

# Motor Cognitive Coordination Training (MCCT) Program: Improving Concentration Ability for Beginner Tennis

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**Abstract** Tennis requires coordination and concentration. Concentration is a very important component in improving achievement, because concentration is the ability to focus one's attention in a relatively long period of time. This ability must be possessed by individuals because concentration will affect a person's cognitive abilities. If a person's concentration is high, his cognitive abilities will also be high. One of the causes of someone experiencing concentration problems is because the person likes to daydream excessively. The purpose of this study was to determine whether the motor cognitive coordination training (MCCT) program could improve the concentration ability of beginner tennis players. The method used was the experimental method. The research subjects were novice tennis athletes in Tasikmalaya, totaling thirty-seven people. The age range of the participants ranged from 11-16 years. As a result, it is proven that the implementation of the MCCT program provides good effectiveness for increasing the concentration of beginner tennis athletes. This is supported by the results of the significance test with the P-value of the

paired sample t-test of  $0.001 < 0.05$ . This means that  $H_0$  is rejected, so it can be concluded that there is a difference in the average concentration test scores between the pre-test and post-test in this study.

**Keywords** Motor Cognitive Coordination Training, Cognitive Skill, Concentration, Beginner Tennis Athletes

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## 1. Introduction

Tennis is one of the many sports that are included in open skills. This is because players have to constantly adapt their movements to the ever-changing situations on the court [1]. On each shot, a player must decide where to move, what shot to hit, and where to choose while waiting for the opponent's next shot. The movement of players and execution of strokes must be continuously adapted to the situation at hand. Tennis does not only require physical and mental abilities but also technical and

tactical skills [2]. The fact on the field is that, beginners are still not able to do various basic techniques well, when learning tactics their attention still doesn't seem to focus on learning. When it is viewed from the age range, these beginner athletes have an average age of 9-12 years, which incidentally already have increased attention. [3] explains that, the age of children 8-9 and 11-12 years is a condition where it is easier for children to pay attention to learning, as long as the learning is adjusted to the conditions of their age. This attracts the writer's attention, and it probably happens that beginner tennis athletes in Tasikmalaya pay less attention and concentration during technical and tactical training, allegedly the training packages provided are not very interesting. So this has an impact on their coordination ability in learning tennis.

Practicing techniques and tactics requires concentration so that cognitive abilities are needed as a fundamental thing to learn all of them [4]. Cognitive ability is a mental activity of thinking power, memory and also processing information that requires a person to be able to get memories, solve a problem, and think about the future or all psychological processes related to how individuals can learn, pay attention, observe, imagine, estimate, assess and think about the environment [5]. Therefore, one's cognitive ability must be good, and one aspect of cognitive ability is paying attention or it can be called concentration, with good attention skills it will improve cognitive abilities. Cognitive domains based on their function according to Behavioral Neurology cited in [6] are attention, perception, language, memory, visuospatial, executive function. In this study, it focuses on attention, while attention is a concentration of mental activity. According to [7], attention is the concentration of the mind in a clear form on a simultaneous object or group of thoughts. Attention is also a process of direct awareness of the information (stimulus) received to decide an action (response). While concentration is a person's ability to focus on a selected stimulus (one object) in a certain time. Through concentration, it allows a person to avoid problems that can interfere with someone in solving a problem. Some things that can interfere with concentration in children are: 1) when writing there are always missed words, 2) cannot focus on one point, 3) it is difficult to focus and even difficult to listen. In the context of sports achievements, athletes must be able to concentrate in order to improve their abilities [8]. Therefore the concentration factor in athletes must be increased, because it greatly affects a person's cognitive abilities. It means that the process of concentration is always preceded by a person's attention to a selected object. Some ways to increase concentration include looking and thinking on a particular object, taking deep breaths, good body language, and doing rituals (habits). To support the ways of the exercise, some tips are needed. For example, during practice, it must resemble a match (simulation), and use words of encouragement. Seeing the importance of the role of cognitive skills and coordination

in the sport of tennis, it is necessary to have a training method that can improve both. Motor Cognitive Coordination Training (MCCT) is one of methods that can be applied.

MCCT is an exercise method developed by Horst Lutz. Life Kinetics is a modern psychological training method that is routinely carried out by athletes at both local and professional levels. Meanwhile, in Indonesia, this method of kinetic life training is relatively new and has not been widely applied to the training process for sports. In fact, Life Kinetics has tremendous benefits for improving the performance of athletes, especially in small ball games such as tennis [9]. MCCT is an exercise method based on the kinetic life training method [10]. Life kinetic exercise is a combined concept of motor coordination and cognitive challenge, in which simple skills such as hand-eye coordination or balance are combined with intellectual tasks to create complex exercises [11]. [12] explained that game sports athletes need good coordination skills, so that they can more easily perform movements that have a large level of complexity. Meanwhile, according [13], [14] states, life kinetic has a significant effect on cognition in children in elementary school. Several studies also prove that the ability of this cognitive function affects the development of motor coordination in children and adolescents. This program can be realized in a match simulation or, more precisely, a mini-game.

Look at several previous studies which were limited to examining MCCT on working memory in junior volleyball athletes [15], on MCCT and cardio training on coordination and cognition in sedentary lifestyle actors [16] and MCCT on mental health in school-age children [17]. Looking at several previous studies, the researcher has not found research on the involvement of MCCT in small ball games to increase concentration in tennis athletes. From the background of the problems above, the researcher is interested in trying to examine it further to provide a different movement learning experience for beginner tennis players; the purpose of this study is to try to apply the motor cognitive coordination training (MCCT) program to increase concentration abilities in a beginner tennis player.

## 2. Theoretical Framework

### 2.1. Tennis

To be able to play tennis, both beginner and professional athletes are required to master the techniques of hitting the ball, steps and appropriate body movements. According to, [18] there are four basic types of strokes in tennis, namely; 1) service, 2) forehand, 3) backhand, 4) volley. Once a beginner athlete is proficient in doing these four kinds of strokes then they already have the speed, distance, control, so they can master the game of tennis. Among the four basic tennis strokes according to [19],

volley strokes must be mastered well by every tennis player, because volley strokes are often used as finishing shots to end a long rally.

To be a good player, it takes sufficient attack power, speed and mastery of the field as well as the ability to determine the game [20]. If athletes are proficient in basic shots such as drives, service and volley they can rely on them to put pressure on their opponents with those shots as well as possible. However, from time to time the athlete needs to use other strokes to keep the ball in play or to win points. The types of strokes are lob, smash, drop shot, stop volley, half volley, slice and chop shot [18].

In addition, the basic techniques that must be mastered by a tennis player include 1) concentration on the ball and feeling for the ball, 2) how to move the legs and body, 3) adept at swinging a racket to hit the ball in the right way, direction and speed. In the process of practicing the drive stroke, you should be able to hold the racket in the right way and be able to swing the racket smoothly and precisely [21].

#### 2.1.1. Technique Working Principle

In the game of tennis, the basic basis for hitting is body balance and coordination. So in doing every technique of hitting a tennis game, it must be based on the principles of conformity and effectiveness [22].

- (a) **Conformity/Efficiency:** Conformity means here is a blow that is in accordance with the basic foundation of the stroke by considering body balance and coordination. The conformity of the stroke is related to the efficiency of the movement when performing the punch technique. An efficient technique has several advantages, including avoiding hitting techniques that use a lot of power but the results are not optimal so that the technique does not feel comfortable, reducing the possibility of injury and becoming a strong basis for improving the quality of the technique.
- (b) **Effectiveness:** Effective hitting is related to the ability to consistently complete a variety of motion tasks.

To be able to create appropriate and effective technical abilities, it must be based on body balance and coordination of strokes [23]. [24], [25] explained that in order to maintain body balance when hitting the ball, it can be obtained by: The head position is always still and the gaze is straight ahead towards the net, the body position remains relatively upright and the shoulders are always in a parallel position, the leg position rests firmly in a balanced state for ease of movement. Meanwhile, the coordination of the stroke consists of racket motion and body work. Racket motion is related to timing and rhythm. Timing is the alignment of the stroke so that the ball really hits at the time of impact. Characteristics of players who have good timing are having a good level of hitting consistency, being able to direct the ball in accordance with the intended target, being able to increase the speed of the stroke without fatigue [26]. Some ways to develop easy ball timing skills include; 1) Point of contact, preferably on the right in front of the body, exhaling when hitting the ball will help concentration and feeling towards the ball better, 2) Racket head, always facing forward and perpendicular when impacting with the ball, 3) The rhythm of racket swing must have acceleration just before impact with the ball. Meanwhile, according to [27] he said that the ways to develop difficult ball timing skills include; 1) React to the ball and quickly prepare yourself. First, to react quickly to the incoming ball can be done by focusing on the direction of the ball before the ball crosses the net to the right or to the left. Next, anticipate the direction of the ball. Second, the preparation of the racket must be complete and ready before the ball falls. 2) React to the ball with a short backward swing so that the racket is close to the ball and increases the accuracy of hitting the center area. For a fast ball, keep your arms close to your body and try to rotate your body instead of swinging backwards.

Furthermore, according to [28], [29] the description of the technical framework can be summarized into one table as follows:

**Table 1.** Technical Framework

PREPARATION STAGE	HITTING STAGE
<p><b>Reception Fundamentals:</b></p> <p><b>Preception:</b> against the arrival of the ball from the opponent, for judgment on the ball (Speed, spin, height, distance, direction).</p> <p><b>Footwork:</b> the right position before the opponent hits, split step for timing, displacement of motion towards the ball.</p> <p><b>Racquet Preparation:</b> grip, swing shape and length, racket head position.</p> <p><b>Body Preparation:</b> balance, ready stance, pre-stretch, use of body segments.</p>	<p><b>Projection Fundamentals:</b></p> <p>Impact Point: high-low, lateral side far-near, front-back.</p> <p><b>Footwork:</b> placement, recovery</p> <p><b>Racquet Work:</b> racket head angle position, speed, rhythm-acceleration, final trajectory of preparation to advanced motion.</p> <p><b>Body Work:</b> balance is maintained, continuity of body segments, angular momentum turning the stake, linear momentum-weight transfer</p>

## 2.2. Motor Cognitive Coordination Training (MCCT)

Motor Cognitive Coordination Training was developed by Horst Lutz [30] which is a training method developed based on the kinetic life training method. The main key of this motor cognitive coordination training is a combination of movement and cognitive tasks that are carried out simultaneously at one time. One of the goals of this cognitive coordination training is to stimulate the cognitive of novice athletes because during the training period at the club, they do not only learn to improve movement skills but also cognitive factors that must be present in the training process. [15] says that everything we do in the motor domain is influenced by our emotions, our social interactions, and cognitive development. It can be concluded that cognitive can affect the motoric development of children so that their cognitive skill must be trained instead of training their skills only. [16] suggested that there are several exercises to train life kinetic including adaptable body control, visual system, cognitive skills.

### 2.2.1. Adaptable Body Control

Adaptable body control or can be called adaptive control, aims to cooperate through several different functions in the brain. Control of body adaptation includes [16]:

- a. **Movement to Change Direction;** Movement to change direction is the individual's skill in changing the orientation of his body movements frequently. For example, when someone throws a ball, he is able to change the direction of his throw quickly.
- b. **Patterned Movement;** Patterned movement is a movement that is done in a pattern with a combination in a series of movements. For example, hands throw a ball and feet jump.
- c. **Flowing Movement;** Flowing movement is an attempt to combine a movement into a flowing movement, which is carried out with smooth movements from one movement to the next ones. The purpose of this movement is to train the coordination of motion and concentration of athletes in performing a movement task. For example, the right hand spins a bottle and the left hand bounces a tennis ball to the floor.

### 2.2.2. Visual System

The visual system is a basic part that is needed by a person to carry out body coordination movements including [31], [32]; 1) Viewing Point of View Movement: Movement to see an object that can be done by observing the direction of motion of the object through his eyes, or through the help of other objects, like using optics to describe the point of view seen by his eyes. 2) Directional Eye Movement: Directional eye movement is the athlete's ability to follow objects that are coordinated using eye movements. For example, when an athlete makes a shot,

his sight will not be separated from the ball because the athlete is able to control the ball. 3) Focusing the Eyes on an Object: Focusing the eyes on an object is the athlete's ability to focus on an object, which aims to train the athlete's concentration. For example, when the athlete will receive the first serve from the opponent, then he will focus on the ball.

### 2.2.3. Cognitive Skill

Cognitive skills have a very important role in making a decision. Cognitive function is the ability of attention, memory, judgment, problem solving, and executive abilities such as planning, assessing, supervising, and evaluating [33]. Cognitive function is a very important thing that athletes must have, even though it is in the context of training because when tennis athletes undergo the training process, they do not only learn the technique and origin of movement, but athletes must think about what decisions will be made when they want to move. Therefore, by learning the coordination of complex movements in tennis, the cognitive skills of athletes can be trained and developed.

## 2.3. Concentration

Concentration comes from the word concentrate (verb) which means to concentrate, and in the form of the word (noun) concentrate is concentration. [34] revealed that concentration is focusing attention on one thing to the exclusion of all things that are not related. So it can be concluded that concentration is prioritizing what is being done and putting aside things that are not relevant or unrelated to what is being done. Decision making requires concentration power that focuses on the stimulus received and the response to be carried out [35]. The attention process only reaches the level of perception, because of the limited time required. That means that attention only lasts for a short time, the rest of the time is a process towards concentration. Meanwhile, the concentration of the process reaches the decision stage (program to respond), because concentration takes a long time. For this reason, the level of the athlete's ability to respond to situations is very specifically depending on the type of information (stimulus) received. [36] explained that, the more difficult the information received, the higher the response according to the level of difficulty. Thus the position of attention and concentration is in the brain, so it is an athlete's mental ability that must be specially trained.

### 2.3.1. Types of Concentration

The type of concentration is determined by two things according to [36], namely breadth (widening and narrowing) and direction (inward and outward). Expanded concentration is a person's condition in receiving several events (stimuli) simultaneously. This happens when athletes must be aware of and sensitive to changes in the competition environment which usually interfere with

concentration power. Meanwhile, narrowed concentration is the condition of a person receiving only one or two stimuli. For example, when a player serves, his concentration is on the racket and the ball to be hit. Furthermore, outward concentration is the focus of attention on objects that are outside one's self, which can be in the form of a ball or the opponent's movement. While inward concentration is the focus of attention that leads to one's own thoughts and feelings. For example, a high jumper concentrates on going to start for a sprint. The combination of the two things above will form four types, namely the concentration that 1) expands outward, 2) narrows outward, 3) expands inward, and 4) narrows inward concentration that extends outward is an athlete's effort to control any changes that occur in the game environment well and quickly. Concentration that narrows outward is the athlete's attempt to focus on a single target or perform a single movement in which the focus is clear. Concentration that extends inward is the athlete's effort to think well, plan strategies, carry out tactics accurately, analyze opponents, and anticipate responses made by opponents. It is also the athlete's effort to focus on one target, imagine the performance being performed, and control his emotional state [37]. It can simply be described as in the following chart.

**Table 2.** Direction of Concentration for Athletes

		outward	inward
<b>Breadth of Concentration</b>	<b>expands</b>	Athletes' efforts to control any changes that occur in the competition environment properly and quickly.	Athletes attempt to control each strategy well, implement tactics accurately, analyze opponents, and anticipate responses made by opponents.
	<b>narrows</b>	The athlete's attempt to focus on a single target or perform a movement in which the focus is clear.	The athlete's efforts to focus on one target, imagine the performance that is performed, control his emotional state.

Concentration is the ability to fully focus on the problem at hand. Concentration allows a person to avoid thoughts that can bother someone to solve a problem. However, when a person is under pressure, he cannot concentrate [38]. The definition of concentration in general is a process of focusing attention on a particular thing or object. This means that our actions or work must be done seriously on an object that is being done by focusing all the senses, smell, sight, hearing and even feeling.

### 2.3.2. The Principle of Concentration

Concentration can take place well when someone can

focus on an object. Effective concentration is a process of focusing one's attention maximally on an object of activity that is being carried out and the process is automatic and easy because the person is increasing the activity [39]. According to [40], there are several principles of effective concentration as follows:

- One of the first and most important supports to be able to do effective concentration is to have a strong and consistent will.
- Concentration is essentially the ability to control one's will, feelings, and thoughts. With this will, someone can focus on the object that is being desired.
- To be able to do effective concentration, there must be a driving factor, for instance internal factors are factors that are rooted from the inside of oneself which include healthy mental and physical conditions.
- Concentration will occur easily if someone has enjoyed the activities he does.
- One of the main principles of effective concentration is when someone can enjoy the activity he is doing.
- Effective concentration will also be maximal if it is driven by factors from outside the person (external factors), namely environmental conditions that create a sense of security, comfort, and fun.
- In order to control the will, thoughts, and feelings to achieve effective and easy concentration, someone must be able to enjoy something that is currently being done.

### 2.3.3. The Focusing Aspect of Attention or Concentration

Some aspects to focus one's attention and concentration are as follows:

- Focusing or attention control;** Attention or concentration will be maintained if someone gets older, but to increase the focusing of attention in children, it can also be influenced by the interests of that child.
- Adjustment;** Must be carried out a filtering of relevant information. Older children can be more flexible to modify their attention.
- Planned;** The strategy can create a planned program so that it can direct attention in a planned manner and can develop the efficiency of selecting inappropriate information. Young children are more unstructured and unplanned than older children. Meanwhile, children often make assessments with information that is not comprehensive and not appropriate.
- Adaptation of attention with increasing age;** At the increasing age of the child, the child can be more able to use a complete information processing system, so that children can complete their focus of attention with complete information and available information, children become more flexible and able to adapt and focus their attention.

Afterwards [41], [42] explain about several ways that can be used by coach to increase the concentration of their athletes, are as follows:

- (a) Inform the child how long the duration of time given to complete the task that the child is working on.
- (b) Reduce distractions when the child is practicing.
- (c) Through focusing of mind using hypnotherapy.
- (d) Immediately provide feedback to the child so that the child feels motivated, and redirects focus on the task that is being worked on.
- (e) Plan and assign tasks to children with smaller tasks rather than giving one long session.
- (f) Set goals and give rewards by giving gifts therefore the child feels motivated again to do and complete the task.

### 3. Materials and Methods

#### 3.1. Research Design

The method used by the researcher was quantitative, with an experimental design, namely to determine the effect of the MCCT program on increasing concentration ability in beginner tennis players. Research data collection was carried out twice, namely before and after the experiment through one-group pretest-posttest design adapted from [43]. The sampling technique used was non-probability sampling using a purposive sampling approach, which is a sampling technique for certain purposes only. Then the selected samples were beginner tennis athletes with the athlete sample criteria learning to train stage [44] namely athletes with an age range of 11-16. The basis of the researcher ' consideration in determining here was also based on one of the most important periods starting the development of specific skills in sports [45]. So, the number of samples taken in this study was 37 people, consisted of 20 males (12-16 years) and 17 females (11-15 years).

#### 3.2. Procedures

In the first stage before the test was carried out, the

researcher group the participants, the aim was to facilitate and speed up the preliminary test process. Participants were required to learn the MCCT program accompanied by a coach and their assistant. Participants were divided into 6 groups, so on average each group consisted of 6-7 people accompanied by 1 tester. The process of identifying the participants' initial concentration ability was carried out using the Concentration Grid Test, given the opportunity to do 2 times. After getting the initial data, the researcher explained the steps of the MCCT Exercise program to be implemented at the next meeting. The treatment was carried out for 2 months with a frequency of 3 meetings a week, to be exact on Tuesday, Thursday and Saturday. The researcher made a special note in the form of a journal for each participant, this was done with the aim of facilitating observations during the research process, therefore it could be seen how far each individual's ability has developed. So that in the future it becomes a special note for coaches, data recordings of participants' abilities can be archived.

From a total of 22 practice meetings, the researcher designed the program by developing several other aspects of exercise needed for beginner tennis players, so that not only aspects of coordination and concentration were trained. The researcher provided several exercises for other components such as flexibility, strength, speed, and endurance exercises, balance as a basic foundation for them, which were expected to develop as a whole without a lack of physical condition component needs for those tennis athletes. Athletes train slowly, systematically, accurately, calmly using shadow training by using some of the tools provided. Because when practicing concentration, athletes must be calm, focusing on dealing with disturbances both inside and outside themselves.

#### 3.3. MCCT Training Program

In the MCCT training program below, it explained several stages of core activities that are carried out by participants. The core material of MCCT can be seen in Table 3 below.

**Table 3.** MCCT Training Program

Indicator	Activity Level	Activity description
MCCT 1	Level 1 Participants listen to instructions if the researchers instruct to go forward then the students step back, and if the researchers instruct them to step back, the students go forward.	In the MCCT 1 exercise needs the following tools: Small balls with different colors Four square boxes that can be made using chalk or the like. Students facing back to the box Then the researchers mention the number and the students jump into the box according to the instructions from the researchers, if 3 then the students jump into the box number 3
	Level 2 Participants listen to instructions if the researchers instruct right, the students jump to the left, and if the researchers instruct left, the students jump to the right.	Students facing back to the box Then the researchers mention the number and the students jump into the box according to the researchers' instructions, if the number is odd then the students jump by landing their right foot and if an even number land with their left foot Example: if the researchers mention number 4, then the students jump into the box number 4 and land using their left foot.
	Level 3 The researchers prepared 2 balls of different colors: red and blue. If the researchers instruct right, the students throw a blue ball and jump to the left. Meanwhile, if the researchers instruct left, the participants throw a red ball and then jump to the right.	Students prepared to stand in front of the box Researchers prepared 2 small balls with different colors, for example blue and red If the researchers throw a blue ball, the students catch the ball using their right hand, and if the researchers throw a red ball, the students catch the ball using their left hand. For example: if the researchers mention the number 4 and throw a blue ball, then the students catch the ball with their right hand and jump to box no 4
MCCT 2	Level 1 Participants hold the ball and then throw it up and are given instructions to walk straight without dropping the ball.	In the second exercise of MCCT the tools needed are as follows: 10 cones with different colours Students get ready in a circle The researchers instruct to use numbers 1-10, then students run to the funnel, if odd numbers are blue, and even numbers are red.
	Level 2 The researchers prepared the cones, then the students held the ball and then threw it up and were given instructions to walk zigzag through the cones without dropping the ball.	Students get ready in a circle The researchers instruct to use numbers 1-10, then students run to the funnel, if odd: blue, and if even: red If numbers 1-5 go to the front funnel, numbers 6-10 go to the back funnel
	Level 3 Participants walk freely while throwing the ball upwards, then the researchers instruct if the researchers mention land animals, then the students stop and if the researchers mention water animals, then the students walk back.	Students get ready in a circle The researchers instruct numbers 1-10 and used the names of land and water animals, then students run towards cones, if land animals: red and water animals: blue If 1-5 go to the front funnel, if 6-10 go to the rear funnel
MCCT 3	Level 1 The researchers and the participants faced each other, the researchers held two balls in both hands then the researchers instructed if the ball was dropped from the right hand, the students caught the ball from the opposite hand and vice versa.	In the third exercise of MCCT the tools used are as follows: 10-15 cones with different colours 5 balls with different colours Students get ready at the starting line The researchers instructed to use numbers from 1-10, then the students jumped into the funnel. If the number is odd: blue if the number is even: red
	Level 2 It was the same with level 1 but at level 2 if the researchers dropped the ball from the right hand, the students picked it up using the right hand, and vice versa.	Students get ready at the starting line by holding the ball The researchers instruct to use numbers 1-10, then the students jumped into the funnel and threw the ball then caught it according to the instructions If the number is odd: jumped to the blue cone and caught the ball with the right hand and if the number is even: jumped to the red cone and caught the ball with the left hand
	Level 3 Same with level 2 but at level 3 there were 2 additional cones behind students with different colors. After the students caught the ball, then the students ran to the cone according to the researchers' instructions, if it is red then the students ran to the red cone.	Students get ready at the starting line by holding the ball The researchers instruct to use numbers from 1-10, and used the names of land and water animals, then students jumped to the funnel and threw and caught the ball according to the instructions. If the number is odd: jumped to the blue and caught the ball with the right hand and if the number is even: jumped to the red cone and caught the ball with the left hand If a land animal: landed on the right foot If the water animal: landed using the left foot.

The stages of MCCT exercise in the field are presented through preliminary activities that contain warm-up and stretching activities. The warm-up activities carried out by the participants were in the form of jogging around the field and using game activities that could approach the core material of the exercise. Stretching was done in pairs, to make it easier for participants to stretch between each other. The core activities of the MCCT Exercise program consist of MCCT 1-MCCT 3. Each MCCT program has a different level of practice, tailored to the ability level of the participants. The more proficient in doing the movement at level 1, it will move to the next level. To make it easier for the researcher to observe and stimulate athletes to continue to improve their abilities, the researcher continues to group participants as they were formed at the initial test stage consisting of 6-7 people in each group. Each group contains athletes with varying levels of tennis ability, coordination and concentration from high to low. This was intended so that participants who already have high abilities can provide role models, become tutors for participants who still have medium and low abilities. So this can foster a very large motivation within the circle of the group. The final activity contains evaluation activities from a series of training activities for each session. At the end of the training session, it is always complemented by muscle strengthening activities in both the upper and lower bodies. This is done as an effort to increase the initial foundation for athletes to be able to continue to adapt to the training program in the future.

### 3.4. Research Instrument

Research data obtained in the form of concentration test results using the Concentration Grid Test are adapted from Harris and Bette L. Harris p. 189 [46]. In carrying out this test needed 100 boxes contained numbers from 1 to 100 were randomly arranged. Before carrying out the test, the condition of the sample was in the same condition including that each sample was recommended to rest enough, before doing the test the sample had had breakfast. In carrying out this test, the sample sat in a place that has been provided with a distance of 2 meters from each sample. Previously, the testee had to fill in the biodata provided in the form. Each Testee sorted the numbers from the smallest value to the largest value by connecting the numbers with horizontal or vertical lines. The duration of time given to fill in the data was one minute. The scoring was taken from the correctly connected numbers, which are achieved by the sample. The answers will be accumulated for each correct number of solutions in a row until the time limit runs out for 60 seconds. The frequency of correct

answers is from a score of 5 and below; it is stated that you have very poor concentration, but if the correct answers are from 21 and above, you are declared to have an excellent attention. Therefore, to facilitate the researcher, the test assessment criteria can be seen in Table 4 below:

**Table 4.** Norms of Concentration Test Assessment

No	Criteria	Description
1	21 and above	Excellent concentration
2	16 – 20	Good concentration
3	11 – 15	Average concentration
4	6 – 10	Fair concentration
5	5 and under	Poor concentration

Testing the validity of the concentration test, obtained  $r_{\text{count}}$  0,96 while in  $r_{\text{tabel}}$  product moment was known that  $n = 35$  respondents with the value of significance level 0,05 was 0,334, then it can be stated the average value of  $r_{\text{count}}$  was bigger than  $r_{\text{tabel}}$ . Reliable or not an instrument can also be seen using *Cronbach's Alpha* where from the calculation results obtained a value of 0,960 is in the range 0,800-1,00 which means that the reliability is very high. This shows that the research instrument used can be declared valid and reliable.

#### 3.4.1. Normality Test Data

After the data was obtained, the first step for data analysis was to use a statistical approach with a data normality test. The data for the normality test taken by the researchers was Shapiro Wilk with the help of the SPSS series 20 application program. Shapiro Wilk is an effective and valid normality test method used for small samples. The data for the normality test can be seen in Table 5.

**Table 5.** Normality Test

		Shapiro wilk		
		Statistic	df	Sig.
Concentration Test	Pre-test	0,228	37	0,137
	Post-test	0,361	37	0,160

Based on the results of the Shapiro Wilk test in table 5 above, the value of *Asymp.Sig (2-Tailed)* from the concentration test was 0,137 for the pre-test and 0,160 for the post-test. The normal data requirement was the *Asymp.Sig* value  $> 0,05$ , so that when viewed from the normality test data above, the results of the concentration test on beginner tennis athletes were normally distributed. Therefore, the next statistical test step was a parametric test.

## 4. Result

### 4.1. Data Descriptions

After the researchers got the test results data using the Concentration Grid Test, the next step was to process and analyze the data, to see how far the changes occurred significantly between the pre-test and post-test data. So that the resulting data can provide factual answers, in testing research hypothesis. The average value and standard deviation of the concentration test results were processed using the SPSS series 20 application. The data can be seen in Table 6.

Based on the data in table 6, obtained the pre-test value in the sample group of 37 athletes, namely, the average value of the concentration test results was 32.6024 and the standard deviation value was 0.20670. For post-test data, the average value of the concentration test results was 43.0213 and the standard deviation value was 1.2205.

### 4.2. Results of Hypothesis Testing using T-test

After the requirement was fulfilled by conducting a normality test, the researchers can process the data with the Paired Sample T-test. This test was a parametric statistical analysis that can be used on two paired data. The purpose of this test was to see if there was an average difference between the pre-test and post-test data. Paired T-test test data can be seen in Table 7 below.

Based on the data in table 7, it can be seen that the results of the calculation of the average difference between the pre-test and post-test data for the concentration test on beginner tennis athletes obtained a P-value score from the paired sample t-test test of 0,001 which means less of 0.05, it means that  $H_0$  was rejected. Accordingly, the presence of these data proves that there was a difference between the average value in the pre-test and post-test results. Hence, it can be concluded that the Motor Cognitive Coordination Training (MCCT) program can improve concentration skills in beginner tennis players.

## 5. Discussion

The results of this research are expected to be a reference for trainers to pay more attention to the role of cognitive skills. Because cognitive skills give a huge impact on the athlete's training process [47]. [48] explain that, athletes not only remember every movement but, through cognitive processes, athletes regulate the emotional stimulation they receive and choose the right strategy to carry out their movement tasks effectively. The effectiveness of the movement will increase the efficiency of time in competition. They will be able to concentrate longer and be able to repeat any given material, because of the process of habituation to practice and good working memory of the brain [49], [50].

**Table 6.** Data Description

Group	Pre-test		Post-test	
	Statistic	Std. Error	Statistic	Std. Error
Mean	32.6024	.20301	43.0213	.11624
Concentration Grid Test	95% Confidence Interval for Mean	Lower Bound	31.1126	38.0147
		Upper Bound	35.3601	44.0172
Std. Deviation	.20670		1.2205	

**Table 7.** Uji Paired Sample T-test

	Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
					Pair 1	Pre-test Post-test			

A person is said to have good coordination if he is able to move easily and his movements are well controlled. The ability to move well in one's environment depends on the combination of sensory and motor aspects of the nervous system efficiently [51], [52]. A person's coordination ability not only has an impact on his performance, but the ability of coordination can be used as an assessment to see the condition of mental health and cognitive function [53]. Coordination has an important role in a developmental process for children, especially in terms of supporting daily physical activities, where children who have good coordination skills are able to perform better movement skills, compared to children who have poor coordination skills [54], [55]. In sports, the ability of coordination is needed by an athlete, in order to be able to control body parts well [56]. In the game of tennis, a player is said to have good coordination if he can move towards the ball while swinging the racket and then hit it with the correct technique. Tennis is a game played on a relatively wide field using a racket and the direction of the ball is always changing. In the face of a ball that always changes direction, good footwork is needed so that the results of the hit can be perfect. For this reason, in tennis, eye-hand coordination and eye-foot coordination are needed, because the players always see the movement of the ball changing direction. The inception of the Motor Cognitive Coordination Training (MCCT) program provides a great opportunity for athletes to learn comprehensively in one training session. So that they can easily learn some movement coordination exercises that can lead directly to an increase in their cognitive capacity. The training foundation added to the cognitive domain has a significant impact on the development of children's cognitive functions so that it can significantly improve decision-making abilities in implementing tactics during competition [57], [58]. When the MCCT program is applied to several sports that require a high coordination capacity, it will help to improve the athlete's performance. Thus, it can be concluded that the MCCT training program which has the characteristics of cognitive tasks can improve the athlete's concentration ability, where concentration has a very important role in decision making. This is homework for every coach, sports actor, and policy stakeholder to adopt research results to be used as a reference source in fostering athlete achievement.

## 6. Conclusions

This research gives an illustration that the implementation of the Motor Cognitive Coordination Training (MCCT) program has proven to be effective in helping to increase the concentration of beginner tennis athletes. Therefore, this program needs to be developed further, so that it can be useful for the development of game sports athletes, who are always required to have good coordination and cognitive abilities.

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