SEGMENTAL ANALYSIS OF THE PAWLATA ROLL

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The segmental analysis of the canoe roll has been studied in an attempt to develop more effective instructional techniques for the novice. The main difficulty presented by the study was the integration of postural analysis of the physical skill with cinephotography and electromyography in the under water condition. Techniques for underwater cinephotography were easily obtained in this instance by the use of underwater inspection windows in a swimming pool. Underwater electromyography required some careful modifications of normal surface methods.

The exercise studied was the skill known as the 'Pawlata Roll'. This is performed in a closed Kayak where the initial position of the performer is inverted underwater. (The requirement is to right the Kayak with the performer, reaching the stable vertical position, (180° rotation). The Kayak paddle plays an integral part in this skill and for this reason the 'Pawlata Roll' is regarded as a simple canoe roll.

Methods:

The performer used was an experienced coach in the sport capable of repeating the roll with a minimum of time interval between repeats and with a high reproducible time for each roll. The action of the Pawlata Roll is shown in Fig. 1. The Kayak was a standard slalom model constructed of fibreglass. Minor modifications were made to permit attachment of recording cables to the Kayak from the electronic apparatus. This permitted rotation of the Kayak on its long axis without interrupting recording in a series of rolls. The frame recorder of a 16 mm. cine camera operating at 24 frames/second, was linked to a four channel pen-oscillograph. This was used to relate time (the time marker was not used), as indicated by the frame signal marker from the cine camera simultaneously to a channel of the oscillograph. Four muscles were studied by serially switched inputs to the oscillograph from a screened eight channel cable connecting to the muscle sites on the performer. Electromyography (e.m.g.) was by silverchloride surface electrodes.

Natural skin greases were removed from the attachment point of each muscle by irritation with a tooth brush and electrode jelly until there was capillary exposure. Grommet electrodes filled with electrode jelly were attached to the skin over the muscle belly by 'UHU' adhesive and waterproofed with 'Copidex', waterproof insulating tape placed over the electrode also gave additional anchorage. In other respects the technique was as described by Kamon 1965.

Results and Discussion

The recordings obtained, give an interesting demonstration of potential information from submerged water skills using synchronisation of cine-photography with a four channelled pen-oscillograph. Fig. 1 shows the myographic recordings related to six relevant positions traced from the cine frames.

(1) considerable common muscle activity is seen between the position on frame 19 where the Kayak reached 90° , and the position on frame 45 where the performer's head moves above the water. This corresponds to the 'hip flick'. In this action the Kayak is drawn under the body as the trunk goes to hyper-extension. This also reduces the moment of inertia of the body which facilitates easier rotation of the Kayak.

The main limitations of the study were two-fold:-

(1) the performer's fatigue in the later stages of the experiment could not be determined.

(2) the temperature of the water and surface air were not sufficiently high to allow efficient muscle contraction.

With this particular performer no significant change was recorded in the muscle activity pattern throughout the series of rolls. It is evident from the results that considerable effort is required for the 'hip flick' even by a skilled performer.

References

- Kamon, E. (1965). J. Appl. Physiol.
 Sutherland, C. (1964) "Modern Canoeing". Faber and Faber, London.