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EXTERNAL FOCUS OF ATTENTION ENHANCES PRECISION IN RECREATIONAL ARCHERS

ZUNANJI FOKUS POZORNOSTI IZBOLJŠUJE NATANČNOST PRI REKREACIJSKEM LOKOSTRELSTVU

ABSTRACT

The studies confirm that instructions and feedback that induce external focus of attention (oriented on movement outcome) result with greater efficiency in motor performance and learning regarding internal focus of attention (oriented on bodily dimensions). Advantages and differences between external and internal focus of attention have been proved also in different levels of sport and recreational expertise. In this study, 10 recreational archers were tested in three different conditions: C1 - freely oriented focus of attention, C2 – internally oriented focus of attention, and C3 – externally oriented focus of attention. The subjects first undertook the C1 condition, and afterwards the next two conditions were randomly decided. According to the hypothesis, the main goal was to investigate the effect of external and internal focus of attention on precision of the shots. According to the results, in externally focused condition, recreational archers had better results than in other conditions with higher number of 9 points and lesser number of misses. Based on findings from this paper, adopting an external focus of attention should be beneficial for the shot precision, self-fulfillment and feelings of accomplishment in recreational archers.

Keywords: archery, constrained action hypothesis, shot accuracy

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IZVLEČEK

Raziskave potrjujejo, da imajo navodila in povratne informacije, ki sprožajo zunanji fokus pozornosti (usmerjen na rezultat gibanja), za posledico večjo učinkovitost motorične izvedbe in učenja v primerjavi z notranjim fokusom pozornosti (usmerjen na telesne mere). Prednosti in razlike med zunanjim in notranjim fokusom pozornosti so dokazane na različnih nivojih športne in rekreacijske sposobnosti. V tej raziskavi je bilo testiranih 10 rekreativnih lokostrelcev v treh različnih pogojih: C1 – prosto usmerjen fokus pozornosti, C2 – notranje usmerjen fokus pozornosti in C3 – zunanje usmerjen fokus pozornosti. Osebe so bile najprej testirane v C1 pogoju ciljanja, potem pa je bil vrstni red pogojev naključno izbran. Glavni cilj hipoteze je bil raziskati učinke zunanjega in notranjega fokusa pozornosti na natančnost zadetka. Rezultati so pokazali, da so imeli rekreativni lokostrelci ob zunanje usmerjenem fokusu pozornosti boljše rezultate kot v ostalih pogojih, večje število 9-ic in manj zgrešenih strelov.

Ključne besede: lokostrelstvo, hipoteza omejene aktivnosti, natančnost zadetka

INTRODUCTION

The kinesiological analysis of archery identifies a monostructural acyclic activity in which dominates relatively statical lower body posture and discrete active coordination of shoulder girdle and arms, divided into several phases or elements of technique (Mann and Littke, 1989; Vrbik, A., Bene and Vrbik, I., 2015). The elite performance of archery technique is characterized by the ability to repeatedly hit the same spot in the space (center of the target) in specific time with high accuracy and precision. In order to do so, an archer has to perfectly perform elements of technique by precise repetition of all kinematic parameters of chosen i.e. key body coordinates with the consequence of accurate and desired positioning of the arrows in the target. The key factors of success in archery imply general motor abilities such as strength, endurance, balance and flexibility (Acikada, Ertan and Tinazci, 2004), but also specific motor abilities characteristic for archery itself (intermuscular coordination, rhythm, timing and precision). Different psychological factors also play an important role, such as concentration, relaxation and different types of attention (Zeplin, Galli, Visek, Durham and Staples, 2014), accompanied by visual focus (Acikada et al., 2004; Lee, 2009). As in all master performances, weather it is about playing a piano or hitting a target, a mindful repetition is a prerequisite of skill acquisition and later excellence. Unfortunately, sometimes it means spending hours and hours of long practice trying to brush the specific element or movement to perfection. In the field of sport it is considered to be quite an usual request, but in the field of sport recreation rules are a bit different (Andrijašević, 2010). As a professional kinesiologist in sports recreation one faces relatively smaller exercise time on hand, but very soon high performance outcome wishes from the clients. In recreational archery very often anecdotal stories evidence statements from the people who “want to shoot just a little and see how it goes” to “I am not satisfied with today’s shooting because I cannot hit what I want” in only a few weeks of practice. Why is this so? Since archery is a static sport, in recreational users a general fitness is not highly important for successful beginning of the activity. As they progress in training and practice, they also progress in performance, but since archery is an activity which requires a lot of accurate body posture repetition, a certain discrepancy from the expected progress occurs. In this paper the intention was to address this problem and see if through different focus of attention during shooting execution, some changes in precision in recreational archers can occur. Different effects of external versus internal focus of attention have been explained with the constrained action hypothesis (Wulf, McNevin and Shea, 2001), which states that an internal focus on the body parts causes individuals to control their movements at a more

conscious level, while a focus on the movement effect promotes a more automatic mode of control. Consequently, individuals tend to constrain their motor system by interfering with automatic control mechanisms that have the capacity to control movements effectively and efficiently. During years of research, focus of attention was observed from different aspects and was characterized as associative (focused on body senses) or dissociative (blocking of senses created by physical labor), wide or narrow, and by direction (internal or external). Many researches in sport tried to investigate different focus of attention: in golf, basketball, baseball, tennis, darts, swimming, high jump, volleyball and in football (An, Wulf and Kim, 2013; Lohse, Jones, Healy and Sherwood, 2013). Advantages and differences of different focus of attention were proven in different levels of sports expertise (Wulf and Su, 2007; Memmert, 2009; Vickers, 2010; Neumann and Thomas, 2011; An et al., 2013), and also in retention and transfer (Carpenter, Lohse, Healy, Bourne and Clegg, 2013). The main purpose of this paper was to investigate if different focus of attention has any impact on precision in recreational archers during archery practice sessions.

METHODS

Participants

The subject sample was consisted of 10 recreational male archers, with average age 29.8 years, all without any attention disorders in their anamnesis. Subjects were training 2 times per week on average, and had no more than one year of shooting experience. All subjects gave their written consent for participation, and this particular survey was approved by Science and Ethical Commission on Faculty of Kinesiology in Zagreb.

Protocol

The sample of variables came out from observed characteristics of entities in different shooting conditions. Therefore, in order to estimate shooting precision, a measure of arrow distance from the center of the target face was used, shown as a number of points in a standard way of scoring. The experiment was made in standard conditions of indoor field set-up, target placed at 18m distance, and target face standard triple ϕ40mm, with center target face positioned at 1,30m. One target face consisted of 5 concentrically placed circles valued 10 to 6 from approved standard equipment. The experiment was divided in three separate measures for each subject. Every measurement consisted of warm up (3 ends x 3 arrows) and testing (10 ends x 3 arrows).

Estimated time of warm up and testing by subject was about 45 minutes. The testing consisted of three different shooting conditions: C1- free focus of attention, C2 – internal focus of attention and C3 – external focus of attention. All subjects were first measured in C1 condition and then in C2 or C3 by a random choice. According to World Archery rules and regulations, the allowed time for one end, consisted of three arrows, is 120 seconds. Every archer set his own rhythm and tempo in each end. Between ends, the estimated time for rest was that needed for the arrows to be picked up from target and results scored (approx. 90 sec.). In all three conditions, subjects were told to try to be as much precise as they can. In C1 condition subjects got no special instructions. In other two conditions, subjects were directed via verbal instructions on different aspects of shooting: C2 – coordinated arms movement and release (movement of the body parts – internal focus), and C3 – on center of the target (bull's eye) and arrow flight (movement effects – external focus of attention). Concretely, in C2, before every end (10 ends in sum), an archer received a following instruction: "Focus on movement of your arms and shoulders and smooth release. If you are restless and experience tremor in bull's eye try to fix it in a way to concentrate on better push – pull action and patiently waiting for a smooth surprising release. Try to be as precise as you can." In C3, archers received following instruction: "Focus on bull's eye and arrow flight. If you are restless and experience tremor in bull's eye try to fix it in a way to concentrate on your sight's pin and letting it melt with the center and on the follow-through and arrow flight. Try to be as precise as you can." (Lohse, Sherwood and Healy, 2010; Lohse et al. 2013). The praxis in social experiments often imply a manipulation check, which is an additional check consisted of qualitative data and provides a researcher certain proof that measured variables truly reflect observed characteristics (Peh, Chow and Davids, 2011; Abdollahipour, Psotta, Nieto, Rouzbahani, Nikdast and Bahram, 2014). In case of this experiment, after every end in C2 and C3 conditions, the subjects were asked if they complied to the condition instructions in order to interpret obtained data with maximum certainty. The subjects were clearly informed that their honest feedback is very important for the experiment, and were encouraged in sense of giving as straight answer as possible.

Statistical analysis

Central and dispersive parameters were calculated for all variables. Since there was a deviation from normal distribution, as a non-parametric alternative to one factor ANOVA for repeated measures, Friedman's test was used, along with Wilcoxon's test of ranks.

RESULTS

In every shooting condition recreational archers shot 300 arrows, i.e. 900 arrows in sum (3 conditions x 300 arrows). In control condition C1, from possible 3000 points, archers shot 1826, from which 38 6s', 53 7s', 59 8s', 55 9's and 26 10s'. 69 times archers missed the target (mod value). The average shot was 6.09±3.51SD. In internal shooting condition C2, archers shot 1798 points from which 27 6s', 46 7s', 67 8s', 52 9's and 31 10s'. 77 times archers missed the target (mod value). The average shot was 5.99±3.68SD. In external shooting condition C3, archers shot 1969 points from which 35 6s', 48 7s', 61 8s', 75 9's and 26 10s'. 55 times archers missed the target. The average shot was 6.56±3.31SD.

Table 1. Descriptive parameters and the results of the Friedman's ANOVA and Wilcoxon's test of ranks.

S.C.	N	POINTS	Mean and S.D.	NO.OF 10's	F.A.	W.T.
C1	300	1826	6.09 ± 3.51	26		C1:C2
						p = 0.920
C2	300	1798	5.99 ± 3.68	31	p = 0.038*	C1:C3
						p =0.023*
C3	300	1969	6.56 ± 3.31	26		C2:C3
						p =0.012*

SC – shooting condition, N – number of arrows per condition, POINTS – sum of points shot, Mean – mean of the points scored, S.D. – standard deviation of the points scored, No. of 10's – number of 10 points scored, F.A. – Friedman's Anova, W.T. – Wilcoxon test of rank, * - statistically significant difference.

Table 1. shows that the best results were obtained in C3 condition of shooting (external focus of attention), and the worst results in C2 (internal focus of attention). Friedman's Anova showed significant difference between different shooting conditions. Wilcoxon test of rank showed that significant differences were found between C1 and C3, and C2 and C3 shooting condition. In C3 shooting condition archers had the lowest number of misses (0 points), 22 less than in C2 shooting condition, and notably larger number of 9s' (C1:C2:C3 – 55, 52, 77), indicating better arrow grouping and better shot precision.

DISCUSSION

Precision is defined as a qualitative motor ability which allows one to hit a certain dinamic or static target at a given distance by throwing or aiming (Milanović, 1997). In archery, precise shot is a result of a meticulously accurate movement performance related with specific coordination based on kinesthetic information from the memory and receptors and perfect balance and harmony with the visual target (Milanović, 1997; Čižmek, 2007; Čižmek and Peršun, 2011; Vrbik et al., 2015). Archery is a precision sport, meaning that it is an absolute imperative to hit a center of the target as frequent and as accurate as possible (Podržaj, 1998; Frangilli V. and Frangilli M., 2005). In this experiment, external focus of attention contributed to better results and higher precision in compare to internal focus of attention or non-guided condition (no instruction on focus localization). In many studies which dealt with different focus of attention and its impact on precision, similar results were obtained. Wulf, Lauterbach and Toole (1999) observed two groups with two different intervention focus (external and internal) in golf. Better precision was noticed in both groups along the experiment duration, but significantly better, i.e. precise results had the external focus group. Better precision in external focus of attention over internal focus of attention was also noted in volleyball players during tennis serve (Wulf, McConnel, Gaertner and Schwartz, 2002). Similarly, Zachry, Wulf, Mercer and Bezodis (2005) tested precision in basketball players during free throw. The external focus group had better precision and more accomplished free throws then internal focus group. Although recreational archers have respectively smaller number of hours of practice and absolutely different initial drive to train in compare with expert archers, the nature of archery as a sport always makes one tend to be perfectly precise. Unlike expert archers who accomplish automated movement with more ease due to the significantly higher time engaged in the activity, along with the more perfected planning and programming of the training process, recreational archers due to their occasional participation in the activity tend to spend a lot of time thinking and analyzing their technical performance in order to be able to shoot and be satisfied with the shot. Therefore, thinking of bodily parts during shot execution and overtaking internal focus of attention is very common among recreational archers. Additionally, no significant differences in precision between control condition and internal focus condition were found. Something similar was observed in the experiment of Wulf and Su (2007), who noticed that although one would expect individuals to adopt the optimal focus of attention in a non-guided condition (control), studies have shown that when participants do not receive attentional focus instruction, their performance is typically similar to that seen under internal focus

condition and less effective than under external focus condition. This suggests that individuals tend to use lower than necessary level of control as they incline to be relatively cautious when confronted with a complex task.

Limitations and strengths

It is important to mention that this paper also has certain limitations. Higher number of subjects would definitely give more reliable results on the matter. Unfortunately, archery is a relatively small sport, and recreational subjects were not easy to find and measure. For future studies it would be interesting to find out at what point exactly after acquiring archery technique starts a beneficial time of overtaking external focus of attention in recreational archers, and the exact pace of distancing the focus of attention.

CONCLUSION

Wulf and Prinz (2001) referred to Bliss (1892-1893) and Boulder (1935) who investigated researches from the end of the 19th century which engaged in studying distracting nature of excessive attention of a well-rehearsed activity. In many cases it was confirmed that specifically oriented focus of attention can have an impact on individual's motor performance and learning (Wulf and Prinz, 2001; Wulf, 2013). This paper investigated the influence of different focus of attention in recreational archers, and its impact on shot precision. Recreational archers demonstrated better shot precision when adopting external focus of attention, which is coherent with previous research of focus of attention. These findings are important from the recreational point of view, especially for the practitioners who plan and program recreational activities. The whole meaning behind the external focus of attention lies in redirecting one's attention to as distal possible point in order to allow body dimensions to self-tune in an optimal manner with the highest possible outcome. This is also connected with the quiet eye period (Vickers, 2010), and both terms are associated with anecdotal evidence of the zone or the flow. Why is this important? The main purpose of recreational archery programs is to allow its consumers safe environment in which they can relax, adopt a calm breathing manner, stretch and strengthen their muscles in fluent and low impact mode and enjoy the true essence of archery, and that is to hit the targeted area with ease, provoking only good emotions and well-being. In order to do so, professional practitioners are frequently put in a position of balancing between insisting and "drilling" on movement technique and outcome result recognized in points shot, losing the core essence of recreation. Therefore, based on findings from this paper we would suggest adopting

internal focus of attention for the period of acquisition of the motor skills in early stages of motor learning, but afterwards, adopting an external focus of attention should be beneficial for the shot precision, self-fulfillment and feelings of accomplishment in recreational archers.

Declaration of Conflicting Interests

The authors declare that they have no conflict of interest.

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