Gutiérrez-Santiago, A.; Prieto, I.; Cancela, J. y Ayán, C. (2014). Análisis del error en la técnica de judo koshi guruma mediante t-patterns / The error analysis of koshi guruma judo throw using t-patterns. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte vol. 14 (55) pp. 393-407. Http://cdeporte.rediris.es/revista/revista55/artfeedback493.htm

ORIGINAL

THE ERROR ANALYSIS OF KOSHI GURUMA JUDO THROW USING T-PATTERNS

ANÁLISIS DEL ERROR EN LA TÉCNICA DE JUDO KOSHI GURUMA MEDIANTE T-PATTERNS

Gutiérrez-Santiago, A.[1]; Prieto, I.[2]; Cancela, J.[3] y Ayán, C.[4]

1 Professor. Faculty of Education and Sports Sciences. University of Vigo (Spain). ags@uvigo.es
2 Researcher at the Faculty of Education and Sports Sciences. University of Vigo (Spain). ivanprieto@uvigo.es
3 Professor. Faculty of Education and Sports Sciences. University of Vigo (Spain). chemacc@uvigo.es
4 Professor. Faculty of Education and Sports Sciences. University of Vigo (Spain). cayan@uvigo.es

Spanish-English translator: Miguel Ángel Prieto Lage, e-mail: michaelumangelum@gmail.com, Instituto de Investigaciones Marinas (IIM-CSIC).

UNESCO Code / Código UNESCO: 5899 Other Educational Specialties (Physical Education and Sport) / Otras Especialidades Pedagógicas (Educación Física y Deporte)
Council of Europe Classification / Clasificación Consejo de Europa: 4. Comparative Physical Education and Sport / Educación Física y Deporte Comparado.

Received January 3, 2012 **Recibido** 3 de enero de 2012
Accepted June 8, 2012 **Aceptado** 8 de junio de 2012

ABSTRACT

In this research, the most frequent technical errors and their sequences of action during the Koshi-guruma judo-technique execution were examined. The participants were students from the University of Vigo with no experience in the fundamentals of judo (18 men and 27 women; M=24.22±4.93 years old). The study was conducted based on a process of systematic observation of a recorded video during the performance of Koshi-guruma technique. The obtained data were evaluated by descriptive statistics and sequential analysis of T-Patterns, identifying: a) the presence of typical inaccuracies during the execution of the technique; b) a number of chains of errors affecting the imbalance of the body, the position of the feet and hip, blocking action and the arm's action. These findings allowed to propose motor tasks to correct the identified inaccuracies, sequential actions to ensure the success of the execution and recommendations for the use of feedback.

KEYWORDS: feedback, error patterns, observation instrument, knowledge of performance, teaching, judo.

RESUMEN

El objetivo de esta investigación es determinar los errores técnicos más frecuentes y sus secuencias conductuales en la proyección de judo Koshi-guruma. Los participantes (n=45; 18 hombres y 27 mujeres; M=24.22 años; DT=2.43), estudiantes universitarios sin experiencia en judo que cursaron una materia de fundamentos del judo, se sometieron, a partir de un estudio observacional sistemático, a un registro en video de la ejecución de la técnica de estudio. Los resultados, determinados mediante estadística descriptiva y análisis secuencial de *T-Patterns,* corroboran que existe una serie de defectos típicos, así como unas secuencias de errores en cadena, que básicamente afectan al desequilibrio, a la posición de los pies y cadera, a la acción de bloqueo y a la acción de brazos. Estos resultados permiten proponer tareas motrices basadas en los errores detectados, secuencias de movimientos que garanticen el éxito en la proyección y recomendaciones sobre la utilización del *feedback*.

PALABRAS CLAVE: *feedback*, patrón de errores, instrumento de observación, conocimiento de la ejecución, enseñanza, judo.

INTRODUCTION

The feedback given by the trainees (Hodges and Franks, 2002) and the use of an appropriate modeling (Bandura, 1977; McCullagh, 1986; Zubiaur, 2005) are factors that contribute significantly to the teaching-learning process in both sport and physical education (Pereira, Mesquita, Graça y Moreno, 2010; Zabala, Sánchez-Muñoz y Mateo, 2009). This implies detailed knowledge of the key factors to run a motor task, as well as the most common errors and their sequences, leading to the use of precise task-oriented feedbacks based on the fundamental aspects of the performance of a movement.

Gentile (1972) pointed out that the use of feedback varies depending on the type of task, thus when learning a close task, it is preferable to use the knowledge of the performance (KP), and when the task is open, the pupil benefits more from the knowledge of the result. In any case, according to Newell and Walter (1981) the KP would be as useful for open tasks, in which the external stimuli are similar on numerous occasions, and the response patterns are repeated.

The transmission of information based on the KP supports a variety of forms of study, in which the analysis of the performance of the movement is one of the most important, especially if we refer to the beginner stages (Zubiaur, 1998). In an analysis of the pseudoscientific movement, the information provided by professionals is based on their personal experience, which occasionally produces errors during the teaching-learning process of projections, due to the lack of knowledge on the key points of these techniques, ignoring the typical errors and their sequences.

The use of observational analysis and scientific methods to manage the information contributes to eliminate this bias, optimizing the feedback mechanisms. Previous research has established in which way the feedback should be displayed (Reo y Mercer, 2004; Tzetzis, Votsis y Kourtessis, 2008), and all under one common approach: the detailed knowledge of the movement.

OBJETIVES

The aim of this work is to identify the patterns of motor behaviour (as errors and its sequences) that are hidden from visual inference through a systematic observational study, to gain necessary knowledge that allow us to act accordingly to improve the teaching-learning process. Additionally, by studying the relevant standard errors and its sequences of the *Koshi-guruma* technique, we provide meaningful methodological recommendations to be used during the application of tasks and/or feedbacks in the teaching-learning process, thus facilitating the work of coaches and teachers of judo.

METHOD

In this research, an observational methodology (Anguera and Jonsson, 2003) was used, which has the rigor and flexibility required to study the episodes of behaviour that emerge naturally during the process of teaching and learning judo. Based on Borrie, Jonsson and Magnusson (2002) the type of observation carried out was systematic, open and non-participating.

Design

The observational design (Anguera, Blanco-Villaseñor y Losada, 2001) was nomothetic (several participants performing the same technique, in this case Deashi harai), monitoring (a technical procedure carried out during five academic years), and multidimensional (different dimensions of the observation instrument). From this design, nomothetic/tracking/multidimensional (N/S/M), a series of decisions concerning participants, observation and recording instruments, and the analysis procedure are derived.

Participants

Novice's students (n=45; 18 men and 27 women) from a subject of judo at the Faculty of Sciences of Education and Sport from the University of Vigo, with an age range between 21 and 30 years (an average of 24.22±4.93), during five academic years (2003 to 2008) were filmed on video (with their written authorization for research purposes). The study was also approved by the University of Vigo Research Ethics Committee.

Observational instrument

The observation instrument developed for this study is the SOBJUDO-KG (see table 1) combining field format with the category system (Fernández, Camerino, Anguera y Jonsson, 2009). Such instrument includes in their criteria the objective of our study: the technical errors on the performance of the judo-technique. The methodological model used for the teaching-learning process of both performance and observation, is based on the indications from Kodokan (Kodokan, s.f) school.

The SOBJUDO-KG fits the observational design presented, being multidimensional in nature with the following structure criteria: grip, off-balance, right-foot position, right-arm position, hip position, left-foot position, leg´s action, blocking action, throw stage, control stage and globality. Each of these dimensions gives rise to a system of categories that meets the conditions of exhaustiveness and mutual exclusivity (EME):

Table 1. Observational instrument of SOBJUDO-KG.

CRITERION	*CODE*	*DESCRIPTION*
GRIP	AGR	*Tori* (the *judoka* that performs the action) uses his left hand to grip *Uke's* (the *judoka* that receives the action) midway up the forearm.
OFF-BALANCE	NOB	*Tori* does not put *Uke* off-balance in the first part of the technique. His arms maintain the initial grip and only serve to accompany the action.
	DOB	The frontal off-balancing action and the subsequent initial displacement are performed in a discontinuous way.
RIGHT-FOOT POSITION	IRFP	*Tori's* incorrectly positions his right foot during the *Tsukuri* performance of the judo-technique (transitional part of the execution), after the turn on the vertical axes
RIGHT-ARM POSITION	ANC	*Tori's* right hand is in the supine position when gripping the neck of his opponent when performing the *Tai Sabaki* action (displacement of the body) but does not manage correctly *Uke*'s body because it does not apply enough power.
HIP POSITION	IHP	*Tori* incorrectly positioned his hip after the turn on the vertical. The proper location of the hip is in parallel to *Uke's* body.
LEFT-FOOT POSITION	ILFP	*Tori's* incorrectly positions his left foot during the *Tsukuri* performance of the judo-technique, after the turn on the vertical axes. The correct position in the frontal plane is between of the *Uke's* feet.
LEG'S ACTION	ESQ	*Tori* bends his legs excessively prior to the motor action.
BLOCKING ACTION	NBLC	The blocking action is incorrectly performed by *Tori*.
THROW STAGE	ILAT	During the final stage of the throw, *Tori* does not apply sufficient power when throwing *Uke's* body to the floor with his left arm.
	IRAT	During the final stage of the throw, *Tori* does not apply sufficient power when throwing *Uke's* body to the floor with his right arm.
	TSH	The *Tori's* arm action at the end of the throw is straight down following a lineal trayectory avoiding as much as possible to perform a parabolic trayectory.
	ITFL	Insufficient trunk flexion at the end of the throw (*Tori* maintains a position between 10º and 60º).
	ITTU	*Tori* fails to turn his trunk enough in the guiding stage of the technique.
	STH	*Tori* throws *Uke* around the side of his body instead of over the top and toward the front of his hip.
CONTROL STAGE	KTB	During the final stage of the technique *Tori* performs a trunk flexion, around 110º to 90º keeping it after the end of the execution.
	FACC	During the *kake* stage *Tori* uses his right arm to accompany *Uke's* fall to the floor.
REBALANCING	RRF	After performing the throw *Tori* loses his balance. In order to regain it he steadies himself with his right foot.
	RLF	Upon completion of the technique *Tori* loses his balance, which he regains by steadying himself with his left foot.
GLOBALITY	SLEX	The throw is executed slowly and without any continuity.

Recording instrument

The data collection was performed by recording the student front from two different angles with two digital cameras (JVC GZ-MG21E). To assist the analysis of the projections recorded, the filmed material was edited with the software Pinnacle Studio v.12. The software Match Vision Studio Premium v.3.0. (Spanish, Perea, Alday and Hernández, 2008), a multimedia interactive program that allows viewing and registering the filmed material at the same time in a computer, was used to support systematically the observational analysis. This program is highly flexible, allowing us to introduce all the codes for each of the dimensions of the changing criteria of the observation tool SOBJUDO-KG in order to register its succession.

Procedure

The technical execution of Koshi-guruma was filmed during the ordinary training period (~ 4 months with 3 hrs of practice per week) at the University of Vigo,

involving the learning process of a total of 17 projections. Only the data from 10 techniques collected were used. The selection criteria was based on: 1) the premises of an investigation with the difficulty of performing certain techniques of *Gokyo* (Garcia, Carratalá, Sterkowicz and Escobar, 2009); and 2) a questionnaire addressed to the faculty members who at that time were teaching at the Faculty of Sport Science the subject of "fundamentals of learning judo-techniques." In both cases, the Koshi-guruma projection was among the 10 simplest to learn. The filmed material was obtained by recording each participant performing the learned techniques, all without opposition and from a static position (technical), employing a stratified random sampling. After the observation and recording of all technical actions, we obtain an Excel file for each projection with its sequentiality.

The quality control of the data recorded by two observers is performed by the Cohen's Kappa coefficient (*k*), that guarantees the agreement between them when the value $k>0.80$. This statistical test was provided by GSEQ software (Bakeman and Quera, 2001), in which the obtained value for our study was $k=0.90$. Once this quality control test is achieved a first descriptive analysis of frequencies and percentages of occurrence of technical errors is conducted.

The excel files obtained allow us to have the frequencies of all codes of occurrences registered, which are successively transformed to allow different analysis. The codes of the instrument of observation SOBJUDO-KG are exported into the software THEME (Magnusson, 2000, 2005) with the aim of detecting temporal patterns, a computer application that is extremely effective for the study of team and individual sports (Fernández, Camerino, Anguera y Jonsson, 2009; Gutiérrez-Santiago, Prieto, Camerino y Anguera, 2011). The temporal patterns (T-Patterns) obtained using the algorithm present in the THEME v.5 (Magnusson, 2000), guides to reveal the hidden structures and unobservable aspects of the Koshi-guruma technique.

Data analysis

The frequency of occurrence of the different errors made when performing the Koshi-guruma throw was determined by means of a descriptive analysis using SPSS 15, The results are shown in Table 2. An analysis of temporal patterns among the observed errors was also conducted using THEME, the aim here being to identify the most significant error sequences. The Mann-Whitney U test (in SPSS 15, with significance set at $p<0.05$) was used to analyse the data in relation to the chosen independent variable, in this case the gender of participants. The quality analysis of the data was performed by calculating the reliability among the observers, using the Cohen's Kappa obtained with the GSEQ (Generalized Sequential Querier) software.

RESULTS

Statistic analysis

In Table 2, a descriptive analysis of the errors noted in the study group (n=45) is presented.

Table 2. Frequency and percentage of occurrence of technical errors made when performing the Koshi-guruma.

	Error	*Frequency*	*Percentage*
Grip	AGR	11	24.4%
Off-balance	NOB	30	66.7%
	DOB	8	17.8%
Right-foot position	IRFP	21	46.7%
Right-arm position	ANC	9	20%
Hip position	IHP	33	73.3%
Left-foot position	ILFP	34	75.6%
Legs action	ESQ	5	11.1%
Blocking action	NBLC	19	42.2%
Throw stage	ILAT	24	53.3%
	IRAT	16	35.6%
	TSH	1	2.2%
	ITFL	21	46.7%
	ITTU	7	15.6%
	STH	32	71.1%
Control stage	KTB	13	28.9%
	FACC	10	22.2%
Rebalancing	RRF	10	22.2%
	RLF	14	31.1%
Globality	SLEX	2	4.4%

The most common errors are related to the initial imbalance (NOB), with the improper position of the left and right feet and the hip (IRFP, ILFP and IHP), with the incorrect blocking action of *Tori* with the hip (NBLC), with the inefficient grip action and the inappropriate direction of the arms at the end of the performance of the technique (IRAT and ILAT) and by throwing the *Uke's* body from *Tori's* side rather than pulling *Uke* down in a circular motion over himself (STH).

To check the existence of any possible difference between men and women with respect to the observed errors in the performance of Koshi-guruma, a comparison mean by the Mann-Whitney U test is applied, founding in any case none statistically significant differences ($p<0.05$).

Detection of temporal patterns

In Figure 1, the sequence of the detected errors is presented. The left quadrant represents the relationship established between the different categories (the technical errors, see observational instrument of SOBJUDO-KG); its reading is carried out as a tree diagram from left to right. The right quadrant allows to know how often the previous relationships take place using the lines that go from the top to the bottom.

It shows a strong relationship between the inappropriate imbalance (NOB), the inadequate positioning of the hip (IHP), the inappropriate blocking action of *Uke's* body (NBLC) and the throw of *Uke's* body from the side rather than from the front and above the hip (STH), all highlighted by a red rectangle in the left quadrant of the dendrogram. Note the robust link observed between the improper positioning of the hip and the incorrect blocking action (IHP-NBLC), sequence that took place 18 times of the 19 instances in which one of them was observed (highlighted using a blue rectangle). Such a relationship has an important role, affecting directly on the later motor action of the projection (highlighted in the cluster analysis using a red rectangle).

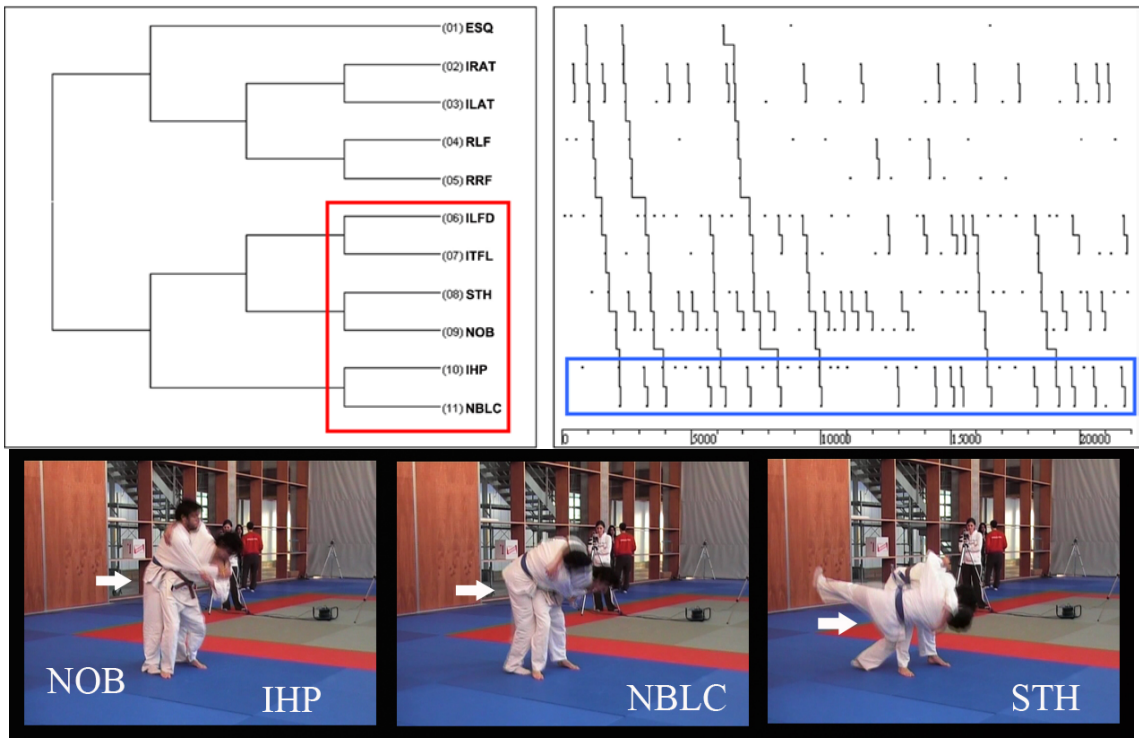

Figure 1. First Koshi-guruma dendrogram.

DISCUSSION

After an intense literature review, a lack of scientific studies that deal with the technical error and its sequences in judo was found out, in which only the relevant authors of this field of study had point out the key aspects or the most common technical errors when describing a technique (Daigo, 2005, Mifune, 2004; Ohlenkamp, 2006). Such indications, which were likely to be based on their personal and professional experience, persistently agree with those errors

that have been determined in this study, demonstrating the reliability of the method here applied.

In general, the bibliographic documents highlighted the importance of performing a correct action of imbalance at the start of the technique (NOB), so *Tori* would let *Uke* balanced only on his tiptoe before starting with the *Tai Sabaki* action. Authors such as Kano (1989), Mifune (2004), Ohlenkamp (2006) or Uzawa (1981), support the above statement, but only few like Koblev, Rubanov and Nevzorov (1988) described it as a typical error of Koshi-guruma throw.

The *Tori's* feet location after the *Tai Sabaki* of Koshi-guruma has been one of the major technical errors observed in our group of study (ILFP and IRFP). Several authors (Daigo, 2005; Uzawa, 1981) recognize the importance of the *Tori's* feet position, after the *Tai Sabaki*, indicating that they must be located in the frontal plane between the *Uke's* feet position.

The existing agreement in the scientific literature regarding *Tori´s* position before executing the main motor action of the Koshi-guruma technique has to be highlighted. The basic methodological recommendations are: first, the *Uke's* hip and chest should be in full contact with *Tori's* back (Carratalá and Carratalá, 2000, Mifune, 2004); and consequently, *Tori* can move inwards out of *Uke´s* hip, through a lateral flexion of the trunk (Inogai and Habersetzer, 2002; Ohlenkamp, 2006; Uzawa, 1981), performing appropriately the blocking action.

Another common error found, was the incorrect blocking action, either by the lack of such action or by loading *Uke* on the *Tori's* hip rather than the blockade itself (NBLC). Authors such as Daigo (2005), Ohlenkamp (2006) and Uzawa (1981) indicate the blocking action as one of the key aspects during the performance of Koshi-guruma technique.

Another common technical error found in our study group is linked to the lack of a strong arm action and their direction at the end of the judo-technique's performance. Several authors (Daigo, 2005; Inogai and Habersetzer, 2002, Mifune, 2004) recommend that *Tori* should not end the pulling action of his arms during the *Kake* of Koshi-guruma and that the direction should be forward to the left.

Some authors (Koblev et al., 1988) indicate, in the typical errors section, that in many cases an insufficient trunk flexion at the end of the technique (ITFL) affects significantly the performance quality of the throw.

Another recurrent error made by a large number of participants of our group of study, which significantly affects the performance of Koshi-guruma, is the throw of *Uke'*s body over the side, rather than throwing it in front and above of the *Tori's* hip in a circular motion with a perpendicular trajectory. Some authors, listed in the section reserved for key points, the importance of this technical aspect, confirming the relevance of the throw stage of *Uke's* body (Daigo, 2005; Ohlenkamp, 2006). In most cases, this error is a consequence of the deficient blocking action of *Tori* over *Uke's* body.

The pattern analysis of the sequential of errors, uncover a strong link between some of the described errors with some others not jet related by any of the scientific documents consulted, such as: incorrect off-balance action (NOB), incorrect hip position (IHP), the lack of a correct blocking action with the hip (NBLC) and the throw of *Uke's* body from the side rather than from the above and in front of the hip in a circular motion with a perpendicular trajectory (STH). However, if the descriptions and explanations analysed by the relevant authors in this field are rigorously reviewed (Daigo, 2005; Inogai and Habersetzer, 2002; Kobayashi and Sharp, 1995; Uzawa, 1981), it can be found that many of them pointed out the importance of locating *Tori's* hip properly in order to perform the later blocking action of *Uke's* body, linking the IHP and NBLC errors.

In fact, Mifune (2004) wrote one of the clearest statement, considering that a correct positioning of the hip (IHP) provides an effective blocking action (NBLC) and consequently a correct throw stage (IRAT and ILAT and STH) by indicating (in page 61): “It is crucial to insert your hips deep enough so that the rear side of your body touches the front side of his body, while firmly using both hands to pull and wrap him around”.

Nonetheless, many judo manuals identify the importance of correctly unbalance *Uke's* body (NOB) in order to continue the technical action appropriately, which could be interpreted as an attempt to avoid errors as IHP, NBLC or STH (Inogai and Habersetzer, 2002, Mifune, 2004).

Study limitations and future perspectives

One of the limitations of this study has been the time for students to practice (four months) as well as the type of study group (university students). Therefore, it would be interesting to see in a later study, what happens when using longer learning periods (>10 months) of study or other type of groups (high school, judo clubs, etc.) or different age groups. Thus, the process of learning judo-techniques could be well analyzed, establishing guidelines and the practice time needed identifying common mistakes, linking different factors with the number and the importance of errors and its sequentiality.

CONCLUSIONS

With the aim of avoiding the errors detected here a number of methodological recommendations can be made regarding the execution of the Koshi-guruma technique: 1) *Tori* should use his left hand to grip *Uke's* right sleeve at the level of the elbow; 2) *Tori* should put *Uke* off-balance in the direction of the right anterior diagonal, thus the weight of *Uke's* body fall solely on his right foot; 3) *Tori* should place his foot in the frontal plane between *Uke*'s right foot; 4) *Tori* should grip tightly around *Uke's* neck from the back; 5) *Tori* should place his left foot between *Uke's* feet besides *Uke's* left foot, establishing a strong contact between their hips; 6) *Tori* should displace his right iliac crest out of the space of *Uke's* hip, so that *Uke*'s body is crossed over *Tori*'s hip; 7) *Tori* should throw *Uke's* body twisting (wheel hip) his hip (being the axis of the rotation *Tori's* hip) pulling down in a circular motion over himself (clockwise) with his left arm towards the position of his left foot, displacing his right arm forward (keeping control over *Uke's* neck), raising the hip, bending the trunk slightly (from 90º to 70 º) and turning it to the left; and 8) *Tori* should control the flight of *Uke's* body with his left arm on the vertical plane.

As a matter of fact, the teaching and learning of the Koshi-guruma technique could be improved by paying special attention to the following movement sequences, which will ensure that the throw is correctly executed: 1) putting properly the adversary off-balance increases the likelihood that the feet and body will subsequently be in the correct position; and 2) accurate displacement of *Tori's* hip after the initial movement, simplifies the later *Uke's* blocking action and makes it easier to execute the throw phase of the technique.

Practical implications based on knowledge of performance (KP)

The results of this study also enable a number of strategies based on knowledge of performance to be proposed with the aim of improving the teaching and learning of the Koshi-guruma technique:

When demonstrating the technique the student's attention should be drawn towards the key points highlighted by this study. In relation to the theoretical aspects of the throw, coaches may wish to incorporate the use of video or other images that illustrate its fundamental features, as well as the most common errors detected here. At all events, teachers or coaches should focus only on the most relevant aspects.

Instructors could design tasks or drills that focus the student's attention on the most significant errors and sequences of behaviour detected.

After a throw is performed in training, the subsequent communication between coaches and students could be improved by providing more precise feedback. Coaches should begin by focusing on the most significant errors and sequences identified in the present study, leaving any others for a later stage of training. It is also helpful to focus on a few key aspects so that students do not become overloaded with information. At all events, the results of this study can provide a

platform for different kinds of feedback (verbal, verbal with a practical demonstration or verbal with hands-on assistance), which should always be positive in nature.

Coaches could draw up observation/evaluation sheets based on the category system of the observation instrument used in this study. One model would be for students to work in groups of three, with one of them observing the other two while they perform the throw. The former student would therefore conduct an observational analysis using the evaluation sheet, noting the errors made and providing immediate feedback. The same approach could also be used with video recordings, thereby enabling the observational analysis to be conducted after the throw has been performed.

REFERENCES

Anguera, M. T. y Jonsson, G. K. (2003). Detection of real-time patterns in sport: Interactions in football. *International Journal of Computer Science in Sport, 2*, 118-121.

Anguera, M. T., Blanco-Villaseñor, A. y Losada, J. L. (2001). Diseños Observacionales, cuestión clave en el proceso de la metodología observacional. *Metodología de las Ciencias del Comportamiento, 3*, 135-161.

Bakeman, R. y Quera, V. (2001). Using GSEQ with SPSS. *Metodología de las Ciencias del Comportamiento, 3*, 195-214.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191-215.

Borrie, A., Jonsson, G. K. y Magnusson, M. S. (2002). Temporal pattern analysis and its applicability in sport: An explanation and exemplar data. *Journal of Sports Sciences*, *20*, 845-852.

Carratalá, V. y Carratalá, E. (2000). *Judo*. Madrid: Consejo Superior de Deportes.

Castellano, J., Perea, A., Alday, L. y Hernández, A. (2008). The Measuring and Observation Tool in Sports. *Behavior Research Methods, 40,* 898-905.

Daigo, T. (2005). *Kodokan Judo Throwing Techniques*. Tokio, Japón: Kodansha International.

Fernández, J., Camerino, O., Anguera, M. T. y Jonsson, G. K. (2009). Identifying and analyzing the construction and effectiveness of offensive plays in basketball by using systematic observation. *Behavior Research Methods, 41*, 719-730.

García, J. M., Carratalá, V., Sterkowicz, S. y Escobar, R. (2009). A study of the difficulties involved in introducing young children to judo techniques: A proposed teaching programme. *Archives of Budo, 5*, 121-126.

Gentile, A. M. (1972). A working model of skill acquisition with application to teaching. *Quest*, *17*, 3-23.

Gutiérrez-Santiago, A., Prieto, I., Camerino, O. y Anguera, M. T. (2011). The temporal structure of judo bouts in visually impaired men and women. *Journal of Sports Sciences, 29*(13), 1443-1451.

Hodges, N. J. y Franks, I. M. (2002). Modelling coaching practice: The role of instruction and demonstration. *Journal of Sports Sciences*, *20*(10), 793-811.

Inogai, T. y Habersetzer, R. (2002). *Judo pratique. Du débutant à la ceinture noire*. París, Francia: Amphora.

Kano, J. (1989). *Judo Kodokan*. Madrid: Eyras.

Kobayashi, K. y Sharp, H. E. (1995). *The sport of Judo*. Tokio, Japón: Charles E. Tuttle Company.

Koblev, J. K., Rubanov, M. N. y Nevzorov, V. M. (1988). *Judo Moderno*. Milán, Italia: Edi-ermes.

Kodokan (s.f.). *Nage Waza: various techniques and their names [Video].* Tokyo, Japan: Kodokan Judo Video Series.

Magnusson, M. S. (2000). Discovering hidden time patterns in behavior: T-patterns and their detection. *Behavior Research Methods, Instruments, & Computers, 32*, 93-110.

McCullagh, P. (1986). A model status as a determinant of attention in observational learning and performance. *Journal of Sport Psychology, 8*, 319-331.

Mifune, K. (2004). *The Canon of Judo: classic teachings on principles and techniques.* Tokio, Japón: Kodansha International.

Newell, K. M. y Walter, C. B. (1981). Kinematic and kinetic parameters as information feedback in motor skill acquisition. *Journal of Human Movement Studies, 7*, 235-254.

Ohlenkamp, N. (2006). *Black Belt. Judo Skills and Techniques*. Londres, Inglaterra: New Holland.

Pereira, F., Mesquita, I., Graça, A. y Moreno, M. P. (2010). Análisis multidimensional del feedback pedagógico en entrenamiento en voleibol. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte, 10*(38), 181-202.

Reo, J. A. y Mercer, V. S. (2004). Effects of live, videotaped, or written instruction on learning an upper-extremity exercise program. *Physical Therapy, 84*, 7622-7633.

Tzetzis, G., Votsis, E. y Kourtessis, T. (2008). The effect of different corrective feedback methods on the outcome and selfconfidence of young athletes. *Journal of Sports Science and Medicine, 7*, 371-378.

Uzawa, T. (1981). *Pedagogía del Judo.* Valladolid: Miñón.

Zabala, M., Sánchez-Muñoz, C. y Mateo, M. (2009). Effects of the administration of feedback on performance of the BMX cycling gate start. *Journal of Sports Science and Medicine, 8*, 393-400.

Zubiaur, M. (1998). El conocimiento de la ejecución. *Motricidad, 4*, 97-111.

Zubiaur, M. (2005). Algunas consideraciones sobre la utilización del modelado en la adquisición de habilidades motrices en niños. *Revista de psicología del deporte, 14,* 85-97.

Referencias totales / Total references: 29 (100%)
Referencias propias de la revista / Journal's own references: 1 (3.3%)