EVALUATION'S CRITERIA DURING PRACTICE OF SERVICE IN TENNIS

A. MAVVIDIS[1]   V. KORONAS[1]   G. DALLAS[2]

Abstract: *The purpose of this study was the practice of service in tennis into 6 teaching units (3*2 hours) and application of evaluation's criteria in this motor skill. The sample consisted of 101 novices' students of physical education, aged 19-20 years old (59 male and 42 female). After the end of practice an assessment of these criteria were done in this motor skill. Although, five criteria was proposed initially, after statistical analysis (correlation, factorial analysis) four criteria were accepted: "timing", "ball throw", "racket swing", and "body movement". Furthermore, the present study proposes norms to these criteria to evaluate service during practice in novice players.*

Keywords: *Timing, ball throw, racket swing, body movement, norms.*

1. Introduction

A necessary procedure in sports is the evaluation of technique during practice, which contributes to learn the effective technique and to avoid injuries (Miyashita et al., 1980; Durovic, 2008). This evaluation, especially in verbal-cognitive stage (first stage-novice players) is a difficult procedure that demands practicing a great number of students (sample) in long term and to evaluate that stage, where a comparison was made in technique's effectiveness with valid and reliable tests. Focusing on only one motor skill, as throwing, and on particular level, is an advantage to researchers to evaluate this skill. Service in tennis, as the first movement from stunt position, is a basic element for further assessment. To this sense, video analysis is a traditional way that applied in competitive level to evaluate service in tennis (Tetu 1977; Elliott et al., 1986; Elliott 2006; Subijana.& Navaro, 2009). On the contrary, there were previous data that examine service from methodological point of view in tennis. Results of Bouchard and Singer (1998), that examined learning procedure on service via video, with graphic feedback and without feedback, didn't find statistical differences between these two situations. In verbal-cognitive stage it is recommended a simultaneously observing by two examiners (judges) with uniform criteria (Tetu, 1977). The purpose of the present study was to evaluate service's technique in tennis, using five criteria, based on previous research that follow a similar methodological way (Messick, 1991) or with six criteria (Rose et al., 1990).

---

[1] Democritus University of Thrace, Department of Physical Education and Sport Science.
[2] National end Kapodistrian University of Athens, Department of Physical Education and Sport Science.

2. Method

One hundred-one novice students with no previous experience in tennis (59 male, 42 female) with a mean age 18,00±1,60 years old, volunteered to participate in this study. A pre test was done to evaluate the initial level of learning, after which followed a practice of three teaching units of two hours each one. After the end of practice a post test, for 87 subjects (59 male, 28 female) was done to evaluate the level of learning, from two examiners (experienced teachers), which evaluated 5 basic parameters (timing, ball throw, effectiveness, racket swing, body movement) and sixteen sub-parameters in total (table 1). The rest subjects were withdrawn from the study. A minute rest was given between each exercise. In each criterion there was a different result. According to table 1, e.g. for effectiveness the best score was 10, meanwhile for ball throw was twenty. Each subject performed 10 services and two examiners independently each other evaluated the five basic parameters. A correlation coefficient was done initially, following a factor analysis of these 5 criteria to evaluate their contribution to the general performance of service and one way ANOVA to evaluate the differences between the two sexes.

Five basic criteria and their sub-parameters on service evaluation   Table 1

Score 1=no good, 2= almost good, 3= good, 4= a lot of, 5= very good	1-5	1-5	1-5	1-5
1. **timing** Max=15	Opposing swing on hands' movement	No interval movement	Ball throw in correct point (an almost straight hand)	
2. **ball throw** Max =20	Straight hand during throw	No bending on the knee during throwing	Ball position in vertical in correct height (20-30cm higher to the contact point)	Transfer body weight to the supported-leading leg
3. **effectiveness** Max =10	target, from 10 services, (1-2 no good, 3-4 almost good, 5-6 good, 7-8 a lot of good, 9-10 very good)	velocity (1-5, evaluation scale)		
4. **racket swing** Max =20	Toss	Backscratch	Contact point	Follow through
5. **body movement** Max =15	Correct turn on shoulder's axis	Bending-straighten on knees with correct timing	Correct stepping (no in advance movement in the front	

3. Results

Reliability of measurements was statistical significant (r>.8). Evaluation's results, frequency and percentage of each summarized score are presented in table 2. A low score was presented in "body movement" during throwing. In figure 1, score is given in these criteria in percentage base, with standard deviation. Correlation coefficient between five basic criteria in sixteen sub-parameters in both measurements (first and second test) was remaining in same level of significance (table 3). Contribution of effectiveness appeared in lower level in both measurements. Factorial analysis of five basic parameters was done to show the contribution of each one in this general evaluation on service in tennis. In this statistical analysis effectiveness appears to be in very low score, in relation to the rest four criteria. But extracting this parameter, rest parameters continue to remain in high level (table 4), and this is the main reason upon which we conclude to four criteria. There were not statistical significant differences between gender and service sub-parameters, except "ball throwing" and "ball velocity" ($p<.05$).

Evaluation score in five basic criteria in service measurement Table 2

timing (3 parameter)			ball throw (4 parameter)			effectiveness (2 parameter)			racket swing (4 parameter)			body movement (3 parameter)		
Valid	Frequency	Percent	Valid	Frequency	Percent	Valid	Frequency	Percent	Valid	Frequency	Percent	Valid	Frequency	Percent
3	6	5,9	4	1	1,0	3	26	25,7	4	3	3,0	3	23	22,8
4	11	10,9	5	3	3,0	4	30	29,7	5	10	9,9	4	44	43,6
5	21	20,8	6	4	4,0	5	29	28,7	6	14	13,9	5	13	12,9
6	15	14,9	7	12	11,9	6	9	8,9	7	18	17,8	6	10	9,9
7	11	10,9	8	15	14,9	7	4	4,0	8	11	10,9	7	8	7,9
8	8	7,9	9	16	15,8	8	2	2,0	9	7	6,9	8	1	1,0
9	13	12,9	10	9	8,9	9	1	1,0	10	12	11,9	9	1	1,0
10	7	6,9	11	12	11,9				11	8	7,9	10	1	1,0
11	4	4,0	12	10	9,9				12	4	4,0			
12	3	3,0	13	5	5,0				13	6	5,9			
13	2	2,0	14	5	5,0				14	4	4,0			
			15	4	4,0				15	2	2,0			
			16	2	2,0				17	1	1,0			
			17	2	2,0				18	1	1,0			
			18	1	1,0									
Max=15			Max=20			Max=10			Max=20			Max=15		

Correlation between five basic parameters on service evaluation in first Table 3
(n=101) and second test (n=87)

Ball throw	.655[**]/.629[**]			
Effectiveness	.455[**]/.472[**]	.518[**]/.599[**]		
Racket swing	.720[**]/.700[**]	.715[**]/.735[**]	.553[**]/.488[**]	
Body movement	.605[**]/.585[**]	.638[**]/.589[**]	.539[**]/.445[**]	.762[**]/.712[**]
n=101/87	timing	Ball throw	effectiveness	Racket swing

[**] p< .01

Factorial analysis with five and four evaluations' criteria in service   Table 4

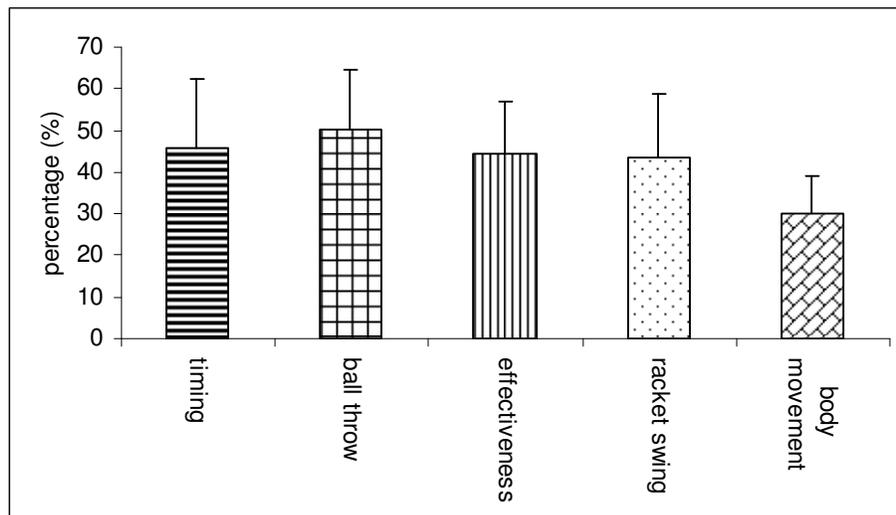| Extraction	1st test	2nd test
timing	.693	.711
ball throw	.734	.734
effectiveness	.343	-
racket swing	.820	.839
body movement	.725	.695

Fig. 1. *Means scores (percentage) of 5 criteria in total sample*

4. Discussion

Although target and velocity of service are two factors that appeared great measurement's reliability (after examiners' evaluation), in two measurements (p<.001), there were not crucial factors in evaluation of service in novice subjects. Evaluation in high level players is based on velocity and target of service and also on the kind of service as well (ball's rotations around her axis) (Avery et al., 1979; Elliott et al., 2003; Ferrauti et al., 2006). This player's ability has not the same severity during practice in service. The simple technique of kicking, as raised from 14 rest sub-parameters has an

important role to build service's ability in novice subjects. It is recommended to show more importance in evaluation of service in novice subjects. Due to the subjectivity of evaluation two independent examiners must participate in this procedure and the mean score will be the evaluation score. It is mentioned that in the present study there was not statistical difference between these two examiners.

The low score in "body's movement" (verbal-cognitive stage) was expected due to the initial stage of the subjects , because this criteria demands more time in order to be assimilated and for that reason it is considered to be a criterion about the improvement in throwing. Also, there was

trend that racket swing, as expected, was the more important criterion for ball throwing (Schoenborn, 1986; 1998). So, it is obvious that this service ability, in tennis, in first stage of learning (verbal-cognitive stage) could be based in these four evaluation's criteria according to the results of the present study. This means that someone must exclude criteria like "target" and "velocity" that constitute effectiveness criterion in service. In total, important criteria in the present study were "timing", "ball throw", "racket swing", and "body movement". This "phenomenon" would be under examination in lower aged group. Teaching method was not part of the purpose of the present study. This means that in future research it is under examination which of two methods is better correlated with evaluation way in relation to the performance quality in this motor skill. Another dimension is the time of education in service. For the purpose of the present study this time schedule was satisfactory for practice this motor skill (service in tennis). But this movement on service in tennis has a linear relation with service in other sports, like volleyball, Badminton, javelin throw etc. It is important this examination to contain this examination parameter. In many athletes there is a positive transfer effect between different sports during practice procedure (Wilkinson, 1996). According to the results of table 1, there was a satisfactory improvement in performance score in our subjects (novice players). In addition, examination's time of the day must be under control, as this motor ability (service in tennis) was affected by time of day. In the evening there were better results in comparison with the morning. First serves were faster but least accurate at 18:00 hours, the time of day that body temperature and grip strength were highest. At 09:00 hours, first serves were just as accurate as second serves, even though velocity of first serves was higher. No effects for time of the day were found for the speed and accuracy of second serves. These results indicate that time of day does affect the performance of tennis serves in a way that suggests a nonlinear relationship between velocity and accuracy (Atkinson & Speirs, 1998). The warm-up hour must be very stable, although previous data support that service is not affected by this factor (warm-up hour) «There was no short-term effect of stretching in the warm-up on the tennis serve performance of adult players, so adding stretching to the traditional 5-minute warm-up in tennis does not affect serve performance» (Knudson et al., 2004). Further, mood, control, roles, attitudes and beliefs are affect educational and evaluation results, and must be under consideration for such arguments (Gurney, 2006).

5. Conclusions

Three teaching units per two hours each one is recommended to evaluate service in tennis upon four evaluation's criteria. Each criterion must contain different number of sub-parameters. For example, timing contain three, ball throw 4, racket swing 4, and body movement 3 sub-parameters. A uniform scale score (5 parameters) is applied to these parameters. According to the results raised from table 2 was made table 6 with norms about the evolution of service in tennis. Construction of the table was done from mean with addition and subtraction one standard deviation and from this way we had five scales from "not good" until "very good". In these particular ages, these scales can evaluate accurately educational level on service in tennis in this aged group

*Norms to evaluate service after a regime of 3-4 hours teaching units
by two hours each one*   Table 6

	No good	Almost good	Good	A lot of good	Very good
timing	<4	5-7	8-9	10-12	>12
ball throw	<7	8-10	11-13	14-16	>16
racket swing	<6	7-9	10-12	13-15	>15
body movement	<3	4	5-6	7	>7

Usage of norms is recommended both in teaching procedure in schools and educational department, as well in sport for all to evaluate ability in this particular motor skill in tennis.

References

1. Atkinson G, Speirs L. (1998) Diurnal variation in tennis service, *Percept Mot Skills.* **86**, 3 ,2, 1335-8.
2. Avery C A, Richardson PA., Jackson A.W. (1979) Practical tennis serve test, measurement of skill under simulated game conditions. *Research quarterly* **50**, 4, 554-564.
3. Bouchard L. J., Singer R. N. (1998) Effects of the five-step strategy with videotape Modeling on performance of the tennis serve, *Perceptual and motor skills* **83**, 3 ,1, 739-746.
4. Durovic N., Lozovina V. & Mrduljas D. (2008) New biomechanical model for tennis, *Acta Kinesiologica*, **22**, 45-49.
5. Elliott B, Fleisig G, Nicholls R, Escamilia R. (2003) Technique effects on upper limb loading in the tennis serve. *Journal of Science and Medicine in Sport* **6**, 1, 76-87.
6. Elliott B., Marsh T., Blanksby B. (1986) A three-dimensional cinematographic analysis of the tennis serve. *International journal of sport biomechanics* **2**, 4, 260-271.
7. Elliott B. (2006) Tennis basics: Biomechanics and tennis. *Br J Sports Med* **40**, 392-396 .
8. Ferrauti A., Maier P., Weber K. (2006) *Tennistraining*. Aachen: Meyer & Meyer.
9. Gurney B. F. (2006) Tugboats and tennis games: Preservice conceptions of teaching and learning revealed through metaphors, *Journal of Research in Science Teaching* **32, 6**, 569 – 583.
10. Knudson DV, Noffal GJ, Bahamonde RE, Bauer JA, Blackwell JR. (2004), Stretching has no effect on tennis serve performance *J Strength Cond Res.* **18**,3, 654.
11. Messick, J. (1991) Prelongitudinal screening of hypothesized developmental sequences for the overhead tennis serve in experienced tennis players 9-19 years age. *Research quarterly for exercise and sport, Reston* **62**, 3, 249-256
12. Miyashita M., Tsunoda T., Sakurai S., Nishizona H., Mizunna T. (1980) Muscular activities in the tennis serve and overhand throwing, *Scandinavian journal of sports sciences* **2**, 2, 52-58.
13. Rose, D.J; Heath, E. M; Megale, D.M. (1990) Development of a diagnostic instrument for evaluating tennis serving performance *Perceptual and motor skills,* **71**, 2, 355-363.
14. Schoenborn (1986). *Die Neue Tennis-Praxis*, Niedernhausen: Falken Verlag
15. Schoenborn (1998) *Tennis Technik-training*, Aachen: Meyer & Meyer.
16. Subijana L-Cr., Navaro E. (2009) Kinetic energy transfer during the serve, *J. Hum. Sport Exerc.* **4,2**, 114-128.
17. Tetu R.G. (1977) Kinesiological analysis of the "American twist" tennis serve executed by a highly skilled tournament level tennis player: Microfilm (neg.) of typescript. Thesis (M.A.) - Univ. of Illinois.
18. Wilkinson S. (1996) Visual analysis of the over arm throw and related sport skills: training and transfer effects. *Journal of teaching in physical education, Champaign*, **16 1**, 66-78