

# The importance of balance with the prescriptive teaching in kickboxing

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## ABSTRACT

**Problem statement.** The problem in kickboxers is that during the execution of a shot (especially in lateral kicks) they have difficulty in keeping the balance in the third phase (reload phase) of the shot as they are focused on hitting the opponent in a position from their guard and their balance. **Aim.** The goal of the study is to improve balance in a group of kickboxers using two different types of exercises and observe which of the two is more effective. **Methods.** The sample is made up of 2 groups of 10 people in each group, with an average age of 16 with no experience in kickboxing. The first group was trained following the cognitive approach through varied exercises. The second group, on the other hand, was trained following the cognitive approach through partial exercises. The stork test was performed to underestimate balance and the independent samples t-test was used to underestimate the post-workout difference. **Results.** The result is statistically significant ( $p < .05$ ). The results of the first group are higher than the seconds. The improvement of the balance, the ability to make decisions in a short time, the reaction, through visual stimulation given by the led light discs through the varied exercise, was better than in the experimental group 2. **Conclusions.** Both groups improved the balance but those who did a training based on varied exercise had a greater improvement because in kickboxing it is important to reproduce the technical gesture in various situations that are unexpected that cannot be anticipated due to the variability contextual.

**Keywords:** Blocked practice; Varied practice; Prescriptive teaching; Reaction; Kick.

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## INTRODUCTION

Kickboxing is a combat sport that involves the use of punches and kicks, especially rapid movements of the limbs and trunk, explosive and repetitive movements. Kickboxing has seen an increasing diffusion in the United States where, until now, better known fighting disciplines such as Karate, Kung Fu or boxing have been practiced. It has now come to have an excellent following of athletes, instructors and enthusiasts eager to penetrate more and more into this fascinating world. One of the most complex and fundamental techniques concerning the execution of the side kick. The side kick in kickboxing is performed by assuming a side guard position. The execution of this kick can be divided into three phases:

1. Loading: from the side guard position, the support leg (rear or front) rotates 90 ° and at the same time the knee of the kicking leg is raised, bringing it close to the chest, turning the heel towards the target.
2. Discharge: the kicking leg is extended to hit the target by hitting it with the cut of the foot and at the same time the support foot is rotated to give more power.
3. The support foot will point in the opposite direction to the target.
4. Reload: after kicking the is the return to the first phase, that is the loading phase, the knee will be brought close to the chest. Upon landing, the support foot must return to its initial guard position.

Technique is a key determinant of performance, while for athlete training the determining elements are both learning and technical improvement (Raiola et al., 2016). Different theories of movement are proposed as models from which to draw application information for teaching motor skills. The teaching method of physical activity and sport traditionally used in sports clubs or centres is the prescriptive method, which has the theoretical basis in the cognitive approach (Raiola, 2014; Raiola & Di Tore, 2017; Raiola & Tafuri, 2015). This approach has psychological bases in motor control theory, articulated in a closed-circuit model, an open circuit model and a generalized motor program (Raiola, 2014). Furthermore, the main teaching tools are tutorials: question, sequence, timing, executive model of movement learning, intensive activity (Raiola, 2017). The theory of generalized motor programs has direct methodological-didactic implications on the choice of which information to provide with feedback (Schmidt & Wrisberg, 2000). This choice depends on the type of error made by the student, furthermore, it varies according to the type of motor control used (Adams, 1968; Adams, 1971). Motor programs are therefore the starting point for the development of motor skill through feedback regulation (Schmidt, 2004). Kickboxing is a situational sport with open skills, therefore the execution of any movement, and therefore also of a sporting technique, is never repeated exactly the same way, but we must continue to make changes to the motor skill to adapt the 'execution to the environmental requirement. Two variants have powerful effects on learning: partial practice and varied practice. The partial exercise consists in dividing complex movements by simplifying them, segmenting them or reducing their speed or the requests for executive precision in order to perform them in a more simplified form. In other words, it consists in exercising a complex motor skill initially in a simplified form. Complex movements can be simplified by dividing them, segmenting them or reducing their speed or demands for executive precision (Wightman & Lintern, 1985). For all forms of partial exercise, the rule is that a learning facilitation is obtained only as long as the partial exercise techniques, i.e., fragmentation, segmentation and simplification, do not alter the profound structure of the generalized motor program. The deep structure of the program is instead altered if the interaction between the effectors is changed if the functional phases of the movement are altered or if motor execution is slowed down too much. The varied exercise consists in having several movements belonging to the same class performed by varying some parameters: faster ball launch, at different distances, targets of different sizes. This technique facilitates parameterization of the generalized motor program and could be applicable for every sports skill, also for disabled people (D'Elia, 2021ab). Finally, the randomized one consists in carrying out actions that are different from each other in a random manner.

In kickboxing, balance is important during the side kick to ensure stability during execution. Many athletes don't start learning to control their balance, they get too carried away by the flashy moves of the sport, and therefore don't learn to appreciate the value of good balance. The ancient dichotomy between form and substance also exists in the martial world, where many still believe that having big muscles automatically means being strong, and that being strong is enough to be victorious in a fight. Balance is something that develops over time and that can be consciously trained and improved: it is a spontaneous intelligence of the body that allows you to organize your shape and movements in space in relation to the forces that influence it, first of all gravity. According to a study, the five V keys for the development of balance are represented by: speed, the rapid interactive movements of the head and body; verticality, vertical movements of the body against gravity; vigour, moderate to high intensity exercise; vision, challenges to the visual system; and vestibular, challenges to the vestibular system (Whipple, 1997). Balance and stability are the key to performance. Having good balance means having a good foundation that keeps the body erect and stable so that you can attack, defend or counter without worrying about losing your balance and compromising your position. One of the most frequent problems is the loss of balance in the third phase of the side kick, or in the reloading phase.

The goal is to improve balance, core and lower limb muscles, and consequently the effectiveness of the side kick, in a group of kickboxers during a mesocycle, using the prescriptive method. Specifically, two different types of exercises will be compared, i.e., varied / randomized and partial exercises.

## METHODS

### *Design and participants*

This study was designed to verify the effects of partial and varied exercises on balance in lateral kick, in a group of 20 beginner kickboxers. The sample (age, mean  $\pm$  standard deviation [SD] = 16  $\pm$  4 years old) was divided into two groups: an experimental group 1 (S.G.1) of 10 people (5 males and 5 females) and an experimental group 2 (S.G.2) of 10 people (5 males and 5 females), both with no experience in kickboxing, registered with the sports association Asd Kickboxing Avellino. The study adhered to ethical code of the Declaration of Helsinki and written informed consent was obtained from all participants. Data were stored and processed anonymously.

### *Test procedure*

The assessment tool administered to both groups was the stork test adapted to kickboxing, both in and out. This test is useful for assessing the athlete's ability to maintain static balance. The participant is initially in an upright position with the hands in the guard position. Slowly raise one leg to the side kick loading position (1 step). The participant will try to hold this position for as long as possible. For the test to be valid, the athlete must not rest the heel on the ground. The examiner records the time for which the stork's position is maintained. This test allows to establish the athlete's static balance capacity and, if referred to previous tests, it is able to give an estimate of the improvements or worsening of performance. The results must be evaluated in relation to the age and sex of the subject. In this case, the subjects are men and women with an age ranging between 15 and 18 years.

Table 1. Table with reference values of the stork test adapted to kickboxing.

Gender	Excellent	Good	Middle	Low
Male	>50 sec	50-41 sec	40-31 sec	30-20 sec
Female	>30 sec	30-23 sec	22-16 sec	15-10 sec

## **Kickboxing training program**

### **S.G.1 protocol**

S.G.1 underwent a training session lasting 1 hour and 30 minutes for 1 month twice a week using a cognitive approach based on varied and randomized exercises. The training was mainly structured in 3 major phases:

1. Warm-up: where low-intensity muscle exercises are proposed in order to prepare the body for the next phase, thus avoiding possible injuries.
2. Central phase: in which the use of 9 discs with LED lights (fit light) positioned on a vertical surface (e.g., wall) was proposed. 3 disks were placed for each column spaced apart from each other, both vertically and horizontally by 30 cm. By means of a central controller the discs with LED light turned on one at a time, emitting a colour (red, blue, green). Every time it lit; the athlete had to try to hit it with his side kick. The exercise was structured in 3 rounds. The first round lasted 3 minutes. The second round of 2 minutes. The third 1-minute round. The cooldown is 30 seconds.
3. Cool down: phase in which stretching and breathing exercises were proposed so that the body can return to its basal state.

### **S.G.2 protocol**

S.G.2 was subjected 2 times a week to training lasting 1 hour and 30 minutes for 1 month using a cognitive approach, based on the partial lateral kick exercise. The training was mainly structured in 3 major phases:

1. Warm-up: where low-intensity muscle exercises have been proposed in order to prepare the body for the next phase, thus avoiding possible injuries.
2. Central phase, which included:
  - Single leg balance on the right leg in the stock loading position, in advance (4 series of 2 laps).
  - Single leg balance on the left leg in the forward kick loading position.
  - On the ladder single-leg balance on the right leg in the forward kick loading position.
  - On the ladder single leg balance on the left leg in the forward kick loading position.
  - The coach will dictate the pace of progress. With each clap of the hand, the athlete will advance standing in monopodal balance on the right leg.
  - The coach will dictate the pace of progress. With each clap of the hand, the athlete will advance standing in single leg balance on the left leg.
  - The coach will dictate the pace of progress. With each clap of the hand the athlete will advance alternating right leg to left leg.
3. Cool down: phase in which stretching and breathing exercises were proposed so that the body can return to its basal state.

## **Statistical analyses**

After verifying the normality of the incoming and outgoing data of the kickboxing adapted stork test, with the Shapiro Wilk test ( $p > .05$ ) and the homogeneity of the data with the Levene test ( $p > .05$ ), it was performed a t-test for independent samples post training period, to verify the difference between the two groups (SG1 and SG2). Statistical significance was set at  $p \leq .05$ . Data analyses were performed using Statistical Package for Social Science software (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY).

## **RESULTS**

A detailed description of the results of the kickboxing adapted stork test, performed before and after administering the protocols, is shown in Table 2.

Table 2. Descriptive statistics of pre-post training stork test results in the S.G.1 and S.G.2.

	<b>Mean ± SD</b>
S.G.1 Pre	26.1 ± 8.3
S.G.1 Post	37.2 ± 10.5
S.G.2 Pre	24.8 ± 8.5
S.G.2 Post	26.8 ± 7.8

A statistically significant difference was observed, after administration of the protocols, between S.G.1 and S.G.2 ( $p < .05$ ). A detailed description is shown in Table 3.

Table 3. T test for independent samples between S.G.1 and S.G.2 after training protocol.

<b>S.G.1–S.G.2 post training protocol</b>	<b>t</b>	<b>gl</b>	<b>Sign. (Two tailed test)</b>	<b>Difference of means</b>	<b>Standard error difference</b>	<b>95% confidence interval</b>	
						Lower	Upper
	2.458	18	.024	10.40000	4.23110	1.51079	19.28921

## DISCUSSION

From the results obtained, we can say that the cognitive approach, with the prescribed teaching method, through the didactic technique of varied and randomized exercise, was able to improve the balance more than the exercises for blocks. In kickboxing it is important to try to reproduce a technical gesture in various unexpected situations due to contextual interference (Bortoli et al., 1992; Brady, 2008; Raiola & Di Tore, 2017). Although initial performance may be poorer in those who practice varied and randomized practice, it leads to better final learning. This happens because when a task is performed and then immediately passed to the second task, and then asked to return to the first task, the subject is forced to start from scratch, reconstructing the action plan. Given that kickboxing athletes find themselves in the need of having to continuously produce always different action plans due to contextual variability, with the varied and randomized exercise he will be able to perform that specific motor task in any situation. So, at the time of the match where it will be necessary to perform the side kick they will be able to reproduce it in different situations without losing balance. In other words, the student will remember the skill in a more lasting way and will be more easily extrapolated from their baggage when the opportunity presents itself. Instead, S.G.2, carrying out an activity in blocks, when they are faced with little-known situations, will have difficulty in making the motor skills resurface. The limit of the exercise by blocks is that there is no variety of proposals, the environmental models are fixed and predictable (Raiola et al., 2014), while the varied ones respond more to the needs required in kick boxing for their structural essence. The varied exercises are the most profitable, they are never monothematic and the athlete's responses are open skills, performed in dynamic and unpredictable environments with the possibility of adaptation, without forgetting that it involves an increase in motivation.

Kickboxing improves balance, important for posture (Aliberti et al. ; Andreeva et al., 2020), strength, mobility and quality of life (Jackson et al., 2012),  $Vo_2max$  (Ouerqui et al., 2020) al., 2013) and many other psychological aspects. In particular, balance, spatial orientation and stable vision are indispensable factors for sport or any other physical activity (Felipe, 2021). The ability to maintain and control balance is the basis for the design and construction of more complex motor skills in sports performance (Altavilla et al., 2014). The Fit Light Trainer used to improve balance in the S.G.1 group is a system consisting of 9 discs with LED

lights and a central controller with wireless technology with the possibility of creating "movement patterns" by stimulating the athlete's reaction and perception with visual stimuli. The system is simple to use and can be adapted and configured for any sport, for "hand-eye", "foot-eye" coordination training, athletic conditioning and / or controlled injury rehabilitation, all integrated in a single system. Thanks to the Fit Light Trainer system, tests can be performed in which elements such as the stimulus (or stimuli), the response evoked by the stimuli and the evaluation of relative performance are used, allowing the subject to perform motor activity and cognitive activity. Exercises using Fit Light technology helped develop skills in various sports (Duda, 2020; Hosen & Hatem, 2020). In kickboxing, it is able to improve reaction, coordination, speed, and perception, the ability to make decisions, endurance and balance through visual stimuli provided by the lights.

Evaluation in the sports field with tests is of fundamental importance for the coach (Aliberti et al., 2021; Ceruso et al., 2018; D'Isanto et al., 2019; Raiola & Altavilla., 2020). The test used to evaluate balance, the Stork Test (Johnson & Nelson, 1974), has been adapted to kickboxing, as the athlete must maintain balance during the side kick position. However, for future studies, a test that evaluates dynamic equilibrium could be used, such as the Y-Balance Test (Faigenbaum et al., 2015; Hooper et al., 2016; Sikora et al., 2020).

## CONCLUSION

In conclusion, prescriptive teaching, with varied and randomized exercises, has made it possible to improve the balance in G.S.1 more than in G.S.2. Specifically, in Kickboxing it is important to apply prescriptive teaching because in sports clubs there is a primary need to achieve the goal, to win the game / match and therefore it is essential to pay attention and take great care of the quantitative aspects (strength, expressiveness of strength), the technical-tactical, physical-performance aspects. It has a didactic basis that aims to standardize everyone's performance upwards. For those wishing to replicate the following study, I would suggest recording the incoming and outgoing test with a video camera, so as to allow the student to observe any improvements obtained at the end of the mesocycle. In this way, there will be an increase in motivation as the athlete will be able to observe these results with their own eyes. The athlete will thus have the opportunity to quantify the effort and commitment he will have given during the mesocycle, allowing him to achieve this result.

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