Pic Aguilar, M. y Navarro Adelantado, V. (2017). La comunicación motriz de tríada y la especificidad de los juegos motores / Triad Communication and Specificity of Motor Games. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte vol. 17 (67) pp. 523-539. Http://cdeporte.rediris.es/revista/revista67/artcomunicacion846.htm
DOI: https://doi.org/10.15366/rimcafd2017.67.009

ORIGINAL

TRIAD COMMUNICATION AND SPECIFICITY OF MOTOR GAMES

LA COMUNICACIÓN MOTRIZ DE TRÍADA Y LA ESPECIFICIDAD DE LOS JUEGOS MOTORES

Pic Aguilar, M.[1] **and Navarro Adelantado, V.**[2]

[1] Profesor de Educación Física en Secundaria. IES Garoé, Islas Canarias (España) pic.aguilar.90@ull.edu.es
[2] Profesor Titular de Universidad. Departamento de Didácticas Específicas. Universidad de La Laguna (España) vnavarro@ull.edu.es

Spanish-English translator: Donna Ashton-Brown MA (Oxon)
canary_brokers@yahoo.es

CÓDIGO UNESCO / UNESCO code: 6305. Sociology Mathematics Sociología matemática. 630599. Communication Networks / Redes de comunicación.
Clasificación Consejo de Europa / Council of Europa classification: 16. Sociology of Sport / Sociología del Deporte.

Recibido 5 de mayo de 2015 **Received** May 5, 2015
Aceptado 26 de julio de 2015 **Accepted** July 26, 2015

ABSTRACT

Triads are studied from a motor communication point of view. Our study is aimed at a) identifying the various type that triads originate; b) measuring the differences among the type of the studied triads; and c) showing with specific examples the feasibility of triad games transferred to programs. 13 types are justified as being likely feasible as motor games. They correspond to complete triads and to triads with one missing connection between two of its nodes. Four games are compared through five different proxies: roles, intra-group interaction, interaction among groups, emissions and receptions, and positive or negative valence. The comparison demonstrates the specific behavior of motor triads. The results confirm the feasibility of the studied games and the relative differences between rivalry and solidarity. Motor games with a triad structure are a singular source of communication and a pedagogic alternative for game programs.

KEYWORDS: Motor game, triad, communication network, motor praxeology, physical education

RESUMEN

Se estudian las tríadas desde la comunicación motriz, con el propósito de a) identificar los distintos tipos a que da lugar la tríada; b) medir las diferencias entre los tipos de tríadas estudiados; y c) mostrar con juegos concretos la viabilidad de los juegos de tríada trasladables a programas. Se justifican 13 tipos susceptibles de ser viables como juegos motores, que corresponden a tríadas completas y a tríadas con ausencia de una conexión entre dos de sus nodos. Se comparan cuatro juegos por medio de cinco indicadores: roles, interacción intragrupo, interacción intergrupos, emisiones o recepciones, y valencia positiva o negativa. La comparación evidencia el comportamiento específico de las tríadas motrices. Los resultados confirman la viabilidad de los juegos estudiados, y las diferencias relativas entre antagonismo y solidaridad. Los juegos motores de tríada son una fuente singular de comunicación motriz y una alternativa pedagógica para los programas de juegos.

PALABRAS CLAVE: Juego motor, tríada, red de comunicación, praxiología motriz, educación física

1. INTRODUCTION

Analysis of triad communication networks with regard to motor games and and their viability in practice has received very little attention. This study focuses on specific triad motor behavior, that is, the antagonistic motor interaction of three people or groups.

Triad motor games are a very small part of our ludic heritage. Why are there so few triad games? Parlebas (2001, p131) accounts for it by games being "sportified", adapting play to the new cultural order. Thus, ambiguity, such as the evident ambivalence of triads, is an expense of confusion that society prefers to avoid in its game formulae (Parlebas, 1988, p.102). For Bauman (2005, p.12-18), ambivalence is a challenge we take up in order to live together and help each other as opposed to the dominance of objective culture (Robles, 2000, p. 229). Sport, by not accepting this ambivalence represents an institutionalized dualist formula that works by its own internal order (Puig and Heinemann, 1991). In the context of confrontation, triads and ambivalence, as a specific property of their communication patterns, are mathematizable from the perspective of sports games (Parlebas, 1981, 2005a, 2005b, 2005c, 2010, 2011). The triad offers different versions of communication that have not been explored from the point of view of motor games, although it seems more appropriate to speak of different types, as structural forms, since there are no new underlying conditions to differentiate them socially. Three types will be examined, for their connections and flows, and/or lack of connection ('structural *hole',* Burt, 2004, p.65).

One field for applied motor triads is physical education, where they are recognized as an alternative to the dominant model for sport (Navarro, 1995, 2006, 2009); triads bring greater motor enrichment to games proposals (alliances, problem situations); even more important is how to make them playable. The world of motor games has only been interested in two types of triads (Parlebas, 1981, 1996; Guillemard, Marchal, Parent, Parlebas and Schmitt, 1988; Navarro, 1995; 2011; Sánchez, 2000), and this communication structure remains uncommon when games are being programmed.

Fully to understand the nature of triads, different approaches and a specific vision will be outlined. First of all is the sociocultural view of the triad and its nature. As Parlebas indicates (2005c, p.115), "(...) the structures of the games can also reveal social structures (...) reveal a specific ethnomotricity (...)". Boudon (1980) explains why the dual communication prevails over triads, and suggests that the primary function of social organization is the elimination of *perverse effect.* Clearly in the course of a motor triad game there will be a conflict of interest in resolving situations where there is more than one contract to be fulfilled. Levi-Strauss (1962/1997, p.56-59), studying a game of the *Fox* Indians as a rite of the dead and the living observed that victory in a dual sports game is a symbolic event that giving the winners an extra lease of life. In sport, with the exception of *three-sided football* devised by Asger Jorg, a dual formula seems more efficient, as it gives a clear message to players and spectators so that they can understand the motor situation and perhaps for this reason social gaming shuns triads.

Another view of triads to be taken is the mathematical one in the context of social sciences. Referring to the descriptive usefulness of mathematical game theory to predict ludic behavior, Barbut (1967, P.840) differentiates between 'scheme causality' and 'scheme purpose' in games, and postulates inserting human behavior in action into the mathematical analysis (p.863). But how can a mathematical forecast coincide with the motor action of triad games? In a simultaneous triad game situation, will the extremely rapid motor action allow players to apply any strategy at all?

Simmel (1950) was the first to study the social interactions of three individuals involving a *mediating* role for one of them as in triads without coalitions where the decisions of the third party determine the action. For him, the triad was a dyad plus one. Granovetter (1973, p.1363) gave the name 'forbidden triad' to communication lacking a connection to one of the three vertices, and identified how difficult it would be for this agent to maintain two strong relations, resulting in the greater probability that this weaker part (the one without a connection or with different forces) would throw up bridges. Elaborating upon this, Caplow (1956, 1959/1968) studied triads and the distribution of their powers at the start of play as well as the property he considered peculiar to the triad: that of coalition or alliance. According to these criteria there are eight types of triad (1968, p.57) and the forces of all the players involved fluctuate with each interaction. For Caplow, the ability to start the negotiating process to achieve coalitions thus reducing the original triad to two clearly defined blocks (Esteban and Mayoral, 2011) is fundamental. Parlebas (2011 p.23,9), however, disputes Carlow´s approach as strictly quantitative, polarized, and linked to the power of each group in the likeness of the economy, whereas the triad – according to the author – is successfully developed in sports games, showing that the Condorcet effect (intransitivity among three elements) is present in the practice of such games. To sum up, the initial weight or power possessed by each team in a triad at the outset is not decisive since the players will act strategically to minimize their initial differences. Another aspect in favor of specificity is supplied by Flament (1977), considering the weight of the task within the communication. Gamson (1961) was more interested in how power is shared in the partnerships and studied this distribution with the least expenditure of force ('more economical dominant coalitions*').*

But how to achieve alliance? Mills (1953, 1954) suggested that alliances would be easier for the two more active members of the triad with four situations between two parties and the third: solidarity, conflict, dominance, and struggle against dominance. The author describes two levels; the first is communication (solidarity and rivalry), and, second, the differences of power (dominance, and struggle against the dominance).

In an analysis of motor games, Navarro (1995) addressed the motor triad in a quasi-experimental way, comparing the differences between the same game played in a dual format or as a triad; he noted a greater complexity of interactions and increase in density in the triad version of the game compared with the dyad. A later work analysed the transformation of dual motor games into triad games (Navarro, 2006, 2011).

These are important approaches towards understanding the nature of the triad. From the point of view of motor communication and internal logic, the motor praxeology posited by Parlebas (1976, 1981, 1988) is a relevant theory for this purpose, because it is based on a structural and systemic perspective with which to approach the study of motor triads through operational concepts such as 'motor communication' 'motor interaction', 'sociomotor role' and 'internal logic'. In addition, the modeling of sports games *(mathemasation structurante,* Parlebas, 2005a, p.114) makes it possible to distinguish the weight of the role from actions in the various types of triads, and identify the reason for these differences. Motor communication is applied to games by social approach graph theory (Parlebas, 1988); thus, the motor communication networks of the triads with three vertices or nodes connected are ambivalent networks (paradoxical situations). Parlebas (1981, 2005b, 2010) studied, among others, a type of motor triad ('Foxes, Chickens and Snakes') with an A→B→C→A relationship. Overall, a motor triad has an objective communication network structure that initially connects the teams negatively (rivalry), and in which episodes of co-alliance (solidarity) may occur; it is, therefore, a complete graph in which all spokes are connected: A-B, B-C, A-C. However, the triad changes notably when the direction of its communication flow is altered (e.g., A↔B, A→C, B→C), and even more so when there is no connection.

A subset of triads have not been explored as motor games. These are triads without a connection between two of their nodes, even though they have three elements (Figure 1, Types 8, 9, 10, 11, 12, 13). All these types of triad involve double dyad confrontation (Heider, 1946) because ambivalence is not feasible because of the rules and the relationship that have been negotiated. Kadushin (2013, p.46-54) views triads as an authentic social system with the dyad as the smallest unit (2013, p.53). It might seem that Types 8 to 13 are of no interest to the design of motor games because of the lack of motor communication between two of their teams; nonetheless, the games can be played in this state if the teams' forces are rebalanced.

Another interesting aspect is the practice of an ambivalent triad motor game where no coalitions between players can be discerned and so attention must be paid to the link with understanding and learning experience, and to the speed of the motor actions which make strategic assimilation difficult. These issues become apparent when supposedly ambivalent behavior is observed and it must be decided whether the action is intentional or not. All this should not be seen as a loss of triad personality but rather as a part of its inherent nature.

The foregoing describes the internal perspective of the triad. As far as the teaching of physical education is concerned there is a notable lack of theoretical construction and practical solutions applied to triad motor games which is unsettling when considering their potential educational value in inculcating the social assimilation of ambivalence and the possibility it provides for group interactions.

In short, games formulae derived from motor triads need to be examined intensively and as an educational tool. The object of this study is a) to identify the different types that motor triads may fall into; b) to recognize and measure the aspects that differentiate them; c) to show by practical examples that triad games could enrich the motor games programmes in physical education.

2. METHOD

Four triad motor games were first described and then studied, using a case-comparative method, based on motor praxeology (Parlebas, 1976, 1981, 1988, 2001) studying motor communication networks, communication flows, and the emission and reception of communication flows within the framework of intragroup and intergroup values (Parlebas, 1981, p.299-301); to this end, the roles were treated as labels added to the flow (Parlebas, 1981 p.193,197; Wasserman and Faust, 2013, p.366).

2.1. The games selected

Four triad motor games were selected (three chasing and one throwing game): 'Maze' (laberinto) (as adapted by Navarro, 1995); 'Allied Ball Game' (pelota aliada); 'In Chains' (encadenados); 'You Come Along With Me' (vente conmigo). The games are Type 1 ('Maze', 'Allied Ball Game'), Type 6 ('You Come Along With Me'), both types with all the vertices connected and Type 8 ('In Chains'), with no connection between two of its vertices. Two versions of a Type 1 game have been included because 'Allied Ball Game' has rules governing the alliance situation. The four motor games compared are motor games designed for and practised by high school students, and correspond to three motor communication networks.

In the game 'Maze' (Type 1, Figure 1), the rivalry is shared by three teams (A ↔B, A↔C, B↔C), thus forming a balanced motor solution structure (Heider, 1946); the person playing Taker tries to imprison the escaping Dodger, but can also tag an adversary's Taker if they meet up; this tagging requires bodily contact with the opponent and a reorganization of the strategy for reciprocal meetings (Navarro, 1995, 2006, p.98). Any player who is a Captive must wait to be freed by the player Savior, fostering peer collaboration. This game is unusual inasmuch as by a rule limiting contact, on a scale of increasing difficulty, free players from the opposing sides can choose to be Takers or Dodgers, according to the strategic circumstances, which represents a diversification of the antagonist role.

The 'Allied Ball Game' is the same type of triad as the 'Maze' game (Type 1, Figure 1), but here the activity of making alliances is pre-regulated. There are five roles symmetrically shared by the three teams involved in the game (Thrower', 'Dodger' 'Captive', 'Co-Thrower', 'Savior'), and the strategic development involves three different-colored balls two of which are for capturing with negative emissions and one for saving (positive),

The game 'In Chains' is a communication in which two nodes are connected and one is not (Type 8, Figure 1), unlike the rest of the games studied. The three teams have five roles, not symmetrical in themselves. As this is a triad with one connection missing it appears to be a double confrontation (A↔B, A↔C), with team A being more vulnerable; its viability as a motor game is achieved by augmenting the strategic choices of the disadvantaged team so that the roles' Captain' and 'Chained' are confined to teams B and C, and only side A has a 'Free Agent' and a 'Collector '. The only role common to all three teams is that of the 'Taker'.

The game 'You Come Along With Me' corresponds to a triad connected at all vertices, but with asymmetrical forces (Type 6, Figure 1). Here teams A and B have a balanced two-way communication flow A↔B whilst C receives negative attacks from both the other teams (A→C, B→C). The game is made viable by offsetting this imbalance by endowing team C with special attributes. Team A has two players ('Taker' and 'Dodger') as does Team B, while C has a 'Dodger', a 'Captive' and a 'Savior'. The latter role and the difference in the number of players in favor of C counteract the activity of the 'Taker' of teams A and B.

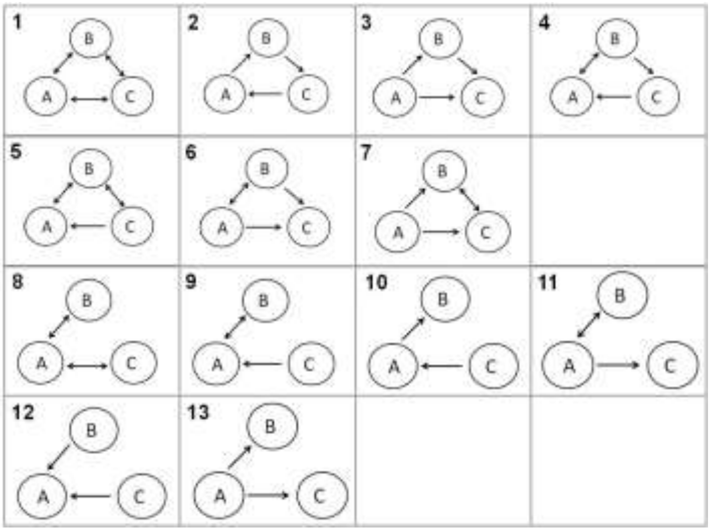
2.2. Procedure

In order to identify the different forms of the triads under study, they were compared with the types of motor communication networks discussed by Parlebas (1988, p.212-215), and Caplow's theories (1968, p.57) about interpreting differences in power and how they affect game design were taken into consideration.

The four games studied are divided into the following motor communication networks (Parlebas, 1988, p.215): 'Maze' and 'Allied Ball Game' (stable, ambivalent network); 'In Chains' (unstable, changeable dedicated network); and 'Come With Me' (ambivalent, unstable, changeable network). Caplow (1956, 1959/1968) based his analysis on the differences in initial power, regarding the size of the nodes or vertices as of vital importance. However, this study is based on communication flows as a starting point for studying the differences of forces, and not vice versa, because this is what best explains the model in terms of motor action.

Based on the flow and direction of communication, there are 64 possible variants of triads (2^6) (Holland and Leinhardt, 1974; Wasserman, 1975, p.5; Wasserman and Faust, 2013, p.583; Moody, 1998, p.292; Batagelj and Mrvar, 2000, p.2). Sixteen of these are original triads and are not duplicated. After removing the equivalent versions that may occur by combining three elements, 13 types are left which are potentially motor games and 7 of these have directed flows (three nodes connected), while 6 are missing one connection (Figure 1):

Fig. 1. Types of triads taken from a census of earlier authors and proposed as viable motor games



Of all these types, the only ones known to be motor games are the complete triads Types 1 ('Maze', Navarro, 1995, 2002) and 2 ('Foxes, Chickens and Snakes', also known as 'The Three Fields') (Guillemard et al.,1988; Parlebas, 1988). Types 8 to 13, when the differences of forces are taken into account as per Caplow (1956, 1959), were included within the internal logic posited by Parlebas' system of roles and sub-roles (1981 p.193,197). Rebalancing has been incorporated into the design of Type 8 and 6 games.

For the second objective of this study (recognizing the aspects that differentiate the various types studied), five indicators were examined: roles, intragroup interaction, intergroup interaction, emission or reception (communication flows) and positive or negative valence (Heider, 1946) (Tables 1-4). The indicators correspond to the internal structure of communication, so that the role is the social reference of motor relations, intragroup interaction shows the degree of relationship between team-mates, and intergroup interaction indicates the degree of connection with the opposition; both interactions are plotted by emissions and receptions, which are understood as to be of positive (solidarity) or negative (antagonism) valence, respectively.

The four games are compared by a computation which takes into account the vertex or node representing each team (A, B, C) and corresponding emissions (positive or negative) and receptions (positive or negative) (Tables 1-4). Thus, in a chasing game with identical relations, in the motor interaction 'Taker-Dodger' there are two negative emissions in the motor interaction A↔B and two more in the interaction A↔C giving vertex 'A' (Team A) a total of two negative emissions. The three vertices or nodes may be represented as (2,2,2). This procedure is repeated for each role and its intra-group (within a team) and intergroup (relative to an opposing team) communication, and the results are set out in Tables 1 to 4; calculations were carried out according to the guidelines of different authors such as Heider (1946), Wasserman (1975) and Parlebas (2005), and show the degree of antagonism as opposed to the degree of solidarity in these motor games.

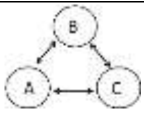
The viability of triad games in enriching motor gaming programs is assessed at the same time as the foregoing, since it is based on the playability of the types of games under comparison.

3. COMPARISON OF GAMES. RESULTS

A comparison of the four motor games studied, following the procedure outlined above, gives the following results:

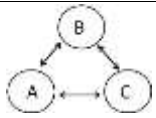
Type 1 ('Maze', as adapted by Navarro, 1995) (Table 1): In this ambivalent and stable motor communication network, intra-group versus intergroup interactions show the game to be markedly antagonistic in the interactions of the flows between the three teams (36 intergroup interactions versus 6 intragroup: 6:1 favoring rivalry). This is confirmed in the intragroup emissions (positive) and receptions (negative), with two reciprocal emissions (Savior-Captive), and in the intergroup interactions, very focused on the antagonistic actions of the Taker (36 negative emissions), distributed between Dodger-Taker (18 negative) and Savior-Taker (18 negative).

Table 1. Interactions in the game 'Maze' (Type 1)

 Type 1		Intragroup				Intergroup			
		Emissions		Receptions		Emissions		Receptions	
		+	-	+	-	+	-	+	-
Game	Roles								
Maze	*Taker*	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	6,6,6	0,0,0	2,2,2
	Dodger	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	2,2,2
	Captive	0,0,0	0,0,0	1,1,1	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0
	Savior	1,1,1	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	2,2,2
	Total	**1,1,1**	**0,0,0**	**1,1,1**	**0,0,0**	**0,0,0**	**6,6,6**	**0,0,0**	**6,6,6**
		6 intragroup interactions (6 positive, 0 negative) Total (A,B,C= 3 positive emissions and 3 positive receptions)				36 intergrup interactions (0 positive and 36 negative) Total (A,B,C= 18 emissions negative and 18 negative receptions)			
	Total: 42 motor interactions (36 negative and 6 positive: 6:1 in favor of rivalry over solidarity)								

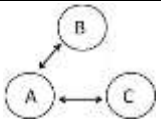
Type 1 ('Allied Ball Game') (Table 2): Again, as in the game 'Maze', in an ambivalent and stable motor communication network, in the interaction flows among the three teams intra-group versus intergroup interactions show a game focused on antagonism although slightly less so in the case of the 'Allied Ball Game' (30 intergroup versus 6 intragroup interactions). Intergroup emissions and receptions are increased by positive or co-operative valence (12 positive versus 18 negative). The 12 positive intergroup emissions-receptions concerned the role of the Co-Thrower, while the negative intergroup emissions were distributd among the three roles. Although this is a game of the same type as 'Maze', the main interest is not antagonism but is directed towards occasional cooperation, and antagonism and solidarity are balanced in the total of motor interactions (36) in relative terms, in the ratio of 1 to 1.

Table 2. Interactions in the game 'Allied Ball Game' (Type 1)

 Type 1		Intragroup				Intergroup			
		Emissions		Receptions		Emissions		Receptions	
		+	-	+	-	+	-	+	-
Game	Roles								
Allied Ball Game	*Thrower (red ball)*	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	2,2,2	0,0,0	0,0,0
	Savior (Green ball)	1,1,1	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0
	Co-Thrower (White ball)	0,0,0	0,0,0	0,0,0	0,0,0	2,2,2	1,1,1	2,2,2	0,0,0
	Captive	0,0,0	0,0,0	1,1,1	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0
	Dodger	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	3,3,3
	Total	**1,1,1**	**0,0,0**	**1,1,1**	**0,0,0**	**2,2,2**	**3,3,3**	**2,2,2**	**3,3,3**
		6 Intragroup interactions (6 positive, 0 negative) Total (A,B,C= 3 positive emissions and 3 positive receptions)				30 intergroup interactions (12 positive y 18 negative) Total (A,B,C= 12 positive and 18 negative emissions/receptions)			
	Total: 36 motor interactions (18 positive and 18 negative: 1 : 1 competition : solidarity)								

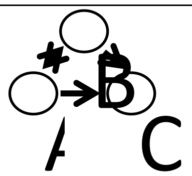
Type 8 ('In Chains') (Table 3) is a game with an ambivalent, changeable unstable motor communication network with very few intra-group relationships (4 positive emissions), proving to be a markedly antagonistic game (0 positive, 31 negative emissions), which shows the double confrontation of B and C against A in a situation where the rules do not allow B and C to communicate. The double dyad brings greater relative antagonism (7:1) than 'Maze' (6:1). From the point of view of the setting, the motor problem takes place on the same stage so that the players are helped or hindered by the actions of the other players.

Table 3. Interactions in the game 'In Chains' (Type 8)

 Tipo 8		Intragroup				Intergroup			
		Emissions		Receptions		Emissions		Receptions	
		+	-	+	-	+	-	+	-
Game	Roles								
In Chains	*Captain*	0,0,0	0,0,0	0,1,1	0,0,0	0,0,0	0,3,3	0,0,0	0,1,1
	Chained	0,1,1	0,0,0	0,0,0	0,0,0	0,0,0	0,3,3	0,0,0	0,0,0
	Free Agent	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	4,0,0
	Collector	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	4,0,0
	Taker (Player wins)	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	2,0,0	0,0,0	4,0,0
	Total	**0,1,1**	**0,0,0**	**0,1,1**	**0,0,0**	**0,0,0**	**2,6,6**	**0,0,0**	**12,1,1**
		4 intragroup interactions (4 positive, 0 negative) Total (A,B,C= 4 positive emissions emisiones and 0 positive receptions)				28 intergroup interactions (0 positive and 28 negative) Total (A,B,C= 14 negative emissions and 14 negative receptions)			
	Total: 32 motor interactions (28 negative and 4 positive: 1 : 7 in favor of rivalry over solidarity)								

Type 6 ('You Come Along With Me') (Table 4) is an ambivalent, unstable, interchangeable network with very few intragroup relations (one positive emission, one positive reception), even fewer than the 'In Chains' game; moreover the initial imbalance of communication flows is very low (8 negative intergroup emissions). This is partly due to the fact that team C reinforces itself by cooperative actions (positive intragroup emissions). However, the concentration of the forces of A and B against C, and the fact that A and B are also opponents conduces to an 8:1 antagonistic relationship, the highest index in the games studied.

Table 4. Interactions in the game 'You Come Along With Me' (Type 6)

 Type 6		Intragroup				Intergroup			
		Emissions		Receptions		Emissions		Receptions	
		+	-	+	-	+	-	+	-
Game	Roles								
You Come Along With Me	*Taker*	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	4,4,0	0,0,0	1,1,0
	Dodger	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	1,1,2
	Savior	0,0,1	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,2
	Captive	0,0,0	0,0,0	0,0,1	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0
	Total	**0,0,1**	**0,0,0**	**0,0,1**	**0,0,0**	**0,0,0**	**4,4,0**	**0,0,0**	**2,2,4**
		2 intragroup interactions (2 positive, 0 negative) Total (A,B,C= 1 positive emission and 1 positive reception)				16 intergroup interactions (0 positive, 16 negative) Total (A,B,C= 8 negative emissions 8 negative receptions)			
	Total: 18 motor interactions (2 positive and 16 negative: 1 : 8 solidarity versus rivalry)								

Comparison of the results reveals differences between the two sets of Type 1 ambivalent stable networks, indicating variability within the same type of triad. Thus, the game 'Maze' shows a marked antagonism, while 'Allied Ball Game' reduces this antagonism by an occasional intergroup act of cooperation, with more balanced results than the other game. The game 'In Chains' shows less antagonism than Maze in absolute terms though not relatively where it is actually greater than in the the Type 1 games. The game 'You Come Along With Me' shows reduced antagonism in absolute terms, with positive and negative emissions and receptions very evenly balanced, as a result of its unstable, ambivalent and interchangeable network and the development of the task in hand; however, in relative terms this game has the intensest rivalry.
Finally, the balance between competition and solidarity (ratio of total motor positive interactions to negative ones) shows that the two games with symmetry in their flow relations ('Maze': 6:1 in favor of rivalry and 'Allied Ball Game': 1:1 balance between competition and solidarity) are radically different as the relationship of ambivalence among the opponents of the second set is regulated. Moreover, the two games with initial differences of forces ('In Chains' and 'You Come Along With Me') intensify rivalry at the expense of solidarity (7:1, and 8:1, respectively).

4. DISCUSSION AND CONCLUSIONS

Communication in triads is unusual and different from that of the more common cultural model for games, that of dual confrontation; this difference has made triad play a rarity and excluded it from standard game play planning. This study indicates new forms of communication within triads making them viable as motor games and enables their specific behavior to be understood and them to be added to broaden the range of motor situations available in game programs.

The types of triads studied and their differing communication networks have been identified by motor praxeology while the validity of the roles in understanding the functioning of the internal logic of the games has been reaffirmed. Useful comparative insights into the triads under study were obtained by focusing on the roles and emissions and receptions (+ or -) defined in game action (Parlebas, 1981, p.285). In addition, the relevance of the weight of the task (Flament, 1977) deriving from the motor action was recognised and the conditions for this communication were defined.

The internal analysis shows that triads with one connection missing between two of their three elements are still viable as motor games. Games 8 to 13 have the minimum number of connections between nodes to be played like real motor games and as such represent the limit of communication for the 'structural hole' described by Burt (2004). Hence, the number of triads according to Wasserman's census (1975) can be reduced from 16 to 13.

Differences in 'power' of the teams, qua Caplow, can be compensated for by assigning the weaker group a new role, more members, or new attributes for an already existing role making it is possible, as has been shown, to play certain triads such as 'In Chains' and 'You Come Along With Me'. Parlebas' (2011, p.23, 9) commentary on Caplow (1968), is borne out since in sporting events with three teams these have at least two options to choose from and with any of these options, the three teams (or players) may each choose a different one. In short, as Elias stated (1995, p.88) "(...) the effect of power has been replaced by that of 'relative game strength' ".

The three versions of communication networks that according to Mills (1953) are to be seen in motor triads are clearly present: solidarity, rivalry and ambivalence, giving validity to the concept 'struggle against domination', since this struggle is intrinsic to the formation of alliances. Co-alliance has been incorporated into the rules of the 'Allied Ball Game', increasing the interactions of positive valence as opposed to deliberately negative interactions. The result of introducing co-alliance as a rule of the game is that when players act ambivalently, they do so on purpose and means that their strategies are no longer close to those of a dyad. In short, this version provides paradox in a tangible form for the players.

The context in which alliances are made in motor triads is one of rapid action corresponding to the strategic behavior of the players in situations where decisions are made very quickly (Mahlo, 1969 p.84,120), and generally without time to gauge the advantages for the player. Reflecting the reality of how ambivalence is implemented, the 'Allied Ball Game' was modified; there are advantages in defining alliance in the rules, and two things are achieved: players appreciate the strategic sense of making an alliance, and triad games in which the players are not aware that some of their actions (involuntary) are paradoxical can be avoided.

No parallel between the motor context of the triad game and a mathematical game analysis could be established, since the latter requires a significant reflective process for decisions by the players. The mathematical analysis of human behavior in action, to which Barbut referred (1967) is evident in motor triads. The rules of conduct (behaviors) are for Barbut (1967, p.841) those which relate the purposes and means (causality and purpose), and both are present in the internal logic of a motor game.

The differences between the types of triads studied indicate a diversification of antagonism which must finally be interpreted in relative terms. At first, the overall results of the positive and negative emissions in the interaction of the motor triads studied present greater antagonism, in absolute terms, 1) when there is symmetry between the three teams and intergroup interaction is more intense ('Maze'); 2) when the antagonism is derailed thanks to the occasional alliance ('Allied Ball Game'); 3) antagonism that balances forces in a double confrontation ('In Chains'); 4, reduced antagonism by incorporating cooperative actions for the team with the lowest initial force, in a situation of unstable communication (players who change sides between the two teams with the most initial force) ('You Come Along With Me'). However, in relative terms, the largest differences in favor of rivalry over solidarity were: 8:1 for the game 'You Come Along With Me', 7:1 for the game 'In Chains', 6:1 for the game 'Maze'. 'Allied Ball Game' proved to be the exception with a 1:1 balance due to having intragroup and intergroup emissions and receptions. These differences between rivalry and solidarity have confirmed how important it is to incorporate positive intragroup emissions and receptions into the game design, especially for the team which is the target of more flows and makes fewer to the other teams. Overall, triad communication is more complex than that of dyads (Navarro, 1995 p.222, 301), because the scene for motor interaction lends itself to greater diversity of action (density); logically, the greater the complexity, the greater the strategy needed to resolve situations. This complexity should be borne in mind when designing games so as not to prejudice viability.

The practical reality of triad motor games seems a useful pedagogical and curricular tool for schools first of all because of the values they transmit: the triad formula overrides the customary solidarity/rivalry polarization. Educationally, the more pronounced the hegemony of dualistic thinking, the more valuable this formula appears as a way of breaking with the prevalent model. In an educational process which should involve reflecting upon the phenomena and concepts that are being learned, practices that are being experienced and procedures that solve game situations, “different”, less common game models extending awareness of motricity are to be recommended.

REFERENCES

Barbut, M. (1967). Jeux et mathématiques. En Roger Caillois (dir). *Jeux et Sports*, Encyclopédie de la Pléiade, XXIII. Paris: Gallimard, 826-864.

Batagelj, V. y Mrvar, A. (2000). A subcaudratic triad census algoritm for large sparse networks with small máximum degree. *Social networks*, 23 (3), 237-243.

Bauman, Z. (2005). *Modernidad y ambivalencia*. Barcelona: Anthropos.

Boudon, R. (1980). *Efectos perversos y orden social.* México: Premia.

Burt, R. S. (2004). Structural Holes and Good Ideas. *The American Journal of Sociology*, 110 (2), 349-399. Recuperado de http://dex.doi.org/10.1086/421787

Caplow, T. (1956). *A theory of coalitions in the triad*. *American sociological review*, 21 (4), 489-493.

Caplow, T. (1959). Further development of a theory of coalitions in the triad. *The American Journal of Sociology*, LXIV, 5, University of Chicago.

Caplow, T. (1968). *Dos contra uno: Teoría de coaliciones en las triadas*. Madrid: Alianza.

Elías, N. (1995). *Sociología fundamental*. Madrid: Gedisa. Original de 1970.

Esteban, J. y Mayoral, L. (2011). Ethic and religious polarization and social conflict. Barcelona economics working paper series, 528, Graduate school of economics, Barcelona.

Flament, Cl. (1977). *Redes de Comunicación y Estructuras de Grupo*. Buenos Aires: Ediciones Nueva Visión.

Gamson, W. (1961). An experimental test of theory of coalitions formation. *American Sociological Review*, 26, 4, 565-573.

Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 1360-1380.

Guillemard, G, Marchal, J.Cl., Parent, M., Parlebas, P. y Schmitt, A. (1988). *Las cuatro esquinas de los juegos*. Lérida: Agonos.

Heider, F. (1946). Attitudes and cognitive organtitation. *Journal of Pchycology*, 21, 107-112.

Holland, P.W. y Leinhardt, S. (1974). The statistical analysis of local structure in social net works. *NBER Working Paper*, 44.

Jorg, A. Three sided football. Disponible en https://www.youtube.com/watch?v=EzbnKQKszm4

Kadushin, C. (2013). *Comprender las redes sociales: teorías, conceptos y hallazgos*, vol. 11, Madrid: CIS.

Lévi-Strauss, Cl. (1997). *El pensamiento salvaje*. Mexico: FCE. Original de 1962.

Mahlo, F. (1969). *L'acte tactique en jeu*. Paris: Vigot.

Mills, T. M. (1953), Power relations in three-person groups. *American Sociological Review,* 18, 351-357.

Mills, T. M. (1954). The coalition pattern in three-person groups. *American Sociological Association, American Sociological*, 19, (6), 567-667.

Moody, J. (1998). Matrix methods for calculating the triad census. *Social Networks*, 20, 291-299.

Navarro, V. Estudio de conductas infantiles en un juego de reglas. Análisis de la estructura de juego, edad y género. Tesis doctoral. Universidad de Las Palmas de Gran Canaria, 1995. Recuperado de http://hdl.handle.net/10553/2016

Navarro, V, (2002). *El Afán de Jugar*. *Teoría y práctica de los juegos motores*. Barcelona: INDE.

Navarro, V. (2006). 40 años de propuestas de juegos motores en educación física. Comparativa entre las propuestas tradicionales y modernas de libros manuales de juegos motores. *Revista de Educación*, 340, 787-808. http://www.revistaeducacion.mec.es/re340_28.html

Navarro, V. (2009). Investigaciones cuasi-experimentales acerca de conductas lúdicas en juegos motores de reglas, en V. Navarro y C. Trigueros (eds.) *Investigación y juego motor en España*. Lleida: Servicio de Publicaciones Universitat de Lleida, 325-368.

Navarro, V. (2011). Aplicaciones pedagógicas del diseño de juegos motores de reglas en educación física. *Ágora*, 13 (1), 15-34.

Parlebas, P. (1976). Activités physiques et éducation motrice, 4. *EPS*, dossiers 1967-1977.

Parlebas, P. (1981). *Contribution à un lexique commenté de l'action motrice*. Paris: INSEP.

Parlebas, P. (1988), *Elementos de Sociología del Deporte*. Málaga: Unisport.

Parlebas, P. (1996). Los universales de los juegos deportivos. *Praxiología Motriz*, 0, 15-29.

Parlebas, P. (2001). *Juegos, deporte y sociedad. Léxico de praxiologia motriz.* Paidotribo: Barcelona.

Parlebas, P. (2005a). Mathematisation elementaire de l'action dans les jeux sportifs. *Mathematiques et Sciences Humaines*, 170 (2), 95-117. http://msh.revues.org/2952

Parlebas, P. (2005b). Modélisation dans les jeux et les sports. *Mathematiques et Sciences Humaines*, 170 (2), 11-45. http://msh.revues.org/2968

Parlebas, P. (2005c). Mathematiques, jeux sportifs, sociologie. *Mathematiques et Sciences Humaines*, 170 (2), 5-9. http://msh.revues.org/2966

Parlebas, P. (2010). Modélisation mathematique, jeux sportifs et sciences socials. *Mathematiques et Sciences Humaines*, 191 (3), 33-50. http://msh.revues.org/11861

Parlebas, P. (2011). Trio maudit ou triade féconde? Le cas du jeu «pierre-feuille-ciseaux. *Math. Sci. Hum / Mathematics and Social Sciences*, 196 (4), 5-25. http://msh.revues.org/12107

Puig, N. y Heinemann, K. (1991). El deporte en la perspectiva del año 2000, *Papers*, 38, 123-141. Recuperado de http://www.ddd.uab.es/pub/papers/02102862n38/02102862n38p123.pdf

Robles, F. (2000). La ambivalencia como categoría sociológica en Simmel. *REIS*, 89, 219-235. http://www.jstor.org/stable/40184231

Sánchez, R. (2000). Del duelo a la paradoja: una propuesta de enseñanza de los juegos tradicionales infantiles basada en la comunicación motriz. III Jornades d'Intercanvi d'Experiències d'Educació Física. Valencia: CEFIRE, 173-189.

Simmel, G. (1950).*The sociology of George Simmel*. En K. Wolff (ed). New York: The Free Press-Mcmillan Publisher Company.

Wasserman, S. (1975). Random directed graph distributions and the triad

census in social networks. *NBER Working Paper*, 113.
Wasserman, S. y Faust, K. (2013). *Análisis de redes sociales. Métodos y aplicaciones*. Madrid, CIS.

Total references / Referencias totales: 46 (100%)
Journal's own references / Referencias propias de la revista: 5 (11%)

Rev.int.med.cienc.act.fís.deporte - vol. 17 - número 67 - ISSN: 1577-0354