

Influence of archery handle bow, bow limb and arrows on international level archer's skill.

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Skill in archery directly depends on the interaction between the subject, the bow and the arrow when shooting. Researches in biomechanics of archery have frequently described the different coordination and muscular activation during the shoot of the subject. Few of them describe the influence of the bow (mechanical characteristics, stabilizers, etc.) on the subject's skill and physical capacities.

The aim of this study is to compare the influence of two bows on the subject's skill. An international level archer shot a sequence of twelve arrows (A1) X10, 380 (Easton) and a sequence of twelve arrows (A2) X10 Pro Tour, 380 (Easton). Each sequence of arrows were shot with two bows (B1: 27 inch Inno carbon bow handle associated with 70 inch and 38 lb bow limb, B2 : 25 inch Inno how carbon handle associated with 70 inch and 40 lb bow limb). All archers' shots were performed on a 70 in distant target. For each arrow, heights at shot (H1) and on the target (H2) were measured. The velocity (km.h⁻¹) of the arrow was recorded using Stalker ATS radar when it left the bow. The angle (α) between the arrow and the horizontal axis was estimated using the previous measurement and the Newton's law. Multi-varied Anova test was used to define the influence of bows and arrows on the shot parameter (V) and archer's skill (α , H2).

Results show that the use of the B2A2 condition would be the less interesting for this archer's skill in order to perform the centre of the target. Indeed, H2 with B2A2 condition is usually 10 cm above the centre of the target. The use of the B2A1 condition could permit the archer to perform the centre of the target as accurately as the BI conditions. When using B2A1 condition, a shot is realised with smaller velocity (219±0.3 versus 226±0 km.h⁻¹) and bigger angle α (5.45±0.3 versus 5.16±0.03 degree). For this archer, B2A1 condition could help him to reach the centre of the target with less energy to bend the bow and shoot with less velocity, and bigger range of angle when shooting (0.6 versus 0.08 degree).

Keywords: archery, skill, arrows, bow