head and neck above water as much as possible.

Wear sensible clothing when paddling. Dressing right for paddling does not imply an aesthetically appealing attire, although it looks nice, but rather a practical outfit which is right for the season, the time of day, and the duration and intensity of your paddling. The paddlers' clothing serves one main purpose, which is protection from exposure, whether cold or heat.

The outcome of a training session or a marathon can depend on the clothing you wear. This, of course, is especially true in climatic extremes, and in times of changing temperature. As a general rule, always wear clothing, which is soft, comfortable, lightweight, and porous, permitting perspiration without condensation inside. For kayaks spray decks over the cockpit also retains body heat and keeps the cold out.

It is also highly recommended to wear a life vest or jacket for children and beginners.

4.5 RESCUE

As racing boats are very unstable, learning basic balance requires a few weeks/month of practice. During this time, and once in a while thereafter, your athletes will capsize and a rescue will need to be performed. Coaches should teach their beginners that capsizing is a normal part of learning the sport and is not embarrassing. By following instructions and procedures and with proper management, rescues can be conducted safely and without danger or risk to paddlers or equipment.

4.5.1 Self rescue

When paddlers lose their balance and bracing is not effective they fall out of their boat. Canoes generally remain upright while kayaks usually tip upside down. The first step in any rescue is for the paddler to stay with the boat and make sure it is the right side up. The sooner this is accomplished, the less water will get into the boat.

The standard of any rescue should be that the paddler(s) stays with the boat, holds it so as to keep more water from getting inside, puts the paddle(s) into the boat and remains calm. In case of standard kayak the trapped air keeps most of the water out, usually only a small amount of water enters the boat. However, if a kayak or canoe is constructed where it is entirely open inside when in a capsized position it can fill with water. This makes righting of the boat difficult and the boat will be very heavy. After righting the boat put the paddle in it and holds either the bow or the stern of the boat and swim ashore with powerful leg kicks.

A key to self-rescue is to paddle close to shore in the first place so if the boat does capsize the swimming distance is very short. Very important that you constantly remain with the boat as it is a floating devise especially if you must swim a long distance. The boat will help keep you afloat! The canoe or kayak should be pointed towards the shore, as it is very difficult to push sideways.

When you reach the shallows or the shore (bank) or a pontoon you must keep the boat in the water in the upright position that you are facing with the bow of the boat and follow the procedure for emptying the boat:

Push down the bow until the water collects there. Then you suddenly rise up and twist it over so that the water drains out through the cockpit or goes to the rear. Repeat this until most of the water is bailed out. It is important to remember that a fully or even partially swamped boat should never be lifted out of the water, since it will break under the weight of the trapped water.

Some paddlers with good skill and practice are able to climb back into a capsized racing boat in the water (if its not full of water therefore not semi submerged) but the boat could easily be damaged. This practice is not recommended.
This practice is much easier if there is another boat which can help the troubled paddler to gain support and balance whilst bailing or re-entering the boat.

4.5.2 Assisted rescue

The easiest and safest way to perform a rescue is from a small motorboat operated by the coach. The coach should approach the paddler in the water slowly and carefully, and come parallel to the capsized boat about a half-meter away. With the engine stopped and the propeller still, have the paddler swim the last half-meter to the motorboat. The paddler in the water is safest if he/she is at an end (bow or stern) of the capsized canoe or kayak. Avoid positioning the paddler between the motorboat and the capsized boat, especially in rough conditions. Also keep the swimmer towards the front of the motorboat and away from the propeller. Once the paddler grabs hold of the motorboat help him get into the motorboat, dump out the water and get him back into the canoe or kayak or drag the boat back to shore by motorboat.
Experienced paddlers in his or her own racing boat can often help a capsized paddler back into their boat. By holding the two boats parallel and bracing across the two boats with a paddle, the experienced paddler can form a raft with enough stability that the capsized boat can be put back on the water and the athlete can re-enter the boat to continue paddling.

Coaches working with children and beginners will be assessed in their safety and rescue skills as part of their training

Coach's duty:

- Regardless of whether is working from the bank or from a boat their attention for the safety is always essential!
- The positioning of the coach during a training is critical for observation and action of rescue
- To ensure that all reasonable steps are taken to ensure safety of any person involved in training activity

CHAPTER 5

BRIEF INFORMATION ON EQUIPMENT

INTRODUCTION

The two essential technical equipment in Canoeing are the boats and the paddles.

The different canoe disciplines require different type of boats (e.g. shape, size, form) to perform efficiently in different water conditions. There are different type of canoes and kayaks for Canoe sprint, Canoe slalom, Canoe freestyle, Ocean racing etc"

Kayak / canoe sprint boats have an extensive history of development. Before the ICF made restrictions on boats in 1948 the boats were all designed differently in terms of, length, beams and weight. To create fairness the ICF instigated a strict limit on kayaks and canoes which could be used officially in its competitions. Those measurements did not give a large possibility for design variance however several types of boats were designed and built within the given standards.

The main reason for new boat design has always been the - to achieve some speed advantage over other boats. Due to this aim boats have become more U then V shaped in terms of their hull. They are lower and narrower taking the widest required point of beam further from the bow of the boat. This also allows flexibility to design suitable boats for each paddler tailored to their weight, height, power, paddling style and balance. Boats are fundamentally designed to the weight of the paddler. Light weight (65-75 kg); heavy weight (75-85kg) and super heavy weight for athletes over 85-90kg.

Most top paddlers have custom made boats. The best producers invest heavily into equipment development using the latest computer technology and testing the new designs with athletes. There are "tailor made" individual designed boats for elite athletes in accordance with their technique, power and body size in consideration with the specialised distance. There are boats for high speed (200m) for medium speed (1000m) and for longer distance like Canoe Marathon racing. There is no minimum weight limitation for marathon racing therefore the producers' makes boats from light materials. For example the weight of a K1 boat is about 8kg.

Equipment development has been driven by the desire for speed!

5.1 SELECTION OF BOATS

There is a huge diversity canoe and kayak models on the market that the selection of the correct boat for performing the desired canoeing activity can be a complex task.

Frequently paddlers need to share the same boat for different activities and /or for the same activities even though it is not the best suited for each of them the boat needs to be adequately adaptable for the group of athletes.

Understanding the basic criteria for selecting equipment will help achieve the selection of the most suitable boat for each discipline.

5.1.1 SELECTION OF BOAT ACCORDING TO ITS MATERIAL

The mechanical properties of boat types are closely related to the materials and construction systems used in their fabrication.

Fibreglass canoes and kayaks are lightweight and rigid; both qualities are desirable for paddlers with a good technical level. These are boats suitable for competition, training, canoeing schools, clubs etc. However, these types of boats are fragile (low resistance to external impact) and need to be used with care. These boats are among the cheapest in the market they are recommended for novices.

The polyester resin can be damaged by exposure to seawater and excessive sunlight. The good maintenance of these boats contributes to the extension of the life of the boats.

Canoes and kayaks made from Polyethylene are much more elastic and, accordingly, have excellent impact-resistance. They are suited for novice paddlers and for any activity involving frequent impacts against other boats or obstacles. However, they are heavy and are limited to the early learning stages of canoeing technique.

Advanced materials such as Carbon**, Kevlar, Aramyde, Haney cam** and combinations (sandwich types) with each other and/or with Fibreglass materials prove to be very popular. These boats have strong rigidity and are light weight. They have high resistance for impact and longer lifespan. Due to the materials these boats are more expensive and are generally used for individuals rather than groups.

5.1.2 SELECTION OF A BOAT ACCORDING TO ITS DESIGN

The dynamic characteristics of a boat depend on its design. The following characteristics are essential:

Stability and Speed

Speed and stability of a boat depends on the dimension and shape of the cross section of the boat.

Narrow cross sections cause instability while wide cross-sections provide stability.

Cross-sections of a "V" shape hull result in extremely unstable boats when stationary or at low speeds, while cross-sections of a rounded shape are more

stable and rectangular cross-sections are extraordinarily stable. The latest boat designs are less stable than the previous types but these assure higher speed.

Lately, athletes have been selecting boats based on the distance of the athlete's target at elite level of performance. It is considered that different designed boats are suitable for 200m compared to 1000m distance and for Canoe Marathon racing.

5.2 PADDLE

The paddle designs have history of changes. A wide variety of Paddle blade shapes and sizes are available in the market. Race length, physical strength, body maturity, and paddling experience should be considered when choosing a paddle blade. Smaller or junior-sized paddles should be used for younger and less experienced paddlers. For longer races, in excess of ten kilometres, many athletes prefer small blades because it is easier to maintain the aerobic energy output level needed for these events.

The correct shape, length and surface area of the blade is an individual matter, determined by the paddler's height, arm length, strength, style and the distance raced. Important, that athletes use the most optimal paddle in accordance with the previous descriptions.
The selection of proper size of shaft and blade of a paddle is essential. If there is doubt blade size should be smaller than larger and length should be shorter than longer.

5.2.1 KAYAK PADDLE

The shape of the paddle has developed from the ordinary flat shape to the so-called wing or flip paddle. The wing paddle produced since 1987 has revolutionised the kayak strokes and technique! Nowadays all racing paddlers have wing paddles which facilitates a very firm catch without swaying with its wing which is on the upper edge of the blade. This paddle requires a paddling technique, which is characterized by an explosive-dynamic swing stroke with significant body rotation. The wing blade gives a high lift force which is effective for power transmission and the trunk rotation is produced using the large muscle group of back.

There are several types and sizes of wing blades in the market. Athletes or coaches can select the design based on the athlete's physical power, style and personal sensation when using the paddle.
The right length is to stand upright next to the paddle, with an arm reaching up.
The fingertips are able to roll over the top of the paddle.
A basis of grip position is to have upper and lower arm at 90 degrees.

The blades of the racing paddle are twisted from 68º to 78º with respect to each other. This reduces wind resistance on the blade during the recovery or swing part of the stroke and assures a splash free exit of the blade from the water. The blade rotation can be adapted to cater for left and right hand control paddlers.

Table: grip on the kayak paddle

Relationship of kayak paddlers height and paddle grip distance			
Measurements taken from 3rd finger of each hand on paddle shaft			
Paddler height	**Grip Width cm**	**Paddler height**	**Grip Width cm**
156	62,2	176	69.7
158	63.1	178	70.5
160	63.7	180	71.2
162	64,5	182	72.1
164	65.2	184	72.7
168	66.7	186	73.5
170	67.5	188	74.2
172	68.2	190	75.1
174	69.1	192	75.7

5.2.2 THE CANOE PADDLE

A canoe paddle is a single blade paddle and mainly remained unchanged over the years unlike the kayak paddle.

The general size of the blade length is approximately 50 to 55 cm and the
Blade width is approximately 19 to 24cm.
The blade is offset from the plane of the shaft (called the rake) by a few centimetres which facilitates better water catch with fewer splashes.
There have been various attempts to introduce unsymmetrical blades or with a keel, a bent T bar, wing shaped blades etc. but so far no new design has proven popular with athletes more than the traditional canoe paddle with minor modification of the blade. The length is individual measurement; the standard is with the T-bar at the eyebrow level when the athlete is standing.
The width of grip is like at kayak paddles, 90° angle

5.3 REPAIR

Any damage to equipment should be repaired as soon as possible to avoid further damage.

The repair of Fibreglass boats is relatively easy and does not require special tools. Before starting the repair it is essential to dry the boat thoroughly.

- If the repair must be done from the outside of the boat, the gel-coat layer should be eliminated (if the repair is done from the inside of the boat, this step is not necessary).

- Successive layers of fibre are applied, impregnating each of them with polyester resin.
- Once the repair is dry, it must be polished with sandpaper to obtain a smooth finish.

The repair of polyethylene boats is not difficult, but requires special tools:

- The repair requires bonding a piece of polyethylene to the damaged area. This operation requires a heat gun, to apply hot air between the boat's surface and the polyethylene piece, causing the fusion of both surfaces. When the material's temperature returns to normal, both parts are bonded. The repair is finished with a final polishing operation.

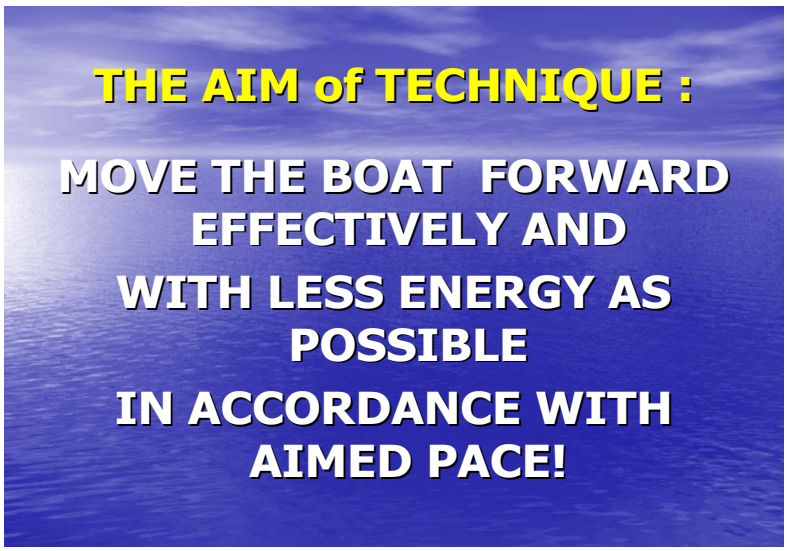
CHAPTER 6
THE TECHNIQUE AND HYDRODYNAMICS OF CANOEING

INTRODUCTION

The Canoe – Kayak technique is the propulsion of the boat with the objective to achieve the fastest speed of the boat.
Canoe/kayak is categorized as a cyclic endurance sport characterized by repetition of a motor action. The goal is to repeat each stroke over and over again in the same form with efficient technique.

The definition of technique of canoeing:

"The ideal cycle of motion that produces maximum boat speed"



The Principle aim of Canoeing technique is: to obtains the greatest speed over a given distance with efficient energy usage and high velocity

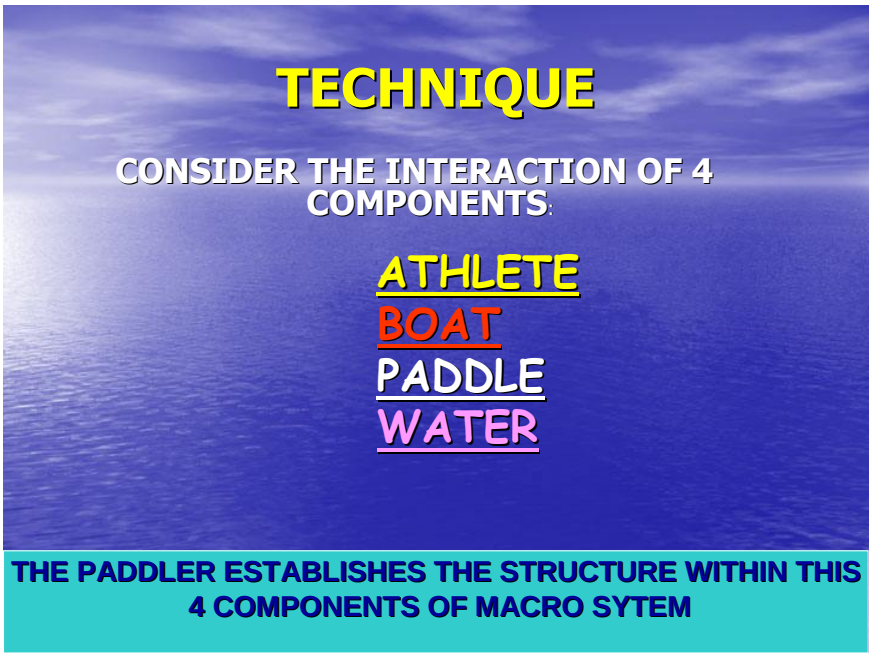
The objective is to obtain the maximum speed and maintaining that speed which depends on perfecting the athletes' technique and cyclical stroke movement.

The paddling technique coupled with the paddler's abilities allows him/her to reach maximum efficiency and maintaining maximum speed over a given distance. To understand the canoeing technique better we have to deal with the different elements of the paddling stroke.

The interaction of the components of water, weather, boat, paddle and paddler makes the technique very complex and difficult to repeat perfectly each time. To perform a good technique requires great concentration, years of practice and the development of great endurance and power that is specific to the efficient motion for paddling.
For the competitive paddler the quality and efficiency of the technique is a major objective in training and requires considerable practice to master the technique.

THE TECHNIQE IS ONE OF THE MAIN DETERMINING FACTORS OF THE SPEED OF THE BOAT!

Table the components of technique



According to the elements associated with paddling technique there is a specific form of power transmission between the “motor” (physical capacities of the paddler) and the “wheels” (the boat) through a paddle.

Canoeing paddling technique results in obtaining the maximum speed over a given distance, through a motor action centred on the ideal movement with the most efficient stroke possible.

6.1 THE HISTORY OF TECHNQUE

Canoeing technique has developed over the years.
The evolutionary change always involved the simultaneous improvement of technique and boat or paddle design. Any change must produce more speed.
Historically, different countries and elite athletes had different techniques.
The paddling technique of most successful athletes was a model for upcoming athletes and paddlers. However, in most of the cases it is simply a copy of the style of the movement. That is, the visible execution of the stroke but clearly not the resultant power transmission that is required to produce the speed necessary through the magnitude and angle of the blades in the water during the stroke movements.

Recently all the different techniques stem from the same basic principles of MODERN CANOEING TECHNIQUE. This technique is based on the hydrodynamic effects, laws of physics (mechanics and kinetics) and biomechanics.

The technique is a perfect model showing the ideal and most efficient movement that must be repeated by every stroke of the paddler.

6.2 HYDRODYNAMICS OF CANOEING

INTRODUCTION

It is useful to analyse the hydrodynamic laws and effects to understand better the techniques of Canoeing.

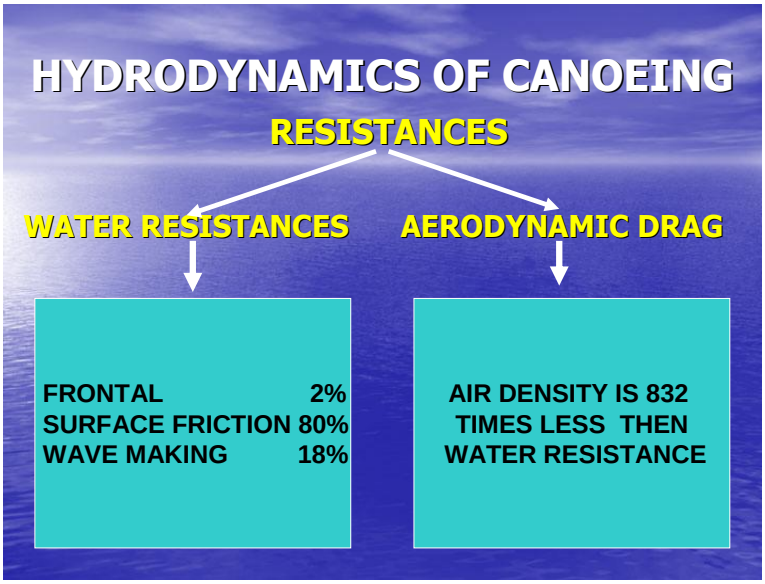
To fully appreciate the sport of Canoeing one should become familiar with the basic principles, definitions and terminology of hydrodynamics. The hydrodynamics of Canoeing relates to the application of physics to the boat moving through water. As in many other sports, certain parameters affect performance. By understanding these principles and dynamics, paddlers can realistically anticipate speed and be successful through good canoeing technique.

In canoeing, the boat is propelled through the water by paddles, carrying paddlers of different size and weight. Freedom of movement is not restricted, both equipment and paddlers are subject to external and internal forces in a three-dimensional field. Subsequently this freedom of movement affects the resistance, motion, and stability of the boat in the water.

6.2.1 RESISTANCE

Both canoes and kayaks are surface vehicles, semi submerged in water. The movement of the boat in the water is restricted by a force called hydrodynamic resistance or drag. The boat and paddle are predominately above the water where another resistance force called aerodynamic drag is present. Both slow down the boat. The water resistance is about 93% whilst the aero-drag is 7%.
Aerodynamic drag is relatively low under normal conditions, compared with water resistance. Air density is 832 times less than that of water and being so low it is often neglected. But under certain conditions this resistance could become an important factor in canoeing performance. For example, lightweight paddlers in a strong head wind will struggle to achieve high speeds.

Table the resistances for boats



Resistance acting upon the hull of the boat can be divided into three components:

Water resistances:	
Frontal resistance	about 2%
Surface friction	about 80%
Wave making resistance	about 18%

The dominant resistance is surface friction. However, the overall picture is not so simple because of the freedom of movement of the boat and the varying speed of the boat due to paddling technique.
This results in additional resistance, which modify the wave structure and the wake generated by the hull.

6.2.1.1 Frontal resistance

This could be neglected because it is only 2% out of all hydrodynamic resistances concerning the sharp shape of the bows of racing boats.

6.2.1.2 Surface friction

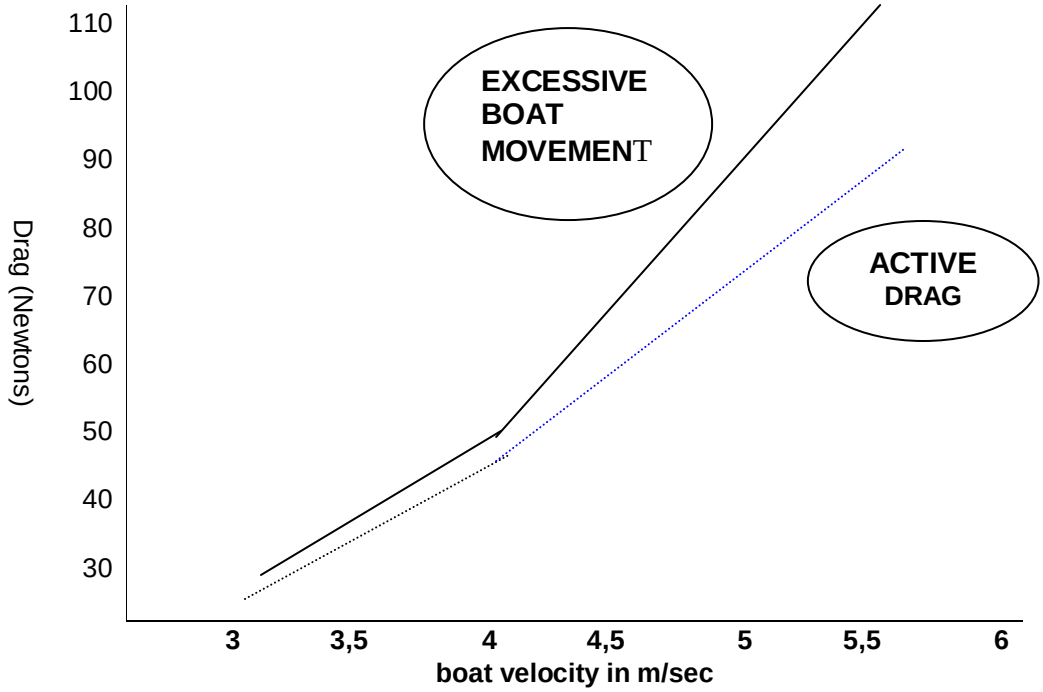
The boat moving through the water creates a turbulent wake effect. The water in the wake has momentum imparted to it by the hull. This resistance component is called viscous or frictional resistance.
Frictional resistance largely depends on the quality of the hull surface. By definition, if the boat surface is smooth to touch, it is said to be hydro dynamically smooth, and the surface irregularities are very small.
As the boat moves, the water molecules will come in contact with its surface. These molecules slow down and either become lodged in the small crevices in the surface or bounce off the ridges on the surface into the surrounding layer of

water, which slows the boat down even further. This molecular layer of water starts at the bow and gradually increases towards the stern.
The energy lost in the boundary layer is the function of the surface. Surface friction force is directly proportional to the wetted surface area of the boat. Besides the wetted surface, length and the surface roughness the frictional resistance is affected by the viscosity of the water, for example salt or fresh water and the temperature of the water. Warmer water is less viscous than cold.

6.2.1.3 Wave-making resistance

Wave making resistance is the second major component of water resistance in canoeing.
The wave-making resistance and the generated wavelengths are strongly dependent on the shape and speed of the boat and the depth of the water. In shallow or restricted waters the wave pattern is different, which means in this condition the speed of the boat is slower. The resistance is sensitive to the effect of shallow water and the reduction of pressure under the boat and subsequent increased sinkage of the boat.
The hull shape will determine the exact position of additional pressure points for a given speed. But any new wave system will lead to move resistance depending on the speed of the boat in relationship to its length. The relationship between wave making resistance and the displacement of the boat is approximately squared for a given length of hull running at a given speed. This relationship can be explained with the following example: 50kg and a 90kg heavy paddlers use the same boat and travel at the same speed. A more heavily loaded boat submerged more deeply into the water takes more power by the paddler to move at the same given speed as the lighter paddler. See the table below.

Frictional resistance can be calculated accurately knowing the wetted surface of the hull under the displacement of the boat. Paddling with inefficient technique such as having a tilted boat can increase the resistance of water on the boat.



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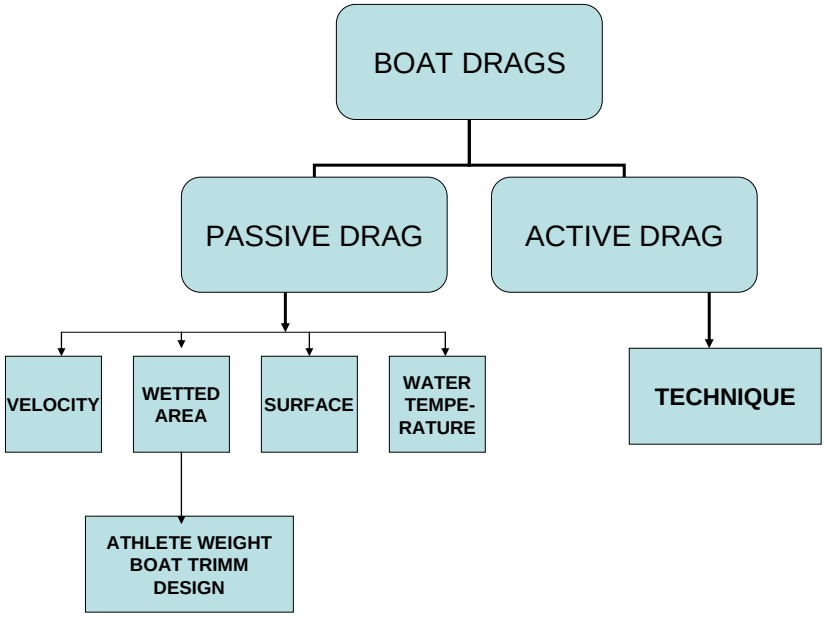


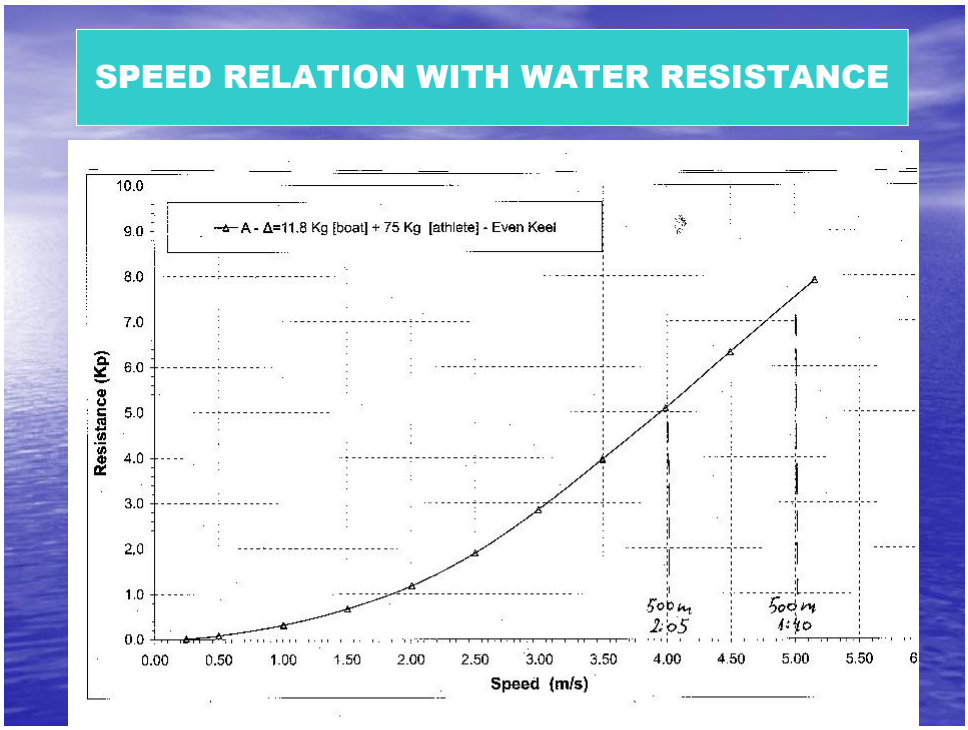
6.2.2 Theory of boat propulsion

From the theory of propeller propulsion it is known that the magnitude of the normal force is closely related to the size and shape of the propelling surface. (Paddle)
The forward movement has to produce more force by a propeller than the water resistance on an object. There is no movement if the proportions of both forces are equal.
An example: (adapted from J. Councilman famous swimming coach) Steam ships are propelled by driving-wheel paddles. In the table below we can see the propelling system of a steam ship. The wheel paddles can meet with the "standing water" to give force to the boat continuously. This propeller theory worked well in practice. A later developed design with another theory wasn't successful in practice because the steam-ship almost couldn't move forward in water. The driving-wheel paddles could not give enough power to the ship from the "moving water" on the given speed of wheel. In canoeing the shape of boat and the direction of the path of the paddles path (especially when using wing blade) almost automatically avoids this problem.
In paddling we must take advantage of these principles. That is, the draw is technically perfect if the blade stays fixed in the water at the point of the paddle being fully submerged into the water and the canoe drawn to it. (See diagram ?)

The boat's propulsion i

The boats propulsion increases proportionally with greater volumes of water the paddle is able to move quickly over the shortest distance.

The drag forces act to slow the boat down. Thus in order to achieve the best speed of the boat the drag forces on the boat must be minimized and factors which contribute to improved propulsive forces must be maximized. The aim of canoeing technique is to maintain a constant boat velocity.
The main contributor to the wetted surface area is the total weight of the paddler. Hence, body size significantly influences paddling performance. While a larger individual may potentially have a larger VO2 max, too large a body mass of the paddler may negatively affect buoyancy cause the kayak to sit deeper in the water, which increases the wetted area subsequently increasing the hydrodynamic drag. To overcome higher resistance the athlete needs to be stronger especially his/her power to weight ratio.

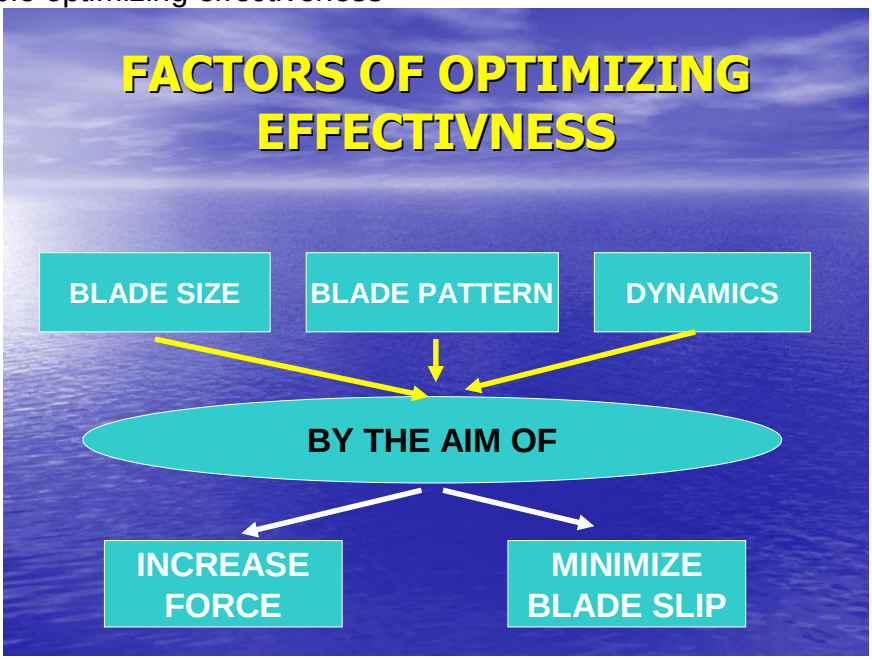


6.2.3 THE HYDRODYNAMICS OF PADDLES

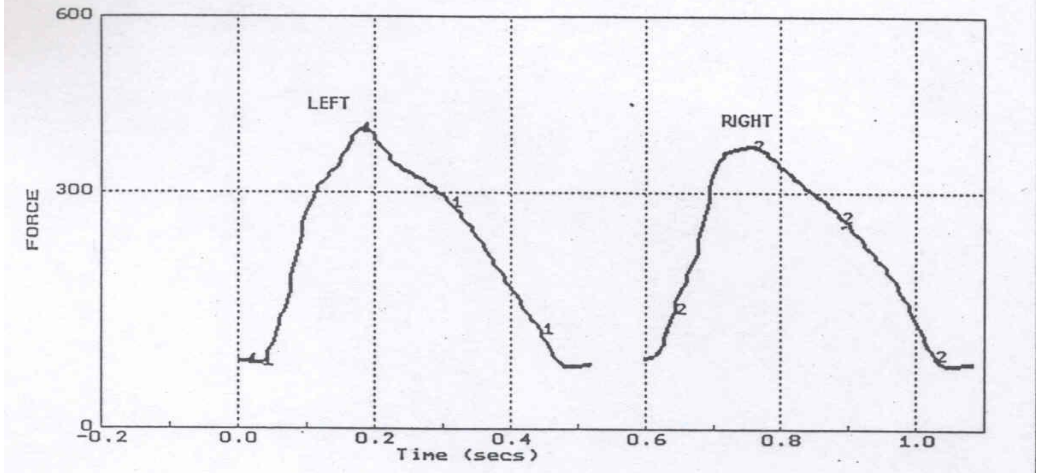
The paddle is used to transmit the power of the athlete to the water. For this the paddle needs to find support in the water – that is, create resistance against the paddle.

The motion of the paddle is unlike any other propulsive device designed to work in water. The paddle has no fixed point of attachment to the boat, only an elastic connection (that is, the paddler's body) through which all forces are transferred to the boat. We know that the forward movement of the boat is based on water resistance or rather on the principle of action and reaction, Newton's Third Law of motion: for every force there is an equal and opposite force or reaction.
The water resistance is proportional to the speed of the boat. At a **higher speed the resistance is greater** thus the paddle must move with increasing speed through the draw. This is necessary because the blade tends to move slightly backward, pushing some water in the same direction and this moving water provides less resistance if the blade moves at a constant speed. In other words, the boat accelerates only by the difference of velocity between the paddle and the water.

Table optimizing effectiveness



FORCE CURVES IN KAYAK STROKES



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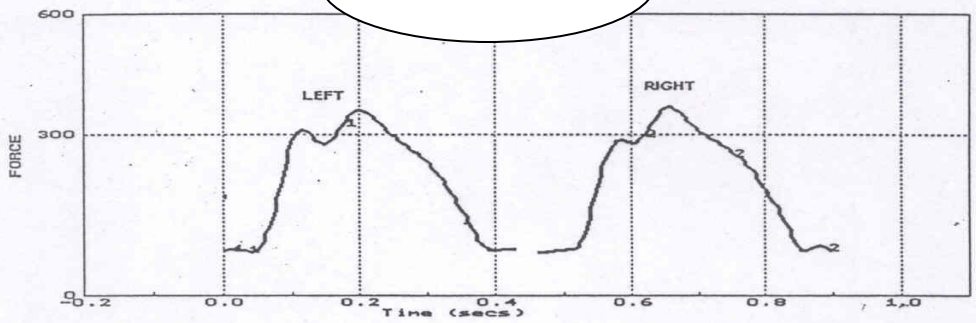

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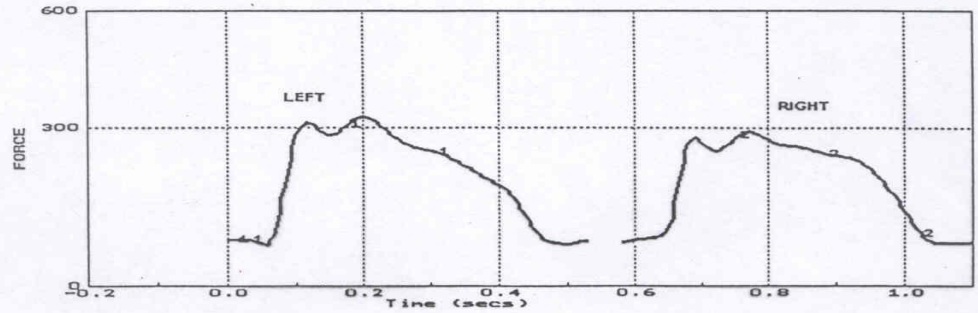

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