

## **OFFENSIVE PASS TACTICS ANALYSIS OF VOLLEYBALL SETTERS IN OLYMPIC FINALS OF 2000 AND 2021**

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### **ABSTRACT**

The aim of the current study was to analyse offensive pass tactics in Olympic Games finals in 2000 and 2021. The authors of the study were interested how the game of volleyball has developed in 20 years, whether it has become faster or even slower. We were also interested whether setters' game tactics had changed in 20 years. Therefore, we undertook three tasks: to compare offensive pass tactics according to types of sets; to compare the distribution of offensive passes between zones and to compare the ball flight phase times of offensive passes. Based on videos of two Olympic finals (eight sets), a total of 327 offensive passes were analysed, which were divided into different types of sets, and the ball flight phase time of each offensive pass was fixed. It was also taken into account whether the setter had had an excellent, good or bad reception or first touch before performing the set. The videos were analysed using the Kinovea program; the quality of the first video was 360p and of the second 1080p. The first final studied was played in Sydney, Australia, on 1 October 2000 between the men's volleyball teams of Yugoslavia and Russia, and the second on 7 August in Tokyo, Japan, between the men's teams of France and Russia.

To find statistically significant differences in data, Student's t-test,  $p < 0.05$ , was used. The results revealed that in 20 years setters' offensive pass tactics had changed; new offensive pass types had been introduced in both back and front zones. As a result of comparison of mean times of ball flight phases, the authors state that in one case the flight phase speed increased, namely in the case of offensive pass into zone 4; in another case, it became slower – in the case of offensive pass tempo forward. In addition to offensive passes played in 2000, new types of offensive pass were played in 2021, such as back line set between

zones 6 and 1, back line set between zones 5 and 6, and the shoot set. The tandem combination played in 2000 was not performed once in 2021. The five most popular offensive passes turned out to be sharp sets into zone 4, sharp sets into zone 2, tempo sets forward, sharp back line sets into zone 2, high sets into zone 4. The difference of 2021 compared to 2000 was that the shoot combination was played on the frontline (6% of all the sets), and the back line attack was used 5% more often. The comparison of ball flight phase times revealed that the mean time of the flight phase decreased only in the case of the sharp set into zone 4. Namely, the mean time of the ball flight phase in 2000 was 1.12 seconds, in 2021, however, 0.97 seconds. This can be explained by sharper and faster sets into zone 4. But in the case of the tempo set forward, the mean time of the ball flight phase increased from 0.40 to 0.49 seconds by 2021. The authors' explanation is that tempo sets were not hit from so near to the setter but, to make blocking more difficult, tempo sets were set longer, or somewhat higher tempo set was used. A statistically significant difference between the two finals was found in the case of sharp set into zone 4 and tempo set forward.

*Keywords: volleyball; setter; setting speed; high level; men*

## INTRODUCTION

Present-day volleyball is a very fast sport. The teams attempt to attack so that blockers have no time to react to the set. This enables the spikers to arrange attacks against belated blockers and earn points for their team. This shows that setting as well as the whole game have become faster.

In 2013, an analysis of 1777 offensive passes by a university men's team was performed. The passes were divided into six groups. In the conclusion of the study, it was found that the speed-up of the set significantly increased the number of successful attacks. When the ball flight phase time into zones 4 and 2 decreases by 0.5 seconds, the team's rankings during the season can essentially improve [4].

One of the essential tasks of the setter it to pass the offensive pass to the spiker so that the latter can attack without a block, which makes the reception of the ball more difficult for the defenders of the opposing team [9].

The main tactical elements of the offensive pass are its direction and the speed with which it is performed. The setter's role is almost as important as that of the coach, and s/he is considered the most essential player of the team as a third of touches of the ball are played through him/her. The setter has three main tasks – technical, tactical and psychological. If these are considered separately in detail, the most important part of the technical tasks is the performance

of offensive passes [8]. By doing so, the setter connects the defenders' and the spikers' activity on the court. The setter must also have good blocking, serving and defence skills. In addition, the setter must also be skilful at feint, which s/he successfully applies if necessary. The setter's tactical devices influence the game as much as his/her technical skills. The setter is expected to have unpredictability and diversity of tactical devices on the court. The attack becomes more effective if the ball flies from the defender along a good and convenient trajectory, which enables the setter to choose at least two spikers and to pass the ball on for an offensive pass [3].

The summer Olympic Games of 2000 were held in Sydney in sunny Australia. Then, the gold medal was won by the men's team of Yugoslavia, Russia received the silver medal. The last summer Olympic Games took place in Tokyo. The Olympics should have taken place in 2020, but because of the corona pandemic, they were held in 2021. So, it happened that namely Tokyo was the birthplace of volleyball as an Olympic sport in 1964, and the last Olympic finals until the present were also played at the same place [10]. Such coincidence seems to be a historic event. In the final, France received the gold for the first time; the Russian Olympic Committee received the silver medal [6].

The aim of the current study was to compare setters' offensive pass tactics in the Olympic finals of 2000 and 2021, to make sure whether the game has changed in twenty years, considering namely the setter's tasks. We compare the offensive pass tactics according to types of sets, distribution of offensive passes between zones and ball flight phase times.

## **MATERIAL AND METHODS**

The study observes the sets performed in two Olympic finals with the aim to assess the changes within twenty years concerning the use of different types of sets, their distribution between the zones and speed.

The authors of the current study used two videos of Olympic finals. The quality of the first video was 360p and the camera filmed the court from the direction of the serve line. The quality of second video filmed in 2021 is 1080p; the camera was in the same zone. The first final studied was played in Sydney, Australia, on 1 October 2000 between the men's volleyball teams of Yugoslavia and Russia. The second game took place in Tokyo, Japan, on 7 August 2021 between the men's volleyball teams of France and Russia. In this paper, eight sets played are studied. The setters' tactics used by men's volleyball teams of different countries in Olympic finals are investigated.

The measured parameters were:

1. Types of offensive pass – high sets into zones 4 and 2, sharp sets into zones 4 and 2, tempo sets forwards and backwards, high and sharp back line sets into zone 1, pipe, shoot, back line sets into zone 6, back zone sets between lines 6 and 1 and 5 and 6, and tandem.
2. Direction of the setter' offensive pass – forwards or behind the back.
3. Height of the offensive pass – high, sharp, low.
4. Ball flight phase time in offensive pass – time difference between the setter and the spiker touching the ball.
5. Setter's options for offensive pass – very good serve reception and very good first touch (all combinations are possible), good serve reception and good first touch (all combinations are still possible but with risk), bad serve reception and bad first touch (only definite offensive passes).
6. Volleyball team's tactics of offence – offence systems 4:2 (two setters and four spikers on the court) or 5:1 (one setter and five spikers on the court).

The study was performed in the video analysis program Kinovea. For data analysis, the Microsoft Excel program was used. For finding statistical significance in comparison of means, Student's t-test was used. The level of significance was set at  $p < 0.05$ .

## **RESULTS AND DISCUSSION**

In the Olympic Games final in 2000, three sets were played where 135 offensive passes were performed. In the Olympic Games final in 2021, five sets were played, and 193 offensive passes were performed.

The volleyball system or game tactics 5:1 means that the main task of one of the six players on the court is giving offensive passes. This tactic is also called playing with one setter. Such a playing scheme is the most widely spread in the world [7]; it was also applied in the finals of 2000 and 2021 in all the sets in the games of all the four teams.

First, all the sets were recorded, considering the success of serve reception – whether the setter had all the opportunities for performing all types of sets into all the zones. The ball flight time in the case of each set was also recorded, regardless of whether they were balls played up in defence or serve receptions. In data analysis, however, we considered only these performances that actually happened in the game, not all the opportunities that the setter had at that moment.

Setter's tactics have changed over time, and more shoot combinations are played now. To find the most frequent types of offensive passes, see Table 1 where the number of offensive passes performed is presented in percentage. It can be concluded from Table 1 that, regardless of the setter's position, the most frequent offensive pass in both 2000 and 2021 was a sharp set into zone 4. In 2021, the setter directed 34% of offensive passes there; in 2000, however, this percentage was considerably lower (28%). In 2021, the second in frequency was sharp set into zone 2 (15%), the third was tempo set forward (11%) and the fourth – sharp back zone set into zone 2 (9%). High pass into zone 4 had only the 5<sup>th</sup> place (8%). In 2000, the second in frequency was the tempo set forward (18%), the third in popularity was the sharp set into zone 2 (17%). High pass into zone 4 (12%) was the fourth in popularity, and the fifth place belonged to sharp back line set into zone 2 (10%).

**Table 1.** Types of offensive passes, number of performances and their distribution in percentage.

Olympic volleyball final in 2021			Olympic volleyball final in 2000		
High sets into zone 4	16	8%	High sets into zone 4	16	12%
Sharp sets into zone 4	65	34%	Sharp sets into zone 4	38	28%
High sets into zone 2	2	1%	High sets into zone 2	5	4%
Sharp sets into zone 2	29	15%	Sharp sets into zone 2	23	17%
Tempo sets forward	22	11%	Tempo sets forward	24	18%
Tempo sets backwards	3	2%	Tempo sets backwards	2	1%
High back line sets into zone 1	6	3%	High back line sets into zone 1	3	2%
High back line sets into zone 1	18	9%	High back line sets into zone 1	13	10%
Pipe	9	5%	Pipe	7	5%
Back line sets into zone 6	5	3%	Back line sets into zone 6	1	1%
Back line sets between zones 6 and 1	4	2%	Back line sets between zones 6 and 1		0%
Shoot	12	6%	Shoot		0%
Back line sets between zones 5 and 6	1	1%	Back line sets between zones 5 and 6		0%
Tandem		0%	Tandem	3	2%
<b>Total</b>	<b>192</b>	<b>100%</b>	<b>Total</b>	<b>135</b>	<b>100%</b>

The authors found that, in 2021, back line offensive passes made up 23% of the total number of offensive passes, which is higher than the number of back line offensive passes in 2000 (18%). It was also found that, in 2021, a new combination was used, which comprised 6% of the total number of offensive passes.

This new combination is shoot, and no such combination was found in the game in 2000. It must be stated that, in both 2000 and 2021, there were combinations which were played in only one of the two games, but their percentage was not higher than 2%, which suggests that their use was caused by the situation in the game.

To understand whether volleyball has become faster in 20 years, see Table 2 where the authors analyse the flight phase times of the five most frequently played combinations of offensive passes. The mean results revealed that in 2020 the ball flight phase became faster except in the case of one combination (tempo forwards became slower). To find whether the differences between the mean times of the finals of 2000 and 2021 were statistically significant, the mean times of different types of sets were compared by Student's t-test. The level of significance was set at  $p < 0.05$ . Table 2 shows that statistically significant difference where  $p < 0.05$  was revealed only in two types of offensive passes. It is also interesting to note that in 2021 the set into zone 4 was statistically significantly faster, but in 2000 the tempo set forwards was statistically significantly faster. From here, the authors concluded that tempo set forwards has been played nowadays as a longer set forward which does not give the blocker full certainty when jumping up from exactly what place the tempo attack will be played. No statistically significant difference was found in the ball flight phase times of other types of sets.

**Table 2.** Mean times of ball flight phase times of the five most frequently played types of offensive passes, comparison of 2000 and 2021, t-test results. The level of significance was set at  $p < 0.05$ .

	Sharp sets into zone 4		Sharp sets into zone 2		Tempo sets forward		Sharp back line sets into zone 2		High sets into zone 4	
	2021	2000	2021	2000	2021	2000	2021	2000	2021	2000
Mean ball flight phase time in seconds	0.97	1.12	1.07	1.10	0.49	0.40	1.08	1.11	1.62	1.73
T-test	0.000000008		0.445715197		0.002593241		0.52974098		0.066179037	

Relying on research, the offensive passes and most frequently used attack combinations have been divided as high pass, shoot, sharp, pipe, tempo, and back line attack [4]. In Romanenko and Fomin's opinion, in addition to the aforementioned types of offensive passes, the direction of offensive pass and the speed with which the set is performed are also essential [9].

It can be concluded from the results of the current study that in 2021 sharp sets into zone 4 became statistically significantly faster. Fellingham et al have also found in their study that quicker sets significantly increase the number of successful attacks [4]. Although we did not directly assess the correlation between the set speed and the success of the attack, indirect parallels can still be drawn, as only successful elite teams reach the Olympic finals, and their sets into zone 4 were statistically significantly faster in 2021 than in 2000. The study revealed that the tempo set forward had become statistically significantly slower in 2021. From here, it can be concluded that tempo sets forward are nowadays played more forwards, as a longer set. The only reason why this would be tactically beneficial is to increase the tempo spiker's free attack area. When the setter sets a somewhat longer tempo set, the tempo spiker will get a longer free sector for the attack, and it is considerably more difficult for the central blocker of the opposing team to understand and anticipate whether the set of the opposing team will come immediately to the setter into zone 3, somewhat further into zone 3 or even between zones 3 and 4, or the sharp set will even reach zone 4. The results of our study revealed that the most popular offensive passes in both 2000 and 2021 were offensive passes into zone 4. The popularity of the attack from zone 4 has been proved in the study of Costa et al where 142 volleyball games were analysed, and the first place with 44% of cases belonged to the attack from zone 4 [1]. Fast and broad sets over the volleyball court from zone 2 into zone 4 make it more difficult for the central blocker to reach into the corner for double block [5].

Our study showed that in 2021 the number of back zone offensive passes had increased 5%. Costa et al. state in their study that the attack from the back line increases the chances for getting a point for one's own team, and the number of back zone attacks in world volleyball is increasing [2]. This situation could be explained by the fact that the players have become ever taller and more powerful in their physical abilities and body build, and it makes no great difference for the players in defence whether the attack came from the frontline or back line. Back zone attack also provides more opportunities to direct the ball into different sectors so that the block cannot stop it, as the real hitting of the ball at attack happens somewhat further from the blockers.

It should also be noted that the game of volleyball became more versatile not only in the back line but also at the frontline where 6% of all the sets were played as shoot combinations in 2020.

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