

TECHNIQUE ANALYSIS BOARD PADDLING

**Task 2: Technique Analysis
COMMENTARY
'Skill Analysis in Sport'**

STAGE 2 SSP SURF LIFESAVING

INTRODUCTION

A technique analysis has been conducted on the skill of paddling a board in Surf Lifesaving. In order to do so, relevant biomechanical principles were researched and then applied to my own technique in order to gauge the performance in comparison to an elite athlete performing the same skill.

The biomechanical principles relevant to board paddling are as follows:

- Force summation
- Impulse & accuracy
- Laws of motion
 - Inertia
 - Force and acceleration
 - Action and reaction
- Motion type - General
- Balance and stability

BIOMECHANICAL ANALYSIS – BOARD PADDLING

- 'General' or 'Combinational' Motion
 - it is a combination of both linear and angular motion. i.e. The angular motion of specific internal axes in the arms at the shoulder, elbow and wrist, (see figure 1) and legs at the knees & hips, allows the board and paddler to move in a linear motion (see figure 2).

Figure 1: Internal Axes of the arm

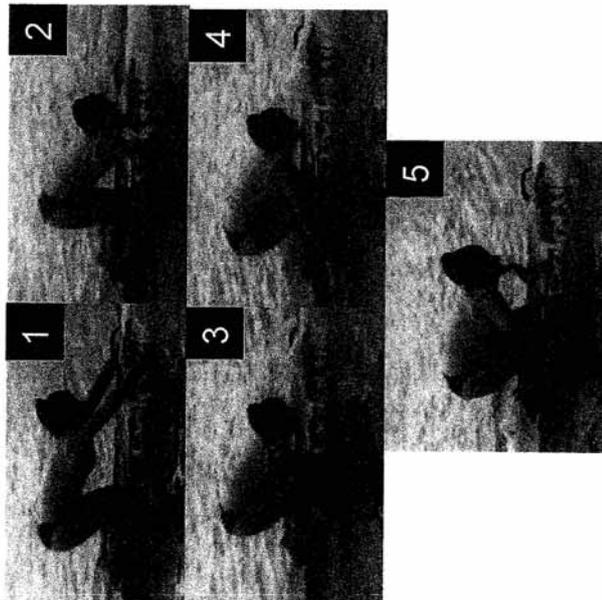


Figure 2: (Video) Example of 'General Motion' while paddling a board



BIOMECHANICAL ANALYSIS – BOARD PADDLING

The principle of **Force Summation** generally tells us when each joint/muscle should be used. It is the sequence of cues performed in a skill in the correct order. Movement should begin with the larger muscle groups and then progress through to the smaller muscle groups (see explanation below). This pattern produces optimal force and flowing, continuous movement. According to Nicolas Bigioli, 2011 South Australian State Surf Lifesaving Head Coach, “there are five phases to an efficient and effective paddling technique”.



1. The Catch

- Upper body and arms are outstretched as far as possible, utilising strength from the quadriceps to maintain position.

2. The Pull

- Shortening (contraction) of quadriceps occur to maintain this position without losing balance.
- Arms reach as deep as possible into the water, chin moves close to the board
- Once at maximum depth, the arms pull.

3. The Push

- Hands maintain force on the water in a flexed position at the wrists.

4. The Release

- At the ankles, hands are lifted from the water with bent elbows, wrists still in a flexed state.

5. Recovery

- The tension force in the arms and legs are released, while returning to 'the catch' position, trailing hands along the rails of the board.

“THE CATCH”

The catch is the beginning of the stroke, or ‘force summation’, where “the buttocks should be raised as high as possible, forming approximately a 75–80 degree angle between the upper and lower leg.”

- “The head and shoulders should be raised, but not above the ‘horizontal’, no more than parallel to the board”.

This ensures the height of the centre of mass (the body) remains high enough over the base of support to remain stable, however allows for optimum length of lever (arm) and therefore greater force exertion.

- The centre of mass shown in green on the elite athlete remains inside the base of support, ensuring he remains stable throughout this phase of the stroke. The appropriate angle of his legs gives him optimum length of leverage, hence his stroke is more efficient, while he remains stable.

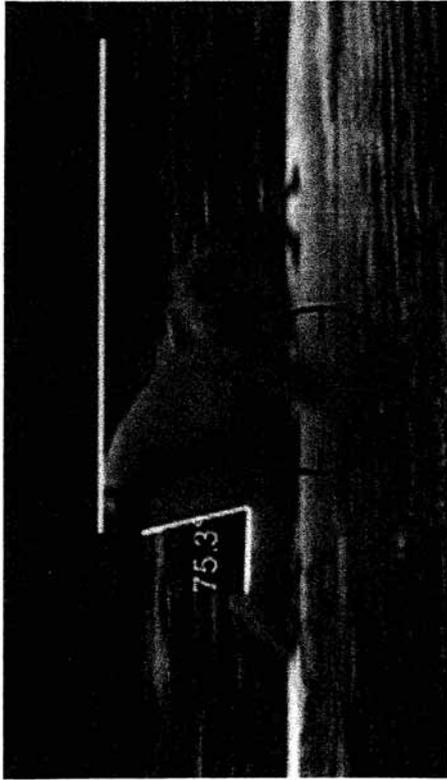


- The angle between my upper and lower legs is significantly smaller than that of the elite athlete, hence my arms are unable to reach the optimal distance in front of me (seen through positioning of handles in relation to both paddler’s hands).

➤ Although this means I am more stable, the length of the lever – arm (contact time of force applied – arms/hands against the water) is decreased, meaning less force is exerted to propel me forward, hence my stroke is less efficient.

“THE PULL”

- Arm acts as a 3rd class lever – the insertion to maximum depth allows for a greater distance to be covered from ‘pull’ to ‘push’, enabling greater force to be exerted.
- This also means optimum surface area is applied against the resistance (the water), and Newton’s 3rd law may be applied. – the arm/hand travels downward in the water and then backwards to propel the paddler forward. In creating an equal and opposite reaction, the greater surface area of the arms/hands (the initial action or force) enables greater propulsion (the reaction).
- The depth at which my arm is in the water resembles that of the elite paddler, however the angle of the elite paddler’s legs has decreased by 5 degrees from ‘the catch’ to ‘the pull’, whereas mine has increased significantly.
 - In order to make the ‘pull’ phase of my stroke more efficient, my quadriceps should be contracting (shortening) to begin propulsion, as this is a larger muscle group in the ‘force summation’ sequence. In doing this, the angle between my upper and lower legs would decrease rather than increase.



“THE PUSH”

- May also be referred to as ‘the follow through’ of the stroke,
- Although it is one of the least powerful parts of the stroke as it utilizes the smaller muscle groups towards the end of the sequence, it is a necessary part of the technique.
 - The biomechanical principle of impulse may be applied to this phase, as the ‘push’ must be performed in the required direction of travel – in this case, propelling the paddler forward.
 - This also ensures maximum contact time with the water, exerting a greater force, again propelling the paddler forward (**Newton’s 3rd law of motion**).



“RELEASE”

Immediately following the completion of the push, the hands are lifted from the water with bent elbows, wrists remaining in a flexed position (see red focal circles). The elite paddler demonstrates this successfully, however my wrists are not only in the incorrect position, but my arm remains relatively straight at this phase.

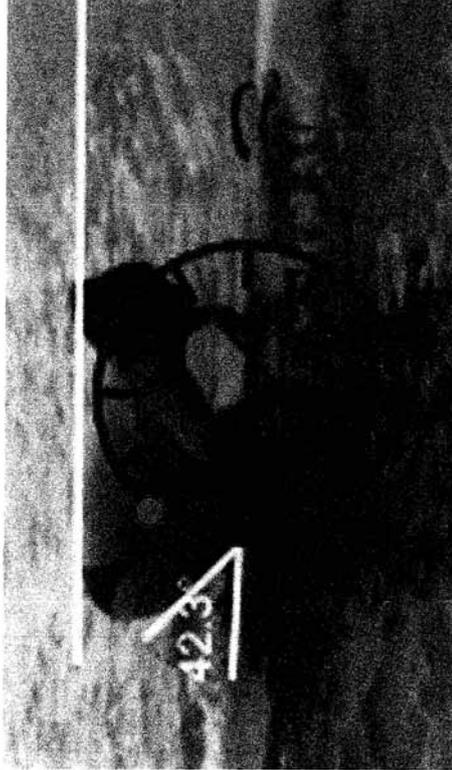
The elite paddler also demonstrates that the body should be lifted to begin the ‘recovery’ phase, so that the centre of mass remains at the same level throughout the stroke, and relinquishing the stress put on the quadriceps in particular.

- The height of my chin above the board and lower centre of mass in relation to the elite paddler’s shows that I have failed to achieve this, therefore my next stroke would be put at risk of being inefficient due to fatigue in this large muscle group.
- This also means my centre of mass is based lower over my base of support (green dot), and although this means I am more stable than the elite athlete, again it detracts my length of leverage, decreasing the amount of force exerted through this action.



“RECOVERY”

- Essential that the angle between the upper and lower leg is decreased, to ensure adequate release of tension in the quadriceps especially.
- This angle will alter the centre of mass once again inside base of support. – if my height of centre of mass was again increased slightly to that of the elite performer, it would enable greater leverage in the stroke to follow, allowing greater propulsion.



BIOMECHANICAL CHANGES TO TECHNIQUE

- ❖ Arm should be inserted slightly deeper into the water – increased leverage will mean for increased distance covered, therefore more force applied resulting in increased acceleration (Newton's 2nd law of motion).
- ❖ Increase angle between upper and lower leg
 - this will increase my height of centre of mass, allowing for increase in leverage and therefore increase in force exerted each stroke (propulsion).

CONCLUSION

Overall my performance of the technique of board paddling is fairly well developed.

However a few improvements could be made to improve leverage and hence force exertion and efficiency of my stroke. Once these biomechanical changes have developed, my performance will be biomechanically to that of an elite standard.

**Stage 2 Surf Lifesaving
COMMENTARY
'Skill Analysis in Sport'**

Reflection

Over the course of conducting this technique analysis on my own skill, I encountered a few difficulties in relation to acquiring relevant information on biomechanical principles for board paddling. Luckily I had enough basic knowledge of biomechanics in relation to other sports such as swimming, so was able to apply this to board paddling, however it was not until I spoke with a coach that I was able to gain any in-depth information for my analysis.

By using the software 'D: strengths and weaknesses were clearly evident when my video was shown next to that of an elite performer, even before the actual analysis was undertaken. When trying to identify specific areas for improvement, using 'snapshots' or 'key positions' ended up being the most effective method. This involved pausing the videoed techniques at the 'key positions' of the skill, and analyzing each of these individually. This enabled me to draw and comment on each of these, and compare my own snapshots with those taken of the elite performer. This meant I was pinpointing the sub routines that were incorrect and why they made my technique unsuccessful.

I had to ask a few coaches I knew interstate for some video footage of their elite paddlers in order to compare to my own video. I needed to make sure these were of similar angle to my video to correctly identify flaws in my technique. Without this component along with the advice of my own coach regarding the biomechanical factors for my technique, I feel my assignment would have lacked any depth and understanding of the concepts.

Although the differences in execution of technique of myself and the elite paddler were shown visually, understanding of biomechanical principles were essential in actually identifying what was inefficient or efficient about my technique in comparison to the elite performer. I found this to be the case when I approached a coach with what I had analyzed thus far on my own, and he simply asked me "why is this the case?" regarding most of my comparisons. He then encouraged me to do further research, giving me advice on which biomechanical concepts to concentrate on, and as my knowledge and understanding developed, so did my technique analysis.

The assignment has helped me to understand the connection between sports science and improvement in my performance. As I gained a better understanding of the biomechanical principles throughout the assignment, I was able to reflect on my technique and identify more and more areas for improvement. The understanding of biomechanical principles was crucial in being able to analyse the videos correctly and state why the components were inaccurate. If I am to truly progress in my sport, and develop my paddling technique to be as efficient as possible, I will need to even further my knowledge of biomechanics, seeking advice from different coaches in the field.

Assessment Comments

This response is illustrative of an A grade.

- KU1 Insightful and clear exploration of scientific principles and knowledge and skills of Physical Education which are skilfully incorporated to demonstrate thorough understanding of the learning interest. At each stage of the subroutine of the board paddling the student explains the link with the science of biomechanics and shows his understanding of how it connects to the learning interest. Sophisticated use of software in an appropriate manner clearly demonstrates understanding of key concepts related to the learning interest.
- KU2 Well-informed understanding of the learning interest and highly effective analysis of the specific sport technique. Highly effective incorporation of the relevant discipline knowledge to make detailed conclusions and reflections. Sustained understanding evident of how to apply biomechanical principles to enhance performance with well-informed detail at each key stage of the student's technique.
- AE2 Sustained and insightful evaluation of the contributions of Science and Physical Education when analysing various techniques, demonstrating an awareness of the significance and value of the contributions of each discipline.
- AE3 Reflective piece demonstrates well-considered reflection on the student's own learning and analysis of the strengths and limitations of the task.
- AE4 Perceptive evaluation of feedback from others is evident throughout, especially in the discussion. Feedback from D_____ and sports coaches, and examples of elite athletes, are used to evaluate strengths and weaknesses of the technique.

Performance Standards for Stage 2 Cross-disciplinary Studies

| | Knowledge and Understanding | Application | Analysis and Evaluation | Interaction and Communication |
|----------|---|---|---|---|
| A | <p>Insightful and sophisticated exploration of key elements of the relevant disciplines and their connections to the learning interest.</p> <p>Well-informed and highly effective understanding of the learning interest, incorporating specific discipline knowledge and skills.</p> <p>In-depth knowledge and understanding of the relevant capabilities.</p> | <p>Comprehensive integration and application of aspects of the relevant disciplines in familiar as well as complex, less familiar situations.</p> <p>Highly focused application of knowledge and understanding to solve problems with insightful creativity and initiative.</p> <p>Convincing and in-depth development of ideas, insights, and further questions.</p> | <p>Comprehensive analysis and evaluation of ideas and information from a variety of sources and perspectives to deepen understanding of the learning interest.</p> <p>Sustained and insightful evaluation of the contributions of the disciplines.</p> <p>Well-considered and substantive analysis of and reflection on the student's own learning.</p> <p>Perceptive evaluation of feedback from others.</p> | <p>Convincing and sustained demonstration of purposeful interactive and collaborative skills in a range of situations.</p> <p>Clear, coherent, and highly focused communication of understanding, reasoned conclusions, and new ideas and insights about the learning interest.</p> |
| B | <p>Well-considered exploration of key elements of the relevant disciplines and their connections to the learning interest.</p> <p>Well-informed understanding of the learning interest, incorporating discipline knowledge and skills.</p> <p>Well-informed knowledge and understanding of the relevant capabilities.</p> | <p>Well-informed integration and application of aspects of the relevant disciplines in familiar and less familiar situations.</p> <p>Well-considered application of knowledge and understanding to solve problems with creativity and initiative.</p> <p>Thoughtful development of ideas, insights, and further questions.</p> | <p>Detailed analysis and evaluation of ideas and information from a variety of sources and perspectives to deepen understanding of the learning interest.</p> <p>Sustained evaluation of the contributions of the disciplines.</p> <p>Well-considered analysis of and reflection on the student's own learning.</p> <p>Well-considered evaluation of feedback from others.</p> | <p>Mostly sustained and focused interactive and collaborative skills in a range of situations.</p> <p>Clear, coherent, and mostly focused communication of understanding, conclusions, and new ideas and insights about the learning interest.</p> |
| C | <p>Exploration of key elements of the relevant disciplines and their connections to the learning interest.</p> <p>Informed understanding of the learning interest, linked to discipline knowledge and skills.</p> <p>Informed understanding of the relevant capabilities.</p> | <p>Informed integration and application of aspects of the relevant disciplines in mostly familiar situations.</p> <p>Considered application of knowledge and understanding to solve problems with some creativity and initiative.</p> <p>Competent development of ideas and insights, and further questions.</p> | <p>Considered analysis and evaluation of ideas and information from different sources and perspectives to deepen understanding of the learning interest. Analysis sometimes tends towards summary and narration.</p> <p>Some evaluation of contributions of the disciplines, tending towards description.</p> <p>Considered analysis of and reflection on the student's own learning.</p> <p>Considered evaluation of feedback from others.</p> | <p>Competent interactive and collaborative skills in different situations.</p> <p>Generally clear communication of understanding, conclusions, and new ideas and insights about the learning interest.</p> |
| D | <p>Some basic connections between aspects of two or more disciplines and the learning interest.</p> <p>Awareness of aspects of the learning interest, discipline knowledge, or skills.</p> <p>Recognition of some of the capabilities.</p> | <p>Superficial integration or application of aspects of the relevant disciplines in highly familiar situations.</p> <p>Some creativity evident in occasional problem-solving.</p> <p>Some development of basic ideas and insights.</p> | <p>Partial summary of ideas and information, with some increased understanding of learning interest.</p> <p>Description of some elements of the contributions of the disciplines.</p> <p>Some reflection on the student's own learning.</p> <p>Basic consideration of feedback from others.</p> | <p>Simple interactive and collaborative skills.</p> <p>Basic communication of some ideas and insights about the learning interest, with some attempted conclusions.</p> |
| E | <p>Identification of limited connections between one or more aspects of disciplines and the learning interest.</p> <p>Emerging awareness of one or more aspects of the learning interest or skills.</p> <p>Identification of one or more capabilities.</p> | <p>Attempted application of an aspect of a relevant discipline.</p> <p>Attempted identification of a possible solution to a problem.</p> <p>Attempted development of an idea or question.</p> | <p>Simple summary of ideas and/or information that may have some relevance to learning interest.</p> <p>Attempted description of one or more elements of the contributions of the disciplines.</p> <p>Attempted description of an aspect of the student's own learning.</p> <p>Limited attempt at reflecting on feedback.</p> | <p>Attempted interactive and collaborative skills.</p> <p>Attempted communication of partially developed ideas that are not necessarily new.</p> |