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TALK THE TALK AND WALK THE WALK - Many can talk the talk but very few will actually walk the walk. Words are cheap and easy. Anyone can talk about commitment and excellence that is easy because it does not take commitment or excellence. It is not about signs on the wall, or slogans on a t-shirt, it is about actions. Walk the walk, actions speak louder than words. Be consistent, demand intensity, concentration and effort from your self daily and the athletes you work with will follow. Do not settle for anything less. In order to be remarkable demands a remarkable approach. No excuses. I have heard them all. Adversity is opportunity. If you don't have enough time, then emphasize intensity. If you do not have enough equipment, then improvise. If you don't have space, then reorganize your workouts. Being remarkable means getting it done. A champion is a champion every day, not just on game day. A champion works when no one else is around to see what they are doing. A champion does not talk, they do – they walk the walk. I recently saw an interview with Pete Carroll, he gets it. He sets the tempo as a coach. He preaches to his players, "You can't choose when you go hard," so he sets the tempo by being totally involved, he demands the same from his assistant coaches. Because they do it the players do it. He walks the walk.

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ROWING TRAINING

TRAINING MODELS IN ROWING: DESCRIPTION, EFFECT AND ENERGY REQUIREMENT

Group 1: Utilisation training

Physiological requirement: Aerobic training with metabolic balance. Energy covered 100% aerobic or with small amount of anaerobic capacity involved, but without accumulated production of acid lactate.

Physiological effect: Increased capillarisation. Increased enzyme activity. Increased number of Mitochondries. *Results:* Increased Oxygen utilisation in the muscle fibres recruited, higher anaerobic threshold and better efficiency of maximum VO₂.

Technical effect: Automatization of the rowing movement. Improved technical efficiency.

Model A: LSD "Long Slow Distance" (Utilisation 2)

	Heart rate:	Stroke rate:	Km:
A) Rowing 90 minutes	130-150	18-22	16-20
B) 10-15 minutes stretching			

<i>Energy-consumption:</i>	<i>(Max VO₂ 6 l/min)</i>	<i>(Max VO₂ 5 l/min)</i>
Calories:	1485	1125
Carbohydrates:	173	131
Fat:	81	62

Total strokes in target-zone: Approximately 1800

Model B: SS "Steady State" (Utilisation 1)

A) Rowing 90 minutes	140-160	22-24	16-20
<i>Energy-consumption:</i>	<i>(Max VO₂ 6 l/min)</i>	<i>(Max VO₂ 5 l/min)</i>	
Calories:	1755	1463	
Carbohydrates:	265	221	
Fat:	67	56	

Total strokes in target-zone: Approximately 1980

Group 2: Interval training

Physiological requirement: Training with a relationship of 50/50 to 70/30 of Aerobic/Anaerobic requirement. The accumulated production of acid lactate is low, from 5-7 moll.

Physiological effect: Enlarge and strengthen the heart. Larger stroke-volume. Higher cardiac output. *Results:* Increased capacity for oxygen transport.

Technical effect: Improved technique in the area of competition. Training of muscular contraction velocity related to competition.

Model C: "30/10" 30 strokes in specified Target-zone - 10 strokes easy. (Transportation)

Heart rate: Stroke rate: Km:

A) Warming up: Rowing 20-30 min.	130-160	18-36	4-5
B) "30/10" x 10 rep. 3 series. 4-5 min. active rest between series.	170-190	33-36	12-14
C) 10-15 minutes stretching			

<i>Energy-consumption:</i>	<i>(Max VO2 6 l/min)</i>	<i>(Max VO2 5 l/min)</i>
Calories:	1770	1425
Carbohydrates:	322	263
Fat:	42	33

Total number of strokes in Target-zone: Approximately: 900

Model D: "17/5" 17 strokes in specified Target-zone - 5 strokes easy. (Transportation)

A) Warming up: Rowing 20-30 min.	130-160	18-36	4-5
B) "17/5" x 20 rep. 3 series. 4-5 min. active rest between series.	170-190	34	12-14
C) 10-15 minutes stretching			

<i>Energy-consumption:</i>	<i>(Max VO2 6 l/min)</i>	<i>(Max VO2 5 l/min)</i>
Calories:	1913	1544
Carbohydrates:	353	289
Fat:	43	33

Total strokes in Target-zone: Approximately 1020

Group 3: Combined training

Physiological requirement: The training will cover both anaerobic and aerobic elements.

Physiological effect: Enlarge and strengthen the heart. Larger stroke-volume. Higher cardiac output. Increased capillarisation, enzyme activity and Mitochondries. *Results:* Increased capacity for oxygen transport, increased utilisation, higher anaerobic threshold and better efficiency of maximum VO2.

Technical effect: Improved automatization of rowing movement, improved technique in the area of competition, give the Coach a good possibility to control technique in different rates. Training of muscular contraction velocity related to competition.

Model E: "4-3-2-1" (Automatisation and Transportation)

	Heart rate:	Stroke rate:	Km:
A) Warming up: Rowing 20-30 min.	130-160	18-36	4-5
B) 4-3-2-1 x 4 (24-26-28-32) 4-5 min. active rest between series.	160-180	24-32	12-14
C) 10-15 minutes stretching			

<i>Energy-consumption:</i>	<i>(Max VO2 6 l/min)</i>	<i>(Max VO2 5 l/min)</i>
Calories:	1530	1275
Carbohydrates:	238	202
Fat:	56	45

Total number of strokes in Target-zone: Approximately: 1040

Model F: "3-2-1" (Automatisation and Transportation)

A) Warming up: Rowing 20-30 min.	130-160	18-36	4-5
B) 3-2-1 x 4 (30-32-36) 4-5 min. active rest between series.	170-190	30-36	12-14
C) 10-15 minutes stretching			

<i>Energy-consumption:</i>	<i>(Max VO2 6 l/min)</i>	<i>(Max VO2 5 l/min)</i>
Calories:	1314	1045
Carbohydrates:	221	179
Fat:	40	30

Total strokes in Target-zone: Approximately 770

Group 4: Special training

Physiological requirement: The training will cover both anaerobic and aerobic elements.

Physiological effect: Recruit all muscle-fibres and empty them for glycogen. Enlarge and strengthen the heart. Larger stroke-volume. Higher cardiac output. Increased capillarisation, enzyme activity and Mitochondries.

Results: Increased capacity for oxygen transport, increased utilisation, higher anaerobic threshold and better efficiency of maximum VO2.

Technical effect: Improved automatisisation of rowing movement.

Psychological effect: Keep technique under pressure, improve velocity under high level of fatigue.

Model G: "5-25-30-25-2-2-1" (Automatisation and Transportation)

	Heart rate:	Stroke rate:	Km:
A) Rowing 5-25-30-25-2-2-1 min. <i>Rowing Non Stop</i> Rate 20-24-26-28-30-32-36	130-190	22-36	18-20
B) 10-15 minutes stretching			

<i>Energy-consumption:</i>	<i>(Max VO2 6 l/min)</i>	<i>(Max VO2 5 l/min)</i>
Calories:	1997	1720
Carbohydrates:	366	317
Fat:	46	39

Total number of strokes in Target-zone: Approximately: 2270

Model H: "Race training" (Automatisation and Transportation)

A) Warming up: Rowing 20-30 min.	130-160	18-36	4-5
B) 3x2000 m (1000: 30 - 500 m: 32 - 250 m: 34 - 250 m: 36) 15-20 min. active rest between series.	170-190	30-36	10-12
C) 10-15 minutes stretching			

<i>Energy-consumption:</i>	<i>(Max VO2 6 l/min)</i>	<i>(Max VO2 5 l/min)</i>
Calories:	1499	1174
Carbohydrates:	277	182
Fat:	57	43

Total strokes in Target-zone: Approximately 670



ASSOCIATION OF ROWING COACHES, SOUTH AFRICA

REST & RECOVERY

PEAK PERFORMANCE REQUIRES OPTIMAL SLEEP AND ALERTNESS

Coach, I had so much to do to prepare for today's competition that I had to stay up all night to be ready.

Coach, to prepare for the time zone change at the international competition I have been sleeping during the day and staying awake all night.

Coach, I couldn't relax and just kept worrying about today's big event but after a few beers I feel much better.

Hopefully, you will never experience these situations. In fact, they probably represent the exact opposite of what you and your athletes are working so hard to attain. Unfortunately, many common practices that are thought to be helpful or benign can actually create performance decrements equivalent to these scenarios.

Consider the diverse and complex array of factors that coaches and athletes address to achieve peak athletic performance and success. Conditioning, sport-specific skills training, nutrition, recovery, strength training, and mental/psychological considerations are just some examples of important factors that can significantly affect athletic performance. So, in all of your preparation, planning and training for your athletes and yourself, how and where do you address sleep, circadian rhythms (the body clock), and alertness?

Humans have some basic physiological requirements for survival: food, water, and air. Though often ignored or underestimated, sleep is also a basic human biological need, equal to food, water and air in its importance to life and for achieving optimal performance and alertness. Sleep is not elective; it is not an option, to be obtained when convenient. Overwhelming scientific data clearly show that sleep loss and circadian disruption can impair performance, degrade health, and disturb mood. More importantly, obtaining optimal sleep, addressing circadian factors, and effective use of alertness strategies can enhance performance, health, and mood and provide a competitive advantage.

An introduction to sleep and circadian basics, some example sleep and alertness strategies, and an approach to planning can provide an initial, informed foundation for addressing this basic physiological requirement.

I'm human, I sleep, I'm an expert.

About a decade ago, the National Sleep Foundation conducted a simple 10-item "Sleep IQ" test and found

that 82% of respondents failed the test with an average score of 46% (1). Flipping a coin could provide a 50% score, so the average respondent did worse than chance. Generally, though our society has become more informed and active regarding exercise and nutrition, the need for sleep and its importance to our performance, alertness, safety, health, and mood continues to be ignored or diminished. Awareness about sleep may be increasing but knowledge and effective actions are alarmingly rare.

Here are four basics about sleep and circadian rhythms that everyone should know (2).

1. **Sleep need.** Physiologically, adult humans require about 8 hours of sleep; with a range of around 7 to 9 hours. The amount of sleep an individual requires is genetically determined and "training" cannot reduce this sleep requirement. Kids and young adults from junior high/middle school years through their early 20's physiologically require about 9 to 10 hours of sleep.
2. **Sleep debt.** Lose sleep and it builds into a cumulative sleep debt. Though most adults require about 8 hours of sleep, on average, they obtain about 1.5 hours less. This sleep loss accumulates into a sleep debt. For example, over a five-day work week, a daily 1.5 hours of sleep loss would build into a 7.5 hour sleep debt by the weekend. This equates to losing one full night of sleep (i.e., pulling an all-nighter) going into the weekend. *(Coach, I had so much to do to prepare for today's competition that I had to stay up all night to be ready.)*
3. **Circadian rhythms.** Humans are hard-wired with a biological clock in the suprachiasmatic nucleus of the hypothalamus. This circadian (circa=around, dies=a day) clock controls the 24-hour rhythms of our physiological and behavioral activities. Its programming controls the 24-hour fluctuations in sleep/wakefulness, hormones, alertness, performance and is exhibited at the cellular level. Circadian disruption commonly occurs as a result of irregular schedules and crossing time zones and has similar negative effects on performance, alertness, health, and mood as sleep loss.
4. **Experience ≠ reality.** How alert an individual "feels" does not reflect reality. Generally, even though an individual might report feeling wide-awake and at peak alertness, the person's actual performance could show significant impairment and the person might fall asleep in less than five minutes (a sign of pathological sleepiness). A person's ratings of alertness and performance do not accurately reflect actual levels. This "disconnect" is one reason why individuals feel that sleep loss and circadian disruption have minimal or no effect.

Our whole society is sleep deprived, who cares?

Most people believe that they can lose sleep or disrupt their circadian clock with minimal or no consequences; ok, maybe they feel a little tired. Extensive scientific research clearly demonstrates that sleep loss and circadian disruption can degrade or impair just about every aspect of human capability and performance.

For example, studies have shown that sleep loss can reduce judgment and decision-making, reaction time, attention, memory, communication skills, mood, and learning. Depending on the variable and amount of sleep loss, performance in these areas can be reduced by 10 to 50%. Performance during the lowest circadian point in the night could be reduced by up to 30%.

How much sleep loss does it take to see these levels of performance reduction?

Studies have shown that getting 2 hours less sleep than needed can significantly impair performance. For example, in one study, allowing 8-hour sleepers to get only 6 hours of sleep (2 hours less than they needed) impaired performance to the equivalent of drinking 2-3 12 oz beers, a level that equates to about .05% breath ethanol concentration. Getting 4 hours of sleep (4 hours less than they needed) impaired performance to the equivalent of drinking 5-6 12 oz beers, a level that equates to about .10% breath ethanol concentration (3). *(Coach, I couldn't relax and just kept worrying about today's big event but after a few beers I feel much better.)*

Sleep loss and circadian disruption also can reduce safety and health. There could be an estimated 1 million car crashes annually due to fatigue and drowsy driving. National Sleep Foundation polls indicate that 60% of Americans have driven drowsy in the last year and 37% report nodding off at the wheel (1). Irregular schedules can be associated with up to a 50% increase in on-the-job injuries and accidents. Disturbed sleep and circadian disruption also can be associated with increased risks for heart and stomach problems, high blood pressure, cancer, pregnancy problems, obesity, anxiety, and depression.

Though not extensive, there are some scientific studies examining these issues and their effects on athletic performance. Most of the efforts have focused on circadian rhythms and circadian disruption associated with jet lag and travel across time zones. For example, one study found circadian variations in world record breaking performances with most records broken by athletes in the early evening (4). Another study with British Olympic squad members showed performance impairments in several measures over a 5-day period after crossing multiple time zones (5). An examination of NFL Monday Night Football outcomes showed that West coast teams had a 20% higher win percentage compared to East coast teams playing at a worst circadian time (6). Even without overwhelming, solid data due to a paucity of studies, there is no justification to consider that the human physiological requirements

related to sleep and circadian rhythms do not extend to athletes and their performance.

Optimal sleep and alertness strategies

There are a variety of scientifically validated strategies that are effective in promoting optimal sleep, alertness and performance. Here are two approaches for obtaining optimal sleep and one powerful strategy to increase performance and alertness.

1. Good sleep habits. The following "good sleep habits" should become part of everyone's routine to obtain optimal sleep.
 - a. Protect sleep from intrusions
 - b. Keep a regular bedtime and wake time (whenever possible)
 - c. Use a pre-bedtime routine to prepare for sleep
 - d. Use the bed and bedroom for relaxation and sleep
 - e. Avoid work and worry in the bed and bedroom
 - f. Learn and practice a relaxation technique for sleep
 - g. Avoid caffeine, alcohol, and exercise within at least 2 hours of sleep
 - h. Get the sleep you need, make sleep a priority
2. Environmental factors. Evaluate and address the following "bedroom" factors.
 - a. Noise (background vs intrusive events)
 - b. Temperature (cooler is better than warmer)
 - c. Light (use black out curtains; night light)
 - d. Use a reliable, regular, effective alarm clock
 - e. Determine personal comfort for mattress and pillows
 - f. Consider privacy/security
3. Strategic naps significantly increase performance and alertness.
 1. While at NASA, we conducted a study that provided commercial airline pilots a planned nap opportunity in-flight to determine the effects of a 40-min nap on performance and alertness (7). It remains a unique study, conducted in the real-world during actual flight operations with pilots flying 9 hour legs between the US and Japan, and included multiple flight legs both day and night. We physiologically monitored the pilots' brainwaves and eye movements and they completed sensitive, validated performance tests (see photo). Our findings: on average, pilots fell asleep in about 6 minutes and slept for about 26 minutes. These 26-minute naps enhanced objective performance by 34% and increased physiological alertness by 54%, with effects lasting around 3 to 4 hours.

2. A planned nap is a very powerful alertness strategy that can significantly increase performance and alertness. Some general guidance for effective use:
 - a. For a short nap, up to 40 minutes in length (helps to avoid deep sleep)
 - b. For a longer nap, around 2 hours
 - c. Avoid a long nap too close to planned bedtime
 - d. Allow 10-15 minutes “wake-up” after nap
 - e. Consider sleep aids: eye mask, ear plugs

Technical Memorandum 108839). Moffett Field, California: NASA Ames Research Center.

Dr. Mark Rosekind is an internationally recognized expert on sleep, circadian rhythms, performance and alertness. He previously directed the NASA Fatigue Countermeasures Program and prior to his NASA position, directed the Center for Human Sleep Research at the Stanford University Sleep Center.

Planning for optimal sleep and alertness

Before using any strategy in a travel or competitive situation, test it at home to ensure that it is safe, effective, and works for you and your athletes. Like any other aspect of coaching, training, strategy, and competition: have a plan. Create a specific plan for managing sleep, circadian rhythms and alertness at home and traveling to competitions. Identify specific strategies to obtain optimal sleep, how to manage circadian disruption, and when to use alertness strategies.

Without a plan or addressing the issues identified, performance will be reduced by sleep loss and circadian disruption. Though only an introduction to a complex area, the knowledge and strategies presented can make a significant difference in successfully mitigating negative outcomes and helping to enhance performance and creating a competitive advantage. There is much more to learn and apply but you and your athletes will already have an edge by acknowledging these physiological and performance issues and applying strategies to achieve peak athletic performance through optimal sleep and alertness.

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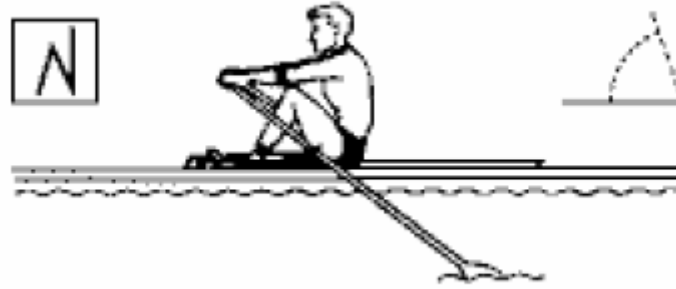
CORRECTING ERRORS

ANALYSIS OF MOVEMENT ERRORS

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1. Body too upright. Body angle is not sufficient.



Effects

- Stroke length too short at the catch
- Inefficient drive phase
- Little propulsion of the boat

Causes

- Incorrect footboard height (too high)
- Torso angle too upright
- Torso did not follow the hands forward after the finish

Corrections

- Demonstrate and describe the correct sequence of movements in order to establish an exact concept of the correct sequence of movements.
- Ensure that the footboard height is correctly adjusted.
- Practice the correct sequence of movements from the finish. Use partial movement sequences and pauses in the stroke cycle.
 - Hands only making sure that the hands move away until the sculls are at 90° to the boat,
 - Hands and body ensuring that the hands move away until the sculls are past the 90° angles to the boat.
 - Rowing full strokes but pausing as the hands reach 90°, and as the hands reach past the 90°
 - Row with an exaggerated body angle but with head held normally and arms stretched out

2. Body angle is too extreme



Effects

- Inefficient use of the legs
- Allows for “bumshoving”
- Poor coordination of the back lever due to poor position
- Too large vertical movements of the body due to body position

Causes

- Jerky uncontrolled seat movements,
- Movement of the seat before the spoons enter the water.
- Applying the leg drive before the spoon connects to the water at the catch
- Incorrect footboard height (too low)

Corrections

- Demonstrate and describe the correct sequence of movements in order to establish an exact concept of the correct sequence of movements.
- Ensure that the footboard height is correctly adjusted.
- Practice slow controlled seat movements, counting to ensure a correct ratio drive:recovery
- Ensure that the spoon is placed in the water in a quick controlled movement before the change of direction of the seat.
- Row using the first half of the slide practicing slow controlled seat movements and accuracy at the placement.

SOUTH AFRICA

3. Prematurely bent arms



Effects

- Stroke length too short at the catch
- Immersing the spoons too deeply in the initial drive phase
- Losing connection through the middle phase of the drive
- Using the torso too late in the drive and encouraging "bumshoving"
- Ineffective use of power for boat propulsion

Causes

- Balance difficulties
- Excessive use of the arms when connecting to the water at the catch
- Incorrect sequence of movements

Corrections

- Demonstrate and describe the correct sequence of movements in order to establish an exact concept of the correct sequence of movements.
- Balance exercises
 - From the finish balance with hands away
 - From the finish hands away and then roll forward balancing
 - From the finish hands away and then roll forward with the catch
 - Rowing with pauses at various seat positions – balancing
- From the catch slowly increase the length of the slide ensuring that the arms stay naturally stretched
 - Increase force and seat movement gradually

4. Pushing the hands down at the catch



Effects

- "Skying"
- Stroke length too short at the catch
- Immersing the spoons too deeply in the initial drive phase
- Ineffective use of power for boat propulsion

Causes

- Balance difficulties
- Cramped shoulder movement (poor shoulder mobility during placement)
- Incorrect height (too low). Athlete drops hand height to create room for squaring

Corrections

- Balance exercises
 - From the finish balance with hands away
 - From the finish hands away and then roll forward balancing
 - From the finish hands away and then roll forward with the catch
 - Rowing with pauses at various seat positions – balancing
- Mobility and flexibility exercises for the shoulder girdle
- Rowing in slow motion with one scull only
 - With the spoons flat on the water allowing a feel of the hands height required for the placement
 - With the spoons squaring practicing the small movement necessary to execute the placement
- Rowing with both sculls
 - Starting at hands only and increasing the seat movement gradually
- Adjust oarlock to correct height.

5. Excessive raising of the arms at the catch



Effects

- Immersing the spoons too deeply in the initial drive phase
- Too hard movements of the arms at the placement
- Vertical and not horizontal movements
- Does not favour correct squaring and feathering

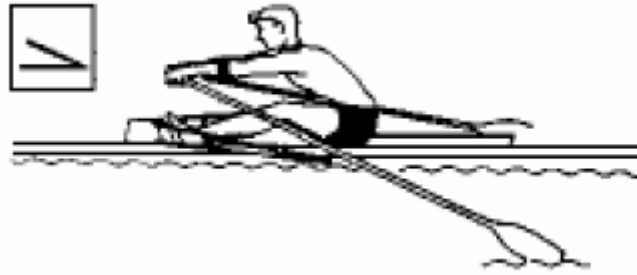
Causes

- Cramped arm and shoulder movement
- Wrong movement coordination
- Incorrect height (too high)

Corrections

- Row with very low pressure emphasizing the small movements necessary for the placement
- Rowing with square spoon starting at hands only and gradually increasing slide length
- With the seat stopped at the frontstops gently drop the spoon into the water and initiate the drive phase.
 - Gradually increase the slide length from $\frac{1}{4}$ to full slides with correct arm use.
- Adjust oarlock to correct height

6. Giving way of the hips during the drive phase -“Bumshoving”



Effects

- Little propulsion
- Increases the torso angle during the 2nd half of the drive phase.
- Ineffective power transmission caused by a lack of co-ordination of the drive movements

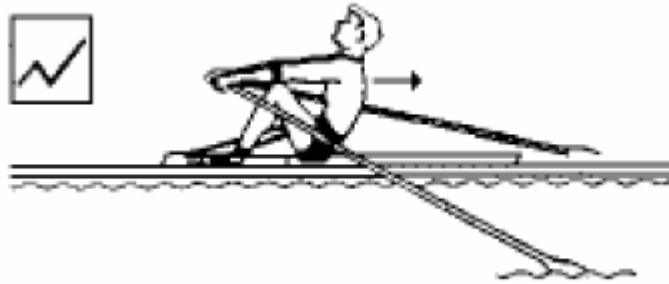
Causes

- Poor strength of the lower torso and hip girdle
- Torso angle too great at the placement
- Arms used too strongly or bent prematurely
- Balance difficulties

Correction

- Adjust footboard towards stern
- Row with slide only with straight arms, stressing good torso posture
- Row with full slide length, emphasizing torso posture without force being applied by the legs
- Intensify strength training. Increase the proportion of exercises devoted to core stability of the trunk and the hip girdle
- Practice balance exercises

7. Opening the body angle prematurely



Effects

- Little propulsion
- Ineffective power transmission by a lack of co-ordination of the drive movements
- Causes the body to fall over the handles at the finish

Causes

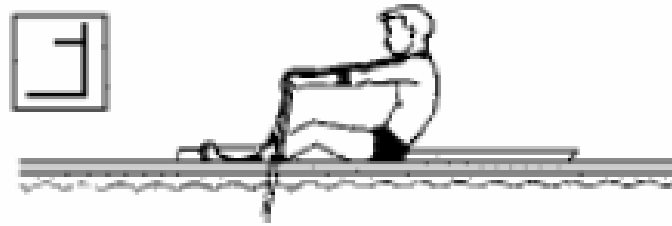
- Drive begins before the placement of the spoon by the body angle opening up.
- Head is thrown backwards before the leg drive commences

Correction

- Attempt to dynamically implement leg drive from the catch
- Ensure torso is at the correct angle on the recovery and that the torso angle is maintained during the placement of the spoon.
- Exaggerate the torso angle at the catch. Row only with the legs emphasizing correct torso angle and maintaining the angle during the leg drive

SOUTH AFRICA

8. Not using the arms through the middle of the drive phase



Effects

- Over use arms in the final drive phase
- Excessive shoulder employment in the final course
- Spoon moves vertically in the water
- Poor co-ordination of the drive sequence
- Little propulsion
- Cramping of the elbow and shoulder musculature

Causes

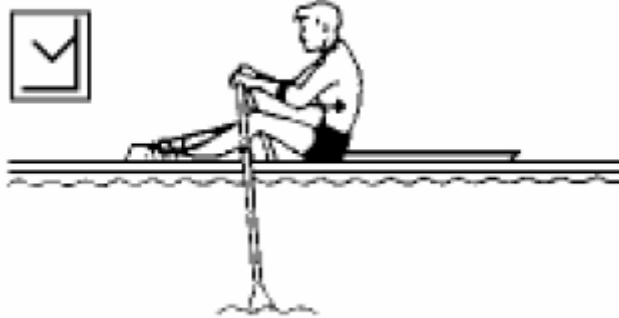
- Overstretched arms at the catch
- Poorly developed elbow and shoulder musculature

Correction

- Row with fixed seat at the catch emphasizing naturally stretched arms when placing the spoon, gradually increase slide length
- Allow the spoons to follow the correct course of motion without force being applied
- Strengthening the elbow and shoulder musculature

SOUTH AFRICA

9. Premature arm employment in the middle drive phase



Effects

- Impairment of the final drive phase
- Decrease of the possible propulsion
- Cramping of the elbow musculature
- Poor coordination of the drive sequence

Causes

- Attempting to maintain connection with the water by using the arms for force production

Correction

- From the catch slowly increase the length of the slide ensuring that the arms stay naturally stretched
 - Increase force and seat movement gradually

10. Shrugging the shoulders in the middle drive



Effects

- Cramping of the elbow and shoulder musculature
- Changing the horizontal movements of the elbows and the position of the spoon in the water
- Insufficient power and insufficient opening of the chest and shoulders in the final drive phase
- Decrease of length in the final drive phase

Causes

- Too strong arm employment with cramped shoulders
- Insufficient use of the back musculature
- Wrong head attitude, head is toward stern and not towards the bows
- Incorrect rigging (overlap too large – span and inboard)

Correction

- Row with low pressure ensuring that the spoon follows the correct path in the water.
- Rowing with one scull only, begin with fixed seat and low pressure ensuring the correct movements of the arms and shoulders and gradually increase the slide length and pressure.
- Row with both sculls, begin with fixed seat and low pressure ensuring the correct movements of the arms and shoulders and gradually increase the slide length and pressure.
- Rowing with loose shoulders, aim at horizontal course of the elbows
- Row with stretched arms as well as exaggerated torso angle, emphasize the use of the back musculature
- Rower requested to complete a certain number of strokes with head towards the bows. Increase the number of strokes gradually

11. Unequal leg drive



Effects

- Spoons move vertically in the water
- Uneven pressure build-up at the spoon
- Decrease of the effective propulsion

Causes

- Uneven force production of the gluteal and leg extension musculature
- Using the torso too early in the stroke

Correction

- See exercises for correction of 7.
- Row with $\frac{1}{4}$ slide emphasizing the leg drive and the connection with the footboard gradually increasing the slide length but ensuring that the force application stays consistent
- Rower request to drive legs dynamically over 1 to 5 strokes, gradually increasing as the rowers consistency of force production improves



12. Extracting the spoons too early in the drive phase



Effects

- Wash in the final course
- Missing final course
- Ineffective impact structure
- Decrease of the propulsion

Causes

- Insufficient shoulder employment
- Spoon is feathered in the water
- Leg drive is broken off before the body movement
- Hands are pulled down onto the thighs
- Hands away too slow in the crew boat, therefore premature stopping of the leg drive in order to hold rhythm

Correction

- Rowing with fixed seat and torso fixed at the finish position, practice drawing the thumbs through to the lower ribs with the spoons buried.
- Rowing with square blade emphasizing the draw through and the down and away movement.

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13. Over using the torso in the final movement – jerky torso movement



Effects

- Torso falls over hands at the finish
- Increased vertical body movement
- Decreasing propulsion

Causes

- Beginning and middle drive too weak
- Bum shoving in the beginning and middle drive

Correction

- see correction exercises of errors 1, 6, 17

14. Leaning out of the boat



Effects

- Uneven leg drive
- Uneven water work between bow and stroke sculls

Causes

- Wrong rigging
- Different force employment between bow and stroke
- Head is inclined to one side

Correction

- Move the athletes position further to the stern
- Rowing with fixed slide ensuring correct body movement. Then gradually increase slide
- Mark finish angles of the sculls
- Fixed seat rowing with low pressure ensuring the correct movement of the body and hands,
- gradually lengthen slide and increase force at the finish

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