

TIMING AND SPACING CONCEPTS: PERFORMANCES IN YOUNG BASKETBALL PLAYERS

Pietro Montesano and Domenico Tafuri

DISMEB – University Parthenope of Naples, Italy

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Abstract

The research was carried out through a manual data detection and observation to monitor the sports performance of a sample of 30 young male athletes, aged between 14 and 16 years, playing basketball at amateur level. The objective of the study was to monitor and enhance the acquisition of the timing and spacing concepts by improving the percentage of passes and shots and developing the coordination and strength skills. The tests were administered at the beginning, at mid-way stage, and at the end of the observation period with athletes divided into two groups, A and B, after taking part in 30 additional training sessions from September 2015 to June 2016 with analytical methods of exercises development. The final output showed an improvement of about a 4% for Group A, and of about a 14% for Group B.

Key words: Basket, pass, shot, timing, spacing

Introduction

The sports discipline of basketball (Mondoni & Anzivino, 2014) has high variability characteristics for the unpredictability that game phases reserve for athletes and skills, especially those open ones (Wang, Liu & Moffit, 2009) that the basketball players must be able to master as quickly and accurately as possible. It's a situational sport (Calvo et al., 2010) where every second/minute of the game is different and the competition rounds are developed through technical and tactical attack and defense actions often without interruptions, except for those laid down by the regulation (FIBA, 2016). The characteristics of the discipline (Bird, 2016), diversified according to the type of activity, involve the athlete's anaerobic-aerobic cardiovascular and neuromuscular effort. Basketball is a team sport where the right balance among these characteristics is highlighted by the effectiveness of the pass, of the shot (Volmer, 2000), of the assists, in a highly variable competitive environment where an athlete's motor skills, divided into conditional and coordinative (Magni, 2009), are always assessed according to the performance (Csataljay et al., 2012) and the outcomes obtained individually and/or with the team. Basketball, especially in younger, develops motor and mental quality, collective and competitive spirit, and self-organization and self-management skills. In basketball players, all the cognitive processes (Benso, 2007) related to the search for the adequate and effective solutions to resolve problematic situations highlighted, from time to time, are constantly triggered during the game stages marked by the position of the individuals (Dežman, Trinić & Dizdar, 2001) and of the teams in the field, by the position and the displacement of the ball, of the teammates and the opponents, and by every athlete's role (Sampaio, 2006). The development of the technical skills (Miller et al., 2017) of basketball (especially for the shot and the pass) and those spatial organization ones represent some of the essential conditions to achieve positive competitive outcomes in conjunction with the acquisition of the disciplinary concepts of *timing and spacing* (table 1).

So the proper performance of the individual and team fundamentals are influenced by the athlete's spatial organization. This perceptive condition is highlighted with the exact positions in the gaming space related to the front, back, left, right, above and below concepts, and to those rhythmic of closeness, displacement, and succession.

Table 1. Concepts of Timing and Spacing

Timing	It is the ability to find the right time to perform an action. For example, getting ready to catch a pass, passing or shooting hoops in the right moment, nor a moment before or a moment after.
Spacing	It is the ability to be in the right place. Every player must know how to move while bearing in mind where he is and what the mates and opponents do, and assess the best position to make or catch a pass and shoot a hoop.

The rules of the technical regulations provide for the compliance with the rules concerning the spatial organization, which may affect the development of the game and then winning of a game, like the prohibition of standing for more than three seconds in the trapezoidal area marked near the basket, or the obligation to carry the ball in the opponent's half of the field (article 30 of the FIBA, 2106) within a time limit set with the prohibition, on pain of a disciplinary sanction, of making a step back in the starting half of the field. In light of these considerations a research, which lasted for ten months, was carried out on a sample of young athletes practicing competitive amateur basketball, aimed at detecting the acquisition of the concepts of timing and spacing through the monitoring of coordinative (Montesano, Tafuri & Mazzeo, 2016) and conditional skills, expressed in the individual fundamentals of the pass and the shot (Erculj & Strumbelj, 2015).

Methods

Participants

The research was carried out on a sample of 30 young male athletes, aged between 14 and 16 years (Ortega et al., 2006), basketball amateur sports practitioners.

Goals and procedures

The study, carried out with an observational method and with manual detection, aimed at detecting the acquisition and enhancement of the concepts of timing and spacing through the improvement of the percentages of shots and passes, by training the explosive strength of the upper limbs (Montesano, 2016) with specific exercises using balls and medicine balls. The characteristics and the percentages related to the shots and passes made by every athlete were detected by administering initial, mid-stage and final tests (Marella & Risaliti, 2007) and specific exercises during the training sessions performed on regulatory field and with approved equipment. The results of the initial detection allowed for the subdivision of the athletes into two groups: the control group, made up of the athletes with the highest percentage of shoots and passes and called *Group A*, and course group, made up of athletes with lower percentages and called *Group B*. The two groups, during the competition year, followed the normal training methodology (Barba, Tafuri, 2007) prepared by the technical staff consisting of three training sessions per week, characterized by athletic, technical and tactical exercises, proposed to the players alternatively with prevalent cardiovascular and neuromuscular efforts. Only the *Group B*, the course group, was given four additional monthly trainings on passes and shots for a total of 30 meetings per year, by dividing the playground in game areas and sectors. Longitudinal area (Fig. 1): the space (a, b, c) that players and ball occupy by advancing from the defensive to the attack zone; every player should occupy an area while moving from the defense to the attack in order to have his own space where to make actions, without hampering the movements of the teammates and by choosing the appropriate time to catch a pass, make a pass or a shot (Viggiano et al., 2014) to the basket. Concentric attack/defense sector: the space that the players and the ball occupy in connection with the development of the action of attack/defense near the basket.

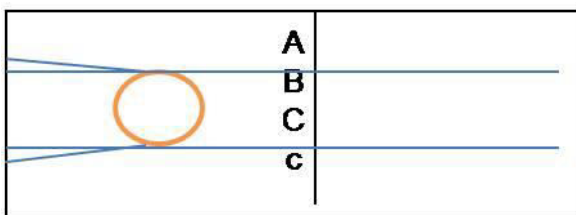


Figure 1. Longitudinal area

Shot and pass test and additional training sessions
 1) exercises for the detection of the percentages of one-hand passes (Fig. 2):

The 30 athletes, in turn, place themselves in the station E and in accordance with the dominant limb, nr. 10 steps towards each station, for a total of 40 passes to the teammates positioned in the stations A, B, C, D (simulation of defense/attack action). The distance between station nr. 5 and nr. 2, 3, 4 was of about 7 mt. The distance between station nr. 5 and nr. 1 was of about 18 mt.

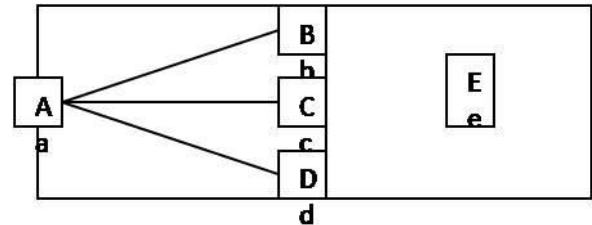


Figure 2. Passes positions

2) exercises for detecting the percentages of shots (Fig. 3): The 30 athletes make a total of 20 shoot hoops, nr. 2 for each station (A, B, C, D, E, F, G, H, L, M), not crossing the lines of delimitation of the area below the basket and the semicircle of the free shots. The stations A, B, C, D, E, F, G, H, L, M were positioned at the level of the side lines. The stations 4, 5, 6, 7 were positioned at a distance of 1 mt. from the mid-field line;

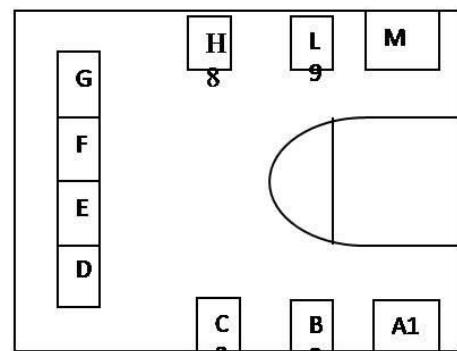


Figure 3. Shooting positions

3) isometric and isotonic strengthening exercises during training sessions in the gym with medicine balls of variable weight between 1 kg and 3 kg. The analytical methodology favored the development of individual fundamentals, passes and shots, for every exercise with the use of the regulatory balls and medicine balls. During the strengthening sessions (Galazoulas, 2017) for exercising on passes, the athletes used medicine balls with a variable weight from 1 to 3 kg. while, for the strengthening of shooting technique, they used only 1 kg medicine ball by alternating it to that of a standard game.

Materials and resources

- Standard basketball field, 28m. x14m., with baskets placed at 3.05 mt. 3.05
- Standard Basket balls
- Medicine balls weighting between 1 and 3 kg.
- Nr. 2 students with the role of detecting the number of passes and shots
- Detection Grid

Variables

Additional exercises were performed always on Wednesday from 3:00 pm to 4.30 pm. The athletes carried out the tests by following the progressive numbering of the identification number (Group A: 1,24,5,9,10,11,14,17,19,22,26,27,28,29 - Group B:3,6,7,8,12,13,15,16,18,20,21,23,24,25,30) and the strengthening made in the gym. The incorrect shots and passes were not repeated but the test continued uninterruptedly. Progressively, the variable of time to adapt was introduced to make the youths adapt to the rules of the three, five, eight and twenty-four seconds (arts. 26, 27, 28, 29, FIBA Technical Regulations,2010). In the last four trainings, the test times for the passes were reduced to two minutes, while those for the shots to 30 seconds.

Results

Starting detection

The starting detection (Tab. 2.3) was made by administering the passage test (theoretical number of correct passes: 40) and the shots test (theoretical number of correct shots: 20) to all athletes. The initial data showed that the percentage between 90% and 100% was achieved by only four athletes in the passes test, while only one athlete achieved a percentage of 100% in the shots test.

Table 2. Initial detection of the precision percentages in passes

Athlete	A *	B *	C *	D *	Total of CP	% of CP
1	8	10	9	9	36	90,0
2	7	9	8	8	32	80,0
3	6	8	7	8	29	72,5
4	10	10	10	9	39	97,5
5	9	8	8	8	33	82,5
6	6	7	8	6	27	67,5
7	5	8	7	7	27	67,5
8	7	7	8	8	30	75,0
9	8	9	9	9	35	87,5
10	10	9	9	10	38	95,0
11	9	8	9	8	34	85,0
12	7	6	7	8	28	70,0
13	6	8	9	7	30	75,0
14	5	9	10	8	32	80,0
15	4	6	7	7	24	60,0
16	7	8	7	7	29	72,5
17	8	9	9	9	35	87,5
18	8	9	7	7	31	77,5
19	9	9	10	9	37	92,5
20	5	8	8	6	25	62,5
21	6	7	8	7	28	70,0
22	7	8	9	8	32	80,0
23	6	7	9	8	30	75,0
24	7	8	8	8	31	77,5
25	5	7	8	8	28	70,0
26	7	9	9	9	34	85,0
27	8	8	9	10	35	87,5
28	6	8	9	9	32	80,0
29	9	10	9	10	38	95,0
30	6	9	8	8	31	77,5

* Arrival Stations of the passes, CP = correct passes

The analysis of the average percentages allowed for the subdivision of athletes into two groups: A and B. Group B involved athletes with a lower percentage of overall average precision between passes and shots.

Table 3. Initial detection of the precision percentages in shots

Athlete	A	B	C	D	E	F	G	H	L	M	Total	%of
1	2	2	2	1	2	2	2	2	1	2	18	90,0
2	2	2	2	2	2	2	2	2	2	2	20	100,
3	2	2	1	2	1	1	2	1	1	1	14	70,0
4	2	1	1	1	2	2	2	2	2	2	17	85,0
5	1	1	1	0	2	2	1	2	1	2	13	65,0
6	1	1	1	1	1	1	1	2	1	2	12	60,0
7	1	1	0	2	1	1	0	1	2	2	11	55,0
8	2	2	1	0	2	1	0	2	1	2	13	65,0
9	2	2	2	2	2	0	2	1	2	2	17	85,0
10	2	1	2	2	1	1	2	1	2	2	16	80,0
11	2	2	0	2	2	1	2	1	2	1	15	75,0
12	2	1	1	1	2	0	2	0	2	1	12	60,0
13	2	1	0	1	2	1	2	0	2	1	12	60,0
14	2	2	2	1	2	1	2	2	2	2	18	90,0
15	0	1	2	0	1	2	1	2	0	2	11	55,0
16	1	2	1	0	1	1	1	2	2	1	12	60,0
17	1	1	1	2	2	1	2	1	2	1	14	70,0
18	2	0	1	1	0	2	2	2	1	2	13	65,0
19	2	2	0	2	2	0	2	2	2	1	15	75,0
20	1	2	2	2	2	0	2	1	1	1	14	70,0
21	0	2	1	1	2	0	1	1	0	2	10	50,0
22	2	1	1	2	1	1	2	2	2	2	16	80,0
23	1	1	2	0	0	2	1	1	2	1	11	55,0
24	2	1	2	0	1	0	1	2	1	1	12	60,0
25	1	1	0	2	0	1	2	1	1	2	11	55,0
26	2	2	2	2	0	1	2	2	2	2	17	85,0
27	1	2	2	2	0	1	2	2	2	2	16	80,0
28	0	2	2	2	2	2	2	2	2	2	18	90,0
29	1	2	0	2	2	2	2	2	2	2	17	85,0
30	2	2	1	0	0	1	1	1	2	3	13	65,0

* Shooting Stations. CS = correct shoots

Table 4. Division into groups with the attribution of average percentage between passes and shots

GROUP A				GROUP B			
% CP	% CS	Athlete	% AVG	% CP	% CS	Athlete	% AVG
90,0	90,0	1	90,0	72,5	70,0	3	71,25
80,0	100,0	2	90,0	67,5	60,0	6	63,75
97,5	85,0	4	91,3	67,5	55,0	7	61,25
82,5	65,0	5	73,8	75,0	65,0	8	70,00
87,5	85,0	9	86,3	70,0	60,0	12	65,00
95,0	80,0	10	87,5	75,0	60,0	13	67,50
85,0	75,0	11	80,0	60,0	55,0	15	57,50
80,0	90,0	14	85,0	72,5	60,0	16	66,25
87,5	70,0	17	78,8	77,5	65,0	18	71,25
92,5	75,0	19	83,8	62,5	70,0	20	66,25
80,0	80,0	22	80,0	70,0	50,0	21	60,00
85,0	85,0	26	85,0	75,0	55,0	23	65,00
87,5	80,0	27	83,8	77,5	60,0	24	68,75
80,0	90,0	28	85,0	70,0	55,0	25	62,50
95,0	85,0	29	90,0	77,5	65,0	30	71,25

CP = correct passes, CS = correct shoots, AVG = average

Intermediate detection

The intermediate detection (Tab. 5), made after five months, showed slight improvements in Group A, whose total percentage average stood at 78.91%, while in Group B, whose total percentage average stood at 67.2%, performance gains were observed, compared with the initial data, for about a 3% with an increase of around a 5% for athletes identified with numbers 15 and 25.

Table 5 – Intermediate increase percentage of passes and shots

GROUP A				GROUP B			
% CP	% CS	Athlete	% AVG	% CP	% CS	Athlete	% AVG
90,0	90,0	1	90,0	75,0	70,0	3	72,5
80,0	100,0	2	90,0	68,0	60,0	6	64,0
98,0	85,0	4	91,3	67,5	55,0	7	61,3
85,0	65,0	5	75,0	75,0	65,0	8	70,0
87,5	85,0	9	86,3	72,0	60,0	12	65/66
95,0	80,0	10	87,5	75,0	60,0	13	67,5
85,0	75,0	11	80,0	66,0	59,0	15	62,5
80,0	90,0	14	85,0	72,5	64,0	16	68,3
87,5	70,0	17	78,8	77,5	65,0	18	71,3
93,0	75,0	19	84,0	62,5	70,0	20	66,3
82,0	80,0	22	81,0	72,0	53,0	21	62,5
85,0	85,0	26	85,0	78,0	59,0	23	68,5
88,0	80,0	27	84,0	77,5	60,0	24	68,8
80,0	90,0	28	85,0	74,0	61,0	25	67,5
95,0	85,0	29	90,0	77,5	65,0	30	71,3

CP = correct passes, CS = correct shoots, AVG = average

Final detection

The final detection (Tab. 6) highlighted for the Group A an overall average improvement, compared to the intermediate detection, of around a 4% with performance percentages for each athlete that exceeded, except for one case, the 80%. For Group B, the individual percentages were slightly lower than the 80%, while an average improvement of approximately a 14%, compared to the intermediate phase, was observed.

Table 6 – Final average percentage of increase in passes and shots

GROUP A				GROUP B			
% CP	% CS	Athlete	% AVG	% CP	% CS	Athlete	% AVG
90,0	90,0	1	90,0	87,0	83,0	3	85,0
86,0	100,0	2	93,0	79,0	83,0	6	81,0
98,0	88,0	4	93,0	82,0	73,0	7	77,5
87,0	76,0	5	81,5	81,0	79,0	8	80,0
87,5	85,0	9	86,3	86,0	79,0	12	82,5
95,0	85,0	10	90,0	78,0	79,0	13	78,5
85,0	75,0	11	80,0	91,0	87,0	15	88,5
86,0	90,0	14	88,0	88,0	78,0	16	83,0
89,0	77,0	17	83,0	80,0	72,0	18	76,0
93,0	82,0	19	87,5	82,0	80,0	20	81,0
82,0	80,0	22	81,0	79,0	78,0	21	78,5
85,0	85,0	26	85,0	78,0	83,0	23	80,5
88,0	86,0	27	87,0	85,0	77,0	24	81,0
80,0	90,0	28	85,0	84,0	79,0	25	81,5
95,0	85,0	29	90,0	87,0	81,0	30	84,0

CP = correct passes, CS = correct shoots, AVG = average

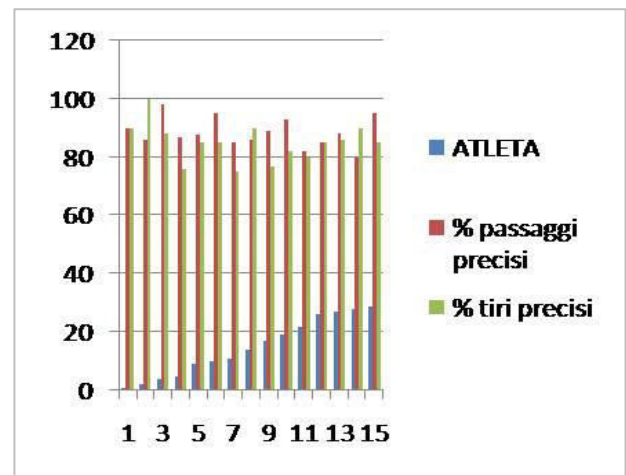


Figure 1. Group A

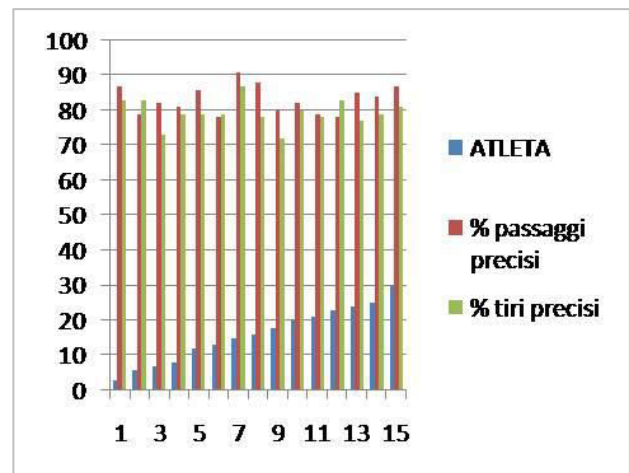


Figure 2. Group B

Discussion and conclusions

The improvement of motor skills for young athletes must be facilitated through training paths that pay particular attention to the auxological stages. The delicate adolescent stage often determines performance standards that are below the young people's actual skills. The research showed that specific concepts, such as those of timing and spacing, can be monitored, acquired and enhanced through training paths that stimulate appropriately the subjects at motor (Budde, 2008), self-esteem level and in establishing relationships with others. In particular, at the general motor level, they improve body orientation skills in space; at the specific technical and tactical level, through the collaboration between multiple players and the choice of solutions depending on the basket, the teammates and the defenders; at a psychological level, by developing a sense of individual responsibility and the spirit of collaboration.

The exercises proposed during the research path allowed each athlete to become aware of the importance of his positions on the field and the execution times of the technical gestures, both at individual and at team level, with an increased focus on the collaboration with his teammates, and this was confirmed by the outcomes of the intermediate and final tests. At the end of the

competition year, the data processed often denoted a general improvement in performance (Luiselli, Woods, 2011) by validating the choice of additional training methods. The percentages of increase in

passes and shots improved by approximately a 14% for the Group B, whose members took part with enthusiasm and constant presence in the additional training sessions.

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PROSTORNO-VREMENSKI KONCEPTI: IZVEDBA KOD MLADIH KOŠARKAŠA

Sažetak

Istraživanje je provedeno kroz ručno otkrivanje podataka i promatranje radi praćenje sportske izvedbe uzorka od 30 mladih muških sportaša uzrasta između 14 i 16 godina, koji igraju košarku na amaterskoj razini. Cilj studije bio je pratiti i unaprijediti stjecanje koncepta prostorno-vremenskih odnosa poboljšanjem postotka dodavanja i šuta te razvijanjem sposobnosti koordinacije i snage. Testovi su primijenjeni na početku, u sredini studije, a na kraju promatranog razdoblja sportaši su podijeljeni u dvije skupine A i B, nakon sudjelovanja u 30 dodatnih treninga od rujna 2015. do lipnja 2016. s analitičkim metodama razvoja vježbi. Konačni rezultat je pokazao poboljšanje od oko 4% za skupinu A i oko 14% za skupinu B.

Ključne riječi: košarka, dodavanje, šut, vrijeme, prostor

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Correspondence to:

Pietro Montesano

DISMEB – University Parthenope

Naples, Italy

e-mail: pieromontesano@libero.it