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## ORIGINAL

### STUDY ABOUT GAME CONTINUITY IN CHILDREN'S MALE VOLLEYBALL

### ESTUDIO SOBRE LA CONTINUIDAD DEL JUEGO EN EL VOLEIBOL MASCULINO INFANTIL

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## ABSTRACT

The aim of this study was to support with results the debate about the adaptation need of the rules in children's volleyball. The only change seen at the moment in the Spanish field, regarding international rules, is the suppression of the libero in these ages. Data from the only Spanish championship they were authorized to participate were analyzed. The result does not show a positive association in one of the variables considered with more formative value: the continuity.

In the same way, first tempo attack, critical action discussed by its early specialization, obtains a positive association with the main criterion studied. Similar results were found in contextual factors as game set and game phase (Serve or reception).

**KEY WORDS:** "Game Analysis", "Sports Initiation", "Game Rules", "Continuity", "Volleyball".

## RESUMEN

El propósito del estudio fue apoyar con resultados el debate por la necesidad de adaptar el reglamento en las categorías menores. El único cambio dado actualmente en el ámbito español, con respecto a las normas internacionales, es la supresión del líbero en la categoría estudiada. Se analizaron datos del único campeonato de España en el que se permitió su participación. Los resultados no se muestran positivos desde una de las variables consideradas con más valor formativo: la continuidad.

Del mismo modo, el ataque de primer tiempo, acción crítica debatida por su especialización temprana, da una relación positiva con el criterio focal estudiado. Resultados similares se encontraron en factores contextuales como el set y la fase de juego (saque o recepción).

**PALABRAS CLAVE:** "Análisis del juego", "iniciación deportiva", "reglas de juego", "continuidad", voleibol.

## INTRODUCTION

Continuity is considered, in sport competition context, as a “game effective action prolongation, expressed in continuous alternatives, in structures and team technical and tactical skills of each team and in the same way in competitive association with the opponent during a rational time lapse, until its resolution” (González, 2003, p. 45).

González (2003) adapts the continuity measurement model proposed by Álvaro et al., (1996) and Orte, Pino & Moreno (2000). Therefore, proposes as defining criterion for competition units (Smaller units which collects all the own components and those that could have relevance in the performance) ball hits and ball transitions from court to court or among opponents.

Such continuity preoccupation, as show attractive element, has promoted continuous variations in volleyball rules. The imbalance existing between attack potential and defence success limitations is the lack of continuity main cause. This is the reason of this continuous rules modification which has expected an enhancement in defence success (Callejón & Hernández, 2009; Ureña, Gallardo, Delgado, Hernández & Calvo, 2000).

Furthermore, increases in jump serve during the '90 disturbed reception efficacy (Fröoner & Zimmermann, 1996; Ureña, Santos, Martinez, Calvo & Oña, 2000) and enhanced defence team options. Nevertheless, reception systems suffered several adaptations (Ureña, Calvo & Gallardo, 2000; Ureña et al., 2001), rally point system implementation (Cayero, 2009; González, Ureña, Santos, Llop & Navarro, 2002; Palao, Santos & Ureña, 2004) and libero appearance, despite its creation, expected for the balance between attack and defence (Fournier, 2005; Mesquita, Manso & Palao, 2007; Peña, 2000; Ureña, Calvo & Lozano, 2002), are receiving team construction facilitator factors, disturbing, defence and counter-attack (Fröhner & Zimmermann, 1996; Mesquita et al., 2007; Zhang et al., 2000) and restricting game continuity.

In other hand, there is a high consensus among the experts about game continuity and player participation promotion during education phases (Arias, 2008; Côté, Macdonald, Baker & Abernethy, 2006; Prusak & Darst, 2000) emphasizing ball contact repetitions (Ejem, 1995) or ball control (Banachowski, 1992). Equally, in some cases, security serve with the only pretension of a game start is a defended need (Canadian Volleyball Association & Coaching Association of Canada, 1986; Perez & Caño, 2000).

Because of this, a discussion is detached about rules change necessity, adapting it to educative purposes planned for early phases, with the pretension of a successful game conduction (Arias, Argudo & Alonso, 2011; Boyce, Coker & Bunker, 2006; Dyson, Griffin & Hastie, 2004; Garoz, 2005; Ortega, Cárdenas, Sainz de Baranda & Palao, 2006; Piñar, Cárdenas, Miranda & Torre, 2008).

The aim of this study was to support with results the debate about the adaptation need of the rules in children's volleyball, focusing on game

continuity. At the moment, the only variation is the libero player suppression in early ages. Even if, there are strong conceptual arguments supporting this decision, in this paper information from the only Spanish Championships permitted to play were analyzed.

Specifically, the objectives proposed are: a) continuity estimation of each team observed in every play registered during game actions; and b) establish the influence of the libero player, first tempo attack utilization, team situation at the beginning of each point (serve or reception) and continuity in each game set.

## **METHOD**

The sample was obtained from the 2002 male Spanish school championship, aged between 12-14 years old.

For the observation 13 of 24 games were recorded, a total of 2021 cases (54, 26%). For the avoidance of team game styles and structures were imposed in relation to the number of events registered in the observation, a minimum of 2 and a maximum of 3 games were recorded per team. Therefore, a stratified sampling was used.

A synchronic investigation design was conducted (nomothetic and punctual), symmetrical and multidimensional. Observation units were complex events and of a categorical nature, with a high molecular level.

Furthermore, the definition and redefinition process of the observation categories, linked with the exhaustiveness and mutual exclusivity conditions kept by the observation system, determined that all the main object of study behaviors manifestations were represented. Hence, different investigation criterions and its respective category levels are exposed.

### a) Continuity in the game actions

- Null
- Low; within one and three ball hits, but without obtaining the ball transition to the other court during the analyzed point.
- Medium; different possibilities can be observed in the analyzed team:
  - o Team in complex 2 (K2) (counter-attack) only one transition obtained, serve in the opponent's court, but without counter-attack.
  - o Team in K2 after the serve, one counter-attack is obtained hitting the ball once or twice.

- Team in K1, one, two or three ball hits in the attack phase are achieved but without counter-attack phase during the point.
  - Team in K1, one ball hit during the attack phase and one ball hit in counter-attack is achieved.
  
  - Team in K1, one, two or three ball hits during the attack phase are achieved and one or more counter-attacks with less than three hits.
- High; two possibilities:
    - Team in K1 is able to achieve the attack phase and more than one counter-attack using four or more hits.
    - Team in K2 and after the serve obtains more than one counter-attack with four or more hits.
- b) Libero role
- Presence
  - Absence
  - Presence and performance
- c) First tempo attack
- With first tempo attack/without first tempo attack
- d) Team situation at the beginning of the point
- Serving (K2)/ Reception (K1)
- e) Game set during play actions (from 1<sup>0</sup>-5<sup>0</sup>)

Events were recorded for a better perception, using a video camera (Panasonic PVDV52) placed in the observation site, where a clear, sharp and without interferences record was possible, and where game actions were captured in its entire duration.

Moreover, reactivity was dismissed using a natural observation context and do not informing the players about game recording and evaluation.

For validity measurement demonstration, Hernández & Molina (2002) criterion was used in terms of content validity, criterion validity, and construct validity, as well as inter-observer and intra-observer agreement.

Interpretation was avoided providing a good data contextualization, also executing a behavior flux fragmentation, which has escaped from radicalization, based on an adequate unit molecularization.

Previous knowledge and expectancy was controlled avoiding authors' participation during the observation process, as well as a long the observer training. Such training, based on the model proposed by Medina & Delgado (1999), provided all the methodological information of the study to the observers, but not the main objective. Furthermore, the observation tool was redesigned; therefore any influence of investigator bias was neutralized.

At the end of the training phase an inter-observer and intra-observer reliability test was conducted. The following formula was applied: (minor number/major number) x 100 recommended by Anguera (1986). Inter-observer concordance results demonstrate that any participant obtained less than 0,80 in each registered code, considered the minimum reliability grade needed by the observer before the participation in an investigation (Medina & Delgado, 1999), being always over 0.85. Likewise, intra-observer levels demonstrate a higher coefficient situated over 0.80.

Chi-Square test was done using the SPSS 11.5 for Windows, as long as in the unilateral significance obtaining as in the bilateral significance produced in the variables crossing. The significance was established from  $p < 0.05$ .

The validity condition for the Chi-Square test application was the inexistence of any expected frequency score lower than one, and had not obtained more than 20% in table boxes expected frequencies lower than five.

For the remainder analysis  $>2$  criterion was taken for an excitatory association and  $<-2$  for inhibitory association.

## RESULTS

### *Continuity Index*

The results obtained relative to continuity index during teams game actions (Table 1) showed a higher percentage of points solved with a "medium" continuity index, followed by "high" continuity index, then "low" and finally "null".

**Table 1.** Continuity index frequency and percentage

		Frequency	Percentage	Valid Percentage	Accumulated percentage
Valid	NULL	337	8.3	8.3	8.3
	LOW	780	19.3	19.3	27.6
	MEDIUM	1966	48.6	48.6	76.3
	HIGH	959	23.7	23.7	100.0
Total		4042	100.0	100.0	

Below are showed the results derived from the association of the continuity index with the other registered criterions:

*Continuity index in relation with the libero player*

Table 2 shows the cases frequency, attending the presence or not of the libero player. The highest actions percentage was obtained during the libero absence.

**Table 2.** Frequency and percentage of the libero player per team and point

		Frequency	Percentage	Valid Percentage	Accumulated percentage
Valid	PRESENCE	891	22.0	22.0	22.0
	ABSENCE	2936	72.6	72.6	94.7
	PRESENCE AND PERFORMANCE	215	5.3	5.3	100.0
	Total	4042	100.0	100.0	

Pearson’s Chi-Square test showed a statistic significance of  $p < .000$ , involving a significant dependency association in both criterions. Attending corrected remainders, an excitatory association appeared when a libero was on court and “null” continuity index and libero absence and presence and performance, with “high” continuity index. Nonetheless, an inhibitory association happened when libero absence were observed and “high” continuity level occurred and also with libero absence and presence and performance were linked to “null” continuity index (Table 3).

**Table 3.** Continuity index in relation with libero player function: corrected remainders

		CONT. IND.			
		NULL	LOW	MEDIUM	HIGH
LIBERO	PRESENCE	5.7	-.8	1.0	-4.2
	ABSENCE	-3.2	.3	.1	1.9
	PRESENCE AND PERFORMANCE	-4.3	.8	-1.8	4.1

0 boxes (.0%) has an expected frequency lower than 5. The minimum expected frequency is 17.93.

*Continuity index in relation with first tempo attack*

The case frequency of first tempo attack usage is showed in Table 4. A higher number of actions without first tempo were detected. The presence of this attack at these ages it’s practically anecdotal.

**Table 4.** Frequency and percentage of first tempo attack per team and point

		Frequency	Percentage	Valid Percentage	Accumulated percentage
Valid	WITH FIRST TEMPO ATTACK	42	1.0	1.0	1.0
	WITHOUT FIRST TEMPO ATTACK	4000	99.0	99.0	100.0
Total		4042	100.0	100.0	

Pearson's Chi-Square test obtained a statistic significance of  $p < .000$ , indicating a significant dependency between these two criterions. Table 5 shows the associations generated, attending corrected reminders. An excitatory association came out from the relation between first tempo attack and "high" continuity index and among first tempo absence and "null", "low" and "medium" continuity indexes. The inhibitory association appear when first tempo attack and "null", "low" and "medium" continuity indexes were observed, as well when first tempo attack do not occur and is related to with "high" continuity index.

**Table 5.** Continuity index in relation with first tempo attack. Corrected reminders

		CONT. IND.			
		NULL	LOW	MEDIUM	HIGH
FIRST TEMPO	WITH FIRST TEMPO ATTACK	-2.0	-2.8	-2.0	6.2
	WITHOUT FIRST TEMPO ATTACK	2.3	2.8	2.0	-6.2

1 box (12.5%) has an expected frequency lower than 5. The minimum expected frequency is 3.50.

### *Continuity index in relation with initial team situation*

Table 6 represents continuity and team situation at the beginning of the point corrected reminders association, where a Pearson's Chi-Square test signification of  $p < .000$  was obtained. An excitatory association was observed among reception phase and "null" and "low" continuity indexes, being the inhibitory association when "medium" and "high" continuity indexes occurred.

**Table 6.** Continuity index in relation with team situation at the beginning of the point: Corrected reminders

		CONT. IND.			
		NULL	LOW	MEDIUM	HIGH
K1-K2	SERVING	-19,2	-8,7	11,5	7,0
	IN RECEPTION	19,2	8,7	-11,5	-7,0

0 boxes (.0%) has an expected frequency lower than 5. The minimum expected frequency is 168.50.

### *Continuity index in relation with game set*

Pearson's Chi-Square test indicated a statistic significance of  $p < .001$ , what suppose a significant dependency between criterions. The excitatory association, attending corrected reminders analysis, was produced among third set and "null" and "low" continuity indexes. Whereas, inhibitory association was during third set and when "high" continuity indexes took place and in the fifth related to "null" and "low" continuity indexes (Table 7).

**Table 7.** Relation of the continuity index with game set

		CONT. IND.			
		NULL	LOW	MEDIUM	HIGH
SET	1º SET	-1.1	-.7	.1	1.3
	2º SET	-1.3	.8	1.1	.2
	3º SET	2.6	2.9	-1.3	-2.8
	4º SET	.9	-.2	-.9	.7
	5º SET	-2.0	-2.8	1.8	1.8



0 boxes (.0%) has an expected frequency lower than 5. The minimum expected frequency is 13.84.

## DISCUSSION

This study has analyzed the influence exerted over continuity index, variable considered with a high formative value, libero player participation, first tempo attack utilization, team situation at the beginning of the point and game set. Regarding continuity index, more than a quarter of the points were solved without continuity or play alternatives, because of team non-contact or receiving team (K1 team) missing transition to the other court. This values are very similar with the obtained by Callejón (2006a) in male high performance categories, where 25.2% of game actions concluded with serve, either through a serving error or an ace. However, this data reveal a continuity index lower than the obtained by Gil (2003) also in higher categories with 89%.

Even so, when a libero player repercussion is related to continuity indexes, the results indicated a “high” continuity when the libero is not playing. Otherwise, in when libero was on court, “null” continuity situations were observed, except when the player took part in the action, fact only obtained in 1% of cases. Hence, libero player does not enhance continuity. Callejón & Hernández (2009) and Peña (2000) found similar results in high level volleyball. In these cases, continuity was reduced because of libero contribution in serve reception making more difficult the possibility of a good defence, decreasing ball transitions. Furthermore, libero player plays a specific function in the game, what suppose a high specialization, according to several authors, detrimental in young players’ development (Giménez, 2000; Hernández, Gil, Guerra, Quiroga & Rodríguez, 2001; Wein, 2001).

Focusing on first tempo attack, the utilization observed was null. Thus, and as commented above in the case of libero, it is in connection with literature about sport initiation in these categories. However, Bellendier (2002) consider important, players’ development periods, the training of different attack tempos. Attending to the association of this attack with the continuity index, results showed an association which increase game continuity level. Costa, Mesquita, Greco, Ferreira & Moraes (2010) analyzing 2007 junior female World Championship, found a positive correlation between points made and first tempo attack, and observed more continuity when a slower attacks were executed. Level differences could explain this discrepancy, even though is interesting to point out that our measurement reflects a symmetric association where causality order cannot be established. That is, the continuity index increase could explain the presence of first tempo attacks and not vice-versa. Considering team situation at the beginning of the point, be the serving team (K1) supposed a higher contribution to continuity. This occurs because serve permits a first ball transition to the other court without being conditioned by a previous ball contact of any teammate or opponent (González, 1993). Likewise, it will favor a higher probability of K2 constructions (Attack after a defence) and an enhancement of the players’ participation index. Nonetheless, K1 construction (attack after serve reception) it is very influenced by serve type and quality (Callejón, 2006b; Ureña, Calvoet al., 2000).

Finally, relative to critic game moments Marcelino, Mesquita, Palao & Sampaio (2009) found in 2005 male World League, independently of home team advantage in victory obtaining, during third set tendency of victory changed favorably to the away team. In this study, a concentration championship was played where home and away distinctions does not affect, but along third set the lowest continuity indexes were observed, as consequence of the limited number of ball hits and transitions. Hence, third set was stated as a game inflection point or critic moment.

## CONCLUSIONS

- 1) Almost half of the points are resolved with a “medium” continuity index, even though a quarter of these are played without continuity during game actions, because players do not hit the ball or do not achieve any transition.
- 2) Libero player does not entail any improvement during the game, attending continuity index. Therefore, Spanish Volleyball Federation’s decision seems to be right, do not permitting libero participation in any under 14 years old category.
- 3) Moreover, first tempo attack frequency founded is “low”, it is related during game actions to higher continuity index. Solutions in favor to continuity enhancement, could be, the increase of players advanced skills repertory.
- 4) Be the server team, suppose higher possibilities in “medium” continuity index obtaining, coinciding serve reception with a “low” continuity index.
- 5) Third set is an inflection point during the game, because is where lower continuity indexes are registered. Therefore, coaches and teams should think about these circumstances, hence correcting these situations could suppose a higher improvement in players development.

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