Psicología Educativa 21 (2015) 39-45

Psicología Educativa

www.elsevier.es/psed

The effect of skill types and competition level on the functions of observational learning in athletes

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ARTICLE INFORMATION

Manuscript received: 18/12/2014
Revision received: 12/02/2015
Accepted: 16/02/2015

Keywords:
Elite athlete
Non-elite athlete
Open skill
Closed skill
Strategy
Performance

ABSTRACT

The aim of the present study was to investigate the effects of skill types (open and closed) and competition level (elite and non-elite) on the functions of observational learning in athletes. To fulfill the objectives of the study, 247 Taekwondo athletes volunteered to answer the Functions of Observational Learning Questionnaire (FOLQ). Results of 2 (skill level) × 2 (skill types) MANOVA showed that the athletes in closed skills use the skill and strategy functions more significantly than the athletes in the open skills, whereas the open skill athletes use the performance function more. Moreover, the elite athletes use all the three functions of the observational learning more than non-elite athletes. In addition, the interactive effect of skill types and competition level on the functions of observational learning was significant ($p < .05$). The study also showed that the effect of skill types on the functions of observational learning is stronger than the effect of the competition level.

El efecto de los tipos de destreza y del nivel de competición en las funciones de aprendizaje observacional en atletas

Palabras clave:
Atleta de élite
Atleta no de élite
Destreza abierta
Destreza cerrada
Estrategia
Desempeño

RESUMEN

El objetivo del presente estudio ha sido investigar los efectos de los tipos de destreza (abierta y cerrada) y del nivel de competición (élite y no élite) en las funciones del aprendizaje observacional en atletas. Para alcanzar los objetivos del estudio se contó con 247 atletas de Taekwondo que contestaron voluntariamente al Cuestionario de Funciones de Aprendizaje Observacional (FOLQ). Los resultados de un ANOVA 2 (nivel de destreza) x 2 (tipos de destreza) muestran que los atletas con destrezas cerradas utilizan las funciones de destrezas y estrategias más significativamente que los atletas con destrezas abiertas, que se sirven más de la función de desempeño. Además, los atletas de élite utilizan las tres funciones del aprendizaje observacional más que los que no son de élite. Por otra parte, fue significativo el efecto interactivo de los tipos de destreza y de nivel de competición en las funciones de aprendizaje observacional ($p < .05$). El estudio mostró igualmente que el efecto de los tipos de destreza en las funciones de aprendizaje observacional es superior al del nivel de competición.

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DOI: http://dx.doi.org/10.1016/j.pse.2015.02.003

Learning a movement skill is often comprised of information transferred from teachers to learners, one of whose most common methods is carried out via observation (Bandura, 1986; McCullagh & Meyer, 1997). In other words, observational learning is a process in which the observers set their motion as a result of a movement which was observed (McCullagh & Davis, 2001). Numerous studies have emphasized the advantages of observational learning (Adams, 1986; Carroll & Bandura, 1985, 1987, 1990; Orlick, 1986). Ashford, Bennett, & Davids (2006), in a meta-analysis, reviewed studies on observational learning and revealed that observational learning is even more effective than body exercise.

One of the aspects of observational learning, which is usually ignored, is the role of task or movement that should be learned. According to Gentile (2000), what happens during the learning process is highly dependent on the task. McCullagh and Davis (2001) suggest the use of movement tasks categorization system, which may be influential on the learning process. Various categories have been defined regarding the movement skills and tasks, some of whose simple forms include the categorization based on the movement requirement of the task (discrete, continuous, and serial) and perception features of the task (open or closed) (Schmidt & Lee, 2011).

Cumming, Clark, Ste-Marie, McCullagh, & Hall (2005) have demonstrated a new approach regarding the observational learning. In their opinion, nowadays one should look at the observational learning from its functions' viewpoints. For this purpose, they designed the Functions of Observational Learning Questionnaire (FOLQ). This questionnaire evaluates three functions of observational learning in athletes, including skill, strategy, and performance. The skill function highlights how athletes acquire the execution pattern of motor skills through observation (e.g., learning how to execute a free-throw in basketball). The strategy function refers to how athletes observe and learn to develop game strategies and motor routines (e.g., gaining an understanding of routines in Poomsae). The performance function identifies how athletes learn to reach optimal arousal and mental states through observation (e.g., learning to focus one's attention on the batter's box in baseball). Skill and strategy functions have a cognitive role and performance function has a motivational function (Cumming et al., 2005). Various researchers have used the FOLQ to examine athletes' general observational learning use, as well as their differences according their gender, sport type, and competitive level (Cumming et al., 2005; Law, 2008; Law & Hall, 2009; Hall et al., 2009; Sunderland, 2008; Wesch, Law, & Hall, 2007). In the following parts, the study will review studies that assessed the effect of competition level and skill types on the functions of observational learning.

Competition Level

Cumming et al. (2005), in their preliminary study which led to designing the FOLQ, attempted to investigate the effects of competition level on the observational learning functions. In their study, which was performed on 953 athletes (462 male and 483 female, 8 unreported), 338 athletes determined their competitive level as recreational, 161 participants were at the club level, 65 others were at the provincial level, 302 of them were at the varsity level, and 70 individuals determined their competitive level as elite. Cumming and her colleagues did not find any significant differences among the various levels of observational learning functions in the athletes who participated in the study. Wesch et al. (2007) compared 642 athletes (312 recreational and 330 varsities) and concluded that there is a significant difference between the various skill levels. The varsity athletes who had participated in their study used the skill, strategy, and performance functions more than the athletes categorized in the recreational level did. Additionally, Sunderland (2008) studied the functions of observational learning in athletes and concluded that there is a significant difference between expert and novice athletes only in the skill function and the difference between expert and novice athletes in the strategy and performance functions was not significant. Hall et al. (2009), with the aim of analyzing the usage of observational learning and imagery and their relationship with self-efficiency in athletes, showed that there is no significant difference between elite and non-elite athletes in using the functions of observational learning. This inconsistency highlights one of the challenges of employing competitive level as a proxy measure for athletes' skill level or sport expertise. In questionnaire-based studies examining psychological skill use, athletes are typically asked to self-report on their competitive level according to a hierarchy of recreational, provincial/state, varsity, national, or international level, and differences in their psychological skill use are then discussed in terms of these categories, or with combination of categories (e.g., elite vs. non-elite). There may be discrepancies among athletes within a single category according to age and years of sport experience, both of which are typically considered by researchers. More importantly however, there may be significant discrepancies in athletes' actual skill level within a single category (Gregg & Hall, 2006; Law & Hall, 2009).

Skill Types

Cumming et al. (2005) in another part of their research investigated the observational learning functions between the athletes of independent and interactive sports. They observed that there is a significant difference between independent and interactive sports in use of skill function, in such a manner that athletes in independent sports use this function more than that of those in interactive sports. A significant difference was also seen in the performance function, highlighting that athletes in independent sports have used this function more than those in interactive sports. They also noted that the extent of the observed effect is very small and the results of this part of the study should be used and interpreted carefully. In another research by Wesch et al. (2007), the effect of sport types on the functions of observational learning in athletes of individual and team sports was investigated. They concluded that athletes in individual sports use the skill function more than athletes in team sports. This is while athletes in team sports use the strategy and performance functions significantly more than athletes in individual sports. The study of Sunderland (2008), which was on the determination of the difference between athletes in independent and interactive sports, is also indicative of a significant difference between the independent and interactive sports in using the functions of observational learning. According to the results of the study, athletes in independent sports used the skill function more than the athletes in interactive sports. Moreover, athletes in interactive sports used the strategy function more than those in independent sports. There was also no significant differences between the interactive and independent sports in using the performance function. Hall et al. (2009) further compared the observational learning functions between team and individual sports and revealed that the athletes in team sports used the skill function more than the athletes in individual sports.

One possible explanation is based on the individual sports that were examined in the above-mentioned studies. Individual athletes were competing in sports such as golf, tennis, figure skating, and swimming where there usually are a number of athletes practicing at the same time. Thus, there is a considerable opportunity to observe others perform. Moreover, these sports place a great emphasis on the proper form, which is one aspect of performance that can be readily acquired by watching others (Sidaway & Hand, 1993; Wesch et al., 2007; Whiting, Bijlard, & Den Brinker, 1987).

Interaction

Wesch et al. (2007) revealed that the interactive effect of skill types and competition level on the functions of observational learning was not significant.

As seen in the above-mentioned researches, no data has been presented regarding the effect of open/closed skills on the functions of observational learning, while in a number of researches, conducted on studying factors, such as functions of imagery (Arvinen-Barrow, Weigand, Thomas, Hemmings, & Walley, 2007; White & Hardy, 1998), differences between the open and closed skills have been observed. In the current research, Taekwondo athletes in two fields of Kiu-rogi and Poomsae have been studied. The reason for selection of these two fields was that the types of skills that are used in both fields are similar; yet at the same time, the environment for performing the skills is different. In the Kiu-rogi field, the environment is unpredictable and the athlete should perform the techniques considering the conditions of the environment (open skill), whereas in Poomsae the environment is consistent and predictable and the athlete should perform certain forms (closed skill).

In summary, since few studies showed the effects of competition level on the functions of observational learning, the current study aims to extend the existing observational learning literature concerning the difference in using functions of observational learning between elite and non-elite athletes in open and closed-skill athletes, because there is no study that has directly compared the observational learning use of athletes in open and closed-skills. By using the FOLQ, the present study intends to directly compare the use of the three functions of observational learning between open and closed skill athletes. Ultimately, in the third step, and considering the fact that in the real conditions a combination of competitive level and skill types generally exist, the interactive effects of competition level and skill types on the functions of observational learning were investigated. It was hypothesized that open and closed skill athletes would use the functions of observational learning to different degrees. Existing literature suggest that elite and successful athletes use more observational learning than less successful and non-elite athletes (Law & Hall, 2009; Sunderland, 2008; Wesch et al., 2007). Thus, the researchers have predicted that the elite athletes would use observational learning significantly more than non-elite athletes and, based on the findings of previous studies, the interactive effect of skill level and skill types are not significant.

Method

Participants

A sample of 247 Taekwondo athletes was randomly selected from among the participants in Galeb summer camp (Serbia, 2010), athletes who participated in the selection competitions for the national team, and the present athletes in the premier league of Taekwondo in Iran, all in the age range of 13 to 61 (25.6 ± 10.89 years old). Athletes that compete in varsity, national, or international levels were determined as elite and other athletes competing in club or province levels were determined as non-elite. In Iran, there are 2-3 elite athletes in each weight rank. Yet, since only 1 athlete could compete in the national team, others compete at varsity level. Therefore, the researchers chose varsity level as elite athletes (see Table1).

Table 1
Distribution of Samples in Different Groups

	Competition level		Skill type	
	Elite	Non-elite	Open skill	Closed skill
Male	72	93	114	51
Female	49	33	55	27

Questionnaire

In this study, the Functions of Observational Learning Questionnaire has been used (Cumming et al., 2005). This questionnaire has 17 questions, which are answered by the athletes themselves and measures three functions of observational learning. The answers given to these questions are in the range of 1-7 (1 = *completely disagree*, 7 = *completely agree*). The three functions of observational learning, which are to be measured via this questionnaire, are: 1) skill, including 6 questions (e.g., "I use OL to understand how to perfectly perform a skill"); 2) strategy, including 5 questions (e.g., "I use OL to develop game plans and routines"); and 3) performance, including 6 questions (e.g., "I use OL to learn how to cope with anxiety"). Cumming et al. (2005) have shown that the FOLQ possesses satisfactory reliability and validity. In the present study, Cronbach's alphas were acceptable for all three subscales: skill = .85, strategy = .89, and performance = .88. In addition to the FOLQ, participants were asked to provide demographic information, including age, gender, sport, and level of competition.

Procedure

Ethics approval was obtained from the appropriate institutional ethics review board. The researchers or their assistants approached individuals at various Taekwondo clubs or in other areas (national training camp in Iran and Galeb camp in Serbia) that were familiar to the participants (e.g., at work, in the community, etc.), explained the study to them, and gave them the letter of information and questionnaire package. Individuals who consented to participate in the study completed the questionnaire package and then returned it directly to the researcher. Completion of the questionnaires took approximately 10 minutes.

Statistical Method

After collecting the distributed questionnaires and extracting data from them, the normality of the distribution of variables with a Kolmogorov-Smirnov test was verified, with no significant deviation from normality. Following that, in order to study the effect of skill and competition level on the functions of observational learning, a factor analysis model, 2 (skill type) × 2 (competition level) MANOVA was used. Moreover, for the determination of the precise location of difference between the groups, the Tukey's followup test was used. All the statistical tests were conducted using SPSS software version 19 and at the significant level of $p = .05$.

Results

The descriptive statistics were calculated for each of the three FOLQ subscales. Means and standard deviations for the entire sample, by competition level (elite/non-elite) and skill-type (open/closed), are presented in Table 2.

With the purpose of establishing whether competition level and skill-type had an effect on athletes' observational learning use, a within-participants multivariate analysis of variance (2 × 2 MANOVA) was conducted, with competition level (elite/non-elite) and skill-type (open/closed) as the within-participants factors. The three functions of observational learning subscales generated from the FOLQ were the dependent variables.

Skill Types

The results revealed that a significant multivariate effect was found for skill-type, Wilks' lambda = .835, $F(3, 232) = 14.91$, $p = .0001$,

Table 2
Means (*SD*) for FOLQ Subscales by Competition Level (Elite/Non-elite) and Skill-type (Open/Closed)

Functions	Total		Skill-type				Competition-level			
			Open		Closed		Elite		Non-elite	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Skill	5.11	1.19	4.93	1.21	5.51	1.04	5.45	1.00	4.65	1.27
Strategy	4.83	1.03	4.80	1.11	4.99	1.00	5.06	0.98	4.52	1.02
Performance	4.61	1.12	4.73	1.19	4.33	1.17	4.87	1.20	4.25	0.88

η^2 = .45, with an observed power of 99%. At the univariate level, due to skill-type, significant effects were found for skill function $F(1, 232)$ = 25.28, p = .0001, η^2 = .28 with an observed power of 99%; strategy function $F(1, 232)$ = 4.466, p = .036, η^2 = .006 with an observed power of 55%; and performance function $F(1, 232)$ = 4.58, p = .033, η^2 = .002 with an observed power of 56%. These findings suggest that athletes in closed-skill sports used skill and strategy functions significantly more than athletes in open-skill sports. In addition to that, athletes in open-skill sports used performance function more than those in the closed-skill sports.

Competition Level

The results revealed that a significant multivariate effect was found for competition-level, Wilks' lambda = .913, $F(3, 232)$ = 7.217, p = .0001, η^2 = .014 with an observed power of 98%. At the univariate level, due to skill-level, significant effects were found for skill function $F(1, 232)$ = 19.679, p = .0001, η^2 = .009 with an observed power of 99%; strategy function $F(1, 232)$ = 11.214, p = .001, η^2 = .002 with an observed power of 91%; and strategy function, $F(1, 232)$ = 8.712, p = .003, η^2 = .005 with an observed power of 83%. These findings suggest that elite athletes used skill strategy and performance functions of observational learning significantly more than non-elite athletes.

Interactions

The results revealed that a significant multivariate effect was found for skill-type and competition-level, Wilks' lambda = .919, $F(3, 232)$ = 6.649, p = .0001, η^2 = .029 with an observed power of 97%. At the univariate level, due to competition-level, significant effects were found for skill function, $F(3, 232)$ = 19.52, p = .0001, η^2 = .17 with an observed power of 99%; strategy function, $F(3, 232)$ = 9.08, p = .003, η^2 = .021 with an observed power of 85%; and performance function, $F(3, 232)$ = 5.26, p = .023, η^2 = .021 with an observed power of 62%. This significant interaction was followed by separate competition-level × skill-type representation analyses of variance (ANOVAs) with on functions of observational learning (Fig 1). This analysis revealed the main effect for functions of observational learning for skill function, $F(3, 235)$ = 25.926, p = .0001; strategy function, $F(3, 235)$ = 9.618, p = .0001; and performance function, $F(3, 235)$ = 9.845, p = .0001. Follow up analysis using Tukey follow up test showed statistically significant differences between groups (Table 3).

Table 3
Results of Tukey follow up test

Functions	Groups	1	2	3	4
Skill	1	-	-	-	-
	2	.0001*	-	-	-
	3	.0001*	.960	-	-
	4	.0001*	.984	1.000	-
Strategy	1	-	-	-	-
	2	.0001*	-	-	-
	3	.007*	.644	-	-
	4	.019*	.467	.994	-
Performance	1	-	-	-	-
	2	.0001*	-	-	-
	3	.199	.001*	-	-
	4	.450	.016*	.976	-

Note. 1= non elite-open-skill sports, 2 = elite-open-skill sports, 3 = non elite-closed-skill sports, 4 = elite-closed-skill sports.
$p < .05$

Discussion

The aim of the current research was to study the effects of competition level (elite and non-elite) and skill types (open or closed) on the functions of observational learning (skill, strategy and performance). The first step was to evaluate the functions of observational learning in the elite and non-elite athletes. The results obtained are indicative of a difference between elite and non-elite athletes in using the functions of observational learning, in such a way that the elite athletes use all three functions of observational learning more than the non-elite athletes. These results are in conformity with the results obtained by Wesch et al. (2007), who reported that varsity athletes use all the three observational learning functions more than recreational athletes, and also with the results of Sunderland et al. (2009), who observed a significant difference between expert and novice athletes in the skill function. On the other hand, the results of our study are not in conformity with the findings of Cumming et al. (2005) and Hall et al. (2009), who reported no significant difference between elite and non-elite athletes in using the functions of observational learning. One of the possible reasons for this inconsistency originates from the available definition of elite and non-elite athlete. In some earlier research, the athletes that were selected as elite were at a lower level compared to the athletes in the current research, because there were few international level athletes and many of them were in national or club level.

According to the results, elite athletes use cognitive functions of observational learning more, since, according to researchers (Cumming et al., 2005; Wesch et al., 2007), skill and strategy functions have a cognitive aspect and the performance function has a motivational aspect. Since the cognitive functions of observational learning are correlated with some psychological factors, such as athletic self-confidence (Hall et al., 2009), this is one of the probable reasons for the supremacy of these athletes and their success to achieve elite level. However, it is suggested that future research look into the relationship between functions of observational learning and other psychological skills. Regarding the performance function, which has a motivational aspect, the elite athletes have also used this function to a much more extent. This fact could originate from the previous experiences of these athletes in using observational learning as a factor for motivational enhancement (Bandura, 1986).

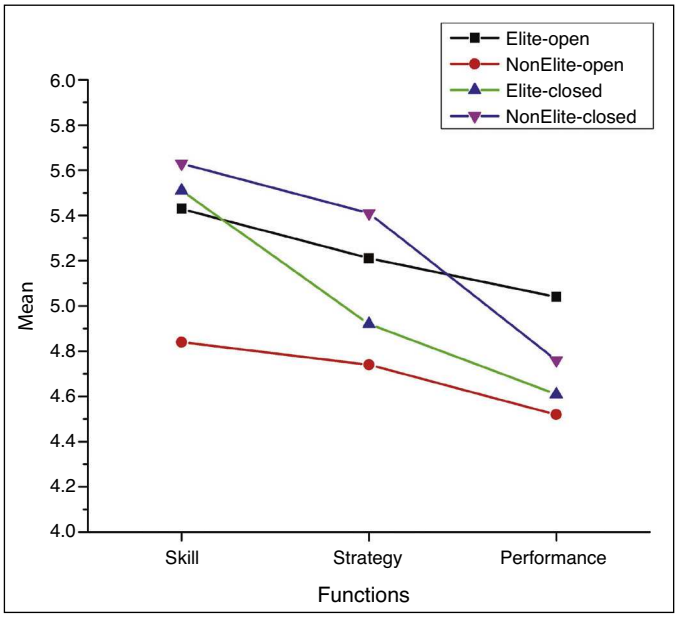

Fig 1. Interaction Effect of Groups on the Functions of Observational Learning

In the second step, the researcher attempts to investigate the effect of skill type (open or closed) on the functions of observational learning (skill, strategy, and performance) in athletes. The results illustrate that athletes in closed skills use the skill and strategy functions more than the athletes in open skills do. However, athletes in open skills use performance function more. Since in the closed skills (Poomsae, gymnastics, etc.) the performance accuracy and movement beauties are very important, these athletes use the skill function more than the athletes in open skills. Additionally, in the closed skills, such as the desired skills in this research, due to the predictability of the environment, the athletes use the predetermined strategies. As an example, the forms that are performed in Poomsae have consistent order and principles, which are considered strategy. On the other hand, in the open skills that the opponent's actions could not predict, the chance of using the predetermined strategies is diminished. Based on the inverse U theory, for any kind of sport activity, a proper level of motivation is needed (Orlick, 2007; Poulton, 1957; Weinberg & Hunt, 1976; Wesch et al., 2007). Activities that need more accuracy and precision (such as Poomsae) also need a lower level of motivation, while interactive and competitive sports (such as Kiu-rogi) need a higher level of motivation. This fact could be the reason for more frequent usage of performance function by the athletes in the Kiu-rogi field, because the performance function has a motivational function. Nevertheless, once other variables, such as the skill types (fine or gross, interactive or non-interactive), are considered, one could surely state that the athletes in open skills use performance function more, since most of the closed skills are individual and fine but the open skills might be interactive and gross (Hall, Singer, Hausenblas, & Janelle, 2001).

In another part of the research, the interactive effect of two variables of skill type and competition level was investigated and according to the obtained results, this hypothesis was confirmed. Based on the results of factorial analysis of variance, one could conclude that most of the differences were between the athletes of Kiu-rogi (open skill), in such a manner that non-elite athletes of this field have a notable difference with other groups. These results are inconsistent with the findings of Wesch et al. (2007), since they observed no significant interactive effect. One of the possible reasons for this difference is related to how the research samples are determined, since in the research done by Wesch et al. (2007), 14 team sports and 14 individual sports have been studied, whereas the present study investigates this interaction in two fields (Poomsae and Kiu-rogi). As observed in previous studies, there are many differences between various sport fields in using the psychological skills (such as imagery and observational learning in the current study) and they recommended that, in order to achieve more reliable results, the amplitude of studied sport fields be reduced (Arvinen-Barrow et al., 2007).

This interaction indicates the fact that even the difference between elite and non-elite levels, which was seen in this research, was in the open skill group and elite and non-elite athletes of closed skill showed no significant difference in the functions of observational learning. The most possible reason for this phenomenon is the previous experience of the Poomsae athletes. After obtaining these results, researchers have investigated the effective factors on these results and came to the conclusion that these athletes had a previous background of Kiu-rogi field, in a way that some of these athletes have chosen Poomsae field after achieving no success in the Kiu-rogi field. Therefore, based on one of the learning principles, called transfer (Schmidt & D.Lee, 2011; Weinberg, 2010), they attempted to learn the new field's skills and have encountered a negative transfer (Maslovat, Hodges, Krigolson, & Handy, 2010), causing a higher amount of skill function usage as compared to the Kiu-rogi field in order to change the old movement style to new forms. This phenomenon is seen less regarding the strategy function, since the extent of strategy used in Kiu-rogi field is lower than that of Poomsae and, in fact, the negative transfer has not occurred. However, the need to learn these strategies in these athletes makes Poomsae athletes attempt to learn this function more than Kiu-rogi athletes. In the performance function, since Poomsae athletes need less motivation, they use performance function much less than the Kiu-rogi athletes.

Conclusion

According to the results obtained in the current study, it could be concluded that both variables of skill types and competition level show a significant effect on the functions of observational learning in athletes. However, the effect of competition level in the open skills was greater than that of the closed skills. These results focus on the fact that one should consider the special exercise methods for each skill. It is also recommended that sport coaches teach skill and strategy functions to their athletes using different methods of observational learning. Moreover, considering the fact that observational learning contributes to the creation of motivation in athletes, this method has been recommended in order to enhance their motivation for participating in exercises and to maintain their motivation during game time.

Resumen ampliado

Aprender una destreza de movimiento a menudo consta de información transferida de profesores a alumnos, uno de cuyos métodos más corrientes se da a través de la observación (Bandura, 1986; McCullagh y Meyer, 1997). Dicho de otro modo, el aprendizaje por observación es un proceso mediante el cual los observadores fijan el movimiento como resultado de un movimiento observado (McCullagh y Davis, 2001). Uno de los aspectos del aprendizaje observacional que normalmente se pasa por alto es el papel que juega la tarea o movimiento a aprender. Según Gentile (2000), lo que ocurre durante el proceso de aprendizaje depende en gran medida de la tarea. McCullagh y Davis (2001) sugieren que se utilice el sistema de categorización de tareas de movimiento, que pueden influir en el proceso de aprendizaje. Se han definido diversas categorías relativas a las destrezas y tareas de movimiento, cuyas formas más simples abarcan la categorización en función del requisito de movimiento de la tarea

(discreta, continua y en serie) y de los rasgos perceptivos de la tarea (abierta o cerrada) (Schmidt y Lee, 2011).

Cumming, Clark, Ste-Marie, McCullagh y Hall (2005) han mostrado un nuevo enfoque relativo al aprendizaje por observación. Según ellos, actualmente debería abordarse el aprendizaje por observación desde el punto de vista de sus funciones. A tal objeto diseñaron el cuestionario de funciones del aprendizaje por observación (FOLQ) que evalúa tres funciones de dicho aprendizaje en atletas: destreza, estrategia y ejecución. La primera destaca cómo adquieren los atletas el patrón de ejecución de las destrezas motrices por medio de observación (p. ej., aprender a ejecutar un tiro libre en baloncesto). La función de estrategia alude a cómo observan y aprenden los atletas a desarrollar estrategias de juego y hábitos motores (por ejemplo conseguir asimilar rutinas del poomsae). La función de ejecución revela cómo aprenden los atletas a alcanzar una activación óptima y estados mentales por medio de la observación (por ejemplo, aprender a centrar la atención en la zona que cubre el bateador en béisbol). Las funciones de destreza y estrategia son de tipo cognitivo y la de ejecución es motivadora (Cumming et al., 2005). Diversos investigadores han utilizado el FOLQ para analizar el uso del aprendizaje general de los atletas por observación, así como las diferencias en función del sexo, tipo de deporte y nivel competitivo (Cumming et al., 2005; Hall et al., 2009; Law y Hall, 2009; Law, 2008; Sunderland, 2008; Wesch, Law y Hall, 2007). Resumiendo, dado que pocos estudios han mostrado los efectos del nivel de competición en las funciones del aprendizaje observacional, este estudio pretende ampliar la literatura científica observacional actual referida a la diferencia al utilizar funciones de aprendizaje por observación entre atletas de élite y aquellos que no lo son en atletas de destrezas abiertas y cerradas. Ningún estudio ha comparado directamente la utilización del aprendizaje observacional de atletas en destrezas abiertas y cerradas. Mediante la utilización del FOLQ, este estudio trata de comparar directamente la utilización de las tres funciones del aprendizaje observacional en atletas de destrezas abiertas y cerradas. Por último, a la vista de que en condiciones reales por lo general se da una combinación de nivel competitivo y tipos de destreza, en un tercer paso este estudio investiga los efectos interactivos del nivel de competición y de los tipos de destreza en las funciones del aprendizaje por observación. Se planteó la hipótesis de que los atletas de destrezas abiertas y cerradas utilizarían en diverso grado las funciones del aprendizaje por observación. Los estudios publicados indican que los atletas de élite y los que son eficaces utilizan más el aprendizaje observacional que los atletas que no son de élite ni que aquellos que no son eficaces (Law y Hall, 2009; Sunderland, 2008; Wesch et al., 2007). De este modo, los investigadores han predicho que los atletas de élite utilizarían el aprendizaje observacional significativamente más que los que no lo son y que, según los estudios previos, el efecto interactivo del nivel de destreza y los tipos de destreza no es significativo.

Método

Se seleccionó aleatoriamente a 247 atletas de taekwondo entre los asistentes al campamento de verano Galeb (Serbia) en 2010, atletas que participaban en las competiciones para la selección nacional, y los atletas actuales de la primera división de taekwondo de Irán, en un rango de edad de 13 a 61 años (25.6 ± 10.89). Se les aplicó el FOLQ (Cumming et al., 2005). Los investigadores, o sus ayudantes, se acercaron a ellos en diversos clubs de taekwondo o en otros lugares (campamento de entrenamiento nacional en Irán y campamento Galeb en Serbia) familiares para los participantes (por ejemplo, en el trabajo, en el barrio, etc.), les explicaron el estudio y les entregaron una carta con información y el conjunto del cuestionario. Aquellos que estuvieron de acuerdo en participar en el estudio cumplimentaron el cuestionario y se lo enviaron directamente al investigador. La cumplimentación duró unos 10 minutos.

Resultados y discusión

Los resultados muestran que hay diferencias entre los atletas de élite y los que no lo son en el uso de las funciones de aprendizaje observacional, de modo tal que los primeros utilizan las tres funciones en mayor medida que los segundos ($p < .0001$). Dichos resultados corroboran los de estudios previos (Cumming et al., 2005; Hall et al., 2009; Wesch et al., 2007). Uno de los posibles motivos de esta incoherencia reside en la definición de atleta de élite y atleta que no lo es. En algunas investigaciones anteriores, los atletas elegidos como de élite estaban en un nivel inferior que los atletas de la presente investigación debido a que había pocos atletas de nivel internacional y muchos de ellos eran de nivel nacional y de club. Los atletas de élite utilizan funciones cognitivas de aprendizaje observacional en mayor medida dado que, de acuerdo a los investigadores (Cumming et al., 2005; Wesch et al., 2007), las funciones de destreza y estrategia tienen un carácter cognitivo, mientras que la función de ejecución lo tiene motivacional. Dado que las funciones cognitivas del aprendizaje por observación correlacionan con algunos factores psicológicos, como la autoconfianza atlética (Hall et al., 2007), se trata de uno de los posibles motivos de la supremacía de estos atletas y de su éxito para lograr el nivel de élite. Los resultados de este estudio también mostraron que los atletas de destrezas cerradas utilizan las funciones de destreza y estrategia en mayor medida que los atletas de destrezas abiertas. No obstante, estos últimos utilizan más la función de ejecución. Dado que en las destrezas cerradas (poomsae, gimnasia, etc.) son muy importantes la precisión en la ejecución y la belleza en los movimientos, dichos atletas utilizan más la función de destreza que los atletas de destrezas abiertas. Además en las destrezas cerradas, como las destrezas buscadas en esta investigación, debido a la predictibilidad del contexto, los atletas utilizan las estrategias predeterminadas. Como ejemplo, las formas ejecutadas en poomsae tienen un orden y unos principios congruentes, que se consideran estrategia. Por otro lado, en las destrezas abiertas en las que no pueden predecirse la acción del oponente, disminuye la probabilidad de utilizar las estrategias predeterminadas. Sirviéndose de la teoría U, para cualquier tipo de actividad deportiva se necesita un nivel adecuado de motivación (Orlick, 2007; Poulton, 1957; Weinberg y Hunt, 1976; Wesch et al., 2007). Las actividades que exigen mayor exactitud y precisión (como el poomsae) requieren un menor nivel de motivación, mientras que los deportes interactivos y competitivos (como el kiu-rogi) necesitan un mayor nivel de motivación. Se investigó el efecto interactivo de dos variables tipo de destreza y nivel de competición, confirmándose la hipótesis de acuerdo a los resultados obtenidos. Partiendo de los resultados del análisis de varianza podría concluirse que la mayoría de las diferencias se daban entre los atletas de kiu-rogi (destreza abierta), de tal modo que los atletas no de élite de este campo tienen diferencias notables con otros grupos. Dicha interacción indica el hecho de que incluso la diferencia entre los niveles de élite y no de élite, vistos en esta investigación, se daba en el grupo de destreza y los atletas de destreza cerrada de élite y no de élite no mostraban diferencias significativas en las funciones de aprendizaje observacional. El motivo más probable que explique este fenómeno es la experiencia previa de los atletas de poomsae. Tras obtener estos resultados, los investigadores han indagado en los factores eficaces de los mismos, llegando a la conclusión de que estos atletas tenían un bagaje previo en el campo del kiu-rogi, de modo que algunos de ellos eligieron el campo del poomsae tras no conseguir triunfar en el campo del kiu-rogi. Por consiguiente, de acuerdo a uno de los principios de aprendizaje, llamado transferencia (Schmidt y Lee, 2011; Weinberg, 2010), trataron de aprender las destrezas del nuevo campo, encontrándose con una transferencia negativa (Maslovat, Hodges, Krigolson y Handy, 2010), produciendo un mayor nivel de uso de la función de destreza en comparación con el campo del kiu-rogi para cambiar el estilo de movimiento antiguo a nuevas formas. Se considera que este fenómeno está menos relacionado con la

función de estrategia, dado que el grado de esta utilizado en el campo del kiu-rogi es inferior al del poomsae y de hecho no se da la transferencia negativa. No obstante, la necesidad de aprender estas estrategias en estos atletas lleva a los atletas de poomsae a intentar aprender esta función más que a los atletas de kiu-rogi. Dado que los primeros precisan menos motivación, utilizan la función de ejecución mucho menos que los segundos.

Conclusión

Según los resultados de este estudio, podría concluirse que ambas variables de tipos de destreza y nivel de competición muestran un efecto significativo en las funciones de aprendizaje observacional en atletas. Sin embargo, el efecto del nivel de competición en las destrezas abiertas era superior al ejercido en las destrezas cerradas. Los resultados se centran en el hecho de que hay que considerar los métodos de ejercicio especial para cada destreza. Igualmente se recomienda que los entrenadores enseñen a los atletas las funciones de destreza y estrategia utilizando métodos diferentes de aprendizaje observacional. Además, a la vista de que este último contribuye a infundir motivación en los atletas, se recomienda este método para aumentar la motivación para participar en los ejercicios y mantenerla durante el periodo de juego.

Conflict of Interest

The authors of this article declare no conflict of interest.

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