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Original article

## Test to evaluate the mental representation of technical and dynamic knowledge in pre-established sports actions in taekwondo poomsae

## Test para evaluar la representación mental de los conocimientos técnicos y dinámicos en las acciones deportivas preestablecidas en las poomsae del taekwondo

## Teste para avaliar a representação mental do conhecimento técnico e dinâmico em ações esportivas pré-estabelecidas em taekwondo poomsae

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## ABSTRACT

**Introduction:** At the Cuban Sports Research Center, studies have been carried out to improve the mental representation of poomsae in high sports performance of taekwondo, related to the logical ordering of its technical sequence. However, it is also necessary to assess the dynamic accents of the movement, which are also evaluated in competition.

**Objective:** The objective of this work was to determine, through a test, the level of knowledge of the technical and dynamic component that the athlete possesses in the mental plane of a pre-established exercises complex such as the world taekwondo poomsae

**Materials and methods:** The empirical methods of documentary review and measurement test were used, as well as the theoretical Inductive-deductive and abstraction methods. Likewise, a formula was assumed to determine the effectiveness of the technical and dynamic ordering of the poomsae, as well as the use of statistical procedures of empirical distributions of frequency with percentage distribution. The population was a study of ten taekwondo specialists, of which subject number eight is presented in a case study.

**Results:** Among the fundamental results, omissions of technical order were identified, but also of important dynamic aspects in the internal model of the studied subject that were not previously detected and, now with this proposal, they can be methodologically treated with greater focus to eradicate them.

**Conclusions:** The theoretical referents on the subject of study supported the analyzes and theoretical inferences expressed by the authors about the theoretical feasibility of the test studied, in which a didactic and methodological enrichment of its content and evaluation was appreciated.

**Keywords:** Mental representation; Taekwondo; Test; Poomsae.

## RESUMEN

**Introducción:** En el Centro de Investigaciones del Deporte cubano, se han efectuado estudios para mejorar la representación mental de las poomsae en el taekwondo del alto rendimiento deportivo, relacionado con el ordenamiento lógico de su secuencia técnica. No obstante, es necesario valorar además los acentos dinámicos del movimiento, los que son igualmente evaluados en competencia.

**Objetivo:** El objetivo de este trabajo consistió en determinar a través de un test, el nivel de conocimiento del componente técnico y dinámico que posee el deportista en el plano mental de un complejo de ejercicios preestablecidos como las poomsae del taekwondo mundial.

**Materiales y métodos:** Se emplearon los métodos empíricos de revisión documental y test de medición, así como los métodos teóricos Inductivo-deductivo y abstracción. Así mismo, se asumió una fórmula para determinar la efectividad del ordenamiento técnico y dinámico de las poomsae, así como el empleo de los procedimientos estadísticos de distribuciones empíricas de frecuencia con distribución porcentual. La población fue un estudio de diez especialistas del taekwondo de los cuales se expone en estudio de caso al sujeto número ocho.

**Resultados:** Entre los resultados fundamentales se identificaron omisiones de ordenamiento técnico, pero igualmente de aspectos dinámicos importantes en el modelo interno del sujeto estudiado que antes no fueron detectados y, que ahora con esta propuesta podrán ser tratados metodológicamente con mayor foco para erradicarlos.



**Conclusiones:** Los referentes teóricos sobre el tema de estudio, sustentaron los análisis y las inferencias teóricas expresadas por los autores sobre la factibilidad teórica del test estudiado, en el que se apreció un enriquecimiento didáctico y metodológico de su contenido y evaluación

**Palabras clave:** Representación mental; Taekwondo; Test; Poomsae.

## RESUMO

**Introdução:** No Centro Cubano de Pesquisa Esportiva, foram realizados estudos para melhorar a representação mental de poomsae em taekwondo no esporte de alto rendimento, relacionados com a ordenação lógica de sua sequência técnica. Entretanto, também é necessário avaliar os acentos dinâmicos do movimento, que também são avaliados em competição.

**Objetivo:** O objetivo deste trabalho consistiu em determinar, por meio de um teste, o nível de conhecimento do componente técnico e dinâmico que o atleta possui no plano mental de um complexo de exercícios pré-estabelecidos como o taekwondo poomsae mundial.

**Materiais e métodos:** Foram utilizados os métodos empíricos de revisão documental e teste de medição, bem como os métodos teóricos de indutivo-dedutivo e abstração. Da mesma forma, foi utilizada uma fórmula para determinar a eficácia da disposição técnica e dinâmica da poomsae, bem como o uso dos procedimentos estatísticos das distribuições empíricas de frequência com distribuição percentual. A população foi um estudo de dez especialistas em taekwondo, dos quais o assunto número oito é apresentado como um estudo de caso.

**Resultados:** Entre os resultados fundamentais, foram identificadas omissões na organização técnica, mas também aspectos dinâmicos importantes no modelo interno do assunto estudado que não foram detectados antes e que agora com esta proposta podem ser tratados metodologicamente com maior foco a fim de erradicá-los.

**Conclusões:** As referências teóricas sobre o tema de estudo, apoiaram as análises e inferências teóricas expressas pelos autores sobre a viabilidade teórica do teste estudado, no qual foi apreciado um enriquecimento didático e metodológico de seu conteúdo e avaliação.

**Palavras-chave:** Representação mental; Taekwondo; Teste; Poomsae.

## INTRODUCTION

The sports modality of poomsae in the martial art of the world taekwondo organization (WT) consists of the demonstration of a complex of choreographically preconceived technical exercises. The technical sequence of the poomsae is characterized by developing with a logical order of beginning, middle and end that gesturally represents martial (includes technique and attitude) an imaginary combat against various opponents.

In poomsae, the dynamic accents in which they are expressed are also very important. Therefore, the study of the mental representation of this exercise to raise its quality is very important due to the load of memorization it contains.



The scientific studies of Ursino *et al.* (2018), Montero and Carazo (2019); Murillo (2020) are consistent, they address conceptualizations, programs and mental practices that are directly and indirectly related to the mental representations of knowledge and its importance both in daily life and in professional sports activities and other areas of knowledge.

In the case of the competitive activity of poomsae, the martial athlete must show the highest technical quality and martial attitude that he possesses of each of the technical and dynamic components of the exercise. According to the regulations, the exercise must be executed consecutively unequivocal in its order from beginning to end. All of which will be reflected in the score awarded by the judges up to a maximum of ten points (World taekwondo, 2017).

For this reason, it is important for the taekwondo practitioner to have both the technical details and the most distinguished dynamic moments of poomsae well represented mentally for each of these exercise complexes. This is because in high performance competitive art sports such as poomsae, techniques are broken down into their fundamental elements and attitudes to be the subject of competitive arbitration.

In poomsae competition a technique is not only evaluated for its integrity, but also for the quality of each of the phases of the movement. If there is any technical error in any of these phases, the judges will deduct the corresponding tenths of points, which will affect the result of the comprehensive evaluation.

That is why it is necessary to develop control and psychological evaluation mechanisms to eradicate, as far as possible, the mental errors of the competitive poomsae exercises that have substantially increased the competitive demand.

There are not a few specialists who have traditionally highlighted the need to approximate and simulate sports preparation to the real conditions of competition with a more objective control of prevailing competitive trends (Forteza, 1999; Verkhoshansky, 2002).

It is assumed that a psychological evaluation that contemplates the essential aspects of the mental representation of the technical sports action and its dynamics, under the influence of factors similar to competitive activity, will allow us to know how these mental planes operate in conditions similar to the stress produced by sports. act of competing

All of the above acquires a meaning of more rigorous control in the preparation of poomsae in high performance sports. However, by reviewing the available literature, it was possible to appreciate the lack of these types of studies in sports martial arts such as taekwondo.

Despite this, it is considered praiseworthy to highlight the Oral Description test with verbal stimulation (DOEV) developed by Dr. Sainz and adapted by Cancino and Fernández to evaluate the motor representation of kicking techniques in high-performance school taekwondo. Test that for its benefits it was incorporated into the Comprehensive Preparation Program of the Cuban taekwondo player (Fernández, 2016).

More recently, PhD Del Monte, in collaboration with PhD Fernández, presented to the coaches of the National Poomsae Team a Test Protocol to evaluate the *Mental Program of Technical Action in the Sport of taekwondo*, in the modality of Cuban high performance



poomsae with a total of ten tests. In this protocol the study of the Mental Representation of poomsae is found.

The theoretical and practical contribution of the aforementioned research directed by Del Monte was "the complex ordering of the sequence of movement of the technical action executed in a difficult situation, which may be in the face of a disorganized photographic expression, and evaluating its organization in the least possible time (...)" [Del Monte and Fernández, 2018, page 9].

However, the complex ordering of the dynamic component of poomsae in disorganized photographic expression has not yet been addressed, specifically for technical movements that are executed with great relevance in the relationship between technique and effort and its intensity.

The evaluation of the knowledge in the identification of these movements, allows to assess the level of awareness that the athlete has with the aim of reducing the forgetfulness of executing these actions at the precise moment of the poomsae during the competition, one of the most common errors observed. in competitions (Cisneros, 2019; González, 2019).

The reasons stated constitute a problematic situation given the existing needs, which can be resolved through this proposal.

For all these reasons, it was worked on the problem of how to evaluate the mental representation of the motor action of the taekwondo athlete, contemplating both the technical component and the dynamic accent on the mental plane of the execution of poomsae, as the ideal pattern for the correct execution of poomsae of this exercise on the physical plane.

To solve this problem, it was proposed as the objective of the research, to determine through a test, the level of knowledge of the technical and dynamic component that the athlete possesses in the mental plane of a complex of pre-established exercises such as the poomsae of world taekwondo. All this, as an ideal pattern learned for the correct execution of this exercise on the physical plane.

## **MATERIALS AND METHODS**

The population and sample were a study of ten young specialists who began the practice of taekwondo from seven or eight years of age. Of them, the case study with subject number eight is presented, selected with the criterion of being the most specialized of the sample with a black belt level and second dan. The subject has an experience of more than ten years in the training of this martial-sports art, of which six years in poomsae competition, whose degree of martial specialization supposes an adequate mastery of the poomsae object of study.

For the descriptive study, the bibliographic review method was used to select the specialized literature and obtain the criteria of different authors regarding the researched topic; Inductive-deductive method, with which inferences were reached to explain the causes of the problem situation, as well as the theoretical aspects that supported the content validity for the preparation of the test and its results; Abstraction Method, the





definition of the test and its evaluation were formed by means of mental operations based on conceptions and studies on the elaboration of the test.

Measurement test, for this, the methodology for the elaboration and presentation of the pedagogical tests was used.

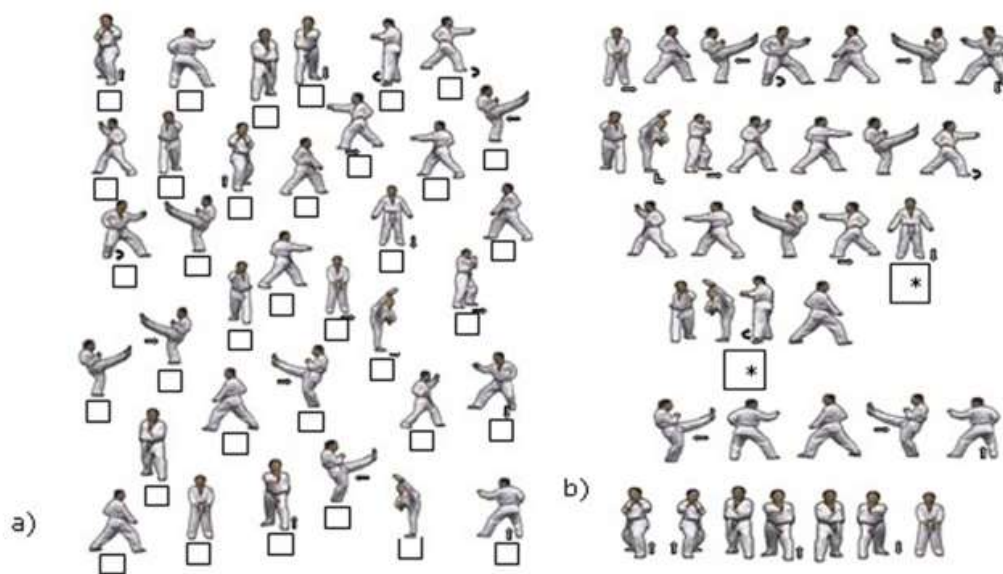
A formula was also used to determine the effectiveness of the technical and dynamic ordering of the poomsae.

Test name: Comprehensive test to evaluate the mental representation of technical and dynamic knowledge in pre-established sports actions.

### **Definition of what is wanted to measure in world taekwondo poomsae**

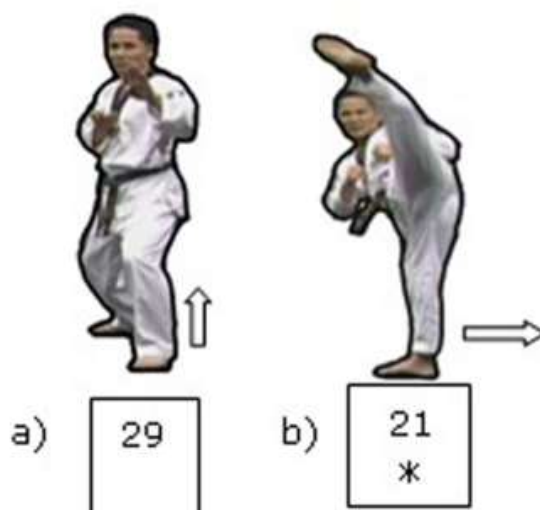
The subject is presented with a sheet with disordered figures of the complex of technical exercises of a poomsae object of study (Figure 1).

Subsequently, the subject is instructed to correctly order the poomsae figures in no more than 15 minutes, listing them with a pencil in their box, as appropriate. Likewise, during the ordering, you must identify, with an asterisk, the dynamic accents that are executed in punctual technical movements of the figures in said plate (Figure 2). This identification will later be submitted to an oral check by an evaluator to match what is identified by the subject with the real action on the physical plane. This is intended to evaluate the mental program of the athlete's internal model on the knowledge of poomsae, resorting to memorization from short-term recognition and the speed of operational thinking.



**Fig. 1.** - Subsection a) represents the sheet with the disordered figures for the subject and b) the sheet with the ordered figures of the poomsae Taeguk Yuck Jang as an evaluation guide





**Fig. 2.** - Example for the numbering of the order and the identification of the dynamic accent with asterisk the figures of the sheet (poomsae Taegek Yuck Jang)

### Contents to evaluate the test, according to sport

Sport object of study: competitive modality of poomsae Recognized style of world taekwondo (WT).

- Contents under study:
  1. Taegek Yuck Jang.
  2. Taegek Pal Jang.
  3. Poomsae Koryo .

Objective of the test: to determine the effectiveness of the knowledge of the technical and dynamic component of the poomsae from the indicators of the volume of figures organized correctly with their respective dynamic accents and the time consumed during the ordering of the exercise.

Indicators under study:

1. Volume of technical movements correctly ordered consecutively in the poomsae sequence.
2. Volume of dynamic accents correctly identified in the corresponding technical movements, which are distinguished by their technique-effort relationship in the execution of poomsae, by their correct order and manifestation:
  - Strong-fast-consecutive technique.
  - Strong-explosive-isolated technique.
  - Slow-breathing technique





- Technique-jump.
- Techniques - Kiap! (martial shouts) according to poomsae.

3) Correct description of the manifestation of the identified dynamic accents.  
4) The teaching time of the test exercise.

### **Methodology for the standardization of the test for the evaluation of poomsae**

The steps to follow to apply the test are organized depending on the type of pre-established sports actions, according to the sport, and incorporate, as far as possible, the competitive factors that can contextualize the test as similar to the conditions of the prevailing competitive activity.

Steps to apply the test in the context of the competitive modality of poomsae recognized in WT taekwondo:

1. The evaluator will give the order to the subject, "Chulyan" (enter!) to stand behind the chair of the table where the figures will be arranged. The subject will stand in "Cha-ryeot" (martial attention stand [feet together]).
2. The evaluator gives the orders "Cha-ryeot-Kyeong-rye" (attention-greeting), "Jumbi" (preemptive voice of Ready!), the subject sits down and gets ready with the means of the test (sheet and pencil) concentrating to start.
3. Once the subject is ready, the evaluator gives the command of "Shijak " (start!) and begins the complete ordering of the poomsae, while the time measurement starts.
4. At the end of the 15-minute time limit, the evaluator gives the command "Baro" (Finish).
5. If the evaluated person finishes the ordering before the established time limit, he must shout Kiap! as a signal for the completion of the exercise, stopping with said signal the measurement of the test time by the evaluator, who will immediately record the test time used on the corresponding picture.
6. Following the command "Baro" (finish), the subject makes the traditional farewell greeting and leaves the test area to immediately carry out the verification oral test, where an evaluator will ask the subject to briefly describe what the tests consist of. types of dynamic accents that he identified in the poomsae object of study.
7. During the oral verification of the dynamic accents, the evaluator will record as valid on the picture, only those dynamic accents that are correctly identified and described by the subject, which will be marked with a tick in the correct figure.

Materials:

- Pencils.
- Pictures with disorganized figures (Medium used).
- Cards with individual figures.



- Chronometer.
- Registration protocol.
- Computerized computer (Microsoft Office Excel 2010 program).

### Test evaluation system

Formula of % adapted by Fernández to determine the effectiveness of the technical ordering (EOT) of the movements that make up the poomsae (Author's source) (Equation 1).

$$EOT = Tmt - \sum ti / Te * 100 = \% (1)$$

Where:

Te- total of technical movements that make up a poomsae.

Regulation of the effectiveness of the technical order:

- 100 % correct-excellent OT (E) = 5 points.
- From 99 % to 95 % of the OT correct - very good (MB\*) = 4.5 points.
- From 94 % to 90 % of the OT correct - very good (MB) = 4 points.
- From 89 to 70 % of the correct OT well (B)= 3 points.
- From 69 % to 50 % of the correct-regular OT (R) = 2 points.
- Less than 50 % correct OT - needs improvement (NM) = 1 point.

Formula adapted by Fernández to determine the effectiveness of the identification of the dynamic accents (EIAD) of the poomsae (Source of the author) (Equation 2).

$$IAD = Tad - \sum adi / Tad * 100 = \% (2)$$

Where:

Tad- total of dynamic accents that a poomsae contains.

$\sum adi$  - sum of incorrectly ordered or omitted dynamic accents.

EIAD- effectiveness of the identification of dynamic accents.

Regulations for the identification of dynamic accents:

- 100 % of the IAD correct-excellent (E) = 5 points.
- 99 % to 85% of the IAD correct - very good (MB\*) = 4.5 points.
- From 84 to 70 % of the correct IAD - very good (MB) = 4 points.
- From 69 to 60 % of the correct IAD good (B) = 3 points.
- From 59 % to 50 % of the correct-regular DAI (R) = 2 points.
- Less than 50 % correct IAD - Needs Improvement (NM) = 1 point.



#### Time regulations for the test

- Up to 90 Seconds- E = 5 points.
- From 91 Seconds to 2 min-MB\* = 4.5 points.
- From 3 - 5 min- MB = 4 points.
- From 6-10 min- B = 3 points.
- From 11-15 min- R = 2 points.
- More than 11 and up to 15 min (maximum test time) - NM = 1 point.

Statistical procedures: Empirical frequency distributions with percentage distribution for evaluations.

## RESULTS AND DISCUSSION

Next, the results of the empirical methods used will be described, that is, the documentary review and the application of the test identified and described above.

In the case of the documentary review, it was possible to verify that for an efficient performance of this test it was necessary to consult very useful reference works such as: Sainz (2011), Pérez (2018), del Monte (2018), Yungan (2020). Also specialized literature by authors such as (Cancino, Sainz and Fernández, 2011, h. 60).

#### Brief fundamentals of the test

The test is based on studies of motor representation in which authors such as Sainz (2011), Pérez (2018), del Monte (2018), Yungán (2020), consider it as the internal model of the motor action by which the athlete is guided in its execution during practice. Specifically, Sainz, ensures that when the athlete at a mental level, he has a movement recorded with great clarity, where all his actions are represented in correspondence with the ideal technique, when the most important aspects of each phase are attended to, this is a guarantee that most of the occasions that he must movement, execute it without technical difficulties (Cancino, Sainz and Fernández, 2011, p. 60).

The studies mentioned and another that are deepened in the discussion of this work, constitute reasons for the elaboration of the test object of study.

#### Test results

##### Results of the effectiveness of the technical ordering of the poomsae studied

Due to the results obtained from the technical ordering of the poomsae (Table 1), it is considered that the poomsae of the evaluated subject present difficulties in their internal model.

Although the subject obtained an effectiveness of the technical organization (EOT in Spanish) between 70 and 96 % from very good (MB) to good (B) respectively in the poomsae studied by their order, the types of errors in the mistake of the correct ordering of the exercise, are equivalent to severe competitive penalties of minus 0.30 points.



The foregoing was corroborated in the "precision" section of the official competitive poomsae regulation, which contributes a total of four maximum points out of a total of ten points distributed with the Presentation section, which contributes the remaining six points (World taekwondo, 2017, p.15).

Table 1. Recording protocol of the results of the effectiveness of the technical ordering of the studied poomsae

Registration protocol:

1. Sport: taekwondo, recognized poomsae modality.
2. Name and surnames: Subject 8.
3. Gender: male.
4. Experience: more than ten years of training.
5. Age 19 years.
6. Martial sports level: 2nd dan black belt of the Cuban Federation of Taekwondo WT.

**Table. 1** - Recording protocol of the results obtained from the Technical Regulation of poomsae

poomsae	TMT	AND	EOT
Koryo	52	2	96%
Tageuk Pal Jang	42	2	95%
Tageuk Yuck Jang	35	9	74.2%

**Legend:** TMT Total technical movements to be organized, E- errors, EOT- Effectiveness of the Technical Arrangement achieved

### Results of the effectiveness of the identification of the dynamic accents of the poomsae studied

In the results obtained to evaluate the identification of the dynamic accents of the studied poomsae (Table 2), it was observed that there were difficulties with omissions of the martial cry (Khiap!) of the Koryo in step 11 of block number two, as well such as the omission in the relation of strong-fast and consecutive technical actions that is manifested from step two to step five, corresponding to technical block number one of the Tageuk Pal Jang. Both difficulties are serious penalties with less than 0.30 points in the indicators of "expression of energy" and "coordination" in the official competitive regulations of poomsae (World taekwondo, 2017, p.16). In the Tageuk Yuck, its dynamic accents were correctly identified.



**Table 2.** - Recording protocol of the Results of the Identification of the Dynamic Accents in the studied poomsae

Poomsae	ADT	AND	EIAD	DAD
Koryo	5	1	80%	1 omitted, rest correct
Tageuk Pal Jang	4	1	75%	1 omitted, rest correct
Tageuk Yuck Jang	2	0	100%	correct

**Legend:** TAD- Total Dynamic Accents to identify, E- errors, EIAD- Effectiveness of Dynamic Accent Identification, DAD- Dynamic Accent Description.

### Results of the evaluation of the teaching time of the test in the poomsae studied

In the time indicator, the evaluated subject did not achieve the correct technical ordering or the identification of the dynamic accents of any of the poomsae studied in the best times (excellent and very good) that range between 90 seconds and 2 minutes in the relevant evaluations (Table 3).

If it is taken into account that the poomsae must be executed in 90 seconds, otherwise it will be penalized with less than 0.30 points of the final result, according to current competitive regulations (World taekwondo, 2017, p.14 and 16), it is presumed that the subject studied does not attains or has lost proficiency in these poomsae.

The results of this test should not be confused with the results of the practical executions (physical plane). Through this test it is deciphered that the subject uses little semantic and image memory for his execution, which can affect the quality of the executions in the physical plane that generally worsens in conditions of competitive stress.

**Table 3.** - Recording protocol of the time consumed during the teaching time of the test in the studied poomsae

poomsae	competitive time	Time consumed in the test
Koryo	90 seconds	15 minutes
Tageuk Pal Jang		10.16 min
Tageuk Yuck Jang		10 minutes

### Poomsae competitive time Time consumed in the test

- Koryo 90 seconds 15 minutes.
- Tageuk Pal Jang 10.16 min.
- Tageuk Yuck Jang 10 minutes.



## General ratings

However, due to the experience, specialization and youth that subject No. 8 possesses, it is considered that he can further improve his internal model in the technical and dynamic execution of the poomsae studied. Therefore, it is suggested to emphasize the conscious study of each of the technical combinations of poomsae. Below are some suggestions for methodological treatments that can help improve the quality of the evaluations taken in the test.

- The application of psychological interventions with ideomotor exercises on the technical and dynamic composition of poomsae under time constraints.
- The use of problematic learning and exercise methods, using the complex internal (mental) ordering present in the exercises of the test object of study.
- The practical, conscious and disciplined exercise of poomsae with analytical-synthetic reproductive methods, standard repetition and varied repetition.
- Use of productive methods such as technical educational games, independent work.
- Use of the test exercise as a problematic method to exercise motor memory.

The need arises to carry out and socialize psychology work applied to sport with clear methodological rigor, in order to recognize the processes that the athlete does to learn, as well as to disclose the procedures of the technician and the psychologist for counseling-training (Palmi and Laugh, 2017). According to these authors, studies should be carried out where tests are proposed aimed at improving sports preparation on the mental plane; This contributes to enriching the theory and methodology of psychological preparation in sport, both in its control and evaluation and in the rectification and improvement of the pedagogical processes of the activity.

It is recognized that when in the mental plane, the images of the movement are recorded with errors and they are not clear in the actions that must be carried out, their execution becomes more difficult and this frequently leads them to make mistakes (Cancino *et al.*, 2011, h60). That is why they must create psychological tests that assess the quality of the internal model of learned sports actions; this allows knowing the degree of assimilation that the athlete is having on the mental plane. Process that, in turn, evaluates and questions the quality of the sports preparation that is being implemented, which facilitates the correction of said process, which increases the rigor of the control of sports psychological preparation.

On the other hand, del Monte (2018) assumes that simulating in a psychological test situation of tensions expressed in some difficulties demanded in the competitive activity that is entered into the internal model, can provide more objective information about the evaluation of *the Mental Program of the action technique in sport* and its manifestations in competitive conditions (del Monte and Fernández, 2018, p. 2.).

In the case of this study, the difficulty included is based on the use of competitive regulatory procedures, the complex ordering of the figures and the time factor, in that the better quality the correct ordering has in the shortest time, the greater its effectiveness will be. knowledge.





It is in the competitive modality of poomsae, where the opposition is perceived to be the quality of the opponent's technical execution. On the other hand, the criteria of the competitor himself plus the appreciation of the judges, are based on evaluative indicators that include the memorized order, the quality of the techniques, the execution time and other volitional types of the martial attitude (World Taekwondo, 2019, page 25). Therefore, a psychological evaluation that deeply assesses the acquisition of knowledge, through its different internal manifestations, is very useful.

The foregoing would objectively determine at what level of development the technical action of the taekwondo player is (skill, motor habit or dexterity) on the mental plane and, consequently, act methodologically in its internal and external improvement (practice).

According to recognized scholars on the subject (Sainz, 2015, Pérez, 2018; Angulo *et al.*, 2018; del Monte, 2018; Yungán, 2020; Murillo, 2020, Tarqui, 2021), it is shown that the methodological impact on mental representations improves the teaching-learning process of students in different areas of knowledge. It is for this reason that the contents of the test object of study, due to its didactic-methodological nature, can contribute in this sense. It is derived from this reasoning that the poomsae modality, the methodological treatment of images during learning, can be extremely positive for the fixation of basic techniques and dynamics.

The need to have a mental program for the technical and dynamic execution of poomsae correctly represented on this plane is one of the reasons why many lower-level techniques are still repeated in poomsae, which require more complex successive phases.

Previous and recent studies (Cancino *et al.*, 2001; Del Monte and Fernandez, 2018; Cisneros and Fernandez, 2019; González and Fernández, 2019) have shown in one way or another that dragging "small details of errors" into the sports preparation time of the technique, results in later becoming "big technical faults" that are very difficult to eliminate. This is due precisely to its simplicity, and its ease of detection. As an example of this, a half-open fist during the execution of a Momtong stands out. Jireugi, a technique that is practically used at all levels of the poomsae modality.

Therefore, evaluating these processes constitute tools that would help specialists and psychologists in sports martial arts such as Taekwondo to methodologically corner the difficulties that arise in this regard. In this way, new research should be developed in other sports modalities such as Kyorugi (Combat), where the competitive result depends largely on the technical-tactical mental program learned; another very necessary topic to investigate in the immediate future.

## CONCLUSIONS

The theoretical referents on the subject of study supported the analyzes and theoretical inferences expressed by the authors on the theoretical feasibility of the test studied, in which a didactic and methodological enrichment of its content and evaluation was appreciated. Its effectiveness was confirmed by the empirical methods used.



The test protocol was put into practice to evaluate in a more exhaustive way the level of knowledge of poomsae. In this study, the practical feasibility of this test was also demonstrated in its preliminary verification according to the effectiveness of the technical-dynamic knowledge in the mental plane of the sports motor action of the poomsae studied.

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**Conflict of interests:**

The authors declare not to have any interest conflicts.

**Authors contribution:**

The authors have participated in the writing of the work and analysis of the documents.



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