

# 弓道実技上達のための「動作訓練」効果

今野 義孝

## The effects of “DOHSA” training for improving the performance of Japanese archery

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The present study aimed to examine the effects of “DOHSA” training for improving the performance of Japanese archery. In Japanese archery, self-control of body and mind processes is considered important factor to lead a successful performance. Shooting an arrow comprises the eight consecutive stage of motions : “ASHIBUMI 足踏み” (standing firmly on the ground with legs open), “DOHZUKURI 胴造り” (keeping a balance in a standing posture by putting the body weight on the waist), “YUGAMAE 弓構え” (preparing for UCHIOKOSHI with holding a bow in a left hand and an arrow in a right hand), “UCHIOKOSHI 打起し” (moving both hands upward slowly), “HIKIWAKE 引分け” (drawing the bow to the full with moving both hands in equal strength), “KAI 会” (preparing for releasing an arrow with holding HIKIWAKE posture), “HANARE 離れ” (releasing an arrow), “ZANSHIN 残身” (a standing posture after releasing an arrow).

Among these eight stages of motions, the most fundamental one is “DOHZUKURI”, because the successful performance of Japanese archery depends heavily on keeping a balance of a standing posture by relaxing the extra body tension in upper part of body. Based on a stable motion of “DOHZUKURI”, players come to be able to concentrate on both motor and inner activities and to control both body and mind processes while shooting an arrow. When players fail either in keeping a balance in a standing posture or in controlling body tension, they can hardly concentrate on motor and inner activities, and lose a control of body and mind processes. Therefore, for the purpose of improving the performance of Japanese archery, establishment of self-control over body and mind processes is regarded as an essential part of training programs.

With respect to this point, “DOHSA” training is considered an effective method. “DOHSA” training was originally developed by G. Naruse (1973) for the purpose of improving motor control in children with cerebral palsy. The main program of “DOHSA” training consists of relaxation of body tension, and controlling of movement and posture. Further, many studies have de-

monstrated that "DOHSA" training makes an important contribution to the development of self-control in children with severe emotional problems (Konno, 1978 ; Iijima, 1986 ; Konno, 1990 a). Recently, "DOHSA" training has been applied to the field of sports psychology for improving self-control of both body and mind processes (Hoshino, 1982 ; 1988). These studies indicate that "DOHSA" training is an effective method for improving self-control of both body and mind processes. Therefore, in this study the author attempts to examine the effects of "DOHSA" training for improving the performance of Japanese archery.

## Method

### Subjects

Twenty-two students belonging to the Japanese archery club of Bunkyo University participated in this study. These subjects were assigned to two groups matched for their careers. Each group size was eleven.

### Experimental procedures

To examine the effects of training of relaxing body tension and of keeping a balance using "DOHSA" training for improving the performance of Japanese archery, the same experiment was repeated under two different conditions. In Condition 1, one of the groups of subjects executed shooting trials without receiving "DOHSA" training, on the other hand in Condition 2, another group of subjects executed the trials immediately after receiving "DOHSA" training.

Each group was tested twice using a counter-balanced method. One of the groups of subjects were tested at first in Condition 1 and next in Condition 2, and another group of subjects were tested in the reverse order, at intervals of one week, respectively.

The experiment was carried out during the off-season of Japanese archery club activities to cancel a repeat effect of the experiment as well as to avoid daily practice effects. Prior to execute the experimental trials, the subjects were admitted to execute four trials as a practice. The numbers of trials in the experiment was eight.

In this study, data were collected for hit ratio measure, body weight shift measure, and psychological measures.

### "DOHSA" training

The tasks of "DOHSA" training used in this study were as follows. (1) Relaxation of shoulder and back regions : The subjects sat with their legs crossed. The trainer held their shoulders with his hands and leaned their trunks back to relax their shoulders and backs as shown in Figure 1 -a. (2) Keeping upright position in sitting : The subjects sat with their legs crossed and moved their waists and backs upward without tensing the neck and the shoulders regions. When the movement of the waist and the back was accompanied with excessive muscular tension either in the neck or the shoulder regions, the trainer blocked their arms and the necks with his hands and made clear the sense of the movement of the waists and the backs as shown in Figure 1-b. (3) Keeping a balance in a standing posture : The subjects stood firmly on the

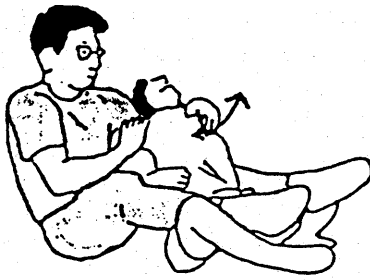


Fig.1-a

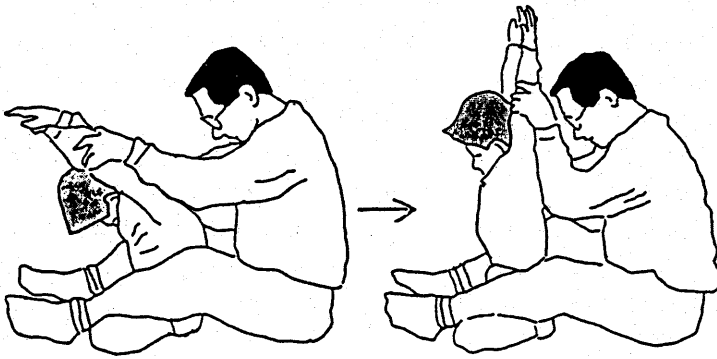


Fig.1-b

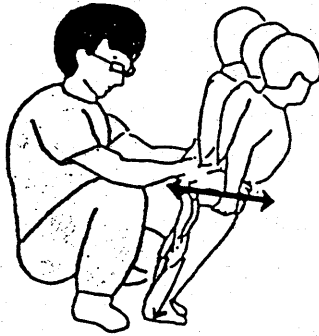


Fig.1-c

Figure 1. Tasks of "DOHSA" training

ground and kept a balance in a standing posture. The trainer held their waists and leaned their bodies forward to make them clear the sense of standing firmly on the ground as shown in Figure 1-c.

### **Hit ratio measure**

The total numbers of trials were 176 in each experimental condition. And the percentage of the number of trials hitting the mark was obtained as a hit ratio measure.

### **Body weight shift measure**

In this study, only the measure of forward-backward body weight shift was used, because in Japanese archery, keeping a balance in a standing posture is realized by shifting body weight forward. To measure the body weight shift while performing Japanese archery, the subjects stood on a wooden board (90 cm by 90 cm in width) attached to the surface of a statograph (NIHONDENKISANEI 1 G 06). The data of body weight shift were recorded using a polygraph (NIHONDENKISANEI 8 S 63), with time constant 1.5, calibration 1 cm/1 mV, and paper speed 1 cm/sec, respectively. And these data were also registered using a data recorder (SONY FC-14). These data were sampled at the following stages: DOHZUKURI, UCHIOKOSHI, HIKIWAKE, KAI, and HANARE, respectively, and obtained the integrated values.

### **Psychological measures**

In order to assess inner experience of the subjects while performing Japanese archery, they answered a following questionnaire after finishing a total of eight trials using a five-point-rating scale and assigned the score from 1 to 5, respectively.

- (1) feeling of psychological tension throughout the performance.
- (2) feeling of body tension throughout the performance.
- (3) adequate feeling of DOHZUKURI by keeping a balance in a stance putting body weight on the waist.
- (4) feeling of body tension at UCHIOKOSHI.
- (5) adequate feeling of KAI by perceiving body sensations as expanding in an up and down and right-left direction.

In addition, inner experiences of the subjects were also assessed by their introspective reports.

## **Results**

### **A comparison of hit ratio between the two conditions**

An average hit ratio in Condition 1 in which the subjects carried out the trials without receiving "DOHSA" training was 38.6% (60/179), whereas that of Condition 2 in which the subjects executed the trials immediately after receiving the training was 57.9% (102/176). A statistical analysis for hit ratio using chi-square test revealed a significant difference between the two

conditions. This result indicates that a remarkable improvement in hit ratio can be brought about through "DOHSA" training.

### Comparisons of magnitudes of body weight shift between the two conditions

Figure 2 shows comparisons of average integrated values (mV) as the measure of magnitudes of body weight shift. Inspection of this figure shows that in each experimental condition an average value increased sharply from DOHZUKURI to UCHIOKOSHI then gradually increased to reach the peak level at KAI, and finally at HANARE it returned to that of DOHZUKURI. However, average values of Condition 1 were larger for all stages in comparison with those of Condition 2. Two way analysis of variance revealed significant effects for conditions and stages (Conditions  $F=7.219$ ,  $df=1/210$ ,  $p<.01$  Stages  $F=24,192$ ,  $df=4/210$ ,  $p<.001$ ).

Theses results indicate that in Condition 1 the subjects attempted to make DOHZUKURI by excessive shifting of their body weight forward.

### Comparisons of magnitudes of body weight shift between hit and missed trials

Comparisons of magnitudes of body weight shift between hit trials and missed trials are shown in Figure 3. Inspection of this figure indicates that in Condition 1 average values of hit trials were larger than those of missed trials at KAI and HANARE. On the other hand, in Condition 2 average values of hit trials were smaller than those of missed trials at all stages. However, two way analysis of variance carried out in each experimental condition independent-

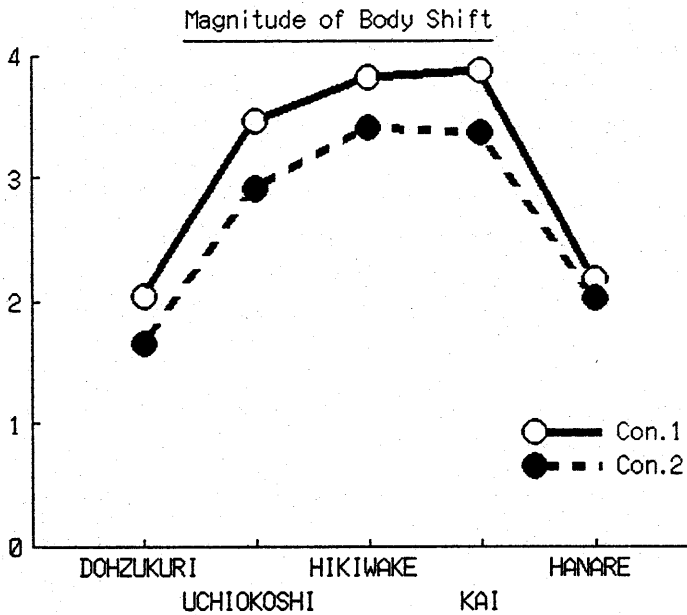


Figure 2. Comparison of magnitudes of body weight shift between the two conditions

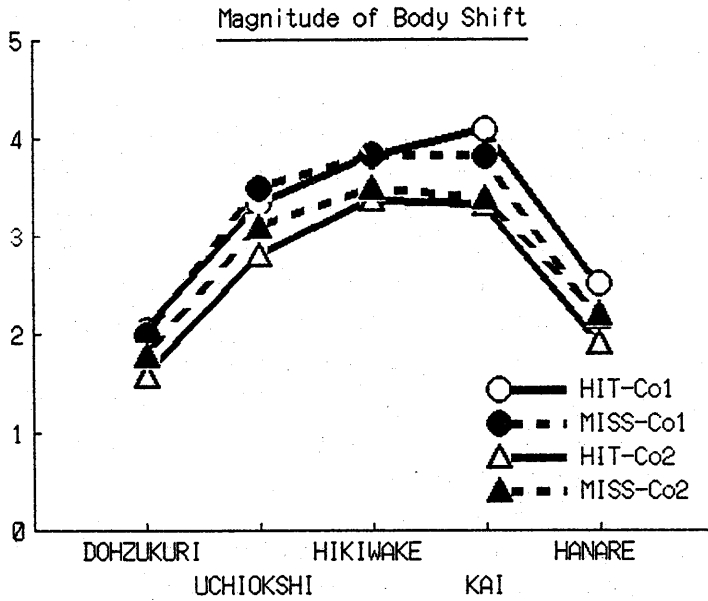


Figure 3. Comparison of magnitudes of body weight shift between hit and missed trials

ly revealed no effect for hit or missed, but revealed for stages (Condition 1  $F=18.54$ ,  $df=210/1$ ,  $p<.01$ ; Condition 2  $F=13.180$ ,  $df=1/210$ ,  $p<.01$ ).

#### Comparisons of scores of questionnaires between the two conditions

Table 1 shows comparisons of rated scores in each question between Condition 1 and Condition 2, as well as between hit and missed trials. There were no differences in rated scores between hit and missed trials for all questions. However, comparisons of scores as a whole indicated that scores of Condition 1 were larger than those of Condition 2 for “feeling of psychological tension” ( $F=25.78$ ,  $df=1/84$ ,  $p<.01$ ), “feeling of body tension” ( $F=11.94$ ,  $df=1/84$ ,  $p<.01$ ), and “feeling of body tension at UCHIOKOSHI” ( $F=8.71$ ,  $df=1/64$ ,  $p<.01$ ). On the other hand, scores of Condition 2 were larger than those of Condition 1 for “adequate feeling of

Table 1. Comparisons of psychological states between the two conditions

	condition 1		condition 2	
	hit	missed	hit	missed
psychological tension	2.2	2.2	1.2	1.2
body tension	2.1	1.9	1.3	1.4
feeling of DOHZUKURI	3.2	2.8	3.7	3.5
tension at UCHIOKOSHI	2.2	2.1	1.6	1.6
feeling of KAI	2.5	2.3	3.1	3.2

DOHZUKURI" ( $F=7.01$ ,  $df=1/84$ ,  $p<.01$ ), and "adequate feeling of KAI" ( $F=13.90$ ,  $1/81$ ,  $p<.01$ ).

According to the introspective reports concerning alteration of inner states, the number of subjects stated that their concentration on both body and mind processes increased remarkably, and perceived a sense of stability in breathing or in heart beat while executing the trials in Condition 2.

## Discussion

In this study, the subjects gained significantly high hit ratio after receiving "DOHSA" training. However, these values were not so high in comparison with those of achieved in a competition. Usually, since they have no practice in the off-season, their performance are not up the mark. Therefore, in this study, this result might simply reflect a temporal recovery of their initial values.

However, according to the results of both the questionnaire for their psychological states and their introspective reports for inner experience, "DOHSA" training might improve the abilities of self-control of psychological states as well as of motor action to result in a better performance of Japanese archery. Therefore in this study, the author attempted to discuss the effects of "DOHSA" training in terms of self-control of body and mind processes from clinical view points of changes of standing posture, body-image and "DOHSA sensation".

Recently, the importance of postural training has been insisted for establishing self-control ability in children with motor difficulties or emotional difficulties. This training method is called "TATEKEI DOHSA" training. The main program of "TATEKEI DOHSA" training are as follows ; keeping an upright posture by moving the waist in sitting position with legs closed, or keeping a balance in standing on-the-knees position.

Iijima (1986) has reported the improvement of self-control of emotional activities as well as body activities in children with kyphosis and lordosis through postural training. Konno (1986) also has reported the improvement in emotional behavior, attentional behavior, goal-directed behavior, or in interpersonal communication through postural training. According to Naruse (1988), "TATEKEI DOHSA" training has the advantages of making inner experience of "the sense of self body" and "image of self body", and also the "sense of self" and "image of self" vivid and clear.

It has been indicated that muscular relaxation training may improve body-image. The term, body-image, used here refers to the body as a psychological experience and focuses on the individual's feelings and attitudes towards his/her own body. Body-image is built based on the body experience especially for sense of muscular tension-relaxation. Through perceiving the differential sense of muscular activities, one can recognize one's body as one's own, and in turn realize an adequate relationship between mind and body.

Konno et al. (1987) and Konno (1989 a) examined the effects of muscular relaxation on changes of body sensations and body image in normal adults. As a result, they found that awareness of body sensations improved remarkably, and based on this improvement highly

reorganized body-image was brought about. In further study, Konno (1989 b, 1990 b) examined the changes of self-image through muscular relaxation in normal adults and found that after relaxing muscular tension changes of positive self-image such as "self-fullness" and "positive self-estimation" were brought about based on changes of body-image such as "sense of enlargement of body and of increased body activities".

Naruse (1982) proposed a schematic relationship between mind and body. According to his scheme, the linkage between mind and body is supported by two kinds of kinesthetic sensations; "DOHSA (action) sensation" and "UNDOH (motor) sensation". "DOHSA sensation" corresponds to an efferent information which conveys the motor intention to the body to realize a particular movement, while the "UNDOH sensation" refers to an afferent or a feedback information provided by a particular body movement. Usually, we are not necessarily aware of these informations while performing a movement which have already become automatic. However, when performing an unfamiliar movement, "DOHSA sensation" especially plays an important role.

Konno (1986) examined the changes of "DOHSA sensation" through muscular relaxation, and its role for performing an arm movement. The task was moving an arm from the bottom to the top slowly. As a result, after relaxing the shoulder, they perceived "DOHSA sensation" clearly, which spread from the shoulder and to the tip of fingers. Based on these experiences, they realized that the arm movement was executed according to their intentions. In addition, through the arm movement, they could feel a vivid and vital body-image of their shoulders, and they also felt a vital self-image emerge from the relaxed body region. This result indicates that muscular relaxation makes "DOHSA sensation" clear, and with this sensation, we can realize our mind and body working together in harmony. These inner experience probably contribute to improvement of the performance of Japanese archery.

### Conclusion

In this study, the author examined the effects of "DOHSA" training for improving the performance of Japanese archery. Main results were as follows:

- (1) After receiving "DOHSA" training, the subjects improved concentration on both body and mind processes and made successful performance as shown in remarkable increasing of hit ratio.
- (2) With regarding to magnitudes of body weight shift, the subjects came to be able to keep a balance by making body weight shift adequately after receiving "DOHSA" training.
- (3) Regarding alteration of inner experience, the subjects came to be able to control both psychological and body tension, and perceive sense of stability in body and mind.

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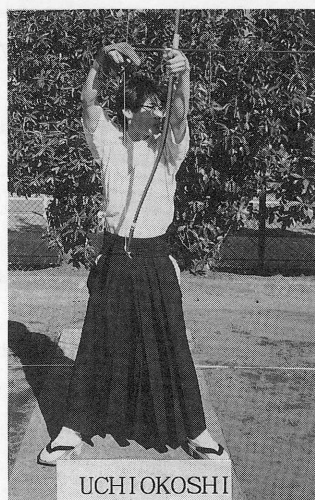
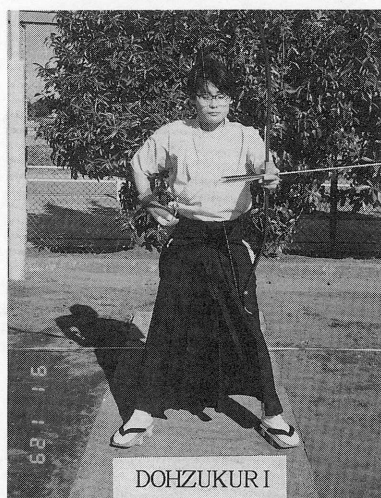
## SUMMARY

### THE EFFECTS OF "DOHSA" TRAINING FOR IMPROVING THE PERFORMANCE OF JAPANESE ARCHERY

The present study aimed to examine the effects of "DOHSA" training for improving the performance of Japanese archery. In Japanese archery, self-control of body and mind processes is considered an important factor to lead a good performance.

Twenty-two students belonging to the Japanese archery club of Bunkyo University participated in this study. The subjects were assigned to two groups matched for their careers.

The same experiment was repeated under two conditions using a counter-balanced method. In Condition 1, the subjects executed shooting trials without receiving "DOHSA" training, while in Condition 2, they executed the trials after receiving "DOHSA" training. In this study, data were collected for ratio of hitting the mark, weight shift forward and backward using a statog-



raph, and psychological states using a questionnaire.

The task of "DOHSA" training were as follows : relaxation of shoulders and back regions, keeping upright in sitting, and keeping a balance in standing posture.

Main results were as follows : After receiving the training they improved concentration on both body and mind processes and hit ratio increased remarkably, came to be able to keep a balance by making body weight shift adequately, and came to be able to control both body and mind, and perceive a sense of stability in body and mind.

The author attempted to discuss the effects of "DOHSA" training in terms of self-control of body and mind processes from clinical view points.

(注) 本研究は、平成2年度特殊教育専修卒業論文として、筆者の指導のもとで片桐春美が行った実験にもとづいて、その後、筆者が追試を実施し、データをまとめなおしたものである。なお、本研究は、日本催眠医学心理学会第37回大会(1991, 早稲田大学)と First Asian South Pacific Association of Sports Psychology International Congress (1991, Melbourne, Australia)において口頭発表したものである。